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ADDENDUM 1

TO

HF-8094 RECEIVER CONTROL INSTRUCTION BOOK

(523-0770751-00121A)

Attached is a schematic diagram of Power Supply, part number 635-9649-001. Insert this schematic diagram as the last page of Power Supply (635-9649-001) Instructions, part number 523-0767948-202211.

Make the following additional corrections:

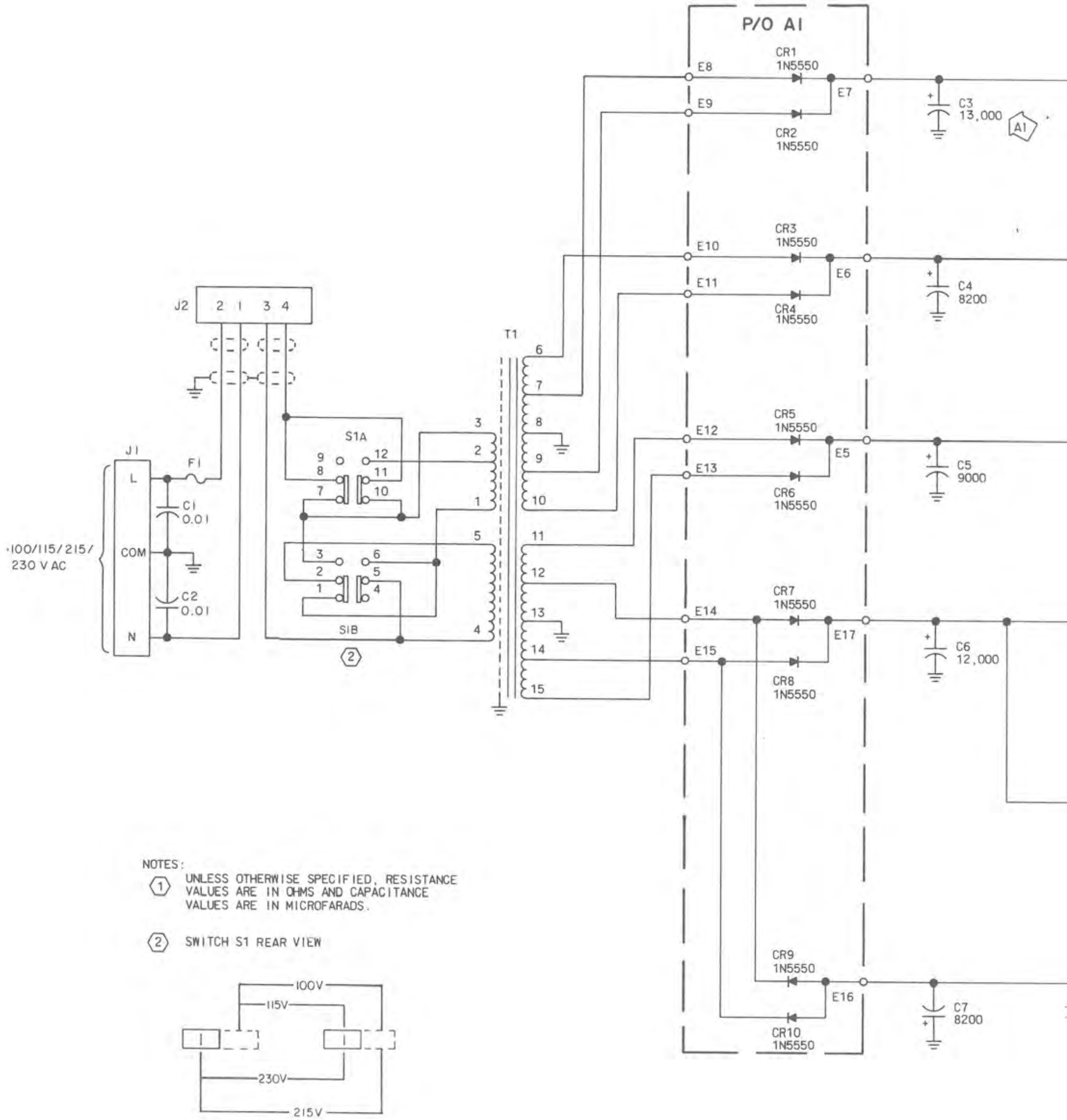
1. Description section, part number 523-0770962.
   Table 1, page 3. In the maintenance kit, change the part number for the 2-A fuse to 264-0305-000 and for the 1-A fuse to 264-4280-000.

2. Installation section, part number 523-0770963.
   Table 2, page 4. Under major head *S2 SWITCH, change subordinate heads for the first column from 6 to 8 and for the third column from 8 to 6.

3. Operation section, part number 523-0770964.
   a. Paragraph 3.2.5, page 13. If NET DATA operation is used, perform the procedure described in the HF-8054( ) Receiver instruction book rather than the procedure in this paragraph.
   b. Word 1 character sequence chart, figure 4, page 17. Opposite A2, ADDRESS L.S.D. (BCD) and under subordinate head WT1 of major head FUNCTIONAL BIT CODING, change A1 (1) to A2 (1).
   c. Nonfunctional character #3 chart, page 23. Change the bits as shown.

NONFUNCTIONAL CHARACTER #3						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
1	0	1	1	0	0	0

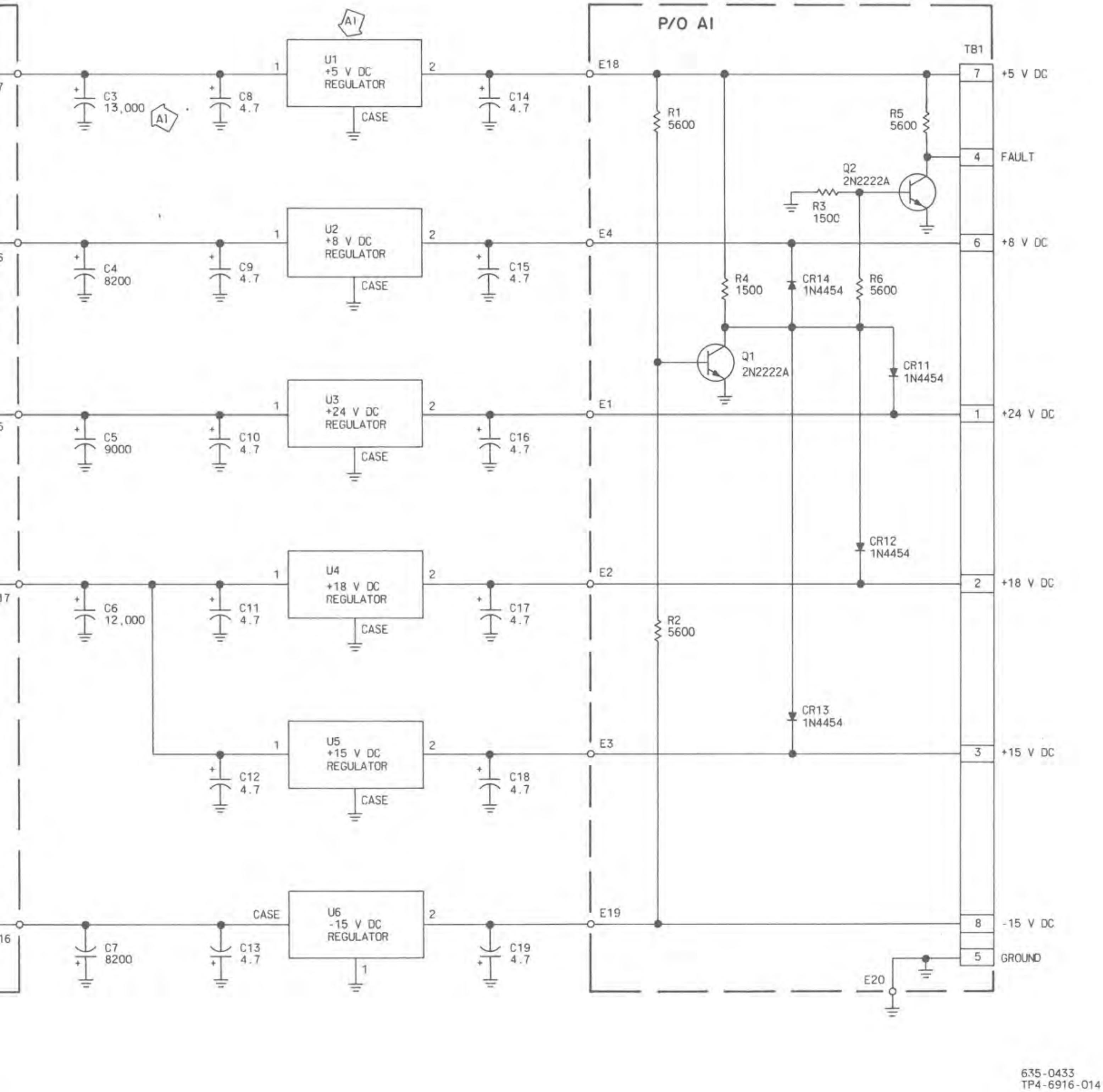
4. Theory section, part number 523-0770965.
   Figure 10, page 19/20. In the LED Status Display, correct the light-emitting diode by connecting the anode to +5 V dc rather than ground as shown.



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.

2. SWITCH S1 REAR VIEW



Power Supply, Schematic Diagram
Figure 7 (Sheet 3)

523-077051-00121A

Rockwell International

Collins instruction book

HF-8094 Receiver Control

This instruction book includes:

Collins Telecommunications Products Division
Electronic Systems Group
Rockwell International
Cedar Rapids, Iowa 52406

Printed in the United States of America

Caution

The material in this manual is subject to change. Before attempting any maintenance operation on the equipment covered in this manual, verify that you have a complete and up-to-date publication applicable to your equipment.

Please be advised that completion of the enclosed Automatic Distribution Service Card and return to Rockwell International ensures you of manual revisions and service bulletin modifications to your equipment. Without the return of this card, Rockwell International bears no responsibility to forward this information to you.

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ATTN: Quality Control-Support Engineering 179-200

DESIGN FEATURES

- Simplicity of operation
- Manual or processor control
- Ease of maintainability
- Compatible with entire HF-80 family
- Multiple receiver control

Complete operating control of up to 16 remote receivers is available through the HF-8094 Receiver Control. Voice grade communication lines can be used for frequency, vbfo, mode, bandwidth, AGC, and rf gain control command signals. Monitor signals from the remote receiver contain frequency, vbfo, equipment status, mode, and bandwidth information to be displayed on the HF-8094 Receiver Control.

For remote control of a single remote unit, FSK signaling is provided. For applications requiring control of multiple remote units, internally selectable RS-232C or MIL-STD-188C logic level signaling is available for either direct connection to the remote units or connection via external modems. The HF-8094 Receiver Control may also be used as an I/O device with a processor when RS-232C or MIL-STD-188C logic levels are used.

TPA - 2874 - 017

HF-8094 Receiver Control
Figure 1

SERVICE BULLETINS/SERVICE INFORMATION LETTERS

The following listed service bulletins (SB) and service information letters (SIL) are those that are applicable to the HF-8094 Receiver Control and are included in the text of this instruction book. Other applicable SB/SIL released before the instruction book was shipped are included in the front of the instruction book.

Note

Service bulletins/service information letters are written in numerical sequence against the whole HF-80 family; therefore, all SB/SIL numbers are not included in the listing. Service bulletins are numbered in sequence for the life of the equipment. Service information letters are numbered in sequence starting at 1 for each calendar year.

SB/SIL	DESCRIPTION	ISSUE DATE

description

1. GENERAL

The HF-8094 Receiver Control provides remote control for the HF-8054A Receiver. In addition to controlling the receiver functions, the receiver control accepts monitor information from the remote receiver that continually indicates the status of the unit under control. In a multiple receiver installation, the individual receiver being monitored/controlled is selected by the front-panel ADDRESS switch.

Receive line audio signals are available as well as a headphone jack and a built-in speaker for monitoring received signals.

Remote control of the associated HF-8054A Receiver is accomplished by using FSK, RS-232C or MIL-STD-188C data signals. The signaling method is selected by changing switch settings on serial interface card A13. As many as 16 receivers can be controlled when using the HF-8094 Receiver Control. For this type of operation, multiple receiver control from one unit, RS-232C or MIL-STD-188C data signaling must be used.

The receiver control can be mounted in a standard 483-mm (19-in) rack using an optional slide-mounting kit. It can also be mounted in a desk-top enclosure or in a console style equipment cabinet. The receiver control can be operated from a 100-, 115-, 215-, or 230-V ac, 47- to 420-Hz power source.

2. EQUIPMENT SUPPLIED/CONFIGURATION

Equipment supplied in the HF-8094 Receiver Control (622-3477-001, -002) and its configuration is listed in table 1.

3. ASSOCIATED EQUIPMENT

The only associated equipment required for operation of the receiver control but not supplied is a standard 600-ohm headphone for monitoring the receiver control audio.

4. ACCESSORIES

For detailed information (including manufacturer's part number and physical description) pertaining to equipment mounting racks and preassembled interconnecting cables, refer to the following system instruction books:

TITLE	PART NUMBER
HF-80 1-kW Transmitter/ Transceiver Systems	523-0767370
HF-80 3-kW Transmitter/ Transceiver Systems	523-0767386
HF-80 10-kW Transmitter/ Transceiver Systems	523-0767402

5. OPTIONS

Options available for the receiver control are listed in table 2.

6. EQUIPMENT SPECIFICATIONS

Specifications for the HF-8094 Receiver Control are listed in table 3.

Table 1. Equipment Supplied/Configuration.

SUBASSEMBLY/CIRCUIT CARD		HF-8094 RECEIVER CONTROL 622-3477-( )		DESCRIPTION/FUNCTION
TITLE	PART NUMBER	-001	-002	
Main chassis	635-9652-001	X	X	
Bottom cover	635-9658-001	X	X	
Top cover	635-9690-003	X	X	
Rear panel	635-9626-005	X	X	
Sideboard assembly	646-6823-001	X		Includes dvbfo cabling.
	646-6823-002		X	
Control sideboard	642-3594-001	X	X	
Cable, special purpose	635-9610-002	X	X	Interconnects J12 and P3 (A2J2, P/O switch mounting board).
Cable, frequency switchboard	635-9635-001	X	X	Interconnects J13 and P2 (A2J4, frequency switchboard).
Cable, special purpose	635-9636-001	X	X	Interconnects J18 and P11 (A2J9, address switchboard).
Cable, status display	635-9639-001	X	X	Interconnects J19 and P5 (A2J3, LED status display).
Cable, dvbfo switchboard	637-1761-001	X		Interconnects J17 and P9 (A2J6, dvbfo switchboard).
Cable, vbfo display	637-3797-002	X		Interconnects J20 and P12 (A2J8, vbfo P/O frequency display).
Cable, special purpose	646-6893-001	X	X	Interconnects J21 and P4 (A2J1, P/O switch mounting board).
Cable, frequency display	637-1759-001	X	X	Interconnects P1 and P8 (A2J5, P/O frequency display).
A1/B1 cable assembly	646-6890-002	X	X	Interconnects TB1.
A2/B2 cable assembly	646-6891-001	X	X	Interconnects TB2.
Speaker cable assembly	637-9126-001	X	X	Interconnects TB3.
Power supply A1	635-9649-001	X	X	Input can be switched for 100, 115, 215, or 230 V ac (47 - 420 Hz).
Front panel assembly A2	646-6815-001	X		Vbfo, AFC, 10-Hz tuning
	646-6815-002		X	100-Hz tuning
LED status display A2A1	635-0825-013	X	X	
Switch mounting board A2A2	638-6873-002	X	X	

Table 1. Equipment Supplied/Configuration (Cont).

SUBASSEMBLY/CIRCUIT CARD		HF-8094 RECEIVER CONTROL 622-3477-( )		DESCRIPTION/FUNCTION
TITLE	PART NUMBER	-001	-002	
Frequency switchboard A2A3	635-0830-001		X	100-Hz tuning
	635-0830-002	X		10-Hz tuning
Dvbfo switchboard A2A4	638-6437-001	X		
Frequency display A2A5	637-1781-008	X		10-Hz display with vbfo
	637-1781-006		X	100-Hz display
Address selector switchboard A2A6	635-0899-001	X	X	
Control receive audio A4	642-3572-001	X		Channel A2-B2 receive audio
Control receive audio A6	642-3572-001	X	X	Channel A1-B1 receive audio
Parallel input A11	642-3135-001	X	X	
Parallel output A12	642-3137-001	X	X	
Serial interface A13	638-6896-001	X	X	Can be switched for 7-bit ASCII or 8-bit character data format. Can be switched for various serial controls: FSK, EIA RS-232C (CCITT V.24), or MIL-STD-188C. Can be switched for various baud rates: 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, or 19 200 bauds.
Power cable	426-1034-010	X	X	
Maintenance kit	637-1769-001	X	X	2-A fuse installed for 100- or 115-V ac operation. 1-A fuse installed for 215- or 230-V ac operation.
Hexwrench, 0.062 in (1)	024-0058-000			
Hexwrench, 0.050 in (1)	024-0057-000			
2-A fuse (5)	264-0723-000			
1-A fuse (5)	264-0721-000			
Lamps (2)	262-1106-000			
Instruction sheet	637-1777-001			

Table 2. Options.

OPTION	PART NUMBER	FUNCTION
AC-8017A 100- to 10-Hz Tuning Conversion Kit	622-3453-002	10-Hz tuning increment capability. Implemented by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002 and changing the front panel frequency display from 637-1781-006 to 637-1782-002.

Table 3. Equipment Specifications.

CHARACTERISTIC	SPECIFICATION
Electrical	
Selectable modes of operation	AM, CW, ISB, and NET DATA
Selectable filters	16 kHz, FLA, FLB, FLC, FLD and FLE
Selectable frequency range	0.0 to 29.9999 MHz
Tuning increments	100 Hz, optional 10 Hz
Digital vbfo tuning range	±9.99 kHz in 10-Hz steps
Audio outputs	Line: 600 Ω ±10%, balanced; 0 dB mW, nom; adjustable from -20 to +10 dB mW; total harmonic distortion, 1% max for 1-kHz tone at +10 dB mw
	Headphone: 600 Ω nom, +10 dB mW min; total harmonic distortion, 3% max for 1-kHz tone at +10 dB mW
	Speaker: 8 Ω nom, 2 W min; total harmonic distortion, 5% max for 1-kHz tone at 2 W
Audio hum and noise	-40 dB on-line audio output
Squelch	Operates on audio snr; applicable to speaker output only
Duty cycle	Continuous
Power requirements	100/115/215/230 V ±10%, 47 - 420 Hz, single-phase ac, 80 W max
Serial control and monitor interface characteristics	
Output data levels	FSK: -5 to +5 dB mW into 600 Ω
	RS-232C/MIL-STD-188C: ±6 ±1 V dc
Input data levels	FSK: -30 to +10 dB mV (20 dB snr, min)
	RS-232C/MIL-STD-188C: ±6 ±1 V dc

Table 3. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Line output impedance	FSK: 600 Ω nom
	RS-232C/MIL-STD-188C: 300 Ω max when transmitting, 100 kΩ min when not transmitting
Line input impedance	FSK: 600 Ω nom
	RS-232C/MIL-STD-188C: not less than 40 kΩ
FSK tone frequencies	Mark: 1260 Hz
	Spare: 2133 Hz
Data rates	FSK: 75, 109, 150, 300, 600 bauds
	RS-232C/MIL-STD-188C: 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, 19 200 bauds
Data format	Selectable 7-bit ASCII code or 8-bit character code
Line characteristics	FSK: 600 Ω balanced
	RS-232C/MIL-STD-188C: Unbalanced, line to ground
Environmental	
Temperature	Full performance: 0 to +50 °C (+32 to +122 °F)
	Reduced performance: -20 to +50 °C (-4 to +122 °F)
	Nonoperating: -57 to +71 °C (-71 to +160 °F)
Humidity	0 to 90% relative humidity
Altitude	Operating: 0 to 3048 m (10 000 ft) 0 to 50 °C (+32 to +122 °F) 0 to 4572 m (15 000 ft) 0 to 25 °C (+32 to +77 °F)
	Nonoperating: 0 to 12 192 m (40 000 ft)
Shock	Bench handling (MIL-STD-810C, procedure V, method 516.2)
Vibration	1.5 g, 5.5 to 55 Hz (MIL-STD-810C, procedure X, method 514.2)
Physical	
Size	177 mm (7 in) high x 483 mm (19 in) wide x 523.8 mm (20.62 in) deep with handles
Weight	13.6 kg (30 lb) max
Mounting	Desk-top cabinet or standard 483-mm (19-in) rack with optional slide mounting kit for rack

INSTALLATION

Rockwell International

HF-8094 Receiver Control

installation

Collins Telecommunications Products Division

Printed in USA

523-0770963-001218
1 January 1981

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*The asterisk indicates pages changed, added, or deleted by the current change.

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10 Blank	1 Jan 81
11	1 Jan 81
12 Blank	1 Jan 81

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REV NO	REVISION DATE	INSERTION DATE	INITIALS	REV NO	REVISION DATE	INSERTION DATE	INITIALS
1st Ed	1 Jan 81						

1. GENERAL

The HF-8094 Receiver Control is ready, as shipped, for mounting in a 178-mm- (7-in) high space in a standard 483-mm (19-in) equipment rack. This section contains information for installing the receiver control in a rack and making the unit operational.

The receiver control may be housed in an accessory desk-top cabinet (CA-8010). When this cabinet is used, the receiver control is installed in it by sliding the unit into the cabinet from the front and securing the unit to the cabinet front mounting rails in the same manner as in an equipment rack.

All interconnecting cables are attached to the receiver control at the rear panel. The headphone jack is located on the front panel for operator convenience.

The receiver control operates with natural convective cooling in single-unit installations. In multiple-unit installations or where other heat-producing equipment is installed in the same cabinet, it is desirable to install a cabinet blower to remove hot air and prevent excessive temperature buildup.

Note

For detailed information (including manufacturer's part number and physical description) pertaining to accessories, refer to the following system instruction books:

TITLE	PART NUMBER
HF-80 1-kW Transmitter/Transceiver Systems	523-0767370
HF-80 3-kW Transmitter/Transceiver Systems	523-0767386
HF-80 10-kW Transmitter/Transceiver Systems	523-0767402

2. UNPACKING AND INSPECTING

Unpack the receiver control carefully and check each item received against the shipping invoice. Inspect the items for evidence of damage during shipment. All claims for damage in shipment should be filed promptly with the transportation company involved. If claims for damage are filed, save the original packing cases and material.

3. PREINSTALLATION CHECK AND REQUIREMENTS

3.1 Strapping

3.1.1 Input Power

Caution

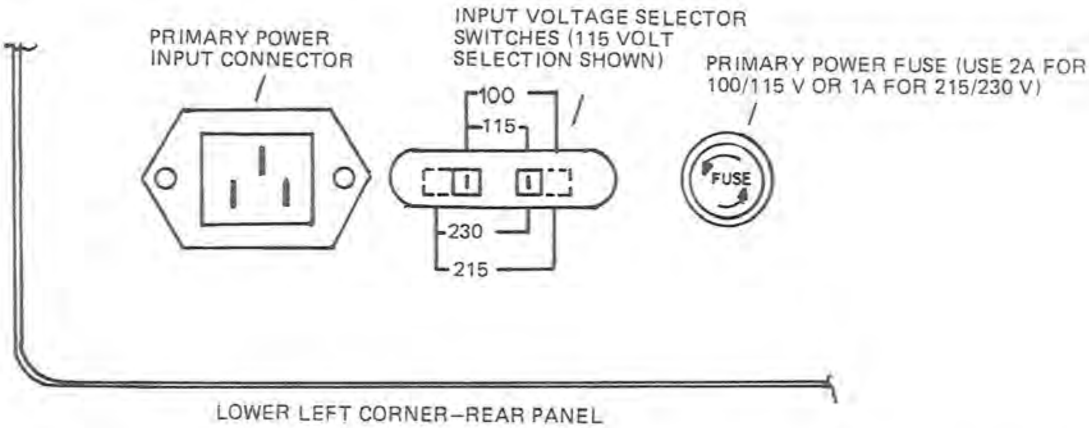
Do not operate the primary input voltage selector switches with power applied. Be sure switches are in proper position with proper fuse installed before applying power.

Do not remove or install plug-in cards or modules with power on. Damage to cards or modules may result.

Connect the ground terminal located on the rear panel to a ground strap that is securely connected to earth ground. (Ground strap should be #14 AWG or larger.)

Switches are provided for strapping the unit for desired primary input power. The unit may be operated from 100, 115, 215, or 230 volts ac, nominal input. In the lower left corner of the rear panel, set the primary input voltage selector switches to the position corresponding to the nearest value of primary input voltage. Figure 1 shows the switches set to the 115-volt position.

For the 100/115-volt position, install a 2-ampere fuse. For the 215/230-volt position, install a 1-ampere fuse. (An initial supply of fuses is included in the maintenance kit supplied with the receiver control.)



Primary Input Voltage Selector Switches
Figure 1

3.1.2 Remote Control

Both the receiver control and associated remote units or processor must operate at the same baud rate and the same signaling format. This is accomplished by the proper strapping of the serial interface, parallel output, and parallel input cards using the dipswitches and straps provided.

Figure 2 is a partial view of serial interface A13 with the dipswitches keyed out. These switches control baud rate, FSK/RS-232 signaling, word format, EIA/MIL-STD-188C polarity, parity, number of stop bits, exciter or receiver control and address recognition enable/disable as follows. (Note: Switch #1 of each dipswitch is towards the top of the card.)

a. Baud Rate

All eight of the switches in S1 and switches 1, 2, and 3 of S2 control the baud rate. Closing one and only one of these switches will select the baud rate as shown in table 1.

Table 1. Baud Rate Selection.

DISPSWITCH	SWITCH	BAUD RATE
S1	1	19 200
S1	2	9 600
S1	3	4 800
S1	4	2 400
S1	5	1 200
S1	6	600
S1	7	300
S1	8	150
S2	1	109
S2	2	75
S2	3	External

b. EIA/MIL-STD-188C Polarity

Open switch 4 of S2 for EIA data polarity and close switch 4 of S2 for MIL-STD-188C polarity.

c. Receiver Control

Serial interface card A13 is used in other units of the HF-80 4-channel family. Close switch 5 of S2 on serial interface A13 when it is being used in the HF-8094 Receiver Control.

d. 8-BIT/ASCII Word Format, Parity, and Number of Stop Bits

Switches 6, 7, and 8 of S2 control the basic character format according to table 2.

e. FSK/RS-232C Signaling

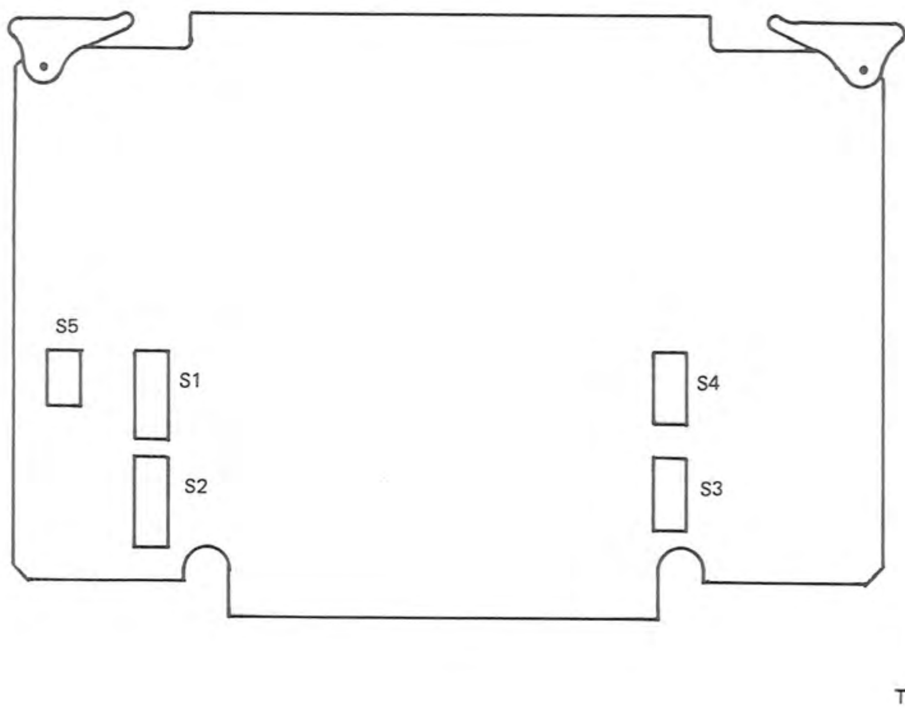
Dipswitches S3 and S4 control the type of signaling. Close only switches 1, 2, and 3 of S3 and S4 for FSK. (Note: For FSK signaling, EIA data polarity should be selected. See 3.1.2b.) For RS-232C signaling, close only switches 4, 5, and 6 of S3 and S4.

f. Address Recognition Enable/Disable

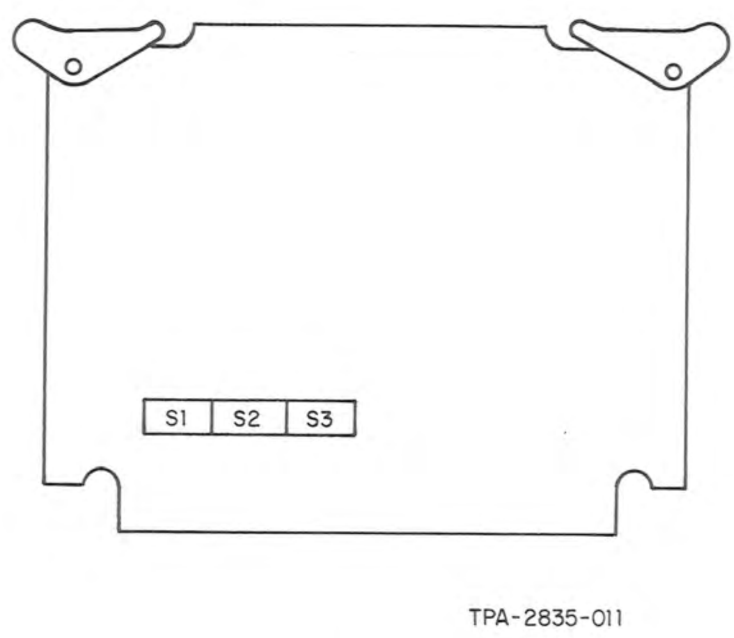
Open switch 1 of S5 to enable address recognition. Close switch 1 of S5 to disable address recognition. When address recognition is disabled, the receiver or receiver control will accept a word with any address if the word is otherwise correct.

g. Parallel Input Strapping (Refer to figure 3.)

Figure 3 is a partial view of parallel input A11 with dipswitch location shown. Close S1 switches 1



Serial Interface Dipswitch Locations
Figure 2



Parallel Input Dipswitch Locations
Figure 3

Table 2. Format Selection.

*S2 SWITCH 6	7	8	WORD FORMAT	PARITY	NUMBER OF STOP BITS
C	C	C	ASCII	Even	2
C	C	O	ASCII	Odd	2
C	O	C	ASCII	Even	1
C	O	O	ASCII	Odd	1
O	C	C	8-BIT	None	2
O	C	O	8-BIT	None	1
O	O	C	8-BIT	Even	1
O	O	O	8-BIT	Odd	1
*O = Open C = Closed					

thru 8 and S2 switch 1. All other switches are open (switch number 1 of each dipswitch is toward the left side of the card when viewing the card as shown in figure 3).

h. Parallel Output Strapping

Parallel output A12 must be strapped for proper operation at initial installation and/or following testing and troubleshooting. Strapping is accomplished using jumper clips over the square pins marked E1 through E6.

Place one jumper connector on each of the square pin pairs labeled E1 thru E4.

Pin pair E5 is strapped between the middle and top pins for a flashing fault indicator or strapped between the middle and bottom pins for a non-flashing fault indicator.

Pin pair E6 is strapped between the middle and left pins.

3.1.3 Address

The ADDRESS switch on the receiver control front panel develops a 4-bit binary output. Associated remote units must be strapped, at the interconnecting cable connector to J14, to correspond to the address bit pattern for the individual unit. Figure 4 shows the strapping for the connector pins associated with each address. Connect a short jumper wire between pins 9 through 12, as applicable, and ground (pin 22 and/or 24) on the wiring harness connector mating with J14 on the remote unit.

3.1.4 Polling Disable/Enable (Refer to figure 2.)

Note

Polling provides a continual update of all receivers connected to a single receiver control when used with a microprocessor-controlled peripheral display.

Open switch 2 of S5 to disable polling operation (normal receiver control operation). Close switch 2 of S5 to enable polling operation.

3.2 Operation

The receiver control operation was within the specified standards when the unit was shipped from the factory. The minimum performance test in the maintenance section should be performed to ensure that the equipment is still operating within specifications.

4. CABLING (Refer to figure 5.)

4.1 HF-8094 Receiver Control to HF-8054A Receiver

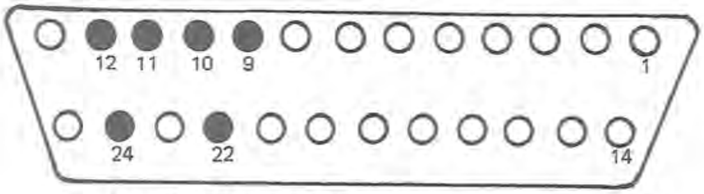
Maximum allowable separation between the receiver control and the receiver is dependent upon the characteristics of the transmission lines used, the method of signaling, and the transmission data rates selected. When using FSK signaling and #22 AWG shielded twisted-pair cable or field wire, maximum line length should be not more than 8 kilometres (5 miles). Transmission of the FSK data signals over private carrier leased lines, commercial telephone lines, microwave links, or satellite communications links permits unlimited separation between the receiver control and receiver. When using RS-232C or MIL-STD-188C signaling, maximum line length should be not more than 152 metres (500 feet).

Preassembled cables are available from Rockwell-Collins as part of kit number AC-8094 (part number 622-3504-XXX) for use in remote installations.

4.2 Remote Control to Multiple Receivers

Remote control of multiple receivers is accomplished by connecting in parallel all control data bus (J14-2 and J14-14) and monitor data bus (J14-3 and J14-16) of the receivers. Each receiver must be strapped for a unique address, as described in paragraph 3.1.3. The receivers also must be strapped for the same data rates, same parity, and same signal levels. (The signal level strapped must be either RS-232C or MIL-STD-188C; FSK cannot be used for multiple receiver systems.)

WIRING HARNESS CONNECTOR MATING
WITH J14 ON REAR PANEL OF REMOTE UNIT



VIEW FROM WIRING (REAR) SIDE

ADDRESS NUMBER	REMOTE UNIT STRAPPING REQD FOR ADDRESS RECOGNITION A4	A3	A2	A1
0	–	–	–	–
1	–	–	–	X
2	–	–	X	–
3	–	–	X	X
4	–	X	–	–
5	–	X	–	X
6	–	X	X	–
7	–	X	X	X
8	X	–	–	–
9	X	–	–	X
10	X	–	X	–
11	X	–	X	X
12	X	X	–	–
13	X	X	–	X
14	X	X	X	–
15	X	X	X	X
PIN	12	11	10	9

X INDICATES PIN STRAPPED TO GROUND (PIN 22 OR 24).
– INDICATES OPEN (NO STRAP REQUIRED).

TP5-2054-011

Strapping for Unit Address
Figure 4

4.3 Receiver Control to Primary Power Source

Separation between receiver control and primary power source (100, 115, 215, of 230 V ac) should be kept to a minimum. A preassembled power cable is supplied as a part of the HF-8094 Receiver Control.

4.4 Receiver Control to External Speaker

Separation between receiver control and external speaker should be kept to a minimum. However, field grade twisted-pair wire should be acceptable for most external speaker requirements. Terminal clips or wires can be attached to HF-8094 Receiver Control. Refer to applicable speaker for connection requirements. Jumper between TB3-1 and TB3-2 is removed for external speaker, and external speaker leads are connected to TB3-2 and TB3-3.

5. INSTALLATION PROCEDURES

5.1 General

Figure 6 shows the outline and mounting dimensions of the HF-8094 Receiver Control. The receiver control has standard 438-mm (19-in) rack-mounting characteristics and can be mounted using four mounting screws through the edges of the front panel; however, on all rack-mounting configurations, slide mounting is recommended for ease of service and side support. Slide mounting kit, CA-8030, is available by ordering part number 622-3418-001. When installation is complete, ensure all electrical connections are made (including strapping) and all dust covers and shields are in place.

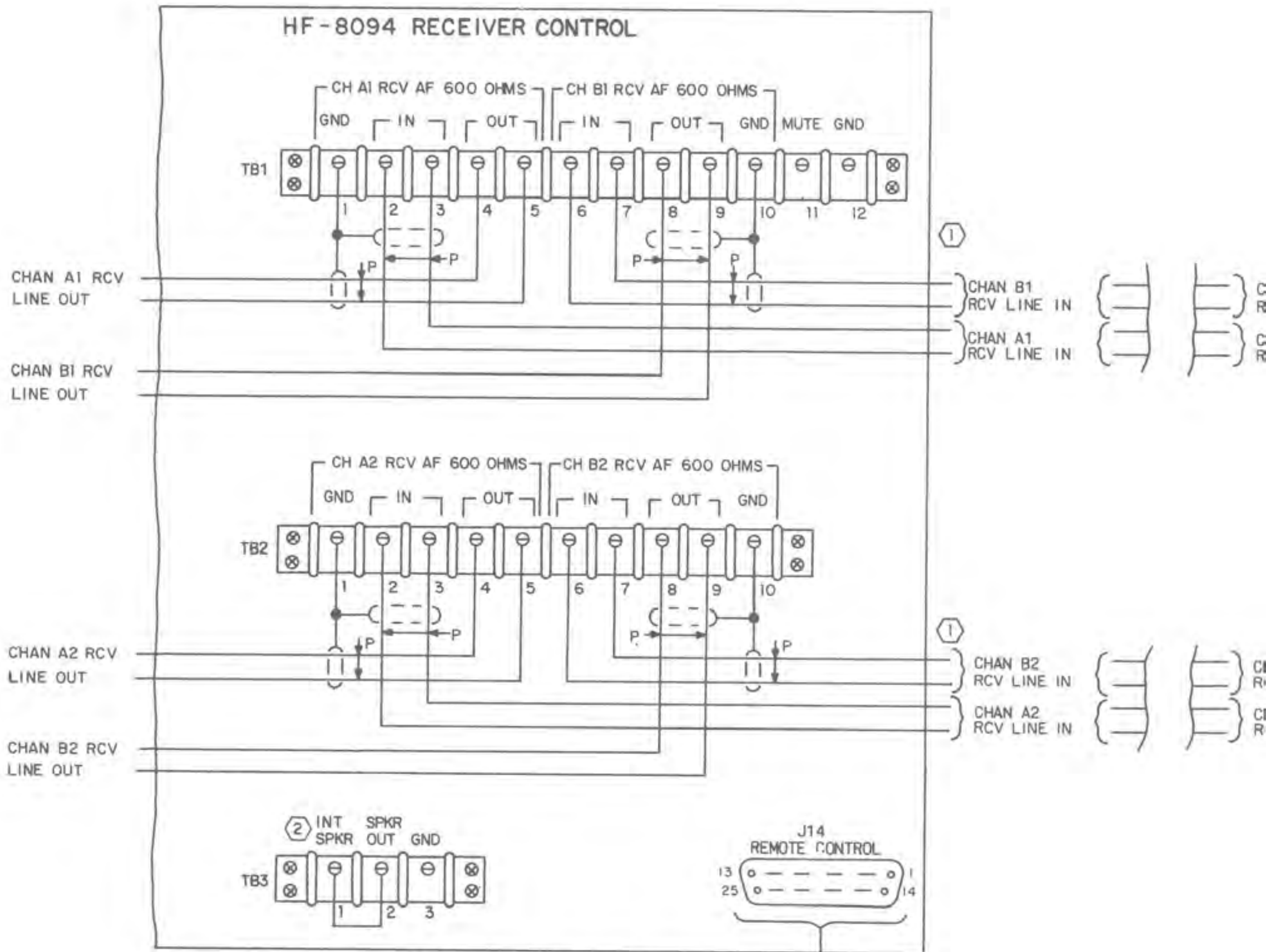
5.2 Installation of Slide Mounts

a. Refer to figures 6 and 7. Attach the CA-8030 Slide Mounting Kit (slide rails) to the proper location in the CA-8020( ) Equipment Cabinet and to the receiver control.
b. Lift the receiver control, position it squarely, and engage the slides of the mounting kit. Slide the receiver control completely into the cabinet to assure that the slides function properly.
c. Refer to cabling instructions of paragraph 4 and make the cable connections to the unit.

d. Connect a ground strap (#14 AWG or larger) from the GND terminal, located on the rear of the receiver control, to a suitable ground point in the equipment cabinet. Be sure that the cabinet ground point is free of paint or foreign material.
e. Slide the receiver control into place in the equipment cabinet and secure it with four screws on each side of the front panel.

6. POSTINSTALLATION CHECK/ REQUIREMENTS

There is no postinstallation check to be performed on the receiver control as a unit. The operation procedures presented in the operation section of this instruction book should be used as a postinstallation operational check.



REAR PANEL-RIGHT SIDE VIEW

NOTES:

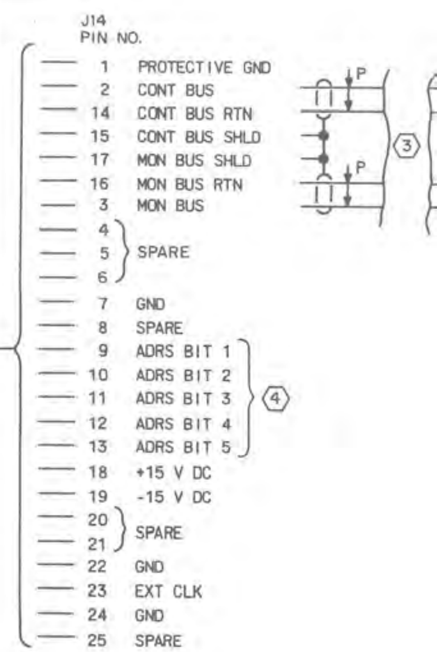
1. NO. 22 AWG TWISTED SHIELDED PAIR WIRE IS RECOMMENDED FOR THESE CIRCUITS.

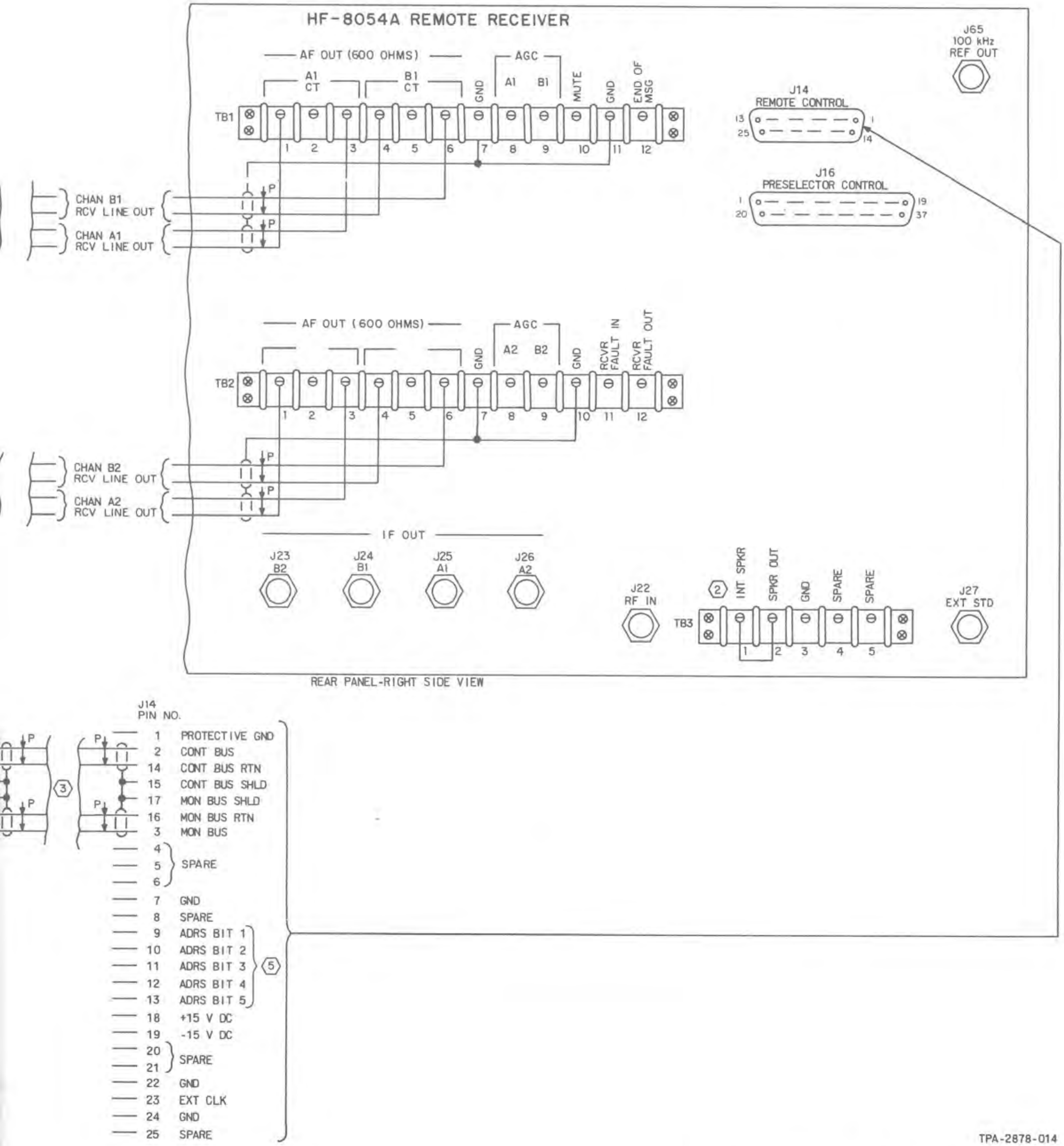
2. TB3-1 AND 2 ARE STRAPPED FOR INTERNAL SPEAKER AS SHOWN. FOR EXTERNAL SPEAKER, REMOVE STRAP FROM TB3-1 AND 2 AND CONNECT EXTERNAL SPEAKER (8 OHM NOMINAL) BETWEEN TB3-2 AND 3.

3. THE THREE CONTROL BUS PINS AND THE THREE MONITOR BUS PINS SHOWN HERE ARE THE ONLY CONNECTIONS BETWEEN J14 ON THE RECEIVER CONTROL AND J14 ON THE RECEIVER (EXCEPT; THE EXTERNAL CLOCK PINS MAY BE INTERCONNECTED IF THE SAME EXTERNAL CLOCK IS TO BE USED FOR BOTH UNITS).

4. THESE ADDRESS BITS ARE CONTROLLED BY THE ADDRESS SELECTOR THUMBWHEEL ON THE RECEIVER CONTROL FRONT PANEL. THEY ARE BROUGHT OUT TO THE REMOTE CONTROL CONNECTOR FOR CONVENIENCE ONLY. THEY DO NOT CONNECT TO J14 ON THE RECEIVER. NO STRAPPING IS REQUIRED ON THESE LINES.

5. THE RECEIVER ADDRESS LINES MUST BE STRAPPED TO CORRESPOND TO AN ADDRESS SELECTED ON THE RECEIVER CONTROL ADDRESS SELECTOR.

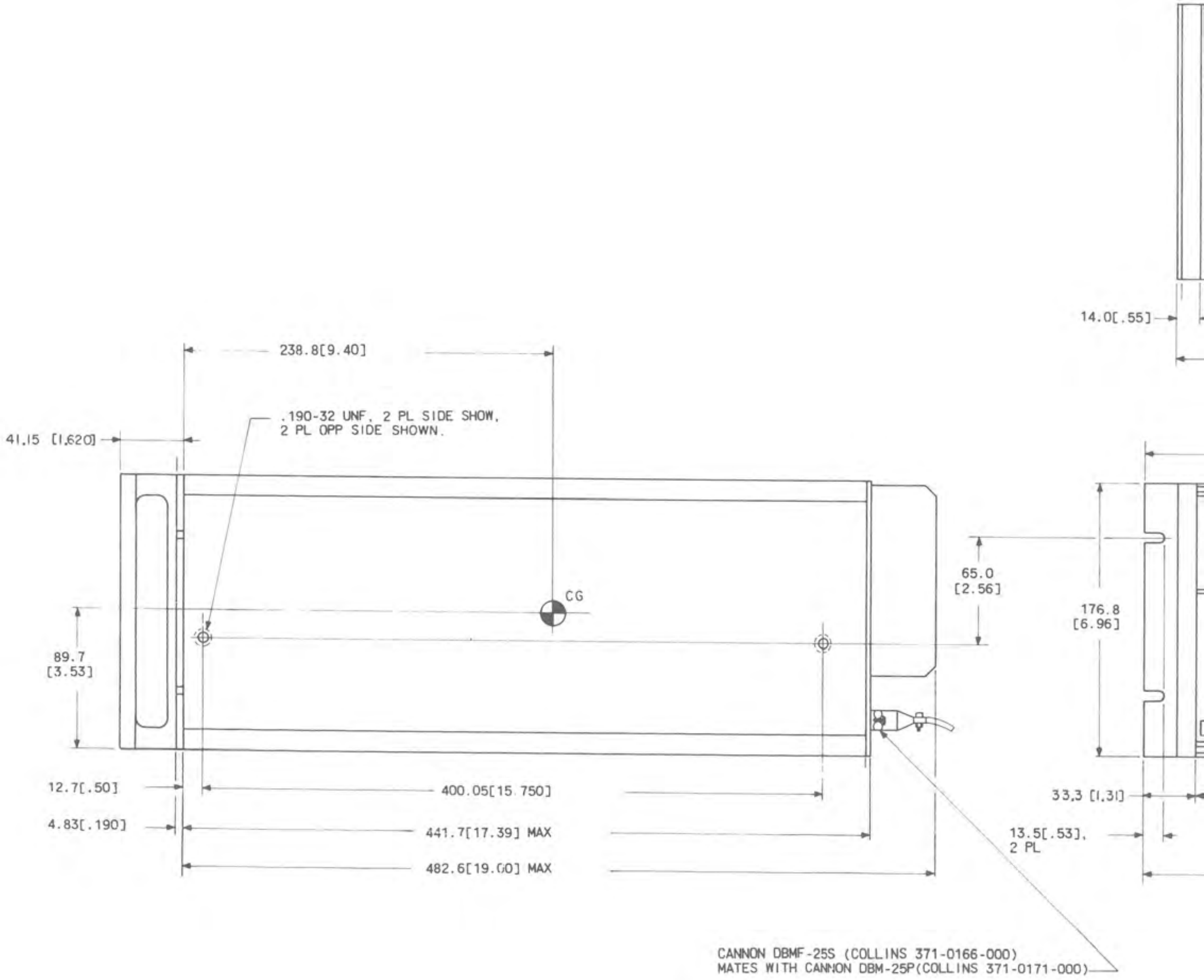


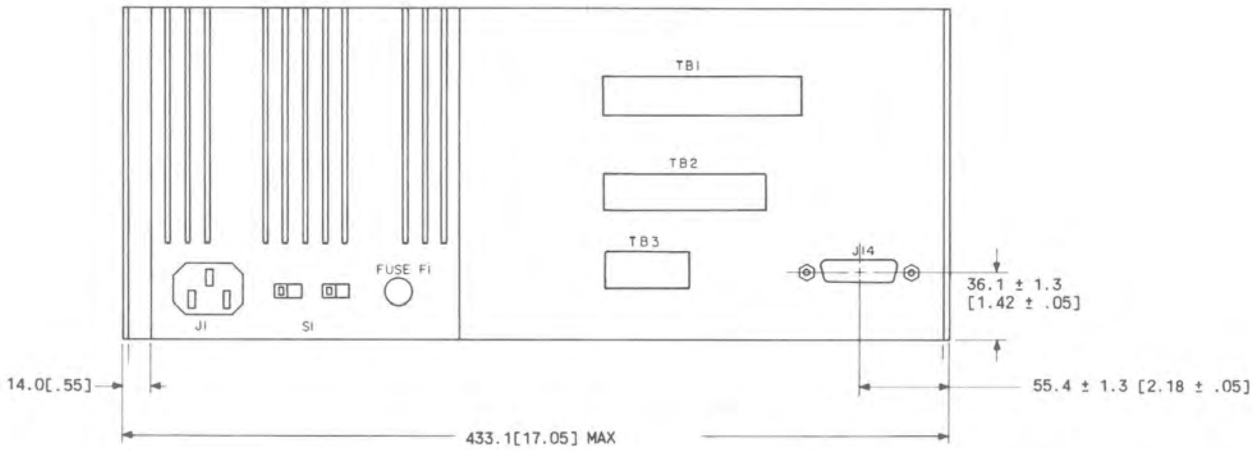


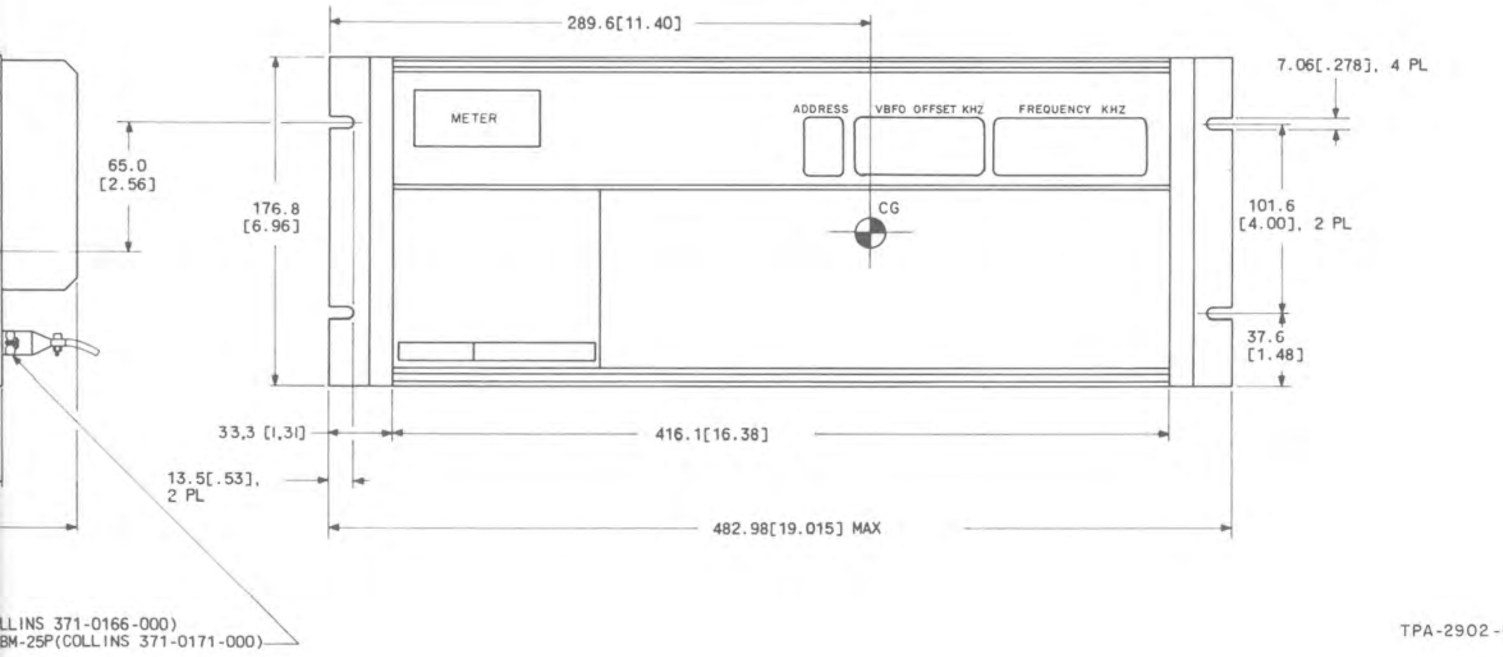
HF-8094 Receiver Control, Typical Installation
Figure 5

NOTES:

1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS [INCHES].
2. WEIGHT: 13.6 kg [30.0 LBS] MAX.
3. (CG symbol) INDICATES CENTER OF GRAVITY.
4. MATING CONNECTOR IS FOR REFERENCE ONLY, WEIGHT AND CENTER OF GRAVITY, DOES NOT INCLUDE MATING CONNECTOR.
5. NO EXTERNAL COOLING AIR REQUIRED.







TPA-2902-014

HF-8094 Receiver Control, Outline and Mounting Dimensions
Figure 6

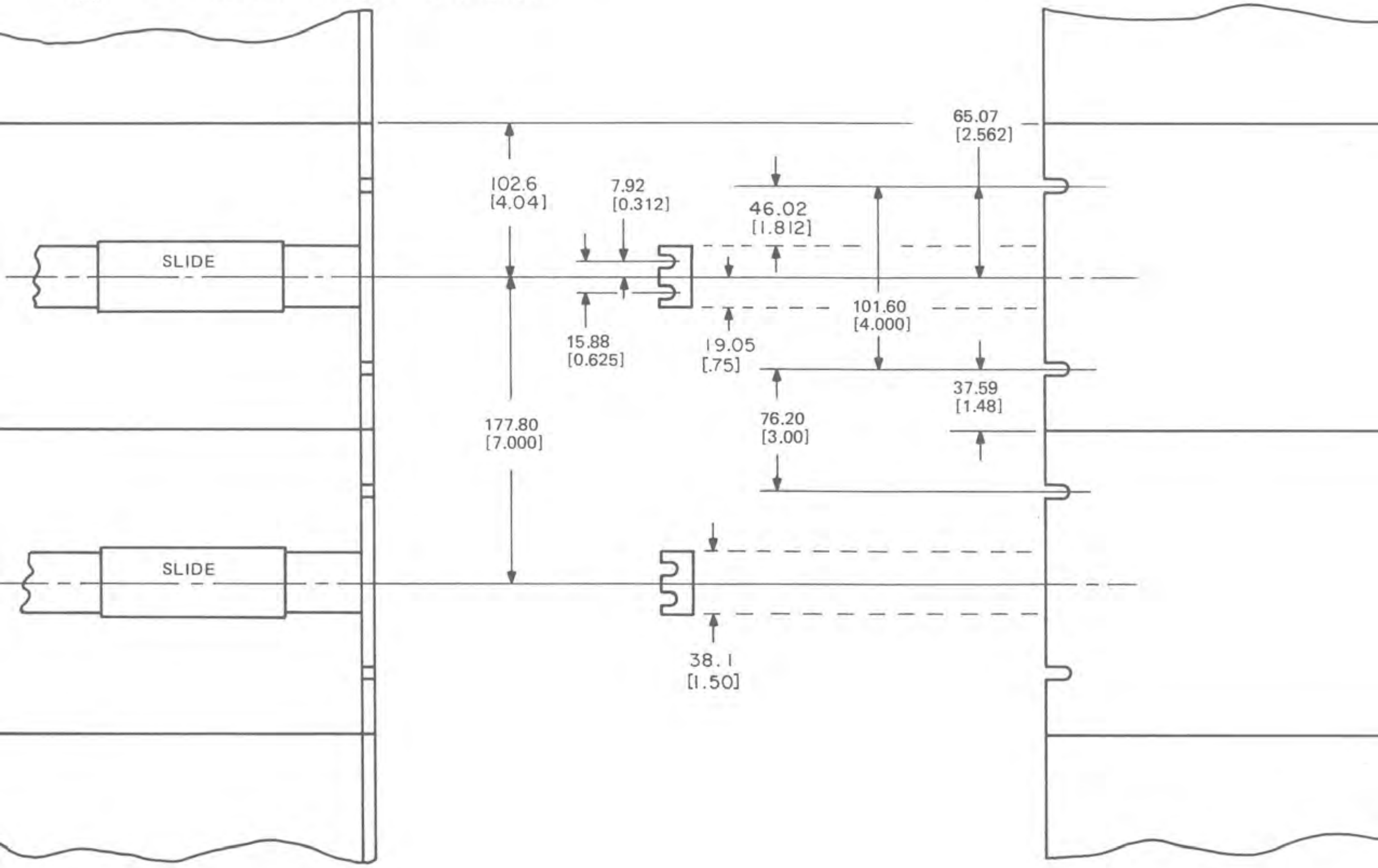
NOTES:

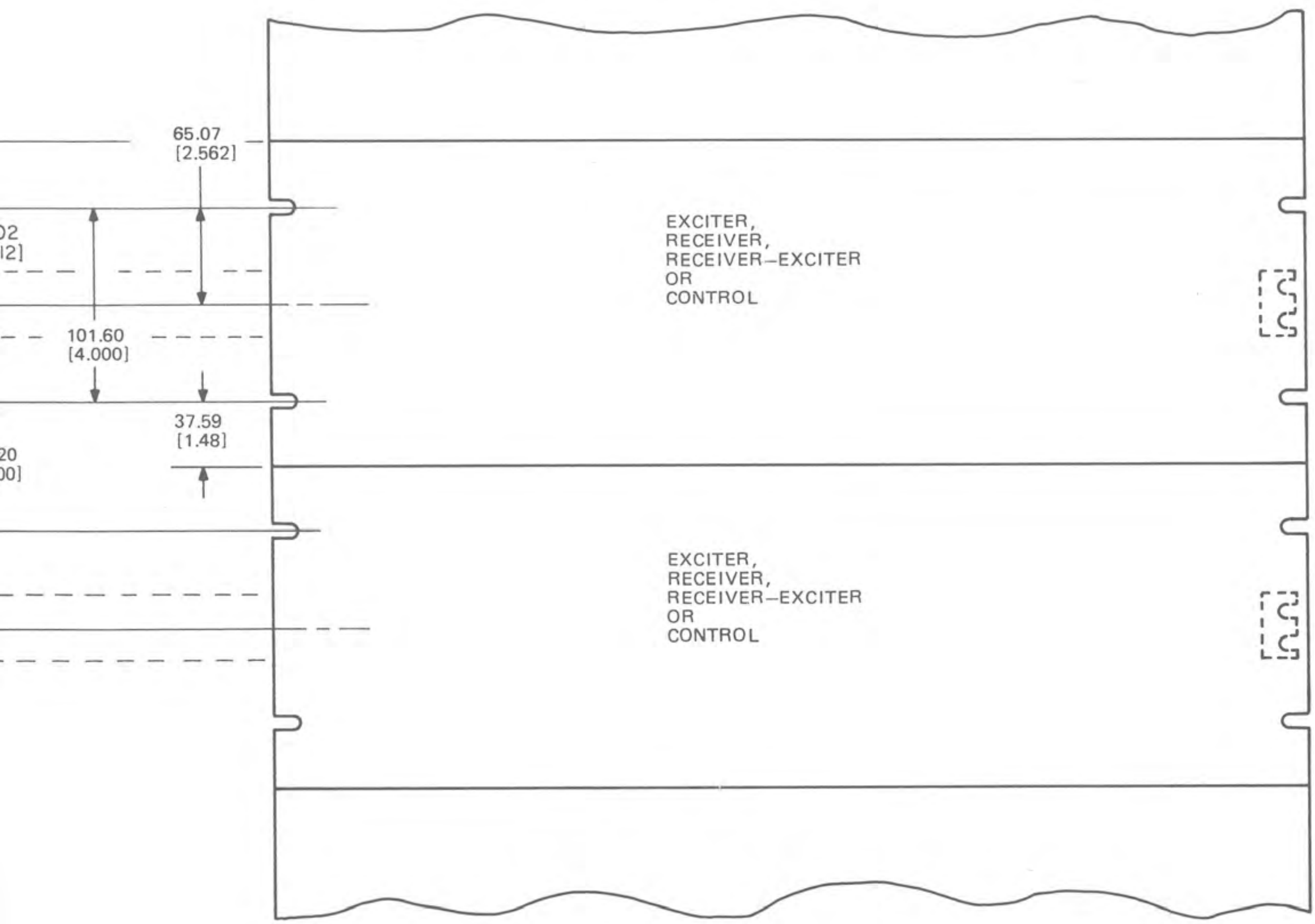
1. SLIDE BRACKETS MOUNT TO REAR SURFACE OF FRONT CABINET RAILS AND FRONT SURFACE OF REAR RAILS.

2. a. FOR CABINETS WITH THREADED MOUNTING HOLES USE SCREWS AND FLAT WASHERS FROM BRACKET SIDE INTO CABINET. SCREW MUST NOT PROJECT BEYOND PANEL MOUNTING SURFACE.

   b. FOR CABINETS WITH CLEARANCE HOLES IN THE RAILS, THE HOLES USED FOR MOUNTING THE SLIDE BRACKETS MUST BE COUNTERSUNK AND FLAT HEAD SCREWS USED FOR MOUNTING.

3. DIMENSIONS ARE IN MILLIMETRES [INCHES].





TP5-1869-013

Installation of Slides in Rack Mounts
Figure 7

OPERATION

HF-8094 Receiver Control

Rockwell International

operation

Collins Telecommunications Products Division

Printed in USA

523-0770964-001218
1 January 1981

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1. GENERAL

All controls and indicators necessary for operation and monitoring of a remote receiver are located on the front panel of the HF-8094 Receiver Control. Remote control must be selected at the associated receiver for the receiver control commands to be effective.

With a receiver connected to the receiver control and set for remote operation, the mode, channel enable, bandwidth, frequency, rf gain, AGC, AFC, and vbfo front-panel controls on the receiver do not affect the operation of the receiver. Likewise, with the receiver set for local operation, the corresponding controls on the receiver control do not affect the operation of the receiver. Audio controls, signals, and monitors of the receiver and receiver control remain enabled whether being operated remotely or locally.

This section of the instruction book contains instructions for operating the receiver control. The operator should be aware of several general characteristics of the receiver and receiver control when operating the radio. Refer to paragraph 4 for this information.

Note that receiver channel B1, A2, B2 if and audio circuits are active only in ISB (independent sideband) or NET DATA modes. In ISB and NET DATA operation, channel A1 output signals are USB (upper sideband), channel B1 output signals are LSB (lower sideband), channel A2 output signals are UUSB (upper-upper sideband), and channel B2 output signals are LLSB (lower-lower sideband). In all other modes, only channel A1 circuits are active and provide signal outputs regardless of if filter selected.

2. CONTROLS AND INDICATORS

Controls and indicators of the exciter control are shown in figure 1 and are listed in table 1 along with their function. All controls and indicators listed are applicable to all units unless otherwise indicated.

Note

All units referred to in the controls and indicators table are interfaced through the receiver to the receiver control.

3. OPERATING PROCEDURES

3.1 Line Audio Adjustments

Line audio output levels of the receiver control may be adjusted by qualified operator when his application requires it. The line audio adjustments are shown in figure 2 and listed in table 2. Refer to maintenance section paragraph 4 for audio output adjustment procedures.

3.2 Normal (Local) Operating Procedures

3.2.1 General

When power is turned on or restored to the remote receiver, it is normal for the RCV FAULT indicator to light. This is caused by latching the receiver fault circuit when power interruptions are detected. The RCV FAULT is cleared by changing one of the frequency digits on the receiver control when the remote receiver CONT switch is set to REM.

Note that the line audio output for all channels may be monitored on the front panel meter.

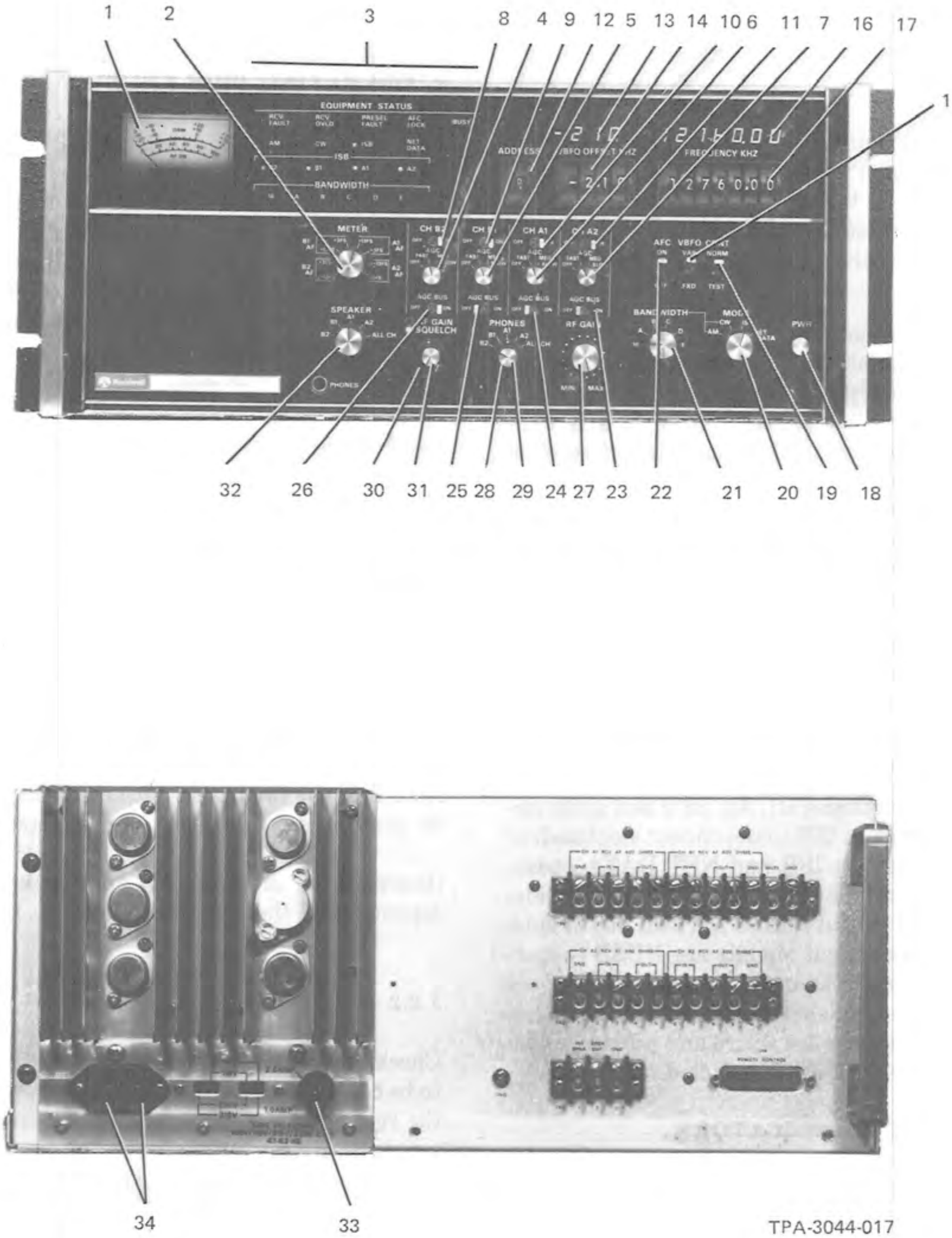
Headphones can be used to monitor any channel independent of the speaker switch.

3.2.2 AM Operation

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in AM mode using the HF-8094 Receiver Control, follow the procedures outlines below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to AM mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad)



HF-8094 Receiver Control, Controls and Indicators
Figure 1

Table 1. HF-8094 Receiver Control, Controls and Indicators.

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter A2M1	Indicates levels as selected by METER switch A2S1.
2	METER switch A2S1	Selects signal levels to be measured by meter A2M1. Selectable positions are as follows: a. B2 AF +13FS position monitors channel B2 receive line audio output (indicates +13-dB mW full scale). b. B2 AF +3FS position monitors channel B2 receive line audio output (indicates +3-dB mW full scale). c. B1 AF +13FS position monitors channel B1 receive line audio output (indicates +13-dB mW full scale). d. B1 AF +3FS position monitors channel B1 receive line audio output (indicates +3-dB mW full scale). e. A1 AF +13FS position monitors channel A1 receive line audio output (indicates +13-dB mW full scale). f. A1 AF +3FS position monitors channel A1 receive line audio output (indicates +3-dB mW full scale). g. A2 AF +13FS position monitors channel A2 receive line audio output (indicates +13-dB mW full scale). h. A2 AF +3FS position monitors channel A2 receive line audio output (indicates +3-dB mW full scale).
3	EQUIPMENT STATUS indicators (color)	
	RCV FAULT A2A1DS5 (red)	Indicates receiver power supply low voltage, synthesizer fault, or vbfo synthesizer fault. Indicated when power supply fault signal is supplied by power supply module A1, synthesizer fault signal is supplied by synthesizer voltage regulator A14, synthesizer subcarrier fault signal is supplied by synthesizer subcarrier A15, and/or vbfo synthesizer fault signal is supplied by vbfo A4. (Synthesizer fault signal from synthesizer voltage regulator A14 is a summary of all synthesizer loss-of-lock signals supplied by A16 through A23.) When flashing, indicates monitor information from the receiver is not being received by the receiver control.
	RCV OVERLOAD A2A1DS6 (red)	Indicates a receive rf overload condition. Indicated by a receive rf overload signal from translator module A9 or from associated preselector caused by excessively high rf inputs from antenna.
	PRESEL FAULT A2A1DS23 (red)	Indicates a preselector fault. Indicated by a preselector fault signal from associated preselector.
	AFC LOCK A2A1DS3 (yellow) (used with AFC option only)	Indicates that AFC (automatic frequency control) is locked.
	BUSY A2A1DS8 (yellow)	Indicates the addressed receiver is being operated in the local control mode.
(Cont)	AM A2A1DS2 (yellow)	Indicates that AM operating mode is selected.

Table 1. HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
3 (Cont)	CW A2A1DS7 (yellow)	Indicates that CW operating mode is selected.
	ISB A2A1DS4 (yellow)	Indicates that ISB operating mode is selected.
	NET DATA A2A1DS22 (yellow)	Indicates that NET DATA operating mode is selected.
	ISB channel indicators	
	B2 A2A1DS10 (yellow)	Indicates that B2 (LLSB) receive circuits are enabled.
	B1 A2A1DS9 (yellow)	Indicates that B1 (LSB) receive circuits are enabled.
	A1 A2A1DS12 (yellow)	Indicates that A1 (USB) receive circuits are enabled.
	A2 A2A1DS13 (yellow)	Indicates that A2 (UUSB) receive circuits are enabled.
	BANDWIDTH indicators	
	16 A2A1DS14 (yellow)	Indicates that 16-kHz if attenuator pad (FL8) is selected.
	A A2A1DS17 (yellow)	Indicates that optional if filter A (FL3) is selected.
	B A2A1DS18 (yellow)	Indicates that optional if filter B (FL4) is selected.
	C A2A1DS15 (yellow)	Indicates that optional if filter C (FL5) is selected.
	D A2A1DS16 (yellow)	Indicates that optional if filter D (FL6) is selected.
	E A2A1DS19 (yellow)	Indicates that optional if filter E (FL7) is selected.
4	Channel B2 AGC switch A2S24	Selects AGC attack and decay times for channel B2. AGC switch A2S24 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.
5	Channel B1 AGC switch A2S25	Selects AGC attack and decay times for channel B1. AGC switch A2S25 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.

Table 1. HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
6	Channel A1 AGC switch A2S26	Selects AGC attack and decay times for channel A1. AGC switch A2S26 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.
7	Channel A2 AGC switch A2S27	Selects AGC attack and decay times for channel A2. AGC switch A2S27 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.
8	CH B2 (ON/OFF) enable switch A2S5	Enables/disables channel B2 audio circuits in ISB and NET DATA modes only.
9	CH B1 (ON/OFF) enable switch A2S3	Enables/disables channel B1 audio circuits in ISB and NET DATA modes only.
10	CH A1 (ON/OFF) enable switch A2S2	Enables/disables channel A1 audio circuits in ISB and NET DATA modes only.
11	CH A2 (ON/OFF) enable switch A2S4	Enables/disables channel A2 audio circuits in ISB and NET DATA modes only.
12	ADDRESS switch A2A6S23	Sets binary address to the complement of the address indicated by thumb wheel display (0 thru 15). Receiver with associated address strapping is the controlled/monitored unit.
13	VBFO OFFSET KHZ display A2A5U15 thru A2A5U19 (used with frequency display option only, and only when dvbfo option is installed)	Displays bcd vbfo offset frequency control signal as set by VBFO OFFSET KHZ controls or a remote receiver control. a. A2A5U15 displays direction of vbfo offset frequency from carrier (+ or -). b. A2A5U16 displays ones kilohertz. c. A2A5U17 displays hundreds hertz. d. A2A5U18 displays tens hertz. e. A2A5U19 displays ones hertz.

Table 1. HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
14	VBFO OFFSET KHZ controls A2S18A thru A2S18D (used with dvbfo option only)	Sets bcd frequency control signal for vbfo as indicated by thumb wheel display. a. A2S18A selects the direction of the offset of the dvbfo signal, + or -. b. A2S18B selects ones kilohertz. c. A2S18C selects hundreds hertz. d. A2S18D selects tens hertz.
15	VBFO switch A2S11 (used with dvbfo option only)	Selects the bfo injection signal to be used. a. VAR position enables dvbfo. b. FXD position selects the fixed 450-kHz injection signal.
16	FREQUENCY KHZ display A2A5U20 thru A2A5U26	Displays bcd frequency control signal of addressed receiver (with CONT switch in NORM position) or setting of FREQUENCY KHZ controls (with CONT switch in TEST position). a. A2A5U20 displays tens megahertz. b. A2A5U21 displays ones megahertz. c. A2A5U22 displays hundreds kilohertz. d. A2A5U23 displays tens kilohertz. e. A2A5U24 displays ones kilohertz. f. A2A5U25 displays hundreds hertz. g. A2A5U26 displays tens hertz. h. A2A5U27 displays ones hertz (option).
17	FREQUENCY KHZ controls A2S17A thru A2S17G	Sets bcd frequency control signal as indicated by thumb wheel display. a. A2S17A selects tens megahertz. b. A2S17B selects ones megahertz. c. A2S17C selects hundreds kilohertz. d. A2S17D selects tens kilohertz. e. A2S17E selects ones kilohertz. f. A2S17F selects hundreds hertz. g. A2S17G selects tens hertz.
18	PWR switch A2S28	Sets power on/off. When pressed and latched (inward position), power is applied to the receiver control. When pressed and unlatched (outward position), power is removed from the receiver control.

Table 1. HF-8094 Receiver Control, Controls and Indicators (Cont).

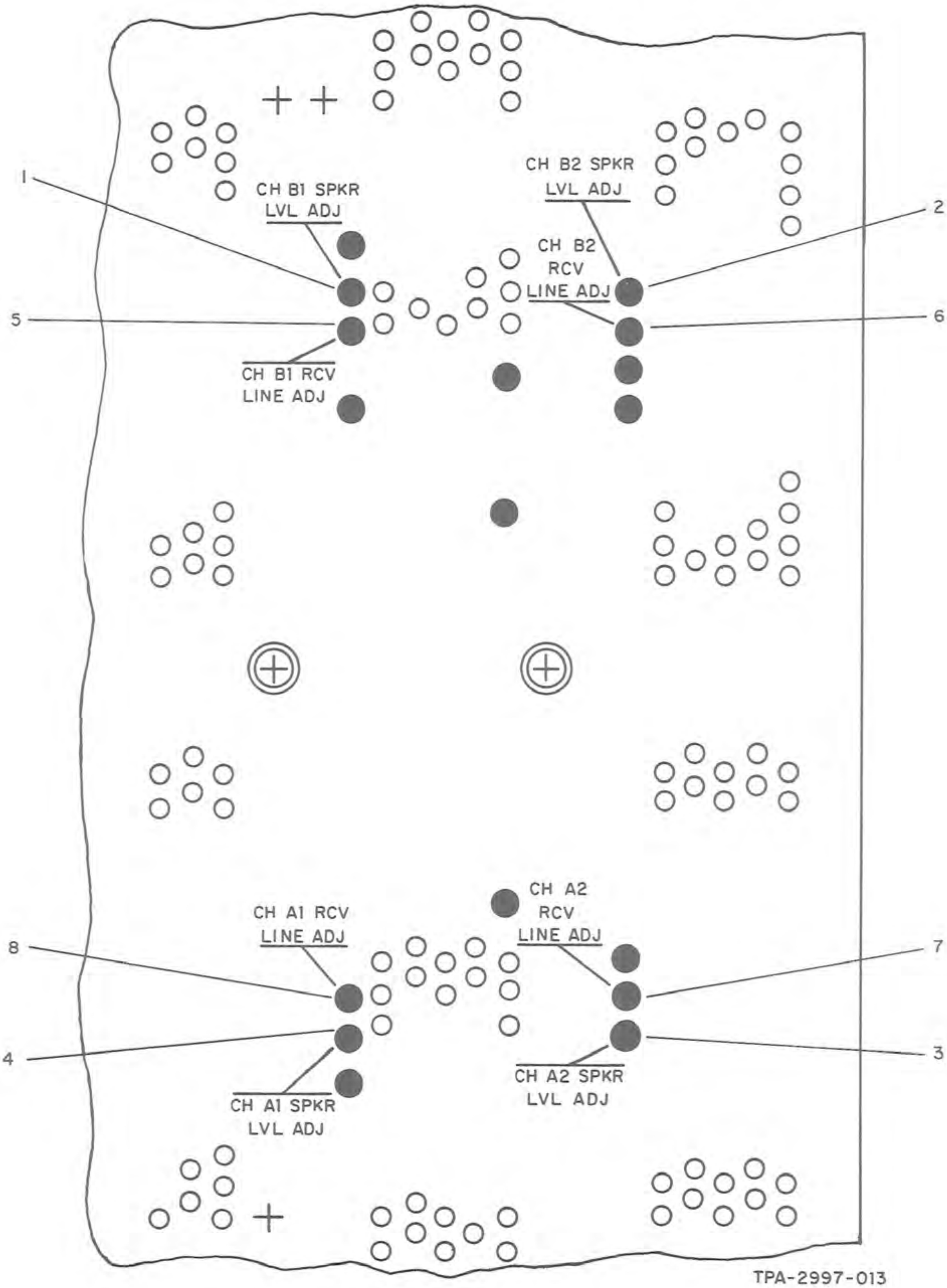
INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
19	CONT switch A2S13 (preset option not installed)	Selects use and method of controlling the receiver/receiver control. a. NORM position allows the receiver control to control the addressed receiver (addressed receiver must be in the remote mode). b. TEST position is a self-test position that allows the receiver control to test its operation internally.
	CONT switch A2S13 (used with preset option installed)	Selects method of controlling the receiver (preset option not used in HF-8054A). a. NORM position allows the receiver control to control the addressed receiver (addressed receiver must be in the remote mode). b. PSET position allows the receiver control to control the frequency, mode and bandwidth, of the addressed receiver, by using stored presets.
Not shown (is mounted just right of CONT switch A2S13)	PRESET switch A2S14 (used with preset option only)	Selects preset controlling functions when CONT switch is in PSET position. a. SEND position transmits the preset control functions to the addressed receiver (addressed receiver must be in the remote mode). The preset functions include frequency, mode, and bandwidth. b. DISPLAY position allows the frequency, mode, and bandwidth data, stored in the channel selected by CHAN selector A2A7, to be displayed on the remote control front panel. c. STORE position presets the channel selected by CHAN selector A2A7 to the control settings on the front panel. The preset functions include frequency, mode, and bandwidth.
Not shown (is mounted to the right of PRESET switch (A2A2S14)	CHAN switch A2A7S20	Selects any one of sixteen presets containing frequency, mode, and bandwidth information.
20	MODE switch A2S21	Selects the remote receiver operating mode and bandwidth. a. AM position selects AM mode and enables BANDWIDTH switch A2S22. b. CW position selects CW mode and enables BANDWIDTH switch A2S22. c. ISB position selects ISB mode. d. NET DATA position selects NET DATA mode.

Table 1. HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
21	BANDWIDTH switch A2S22	Selects HF-8054A Receiver operating bandwidth when MODE switch A2S21 is in AM or CW position. a. 16 position selects if attenuator pad (16-kHz bandwidth). b. A position selects bandpass filter FL3 (optional filter). c. B position selects bandpass filter FL4 (optional filter). d. C position selects bandpass filter FL5 (optional filter). e. D position selects bandpass filter FL6 (optional filter). f. E position selects bandpass filter FL7 (optional filter).
22	AFC switch A2S12 (used with AFC option only)	Seta AFC (automatic frequency control) on or off.
23	CH A2 - AGC BUS switch A2S8	Used in ISB mode to connect channel A2 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
24	CH A1 - AGC BUS switch A2S6	Used in ISB or NET DATA mode to connect channel A1 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
25	CH B1 - AGC BUS switch A2S7	Used in ISB or NET DATA mode to connect channel B1 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
26	CH B2 - AGC BUS switch A2S9	Used in ISB mode to connect channel B2 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other ifs connected to the AGC bus.
27	RF GAIN control A2S29	Controls bcd rf AGC signal. The bcd AGC is converted to an analog rf AGC threshold/level in the receiver, and this in turn controls the gain of the receive rf circuits in the addressed receiver. MIN produces the highest bcd/analog, thus the lowest gain. MAX produces the lowest bcd/analog, thus the highest gain.
28	PHONES level control ◉ S19B	Controls headphones volume; full clockwise equals maximum volume.
29	PHONES switch ◯ A2S19A	Selects audio to be monitored at the PHONES jack (J1) on the receiver control front panel. a. B2 position selects channel B2 receive audio. b. B1 position selects channel B1 receive audio. c. A1 position selects channel A1 receive audio. d. A2 position selects channel A2 receive audio. e. ALL CH position selects receive audio of all channels (B2, B1, A1, A2).

Table 1. HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
30	○ AF GAIN control A2S16A	Controls volume of speaker.
31	◉ SQUELCH control A2S16B and A2S16C	Enables/disables squelch and controls the squelch threshold. In extreme counterclockwise position, squelch is disabled. When control is moved clockwise, squelch is enabled and squelch threshold is adjusted by further clockwise rotation of the SQUELCH control. **Note** Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.
32	SPEAKER switch A2S15	Switches the selected audio to the speaker amplifier. a. B2 position selects channel B2 audio input. b. B1 position selects channel B1 audio input. c. A1 position selects channel A1 audio input. d. A2 position selects channel A2 audio input. e. ALL CH position selects audio input of all channels (B2, B1, A1, A2).
33	Fuse A1F1 (located on rear panel)	Fuse in power line. 2 A used for 100/115-V ac operation, 1 A used for 215/230-V ac operation.
34	Power selection switch A1S1A and A1S1B (located on rear panel)	Controls input power strapping of power transformer in power supply. a. In 100-V position, power transformer strapped for 100-V ac operation (90 to 110 V ac). b. In 115-V position, power transformer strapped for 115-V ac operation (103 to 127 V ac). c. In 215-V position, power transformer strapped for 215-V ac operation (193 to 237 V ac). d. In 230-V position, power transformer strapped for 230-V ac operation (207 to 253 V ac).



Top Cover Adjustments
Figure 2

Table 2. Line Audio Adjustments.

INDEX NUMBER	ADJUSTMENT	PURPOSE
Note With SPKR LVL ADJ and RCV LINE ADJ controls set for maximum gain, the total gain of the line amplifier circuits is NLT 33 dB. Line audio output adjustable from -20 to +10 dB mW with a line audio input of -23 to +10 dB mW (not less than unity gain).		
1	CH B1 SPKR LVL ADJ A6R39 (accessible through top cover)	Controls channel B1 receive line audio input and channel B1 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A6R48 at maximum).
2	CH B2 SPKR LVL ADJ A4R39 (accessible through top cover)	Controls channel B2 receive line audio input and channel B2 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A4R48 at maximum).
3	CH A2 SPKR LVL ADJ A4R6 (accessible through top cover)	Controls channel A2 receive line audio input and channel A2 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A4R15 at maximum).
4	CH A1 SPKR LVL ADJ A6R6 (accessible through top cover)	Controls channel A1 receive line audio input and channel A1 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A6R15 at maximum).
5	CH B1 RCV LINE ADJ A6R48 (accessible through top cover)	Controls channel B1 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A6R39 normally adjusted).
6	CH B2 RCV LINE ADJ A4R48 (accessible through top cover)	Controls channel B2 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A4R39 normally adjusted).
7	CH A2 RCV LINE ADJ A4R15 (accessible through top cover)	Controls channel A2 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A4R6 normally adjusted).
8	CH A1 RCV LINE ADJ A6R15 (accessible through top cover)	Controls channel A1 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A6R6 normally adjusted).

Note

If filter card (A8A2) is not installed in your remote receiver, 16 must be selected. If filter card is installed, 16 or any filter installed on A8A2 may be selected.

2. A (FL3, optional filter)
3. B (FL4, optional filter)
4. C (FL5, optional filter)
5. D (FL6, optional filter)
6. E (FL7, optional filter)

e. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.
f. Set channel A1 AGC switch to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds
   3. MED equals 70 to 150 milliseconds
   4. SLOW equals 1 to 2 seconds.
g. Set RF GAIN control to full gain (clockwise).
h. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A1 and adjust PHONES level control for comfortable listening level.
i. With ◉ SQUELCH control full ccw, set SPKR switch to CH A1 and adjust ○ AF GAIN control for a comfortable listening level. With no signal input, adjust ◉ SQUELCH control until noise just squelches.

3.2.3 CW Operation

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set to on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in CW mode using the HF-8094 Receiver Control, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to CW mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad)

Note

If filter card (A8A2) is not installed in your remote receiver, 16 must be selected. If filter card is installed, 16 or any filter installed on A8A2 may be selected.

2. A (FL3, optional filter)
3. B (FL4, optional filter)
4. C (FL5, optional filter)
5. D (FL6, optional filter)
6. E (FL7, optional filter)

e. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

Note

Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.

f. If the receiver is to receive CW, and dvbfo option is not installed, adjust FREQUENCY KHZ thumb-wheel controls off the CW operating frequency by 300 to 2700 Hz (until frequency tone is pleasant to operator). If receiver is to receive CW and dvbfo option is installed, set VBFO switch to VAR. When the VBFO switch is in the VAR position, the dvbfo is used to set the bfo frequency. Adjust the VBFO OFFSET KHZ controls to a frequency tone that is pleasant to the operator.
g. Set channel A1 AGC switch to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds
   3. MED equals 70 to 150 milliseconds
   4. SLOW equals 1 to 2 seconds
h. Set RF GAIN control to full gain (clockwise).
i. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A1 and adjust PHONES level control for comfortable listening level.
j. With ◉ SQUELCH control full ccw, set SPKR switch to CH A1 and adjust ○ AF GAIN control for a comfortable listening level. With no signal input, adjust ◉ SQUELCH control until noise just squelches.

3.2.4 ISB Operation

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set to on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in ISB mode using the HF-8094 Receiver Control, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to ISB mode.

Note

BANDWIDTH switch is disabled in ISB mode. Channels enabled and their bandwidths are controlled by the channel enable switches (table 1, items 8 through 11).

CH A1 (USB — (2.85 kHz, carrier +250 Hz to +3100 Hz)

CH B1 (LSB) — (2.85 kHz, carrier -250 Hz to -3100 Hz)

CH A2 (UUSB) — (2.85 kHz, carrier +3190 Hz to +6040 Hz)

CH B2 (LLSB) — (2.85 kHz, carrier -3190 Hz to -6040 Hz)

d. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.
e. Set appropriate AGC switch (channel A1, B1, A2, B2) to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds.
   3. MED equals 70 to 150 milliseconds
   4. SLOW equals 1 to 2 seconds
f. Set RF GAIN control to full gain (clockwise).
g. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to appropriate channel (whichever channel to be monitored by the operator). Adjust PHONES level control for comfortable listening level. The PHONES switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.
h. With ◉ SQUELCH control full ccw, set SPEAKER switch to appropriate channel and ADJUST ○ AF GAIN control for a comfortable listening level. With no signal input, adjust ◉ S-QUELCH control until noise just squelches. The SPEAKER switch may be set to monitor CH A1, CH B1, CH A2,CH B2, or to monitor all (ALL CH) channels simultaneously.

3.2.5 NET DATA Operation

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set to on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in NET DATA mode using the HF-8094 Receiver Control, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to ISB mode.

Note

BANDWIDTH switch is disabled in NET DATA mode. Channels enabled and their bandwidths are controlled by the channel enable switches (table 1, items 8 through 11).

CH A1 (USB) — (2.85 kHz, carrier +250 Hz to +3100 Hz)

CH B1 (LSB) — (2.85 kHz, carrier -250 Hz to -3100 Hz)

CH A2 (UUSB) — (2.85 kHz, carrier +3190 Hz to +6040 Hz)

CH B2 (LLSB) — (2.85 kHz, carrier -3190 Hz to -6040 Hz)

d. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.
e. Set appropriate AGC switch (channel A1, B1, A2, B2) to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds
   3. MED equals 70 to 150 milliseconds
   4. SLOW equals 1 to 2 seconds
f. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to appropriate channel (whichever channel to be monitored by the operator). Adjust PHONES level control for comfortable listening level. The PHONES switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.
g. With ◉ SQUELCH control full ccw, set SPEAKER switch to appropriate channel and adjust ○ AF GAIN control for a comfortable listening level. With no signal input, adjust ◉ SQUELCH control until noise just squelches. The SPKR switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.

3.3 Self-Test Operating Procedures

The self-test function in the receiver control may be enabled while the unit is operating in a system without disturbing any of the other equipment in the system. (Self-testing may also be performed on the unit along on a test bench.) The self-test feature checks only the three digital logic circuit cards (A11, A12, and A13), and most front-panel switches and displays. Self-test operation is independent of any strapping options (FSK, RS-232C; odd/even parity; data baud rate) selected, thus eliminating a source of errors frequently encountered in systems operation due to strapping incompatibilities.

In the self-test mode, control data normally transmitted is internally looped back to the monitor circuit to drive the front-panel frequency display and mode/-bandwidth status indicators. Except for the FSK and RS-232C receivers and drivers, all circuits on serial interface A13, approximately 95 percent of the circuits on parallel input A11, and approximately 80 percent of the circuits on parallel output A12 are exercised in self-test.

To perform the self-test, place the receiver control front-panel CONT switch to the TEST position. (No external connections to the receiver control except for the power cable are required.) The RCV FAULT indicator will flash while in the TEST mode indicating that no status response data is being received from any receiver. With satisfactory operation, the displays follow positioning of the thumb-wheel frequency selector and mode and bandwidth control switches.

Satisfactory self-test response indicates that the receiver control digital circuits are functioning normally and that a malfunction in an operating system is external to the receiver control. Possible faults are a defective receiver or malfunction in the data link between the receiver control and the receiver. If the self-test operation is not satisfactory, perform the tests in the maintenance section of this manual.

4. OPERATING CHARACTERISTICS

4.1 Power Failure and Initialization

When primary power to the receiver control is initially applied, or reapplied after a power interruption, the receiver control transmits all command information and requests monitor information from the addressed receiver. When primary power is applied to a receiver, after power has been applied to the receiver control, the receiver control again transmits all command information from the front-panel control settings and requests updated status from the addressed receiver. When power is applied or restored in a system containing more than one receiver, the receiver control can initialize only the currently addressed unit. The remaining receivers must be initialized manually, one at a time, by selecting the appropriate address and transmitting the desired operating parameters.

4.2 CONT Switch Operation

The user must be aware that if the receiver control front-panel controls are changed while the CONT switch is in the TEST mode, their settings may no longer correspond to the receiver operating conditions. Consequently, when the next command to the receiver is initiated (in the NORM mode), some of these settings may be transmitted to the receiver, causing it to change its operating conditions to correspond to the control settings.

The NORM position of the CONT switch is used for normal remote control operation. The TEST position is used to verify that the receiver control is operational and that it can communicate with itself internally. In the TEST mode, the data from the receiver control is transmitted directly to its own display unit. Frequency information displayed will follow the positioning of the frequency thumb-wheel switches, and mode, bandwidth, and channel enable indicators will follow positioning of the front-panel mode, bandwidth, and channel enable controls. When the CONT switch is returned to the NORM position, the receiver control automatically updates to the status information from the receiver without changing the operating conditions of the receiver.

In the TEST mode, the flashing fault indicator (paragraph 4.5) is a normal indication, and flashing may become erratic or halt momentarily as front-panel controls are operated.

4.3 Address Selection

The receiver control is capable of controlling as many as 16 receivers, but communicates with only one at a time. The ADDRESS switch contains numbers from 0 through 15 corresponding to binary coding of the four address bits of the data words.

When the ADDRESS switch is rotated to an address, the receiver control automatically requests a complete status update from the addressed receiver. This is done by transmitting an abbreviated 2-character status request only for words 1, 2, 3, and 4. The receiver control status and frequency displays then update with the operating conditions of the newly addressed receiver.

No command transmission will be initiated from the receiver control to the newly addressed receiver until changes are made to the front panel control settings of the receiver control. Thus the operating status of the receiver will remain unchanged. This sequence of operation permits an operator to address a receiver solely for the purpose of current status inspection or verification.

4.4 BUSY Indicator Operation

The BUSY indicator on the receiver control front panel is lit whenever the addressed receiver CONT switch is placed in the LCL position. When this indicator is lit, the control unit automatically and continuously requests words 1, 2, 3, and 4 monitor data from the receiver. This continuously updates all status information to the receiver control. The operator is thus alerted to the current status of the addressed receiver while it is being locally controlled at the remote site. As long as the BUSY indicator remains lit, commands from the receiver control to the addressed receiver are inhibited.

When the receiver is again returned to remote operation (CONT to REM), the BUSY indicator turns off and the receiver control transmits all current front-panel switch and control settings to the addressed receiver. This causes the receiver operational status to revert to the conditions currently selected on the receiver control front panel.

4.5 No Indication of Monitor Response

If for any reason the receiver control fails to receive monitor data transmissions from the addressed receiver (data transmission link inoperative, unit inoperative, unit power disabled, addressed unit does not exist, etc), the receiver fault indicator (RCV FAULT) will flash at approximately a 0.25-Hz rate (2 seconds on, 2 seconds off). Flashing is normal, however, when the front-panel CONT switch is in the TEST position.

4.6 Polling Operation

The polling strapping option discussed in the installation section (paragraph 3.1.4) permits the receiver control to function in a polling mode of operation. This mode of operation is intended for use when an auxiliary system status display is used to display the current status of more than one remote receiver.

In the polling mode of operation the receiver control automatically and sequentially requests status data from all sixteen possible remote addresses. As status data is received from each addressed remote receiver, it is then transmitted by the receiver control, on the common system control bus, to a remote status display board for update of the display. The remote status display board must be connected to the system control bus to receive the updated display information. If no status response is received from a polled unit, no status data is transmitted to the status display board by the receiver control.

Since the status display board connects to the common system control bus, it is programmed to recognize its own unique address, and the receiver control is programmed to use this same address (00000 for ADB5 through ADB1) when communicating with the status display board. Therefore, when using the polling capability along with a remote status display board and the 8-bit character data format, only fifteen of the sixteen address combinations are available for remote receiver assignment, since the display board itself requires one of the addresses. If, however, the 7-bit ASCII character data format is used in the system, all sixteen remote receiver addresses are available for use because the address assigned to the status display board is not among the sixteen addresses (of the 32 possible in this format) controlled by the thumb-wheel address selector switch of the receiver control.

4.7 Control and Monitor Data Transmission

Under normal operating conditions, the receiver control transmits control information to the addressed receiver only upon initiation from the front panel controls.

Operation of the frequency thumb-wheel switches initiates transmission of a frequency control word (word 1), along with a request for a frequency status response from the receiver. Likewise, operation of any of the front-panel remote-function switches initiates control transmission, with monitor request, of the corresponding word for which the function is defined. When no control word transmission is pending, the receiver control reverts to its idle state.

In the idle state, the receiver control continuously transmits the 2-character, word 4 monitor request. This keeps the front-panel status indicators up to date on any of the word 4 monitor status information (such as the various fault bits) that may change dynamically during normal operation of the remote unit. Monitor word transmission from a receiver is transmitted only when requested by the receiver control.

The data transmitted and received on the control and monitor buses is serial, asynchronous, and is organized in groups of characters called words. The format is independent of the type of signaling (FSK, RS-232C, or MIL-STD-188C) used. The data formats are user selected by internal strapping. One format uses 7-BIT ASCII coded characters and is described in paragraphs 4.7.1 and 4.7.2. The other format uses an 8-bit character code and is described in paragraphs 4.7.3 and 4.7.4. Regardless of the format selected, there are four control words and four monitor data words used by the receiver control.

4.7.1 ASCII Word Format

A word consists of three special nonfunctional characters that are used to establish word boundaries, and eleven functional characters that contain address and front-panel control/status information. Refer to figure 3.

The three special nonfunctional characters are selected from carriage return (CR), line feed (LF), execute (X), hyphen (-) and dollar sign ($). Refer to figures 4 and 5. CR and LF are the first two special nonfunctional characters of each ASCII control word and execute (X) ends each of the ASCII control words. The hyphen (-) is the first two special nonfunctional characters of each ASCII monitor word, and the dollar sign ($) is used to end each of the monitor words.

The eleven functional characters of the control and monitor words consist of two address, one sequence designator, and eight characters for control/status information.

The control and monitor data word formats are similar with one exception, control word 4 is shortened to seven ASCII characters in order to transmit control information as fast as possible. Monitor word 4 contains all eleven ASCII characters. The first five characters of each word are organized the same: two nonfunctional characters are used to establish synchronization, the first two functional characters establish the address, and the third functional character serves as the sequence designator. As many as 32 units (00 through 31) can be addressed on one control or monitor bus, using bcd coded combinations of the two-address characters. Five binary coded address lines with internal pullup to logic one are available at the remote control connector of the receiver and may be strapped to any combination. However, in the receiver control, only four of the five address bits are controlled by the address selector thumb-wheel switch (ADB5 is not used), limiting the number of addresses to 16 (00 through 15). Table 3 describes the relationship between address line strapping (ADB4 through ADB1), the corresponding bcd address digits and the remote control address selector. Only X's require strapping to ground; the dashes remain unstrapped or open address lines.

The third functional ASCII character in each word is the sequence designator. Refer to table 4. The sequence designator is used to define the word number and type (control only, control with status request, or status request only) of the word represented.

Data rates are switchable on the serial interface card A13 from 75 to 19 200 bauds. The levels are strappable for either RS-232C (+6-V dc level defined as a logic 0) or MIL-STD-188C (+6-V dc level defined as a logic 1) compatibility. See the installation section for switching and strapping instructions.

ASCII WORD FORMAT													
SPECIAL NON-FUNCTIONAL CHARACTERS		FUNCTIONAL CHARACTERS											SPECIAL NON-FUNCTIONAL CHARACTERS
# 1	# 2	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 3

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ASCII Word Format
Figure 3

Table 3. Address Number, Binary Data Pattern, and Address Recognition Strapping.

ADDRESS THUMB-WHEEL NUMBER	TRANSMITTED BINARY ADDRESS DATA				RECEIVER STRAPPING REQUIRED FOR ADDRESS RECOGNITION			
	A4	A3	A2	A1	A4 (ADB4)	A3 (ADB3)	A2 (ADB2)	A1 (ADB1)
0	1	1	1	1	-	-	-	-
1	1	1	1	0	-	-	-	X
2	1	1	0	1	-	-	X	-
3	1	1	0	0	-	-	X	X
4	1	0	1	1	-	X	-	-
5	1	0	1	0	-	X	-	X
6	1	0	0	1	-	X	X	-
7	1	0	0	0	-	X	X	X
8	0	1	1	1	X	-	-	-
9	0	1	1	0	X	-	-	X
10	0	1	0	1	X	-	X	-
11	0	1	0	0	X	-	X	X
12	0	0	1	1	X	X	-	-
13	0	0	1	0	X	X	-	X
14	0	0	0	1	X	X	X	-
15	0	0	0	0	X	X	X	X

Note

- indicates no strapping, X indicates strapping to ground.

Table 4. Control and Monitor Word Sequence Designators.

SEQUENCE DESIGNATORS				SIGNIFICANCE
WORD 1	WORD 2	WORD 3	WORD 4	
0	4	8	C	Control word with request for status followup.
*1	5	9	D	Control word only -- no status followup desired.
**2	6	A	E	No command -- status followup only desired.

*Monitor words 1, 2, 3, and 4 contain sequence designators 1, 5, 9, or D respectively.
**These sequence designators are used to request monitor words 1, 2, 3, or 4 and must be followed immediately by the X (control word terminator), thereby bypassing the data characters in the control word structure.

4.7.2 ASCII Character Format

The special nonfunctional ASCII characters are used as word boundary delimiters for each of the control and monitor words. The nonfunctional characters are encoded/decoded in terms of a 7-bit code shown in table 5.

The functional characters contain the control and monitor data and are encoded/decoded in terms of a 4-bit code also shown in table 5. A logic 1 selects or enables a function, while a logic 0 disables a function.

Table 5. ASCII Character Codes.

4-BIT FUNCTION CODE				ASCII CHARACTER	ASCII CHARACTER 7-BIT CODE						
8 2^3	4 2^2	2 2^1	1 2^0		b_7	b_6	b_5	b_4	b_3	b_2	b_1
0	0	0	0	0	0	1	1	0	0	0	0
0	0	0	1	1	0	1	1	0	0	0	1
0	0	1	0	2	0	1	1	0	0	1	0
0	0	1	1	3	0	1	1	0	0	1	1
0	1	0	0	4	0	1	1	0	1	0	0
0	1	0	1	5	0	1	1	0	1	0	1
0	1	1	0	6	0	1	1	0	1	1	0
0	1	1	1	7	0	1	1	0	1	1	1
1	0	0	0	8	0	1	1	1	0	0	0
1	0	0	1	9	0	1	1	1	0	0	1
1	0	1	0	A	1	0	0	0	0	0	1
1	0	1	1	B	1	0	0	0	0	1	0
1	1	0	0	C	1	0	0	0	0	1	1
1	1	0	1	D	1	0	0	0	1	0	0
1	1	1	0	E	1	0	0	0	1	0	1
1	1	1	1	F	1	0	0	0	1	1	0
				*CR	0	0	0	1	1	0	1
				*LF	0	0	0	1	0	1	0
				*X	1	0	1	1	0	0	0
				*-	0	1	0	1	1	0	1
				*$	0	1	0	0	1	0	0

*Denotes special nonfunctional character

4.7.2.1 Control Word

In the following paragraphs the bit structure is shown for a typical control word. The control word is being sent to a receiver with an address of 15 and the sequence designator tells the receiver that this is a control word with a request for a status followup. The frequency the receiver will tune to is 27.548 300 MHz.

a. Word 1 (Frequency Control Word)

Note

The following characters are the same for all four control words so the format for these characters will only be shown for word 1:
Nonfunctional: # 1 (CR), #2 (LF), #3 (X)
Functional: #1 (A1), #2 (A2)

Nonfunctional character #1 — Set bits for carriage return (CR).

NONFUNCTIONAL CHARACTER #1						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	0	0	1	1	0	1

Nonfunctional character #2 — Set bits for line feed (LF).

NONFUNCTIONAL CHARACTER #2						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	0	0	1	0	1	0

Functional character #1 — Set bits to select MSD of address.

FUNCTIONAL CHARACTER #1					WILL		EXAMPLE
8	4	2	1	--	ACCEPT	---	1
0	0	A1	A1		0-3		0 0 0 1

Functional character #2 — Set bits to select LSD of address.

FUNCTIONAL CHARACTER #2					WILL		EXAMPLE
8	4	2	1	--	ACCEPT	---	5
A2	A2	A2	A2		0-9		0 1 0 1

Functional character #3 — Set bits for 0 to select sequence designator.

FUNCTIONAL CHARACTER #3				WILL ACCEPT	EXAMPLE
8	4	2	1		1
NA	NA	NA	NA	0, 1, 2	0 0 0 0

Functional character #4 — Set bits to select 10-MHz frequency.

FUNCTIONAL CHARACTER #4				WILL ACCEPT	EXAMPLE
8	4	2	1		2
0	0	10 MHz	10 MHz	0, 1, 2	0 0 1 0

Functional character #5 — Set bits to select 1-MHz frequency.

FUNCTIONAL CHARACTER #5				WILL ACCEPT	EXAMPLE
8	4	2	1		7
1 MHz	1 MHz	1 MHz	1 MHz	0-9	0 1 1 1

Functional character #6 — Set bits to select 100-kHz frequency.

FUNCTIONAL CHARACTER #6				WILL ACCEPT	EXAMPLE
8	4	2	1		5
100 kHz	100 kHz	100 kHz	100 kHz	0-9	0 1 0 1

Functional character #7 — Set bits to select 10-kHz frequency.

FUNCTIONAL CHARACTER #7				WILL ACCEPT	EXAMPLE
8	4	2	1		4
10 kHz	10 kHz	10 kHz	10 kHz	0-9	0 1 0 0

Functional character #8 — Set bits to select 1-kHz frequency.

FUNCTIONAL CHARACTER #8				WILL ACCEPT	EXAMPLE
8	4	2	1		8
1 kHz	1 kHz	1 kHz	1 kHz	0-9	1 0 0 0

Functional character #9 — Set bits to select 100-Hz frequency.

FUNCTIONAL CHARACTER #9				WILL ACCEPT	EXAMPLE
8	4	2	1		3
100 Hz	100 Hz	100 Hz	100 Hz	0-9	0 0 1 1

Functional character #10 — Set bits to select 10-Hz frequency. (Only used with receiver that can be tuned to 10 Hz or 1 Hz. Set to zeros for 100-Hz tuning.)

FUNCTIONAL CHARACTER #10					WILL		EXAMPLE
8	4	2	1	--	ACCEPT	---	0
10 Hz	10 Hz	10 Hz	10 Hz		0-9		0 0 0 0

Functional character #11 — Set bits to select 1-Hz frequency. (Only used with receiver that can be tuned to 1 Hz. Set to zeros for 10-Hz and 100-Hz tuning.)

FUNCTIONAL CHARACTER #11					WILL		EXAMPLE
8	4	2	1	--	ACCEPT	---	0
1 Hz	1 Hz	1 Hz	1 Hz		0-9		0 0 0 0

Nonfunctional character #3 — Set bits for execute (X).

NONFUNCTIONAL CHARACTER #3						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	0	1	0	0

b. Word 2 (Mode Control Word)

Functional character #3 — Set bits to 4 to select sequence designator.

FUNCTIONAL CHARACTER #3					WILL		EXAMPLE
8	4	2	1	--	ACCEPT	---	4
NA	NA	NA	NA		4, 5, 6		0 1 0 0

Word 2 functional characters #4 and #5 provide approximately 3-dB gain reduction per step. All zeros code indicates maximum gain (no gain reduction), all ones code indicates minimum gain (maximum gain reduction, approximately 93 dB). From a remote control unit, the least significant bit, rf gain (1), is not controllable and is always zero. Therefore, only up to 16-bit wts (0 through 30, even numbered wts only) are available with approximately 6-dB gain reduction per step (maximum gain reduction, approximately 90 dB).

Functional character #4 — Set bit to enable rf gain bit wt 16 (example: bit wt 16)

FUNCTIONAL CHARACTER #4					WILL		EXAMPLE
8	4	2	RF GAIN 1	--	ACCEPT	---	1
0	0	0	(16)		0, 1		0 0 0 1

Functional character #5 — Set bits to enable rf gain bit wts 8, 4, 2, 1 (example: bit wt 13). When combined with functional character #4, provides up to 32-bit wts (0 through 31) rf gain control.

FUNCTION CHARACTER #5				WILL	EXAMPLE
8	4	2	1	ACCEPT	D
RF GAIN (8)	RF GAIN (4)	RF GAIN (2)	RF GAIN (1)	0-9, A-F	1 1 0 1

Word 2 functional characters #6 and part of #8 (filter enables) are associated with AM, CW, and FM modes. The FL 16 EN bit in character #8 is a standard 16-kHz bandwidth filter; FL A through FL E are optional bandwidth filters (selected to suit specific requirements). Only one of the bandwidth filters should be enabled at any one time.

Functional character #6 — Set bits to enable filter B, C, D, or E (example: FL E enabled).

FUNCTIONAL CHARACTER #6				WILL	EXAMPLE
8	4	2	1	ACCEPT	8
FLE EN	FLD EN	FLC EN	FLB EN	0, 1, 2, 4, 8	1 0 0 0

Functional character #7 — Set bits to set AGC decay times of channels A2 and B2. Bits wts 1 and 2 correspond to channel A2 bcd wts 1 and 2. Bit wts 4 and 8 correspond to channel B2 bcd wts 1 and 2. AGC set as follows:

bcd wt 0 = AGC DECAY FAST
1 = AGC DECAY SLOW
2 = AGC DECAY MED
3 = AGC DECAY OFF

(example: channel A2 AGC off, channel B2 AGC slow).

FUNCTIONAL CHARACTER #7				WILL	EXAMPLE
CH B2 8	CH B2 4	CH A2 2	CH A2 1	ACCEPT	7
AGC	AGC	AGC	AGC	0-9, A-F	0 1 1 1

Functional character #8 — Set bits to enable filter A or 16, vbfo, and AFC (example: FL A, vbfo, and AFC are enabled).

FUNCTIONAL CHARACTER #8				WILL	EXAMPLE
8	4	2	1	ACCEPT	B
FLA EN	FL16 EN	VBFO EN	AFC EN	0-9, A, B	1 0 1 1

Functional character #9 — Set bits to set AGC decay times of channels A1 and B1. Bit wts 1 and 2 correspond to channel A1 bcd wts 1 and 2. Bits wts 4 and 8 correspond to channel B1 bcd wts 1 and 2. AGC set as shown for character #7 (example: channel A1 AGC fast, channel B1 AGC med).

FUNCTIONAL CHARACTER #9				WILL	EXAMPLE
CH B1 — 8	CH B1 — 4	CH A1 — 2	CH A1 — 1	ACCEPT	8
AGC	AGC	AGC	AGC	0-9, A-F	1 0 0 0

Functional character #10 — Set bits to select MODE (example: ISB mode enabled).

FUNCTIONAL CHARACTER #10				WILL	EXAMPLE
NET — 8	4	2	1	ACCEPT	1
DATA EN	AM EN	CW EN	ISB EN	1, 2, 4, 8	0 0 0 1

Functional character #11 — Set bits to select ISB channel. Mode must be ISB or NET DATA (example: channels B2, A1 enabled).

FUNCTIONAL CHARACTER #11				WILL	EXAMPLE
8	4	2	1	ACCEPT	A
B2 EN	B1 EN	A1 EN	A2 EN	0-9, A-F	1 0 1 0

c. Word 3 (VBFO Control Word)

Functional character #3 — Set bits to 8 to select sequence designator.

FUNCTIONAL CHARACTER #3				WILL	EXAMPLE
8	4	2	1	ACCEPT	8
NA	NA	NA	NA	8, 9, A	1 0 0 0

Functional characters #4 through #7 set vbfo offset frequency (example: +4500 Hz).

Functional character #4 — Set bit to set vbfo offset sign (0 = +, 1 = -, example: +)

FUNCTIONAL CHARACTER #4				WILL	EXAMPLE
8	4	2	VBFO — 1	ACCEPT	0
0	0	0	SIGN	0, 1	0 0 0 0

Functional character #5 — Set bits to set vbfo offset 1 kHz (example: 4 kHz).

FUNCTIONAL CHARACTER #5				WILL	EXAMPLE
VBFO — 8	VBFO — 4	VBFO — 2	VBFO — 1	ACCEPT	4
1 kHz	1 kHz	1 kHz	1 kHz	0-9	0 1 0 0

Functional character #6 — Set bits to set vbfo offset 100 Hz (example: 500 Hz).

FUNCTIONAL CHARACTER #6				WILL	EXAMPLE
VBFO 8	VBFO 4	VBFO 2	VBFO 1	ACCEPT	5
100 Hz	100 Hz	100 Hz	100 Hz	0-9	0 1 0 1

Functional character #7 — Set bits to set vbfo offset 100 Hz (example: 00 Hz).

FUNCTIONAL CHARACTER #7				WILL	EXAMPLE
VBFO 8	VBFO 4	VBFO 2	VBFO 1	ACCEPT	0
10 Hz	10 Hz	10 Hz	10 Hz	0-9	0 0 0 0

Functional characters #8 through #10 are not used and the bits are set to zero.

Functional character #11 — Set bits to enable AGC common bus line (example: channels A1 and B1 connected to bus line, channels A2 and B2 are not).

FUNCTIONAL CHARACTER #11				WILL	EXAMPLE
B2 8	B1 4	A1 2	A2 1	ACCEPT	6
AGC BUS	AGC BUS	AGC BUS	AGC BUS	0-9, A-F	0 1 1 0

d. Word 4 (Key Control Word)

Contains only four functional characters. Functional characters #1 and #2 are identical to words 1, 2, and 3 as explained above.

Functional character #3 — Set bits to C to select sequence designator.

FUNCTIONAL CHARACTER #3				WILL	EXAMPLE
8	4	2	1	ACCEPT	C
NA	NA	NA	NA	C, D, E	1 1 0 0

Functional character #4 is not used and the bits are set to zero.

4.7.2.2 Monitor Word

In the following paragraphs the bit structure that differs from that of the control word is shown. The bit structure that is the same for the control and monitor words is noted. The address characters (functional characters #1 and #2) are the same as for the control word and will not be repeated here.

a. Word 1 (Frequency Monitor Word)

Note

The following characters are the same for all four monitor words so the format for these characters will only be shown for word 1:
Nonfunctional: #1 (-), #2 (-), #3 ($)

Nonfunctional character #1 — Set bits for hyphen (-).

NONFUNCTIONAL CHARACTER #1						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	1	1	0	1

Nonfunctional character #2 — Set bits for hyphen (-).

NONFUNCTIONAL CHARACTER #2						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	1	1	0	1

Functional character #3 — Set bits for 1 to select sequence designator.

FUNCTIONAL CHARACTER #3					WILL		EXAMPLE			
8	4	2	1	--	ACCEPT	---	1			
NA	NA	NA	NA		1		0	0	0	1

Functional characters #4 through #11 same as for control word 1 (paragraph 4.7.2.1.a).

Nonfunctional character #3 — Set bits for dollar sign ($)

NONFUNCTIONAL CHARACTER #3						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	0	1	0	0

b. Word 2 (Mode Monitor Word)

Functional character #3 — Set bits for 5 to select sequence designator.

FUNCTIONAL CHARACTER #3				WILL ACCEPT	EXAMPLE
8	4	2	1		5
NA	NA	NA	NA	5	0 1 0 1

Functional characters #4 through #11 same as for control word 2 (paragraph 4.7.2.1.b).

c. Word 3 (VBFO Monitor Word)

Functional character #3 — Set bits for 9 to select sequence designator.

FUNCTIONAL CHARACTER #3				WILL ACCEPT	EXAMPLE
8	4	2	1		9
NA	NA	NA	NA	9	1 0 0 1

Functional characters #4 through #11 same as for control word 3 (paragraph 4.7.2.1.c).

d. Word 4 (Performance and Fault Monitor Word)

Word 4 contains performance monitor and fault information that can be used in a processor-controlled system to detect faults in the receiver or units controlled by the receiver, or to detect unsatisfactory performance in the receive signal path.

Functional character #3 — Set bits for D to select sequence designator.

FUNCTIONAL CHARACTER #3				WILL ACCEPT	EXAMPLE
8	4	2	1		D
NA	NA	NA	NA	D	1 1 0 1

Functional character #4 — Receiver fault and receive overload monitor, logic 1 indicates fault/overload (example: receiver fault, no receive overload).

FUNCTIONAL CHARACTER #4				WILL ACCEPT	EXAMPLE
8	4	RECEIVER 2	RECEIVE 1		2
0	0	FAULT	OVERLOAD	0-3	0 0 1 0

Functional character #5 — Af monitors, logic 0 indicates line audio output exceeds -6 dB of nominal AGC controlled output level (example: all channels have audio output within monitor range).

FUNCTIONAL CHARACTER #5				WILL ACCEPT	EXAMPLE
B2 8	B1 4	A1 2	A2 1		0
AF MON	AF MON	AF MON	AF MON	0-9, A-F	0 0 0 0

Functional character #6 — Synthesizer 10-Hz, 100-Hz, and 1-kHz loss-of-lock faults, logic 1 indicates out of lock (example: all signals locked).

FUNCTIONAL CHARACTER #6				WILL	EXAMPLE
8	10-Hz 4	100-Hz 2	1-kHz 1	ACCEPT	0
0	LOCK FAULT	LOCK FAULT	LOCK FAULT	0-7	0 0 0 0

Functional character #7 — Synthesizer 10-kHz, 100-kHz, and output (1-MHz and 10-MHz) loss-of-lock faults and synthesizer reference faults (9.9-MHz, 118-MHz, or 450-kHz injection levels insufficient), logic 1 indicates out of lock/fault (example: 10-kHz and 100-kHz unlocked, output locked and injection levels sufficient).

FUNCTIONAL CHARACTER #7				WILL	EXAMPLE
10-kHz 8	100-kHz 4	SYNTH 2	SYNTH 1	ACCEPT	C
LOCK FAULT	LOCK FAULT	OUTPUT LOCK FAULT	REF LOCK FAULT	0-9, A-F	1 1 0 0

Functional character #8 — Synthesizer subcarrier and vbfo synthesizer loss-of-lock faults, logic 1 indicates out of lock for either subcarrier injection phase-lock loop and for vbfo synthesizer phase-lock loop. Receiver power supply fault, logic 1 indicates loss of any of the power supply voltages except +5 V dc. Loss of +5 V dc power voltage will cause a logic 0 to be presented regardless of the state of the other power supply voltages (example: synthesizer subcarrier unlocked, vbfo synthesizer locked, receiver power supply fault).

FUNCTIONAL CHARACTER #8				WILL	EXAMPLE
8	SYNTH 4	VBFO 2	1	ACCEPT	5
0	SUBCAR LOCK FAULT	SYNTH LOCK FAULT	RECEIVER PWR SPL FAULT	0-7	0 1 0 1

Functional character #9 — If AGC monitors, logic 0 indicates signal level NLT 20 dB above AGC threshold (example: B1 signal level low, all others NLT 20 dB above AGC threshold).

FUNCTIONAL CHARACTER #9				WILL	EXAMPLE
B2 8	B1 4	A1 2	A2 1	ACCEPT	4
AGC MON	AGC MON	AGC MON	AGC MON	0-9, A-F	0 1 0 0

Functional character #10 — External standard, logic 1 when operating using an external frequency standard reference; AFC lock monitor, logic 1 when AFC is enabled and has acquired lock with an input signal; rf performance monitor, logic 0 when if output of channel A1 if amplifier exceeds 0.5 V rms (corresponds to 100-mV rms receiver input signal) (example: using an external frequency standard, AFC not enabled, no rf signal input).

FUNCTIONAL CHARACTER #10					WILL		EXAMPLE
8	4	2	1	—	ACCEPT	---	4
0	EXT STD	AFC LOCK MON	RF PERF MON		0-7		0 1 0 0

Functional character #11 — Preselector fault, logic 1 indicates fault; data error, logic 1 if any of the following errors exist — received character parity, framing error, overrun error, invalid character sequence; local control, logic 1 when CONT switch is LCL or MON position; monitor, logic 1 when CONT switch in MON position (example: no preselector fault, no data error, CONT switch in LCL position).

FUNCTIONAL CHARACTER #11					WILL		EXAMPLE
8	4	2	1	—	ACCEPT	---	2
PRESEL FAULT	DATA ERROR	LOCAL CONTROL	MONITOR		0-9, A-F		0 0 1 0

4.7.3 8-Bit Word Format

The control and monitor data word formats are identical with one exception; control word 4 uses only the first two characters of the five characters shown in figure 6. Monitor word 4 contains all five characters. Status request is accomplished by sending only the first two characters of the desired word.

4.7.4 8-Bit Character Format

The first character of each word is organized the same; it uses bits b8 and b7 for word synchronization, bits b6 and b5 for word identification, and bits b4 through b1 for unit identification. As many as 16 units can be addressed on one control and monitor bus, using all combinations of the 4-bit addresses. The address of each unit is established by strapping the proper pins to ground in the mating connector for J14. See paragraph 3.1.3 of installation section. Bits b8 and b7 of the second character in each control word determine whether the control word sent from the control is new control information or a status request only. Bits b8 and b7 of the second character in each monitor word are always the same; bit b8 is always logic 0 and bit b7 is always logic 1.

The following paragraphs give the bit structure that is used for each of the four control words.

a. Word 1 (Frequency Control Word)

   Character 1 — Set bits as indicated in figure 6.

   Character 2 — Set b8 and b7 as indicated in note 1 of figure 6.

   Remainder of word 1 — Set pattern to correspond to bcd frequency information to be transmitted to the controlled receiver (logic 1 enable, logic 0 disable).

b. Word 2 (Mode Control Word)

   Character 1 — Set bits as indicated in figure 6.

   Character 2 — Set b8 and b7 as indicated in note 1 of figure 6.

   Remainder of character 2, set b5 through b1 for rf gain reduction steps, bcd 1 through 31. Because the LSB (b1) is always logic 0 in the remote control unit, 15 steps of gain reduction (approximately 6 dB per step) are available for a total gain reduction of 90 dB.

   Character 3 — Set one bit only of b8 through b5 (and character 4, b8 and b7) to logic 1 to select filter.

WORD	CHARACTER	STOP BIT	PARITY BIT	B8	B7	B6	B5	B4	B3	B2	B1	START BIT	
1	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	0	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\bar{C}$=0	$\bar{S}$=1	FREQ (10 MHz) (2)	(1)	FREQ (1 MHz) (8)	(4)	(2)	(1)	0	①
	3	1	X	FREQ (100 kHz) (8)	(4)	(2)	(1)	FREQ (10 kHz) (8)	(4)	(2)	(1)	0	
	4	1	X	FREQ (1 kHz) (8)	(4)	(2)	(1)	FREQ (100 Hz) (8)	(4)	(2)	(1)	0	
	5	1	X	FREQ (10 Hz) (8)	(4)	(2)	(1)	FREQ (1 Hz) (8)	(4)	(2)	(1)	0	
2	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	1	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\bar{C}$=0	$\bar{S}$=1	0	(16)	RF GAIN CONTROL (8)	(4)	(2)	(1)	0	① ②
	3	1	X	FILTER SELECT FLE	FLD	FLC	FLB	CHAN B2 AGC (2)	(1)	CHAN A2 AGC (2)	(1)	0	③
	4	1	X	FILTER SELECT FLA	16 kHz	VBFO ENABLE	AFC ENABLE	CHAN B1 AGC (2)	(1)	CHAN A1 AGC (2)	(1)	0	③
	5	1	X	MODE SELECT NET DATA	AM	CW	ISB	CHAN B2 ENABLE	CHAN B1 ENABLE	CHAN A1 ENABLE	CHAN A2 ENABLE	0	
3	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	0	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\bar{C}$=0	$\bar{S}$=1	0	VBFO SIGN	VBFO OFFSET FREQ (1 kHz) (8)	(4)	(2)	(1)	0	①
	3	1	X	VBFO OFFSET FREQ (100 Hz) (8)	(4)	(2)	(1)	VBFO OFFSET FREQ (10 Hz) (8)	(4)	(2)	(1)	0	
	4	1	X	AUXILIARY								0	
	5	1	X	RESERVED				CHAN B2 AGC BUS	CHAN B1 AGC BUS	CHAN A1 AGC BUS	CHAN A2 AGC BUS	0	
4	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	1	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\bar{C}$=0	$\bar{S}$=1	RECEIVER FAULT	RECEIVE OVERLOAD	B2 AF MON	B1 AF MON	A1 AF MON	A2 AF MON	0	① ④
	3	1	X	0	10 Hz LOCK FAULT	100 Hz LOCK FAULT	1 kHz LOCK FAULT	10 kHz LOCK FAULT	100 kHz LOCK FAULT	SYN OUT LOCK FAULT	FREQ REF FAULT	0	⑤
	4	1	X	0	SUBCARR LOCK FAULT	VBFO SYNTH FAULT	RECEIVER PWR SPLY FAULT	B2 AGC MON	B1 AGC MON	A1 AGC MON	A2 AGC MON	0	⑤
	5	1	X	0	EXTERNAL STANDARD	AFC LOCK MON	RF PERF MON	PRE-SELECTOR FAULT	DATA ERROR	LOCAL CONTROL	MONITOR	0	⑤

NOTES:

① THE COMMAND (C) AND STATUS (S) REQUEST BITS ARE CODED AS FOLLOWS:

B8 C	B7 S	SIGNFICANCE
0	0	COMMAND WORD WITH STATUS REQUEST
0	1	COMMAND WORD ONLY-NO STATUS DESIRED
1	0	STATUS REQUEST ONLY (2 CHARACTER SEQUENCE)
1	1	THIS COMBINATION NOT ALLOWED

② RF GAIN CONTROL IS FIVE BITS BINARY CODED, APPROXIMATELY 3-dB GAIN REDUCTION PER STEP (PROCESSOR CONTROL APPLICATIONS) OR FOUR BITS (LEAST SIGNIFICANT BIT SET TO ZERO), APPROXIMATELY 6-dB GAIN REDUCTION PER STEP (CONTROL UNIT APPLICATIONS). ALL "ZERO" CODE INDICATES NO GAIN REDUCTION, PROGRESSING IN BINARY STEPS TO THE ALL "ONES" CODE FOR MAXIMUM GAIN REDUCTION.

③ FILTER BANDWIDTH DESIGNATIONS ARE DEFINED AS FOLLOWS:

16 -- FL1 C -- FL5
A -- FL3 D -- FL6
B -- FL4 E -- FL7

④ WORD 4 COMMAND OR STATUS REQUEST IS ONLY TWO CHARACTERS LONG.

⑤ CHARACTERS 3, 4, AND 5 OF MONITOR WORD 4 CONTAIN FAULT AND PERFORMANCE MONITOR BITS FOR WHICH NO CORRESPONDING CONTROL BITS EXIST. THE "DATA ERROR" BIT IS THE LOGICAL SUM OF THE FOLLOWING CONDITIONS:

A. RECEIVED CHARACTER PARITY ERROR.
B. FRAMING ERROR (NO VALID STOP RECEIVED WITH THE CHARACTER).
C. OVERRUN ERROR (PREVIOUS CHARACTER WAS NOT PROCESSED BEFORE THE CURRENT CHARACTER WAS RECEIVED).
D. INVALID CHARACTER SEQUENCE.

⑥ 1 = LOGIC 1
0 = LOGIC 0
X = FUNCTION OF STRAPPING
(1) = BIT WEIGHT

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8-Bit Character Control and Monitor Word Format
Figure 6

Bits b4 through b1 are set as follows to select AGC decay time.

CHANNEL B2		CHANNEL A2		AGC
b4	b3	b2	b1	
1	1	1	1	OFF
1	0	1	0	SLOW
0	1	0	1	FAST
0	0	0	0	MED

Character 4 — Set one bit only of b8 and b7 (and character 3, b8 through b5) to logic 1 to select filter. Set b6 and b5 to logic 1 to enable function. Set b4 through b1 as outlined for character 3 b4 through b1. (Selects AGC decay time for channels B1 and A1.)

Character 5 — Set appropriate bit to logic 1 to enable desired function, logic 0 to disable function.

Note

For AM and CW mode, a filter (character 3, b8 through b5 or character 4 b8 or b7) must be selected. Know the complement of filters in the receiver being controlled. For ISB and NET DATA mode, one or more channels (B2, B1, A1, A2) must be enabled.

c. Word 3 (VBFO Control Word)

Character 1 — Set bits as indicated in figure 6.

Character 2 — Set b8 and b7 as indicated in note 1 of figure 6.

Remainder of character 2, set b5 to logic 0 if vbfo offset is positive, logic 1 if negative. Set b4 through b1 to bcd code of desired vbfo 1-kHz frequency digit.

Character 3 — Set b8 through b1 to bcd code of desired 100-Hz and 10-Hz vbfo frequency digits.

Character 4 — Not used.

Character 5 — b8 through b5 not used. Set b4 through b1 to logic 1 to connect appropriate channels to AGC bus line.

d. Word 4 (Key Control and Monitor Word)

Character 1 — Set bits as indicated in figure 6.

Character 2 — Set b8 and b7 as indicated in note 1 of figure 6.

Remainder of word 4 — Status information only as follows. (Information sent to control station from receiver for monitoring purposes.)

4.7.5 Performance Monitor and Fault Information

Word 4 contains performance monitor and fault information that can be used in a processor-controlled system to detect faults in the receiver or units controlled by the receiver, or detect unsatisfactory performance in the receive signal path.

a. Fault Monitors

Receiver fault (character 2, b6) — Logic 1 fault summary of synthesizer lock fault and power supply fault. Latches on power supply fault to indicate short term power failures. Requires control sending frequency command (word 1) to reset to logic 0.

Receive overload (character 2, b5) — Logic 1 when receive rf overload exists in receiver or preselector, logic 0 if no receive rf overload.

10-Hz lock fault (character 3, b7) — Logic when 10-Hz decade phase-lock loop is unlocked, logic 0 if locked.

100-Hz lock fault (character 3, b6) — Logic 1 when 100-Hz decade phase-lock loop is unlocked, logic 0 if locked.

1-kHz lock fault (character 3, b5) — Logic 1 when 1-kHz decade phase-lock loop is unlocked, logic 0 if locked.

10-kHz lock fault (character 3, b4) — Logic 1 when 10-kHz decade phase-lock loop is unlocked, logic 0 if locked.

100-kHz lock fault (character 3, b3) — Logic 1 when 100-kHz decade phase-lock loop is unlocked, logic 0 if locked.

Synthesizer output lock fault (character 3, b2) — Logic 1 when 10/1-MHz phase-lock loop is unlocked, logic 0 if locked.

Frequency reference fault (character 3, b1) — Logic 1 when any synthesizer reference injection output (9.9 MHz, 118 MHz, or 450 kHz) is insufficient, logic 0 if all are satisfactory.

Subcarrier lock fault (character 4, b7) — Logic 1 when either subcarrier phase-lock loop is unlocked, logic 0 if both are locked.

Vbfo synthesizer fault (character 4, b6) — Logic 1 when vbfo phase-lock loop is unlocked, logic 0 if locked.

Receiver power supply fault (character 4, b5) — Logic 1 if any power supply voltage (except +5 V dc) fails, logic 0 if all power supply voltages are okay or +5 V dc supply fails.

Preselector fault (character 5, b4) — Logic 1 if receiver receives preselector fault indication from associated preselector, logic 0 if no fault.

Data error (character 5, b3) — Logic 1 when data error occurs in receiving control information since last monitor data response, logic 0 if no data error. Reset when any monitor word is transmitted from receiver.

b. Performance Monitors

Logic 0 signal from the rf performance monitor indicates presence of signal.

Channel B2 af monitor (character 2, b4), channel B1 af monitor (character 2, b3), channel A1 af monitor (character 2, b2) channel A2 af monitor (character 2, b1) — Logic 0 when receive audio out exceeds a level that is 6 dB below nominal AGC controlled output level, logic 1 if less than 6 dB below nominal AGC controlled output level.

Channel B2 AGC monitor (character 4, b4), channel B1 AGC monitor (character 4, b3), channel A1 AGC monitor (character 4, b2), channel A2 AGC monitor (character 4, b1) — Logic 0 when received signal is 20 dB or more above AGC threshold, logic 1 if less than 20 dB above AGC threshold.

External standard (character 5, b7) — Logic 1 when external standard is being used, logic 0 when internal standard is being used (logic level not defined when internal/external switchover module is not used).

AFC lock monitor (character 5, b6) — Logic 1 when AFC is on and locked on frequency, logic 0 when AFC is unlocked.

RF performance monitor (character 5, b5) — Logic 0 when signal level at channel A1 if input exceeds 0.5 V rms (equivalent to 100-mV rms input signal), logic 1 when signal is less than this.

Local control (character 5, b2) — Logic 1 when receiver is in local control mode, logic 0 when in remote.

Monitor (character 5, b1) — Logic 1 when receiver front-panel control switch is pressed to MON position. Can be used, for example, for operator to store front-panel settings in preset table in the processor.

THEORY

HF-8094
Receiver Control

Rockwell International

theory

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1. GENERAL

Two methods of serial data signaling are used in the HF-8094 Receiver Control and are strap selectable on the serial interface card. The two methods are frequency-shift keyed audio tones (FSK) and RS-232C data logic levels. In conjunction with selection of the RS-232C signaling, strapping is available to invert the polarity of the RS-232C data for compatibility with the logic polarity and voltage levels defined in MIL-STD-188C.

When the FSK method is selected, only one remote HF-8054A Receiver may be controlled and monitored by a single receiver control. When the RS-232C logic level signaling method is selected, up to sixteen individually addressable remote receivers may be controlled and monitored by a single receiver control. Also, when using the RS-232C method, the receiver control may be connected directly to the receiver or the connection may be over long distances by data modems.

Two separate sets of data lines are used with the receiver control. One set, called the control bus, is used to transmit command data. The other set, called the monitor bus, is used to receive status information. When using FSK signaling, the control and monitor buses are balanced 600-Ω audio lines. When strapped for RS-232C signaling, the control and monitor buses are unbalanced line to ground. The data transmission rate on the control and monitor buses is strap selectable on the serial interface card. Transmission rates are 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, and 19 200 baud. The usable data rates for the FSK signaling method are limited to not more than 600 baud. Each receiver must be strapped for the same data rate as the associated receiver control.

Data transmitted and received on the control and monitor buses is serial and asynchronous. The data is organized into groups of characters called words. Control data bits are determined by settings of the receiver control front-panel switches and controls. Monitor data bits are determined by the current operational status of the receiver.

Two data formats are available, and are switch selectable on serial interface A13. One format uses 7-bit ASCII characters and the other format uses an 8-bit character format. The input to serial interface A13 is the same for both formats. Both data formats are discussed, in detail, in the operation section.

2. FUNCTIONAL THEORY

The functional theory discussion covers the following five areas: power distribution, control function, frequency and address selection function, audio function, and monitor function. A block diagram is included in each discussion. For detailed circuit diagrams, refer to the schematics in the diagrams section and to the individual circuit card instructions in the back of this manual.

2.1 Overall Unit (Refer to figure 1.)

The receiver control supplies control information to the remote receiver. Control information, in parallel format from the front panel controls, is converted to serial information for application to the receiver. Audio from the receiver is supplied to the receiver control on four separate lines. Monitor signals are applied from the receiver to the receiver control to indicate the operating status of the receiver.

The front-panel-developed frequency, enable, AGC, mode, and bandwidth information signals are applied in parallel format to parallel input A11. Circuits on this card process the parallel information and apply the resulting signals to serial interface A13. Start, parity, and stop bits are added on serial interface A13 to form the complete data word. Address information, also from the front panel, is applied directly to serial interface A13. The address and data information, combined to form the four data words, are supplied in serial format to the receiver.

Monitor information is returned, in serial format, from the receiver to serial interface A13. This card decodes the information and applies the monitor data to parallel output A12. Circuits on parallel output A12 convert the monitor data from serial-to-parallel format and apply the resulting signals to the indicators on the front panel. These indicators display the status of the operating condition of the receiver under control.

Receive audio A6 is used to amplify the audio signal from the HF-8054A Receiver when 2-channel (A1, B1) operation is required. When 4-channel (A1, B1, A2, B2) operation is required, 2 receive audio cards, A6 and A4, are used to produce the 4-channel audio output. Because the 2 receive audio cards are identical, reference is made to only one circuit card in the following discussion.

Receive audio A6 amplifies the audio signals from the HF-8054A Receiver and develops outputs to the speaker, headphones, and the A1, B1, AF line outputs. Front-panel-mounted SPEAKER, AF GAIN-SQUELCH and PHONES controls determine the outputs from receive audio A6.

Audio for the speaker is selected from any one of the input channels by the SPEAKER control. The squelch control enables/disables the squelch circuit and determines the squelch threshold. The AF GAIN control determines the audio level output at the speaker. The PHONES control selects which channel audio is applied to the PHONES jack and what the audio level will be.

2.2 *Power Distribution (Refer to figure 2.)*

Primary input power to the receiver control can be either 100, 115, 215, or 230 V ac. Input power select switch S1 on power supply A1 must be set to the position that corresponds to the primary input power used. The input ac voltage is converted to regulated dc outputs to supply the various circuits. Voltages used in the receiver control are: +5, +8, +24, -15, +15, and +18 V dc. A zener-regulated circuit on parallel output A12 develops +5.6 V dc from the +15-V dc input for use by several logic components on the card. Figure 2 shows how these output voltages are distributed from power supply A1 to the circuit cards and modules.

2.3 *Control and Address Functions (Refer to figure 3.)*

Parallel data outputs from the front-panel switches are applied to parallel input A11 for processing and then applied to serial interface A13. The serial interface A13 output to the remote receiver is control words in serial format.

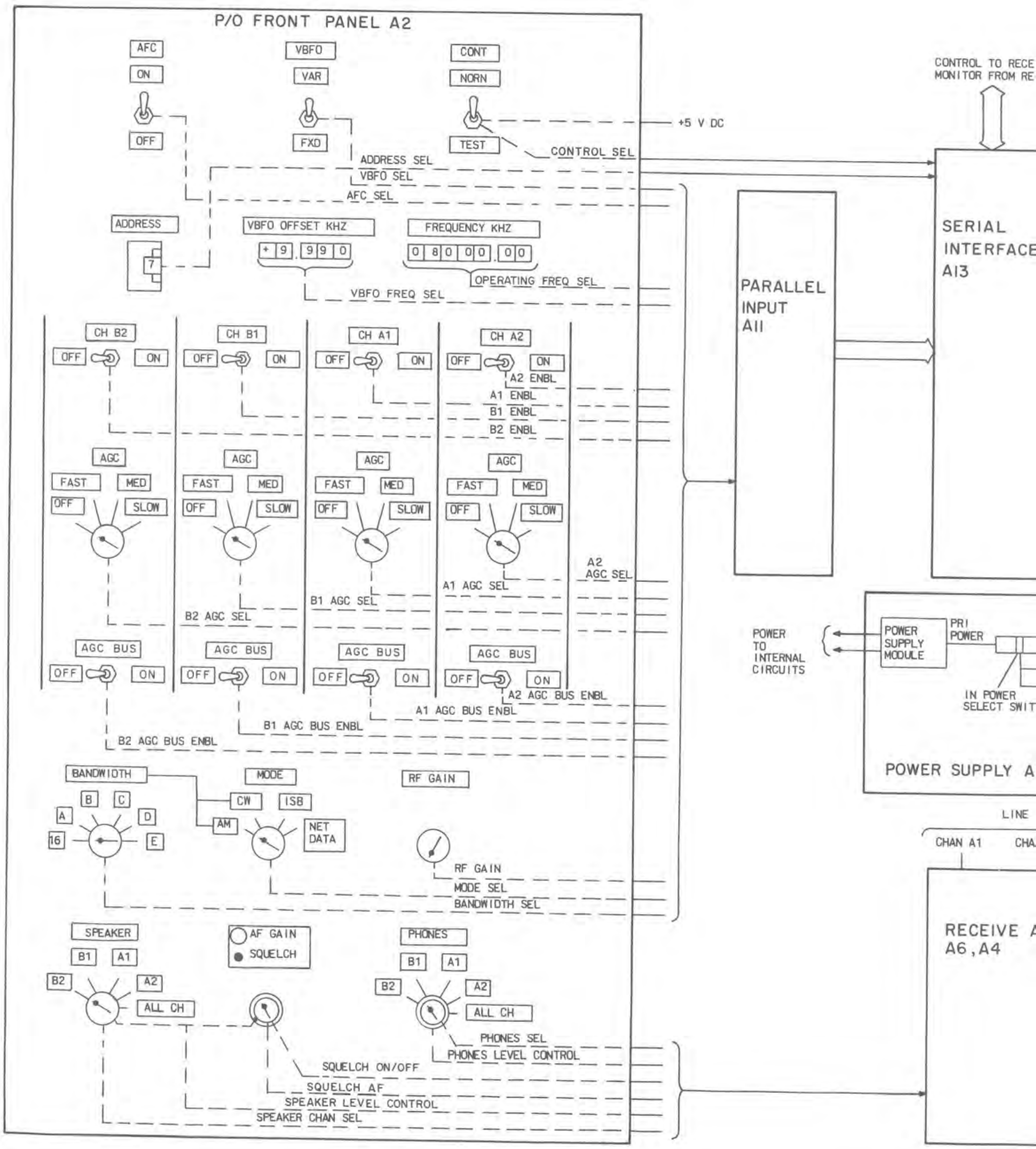
Control information from the front-panel switches is applied to the multiplexers on parallel input A11. The multiplexer input is selected by the MUX 1 - MUX 8 inputs from serial interface A13. The MD 1 - MD 8 output of parallel input A11 is converted from parallel to serial data on microprocessor-controlled serial interface A13. Switch S4 on serial interface A13 selects either the FSK or RS-232 output that is applied to the receiver control bus.

The ADDRESS switch on the front panel is used to select the receiver to be controlled. The ADDRESS switch develops a 4-bit output for each of the sixteen switch positions. These four bits are applied directly to serial interface A13. Address bits are input by U1 through U14 and combined with data from parallel input A11 to form a complete character. Each character is then serially transmitted, by U2, to the control bus. Each receiver under control is strapped for a particular address. Data from the control bus is not accepted by a receiver unless the word address is the same as the strapping. Thus, any one of up to 16 receivers may be under control of the same receiver control.

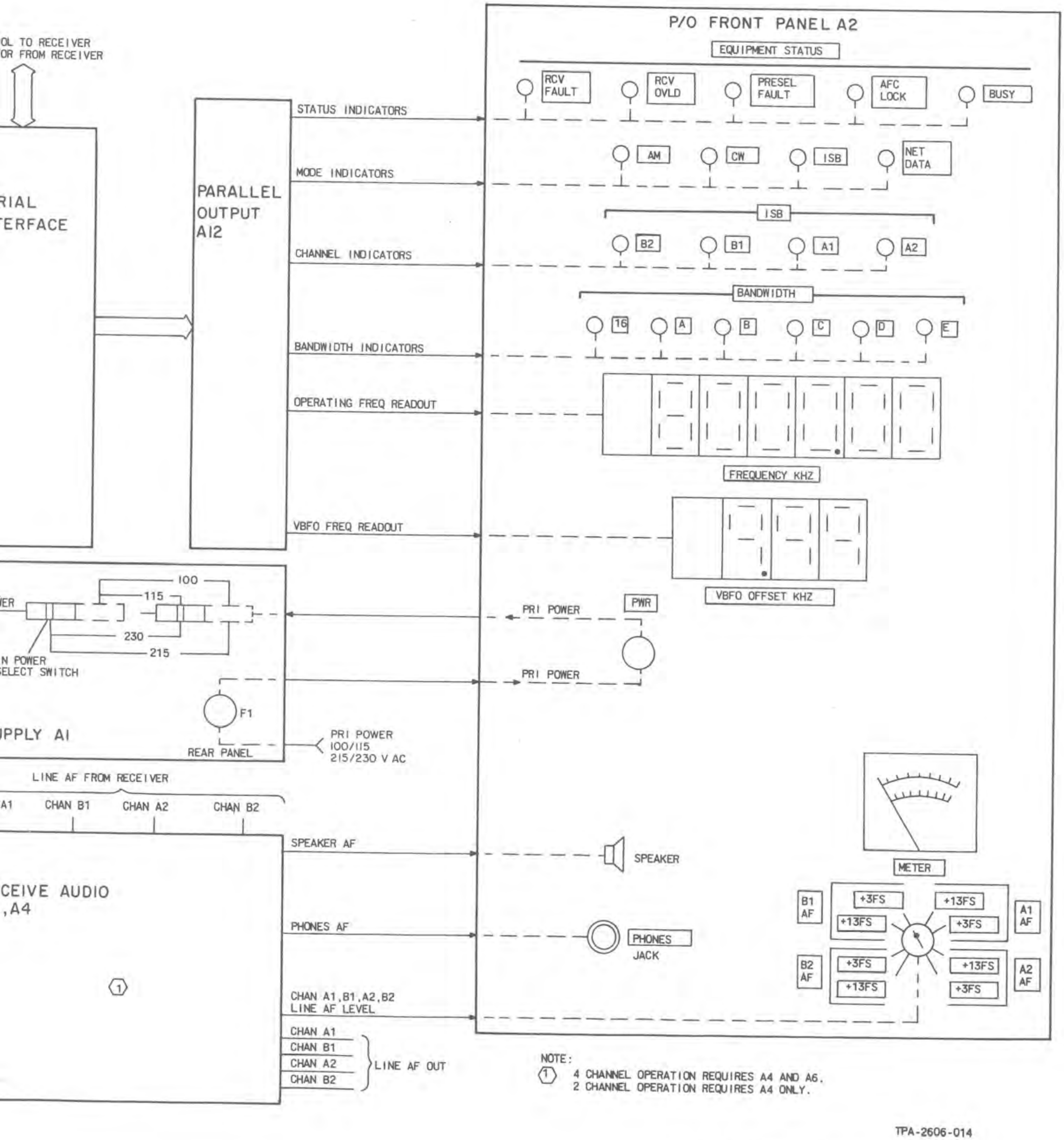
The address number, binary data pattern and address recognition strapping are shown in table 1.

Four separate words are required to completely control the receiver. The control words are independent of each other, thus can be transmitted at any time and in any sequence.

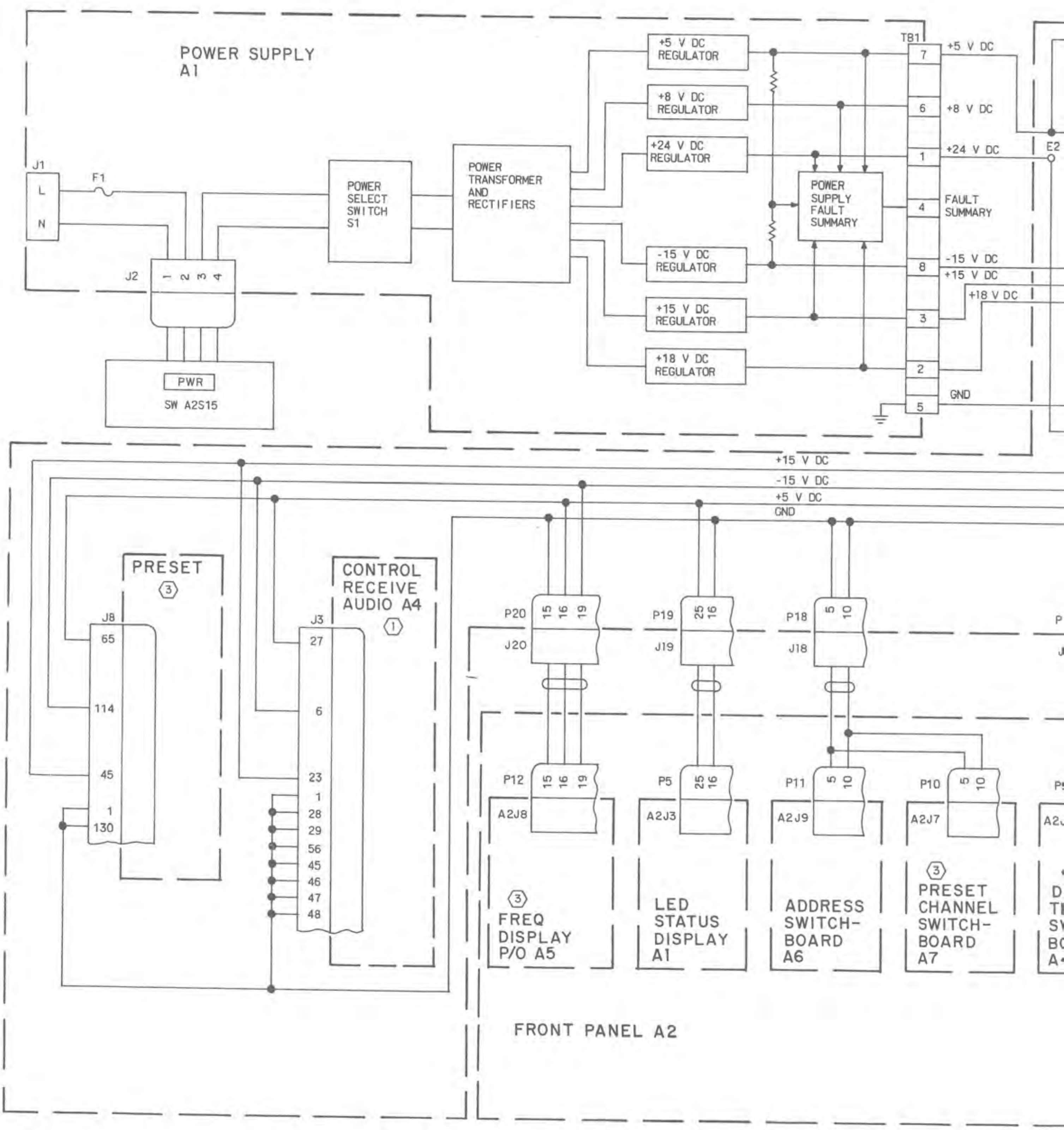
The control and monitor words are identical except for those monitor bits that have no corresponding control functions, such as fault bits and performance monitor bits. These exceptions are in word 4 of both the 8-bit word format and the ASCII word format. Control word 4 in the 8-bit format is made up of character number 1, and bits 7 and 8 of character number 2, refer to figure 4. Monitor word number 4 in the same format contains all 5 characters shown in figure 4. In both formats, word 1 contains frequency information; word 2 is used to determine rf gain, bandwidth, modes of operation, channel operation, AGC time constants, vbfo enable and AFC enable; word 3 contains vbfo offset frequency and AGC bus information. Control word 4 is a status request only. Five equipment status bits in monitor word 4 are used by the receiver control. They are receiver fault, receiver overload, preselector fault, AFC lock and busy. The remaining monitor bits in word 4 are not used with the receiver control. The logic sense of the enable-type bits is defined as a logic 1 that enables a function and a logic 0 that disables a function.



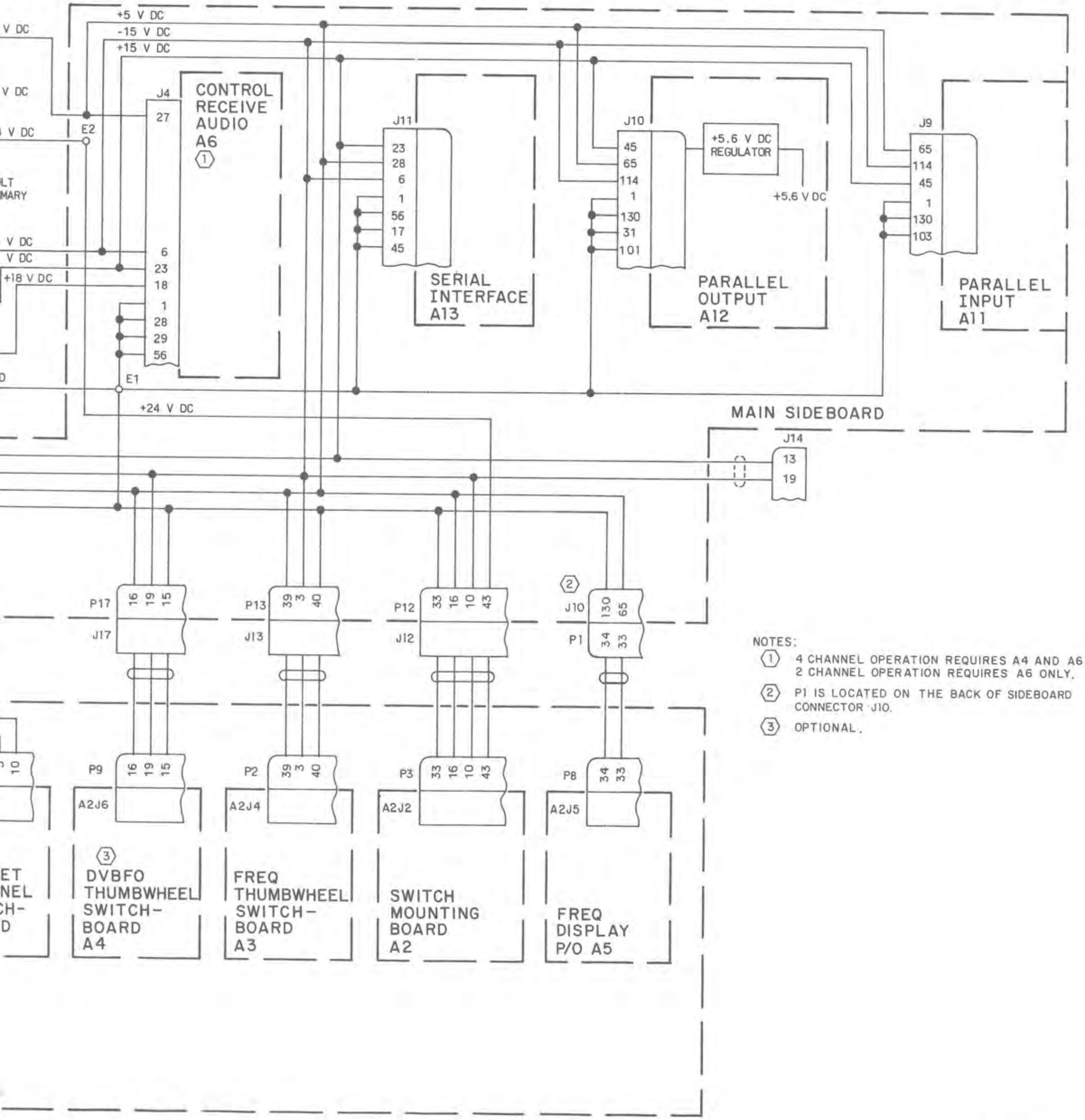
P/O FRONT PANEL A2
AFC
ON
OFF
VBFO
VAR
FXD
CONT
NORN
TEST
+5 V DC
CONTROL TO RECE
MONITOR FROM RE
CONTROL SEL
ADDRESS SEL
VBFO SEL
AFC SEL
ADDRESS
7
VBFO OFFSET KHZ
+ 9 . 9 9 0
FREQUENCY KHZ
0 8 0 0 0 . 0 0
OPERATING FREQ SEL
VBFO FREQ SEL
SERIAL
INTERFACE
A13
PARALLEL
INPUT
A11
CH B2
CH B1
CH A1
CH A2
OFF
ON
A2 ENBL
A1 ENBL
B1 ENBL
B2 ENBL
AGC
FAST
MED
OFF
SLOW
A2
AGC SEL
A1 AGC SEL
B1 AGC SEL
B2 AGC SEL
AGC BUS
A2 AGC BUS ENBL
A1 AGC BUS ENBL
B1 AGC BUS ENBL
B2 AGC BUS ENBL
POWER
TO
INTERNAL
CIRCUITS
POWER
SUPPLY
MODULE
PRI
POWER
IN POWER
SELECT SWIT
POWER SUPPLY A
BANDWIDTH
A
B
C
D
E
16
MODE
CW
ISB
AM
NET
DATA
RF GAIN
RF GAIN
MODE SEL
BANDWIDTH SEL
LINE
CHAN A1
CHA
SPEAKER
B1
A1
B2
A2
ALL CH
AF GAIN
SQUELCH
PHONES
PHONES SEL
PHONES LEVEL CONTROL
SQUELCH ON/OFF
SQUELCH AF
SPEAKER LEVEL CONTROL
SPEAKER CHAN SEL
RECEIVE A
A6, A4



HF-8094 Receiver Control, Overall Block Diagram
Figure 1



POWER SUPPLY
A1
J1
L
N
F1
J2
1 2 3 4
PWR
SW A2S15
POWER SELECT SWITCH S1
POWER TRANSFORMER AND RECTIFIERS
+5 V DC REGULATOR
+8 V DC REGULATOR
+24 V DC REGULATOR
-15 V DC REGULATOR
+15 V DC REGULATOR
+18 V DC REGULATOR
POWER SUPPLY FAULT SUMMARY
TB1
+5 V DC
+8 V DC
+24 V DC
E2
FAULT SUMMARY
-15 V DC
+15 V DC
+18 V DC
GND
+15 V DC
-15 V DC
+5 V DC
GND
PRESET
3
J8
65
114
45
1
130
CONTROL RECEIVE AUDIO A4
1
J3
27
6
23
1
28
29
56
45
46
47
48
P20
J20
15 16 19
P19
J19
25 16
P18
J18
5 10
P12
A2J8
P5
A2J3
P11
A2J9
P10
A2J7
3
FREQ DISPLAY P/O A5
LED STATUS DISPLAY A1
ADDRESS SWITCH-BOARD A6
3
PRESET CHANNEL SWITCH-BOARD A7
FRONT PANEL A2



NOTES:
1. 4 CHANNEL OPERATION REQUIRES A4 AND A6. 2 CHANNEL OPERATION REQUIRES A6 ONLY.
2. P1 IS LOCATED ON THE BACK OF SIDEBOARD CONNECTOR J10.
3. OPTIONAL.

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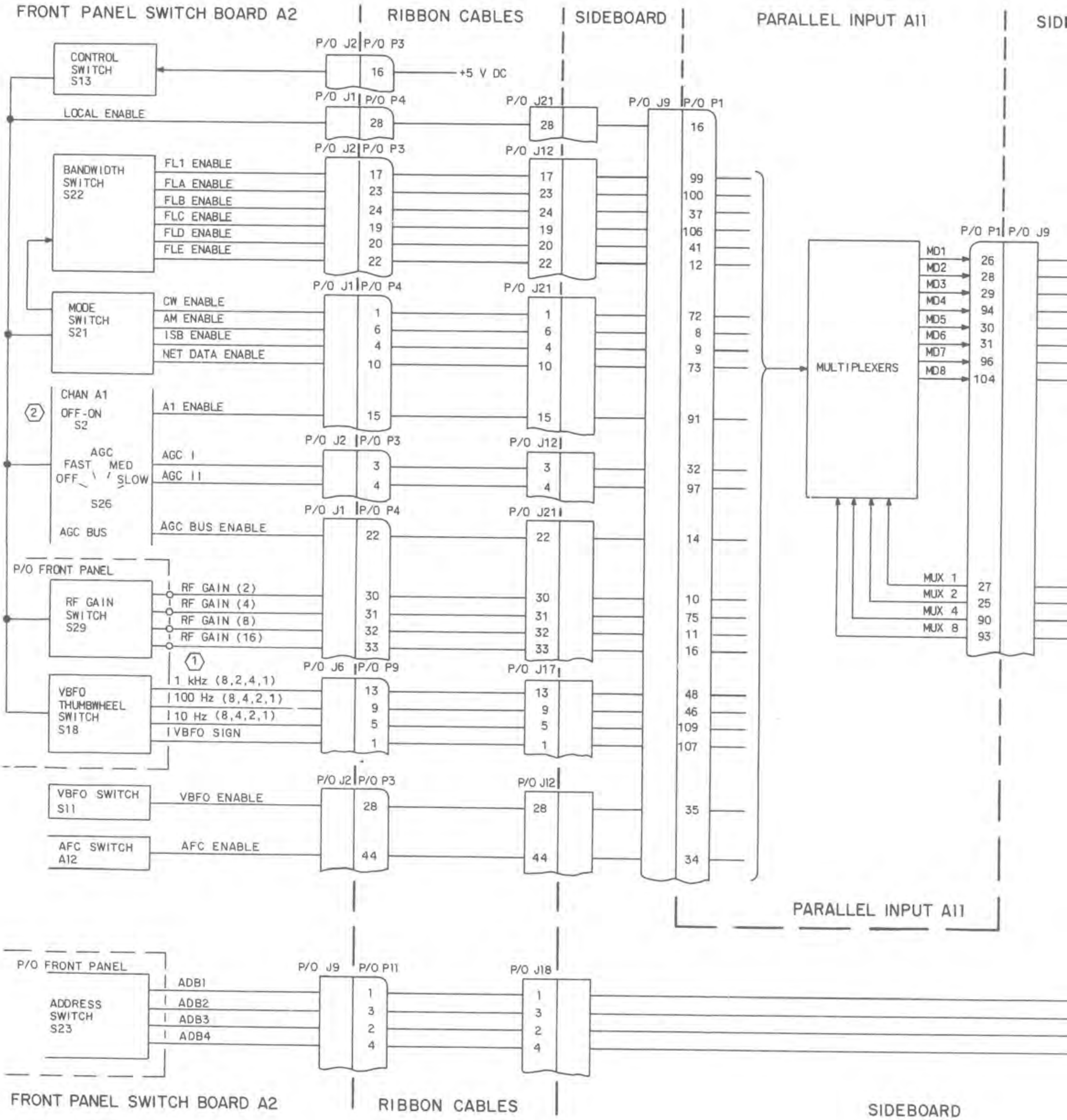
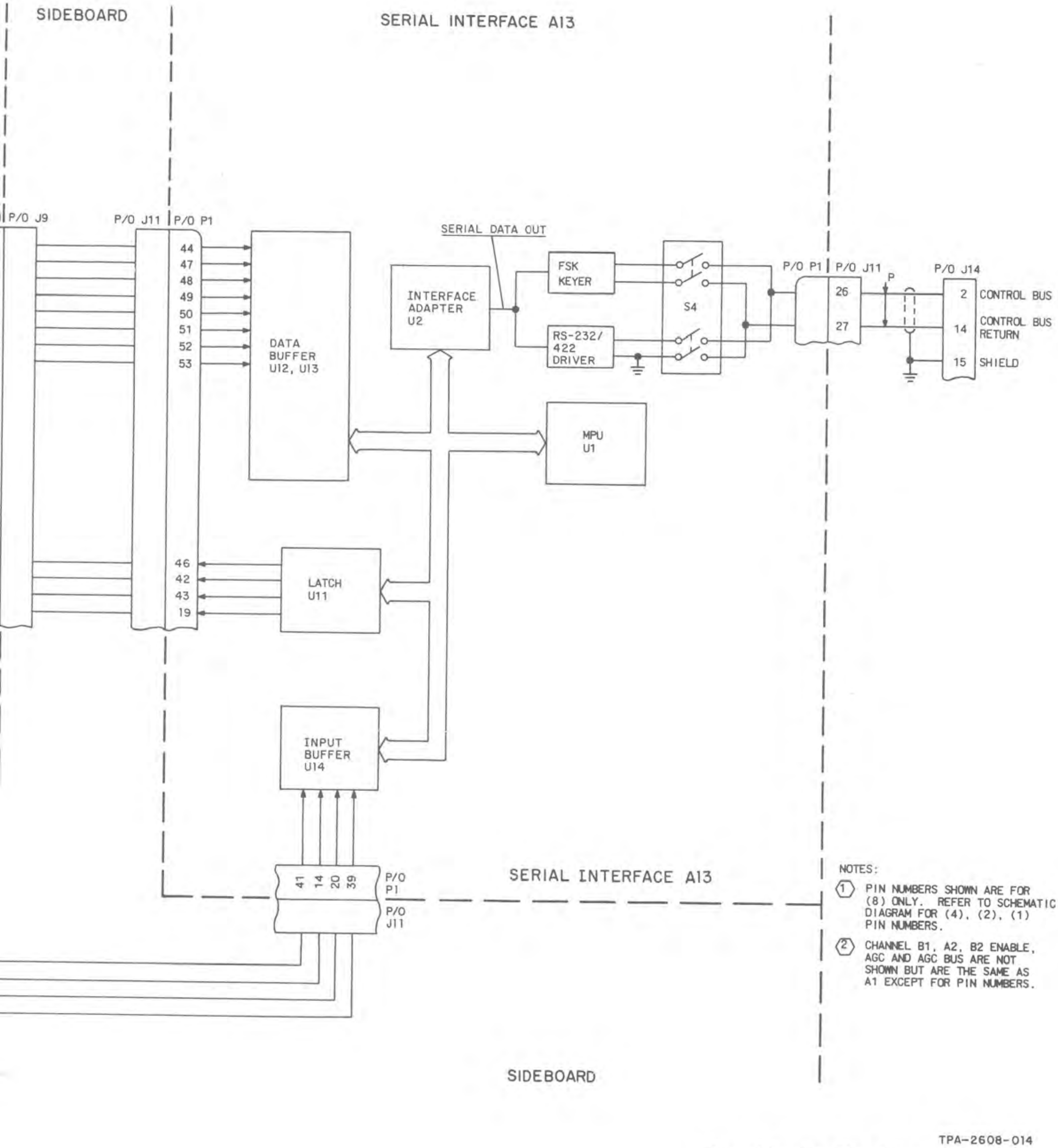
Power Distribution, Block Diagram
Figure 2


FRONT PANEL SWITCH BOARD A2
RIBBON CABLES
SIDEBOARD
PARALLEL INPUT A11
CONTROL SWITCH S13
P/O J2
P/O P3
16
+5 V DC
LOCAL ENABLE
P/O J1
P/O P4
P/O J21
P/O J9
P/O P1
28
BANDWIDTH SWITCH S22
FL1 ENABLE
FLA ENABLE
FLB ENABLE
FLC ENABLE
FLD ENABLE
FLE ENABLE
P/O J12
17
23
24
19
20
22
99
100
37
106
41
12
MODE SWITCH S21
CW ENABLE
AM ENABLE
ISB ENABLE
NET DATA ENABLE
1
6
4
10
72
8
9
73
CHAN A1
OFF-ON
S2
A1 ENABLE
15
91
AGC
FAST
MED
OFF
SLOW
S26
AGC I
AGC II
3
4
32
97
AGC BUS
AGC BUS ENABLE
22
14
P/O FRONT PANEL
RF GAIN SWITCH S29
RF GAIN (2)
RF GAIN (4)
RF GAIN (8)
RF GAIN (16)
30
31
32
33
10
75
11
16
VBFO THUMBWHEEL SWITCH S18
1 kHz (8,2,4,1)
100 Hz (8,4,2,1)
10 Hz (8,4,2,1)
VBFO SIGN
P/O J6
P/O P9
P/O J17
13
9
5
1
48
46
109
107
VBFO SWITCH S11
VBFO ENABLE
28
35
AFC SWITCH A12
AFC ENABLE
44
34
MULTIPLEXERS
MD1
MD2
MD3
MD4
MD5
MD6
MD7
MD8
P/O P1
P/O J9
26
28
29
94
30
31
96
104
MUX 1
MUX 2
MUX 4
MUX 8
27
25
90
93
PARALLEL INPUT A11
P/O FRONT PANEL
ADDRESS SWITCH S23
ADB1
ADB2
ADB3
ADB4
P/O J9
P/O P11
P/O J18
1
3
2
4
FRONT PANEL SWITCH BOARD A2
RIBBON CABLES
SIDEBOARD
SIDI



Control Function, Block Diagram
Figure 3

WORD	CHARACTER	STOP BIT	PARITY BIT	B8	B7	B6	B5	B4	B3	B2	B1	START BIT	
				CHARACTER BIT POSITION									
1	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	0	ADDRESS A4	A3	A2	A1	0	
1	2	1	X	CMD/STATUS RQST $\overline{C}$=0	$\overline{S}$=1	FREQ (10 MHz) (2)	(1)	FREQ (1 MHz) (8)	(4)	(2)	(1)	0	(1)
1	3	1	X	FREQ (100 kHz) (8)	(4)	(2)	(1)	FREQ (10 kHz) (8)	(4)	(2)	(1)	0	
1	4	1	X	FREQ (1 kHz) (8)	(4)	(2)	(1)	FREQ (100 Hz) (8)	(4)	(2)	(1)	0	
1	5	1	X	FREQ (10 Hz) (8)	(4)	(2)	(1)	FREQ (1 Hz) (8)	(4)	(2)	(1)	0	
2	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	1	ADDRESS A4	A3	A2	A1	0	
2	2	1	X	CMD/STATUS RQST $\overline{C}$=0	$\overline{S}$=1	RF GAIN CONTROL 0	(16)	(8)	(4)	(2)	(1)	0	(1) (2)
2	3	1	X	FILTER SELECT FLE	FLD	FLC	FLB	CHAN B2 AGC (2)	(1)	CHAN A2 AGC (2)	(1)	0	(3)
2	4	1	X	FILTER SELECT FLA	16 kHz	VBFO ENABLE	AFC ENABLE	CHAN B1 AGC (2)	(1)	CHAN A1 AGC (2)	(1)	0	(3)
2	5	1	X	MODE SELECT NET DATA	AM	CW	ISB	CHAN B2 ENABLE	CHAN B1 ENABLE	CHAN A1 ENABLE	CHAN A2 ENABLE	0	
3	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	0	ADDRESS A4	A3	A2	A1	0	
3	2	1	X	CMD/STATUS RQST $\overline{C}$=0	$\overline{S}$=1	0	VBFO SIGN	VBFO OFFSET FREQ (1 kHz) (8)	(4)	(2)	(1)	0	(1)
3	3	1	X	VBFO OFFSET FREQ (100 Hz) (8)	(4)	(2)	(1)	VBFO OFFSET FREQ (10 Hz) (8)	(4)	(2)	(1)	0	
3	4	1	X	AUXILIARY								0	
3	5	1	X	RESERVED				CHAN B2 AGC BUS	CHAN B1 AGC BUS	CHAN A1 AGC BUS	CHAN A2 AGC BUS	0	
4	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	1	ADDRESS A4	A3	A2	A1	0	
4	2	1	X	CMD/STATUS RQST $\overline{C}$=0	$\overline{S}$=1	RECEIVER FAULT	RECEIVE OVERLOAD	B2 AF MON	B1 AF MON	A1 AF MON	A2 AF MON	0	(1) (4)
4	3	1	X	0	10 Hz LOCK FAULT	100 Hz LOCK FAULT	1 kHz LOCK FAULT	10 kHz LOCK FAULT	100 kHz LOCK FAULT	SYN OUT LOCK FAULT	FREQ REF FAULT	0	(5)
4	4	1	X	0	SUBCARR LOCK FAULT	VBFO SYNTH FAULT	RECEIVER PWR SPLY FAULT	B2 AGC MON	B1 AGC MON	A1 AGC MON	A2 AGC MON	0	(5)
4	5	1	X	0	EXTERNAL STANDARD	AFC LOCK MON	RF PERF MON	PRE- SELECTOR FAULT	DATA ERROR	LOCAL CONTROL	MONITOR	0	(5)

NOTES:

(1) THE COMMAND (C) AND STATUS (S) REQUEST BITS ARE CODED AS FOLLOWS:

B8 C	B7 S	SIGNFICANCE
0	0	COMMAND WORD WITH STATUS REQUEST
0	1	COMMAND WORD ONLY-NO STATUS DESIRED
1	0	STATUS REQUEST ONLY (2 CHARACTER SEQUENCE)
1	1	THIS COMBINATION NOT ALLOWED

(2) RF GAIN CONTROL IS FIVE BITS BINARY CODED, APPROXIMATELY 3-dB GAIN REDUCTION PER STEP (PROCESSOR CONTROL APPLICATIONS) OR FOUR BITS (LEAST SIGNIFICANT BIT SET TO ZERO), APPROXIMATELY 6-dB GAIN REDUCTION PER STEP (CONTROL UNIT APPLICATIONS). ALL "ZERO" CODE INDICATES NO GAIN REDUCTION, PROGRESSING IN BINARY STEPS TO THE ALL "ONES" CODE FOR MAXIMUM GAIN REDUCTION.

(3) FILTER BANDWIDTH DESIGNATIONS ARE DEFINED AS FOLLOWS:

16 -- FL1   C -- FL5
A -- FL3   D -- FL6
B -- FL4   E -- FL7

(4) WORD 4 COMMAND OR STATUS REQUEST IS ONLY TWO CHARACTERS LONG.

(5) CHARACTERS 3, 4, AND 5 OF MONITOR WORD 4 CONTAIN FAULT AND PERFORMANCE MONITOR BITS FOR WHICH NO CORRESPONDING CONTROL BITS EXIST. THE "DATA ERROR" BIT IS THE LOGICAL SUM OF THE FOLLOWING CONDITIONS:

A. RECEIVED CHARACTER PARITY ERROR.
B. FRAMING ERROR (NO VALID STOP RECEIVED WITH THE CHARACTER).
C. OVERRUN ERROR (PREVIOUS CHARACTER WAS NOT PROCESSED BEFORE THE CURRENT CHARACTER WAS RECEIVED).
D. INVALID CHARACTER SEQUENCE.

(6) 1 = LOGIC 1
0 = LOGIC 0
X = FUNCTION OF STRAPPING
(1) = BIT WEIGHT

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8-Bit Character Control and Monitor Word Format
Figure 4

Table 1. Address Number, Binary Data Pattern, and Address Recognition Strapping.

ADDRESS THUMB-WHEEL NUMBER	TRANSMITTED BINARY ADDRESS DATA				RECEIVER STRAPPING REQUIRED FOR ADDRESS RECOGNITION			
	A4 (ADB4)	A3 (ADB3)	A2 (ADB2)	A1 (ADB1)	A4 (ADB4)	A3 (ADB3)	A2 (ADB2)	A1 (ADB1)
0	1	1	1	1	-	-	-	-
1	1	1	1	0	-	-	-	X
2	1	1	0	1	-	-	X	-
3	1	1	0	0	-	-	X	X
4	1	0	1	1	-	X	-	-
5	1	0	1	0	-	X	-	X
6	1	0	0	1	-	X	X	-
7	1	0	0	0	-	X	X	X
8	0	1	1	1	X	-	-	-
9	0	1	1	0	X	-	-	X
10	0	1	0	1	X	-	X	-
11	0	1	0	0	X	-	X	X
12	0	0	1	1	X	X	-	-
13	0	0	1	0	X	X	-	X
14	0	0	0	1	X	X	X	-
15	0	0	0	0	X	X	X	X

Note

- indicates no strapping, X indicates strapped to ground.

Each control word in the 8-bit format is composed of five 11-bit characters. Refer to figure 4. The last two bits of each character group are stop and parity bits. The first bit is a start bit. The first character of each control word is reserved for equipment address, word identification (subaddress), and word sync information. Bits 7 and 8 of the second character in each word are reserved for command and status request. The remaining characters of each word carry frequency, control, or monitor information. Word 1 contains selected frequency information and is discussed in paragraph 2.4.

Each control word in the ASCII format consists of eleven functional ASCII characters and three special ASCII characters that have no functional significance but are used to establish word boundaries. Refer to figure 5 and figure 6. Carriage return (CR) is the number one special nonfunctional character and line feed (LF) is the number two special nonfunctional character. The dollar sign ($) and execute (X) are used as the number three special nonfunctional character. Execute is used to end all control words (figure 6) and the dollar sign is used to end all monitor words (figure 7).

ASCII WORD FORMAT													
SPECIAL NON-FUNCTIONAL CHARACTERS		FUNCTIONAL CHARACTERS											SPECIAL NON-FUNCTIONAL CHARACTERS
# 1	# 2	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 3

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ASCII Word Format
Figure 5

	CHARACTER SIGNIFICANCE	ASCII PRINT CHAR'S	FUNCTIONAL BIT CODING WT 8	WT 4	WT 2	WT 1

CR LF A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 X — WORD 1 CHARACTER SEQUENCE

CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A1 (1)
SD	SEQUENCE DESIGNATOR	0,1,2	NA	NA	NA	NA
F1	FREQUENCY- 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQUENCY- 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY- 100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY- 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY- 1 Hz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
X	EXECUTE	X	NA	NA	NA	NA

CR LF A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 X — WORD 2 CHARACTER SEQUENCE

CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	4,5,6	NA	NA	NA	NA
M1	RF GAIN CONTROL	0-9, A-F	0	0	0	RF GAIN (16)
M2	RF GAIN CONTROL	0-9, A-F	RF GAIN (8)	RF GAIN (4)	RF GAIN (2)	RF GAIN (1)
M3	BANDWIDTH FILTER ENABLES	0-9, A-F	FL E ENBL	FL D ENBL	FL C ENBL	FL B ENBL
M4	AGC TIME CONSTANTS (B2-A2)	0-9, A-F	B2 AGC (2)	B2 AGC (1)	A2 AGC (2)	A2 AGC (1)
M5	BW FILTER ENABLES, VBFO, AFC ENABLE	0-9, A-F	FL A ENBL	16 kHz ENBL	VBFO ENBL	AFC ENBL
M6	AGC TIME CONSTANTS (B1-A1)	0-9, A-F	B1 AGC (2)	B1 AGC (1)	A1 AGC (2)	A1 AGC (1)
M7	MODE SELECT ENABLES	0-9, A-F	NET DATA	AM	CW	ISB
M8	ISB CHANNEL ENABLES	0-9, A-F	B2	B1	A1	A2
X	EXECUTE	X	NA	NA	NA	NA

CR LF A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 X — WORD 3 CHARACTER SEQUENCE

CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	8,9,A	NA	NA	NA	NA
V1	VBFO SIGN (0=+)	0,1	0	0	0	VBFO SIGN
V2	VBFO FREQUENCY, 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
V3	VBFO FREQUENCY, 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
V4	VBFO FREQUENCY, 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
V5	AUXILIARY	0-9,A-F	-	-	-	-
V6	AUXILIARY	0-9, A-F	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	AGC BUS	0-9, A-F	B2	B1	A1	A2
X	EXECUTE	X	NA	NA	NA	NA

CR LF A1 A2 SD K1 X — WORD 4 CHARACTER SEQUENCE

CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	C,D,E	NA	NA	NA	NA
K1	RESERVED	0	0	0	0	0
X	EXECUTE	X	NA	NA	NA	NA

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ASCII Character Control Word Format
Figure 6

	CHARACTER SIGNIFICANCE	ASCII PRINT CHAR'S	FUNCTIONAL BIT CODING WT 8	WT 4	WT 2	WT 1

- - A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 % WORD 1 CHARACTER SEQUENCE

-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	1	NA	NA	NA	NA
F1	FREQUENCY- 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQUENCY- 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY-100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY-100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY- 1 kHz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
%	END DELIMETER	%	NA	NA	NA	NA

- - A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 % WORD 2 CHARACTER SEQUENCE

-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	5	NA	NA	NA	NA
M1	RF GAIN CONTROL	0-9, A-F	0	0	0	RF GAIN (16)
M2	RF GAIN CONTROL	0-9, A-F	RF GAIN (8)	RF GAIN (4)	RF GAIN (2)	RF GAIN (1)
M3	BANDWIDTH FILTER ENABLES	0-9, A-F	FL E ENBL	FL D ENBL	FL C ENBL	FL B ENBL
M4	AGC TIME CONSTANTS (B2-A2)	0-9, A-F	B2 AGC (2)	B2 AGC (1)	A2 AGC (2)	A2 AGC (1)
M5	SW FILTER ENABLES, VBFO, AFC ENABLE	0-9, A-F	FL A ENBL	16 kHz ENBL	VBFO ENBL	AFC ENBL
M6	AGC TIME CONSTANTS (B1-A1)	0-9, A-F	B1 AGC (2)	B1 AGC (1)	A1 AGC (2)	A1 AGC (1)
M7	MODE SELECT ENABLES	0-9, A-F	NET DATA	AM	CW	ISB
M8	ISB CHANNEL ENABLES	0-9, A-F	B2	B1	A1	A2
%	END DELIMITER	%	NA	NA	NA	NA

- - A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 % WORD 3 CHARACTER SEQUENCE

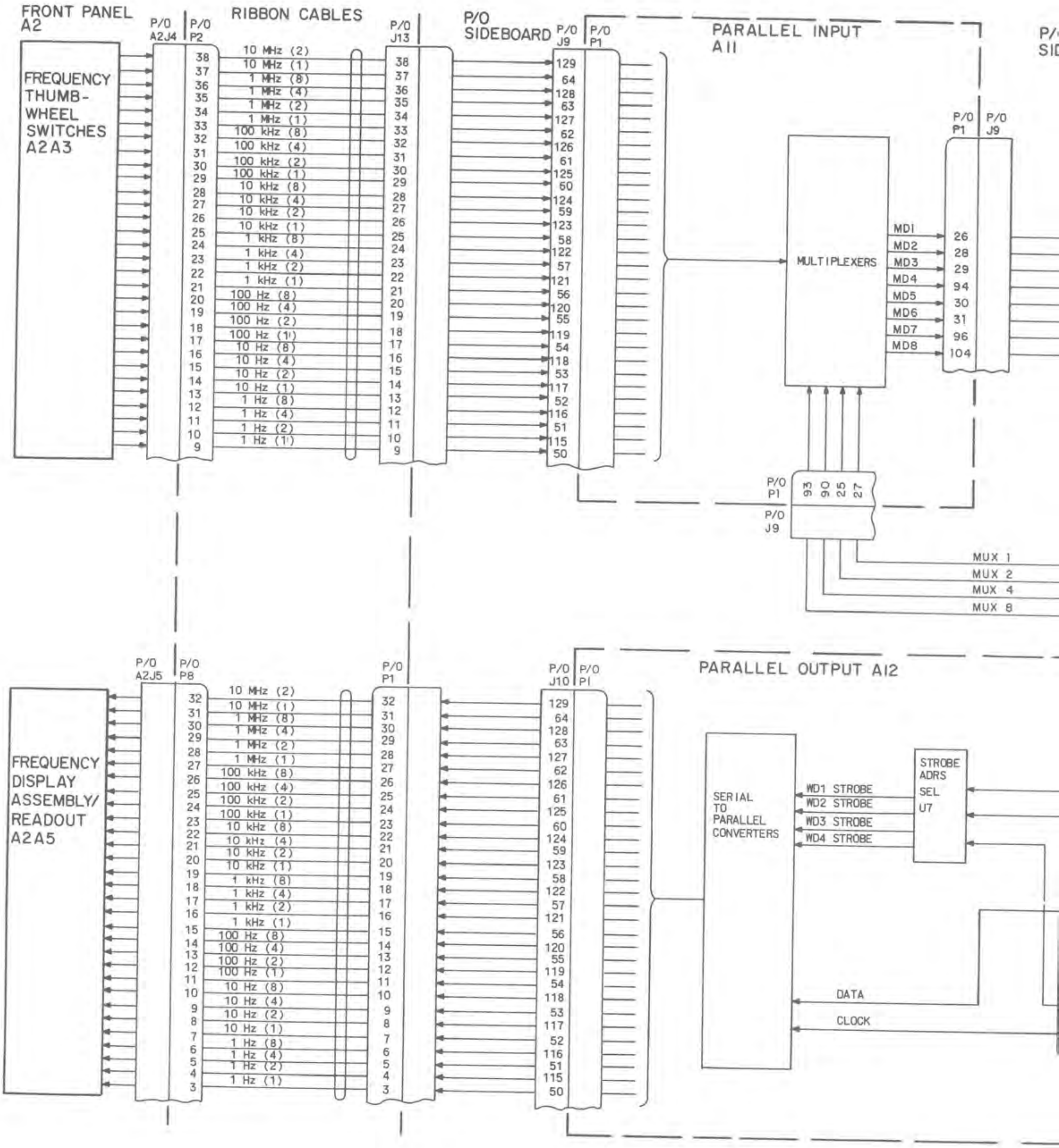
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	9	NA	NA	NA	NA
V1	VBFO SIGN (0=+)	0,1	0	0	0	VBFO SIGN
V2	VBFO FREQUENCY, 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
V3	VBFO FREQUENCY, 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
V4	VBFO FREQUENCY, 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
V5	AUXILIARY	0	-	-	-	-
V6	AUXILIARY	0	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	AGC BUS	0-9, A-F	B2	B1	A1	A2
%	END DELIMITER	%	NA	NA	NA	NA

- - A1 A2 SD S1 S2 S3 S4 S5 S6 S7 S8 % WORD 4 CHARACTER SEQUENCE

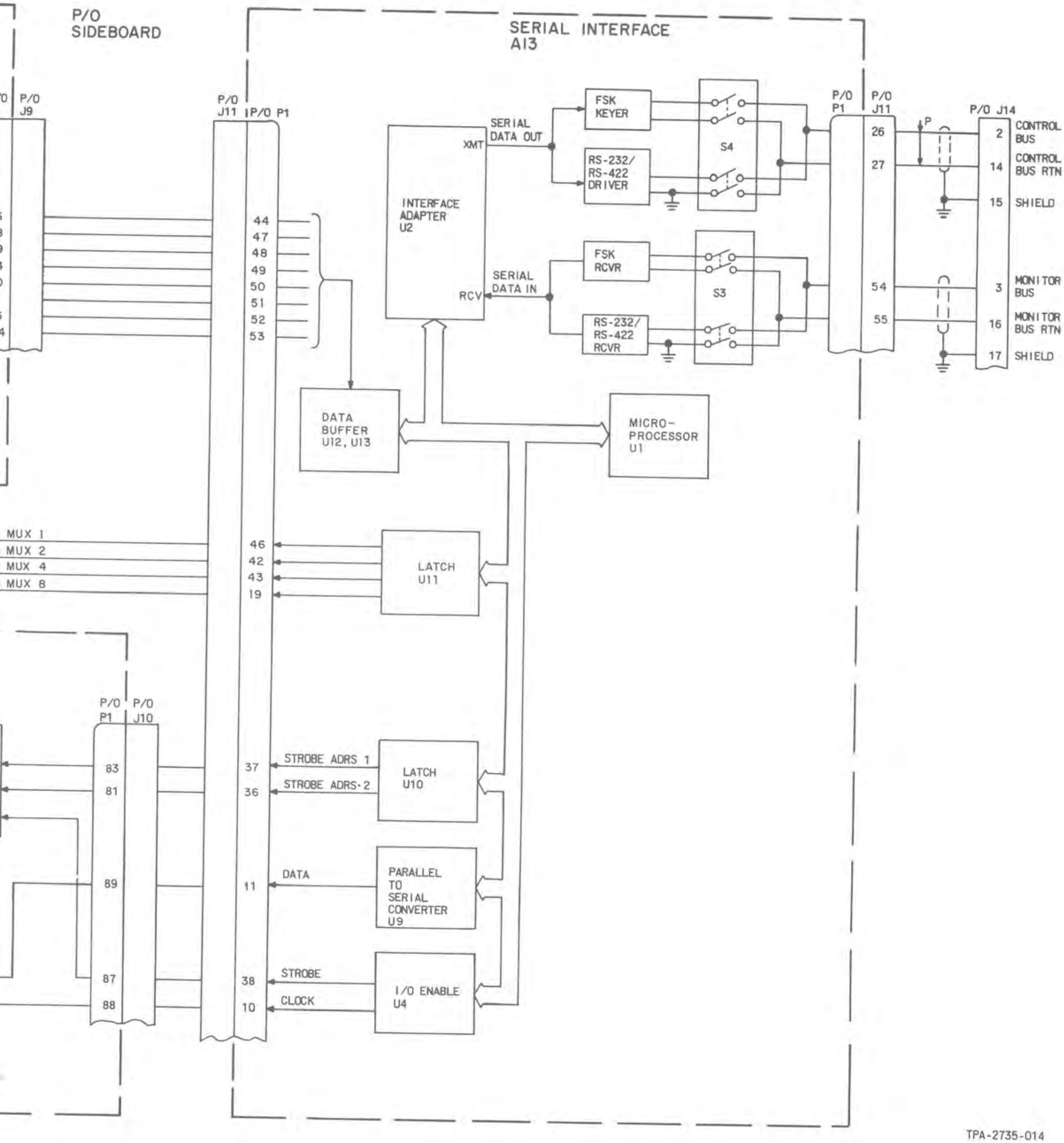
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	D	NA	NA	NA	NA
S1	FAULT SUMMARY	0-3	0	0	RCVR FAULT	RCVR OVLD
S2	AF MONITORS	0-9, A-F	B2	B1	A1	A2
S3	SYNTHESIZER FREQUENCY LOCK FAULTS	0-9, A-F	0	10 Hz	100 Hz	1 kHz
S4	SYNTH FREQ LOCK/SYNTH OUT LOCK/FREQ REF FAULTS	0-9, A-F	10 kHz	100 kHz	SYNTH OUT	FREQ REF
S5	SUBCARRIER LOCK/VBFO SYNTH/PWR SPLY FAULTS	0-7	0	SUBCARRIER	VBFO SYNTH	PWR SPLY
S6	IF AGC MONITORS	0-9, A-F	B2	B1	A1	A2
S7	EXT STD/AFC LOCK/RF PERF MONITORS	0-3	0	EXT STD	AFC LOCK	RF PERF
S8	PRESEL FAULT/DATA ERROR/LOCAL/MONITOR	0-9, A-F	PRESEL FAULT	DATA ERROR	LOCAL CONTROL	MONITOR
%	END DELIMITER	%	NA	NA	NA	NA

TPA-2849-014

ASCII Character Monitor Word Format
Figure 7



FRONT PANEL A2
FREQUENCY THUMB-WHEEL SWITCHES A2A3
P/O A2J4
P/O P2
RIBBON CABLES
P/O J13
P/O SIDEBOARD
P/O J9
P/O P1
PARALLEL INPUT A11
MULTIPLEXERS
MD1
MD2
MD3
MD4
MD5
MD6
MD7
MD8
MUX 1
MUX 2
MUX 4
MUX 8
FREQUENCY DISPLAY ASSEMBLY/ READOUT A2A5
P/O A2J5
P/O P8
P/O J10
PARALLEL OUTPUT A12
SERIAL TO PARALLEL CONVERTERS
STROBE ADRS SEL U7
WD1 STROBE
WD2 STROBE
WD3 STROBE
WD4 STROBE
DATA
CLOCK



Frequency Selection and Monitoring Function, Block Diagram
Figure 8

2.4 Frequency Selection and Monitoring (Refer to figure 8.)

Frequency selection is by thumb-wheel switches located on the front panel. Parallel signals from the switches are processed into serial data for transfer over the control bus to the receiver. The receiver tunes to the frequency commanded by the signals and develops a signal indicating the frequency actually tuned. This frequency-monitor signal is processed into serial format, returned to the receiver control over the monitor bus, again converted to parallel format, and used to drive 7-segment indicators for a front-panel frequency display.

The operating frequency is selected by positioning thumb-wheel switches to the desired frequency. Parallel signals from the switches are applied to a multiplexer on parallel input A11. The multiplexer output is selected by the MUX 1 - MUX 8 inputs from serial interface A13. The MD 1 - MD 8 output of parallel input A11 is converted from parallel to serial data on microprocessor-controlled serial interface A13. Switch S4 on serial interface A13 selects either the FSK or RS-232/RS-422 output that is applied to the receiver control bus.

Frequency monitor data is received by the receiver control, from the remote receiver, on the monitor bus. The data is applied to interface adapter A13U2 on serial interface A13 through either the FSK receiver or the RS-232/RS-422 receiver. The data is then processed out of A13U2 by U1 and applied to parallel-to-serial converter A13U9 and applied to parallel output A12. Word 1 through word 4 strobes are developed in A12U7 from the strobe address 1 and strobe address 2 inputs from serial interface A13. The frequency data from the remote receiver is selected by the word 1 strobe and the data is clocked out of the serial-to-parallel converters on parallel output A12 to frequency display A2A5. Frequency display A2A5 consists of decoder/driver circuits that drive 7-segment indicators. These indicators make up the front panel displays for the frequency readout.

2.5 Audio Function (Refer to figure 9.)

Control receive audios A4 and A6 are both required for 4-channel operation. Control receive audios A4 and A6 are identical; however, due to external circuit connections, they do not function exactly the same in the 4-channel configuration. For 2-channel operation, only control receive audio A6 is needed.

Audio signals from the remote receiver are applied first to a preamplifier stage on the control audio card. The output of the preamplifier is applied to a speaker amplifier, to headphone amplifier circuits, and to a line amplifier for output to external equipment. Front-panel controls adjust the squelch and audio output levels and select the audio channels to be applied to the final speaker amplifier and headphone amplifier.

Outputs from the line audio amplifiers are connected to TB1 on the rear panel of the receiver control, for access in use with external equipment requiring the received audio. Screwdriver adjustments are provided to set the line audio output level. These are accessible through the top of the chassis cover when the dust cover is removed.

Preamplifier outputs to the headphone circuits are applied through analog switches to the headphone amplifier. The PHONES selector on the front panel enables the appropriate analog switch to apply the preamplifier output to the headphones amplifier. Output level of the amplifier is controlled by the PHONES level control on the front panel. In 2-channel operation, the output of the headphone amplifier is applied directly to the PHONES jack on the front panel. In 4-channel operation, channels A1 and B1 are the same as in 2-channel operation. However, in 4-channel operation, the headphone amplifier is not used (on control receive audio A4). The headphone audio for channels A2 and B2 is taken from the output of the analog switches, applied to control receive audio A6, via the phones in/out circuit, amplified in the A6 headphones amplifier, and then applied to the PHONES jack through the PHONES selector switch on the front panel.

Preamplifier outputs to the speaker circuits are connected directly to the SPEAKER switch on the front panel. This switch selects either channel or all channels simultaneously for application to the squelch amplifier and AF GAIN control. The squelch circuit operation can be enabled or inhibited, and the squelch threshold adjusted, by the front-panel SQUELCH control. When the SQUELCH control is OFF, the squelch circuit is inhibited and the signal from the AF GAIN control is applied through the squelch gate to the speaker audio amplifier. The AF GAIN potentiometer controls the audio level to the speaker amplifier. With squelch on, and with no audio input signal present, the normal noise signal causes the squelch gate to be biased off. This removes the audio input to the speaker amplifier. When an audio input signal is present, the signal level overrides the noise level and the squelch gate conducts the audio signal to the amplifier. The level at which the audio input causes the squelch gate to conduct is adjustable with the SQUELCH threshold potentiometer.

Outputs from the line amplifiers are applied to meter amplifier circuits for the two channels. The meter amplifier outputs are connected to the front-panel METER switch for application to the meter. Resistive networks at the switch permit full-scale meter readings of +3 or +13 dB mW for each channel.

2.6 Monitor Inputs (Refer to figure 10.)

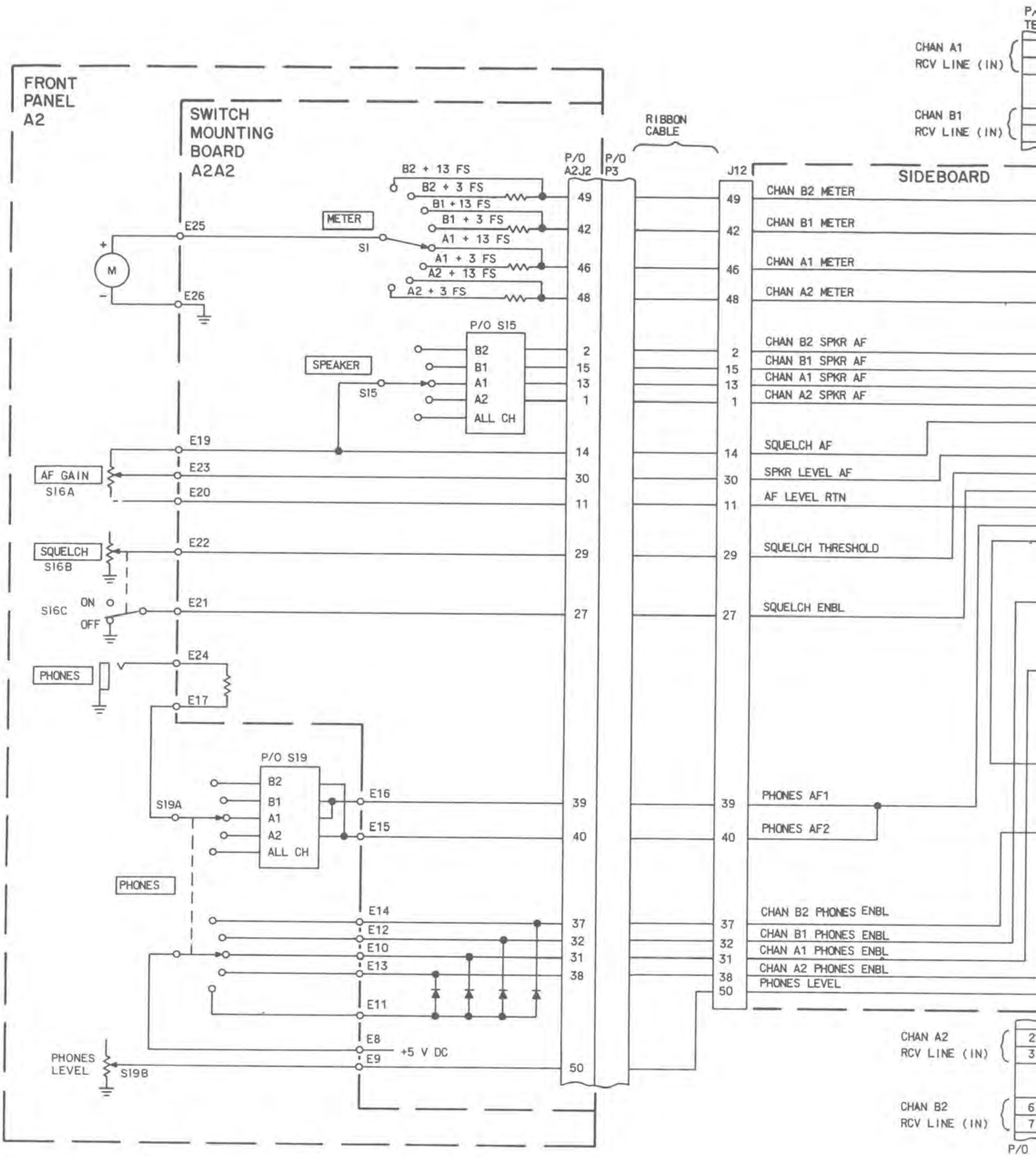
Monitor data signals generated by the receiver under control are applied to the receiver control as status information. These monitor signals are transferred via the monitor bus in serial data format.

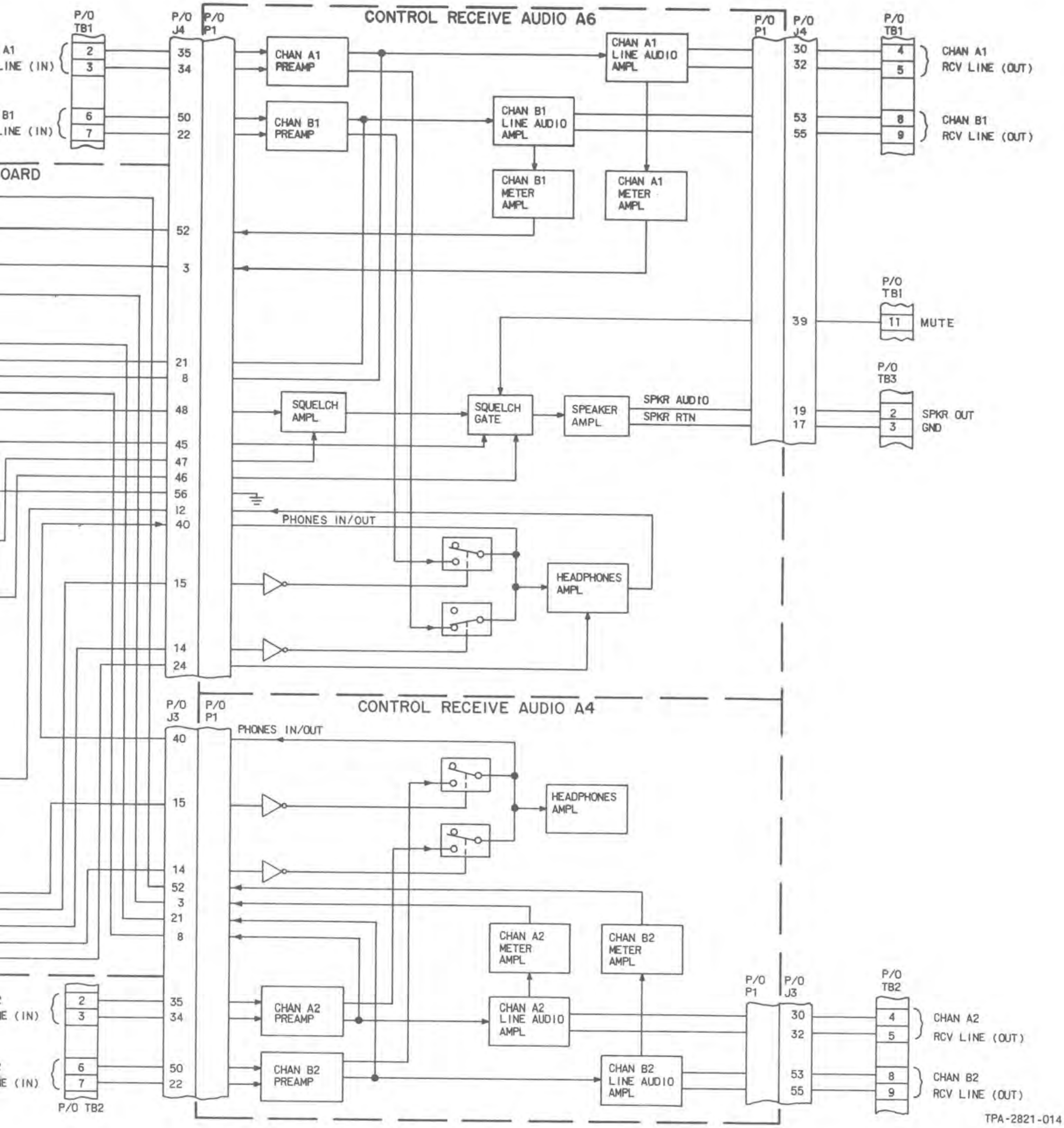
Monitor data is first applied to either the FSK or RS-232C receiver (depending on switch-selectable strapping) on serial interface A13. Word and status information is decoded and used to determine strobe address information. The status data is then applied to the serial-to-parallel converters in parallel output A12. Each serial-to-parallel converter must be enabled before it will accept and process the status data. This occurs when the strobe address input is decoded and an enable signal is generated.

The serial input information is converted to parallel output levels by the serial-to-parallel converters. These parallel outputs drive the LED status indicators and frequency display indicators on the front panel of the receiver control. The frequency display is discussed in paragraph 2.4.

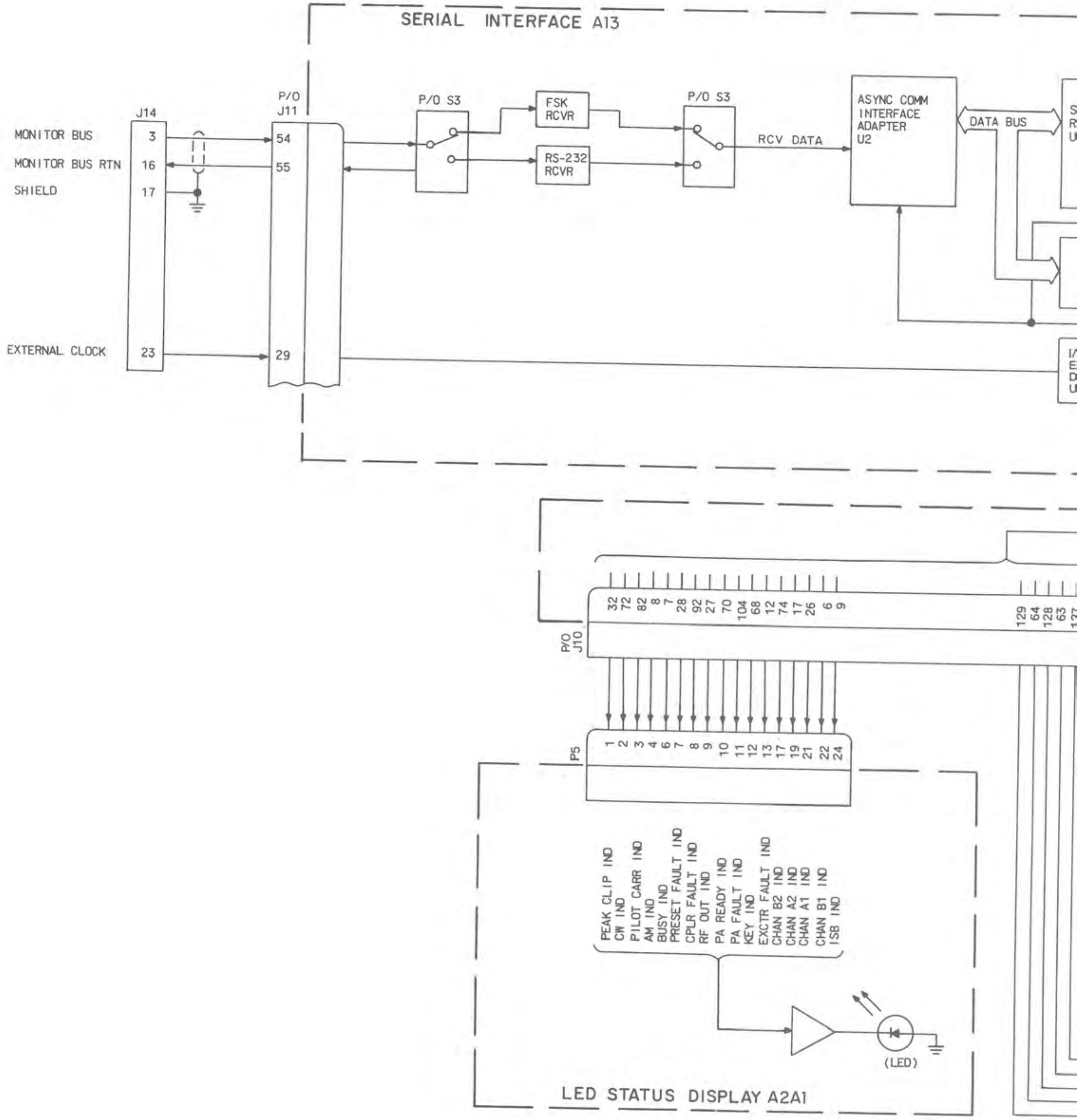
The rate at which data is transferred from the receiver to the receiver control and transferred within each unit is referred to as the baud rate. The baud rate can be selected from several different internal options or it can be set by the external clock input. In either case, the baud rate must be the same for both the receiver control and the receiver under control. The switch-selectable rates are 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, and 19 200 baud (75, 109, 150, 300, and 600 only for FSK signaling).

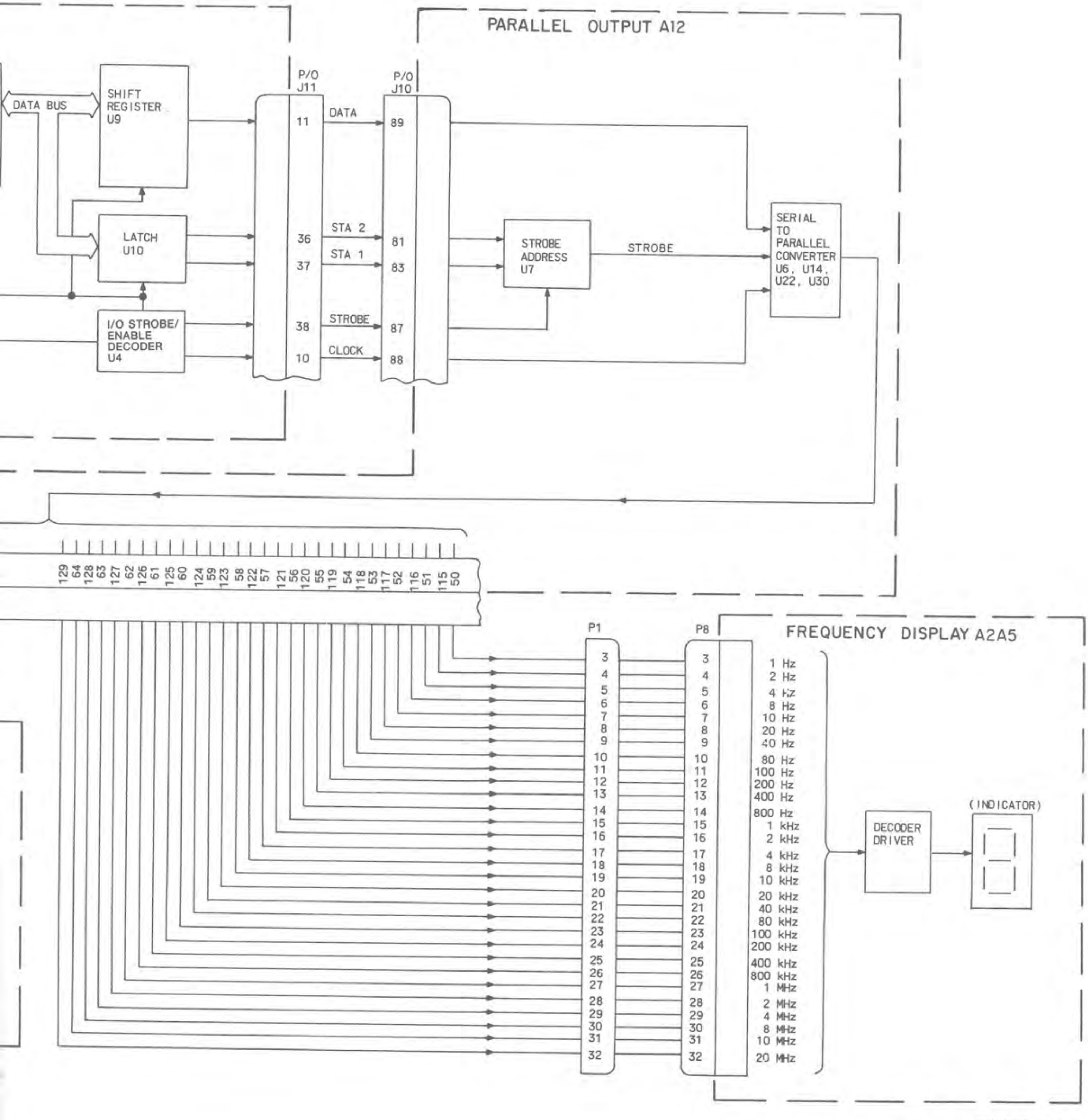
When the receiver control front panel CONT switch is in the TEST position, receiver status inputs are inhibited from the async interface adapter. The control data from the front panel is then looped via the data bus to U9 and applied from serial interface A13 to the serial-to-parallel converter on parallel output A12. The output from parallel output A12 is applied to the frequency and status display cards on the receiver control front panel. This results in the display of the receiver control front panel-generated control data instead of the receiver input status signals.


FRONT PANEL A2
SWITCH MOUNTING BOARD A2A2
RIBBON CABLE
P/O A2J2
P/O P3
J12
SIDEBOARD
CHAN A1 RCV LINE (IN)
CHAN B1 RCV LINE (IN)
CHAN A2 RCV LINE (IN)
CHAN B2 RCV LINE (IN)
B2 + 13 FS
B2 + 3 FS
B1 + 13 FS
B1 + 3 FS
A1 + 13 FS
A1 + 3 FS
A2 + 13 FS
A2 + 3 FS
METER
S1
E25
E26
M
P/O S15
SPEAKER
S15
B2
B1
A1
A2
ALL CH
E19
E23
E20
AF GAIN
S16A
E22
SQUELCH
S16B
S16C
ON
OFF
E21
E24
PHONES
E17
P/O S19
S19A
E16
E15
PHONES
E14
E12
E10
E13
E11
E8
E9
+5 V DC
PHONES LEVEL
S19B
CHAN B2 METER
CHAN B1 METER
CHAN A1 METER
CHAN A2 METER
CHAN B2 SPKR AF
CHAN B1 SPKR AF
CHAN A1 SPKR AF
CHAN A2 SPKR AF
SQUELCH AF
SPKR LEVEL AF
AF LEVEL RTN
SQUELCH THRESHOLD
SQUELCH ENBL
PHONES AF1
PHONES AF2
CHAN B2 PHONES ENBL
CHAN B1 PHONES ENBL
CHAN A1 PHONES ENBL
CHAN A2 PHONES ENBL
PHONES LEVEL
49
42
46
48
2
15
13
1
14
30
11
29
27
39
40
37
32
31
38
50
P/O



Receive Audio Function, Block Diagram
Figure 9


SERIAL INTERFACE A13
J14
MONITOR BUS
MONITOR BUS RTN
SHIELD
EXTERNAL CLOCK
3
16
17
23
P/O
J11
54
55
29
P/O S3
FSK
RCVR
RS-232
RCVR
P/O S3
RCV DATA
ASYNC COMM
INTERFACE
ADAPTER
U2
DATA BUS
P/O
J10
32 72 82 8 7 28 92 27 70 104 68 12 74 17 26 6 9
129 64 128 63
P5
1 2 3 4 6 7 8 9 10 11 12 13 17 19 21 22 24
PEAK CLIP IND
CW IND
PILOT CARR IND
AM IND
BUSY IND
PRESET FAULT IND
CPLR FAULT IND
RF OUT IND
PA READY IND
PA FAULT IND
KEY IND
EXCTR FAULT IND
CHAN B2 IND
CHAN A2 IND
CHAN A1 IND
CHAN B1 IND
ISB IND
(LED)
LED STATUS DISPLAY A2A1



Monitor Function, Block Diagram
Figure 10

MAINTENANCE

HF-8094
Receiver Control

Rockwell International

maintenance

Collins Telecommunications Products Division

Printed in USA

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1 January 1981

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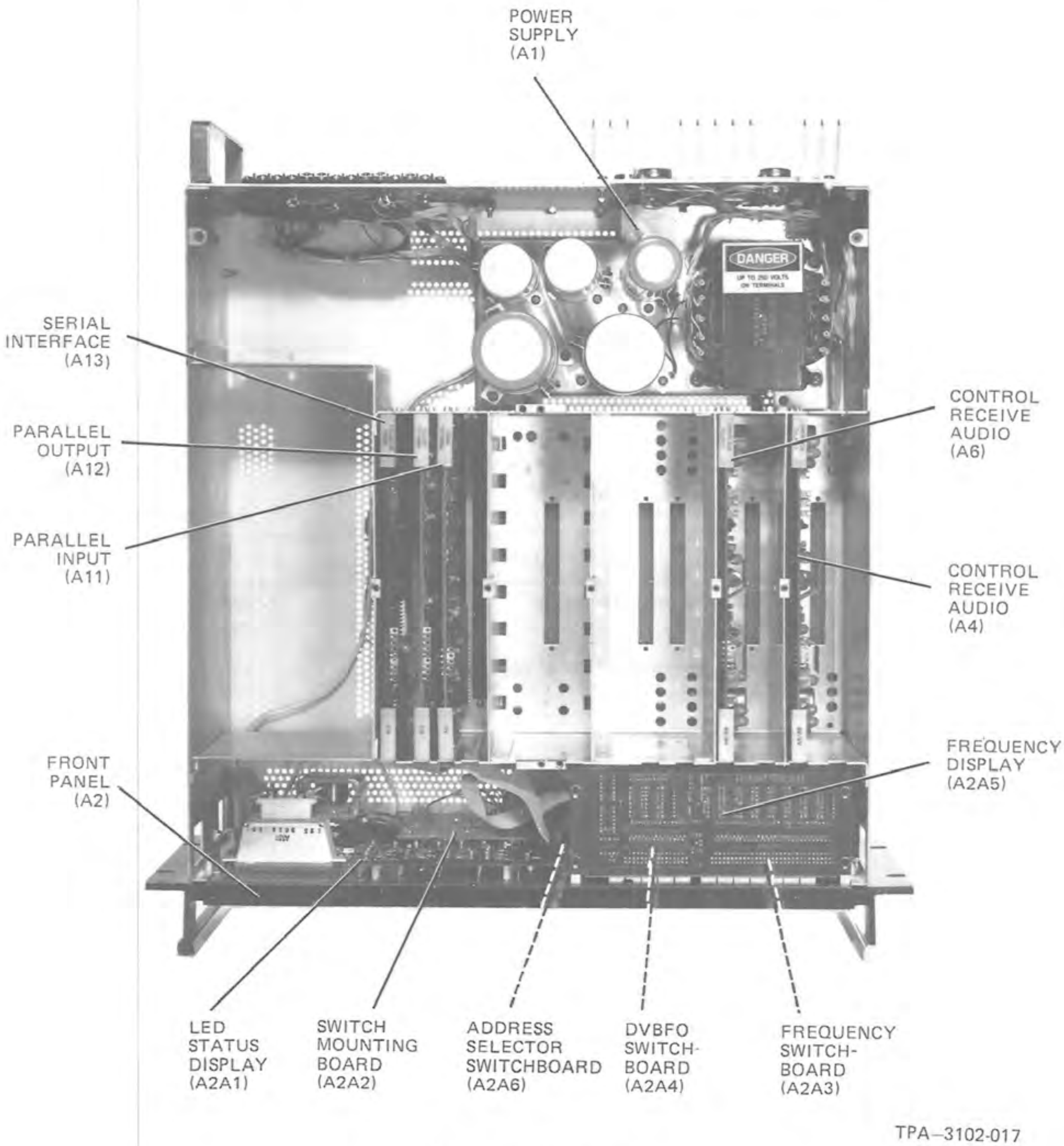
1st Ed	1 Jan 81						

1. GENERAL

This section contains information necessary to maintain the HF-8094 Receiver Control. Testing and troubleshooting procedures isolate a fault to a circuit card or chassis-mounted component. Refer to the appropriate circuit card section in this instruction book for fault isolation and repair of components on the circuit cards. Figure 1 shows the location of the receiver control subassemblies.



Subassembly Location
Figure 1

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 7.4, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on this equipment

2. TEST EQUIPMENT AND TOOLS

Table 1 lists test equipment and tools required to test, troubleshoot, align, and repair the receiver control.

3. TESTING/TROUBLESHOOTING

3.1 Fault Isolation

Some failures that may occur in the receiver control can be isolated quickly to a faulty card or assembly by using the front panel control and monitor features. Table 2 contains a brief description of indications and isolation of apparent failures.

3.2 Test Point, Voltage and Signal Levels

As an additional aid in testing and troubleshooting, voltage and signal levels that are easily accessible are

Table 1. Test Equipment and Tools.

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
	TEST EQUIPMENT	
Card extenders	1-to-1 wiring arrangement; length sufficient to extend circuit cards above chassis level	Collins TS-8010, CPN 622-3431-002
Ac voltmeter (with dB scale)	-30 to +50 dB mW (600 Ω), 1000 ±200 Hz	Hewlett Packard, model 400D
Multimeter	0 to 25 V dc, 10 MΩ/V; 0 to 220 V ac, 10 000 Ω/V; 0 to 10 000-Ω range	Fluke, model 8000A
Oscillator	0 to 5 V ac (into 500 Ω), 1000 ±200 Hz	Hewlett Packard, model 204D
Distortion analyzer	0 to 5 V ac (600 Ω/8 Ω), 1000 ±200 Hz	Hewlett Packard, model 333A
	TOOLS	
Soldering iron	40-watt, 1.6-mm (1/16-in) tip	Weller, model WP-40, with model ST-1 tip
Solder	0.5-mm (0.020-in) dia; 63/37 rosin flux core	Gardiner, type QQS571E SN63 WRMA P-2
Flux	Rosin type	Kester 1544
Solvent	TF/methylene chloride azeotrope	DuPont Freon, TMC
Solder sucker	Plunger type with vacuum sufficient to draw molten solder from work area	Soldavac, model SV-026
Needle-nose pliers	102 mm (4 in) long with 30-mm (1.125-in) nose	Utica, model 46
Diagonal cutters	120 mm (4.75 in) long with 13-mm (0.5-in) cutting edge	Kraeuter, model 83
Small brush	Nylon bristles, 13-mm (0.5-in) typical length	Trumball McFall, model Keller-Hull No 1
Pipe cleaners	127-mm (5-in) typical length, industrial quality	B. L. Long, industrial pipe cleaners

Table 2. Fault Isolation.

INDICATION	ISOLATION OF APPARENT FAILURE
Meter lights are dim, or fuse fails	a. Check that rear panel power selector switches are set to line voltage being used. b. Check that correct fuse is installed for line voltage being used.
RCV FAULT indicator lights (steadily)	Set receiver CONT switch to LCL, and check receiver frequency synthesizer and power supply. If they are okay, check receiver parallel input card and receiver control parallel output A12.
RCV FAULT indicator flashes	a. Check receiver control CONT switch position. If in TEST, set to NORM. b. Check address selected. 1. Does unit for that address exist. If not, select address of existing unit(s). 2. Is power turned on for addressed unit. If not, set unit power on. c. Check cabling between units. If defective, replace.
No speaker receive audio (speaker output)	a. Set SQUELCH off (fully ccw). If speaker audio is present, check frequency of audio signal. If frequency is continuously greater than 1000 Hz, squelch will not operate (break squelch) if used. b. Check SPEAKER switch position. c. Check jumper on rear panel between speaker output/input terminals. If internal speaker is used, jumper should be between TB3-1 and TB3-2. If external speaker is used, remove the jumper from TB3-1 and TB3-2 and connect the jumper from TB3-2 to TB3-3. d. Check headphone audio, same channel, or front panel meter indication for audio. If audio is present here, replace receive audio A6 (channel A1 or B1) or receive audio A4 (channel A2 or B2). If fault remains, trouble is in audio interconnect or receiver.
Speaker receive audio (noise only)	If receive input signal is known to be present and receiver control is properly set up (correct frequency, correct mode, AGC on, local control, rf gain full (cw), etc) and speaker output is noise only, the receiver control is operating. Check receiver.

given in table 3. These levels, when used with tables 2, 4, and 5 further enable the user to isolate and identify faults.

Note

To check signal levels on power supply A1, the bottom dust cover must be removed from the receiver control. To check all other signal levels, the top dust cover must be removed from the receiver control.

3.3 Testing/Troubleshooting Procedures

The testing/troubleshooting procedures isolate a fault to a circuit card or chassis-mounted component. A test setup diagram is shown in figure 2. Testing/troubleshooting procedures are presented in tabular format. Table 4 presents a minimum performance of the receiver control using a minimum amount of test equipment. Table 5 presents a detailed performance test procedure that permits complete repair of the unit and returns the unit to nominal operation.

Table 3. Test Point, Voltage and Signal Levels.

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Power supply A1	TB1-1	+24 V dc	+24 V dc
	TB1-2	+18 V dc	+18 V dc
	TB1-3	+15 V dc	+15 V dc
	TB1-4	Power supply fault	Fault ≅ +5 V dc (indicates low voltage in +24-, +18-, +15-, +8-, or -15-V dc supplies), no fault ≅ 0 V dc (not connected in receiver control).
	TB1-5	Ground	0 V dc (signal common)
	TB1-6	+8 V dc	+8 V dc
	TB1-7	+5 V dc	+5 V dc
	TB1-8	-15 V dc	-15 V dc
Control receive audio A6	TP1	Ground	0 V dc (signal common)
	TP2	Speaker af	150 mV at maximum volume
	TP3	Squelch trigger	Normal ≅ +5 V dc, squelch ≅ -15 V dc
	TP4	Squelch low channel	Output of lower bandpass filter
Parallel input A11	TP1	Ground	0 V dc (signal common)
	TP2	WD4G (output)	
	TP3	WD3G (output)	Word initiate strobes (gates); initiate ≅ +5 V dc, initiate ≅ 0 V dc (are not connected in receiver control).
	TP4	WD1G (output)	
	TP5	WD2G (output)	
	TP5	Squelch high channel	Output of upper bandpass filter
Parallel output A12	TP1	Ground	0 V dc (signal common)
	TP2	Data (input)	Serial data from serial interface A13 (0 or +5 V dc logic levels)
	TP3	Clock (input)	Gated data clock from serial interface A13 (0 or +5 V dc logic levels)
	TP4	Word 4 load strobe	Pulse (≅ +5 V dc) generated on reception of word 4 strobe.
	TP5	Remote rf gain control (output)	Analog dc level (0 to -5.0 V dc), depending on remote RF GAIN setting (MAX ≅ 0 V dc). In local operation ≅ 0 V dc (not used in receiver control).
(Cont)	TP6	Word 2 strobe	Pulse (≅ +5 V dc) generated on reception of word 2 strobe.

Table 3. Test Point, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Parallel output A12 (Cont)	TP7	ADRG (output)	Address gate pulse (≅+5 V dc) generated by a change in the address (latched at 0 V dc in receiver control).
	TP8	Remote frequency change (output)	Pulse (≅+5 V dc) generated on reception of word 1 strobe.
	TP9	Word 3 strobe	Pulse (≅+5 V dc) generated on reception of word 3 strobe.
Serial interface A13	TP1	Ground	0 V dc (signal common)
	TP2	Strobe (output)	Strobe pulse (≅+5 V dc) to parallel output A12
	TP3	Clock (output)	Gated data clock (0 or +5 V dc logic levels) to parallel output A12
	TP4	Data (output)	Serial data (0 or +5 V dc logic levels) to parallel output A12
	TP5	Serial data input	Received serial line data (0 or +5 V dc logic levels); RS-232C or FSK detected data signals
	TP6	Serial data output	Transmitted serial line data (0 or +5 V dc logic levels); data signals prior to level shifting or FSK modulation
	TP7	Microprocessor clock output	921.6-kHz clock output (0 or +5 V dc logic levels) to frequency divider
	TP8	Halt input	Ground applied at this input halts microprocessor program. Normal, logic 1 enabling microprocessor
	TP9	Reset input	Power supply interrupt; reset ≅ +5 V dc, $\overline{\text{reset}}$ ≅ 0 V dc; to microprocessor

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 7.4, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on this equipment.

Caution

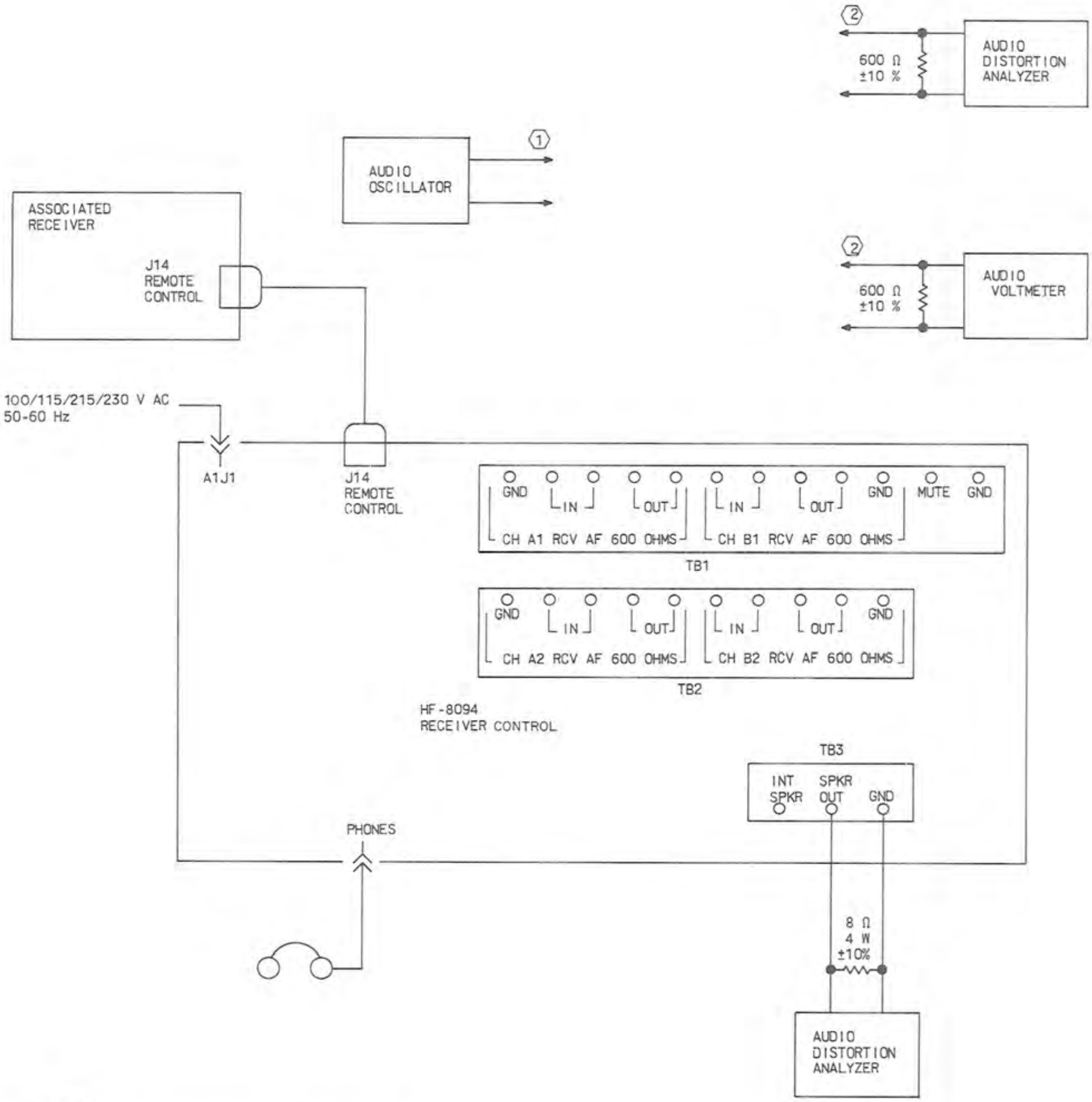
Do not remove or install card modules with primary power applied to the equipment. Doing so could damage components on the modules.

The test procedures in tables 4 and 5 are presented in a manner that allows complete testing or testing of specific characteristics only. After completion of setup (test 1) test procedures may be entered at any numbered test.

Note

Unless otherwise specified in testing, audio line outputs are loaded with 600 Ω, phone output is loaded with 600 Ω, and speaker output is loaded with 8-Ω internal speaker.

Meter level readings in testing apply with factory level settings. Readings may not be valid if field level adjustments have been made.



NOTES:

1 CONNECT TO "IN" TERMINALS OF CHANNEL BEING TESTED.

2 CONNECT TO "OUT" TERMINALS OF CHANNEL BEING TESTED.

TPA-2957-014

Test Setup
Figure 2

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top and bottom chassis covers of unit to be tested. b. Set unit LINE SELECTOR for power source available (100/115/215/230 V ac). **Note** Ensure that proper fuse is installed for power source used. c. Connect HF-8094 Receiver Control under test to associated receiver (refer to test setup, figure 2). Set ADDRESS selector to address as strapped on associated receiver. **Note** Ensure that the strapping options (data rate, parity, FSK/RS-232C signaling, etc) in the receiver control and associated receiver are compatible. d. Connect receiver control to available power source.		
2. Initial checks (Cont)	**Note** To make the initial checks, set unit on edge to gain access to A1TB1. **Caution** If repair has been made to power supply A1 or any power circuits, remove all plug-in cards/modules. a. Front panel controls set as follows: PWR to on b. Measure dc voltages between the following points and ground (A1TB1-5). A1TB1-1 A1TB1-2 A1TB1-3 A1TB1-6 A1TB1-7 A1TB1-8 **Note** Perform step 2.c. only if repair has been made to power supply A1 or any power circuits.	+24 ±1.0 V dc +18 ±1.0 V dc +15 ±1.0 V dc +8 ±1.0 V dc +5 ±0.5 V dc -15 ±1.0 V dc	Check power supply A1 and check for shorts on output voltage lines.

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	c. With all plug-in cards/modules removed, measure dc voltages between the following points and ground.		Check wiring from A1TB1, check for shorts on output lines or check repaired power circuit.
	Control receive audio A4:		
	J3-6 J3-18 J3-23 J3-27	-15 ±1.0 V dc +18 ±1.0 V dc +15 ±1.0 V dc +5 ±0.5 V dc	
	Control receive audio A6:		
	J4-6 J4-18 J4-23 J4-27	-15 ±1.0 V dc +18 ±1.0 V dc +15 ±1.0 V dc +5 ±0.5 V dc	
	Parallel input A11:		
	J9-45 J9-65 J9-114	+15 ±1.0 V dc +5 ±0.5 V dc -15 ±1.0 V dc	
	Parallel output A12:		
	J10-45 J10-65 J10-114	+15 ±1.0 V dc +5 ±0.5 V dc -15 ±1.0 V dc	
	Serial Interface A13:		
	J11-6 J11-23 J11-28	-15 ±1.0 V dc +15 ±1.0 V dc +5 ±1.0 V dc	
	Switch mounting board A2A2:		
	A2J2-43	+24 ±1.0 V dc	
	Note +8-V dc power supply source should not be connected in HF-8094 Receiver Control.		
3. CONT switch	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to AM BANDWIDTH to 16		
(Cont)	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	c. Set CONT switch to TEST.	RCV FAULT display flashes (after 10 seconds delay).	Check for faulty card (remove one at a time).
	d. Set CONT switch to NORM.	RCV FAULT display goes out.	Check serial interface A13 or associated receiver.
	e. Set ADDRESS selector to address other than that of associated receiver. Change MODE and BANDWIDTH controls on receiver control.	RCV FAULT display flashes (after 10 seconds delay). MODE and BAND-WIDTH displays do not change.	Same as step 3.d.
	f. Set ADDRESS selector to address of associated receiver.	RCV FAULT display goes out.	Same as step 3.d
	g. Set associated receiver CONT switch to LCL.	BUSY display lights.	Check serial inter-face A13, parallel output A12, or associated receiver.
	h. Set associated receiver CONT switch to REM.	BUSY display goes out (after short delay).	Same as step 3.g
4. Frequency control	a. Front panel controls set as follows: PWR to on CONT to NORM		
	b. Set associated receiver front panel con-trols as follows: PWR to on CONT to REM		
	c. Check that the frequency controls rotate smoothly and continuously through 360°.	No binding, rubbing, or scraping	Check frequency control A2A3S17.
	d. Check that each frequency digit may be correctly set.	All frequencies between 000.00 and 29999.99 kHz can be selected.	Check frequency switchboard A2A3, the operating fre-quency portion of frequency display A2A5 and the associated receiver.
5. MODE switch	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to AM		
(Cont)	b. Set associated receiver front panel con-trols as follows: PWR to on CONT to REM		

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	c. Note front panel mode indication.	AM indicator is lit.	Check MODE switch A2S21 and LED status display A2A1.
	d. Set MODE switch to CW.	CW indicator lights.	Same as step 5.c
	e. Set MODE switch to ISB.	ISB indicator lights.	Same as step 5.c
	f. Set MODE switch to NET DATA.	NET DATA indicator lights.	Same as step 5.c
6. BANDWIDTH switch	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to AM BANDWIDTH to 16		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Note front panel BANDWIDTH indication.	16 indicator is lit.	Check MODE switch A2S21, BANDWIDTH switch A2S22, and LED status display A2A1.
	d. Set BANDWIDTH switch to A.	A indicator lights.	Same as step 6.c
	e. Set BANDWIDTH switch to B.	B indicator lights.	Same as step 6.c
	f. Set BANDWIDTH switch to C.	C indicator lights.	Same as step 6.c
	g. Set BANDWIDTH switch to D.	D indicator lights.	Same as step 6.c
	h. Set BANDWIDTH switch to E.	E indicator lights.	Same as step 6.c
	i. Repeat steps 6.c. through 6.h. with MODE switch in CW position.	Same as steps 6.c. through 6.h	Same as step 6.c
7. Audio checks	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to AM		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
(Cont)	c. Connect audio oscillator to CH A1 RCV AF 600 OHMS IN (TB1-2, -3) and set for 0.8 V rms at 1000 Hz.		

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	d. Set METER switch to A1 AF (+3 FS) and note meter reading.	0 ±2 dB mW	Check control receive audio A6.
	e. Set PHONES switch to A1 and adjust PHONES level control to full cw.	Audio output present at PHONES jack	Check PHONES switch A2S19 or control receive audio A6.
	f. Set PHONES switch to ALL CH.	Audio output present at PHONES jack	Same as step 7.e
	g. Adjust SQUELCH control full ccw (squelch off).		
	h. Set SPEAKER switch to A1 and adjust AF GAIN control full cw.	Audio signal present at speaker	Check SPEAKER switch A2S15, loud-speaker A2LS1, or control receive audio A6.
	i. Set the SPEAKER switch to ALL CH.	Audio signal present at speaker	Same as step 7.h
	j. Adjust AF GAIN control for comfortable audio level from speaker.		
	k. Set the audio oscillator frequency to 500 Hz and rotate SQUELCH control cw just past the off position.		
	l. Vary audio oscillator frequency between 500 and 3000 Hz and note frequency where squelch occurs.	NLT 1000 Hz, NMT 2000 Hz	Check SQUELCH control A2S16B, or control receive audio A6.
	m. Connect audio oscillator to CH B1 RCV AF 600 OHMS IN (TB1-6, -7) and set for 0.8 V rms at 1000 Hz.		
	n. Set METER switch to B1 AF (+3 FS) and note meter reading.	0 ±2 dB mW	Same as step 7.d
	o. Set PHONES switch to B1 and adjust PHONES level control to full cw.	Audio output present at PHONES jack	Same as step 7.e
	p. Set the PHONES switch to ALL CH.	Audio output present at PHONES jack	Same as step 7.e
	q. Adjust SQUELCH control full ccw (squelch off).		
	r. Set SPEAKER switch to B1 and adjust AF GAIN control full cw.	Audio signal present at speaker	Same as step 7.h
	s. Set the SPEAKER switch to ALL CH.	Audio signal present at speaker	Same as step 7.h
(Cont)	t. Adjust AF GAIN control for comfortable audio level from speaker.		

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	u. Set the audio oscillator frequency to 500 Hz and rotate SQUELCH control cw just past the off position.		
	v. Vary audio oscillator frequency between 500 and 3000 Hz and note frequency where squelch occurs.	NLT 1000 Hz, NMT 2000 Hz	Same as step 7.l
	w. Connect audio oscillator to CH A2 RCV AF 600 OHMS IN (TB2-2, -3) and set for 0.8 V rms at 1000 Hz.		
	x. Set METER switch to A2 AF (+3 FS) and note meter reading.	0 ±2 dB mW	Check control receive audio A4.
	y. Set PHONES switch to A2 and adjust PHONES level control to full cw.	Audio output present at PHONES jack	Check PHONES switch A2S19 or control receive audio A6 and A4.
	z. Set the PHONES switch to ALL CH.	Audio output present at PHONES jack	Same as step 7.y
	aa. Adjust SQUELCH control full ccw (squelch off).		
	ab. Set SPEAKER switch to A2 and adjust AF GAIN control full cw.	Audio signal present at speaker	Check SPEAKER switch A2S15, or control receive audio A6 and A4.
	ac. Set the SPEAKER switch to ALL CH.	Audio signal present at speaker	Same as step 7.ab
	ad. Adjust AF GAIN control for comfortable audio level from speaker.		
	ae. Set the audio oscillator to 500 Hz and rotate SQUELCH control cw just past the off position.		
	af. Vary audio oscillator frequency between 500 and 3000 Hz and note frequency where squelch occurs.	NLT 1000 Hz, NMT 200 Hz	Check SQUELCH control A2S16B, or control receive audio A6 and A4.
	ag. Connect audio oscillator to CH B2 RCV AF 600 OHMS IN (TB2-6, -7) and set for 0.8 V rms at 1000 Hz.		
	ah. Set METER switch to B2 AF (+3 FS) and note meter reading.	0 ±2 dB mW	Same as step 7.x
(Cont)	ai. Set PHONES switch to B2 and adjust PHONES level control to full cw.	Audio output present at PHONES jack	Same as step 7.y

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	aj. Set the PHONES switch ALL CH.	Audio output present at PHONES jack	Same as step 7.y
	ak. Adjust SQUELCH control full ccw (squelch off).		
	al. Set SPEAKER switch to B2 and adjust AF GAIN control full cw.	Audio signal present at speaker	Same as step 7.ab
	am. Set the SPEAKER switch to ALL CH.	Audio signal present at speaker	Same as step 7.ab
	an. Adjust AF GAIN control for comfortable audio level from speaker.		
	ao. Set the audio oscillator frequency to 500 Hz and rotate SQUELCH control cw just past the off position.		
	ap. Vary audio oscillator frequency between 500 and 3000 Hz and note frequency where squelch occurs.	NLT 1000 Hz, NMT 2000 Hz	Same as step 7.af
8. VBFO control (applicable only if vbfo option installed)	a. Front panel controls set as follows: PWR to on CONT to NORM VBFO to VAR		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Check that the VBFO frequency controls rotate smoothly and continuously through 360°.	No binding, rubbing or scraping	Check VBFO frequency control A2A4S18.
	d. Check that each frequency digit may be set.	All frequencies between -9.99 kHz and +9.99 kHz, in 10 Hz increments, can be selected.	Check DVBFO switchboard A2A4, the VBFO frequency portion of frequency display A2A5, and the associated receiver.
	e. Rotate the frequency control in a clockwise direction.	VBFO OFFSET KHZ frequencies increase.	Same as step 8.d
	f. Rotate the frequency control in a counterclockwise direction.	VBFO OFFSET KHZ frequencies decrease.	Same as step 8.d
9. Monitor checks (Cont)	a. Front panel controls set as follows: PWR to on CONT to NORM		

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. (Cont)	b. Set associated receiver front panel controls as follows: PWR to on. CONT to NORM. **Caution** In the following procedures, when applying +5 V dc or 0 V dc (ground) to the indicated points, apply these levels through a 100-Ω (or greater) series limiting resistor. The +5-V dc source should be obtained from the associated receiver power supply so that the integrated circuit supply voltages are not exceeded by the applied levels.		
	c. Apply +5 V dc to P16-8 on associated receiver.	PRESEL FAULT indicator lights.	Check associated receiver and LED status display A2A1.
	d. Remove +5 V dc from P16-8 on associated receiver.	PRESEL FAULT indicator goes out.	Same as step 9.c
	e. Apply +5 V dc to P16-27 on associated receiver.	RCV OVLD indicator lights.	Same as step 9.c
	f. Remove +5 V dc from P16-27 on associated receiver.	RCV OVLD display goes out.	Same as step 9.c
	g. Set the AFC switch to ON.		
	h. Tune the associated receiver to a known transmitting station.	AFC LOCK indicator lights.	Same as step 9.c
	i. To check mode indicators, perform test 5.	Same as test 5	Same as test 5
	j. To check BANDWIDTH indicator, perform test 6.	Same as test 6	Same as test 6
	k. To test FREQUENCY KHZ display, perfrom test 4.	Same as test 4	Same as test 4
	l. To test VBFO OFFSET KHZ display, perform test 8.	Same as test 8	Same as test 8
10. Shutdown	a. Set PWR switch to off.		
	b. Disconnect unit from power source.		
	c. Disconnect all test equipment.		
(Cont)	d. Set unit LINE SELECTOR for power source in installation to be used (100/115/215/230 V ac).		

Table 4. HF-8094 Receiver Control, Minimum Performance Test Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	Note Ensure that proper fuse is installed for power source used. e. Install top and bottom chassis on unit tested.		

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top and bottom chassis covers of unit to be tested. b. Set unit LINE SELECTOR for power source available (100/115/215/230 V ac). **Note** Ensure that proper fuse is installed for power source used. c. Connect HF-8094 Receiver Control under test to associated receiver (refer to test setup, figure 2). Set ADDRESS selector to address as strapped on associated receiver. d. Connect receiver control to available power source.		
2. Initial checks	**Note** To make the initial checks, set unit on edge to gain access to A1TB1. **Caution** If repair has been made to power supply A1 or any power circuits, remove all plug-in cards/modules. a. Front panel controls set as follows: PWR to on. b. Measure dc voltages between the following points and ground (A1TB1-5). A1TB1-1 A1TB1-2 A1TB1-3 A1TB1-6 A1TB1-7 A1TB1-8	 +24 ±1.0 V dc +18 ±1.0 V dc +15 ±1.0 V dc +8 ±1.0 V dc +5 ±0.5 V dc -15 ±1.0 V dc	Check power supply A1 and check for shorts on output voltage lines.
	Note Perform step 2.c. only if repair has been made to power supply A1 or any power circuits. c. With all plug-in cards/modules removed, measure dc voltages between the following points and ground. Control receive audio A4: J3-6 J3-18	 -15 ±1.0 V dc +18 ±1.0 V dc	Check wiring from A1TB1, check for shorts on output lines, or check repaired power circuit.
(Cont)			

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	J3-23	+15 ±1.0 V dc	
	J3-27	+5 ±0.5 V dc	
	Control receive audio A6:		
	J4-6	-15 ±1.0 V dc	
	J4-18	+18 ±1.0 V dc	
	J4-23	+15 ±1.0 V dc	
	J4-27	+5 ±0.5 V dc	
	Parallel input A11:		
	J9-45	+15 ±1.0 V dc	
	J9-65	+5 ±0.5 V dc	
	J9-114	-15 ±1.0 V dc	
	Parallel output A12:		
	J10-45	+15 ±1.0 V dc	
	J10-65	+5 ±0.5 V dc	
	J10-114	+15 ±1.0 V dc	
	Serial Interface A13:		
	J11-6	-15 ±1.0 V dc	
	J11-23	+15 ±1.0 V dc	
	J11-28	+5 ±1.0 V dc	
	Switch mounting board A2A2:		
	A2J2-43	+24 ±1.0 V dc	
	Note +8 V dc power supply source should not be connected in HF-8094 Receiver Control.		
3. CONT switch	a. Front panel controls set as follows: PWR to on; CONT to NORM; MODE to AM; BANDWIDTH to 16		
	b. Set associated receiver front panel controls as follows: PWR to on; CONT to REM		
	c. Set CONT switch to TEST.	RCV FAULT display flashes (after 10 seconds delay).	Check for faulty card (remove one at a time).
(Cont)	d. Set CONT switch to NORM.	RCV FAULT display goes out.	Check serial interface A13 or associated receiver.

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	e. Set ADDRESS selector to address other than that of associated receiver.	RCV FAULT display flashes (after 10 seconds delay).	Same as step 3.d
	f. Set ADDRESS selector to address of associated receiver.	RCV FAULT display goes out.	Same as step 3.d
	g. Set associated receiver CONT switch to LCL.	BUSY display lights.	Check serial interface A13, parallel output A12, or associated receiver.
	h. Set associated receiver CONT switch to REM.	BUSY display goes out (after short delay).	Same as step 3.g
4. Frequency control	a. Front panel controls set as follows: PWR to on CONT TO NORM		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Check that the frequency controls rotate smoothly and continuously through 360°.	No binding, rubbing, or scraping	Check frequency control A2A3S17.
	d. Check that each frequency digit may be correctly set.	All frequencies between 000.000 and 29999.99 kHz can be selected.	Check frequency switchboard A2A3, the operating frequency portion of frequency display A2A5, and the associated receiver.
5. MODE switch	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to AM		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Note front panel mode indication.	AM indicator is lit.	Check MODE switch A2S21 and LED status display A2A1.
	d. Set MODE switch to CW.	CW indicator lights.	Same as step 5.c
(Cont)	e. Set MODE switch to ISB.	ISB indicator lights.	Same as step 5.c

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	f. Set MODE switch to NET DATA.	NET DATA indicator lights.	Same as step 5.c
6. BANDWIDTH switch	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to AM BANDWIDTH to 16		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Note front panel BANDWIDTH indication.	16 indicator is lit.	Check MODE switch A2S21, BANDWIDTH switch A2S22, and LED status display A2A1.
	d. Set BANDWIDTH switch to A.	A indicator lights.	Same as step 6.c
	e. Set BANDWIDTH switch to B.	B indicator lights.	Same as step 6.c
	f. Set BANDWIDTH switch to C.	C indicator lights.	Same as step 6.c
	g. Set BANDWIDTH switch to D.	D indicator lights.	Same as step 6.c
	h. Set BANDWIDTH switch to E.	E indicator lights.	Same as step 6.c
	i. Repeat steps 6.c. through 6.h. with MODE switch in CW position.	Same as steps 6.c. through 6.h.	Same as step 6.c
7. Audio output	a. Front panel controls set as follows: PWR to on CONT to NORM		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Set front panel METER switch to A1 AF (+13FS).		
	d. Connect audio oscillator set for 1000 Hz and 2.5 V rms across CH A1 RCV AF 600 OHMS IN (TB1-2 and -3).		
(Cont)	e. Note front panel meter reading.	10 ±1 dB mW	Measure CH A1 RCV AF 600 OHMS OUT (TB1-4 and -5). If the output is between 2 and 3 V rms, perform meter

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)			calibration; if not, check control receive audio A6.
	f. Adjust audio oscillator for 0.77 V rms across CH A1 RCV 600 OHMS IN (TB1-2 and -3).		
	g. Set front panel METER switch to A1 AF (+3FS).		
	h. Note front panel meter reading.	0 ±2 dB mW	Check control receive audio A6, METER switch A2S1, and load resistor A2R1.
	i. Set PHONES switch to A1 and adjust PHONES level control to full cw.	Audio output present at PHONES jack	Check PHONES switch A2S19 or control receive audio A6.
	j. Set PHONES switch to ALL CH.	Audio output present at PHONES jack	Check PHONES switch A2S19 and A2A2CR14.
	k. Adjust SQUELCH control full ccw (squelch off).		
	l. Set SPEAKER switch to A1 and adjust AF GAIN control full cw.	Audio signal present at speakers	Check SPEAKER switch A2S15, loudspeaker A2LS1, AF GAIN control A2S16A or control receive audio A6.
	m. Set SPEAKER switch to ALL CH.	Audio signal present at speakers	Check SPEAKER switch A2S15.
	n. Set front panel METER switch to B1 AF (+13FS).		
	o. Connect an audio oscillator set for 1000 Hz and 2.5 V rms across CH B1 RCV AF 600 OHMS IN (TB1-6 and -7).		
	p. Note front panel meter reading.	10 ±1 dB mW	Measure CH B1 RCV AF 600 OHMS OUT (TB1-8 and -9). If the output is between 2 and 3 V rms, perform meter calibration; if not, check control receive audio A6.
(Cont)	q. Adjust audio oscillator for 0.77 V rms across CH B1 RCV AF 600 OHMS IN (TB1-6 and -7).		

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	r. Set front panel METER switch to B1 AF (+3FS).		
	s. Note front panel meter reading.	0 ±2 dB mW	Same as step 7.h
	t. Set PHONES switch to B1.	Audio output present at PHONES jack.	Same as step 7.i
	u. Set PHONES switch to ALL CH.	Audio output present at PHONES jack	Check PHONES switch A2S19 and A2A2CR13.
	v. Set SPEAKER switch to B1.	Audio signal present at speaker	Same as step 7.i
	w. Set SPEAKER switch to ALL CH.	Audio signal present at speaker	Check SPEAKER switch A2S15.
	x. Set front panel METER switch to A2 AF (+13FS).		
	y. Connect audio oscillator set for 1000 Hz and 2.5 V rms across CH A2 RCV AF 600 OHMS IN (TB2-2 and -3).		
	z. Note front panel meter reading.	10 ±1 dB mW	Measure CH A2 RCV AF 600 OHMS OUT (TB2-4 and -5). If the output is between 2 and 3 V rms, perform meter calibration; if not, check control receive audio A4.
	aa. Adjust audio oscillator for 0.77 V rms across CH A2 RCV 600 OHMS IN (TB2-2 and -3).		
	ab. Set front panel METER switch to A2 AF (+3FS).		
	ac. Note front panel meter reading.	0 ±2 dB mW	Check control receive audio A4, METER switch A2S1, and load resistor A2R1.
	ad. Set PHONES switch to A2 and adjust PHONES level control to full cw.	Audio output present at PHONES jack	Check PHONES switch A2S19 or control receive audio A4.
	ae. Set PHONES switch to ALL CH.	Audio output present at PHONES jack	Check PHONES switch A2S19 and A2CR15.
(Cont)	af. Adjust SQUELCH control full ccw (squelch off).		

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	ag. Set SPEAKER switch to A2 and adjust AF GAIN control full cw.	Audio signal present at speakers	Check SPEAKER switch A2A2S15, loudspeaker A2LS1, or control receive audio A4.
	ah. Set SPEAKER switch to ALL CH.	Audio signal present at speakers	Check SPEAKER switch to A2S15.
	ai. Set front panel METER switch to B2 AF (+13FS).		
	aj. Connect an audio oscillator set for 1000 Hz and 2.5 V rms across CH B2 RCV AF 600 OHMS IN (TB2-6 and -7).		
	ak. Note front panel meter reading.	10 ±1 dB mW	Measure CH B2 RCV AF 600 OHMS OUT (TB2-8 and -9). If the output is between 2 and 3 V rms, perform meter calibration; if not, check control receive audio A4.
	al. Adjust audio oscillator for 0.77 V rms across CH B2 RCV AF 600 OHMS IN (TB2-6 and -7).		
	am. Set front panel METER switch to B2 AF (+3FS).		
	an. Note front panel meter reading.	0 ±2 dB mW	Same as step 7.ac
	ao. Set PHONES switch to B2.	Audio output present at PHONES jack	Same as step 7.ad
	ap. Set the PHONES switch to ALL CH.	Audio output present at PHONES jack	Check PHONES switch A2S19 and A2A2CR12.
	aq. Set SPEAKER switch to B2.	Audio signal present at speaker	Same as step 7.ag
	ar. Set SPEAKER switch to ALL CH.	Audio signal present at speaker	Check SPEAKER switch A2S15.
8. Audio distortion	a. Front panel controls set as follows: PWR to on CONT to NORM		
(Cont)	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	c. Connect a distortion analyzer across CH A1 RCV AF 600 OHMS OUT (TB1-4 and -5).		
	d. Connect an audio oscillator set for 1000 Hz and 2.5 V rms across CH A1 RCV AF 600 OHMS IN (TB1-2 and -3).		
	e. Measure audio distortion.	NMT 1%	Check control receive audio A6.
	f. Connect a distortion analyzer across CH B1 RCV AF 600 OHMS OUT (TB1-8 and -9).		
	g. Connect an audio oscillator set for 1000 Hz and 2.5 V rms across CH B1 RCV AF 600 OHMS IN (TB1-6 and -7).		
	h. Measure audio distortion.	NMT 1%	Same as step 8.e
	i. Connect an 8-Ω, 4-W resistor between TB3-2 and TB3-3. Disconnect strap between TB3-1 and TB3-2.		
	j. Connect an audio distortion analyzer across the 8-Ω resistor and adjust AF GAIN control for 4 V rms across the resistor.		
	k. Measure audio distortion.	NMT 5%	Same as step 8.e
9. Squelch operation	a. Front panel controls set as follows: PWR to on CONT to NORM		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Set ● SQUELCH control full ccw. Adjust ● SQUELCH control cw just out-of-detent (minimum squelch with squelch enabled).		
	d. Note speaker output.	Speaker should not squelch on normal receiver noise.	Check A2S16B and control receive audio A6.
	e. Rotate ● SQUELCH control cw about 45 degrees from off position.	Speaker output should squelch on noise only.	Check A2S16B, A2S16C, and control receive audio A6.
(Cont)	f. Connect an audio oscillator across CH A1 RCV AF 600 OHMS IN (TB1-2 and -3).		

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. (Cont)	g. Set SPEAKER switch to A1.		
	h. Adjust the audio oscillator for 0.8 V rms.		
	i. Vary audio oscillator between 500 and 3000 Hz and note frequency where squelch occurs.	NLT 1000 Hz, NMT 2000 Hz	Check SQUELCH control A2S16B, A2S16C, or control receive audio A6.
	j. Adjust the audio oscillator for a 2.5-V rms audio output at 300 Hz.	Speaker should break squelch and audio tone should be heard in speaker.	Same as step 9.i
	k. Disconnect audio oscillator.	After 1 to 3 seconds delay, speaker output should squelch on noise only.	Same as step 9.i
10. ISB channel controls	**Note** Parallel input A11 must be extended for this test.		
	a. Front panel controls set as follows: PWR to on CONT to NORM MODE to ISB		
	<u>CH A1</u>		
	1. Set the CH A1 enable switch to OFF and measure the voltage at pin 91 on parallel input A11.	NMT 0.5 V dc	Check CH A1 switch A2S2.
	2. Set the CH A1 enable switch to ON and measure the voltage at pin 91 on parallel input A11.	NLT +3.0 V dc	Check A2S2, A2A2CR1, and MODE switch A2S21.
	3. Set the AGC switch to OFF and measure the voltage at pins 32 and 97 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S26, A2A2CR16, A2A2CR17, and A2A2R14.
	4. Set the AGC switch to FAST and measure the voltage at pins 32 and 97 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S26.
	5. Set the AGC switch to MED and measure the voltage at pin 32 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S26.
(Cont)	6. Measure the voltage at pin 97 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S26 and A2A2CR41.

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	7. Set the AGC switch to SLOW and measure the voltage at pin 32 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S26 and A2A2CR44.
	8. Measure the voltage at pin 97 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S26.
	9. Set the AGC BUS switch to OFF and measure the voltage at pin 14 on parallel input A11.	NMT +0.5 V dc	Check AGC BUS switch A2S6.
	10. Set the AGC BUS switch to ON and measure the voltage at pin 14 on parallel input A11.	NLT +3.0 V dc	Check A2S6 and A2A2CR5.
	CH B1		
	1. Set the CH B1 enable switch to OFF and measure the voltage at pin 92 on parallel A11.	NMT +0.5 V dc	Check CH B1 switch A2S3.
	2. Set the CH B1 enable switch to ON and measure the voltage at A11 pin 92 on parallel input A11.	NLT +3.0 V dc	Check A2S3 and A2A2CR2.
	3. Set the AGC switch to OFF and measure the voltage to pins 33 and 98 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S25, A2A2CR20, A2A2CR21, and A2A2R15.
	4. Set the AGC switch to FAST and measure the voltage at pins 33 and 98 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S25.
	5. Set the AGC switch to MED and measure the voltage at pin 33 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S25.
	6. Measure the voltage at pin 98 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S25 and A2A2CR48.
	7. Set the AGC switch to SLOW and measure the voltage at pin 33 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S25 and A2A2CR45.
	8. Measure the voltage at pin 98 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S25.
	9. Set the AGC BUS switch to OFF and measure the voltage at pin 78 on parallel input A11.	NMT +0.5 V dc	Check AGC BUS switch A2S7.
(Cont)	10. Set the AGC BUS switch to ON and measure the voltage at pin 78 on parallel input A11.	NLT +3.0 V dc	Check A2S7 and A2A2CR6.

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	CH A2		
	1. Set the CH A2 enable switch to OFF and measure the voltage at pin 21 on parallel input A11.	NMT +0.5 V dc	Check CH A2 switch A2S4.
	2. Set the CH A2 enable switch to ON and measure the voltage at pin 21 on parallel input A11.	NLT +3.0 V dc	Check A2S4 and A2A2CR3.
	3. Set the AGC switch to OFF and measure the voltage at pins 20 and 19 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S27, A2A2CR24, A2A2CR25, and A2A2R16.
	4. Set the AGC switch to FAST and measure the voltage at pins 7 and 8 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S27.
	5. Set the AGC switch to MED and measure the voltage at pin 20 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S27.
	6. Measure the voltage at pin 19 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S27 and A2A2CR42.
	7. Set the AGC switch to SLOW and measure the voltage at pin 20 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S27 and A2A2CR43.
	8. Measure the voltage at pin 19 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S27.
	9. Set the AGC BUS switch to OFF and measure the voltage at pin 79 on parallel input A11.	NMT +0.5 V dc	Check AGC BUS switch A2S8.
	10. Set the AGC BUS switch to ON and measure the voltage at pin 79 on parallel input A11.	NLT +3.0 V dc	Check AGC BUS switch A2S8 and A2A2CR7.
	CH B2		
	1. Set the CH B2 enable switch to OFF and measure the voltage at pin 74 on parallel input A11.	NMT +0.5 V dc	Check CH B2 switch A2S5.
	2. Set the CH B2 enable switch to ON and measure the voltage at pin 74 on parallel input A11.	NLT +3.0 V dc	Check A2S5 and A2A2CR4.
	3. Set the AGC switch to OFF and measure the voltage at pins 85 and 84 on parallel input A11.	NLT +3.0 V dc	Check AGC switch A2S24, A2A2CR28, A2A2CR29, and A2A2R17.
(Cont)	4. Set the AGC switch to FAST and measure the voltage at pins 85 and 84 on parallel input A11.	NMT +0.5 V dc	Check AGC switch A2S24.

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

<table>
<tr><th>TEST</th><th>PROCEDURE</th><th>NORMAL INDICATION</th><th>IF INDICATION IS ABNORMAL</th></tr>
<tr><td>10. (Cont)</td><td>5. Set the AGC switch to MED and measure the voltage at pin 85 on parallel input A11.</td><td>NMT +0.5 V dc</td><td>Check AGC switch A2S24.</td></tr>
<tr><td></td><td>6. Measure the voltage at pin 84 on parallel input A11.</td><td>NLT +3.0 V dc</td><td>Check AGC switch A2S24 and A2A2CR47.</td></tr>
<tr><td></td><td>7. Set the AGC switch to SLOW and measure the voltage at pin 85 on parallel input A11.</td><td>NLT +3.0 V dc</td><td>Check AGC switch A2S24 and A2A2CR46.</td></tr>
<tr><td></td><td>8. Measure the voltage at pin 84 on parallel input A11.</td><td>NMT +0.5 V dc</td><td>Check AGC switch A2S24.</td></tr>
<tr><td></td><td>9. Set the AGC BUS switch to OFF and measure the voltage at pin 82 on parallel input A11.</td><td>NMT +0.5 V dc</td><td>Check AGC BUS switch A2S9.</td></tr>
<tr><td></td><td>10. Set the AGC BUS switch to ON and measure the voltage at pin 82 on parallel input A11.</td><td>NLT +3.0 V dc</td><td>Check A2S9 and A2A2CR8.</td></tr>
<tr><td>11. RF GAIN control

(Cont)</td><td>Note

Parallel input A11 must be extended for this test.

a. Front panel controls set as follows:

PWR to on
CONT to NORM
RF GAIN full ccw

b. Measure the voltage on parallel input A11 pin numbers listed below as the RF GAIN control is turned, one step at a time, from MIN to MAX. NORMAL INDICATIONS are: the pins marked with a "1" should measure = +5.0 V dc; the pins marked with a "0" should measure = 0.0 V dc.

<table>
<tr><th rowspan="2">RF GAIN CONTROL POSITION</th><th colspan="4">PARALLEL INPUT A11 PIN NUMBERS</th></tr>
<tr><th>76</th><th>11</th><th>75</th><th>10</th></tr>
<tr><td>(MIN) 1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>3</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>4</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>5</td><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>6</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>7</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>8</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>9</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
</table>
</td><td></td><td>Check RF GAIN control A2S29.</td></tr>
</table>

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

<table>
<tr><th>TEST</th><th>PROCEDURE</th><th>NORMAL INDICATION</th><th>IF INDICATION IS ABNORMAL</th></tr>
<tr><td>11. (Cont</td><td>
<table>
<tr><th rowspan="2">RF GAIN CONTROL POSITION</th><th colspan="4">PARALLEL INPUT A11 PIN NUMBERS</th></tr>
<tr><th>76</th><th>11</th><th>75</th><th>10</th></tr>
<tr><td>10</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>11</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>12</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>13</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>14</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>15</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>(MAX) 16</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>12. ADDRESS control</td><td>
Note
Serial interface A13 must be extended for this test.

a. Front panel controls set as follows:
PWR to on
CONT to NORM
ADDRESS control to 0

b. Measure the voltage on serial interface A13 pin numbers listed below as the ADDRESS switch is set to 0 through 15. NORMAL indications are: the pins marked with a "1" should measure ≅ +5.0 V dc; the pins marked with a "0" should measure ≅ 0.0 V dc.
<table>
<tr><th rowspan="2">ADDRESS SWITCH SETTING</th><th colspan="4">ADDRESS BIT/SERIAL INTERFACE A13 PIN NUMBERS</th></tr>
<tr><th>ADB4/ 39</th><th>ADB3/ 40</th><th>ADB2/ 14</th><th>ADB1/ 41</th></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>3</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>5</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>6</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>7</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>8</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>9</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>10</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>11</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>12</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>13</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>14</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>15</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td><td></td><td>Check address switch A2A6S23.</td></tr>
</table>

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13. VBFO controls (applicable only if vbfo option installed)	a. Front panel controls set as follows: PWR to on CONT to NORM VBFO to VAR		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
	c. Check for smooth and continuous operation of the VBFO controls through 360° of rotation.	No binding, rubbing, or scraping	Check VBFO frequency control A2A4S18.
	d. Check that each frequency digit of the VBFO OFFSET HZ can be set.	All frequencies between -9.99 kHz and +9.99 kHz in 10-Hz increments can be selected.	Check DVBFO switchboard A2A4, the VBFO frequency portion of frequency display A2A5, VBFO switch A2S11, A2A2CR10, A2A2R5 or the associated receiver.
	e. Rotate the frequency control in a clockwise direction.	VBFO OFFSET KHZ frequencies increase.	Same as step 13.d
	f. Rotate the frequency control in a counterclockwise direction.	VBFO OFFSET KHZ frequencies decrease.	Same as step 13.d
14. Monitor checks	a. Front panel controls set as follows: PWR to on CONT to NORM		
	b. Set associated receiver front panel controls as follows: PWR to on CONT to REM		
(Cont)	**Caution** In the following procedures, when applying +5 V dc or 0 V dc (ground) to the indicated points, apply these levels through a 100-Ω (or greater) series limiting resistor. The +5-V dc source should be obtained from the associated receiver power supply so that the integrated circuit supply voltages are not exceeded by the applied levels.		

Table 5. HF-8094 Receiver Control, Detailed Performance Test Procedure (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. (Cont)	c. Apply +5 V dc to P16-8 on associated receiver.	PRESEL FAULT display lights.	Check associated receiver and LED status display A2A1.
	d. Remove +5 V dc from P16-8 on associated receiver.	PRESEL FAULT display goes out.	Same as step 14.c
	e. Apply +5 V dc to P16-27 on associated receiver.	RCV OVLD display lights.	Same as step 14.c
	f. Remove +5 V dc from P16-27 on associated receiver.	RCV OVLD display goes out.	Same as step 14.c
	g. Set the AFC switch to ON.		
	h. Tune the associated receiver to a known transmitting station.	AFC LOCK indicator lights.	Same as 9.c
	i. To check mode indicators, perform test 5.	Same as test 5	Same as test 5
	j. To check BANDWIDTH indicator, perform test 6.	Same as test 6	Same as test 6
	k. To test FREQUENCY KHZ display, perform test 4.	Same as test 4	Same as test 4
	l. To test VBFO OFFSET KHZ display, perform test 13.	Same as test 13	Same as test 13
15. Shutdown	a. Set PWR switch to off.		
	b. Disconnect unit from power source.		
	c. Disconnect all test equipment.		
	d. Set unit LINE SELECTOR for power source in installation to be used (100/115/215/230 V ac). **Note** Ensure that proper fuse is installed for power source used.		
	e. Install top and bottom chassis covers on unit tested.		

4. ALIGNMENT/ADJUSTMENT

Procedures in this section are instructions for properly aligning the receiver control. It is assumed that no malfunctions exist in the unit when these procedures are performed. If a malfunction is suspected, refer to detailed test procedures for troubleshooting information.

4.1 *FSK Data Symmetry Adjustment (Serial Interface A13)*

Note

The adjustment is applicable only to the FSK demodulator circuit. It does not affect the RS-232C/MIL-STD-188C data circuits that have no adjustable components.

Perform the following steps:

a. With the receiver disconnected from all other equipment, jumper J14-2 to J14-3 and J14-14 to J14-16. Set CONT switch to NORM, MODE switch to CW, and turn on PWR switch. (Positions of other switches do not affect this adjustment.)
b. Connect an oscilloscope to A13 TP2 (sweep rate set to approximately 0.5 μs/division).
c. Change the MODE switch back and forth between positions (to initiate data word transmission) and, at the same time, adjust A13R67 until the strobe at TP2 appears on the oscilloscope.
d. Slowly adjust A13R67 counterclockwise to a point where the strobe disappears. Note position of A13R67.
e. Rotate A13R67 clockwise one-half turn and set MODE switch to different position.
f. Slowly adjust A13R67 clockwise (while changing MODE switch back and forth) to a point where the strobe disappears. Note position of A13R67.
g. Set A13R67 half way between positions noted in steps d and f.

4.2 *Speaker and Audio Line Amplifiers Gain Adjustment (Control Receive Audio A6 and A4)*

Note

The variable resistors for these adjustments are accessible to the operator through access holes in the unit top cover (refer to figure 3) and may be adjusted to any desired gain levels within the amplifier range. These procedures set up the amplifier to a standardized unity gain (0 dB in - 0 dB out).

Perform the following steps:

a. With the receiver control disconnected from all other equipment, terminate all four receive line outputs with 600 ohms:

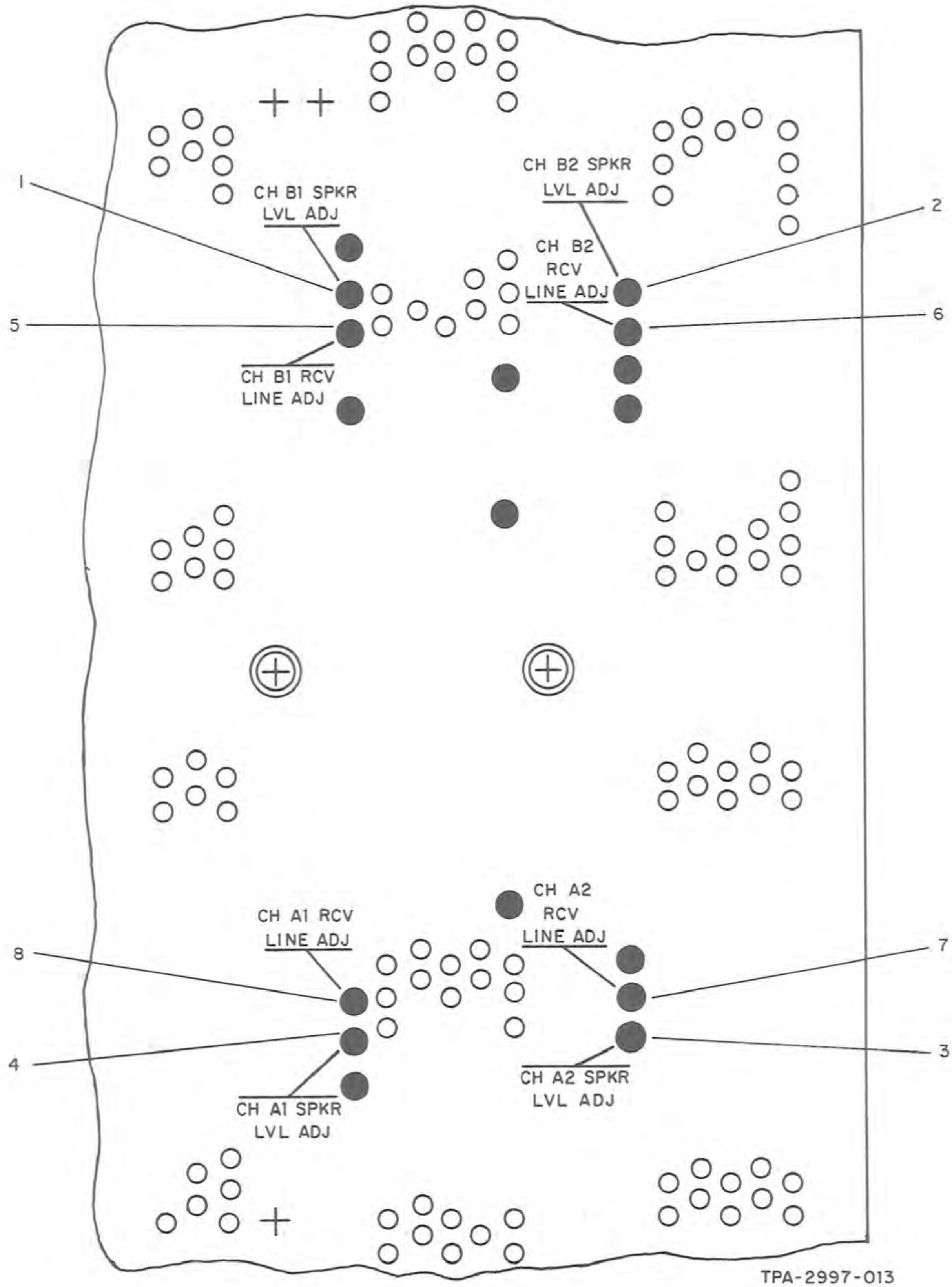
CH A1	TB1-4 to TB1-5
CH B1	TB1-8 to TB1-9
CH A2	TB2-4 to TB2-5
CH B2	TB2-8 to TB2-9

b. On control receive audio A6, adjust R6, R39, R15 and R48 to the maximum clockwise position.
c. Set the SPEAKER switch to A1, AF GAIN to maximum clockwise and turn on the PWR switch.
d. Connect the signal generator output to CH A1 RCV AF 600 OHMS IN (TB1-2 and TB1-3). Adjust the signal generator output to 1 kHz and 0 dB mW.
e. Adjust R6 (CH A1 SPKR LVL ADJ) to obtain +15 dB mW at TB1-4 and TB1-5.
f. Adjust R15 (CH A1 RCV LINE ADJ) to obtain 0 dB mW at TB1-4 and TB1-5.
g. Disconnect the signal generator and connect it to CH B1 RCV 600 OHMS IN (TB1-6 and TB1-7).
h. Set the SPEAKER switch to B1 and adjust R39 (CH B1 SPKR LVL ADJ) to obtain +15 dB mW at TB1-8 and TB1-9.
i. Adjust R48 (CH B1 RCV LINE ADJ) to obtain 0 dB mW at TB1-8 and TB1-9.

Note

If control receive audio A4 is installed in J3 of the control unit, continue with the procedure described below to make the necessary adjustments to channels A2 and B2. If control receive audio A4 is not installed, the audio line adjustments have been completed for channels A1 and B1.

j. Disconnect the signal generator and connect it to CH A2 RCV 600 OHMS IN (TB2-2 and TB2-3).
k. On control receive audio A4, adjust R6, R39, R15 and R48 to the maximum clockwise position.
l. Set the SPEAKER switch to A2 and adjust R6 (CH A2 SPKR LVL ADJ) to obtain +15 dB mW at TB2-4 and TB2-5.
m. Adjust R15 (CH A2 RCV LINE ADJ) to obtain 0 dB mW at TB2-4 and TB2-5.
o. Disconnect the signal generator and connect it to CH B2 RCV AF 600 OHMS IN (TB2-6 and TB2-7).
p. Set the SPEAKER switch to B2 and adjust R39 (CH B2 SPKR LVL ADJ) to obtain +15 dB mW at TB2-8 and TB2-9.
q. Adjust R48 (CH B2 RCV LINE ADJ) to obtain 0 dB mW at TB2-8 and TB2-9.



Speaker and Line Amplifier Adjustments
Figure 3

4.3 Meter Calibration (Control Receive Audio A6 and A4)

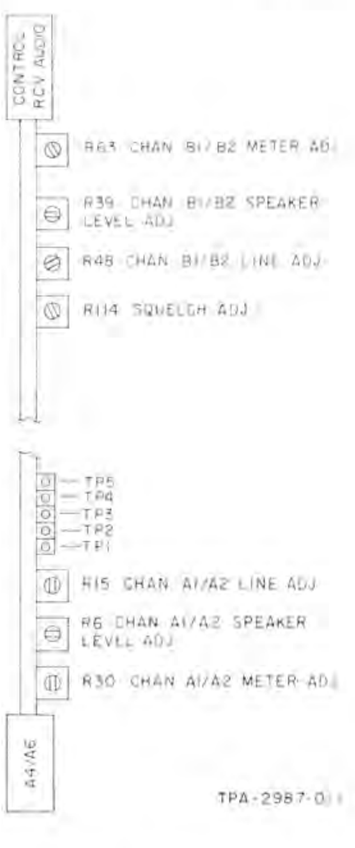
Meter adjustments are required only if the meter circuit is repaired and/or the associated card is replaced. If the associated card is replaced, make only those adjustments applicable to that card. Before performing the following procedures, make sure the audio line amplifiers are properly adjusted.

Note

The variable resistors for these adjustments are located on both control receive audio A6 and A4 (refer to figure 4).

a. With the receiver control disconnected from all other equipment, terminate all four receive line outputs with 600 Ω:

CH A1	TB1-4 to TB1-5
CH B1	TB1-8 to TB1-9
CH A2	TB2-4 to TB2-5
CH B2	TB2-8 to TB2-9



Control Receive Audio Adjustment Locations
Figure 4

b. Set the METER selector to A1 AF +13FS and turn on the PWR switch.
c. Connect the signal generator output to CH A1 RCV AF 600 OHMS IN (TB1-2 and TB1-3). Adjust the signal generator output 1.0 kHz and +10 dB mW.
d. Adjust A6R30 to set the meter indication to +10 DBM.
e. Adjust the signal generator output level to 0 dB mW.
f. Set the METER selector to A1 AF +3FS and note that the meter indicates 0 ±1 DBM.
g. Disconnect the signal generator and connect it to CH B1 RCV AF 600 OHMS IN (TB1-6 and TB1-7).
h. Set the METER selector to B1 AF +13FS and adjust the signal generator output level to +10 dB mW.
i. Adjust A6R63 to set the meter indication to +10 DBM.
j. Adjust the signal generator output level to 0 dB mW.
k. Set the METER selector to B1 AF +3FS and note that the meter indicates 0 ±1 DBM.
l. Disconnect the signal generator and connect it to CH A2 RCV AF 600 OHMS IN (TB2-2 and TB2-3).
m. Set the METER selector to A2 AF +13FS and adjust the signal generator output level to +10 dB mW.
n. Adjust A4R30 to set the meter indication to +10 DBM.
o. Adjust the signal generator output level to 0 dB mW.
p. Set the METER selector to A2 AF +3FS and note that the meter indicates 0 ±1 DBM.
q. Disconnect the signal generator and connect it to CH B2 RCV AF 600 OHMS IN (TB2-6 and TB2-7).
r. Set the METER selector to B2 AF +13FS and adjust the signal generator output level to +10 dB mW.
s. Adjust A4R63 to set the meter indication to +10 DBM.
t. Adjust the signal generator output level to 0 dB mW.
u. Set the METER selector to B2 AF +3FS and note that the meter indicates 0 ±1 DBM.

4.4 Squelch Adjustment (Control Receive Audio A6)

Perform the following steps:

a. Set METER switch to A1 AF (+3FS), set SPEAKER switch to A1, turn on SQUELCH control and leave adjusted for minimum squelch (ccw position), and turn on PWR switch.

b. Connect signal generator to CH A1 RCV AF 600 OHMS in (TB1-2 and TB1-3). Adjust output frequency to 600 Hz and output level for 0-dB mW indication on front panel meter.
c. Connect ac voltmeter to A6TP4 (refer to figure 4) and vary signal generator frequency within range of 500 to 700 Hz to obtain maximum output voltage at TP4. Record the output in dB.
d. Disconnect ac voltmeter from A6TP4 and connect it to A6TP5. Adjust signal generator frequency to obtain maximum output at TP5 within range of 2000 to 2800 Hz. Leave generator set to this frequency.
e. Adjust A6R114 to set voltage at TP5 to be 12 dB below that at TP4 (recorded in step c).

5. DISASSEMBLY/ASSEMBLY

Warning

Do not attempt disassembly or assembly of the unit with primary power applied.

Caution

Do not remove or install subassemblies with primary power applied to the equipment. Doing so could damge components on the subassemblies.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 7.4, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on this equipment.

5.1 Disassembly

After removing the top and bottom cover plates of the receiver control, all circuit cards plug directly into connectors mounted on the chassis. Power supply A1, located at the rear of the unit, is secured to the chassis by screws. Subassemblies located behind the front panel are made accessible by removing the front panel. Subassemblies other than the plug-in circuit cards are interconnected by connectors mounted on ribbon-type cables.

Note

Retain hardware removed during disassembly for use in reassembly. Refer to unit parts list as an aid in disassembly and assembly.

5.1.1 Meter Lamp Replacement

a. Grasp spring-loaded white terminal block and pull block away from back of meter until maps are clear. Rotate block 90 degrees and gently release.
b. Remove and replace meter lamps.
c. Grasp spring-loaded white terminal block and carefully rotate the block back to its original position.

5.1.2 LED Status Display A2A1 Removal

a. Remove unit top cover.
b. Remove front panel from unit by removing four hexhead screws and attaching hardware.
c. Remove four Phillips-head screws that secure LED status display A2A1 to hex-screw posts/front panel.
d. Disconnect plug P5 from LED status display A2A1 jack A3J3.
e. Carefully pull LED status display A2A1 from front panel mounted position (pull straight back).

5.1.3 Switch Mounting Board A2A2 Removal

a. Remove unit top cover.
b. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during removal of upper overlay panel.

c. Remove upper overlay panel from front panel as follows:
   1. Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   3. Lift upper edge bar from front panel.
   4. Carefully remove upper overlay panel.
d. Remove lower overlay panel from front panel as follows:
   1. Remove all knobs from front panel switches and controls.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to lower edge bar.
   3. Lift lower edge bar from front panel.
   4. Remove lower overlay panel.

e. Remove attaching hardware from all switches, controls, and connectors on the front panel.
f. Disconnect plugs P3 and P4 from mounting board jacks A2J2 and A2J1, respectively.
g. Remove switch mounting board A2A2 by removing three Phillips-head screws and attaching hardware (screwheads on front of front panel). Use care so as not to damage wiring of wire-mounted controls and connectors.

5.1.4 Frequency Display A2A5 Removal

a. Remove unit top cover.
b. Remove four Phillips-head screws and attaching hardware.
c. Disconnect plug P8 from jack A2J5 on frequency display A2A5.
d. Carefully pull frequency display A2A5 from front panel mounted position.

5.1.5 Frequency Switchboard A2A3 Removal

a. Remove unit top cover.
b. Remove frequency Display A2A5 per paragraph 5.1.4.
c. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexigalass) is brittle; exercise care during removal of upper overlay panel.

d. Remove upper overlay panel from front panel as follows:
   1. Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   3. Lift upper edge bar from front panel.
   4. Carefully remove upper overlay panel.
e. Remove cover plate on back of front panel by removing five Phillips-head screws and attaching hardware (screwheads on front of front panel).
f. Disconnect plug P2 from frequency switchboard A2A3 jack A2J4.
g. Remove frequency switchboard A2A3 by removing four Phillips-head screws and attaching hardware (screwheads on front of front panel).

5.1.6 VBFO Switchboard A2A4 Removal

a. Remove top cover.
b. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during removal of upper overlay panel.

c. Remove upper overlay panel from front panel as follows:
   1. Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   3. Lift upper edge bar from front panel.
   4. Carefully remove upper overlay panel.
d. Disconnect plug P9 from VBFO switchboard A2A4 jack A2J6.
e. Remove VBFO switchboard A2A4 by removing four Phillips-head screws and attaching hardware (screwheads on front of front panel).

5.1.7 Address Selector Switchboard A2A6 Removal

a. Remove top cover.
b. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during removal of upper overlay panel.

c. Remove upper overlay panel from front panel as follows:
   1. Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   3. Lift upper edge bar from front panel.
   4. Carefully remove upper overlay panel.
d. Disconnect plug P11 from address selector switchboard A2A6 jack A2J9.
e. Remove address selector switchboard A2A6 by removing two Phillips-head screws and attaching hardware (screwheads on front of front panel).

5.1.8 Speaker Removal

a. Remove unit top cover.
b. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during removal of upper overlay panel.

c. Remove upper overlay panel from front panel as follows:
   1. Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   3. Lift upper edge bar from front panel.
   4. Carefully remove upper overlay panel.
d. Remove speaker overlay panel from front panel as follows:
   1. Remove all knobs from front panel switches and controls.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to lower edge bar.
   3. Lift lower edge bar from front panel.
   4. Remove speaker overlay panel.
e. Disconnect jack J47 from speaker plug A2P2.
f. Remove speaker by removing four Phillips-head screws and attaching hardware (screwheads on front of front panel).

5.2 Assembly

Except for the subassemblies required to be mounted to the rear of the front panel before the panel is attached to the chassis, assembly of the unit is not in any certain order. The plug-in circuit cards are keyed so each card can be inserted in the correct connector only.

5.2.1 LED Status Display A2A1 Installation

Caution

LED status display A2A1 must be correctly positioned and pushed straight into front panel slot.

a. Carefully push LED status display A2A1 into front panel mounted position.
b. Secure LED status display A2A1 to hexscrew posts/front panel using four Phillips-head screws.
c. Plug P5 into LED status display A2A1 jack A2J3.
d. Install front panel to unit using four hexhead screws and attaching hardware.
e. Install unit top cover.

5.2.2 Switch Mounting Board A2A2 Installation

a. Carefully install switch mounting board A2A2 to front panel using three Phillips-head screws and attaching hardware (screwheads on front of front panel). Be careful not to damage wiring of wire-mounted controls and connectors.
b. Install the necessary attaching hardware on all front panel switches, controls, and connectors.
c. Mount panel support (middle bar on front panel) to front panel by using four Phillips-head screws and lockwashers.
d. Install lower overlay panel and speaker overlay panel into slot of middle bar on front panel.
e. Carefully install lower edge bar and secure to front panel by using four Phillips-head screws and lockwashers.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care when installing upper overlay panel.

f. Carefully install upper overlay panel into slot of middle bar on front panel.
g. Carefully install upper edge bar and secure to front panel by using four Phillips-head screws and lockwashers.
h. Install all knobs on front panel switches and controls.
i. Plug P3 and P4 into switch mounting board A2A2 jacks A2J2 and A2J1, respectively.
j. Install front panel to unit using four hexhead screws and attaching hardware.
k. Install unit top cover.

5.2.3 Frequency Switchboard A2A3 Installation

a. Install frequency switchboard A2A3 in front panel using four Phillips-head screws (screwheads on front of front panel).
b. Install cover plate to back of front panel using five Phillips-head screws and attaching hardware (screwheads on front of front panel).
c. Mount panel support (middle bar on front panel) to front panel by using four Phillips-head screws and lockwashers.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care when installing upper overlay panel.

d. Carefully install upper overlay panel into slot of middle bar on front panel.
e. Carefully install upper edge bar and secure to front panel by using four Phillips-head screws and lockwashers.
f. Plug P2 into frequency switchboard A2A3 jack A2J4.
g. Install front panel to unit using four hexhead screws and attaching hardware.
h. Install frequency display A2A5 according to paragraph 5.2.5.
i. Install unit top cover.

5.2.4 VBFO Switchboard A2A4 Installation

a. Install VBFO switchboard A2A4 in front panel using four Phillips-head screws (screwheads on front of front panel).
b. Mount panel support (middle bar on front panel) to front panel by using four Phillips-head screws and lockwashers.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care when installing upper overlay panel.

c. Carefully install upper overlay panel into slot of middle bar on front panel.
d. Carefully install upper edge bar and secure to front panel by using four Phillips-head screws and lockwashers.
e. Plug P9 into VBFO switchboard A2A4 jack A2J6.
f. Install front panel to unit using four hexhead screws and attaching hardware.
g. Install unit top cover.

5.2.5 Frequency Display A2A5 Installation

a. Carefully slide frequency display A2A5 in place in front panel.
b. Connect plug P8 to jack A2J5 on frequency display A2A5.
c. Secure frequency display A2A5 using four Phillips-head screws and attaching hardware.
d. Install unit top cover.

5.2.6 Address Selector Switchboard A2A6 Installation

a. Install address selector switchboard A2A6 in front panel using two Phillips-head screws (screwheads on front of front panel).
b. Mount panel support (middle bar on front panel) to front panel by using four Phillips-head screws and lockwashers.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care when installing upper overlay panel.

c. Careflly install upper overlay panel into slot of middle bar on front panel.
d. Carefully install upper edge bar and secure to front panel by using four Phillips-head screws and lockwashers.
e. Plug P11 into address selector switchboard A2A6 jack A2J9.
f. Install front panel to unit using four hexhead screws and attaching hardware.
g. Install unit top cover.

5.2.7 Speaker Installation

a. Mount speaker to front panel using four Phillips-head screws and attaching hardware (screwheads on front of front panel).
b. Mount panel support (middle bar on front panel) to front panel by using four Phillips-head screws and lockwashers.
c. Install speaker overlay panel and lower overlay panel into slot of middle bar on front panel.
d. Carefully install lower edge bar and secure to front panel by using four Phillips-head screws and lockwashers.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care when installing upper overlay panel.

d. Carefully install upper overlay panel into slot of middle bar on front panel.
f. Carefully install upper edge bar and secure to front panel by using four Phillips-head screws and lockwashers.
g. Install all knobs on front panel switches and controls.
h. Plug jack J47 into speaker plug A2P2.

i. Install front panel to unit using four hexhead screws and attaching hardware.
j. Install unit top cover.

6. REPAIR

Repair of the receiver control consists of replacing subassemblies and chassis-mounted components. For replacement of subassemblies, refer to paragraph 5. Use standard shop practices to replace chassis-mounted components.

7. CIRCUIT CARD REPAIR

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 7.4, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on this equipment.

7.1 General

The following paragraphs provide information for repair and replacement of components mounted on subassemblies. Testing and troubleshooting procedures for subassemblies are included in the individual instruction sections. The following is a list of tools and materials necessary for repair of circuit cards.

a. Flux, Kester 1544 or equivalent
b. Solder, 0.5-mm (0.020-in) diameter, 63/37 rosin flux core or equivalent
c. Solvent, Freon TMC
d. Soldering iron, 40-watt, 1.6-mm (1/16-in) tip
e. Solder sucker, plunger type
f. Needle-nose pliers
g. Small brush
h. Pipe cleaners
i. Diagonal cutters

7.2 Replacement of Resistors, Diodes, and Capacitors

7.2.1 Removal

Note

Before removing diodes or polarized capacitors, note polarity marking and orientation on the circuit card.

Caution

Do not apply heat at a thru hole for more than 8 seconds.

a. On back side of board (side opposite components), place soldering iron on pad of component to be removed until solder begins to melt (refer to figure 5).
b. Use a solder sucker and remove solder from hole. More solder may be required to conduct heat into hole and provide better suction for removal.
c. Use needle-nose pliers to remove lead from hole. It may be necessary to reheat lead, as a certain amount of solder will remain in thru hole.
d. When component has been removed, reheat thru holes and, using a solder sucker, remove excess solder. Repeat procedures as necessary until holes are clean, as indicated by lack of solder on walls, top, or bottom.

7.2.2 Installation

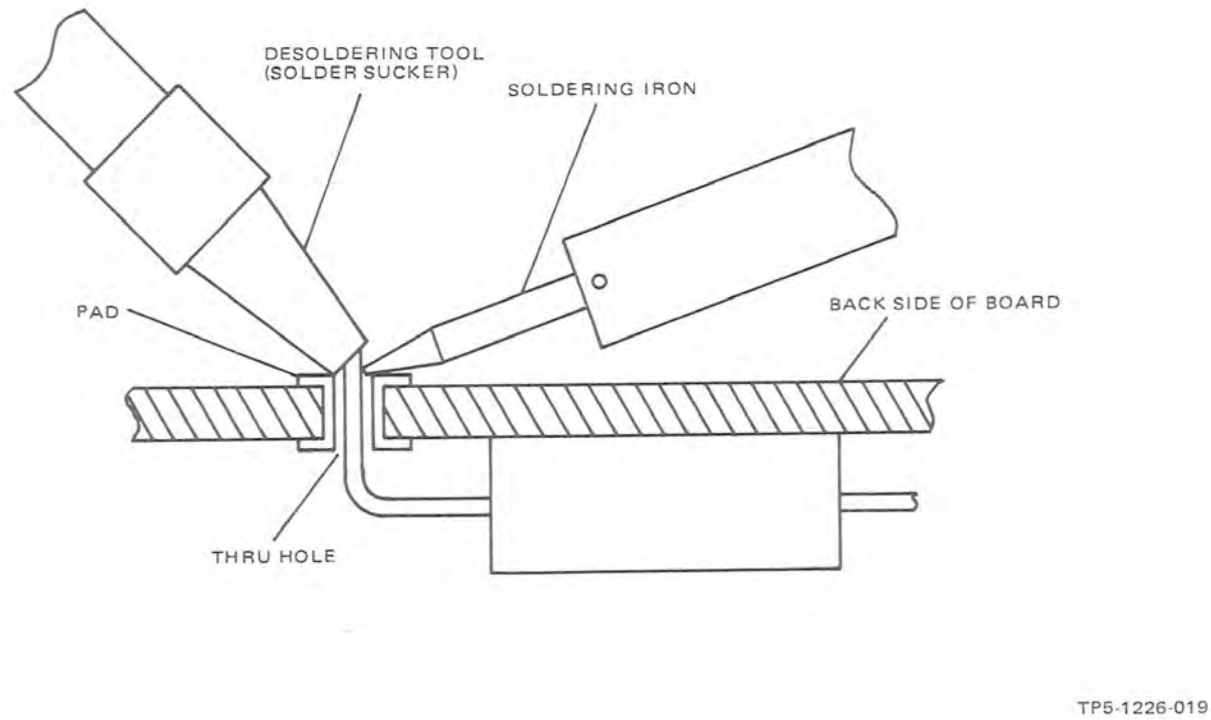
a. Using a small brush or tip of a pipe cleaner dipped in solvent, carefully clean both sides of surface area, thru holes, and pads.
b. Observe polarity markings and properly orient component. Shape leads of the replacement component so that leads fit freely into correc thru holes.
c. Gently maneuver component, inserting leads into proper thru holes, until component is inserted to proper depth or until body of component makes contact with surface of circuit board.

Note

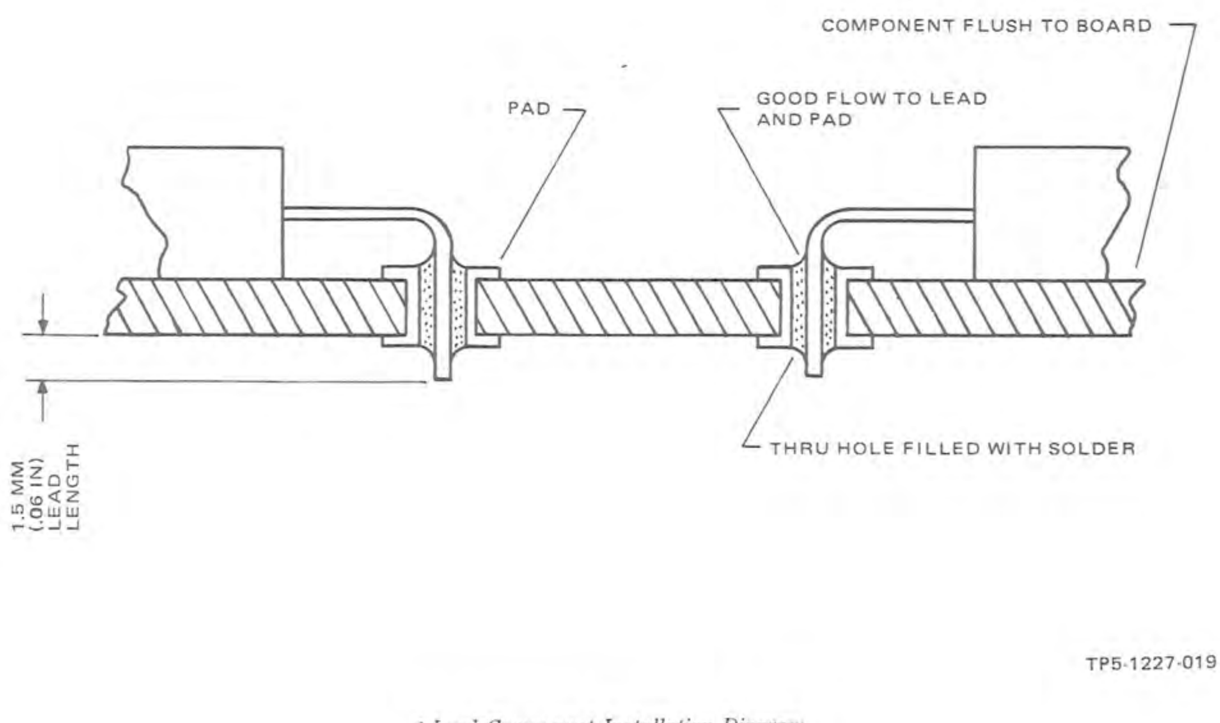
Do not crimp or bend leads to hold component in position for soldering. Protruding portion of lead should remain straight to prevent damage to circuit board if subsequent replacement is required.

d. Using small diagonal cutters, cut leads so that protruding length (approximately 1.5 mm (1/16 in)) matches that of other components.
e. Using flux and solder sparingly, solder each lead on side opposite component. Ensure that component does not shift position during soldering procedure.

f. Carefully inspect all new solder joints for evidence of poor connection, cold solder, or short circuit. Solder should completely fill thru hole without excess. Refer to figure 6.



2-Lead Component Removal Diagram
Figure 5



2-Lead Component Installation Diagram
Figure 6

g. Using a small brush or the tip of a pipe cleaner dipped in solvent, throughly clean all new solder joints. Ensure that all flux and rosin are removed. Solder joints should appear clean, smooth, and bright.

7.3 Replacement of Multilead Components (Transistors, Transformers, Dual In-Line Packages, Relays, Etc)

7.3.1 Removal

a. Locate component to be removed. Note position, lead confirmation, and physical alignment of component. Observe position of orientation tab (if any). Determine pads and thru holes used for mounting.
b. Lay circuit board flat on a clean surface with component side facing down.

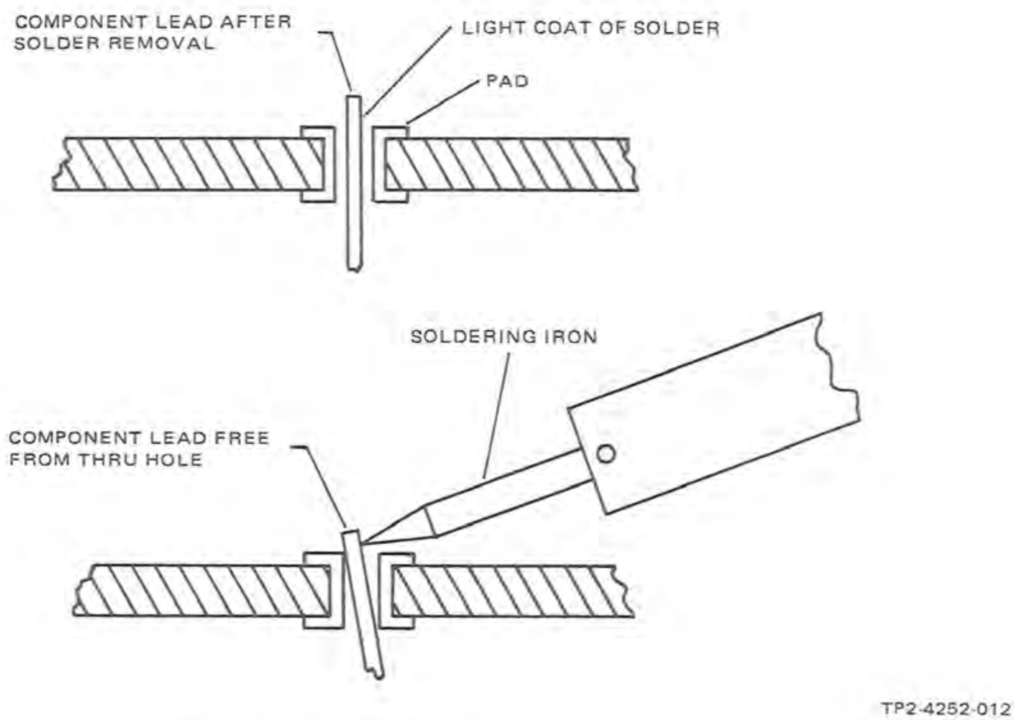
Caution

Do not apply heat at a pad or thru hole for longer than 8 seconds.

c. Place soldering iron tip to one pad and lead until solder begins to melt. Use a solder sucker to remove excess solder. More solder may be required to conduct head into hole and to provide better suction for solder removal. Refer to figure 7.
d. Allow circuit board to cool before applying heat to thru hole in same area. Repeat procedure for each lead.
e. When all leads have been unsoldered, remove component from board.
f. When component has been removed, reheat each hole. When solder is melted, use a solder sucker to remove excess solder. Allow circuit board to cool before reapplying heat in same area. Repeat procedure as required until each thru hole is clean, as indicated by absence of solder on walls, top, and bottom.

7.3.2 Installation

a. Using a small brush or tip of a pipe cleaner dipped in solvent, carefully clean both sides of circuit board in mounting area. Clean mounting holes and pads.
b. Carefully bend leads of new component to same configuration as old one so that leads fit freely into correct thru holes. Do not cut leads at this time.
c. Gently maneuver component, inserting leads into proper thru holes. Continue with rocking movement until component is inserted to proper depth.



Multilead Component Removal Diagram
Figure 7

Note

Do not crimp or bend leads to hold component in position for soldering. Protruding portion of lead should remain straight to prevent damage to circuit board if subsequent replacement is required.

d. Using small diagonal cutters or end nippers, cut leads so that protruding length (approximately 1.5 mm (1/16 in)) matches that of other components.

Caution

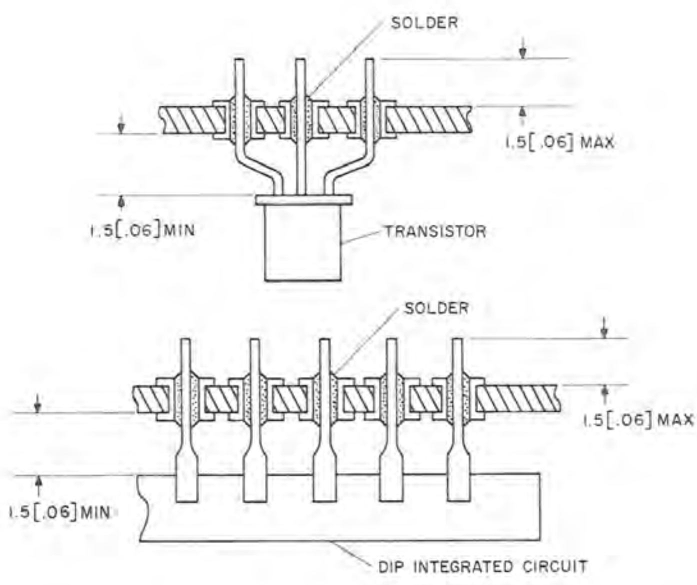
Do not apply heat at a thru hole for longer than 8 seconds.

e. Using flux and solder sparingly, solder each lead at side opposite component. Ensure that component does not shift position during soldering procedure.
f. Allow circuit board to cool before applying heat to other thru holes.
g. Carefully inspect all new solder joints for evidence of poor connections, cold or excess solder, or short circuits. Solder should completely fill hole without excess (refer to figure 8).
h. Using a small brush or tip of a pipe cleaner dippled in solvent, thoroughly clean all new solder joints. Ensure that all flux is removed. Solder joints should appear clean, smooth, and bright.

7.4 Replacement of Electrostatic Sensitive Devices (COS/MOS)

The replacement processes for electrostatic sensitive devices (COS/MOS) are the same as the processes for replacing multilead components specified in paragraph 7.3. Because electrostatic sensitive devices have extremely high input resistance, they are susceptible to damage when exposed to high static electrical charges. To avoid possible damage during handling, the following procedures should be performed.

a. The leads of the devices should be in contact with a conductive material, except when being installed or operated, to avoid buildup of static charge.



NOTE:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETRES [INCHES].

TP5-0981-013

Multilead Component Installation Diagram
Figure 8

b. Soldering iron tips, tools, and handling facilities should be grounded.
c. Devices should not be installed (inserted) in, or removed from, circuits with the power on because transient voltages may cause damage.
d. Signals should not be applied to the device inputs while the device supply is turned off.
e. All unused input leads must be connected to ground or the device supply, whichever is applicable for the logic circuit involved.

Note

Dry weather (relative humidity less than 30 percent) multiplies the accumulation of static charges on a surface. In a low-humidity environment, the handling procedures specified above are of greater importance and should be adhered to without exception.

PARTS LIST

HF-8094
Receiver Control

Rockwell International

parts list

Collins Telecommunications Products Division

Printed in USA

523-0770967-001218
1 January 1981

list of illustrations

List of Effective Pages

*The asterisk indicates pages changed, added, or deleted by the current change.

Page No	Issue
Title	1 Jan 81
List of Effective Pages	1 Jan 81
1 thru 25	1 Jan 81
26 Blank	1 Jan 81

Record of Revisions

RETAIN THIS RECORD IN THE FRONT OF MANUAL.
ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.

REV NO	REVISION DATE	INSERTION DATE	INITIALS	REV NO	REVISION DATE	INSERTION DATE	INITIALS
1st Ed	1 Jan 81						

parts list

1. INTRODUCTION

1.1 General

The purpose of this parts list, prepared by Collins Telecommunications Products Division of Rockwell International, is for identification, requisition, and issuance of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

1.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard, vendor, or Collins part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up; CI (Configuration Identifier) 5-digit number; REV (Revision Identifier) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB 2, etc.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

Caution

This equipment contains electrostatic discharge sensitive devices, indicated in the description column by (ESDS). Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section before assembly/-disassembly or repair is performed. All illustrations that contain ESDS devices have the following symbol attached.

CAUTION CAUTION
ELECTROSTATIC SENSITIVE DEVICES
OBSERVE PRECAUTIONS FOR HANDLING

1.3 Numerical Index

PART NUMBER Column — Part numbers are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

TTL REQ Column — Listed is the total quantity of parts or assemblies covered in the Group Assembly Parts List.

1.4 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

1.5 How To Use This Parts List

To locate a part number if the assembly in which the part is used is known, turn to the List of Illustrations and find the page number for the assembly in which the part is used. Locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

To locate the illustration for a part if the part number is known, refer to the Numerical Index and find the part number. Turn to the Group Assembly Parts List and find the first figure and index number indicated in the Numerical Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Index.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

1.6 Manufacturer's Code, Name, and Address

CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC P O BOX 3608 HARRISBURG PA 17105
01121	ALLEN-BRADLEY CO 1201 SOUTH 2ND ST MILWAUKEE WI 53204
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
07126	DIGITRAN CO THE 855 SOUTH ARROYO PARKWAY PASADENA CA 91105
08664	ACCO INDUSTRIES INC BRISTOL DIV 40 BRISTOL ST WATERBURY CT 06720

CODE	MANUFACTURER'S NAME AND ADDRESS
09353	C AND K COMPONENTS INC 103 MORSE STREET WATERTOWN MA 02172
12294	ERIE TECHNOLOGICAL PRODUCTS OF CANADA LTD 5 FRASER AVE TRENTON ONTARIO CAN K8V 5S1
12998	QUALITY NAME PLATE INC MILL ROAD EAST GLASTONBURY CT 06025
13499	ROCKWELL INTERNATIONAL CORP COLLINS TELECOMMUNICATIONS PRODUCTS DIV PO BOX 728 855 35TH STREET NE CEDAR RAPIDS IA 52406
14208	MINNEAPOLIS SPEAKER CO 3806 GRAND AVE S MINNEAPOLIS MN 55409
17235	CONTROL DATA CORP. CONNECTOR OPNS 31829 W. LA TIENDA DR. WESTLAKE VILLAGE, CA 91361
18677	SCANBE MFG CO 3445 FLETCHER AVE EL MONTE CA 91731
31918	ITT SCHADOW INC 8081 WALLACE RD EDEN PRAIRIE MN 55343
55616	ELFAB CORP 4200 WILEY POST RD P O BOX 34555 DALLAS TX 75234
56289	SPRAGUE ELECTRIC CO NORTH ADAMS MA 01247
65092	WESTON INSTRUMENTS DIV SANGAMO WESTON INC 614 FRELINGHUYSEN AVE NEWARK NJ 07114
70903	BELDEN CORP 2000 S BATAVIA AVE GENEVA IL 60134
71400	BUSSMANN MFG DIV MCGRAW-EDISON CO 502 EARTH CITY PLAZA P O BOX 14460 ST LOUIS MO 63178
71468	ITT CANNON ELECTRIC DIV INTERNATIONAL TELEPHONE AND TELEGRAPH CO 666 E DYER RD SANTA ANA CA 92702

CODE	MANUFACTURER'S NAME AND ADDRESS
71590	GLOBE-UNION INC CENTRALAB ELECTRONICS DIV HWY 20 W P O BOX 858 FORT DODGE IA 50501
71785	TRW CINCH CONNECTORS 1501 MORSE AVE ELK GROVE VILLAGE IL 60007
74970	JOHNSON E F CO 299 10TH AVE S W WASECA MN 56093
76854	OAK INDUSTRIES INC SWITCH DIV 100 S MAIN ST CRYSTAL LAKE IL 60014
77250	PHEOLL MFG CO DIV OF ALLIED PRODUCTS CORP 5700 W ROOSEVELT RD CHICAGO IL 60650
79807	WROUGHT WASHER MFG INC 2100 S O BAY ST MILWAUKEE WI 53207
79963	ZIERICK MFG CO RADIO CIRCLE MT KISCO NY 10549
81349	MILITARY SPECIFICATION
86797	ROGAN CORP 3455 WOODHEAD DR NORTHBROOK IL 60062
88044	AERONAUTICAL STANDARDS GROUP DEPARTMENT OF NAVY AND AIR FORCE
91314	LEWIS SPRING AND MFG CO 2652 W NORTH AVE CHICAGO IL 60647
95146	ALCO ELECTRONIC PRODUCTS INC P O BOX 1348 LAWRENCE MA 01842
96906	MILITARY STANDARD

1.7 Usable on Codes

The following usable on codes have been assigned in this manual:

USABLE ON CODE	UNIT PART NUMBER	FIG-ITEM
A	622-3477-001	1-
B	622-3477-002	1-
A	646-6815-001	2-
B	646-6815-002	2-

1.8 Reference Designation Prefixes

The following prefixes have been assigned in this manual:

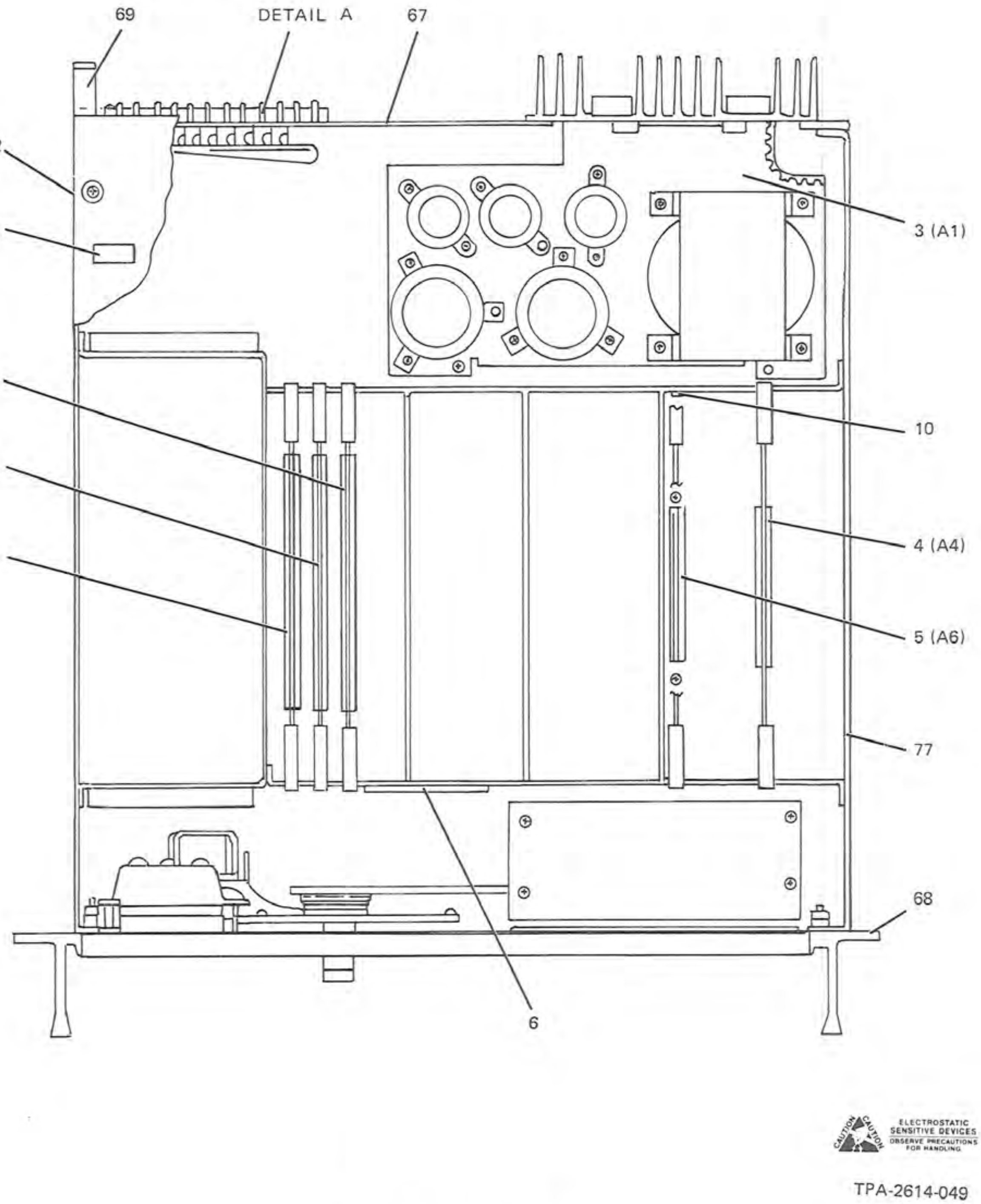
PREFIX	UNIT PART NUMBER	FIG-ITEM
A1	635-9649-001	1-3
A2	646-6815-001	2-
A2	646-6815-002	2-
A2A1	635-0825-013	2-48
A2A2	638-6873-002	3-
A2A3	635-0830-001	2-42
A2A3	635-0830-002	2-42
A2A4	638-6437-001	2-43
A2A5	637-1781-006	2-44
A2A5	637-1781-008	2-44
A2A6	625-0899-001	2-46
A4	642-3572-001	1-4
A6	642-3572-001	1-5
A11	642-3135-001	1-9
A12	642-3137-001	1-8
A13	638-6896-001	1-7

1.9 Configuration Identifiers

The following CI's/REV LTR's were used in compiling data for this manual:

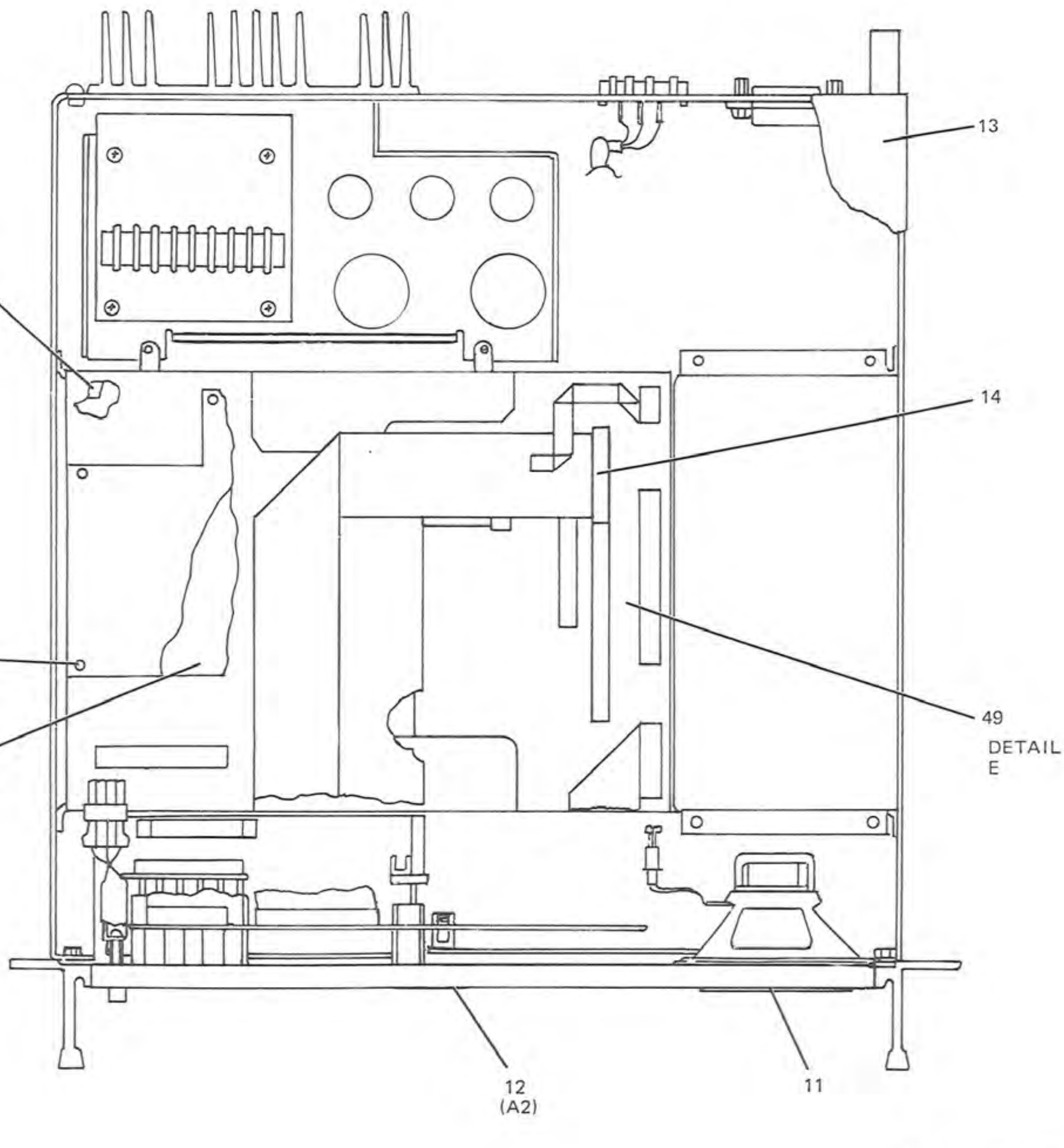
CI/ REV LTR	UNIT PART NUMBER	FIG-ITEM
A	622-3477-001	1-
A	622-3477-002	1-
B	646-6815-001	2-
B	646-6815-002	2-
E	638-6873-002	3-

2. GROUP ASSEMBLY PARTS LIST



Receiver Control HF-8094
Figure 1 (Sheet 1 of 4)

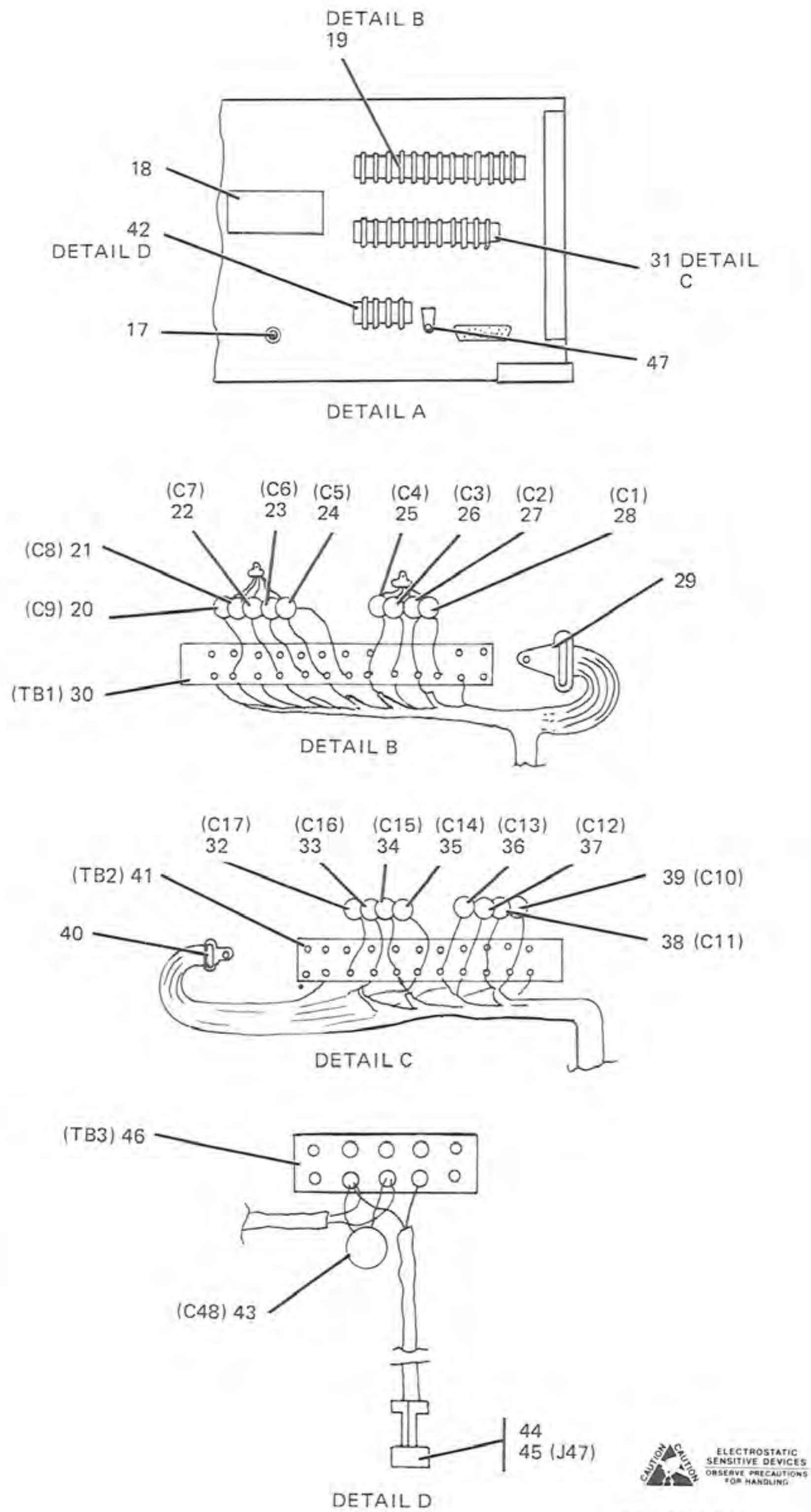
GROUP ASSEMBLY PARTS LIST



TPA-2614-049

Receiver Control HF-8094
Figure 1 (Sheet 2)

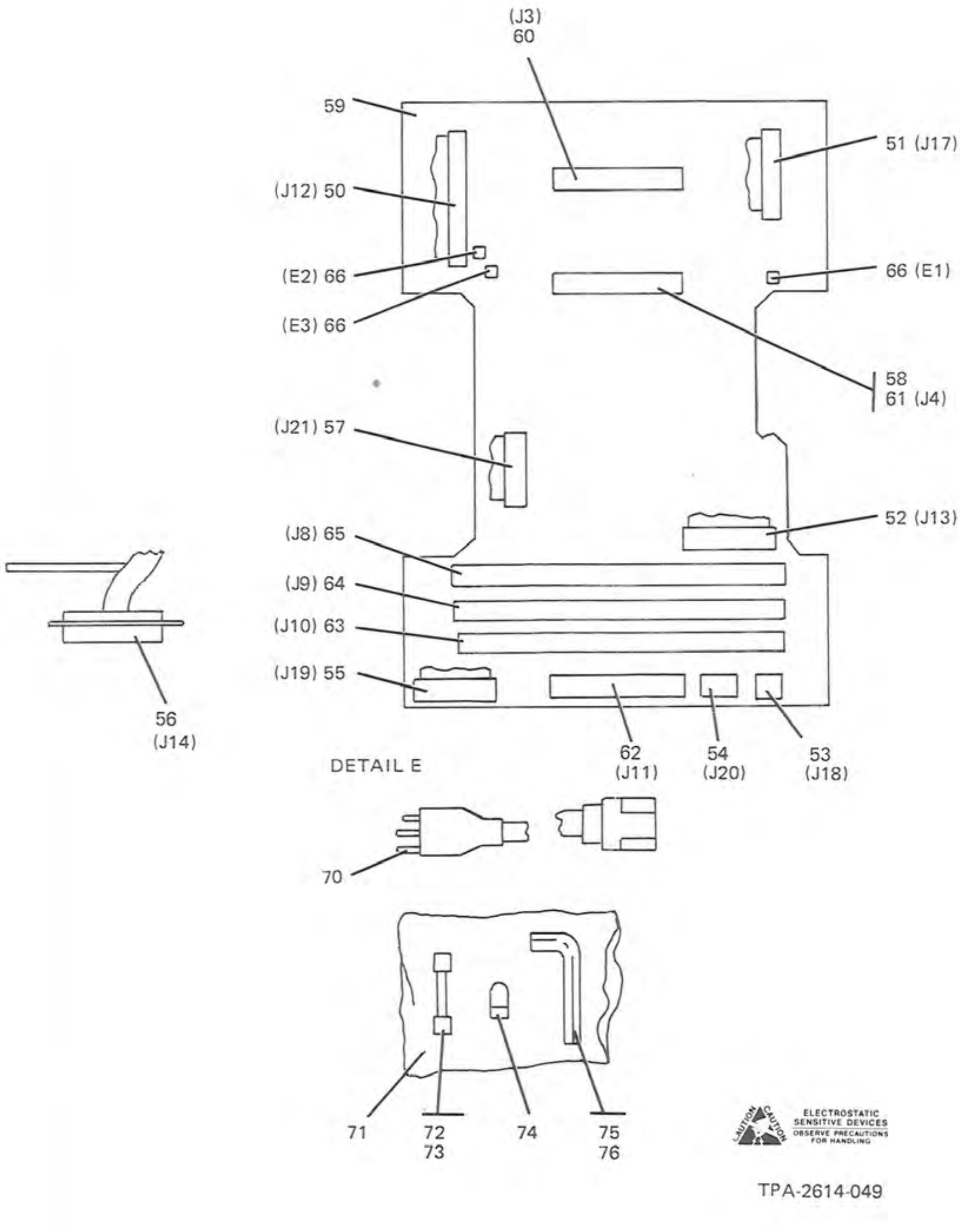
GROUP ASSEMBLY PARTS LIST



TPA-2614-049

Receiver Control HF-8094
Figure 1 (Sheet 3)

GROUP ASSEMBLY PARTS LIST



Receiver Control HF-8094
Figure 1 (Sheet 4)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3477-001	1	CONTROL, RECEIVER, HF-8094 (ESDS)	1	A
	622-3477-002	1	CONTROL, RECEIVER, HF-8094 (ESDS)	1	B
1	280-1368-350	2	LABEL,PRESSURE (12998)	1	
2	635-9690-003	2	COVER,TOP	1	
	MS51957-28	2	SCREW,MACH SST, 6-32 X 3/8 (96906) 343-0169-000 (AP)	7	
	MS51957-30	2	SCREW,MACH SST, 6-32 X 1/2 (96906) 343-0171-000 (AP)	2	
3	635-9649-001	2	POWER SUPPLY A1	1	
4	642-3572-001	2	CONTROL RECEIVE AUDIO A4 (ESDS)	1	A
5	642-3572-001	2	CONTROL RECEIVE AUDIO A6 (ESDS)	1	
6	280-2745-030	2	LABEL,PRESS SENS (12998)	1	
7	638-6896-001	2	SERIAL INTERFACE A13 (ESDS)	1	
8	642-3137-001	2	PARALLEL OUTPUT A12 (ESDS)	1	
9	642-3135-001	2	PARALLEL INPUT A11 (ESDS)	1	
10	23071-4	2	CARD GUIDE,PC (18677) 150-0810-040	10	
	MS51957-13	2	SCREW,MACH STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	10	
11	646-6889-001	2	INSERT, IDENT	1	
12	646-6815-001	2	PANEL,FRONT A2 (SEE FIG 2)	1	A
12	646-6815-002	2	PANEL,FRONT A2 (SEE FIG 2)	1	B
13	635-9658-001	2	COVER,BOTTOM	1	
	MS51957-28	2	SCREW,MACH SST, 6-32 X 3/8 (96906) 343-0169-000 (AP)	7	
14	637-1759-010	2	CABLE,FREQ DISPLAY 637-1759-001	1	
15	635-9669-002	2	GUARD,CABLE	1	
16	635-9669-001	2	GUARD,CABLE	1	
	115-0260-003	2	SPACER (74970) 150-1012-030 (AP)	4	
17	P343-0309-000	2	SCREW,MACH NP BRS, 8-32 X 3/8 (77250) 343-0309-000	1	
	MS35338-99	2	WASHER,SPRING CD PL BRZ, 0.168 ID X 0.293 OD (96906) 310-0098-000 (AP)	1	
	AN961-8T	2	WASHER,FLAT TP BRS, 0.174 ID X 0.375 OD (88044) 310-0751-030 (AP)	1	
18	635-2277-000	2	PLATE,IDENT	1	
	MS51957-11	2	SCREW,MACH STL, 4-40 X 1/8 (96906) 343-0131-000 (AP)	2	
19	646-6890-002	2	CABLE ASSY	1	
	P313-0045-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0045-000 (AP)	4	
	310-0071-000	2	WASHER,LOCK SST, 0.151 ID X 0.239 OD (79807) (AP)	4	
	MS51957-30	2	SCREW,MACH SST, 6-32 X 1/2 (96906) 343-0171-000 (AP)	4	
20	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C9	1	
21	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C8	1	
22	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C7	1	
23	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C6	1	
24	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C5	1	
25	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C4	1	
26	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C3	1	
27	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C2	1	
28	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C1	1	
29	403	3	TERMINAL,LUG (79963) 304-1089-000	3	
30	353-18-12-001	3	TERMINAL STRIP (71785) 367-0020-000 TB1	1	
31	646-6891-001	2	ASSY,CABLE	1	
	P313-0045-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0045-000 (AP)	4	
	310-0071-000	2	WASHER,LOCK SST, 0.151 ID X 0.239 OD (79807) (AP)	4	
	MS51957-30	2	SCREW,MACH SST, 6-32 X 1/2 (96906) 343-0171-000 (AP)	4	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	

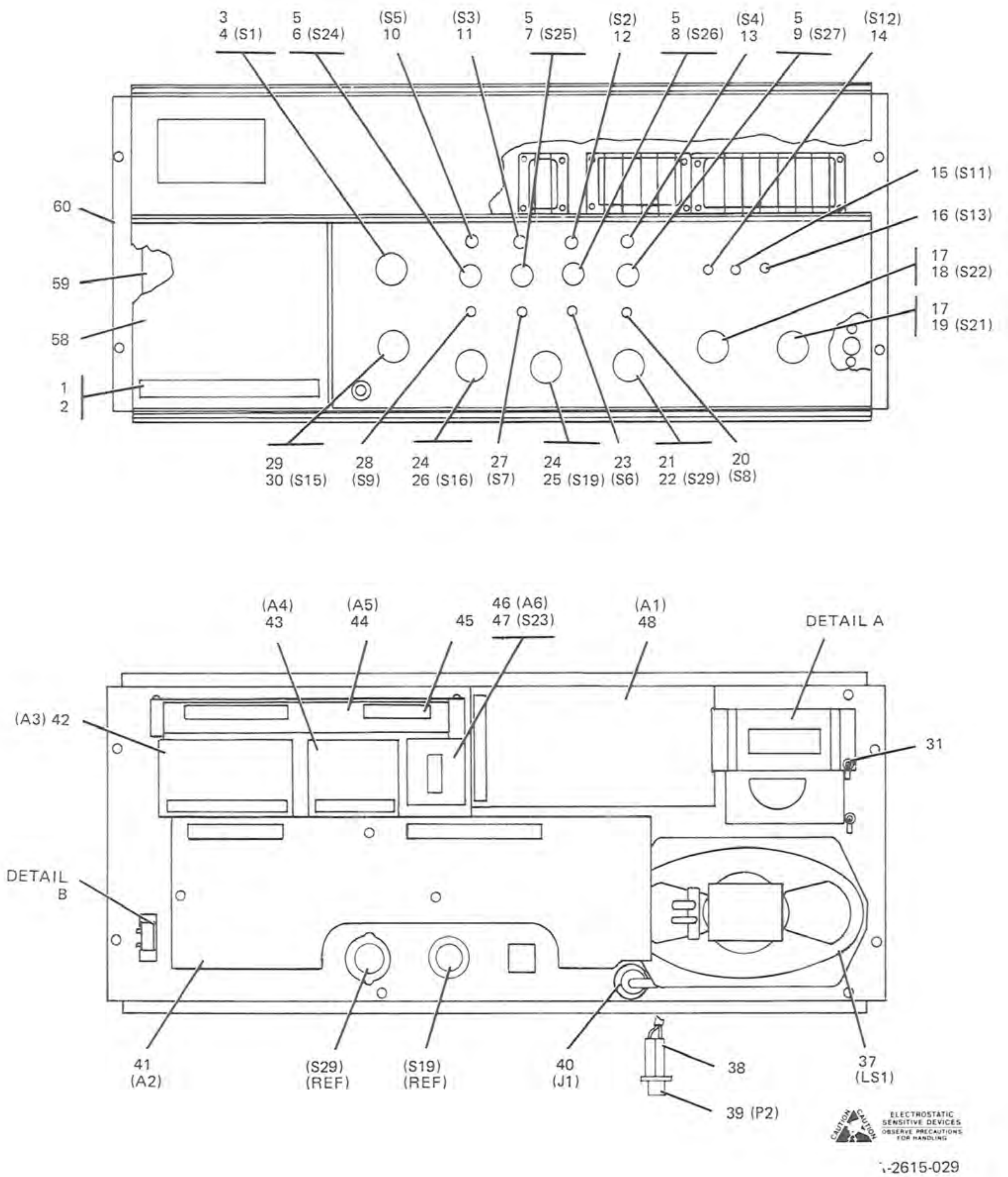
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-32	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C17	1	
33	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C16	1	
34	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C15	1	
35	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C14	1	
36	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C13	1	
37	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C12	1	
38	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C11	1	
39	CK63AW103M	3	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V (81349) 913-1188-000 C10	1	
40	403	3	TERMINAL,LUG (79963) 304-1089-000	3	
41	353-18-10-001	3	TERMINAL STRIP (71785) 367-0018-000 TB2	1	
42	637-9126-001	2	CABLE ASSY,SPEAKER	1	
	P313-0045-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0045-000 (AP)	4	
	310-0071-000	2	WASHER,LOCK SST, 0.151 ID X 0.239 OD (79807) (AP)	4	
	MS51957-30	2	SCREW,MACH SST, 6-32 X 1/2 (96906) 343-0171-000 (AP)	4	
43	805-014X5V0103Z	3	CAPACITOR,FXD CER DIEL, 0.01UF, P80%M20%, 100V (12294) 913-3680-000 C48	1	
44	60617-1	3	SOCKET CONTACT (00779) 372-5884-060	2	
45	1-480318-0	3	HOUSING,SOCKET (00779) 372-5884-330 J47	1	
46	353-18-03-001	3	TERMINAL STRIP (71785) 367-0011-000 TB3	1	
47	403	2	TERMINAL,LUG (79963) 304-1089-000	1	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	
48	540-9039-003	2	POST	4	
	MS51957-13	2	SCREW,MACH STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	8	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	8	
	MS15795-803	2	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP)	4	
49	646-6823-001	2	ASSY,SIDEBOARD	1	A
49	646-6823-002	2	ASSY,SIDEBOARD	1	B
	M24308-26-1	2	SCREW ASSY (81349) 371-0062-000 (AP)	2	
50	635-9610-002	3	CABLE,SPECIAL PURPOSE J12	1	
51	637-3761-001	3	CABLE,VBFO SWITCH J17	1	A
52	635-9635-001	3	CABLE,FREQ SWITCH J13	1	
53	635-9636-001	3	CABLE,SPECIAL PURPOSE J18	1	
54	637-3797-002	3	CABLE,VBFO DISPLAY J20	1	A
55	635-9639-001	3	CABLE,STATUS DISPLAY J19	1	
56	DBM25S	3	CONNECTOR,RCPT ELEC (71468) 371-0221-000 J14	1	
57	646-6893-001	3	CABLE,SPECIAL PURPOSE J21	1	
58	MS25036-101	3	TERMINAL,LUG (96906) 304-0127-000	6	
59	642-3594-001	3	SIDEBOARD,CONTROL	1	
60	BS1225F28PFF	4	CONNECTOR,RCPT ELEC (17235) 372-7515-010 J3	1	
61	BS1225F28PFF	4	CONNECTOR,RCPT ELEC (17235) 372-7515-010 J4	1	
	97096900	4	CONNECTOR,RCPT ELEC (17235) 372-7600-280	5	
62	BS1225F28PFF	4	CONNECTOR,RCPT ELEC (17235) 372-7515-010 J11	1	
63	637-9315-001	4	CONNECTOR,130 PIN J10	1	
64	BS1020F65PAF	4	CONNECTOR,RCPT ELEC (55616) 372-2274-050 J9	1	
65	BS1020F65PAF	4	CONNECTOR,RCPT ELEC (55616) 372-2274-050 J8	1	
66	372-2601-027	4	CONTACT,ELEC E1-E3	3	
67	635-9626-005	2	PANEL,REAR	1	
	MS51959-61	2	SCREW,MACH SST, 10-32 X 3/8 (96906) 343-0226-000 (AP)	2	
	MS51957-29	2	SCREW,MACH SST, 6-32 X 7/16 (96906) 343-0170-000 (AP)	7	
68	635-9616-001	2	FLANGE,CHASSIS	2	

GROUP ASSEMBLY PARTS LIST

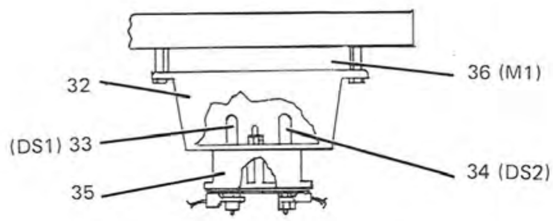
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	MS35650-304	2	NUT,PLAIN,HEX SST, 10-32 (96906) 313-0019-000 (AP)	4	
	541-6106-002	2	SPACER,SLV (AP)	4	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	4	
	P312-0116-000	2	STUD,CONT THD STL, 10-32 X 1 (77250) 312-0116-000 (AP)	4	
69	637-9121-001	2	SUPPORT,RADIO	1	
	P325-0051-000	2	SCREW,MACH STL, 10-32UNF-2A X 1/2 (77250) 325-0051-000 (AP)	2	
70	17250	2	CABLE ASSY,PWR (70903) 426-1034-010	1	
71	637-1769-001	2	KIT,MAINTENANCE	1	
72	AGC250-1	3	FUSE,CRTG (71400) 264-0721-000	5	
73	AGC250-2	3	FUSE,CRTG (71400) 264-0723-000	5	
74	MS25237-327-15	3	LAMP,INCAND (96906) 262-1106-000	1	
75	024-0057-000	3	KEY,SCH SCR (08664)	1	
76	024-0058-000	3	KEY,SCH SCR (08664)	1	
77	635-9652-001	2	CHASSIS,CONTROL	1	

GROUP ASSEMBLY PARTS LIST

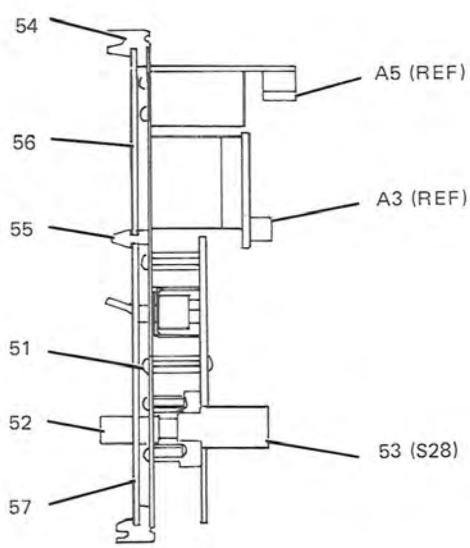


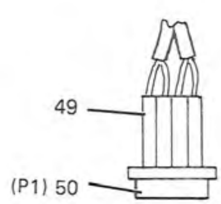
Front Panel Assembly A2
Figure 2 (Sheet 1 of 2)

GROUP ASSEMBLY PARTS LIST



DETAIL A





DETAIL B

CAUTION ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-2615-029

Front Panel Assembly A2
Figure 2 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	646-6815-001	1	PANEL,FRONT A2 [ESDS] [SEE FIG 1-12 FOR NHA]	REF	A
	646-6815-002	1	PANEL,FRONT A2 [ESDS] [SEE FIG 1-12 FOR NHA]	REF	B
1	623-9008-001	2	INSERT,HOUSEMARK	1	
2	632-5201-001	2	HOLDER,INSERT	1	
	P313-0132-000	2	NUT,PLAIN,HEX SST, 4-40 (77250) 313-0132-000 (AP)	2	
	MS51959-12	2	SCREW,MACH SST, 4-40 X 3/16 (96906) 342-0043-000 (AP)	2	
3	RB67-1DCML	2	KNOB,RING SKRTD (86797) 281-0650-010	1	
4	280611BF1	2	SWITCH,RTRY (76854) 259-7201-290 A2S1	1	
	P313-0064-000	2	NUT,PLAIN,HEX SST, 3/8-32 (77250) 313-0064-000 (AP)	1	
	MS35333-76	2	WASHER,LOCK SST, 0.398 ID X 0.692 OD (96906) 373-0046-000 (AP)	1	
5	RB67-0ML	2	KNOB,ROUND (86797) 281-0650-140	4	
6	MRB1-10SPC	2	SWITCH,RTRY (95146) 259-2933-010 A2S24	1	
7	MRB1-10SPC	2	SWITCH,RTRY (95146) 259-2933-010 A2S25	1	
8	MRB1-10SPC	2	SWITCH,RTRY (95146) 259-2933-010 A2S26	1	
9	MRB1-10SPC	2	SWITCH,RTRY (95146) 259-2933-010 A2S27	1	
10	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S5	1	A
10	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S5	1	B
11	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S3	1	A
11	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S3	1	B
12	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S2	1	A
12	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S2	1	B
13	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S4	1	A
13	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S4	1	B
14	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S12	1	B
15	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S11	1	B
16	7207P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-170 A2S13	1	
17	RB67-1DCML	2	KNOB,RING SKRTD (86797) 281-0650-010	2	
18	280568BF1	2	SWITCH,RTRY (76854) 259-7201-280 A2S22	1	
19	280567BF1	2	SWITCH,RTRY (76854) 259-7201-270 A2S21	1	
	P313-0064-000	2	NUT,PLAIN,HEX SST, 3/8-32 (77250) 313-0064-000 (AP FOR 18,19)	2	
	MS35333-76	2	WASHER,LOCK SST, 0.398 ID X 0.692 OD (96906) 373-0046-000 (AP FOR 18,19)	2	
20	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S8	1	A
20	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S8	1	B
21	RB67-1DCML	2	KNOB,RING SKRTD (86797) 281-0650-010	1	
22	5-22641-766	2	SWITCH,RTRY (76854) 259-2916-010 A2S29	1	
	P313-0064-000	2	NUT,PLAIN,HEX SST, 3/8-32 (77250) 313-0064-000 (AP)	1	
	MS35333-76	2	WASHER,LOCK SST, 0.398 ID X 0.692 OD (96906) 373-0046-000 (AP)	1	
23	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S6	1	A
23	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S6	1	B
24	RB67-1-0ML9	2	KNOB,CONCENTRIC (86797) 281-0650-030	2	
25	259-8017-030	2	SWITCH,RTRY (71590) A2S19	1	
26	382-0047-030	2	RESISTOR,VAR CERMET,10K,25K,10%,1W,2SECT (01121) A2S16	1	
	P313-0064-000	2	NUT,PLAIN,HEX SST, 3/8-32 (77250) 313-0064-000 (AP FOR 25,26)	2	
	MS35333-76	2	WASHER,LOCK SST, 0.398 ID X 0.692 OD (96906) 373-0046-000 (AP FOR 25,26)	2	
27	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S7	1	A
27	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S7	1	B
28	7101P3PD9V40B	2	SWITCH,TGL (09353) 266-5415-130 A2S9	1	A
28	7101P4PD9V40B	2	SWITCH,TGL (09353) 266-5415-800 A2S9	1	B
29	RB67-1DCML	2	KNOB,RING SKRTD (86797) 281-0650-010	1	
30	280566BF1	2	SWITCH,RTRY (76854) 259-7201-260 A2S15	1	
	P313-0064-000	2	NUT,PLAIN,HEX SST, 3/8-32 (77250) 313-0064-000 (AP)	1	
	MS35333-76	2	WASHER,LOCK SST, 0.398 ID X 0.692 OD (96906) 373-0046-000 (AP)	1	
31	MS25036-144	2	TERMINAL,LUG (96906) 304-1251-000	1	
	P313-0051-000	2	NUT,PLAIN,HEX NP BRS, 4-40 (77250) 313-0051-000 (AP)	1	

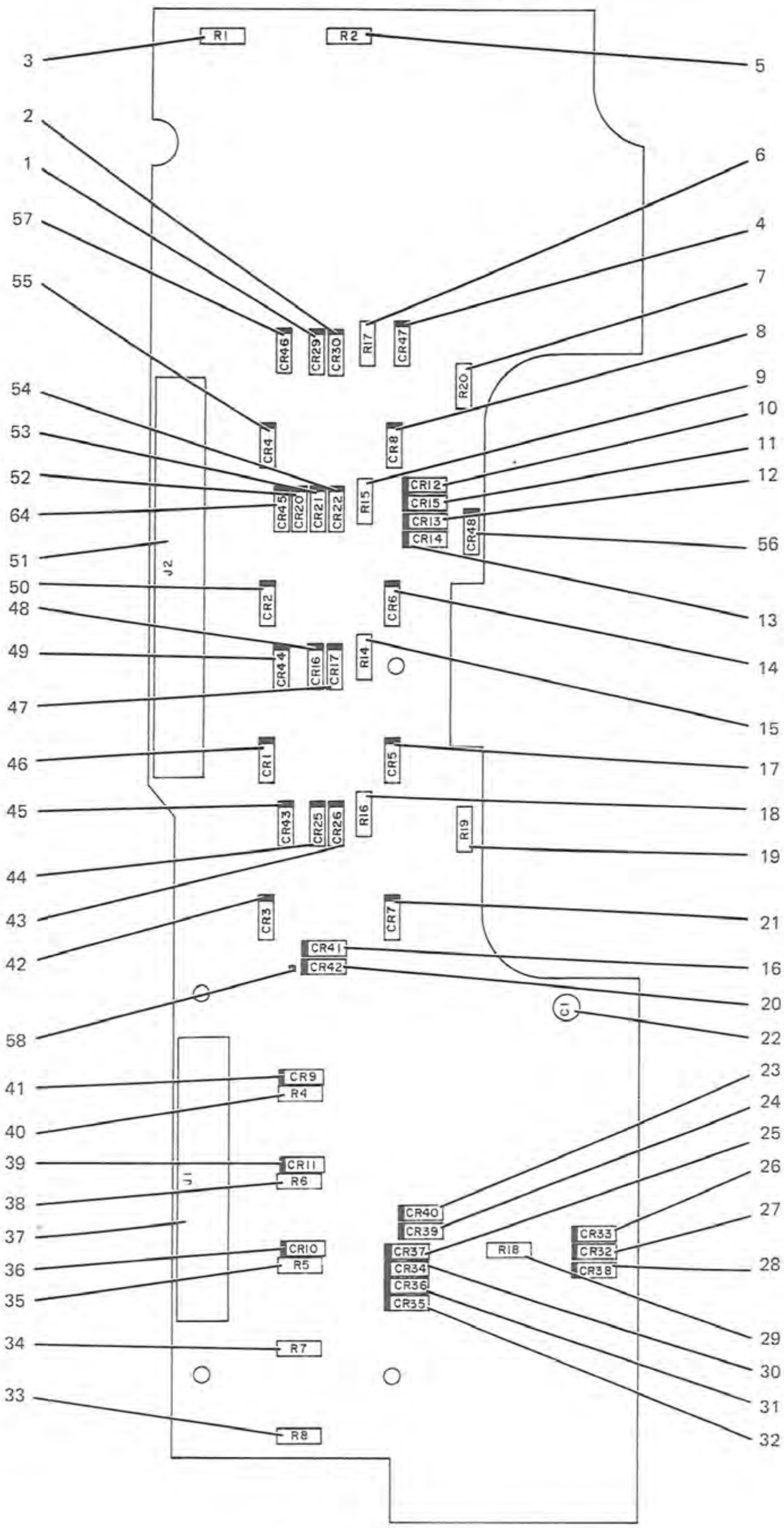
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	1	
32	635-9614-001	2	BRACKET,LIGHT	1	
	MS51957-18B	2	SCREW,MACH SST, 4-40 X 5/8 (96906) 343-0024-000 (AP)	2	
	MS15795-803	2	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP)	2	
	MS25036-144	2	TERMINAL,LUG (96906) 304-1251-000 (AP)	2	
33	MS25237-327-15	2	LAMP,INCAND (96906) 262-1106-000 A2DS1	1	
34	MS25237-327-15	2	LAMP,INCAND (96906) 262-1106-000 A2DS2	1	
35	637-1779-001	2	BLOCK,INS	1	
	P313-0051-000	2	NUT,PLAIN,HEX NP BRS, 4-40 (77250) 313-0051-000 (AP)	4	
	MS25036-144	2	TERMINAL,LUG (96906) 304-1251-000 (AP)	4	
	P343-0291-000	2	SCREW,MACH NP BRS, 4-40 X 3/4 (77250) 343-0291-000 (AP)	3	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	340-1010-000	2	SPRING,HELICAL (91314) (AP)	1	
36	7521	2	METER,DC AMP 45 OHMS RES (65092) 450-0151-010 A2M1	1	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
37	X8014-1	2	LOUDSPEAKER,PM (14208) 271-0250-010 A2LS1	1	
	MS35649-264	2	NUT,PLAIN,HEX CRES,6-32 (96906) 313-0002-000 (AP)	4	
	MS51957-28B	2	SCREW,MACH SST, 6-32 X 3/8 (96906) 343-0034-000 (AP)	4	
38	60618-1	2	PIN CONTACT (00779) 372-5884-200	2	
39	1-480319-0	2	HOUSING,PIN (00779) 372-5884-320 A2P2	1	
40	M641-6-1	2	JACK,TEL (81349) 358-1040-000 A2J1	1	
41	638-6873-002	2	BOARD, SWITCH MOUNTING A2A2 (SEE FIG 3)	1	
42	635-0830-002	2	FREQ SWITCHBOARD A2A3	1	A
42	635-0830-001	2	FREQ SWITCHBOARD A2A3	1	B
	MS35649-224	2	NUT,PLAIN,HEX SST, 2-56 (96906) 313-0037-000 (AP)	4	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
	MS51957-5B	2	SCREW,MACH SST, 2-56 X 3/8 (96906) 343-0674-000 (AP)	4	
43	638-6437-001	2	DVBFO SWITCHBOARD A2A4 (OPTIONAL)	1	A
43	637-1780-001	2	COVER,PLATE	1	B
	MS35649-224	2	NUT,PLAIN,HEX SST, 2-56 (96906) 313-0037-000 (AP)	4	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
	MS51957-5B	2	SCREW,MACH SST, 2-56 X 3/8 (96906) 343-0674-000 (AP)	4	A
	MS51957-3B	2	SCREW,MACH SST, 2-56 X 1/4 (96906) 343-0072-000 (AP)	4	B
44	637-1781-008	2	FREQUENCY DISPLAY A2A5 [ESDS]	1	A
44	637-1781-006	2	FREQUENCY DISPLAY A2A5 [ESDS]	1	B
	MS51957-5B	2	SCREW,MACH SST, 2-56 X 3/8 (96906) 343-0674-000 (AP)	4	
	MS15795-802	2	WASHER,FLAT CRES, 0.094ID X 0.250 OD (96906) 310-0779-020 (AP)	4	
45	637-1546-001	2	BRACKET	2	
	MS51957-3B	2	SCREW,MACH SST, 2-56 X 1/4 (96906) 343-0072-000 (AP)	4	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
46	635-0899-001	2	SWITCHBOARD, ADDRESS SELECTOR A2A6	1	
	MS35649-224	2	NUT,PLAIN,HEX SST, 2-56 (96906) 313-0037-000 (AP)	4	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
	MS51957-5B	2	SCREW,MACH SST, 2-56 X 3/8 (96906) 343-0674-000 (AP)	4	
47	29C81	3	SWITCH ASSEMBLY (07126) 259-9651-030 A2A6S23	1	
48	635-0825-013	2	LED STATUS DISPLAY A2A1	1	
	MS51957-3B	2	SCREW,MACH SST, 2-56 X 1/4 (96906) 343-0072-000 (AP)	8	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
	540-9006-003	2	POST (AP)	4	
49	60618-1	2	PIN CONTACT (00779) 372-5884-200	4	
50	1-480426-0	2	HOUSING,PIN (00779) 372-5884-480 A2P1	1	
51	540-9096-003	2	POST	4	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	MS51957-3B	2	SCREW,MACH SST, 2-56 X 1/4 (96906) 343-0072-000 (AP)	8	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
52	F1-15H4	2	BUTTON,PUSH (31918) 266-7508-210	1	
53	NE15F01-0003-00	2	SWITCH,PUSH (31918) 266-7524-010 A2S28	1	
	MS51957-3B	2	SCREW,MACH SST, 2-56 X 1/4 (96906) 343-0072-000 (AP)	4	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
	540-9006-003	2	POST (AP)	2	
54	635-9601-001	2	BAR,EDGE	2	
	MS51957-13B	2	SCREW,MACH SST, 4-40 X 1/4 (96906) 343-0019-000 (AP)	8	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	8	
55	635-9615-001	2	SUPPORT, PANEL	1	
	MS51957-13B	2	SCREW,MACH SST, 4-40 X 1/4 (96906) 343-0019-000 (AP)	4	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	4	
56	634-8209-002	2	OVERLAY, UPPER	1	A
56	635-9640-008	2	OVERLAY, UPPER	1	B
57	637-3788-005	2	OVERLAY, LOWER	1	A
57	637-3788-004	2	OVERLAY, LOWER	1	B
58	635-9602-001	2	GRILL, SPEAKER	1	
59	637-1547-001	2	BAFFLE, SPEAKER	1	
60	637-3784-001	2	PANEL, SWITCH MTG	1	

GROUP ASSEMBLY PARTS LIST



TPA-3104-019

Switch Mounting Board A2A2
Figure 3

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
3-	638-6873-002	1	BOARD, SWITCH MOUNTING A2A2 [SEE FIG 2-41 FOR NHA]	REF	
1	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR29	1	
2	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR30	1	
3	RN55D1540F	2	RESISTOR,FXD FILM, 154 OHMS, 1%, 1/8W (81349) 705-0957-000 A2A2R1	1	
4	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR47	1	
5	RN55D16R9F	2	RESISTOR,FXD FILM, 16.9 OHMS, 1%, 1/8W (81349) 705-0911-000 A2A2R2	1	
6	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R17	1	
7	RCR07G560KS	2	RESISTOR,FXD CMPSN, 56 OHMS, 10%, 1/4W (81349) 745-0704-000 A2A2R20	1	
8	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR8	1	
9	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R15	1	
10	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR12	1	
11	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR15	1	
12	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR13	1	
13	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR14	1	
14	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR6	1	
15	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R14	1	
16	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR41	1	
17	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR5	1	
18	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R16	1	
19	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R19	1	
20	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR42	1	
21	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR7	1	
22	199D226X0015DB1	2	CAPACITOR,FXD TNTLM ELCTLT, 22UF, 20%, 15V (56289) 184-9102-140 A2A2C1	1	
23	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR40	1	
24	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR39	1	
25	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR37	1	
26	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR33	1	
27	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR32	1	
28	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR38	1	
29	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R18	1	
30	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR34	1	
31	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR36	1	
32	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR35	1	
33	RCR07G105KS	2	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W (81349) 745-0857-000 A2A2R8	1	
34	RCR07G104KS	2	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W (81349) 745-0821-000 A2A2R7	1	
35	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R5	1	
36	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR10	1	
37	87478-5	2	HOUSING,CONN,EL (00779) 372-0043-450 A2A2J1	1	
38	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R6	1	
39	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR11	1	
40	RCR07G271KS	2	RESISTOR,FXD CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A2A2R4	1	
41	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR9	1	
42	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR3	1	
43	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR26	1	
44	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR25	1	
45	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR43	1	
46	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR1	1	
47	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR17	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
3-48	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR16	1	
49	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR44	1	
50	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR2	1	
51	87478-8	2	HOUSING,CONN,EL (00779) 372-0043-530 A2A2J2	1	
52	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR45	1	
53	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR21	1	
54	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR22	1	
55	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR4	1	
56	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR48	1	
57	1N4454GE	2	SEMICOND DEVICE (03508) 353-3644-010 A2A2CR46	1	
58	372-2601-026	2	CONTACT,ELEC	4	

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PART NUMBER	FIG-ITEM	TTL REQ	PART NUMBER	FIG-ITEM	TTL REQ
AGC250-1	1-72	5	MS35338-135	2-31	
AGC250-2	1-73	5		2-35	
AN961-8T	1-17	1		2-36	
BS1020F65PAF	1-64			2-54	
	1-65	2		2-55	29
BS1225F28PFF	1-60		MS35338-138	1-68	4
	1-61		MS35338-99	1-17	1
	1-62	3	MS35649-224	2-42	
CK63AW103M	1-20			2-43	
	1-21			2-46	12
	1-22		MS35649-244	1-31	
	1-23			1-47	4
	1-24		MS35649-264	2-37	4
	1-25		MS35650-304	1-68	4
	1-26		MS51957-11	1-18	2
	1-27		MS51957-13	1-10	
	1-28			1-48	18
	1-32		MS51957-13B	2-54	
	1-33			2-55	12
	1-34		MS51957-15	1-31	
	1-35			1-47	4
	1-36		MS51957-18B	2-32	2
	1-37		MS51957-28	1-2	
	1-38			1-13	14
	1-39	17	MS51957-28B	2-37	4
DBM25S	1-56	1	MS51957-29	1-67	7
F1-15H4	2-52	1	MS51957-3B	2-43	
MRB1-10SPC	2-6			2-45	
	2-7			2-48	
	2-8			2-51	
	2-9	4		2-53	28
MS15795-802	2-44	4	MS51957-30	1-2	
MS15795-803	1-48			1-19	
	2-32	6		1-31	
MS25036-101	1-58	6		1-42	14
MS25036-144	2-31		MS51957-5B	2-42	
	2-32			2-43	
	2-35	7		2-44	
MS25237-327-15	1-74			2-46	16
	2-33		MS51958-61	1-67	2
	2-34	3	MS51959-12	2-2	2
MS35333-76	2-4		M24308-26-1	1-49	2
	2-19		M641-6-1	2-40	1
	2-22		NE15F01-0003-00	2-53	1
	2-26		P312-0116-000	1-63	4
	2-30	7	P313-0045-000	1-19	
MS35338-134	2-42			1-31	
	2-43			1-42	12
	2-45		P313-0051-000	2-31	
	2-46			2-35	5
	2-48		P313-0064-000	2-4	
	2-51			2-19	
	2-53	28		2-22	
MS35338-135	1-31			2-26	
	1-47			2-30	7
	1-48		P313-0132-000	2-2	2

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PART NUMBER	FIG-ITEM	TTL REQ
P325-0051-000	1-69	2
P343-0291-000	2-35	3
P343-0309-000	1-17	1
RB67-0ML	2-5	4
RB67-1-0ML9	2-24	2
RB67-1DCML	2-3	
	2-17	
	2-21	
	2-29	5
RCR07G104KS	3-34	1
RCR07G105KS	3-33	1
RCR07G271KS	3-6	
	3-9	
	3-15	
	3-18	
	3-19	
	3-29	
	3-35	
	3-38	
	3-40	9
RCR07G560KS	3-7	1
RN55D1540F	3-3	1
RN55D16R9F	3-5	1
X8014-1	2-37	1
024-0057-000	1-75	1
024-0058-000	1-76	1
1-480318-0	1-45	1
1-480319-0	2-39	1
1-480426-0	2-50	1
1N4454GE	3-1	
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1N4454GE	3-52	
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115-0260-003	1-16	4
150-0810-040	1-10	10
150-1012-030	1-16	4
17250	1-70	1
184-9102-140	3-22	1
199D226X0015DB1	3-22	1
23071-4	1-10	10
259-2916-010	2-22	1
259-2933-010	2-6	
	2-7	
	2-8	
	2-9	4
259-7201-260	2-30	1
259-7201-270	2-19	1
259-7201-280	2-18	1
259-7201-290	2-4	1
259-8017-030	2-25	1
259-9651-030	2-47	1
262-1106-000	1-74	
	2-33	
	2-34	3
264-0721-000	1-72	5
264-0723-000	1-73	5
266-5415-130	2-10	
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	2-28	8
266-5415-170	2-16	1
266-5415-800	2-10	
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	2-23	
	2-27	
	2-28	10
266-7508-210	2-52	1
266-7524-010	2-53	1
271-0250-010	2-37	1
280-1368-350	1-1	1
280-2745-030	1-6	1
280566BF1	2-30	1
280567BF1	2-19	1
280568BF1	2-18	1
280611BF1	2-4	1
281-0650-010	2-3	
	2-17	
	2-21	
	2-29	5
281-0650-030	2-24	2
281-0650-140	2-5	4

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PART NUMBER	FIG-ITEM	TTL REQ
29C81	2-47	1
304-0127-000	1-58	6
304-1089-000	1-29	
	1-40	
	1-47	7
304-1251-000	2-31	
	2-32	
	2-35	7
310-0071-000	1-19	
	1-31	
	1-42	12
310-0098-000	1-17	1
310-0275-000	2-42	
	2-43	
	2-45	
	2-46	
	2-48	
	2-51	
	2-53	28
310-0279-000	1-31	
	1-47	
	1-48	
	2-31	
	2-35	
	2-36	
	2-54	
	2-55	29
310-0284-000	1-68	4
310-0751-030	1-17	1
310-0779-020	2-44	4
310-0779-030	1-48	
	2-32	6
312-0116-000	1-68	4
313-0002-000	2-37	4
313-0019-000	1-68	4
313-0037-000	2-42	
	2-43	
	2-46	12
313-0043-000	1-31	
	1-47	4
313-0045-000	1-19	
	1-31	
	1-42	12
313-0051-000	2-31	
	2-35	5
313-0064-000	2-4	
	2-19	
	2-22	
	2-26	
	2-30	7
313-0132-000	2-2	2
325-0051-000	1-69	2
340-1010-000	2-35	1
342-0043-000	2-2	2
343-0019-000	2-54	
	2-55	12
343-0024-000	2-32	2
343-0034-000	2-37	4
343-0072-000	2-43	
	2-45	
	2-48	
	2-51	
	2-53	28

PART NUMBER	FIG-ITEM	TTL REQ
343-0131-000	1-18	2
343-0133-000	1-10	
	1-48	18
343-0135-000	1-31	
	1-47	4
343-0169-000	1-2	
	1-13	14
343-0170-000	1-67	7
343-0171-000	1-2	
	1-19	
	1-31	
	1-42	14
343-0226-000	1-67	2
343-0291-000	2-35	3
343-0309-000	1-17	1
343-0674-000	2-42	
	2-43	
	2-44	
	2-46	16
353-18-03-001	1-46	1
353-18-10-001	1-41	1
353-18-12-001	1-30	1
353-3644-010	3-1	
	3-2	
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	3-57	40
358-1040-000	2-40	1

NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ	PART NUMBER	FIG-ITEM	TTL REQ
367-0011-000	1-46	1	635-9652-001	1-77	1
367-0018-000	1-41	1	635-9658-001	1-13	1
367-0020-000	1-30	1	635-9669-001	1-16	1
371-0062-000	1-49	2	635-9669-002	1-15	1
371-0221-000	1-56	1	635-9690-003	1-2	1
372-0043-450	3-37	1	637-1546-001	2-45	2
372-0043-530	3-51	1	637-1547-001	2-59	1
372-2274-050	1-64		637-1759-001	1-14	1
	1-65	2	637-1759-010	1-14	1
372-2601-026	3-58	4	637-1769-001	1-71	1
372-2601-027	1-66	3	637-1779-001	2-35	1
372-5884-060	1-44	2	637-1780-001	2-43	1
372-5884-200	2-38		637-1781-006	2-44	1
	2-49	6	637-1781-008	2-44	1
372-5884-320	2-39	1	637-3761-001	1-51	1
372-5884-330	1-45	1	637-3784-001	2-60	1
372-5884-480	2-50	1	637-3788-004	2-57	1
372-7515-010	1-60		637-3788-005	2-57	1
	1-61		637-3797-002	1-54	1
	1-62	3	637-9121-001	1-69	1
372-7600-280	1-61	5	637-9126-001	1-42	1
373-0046-000	2-4		637-9315-001	1-63	1
	2-19		638-6437-001	2-43	1
	2-22		638-6873-002	2-41	1
	2-26			3-	REF
	2-30	7	638-6896-001	1-7	1
382-0047-030	2-26	1	642-3135-001	1-9	1
403	1-29		642-3137-001	1-8	1
	1-40		642-3572-001	1-4	
	1-47	7		1-5	2
426-1034-010	1-70	1	642-3594-001	1-59	1
450-0151-010	2-36	1	646-6815-001	1-12	1
5-22641-766	2-22	1		2-	REF
540-9006-003	2-48		646-6815-002	1-12	1
	2-53	6		2-	REF
540-9039-003	1-48	4	646-6823-001	1-49	1
540-9096-003	2-51	4	646-6823-002	1-49	1
541-6106-002	1-68	4	646-6889-001	1-11	1
60617-1	1-44	2	646-6890-002	1-19	1
60618-1	2-38		646-6891-001	1-31	1
	2-49	6	646-6893-001	1-57	1
622-3477-001	1-	1	705-0911-000	3-5	1
622-3477-002	1-	1	705-0957-000	3-3	1
623-9008-001	2-1	1	7101P3PD9V40B	2-10	
632-5201-001	2-2	1		2-11	
634-8209-002	2-56	1		2-12	
635-0825-013	2-48	1		2-13	
635-0830-001	2-42	1		2-20	
635-0830-002	2-42	1		2-23	
635-0899-001	2-46	1		2-27	
635-2277-000	1-18	1		2-28	8
635-9601-001	2-54	2	7101P4PD9V40B	2-10	
635-9602-001	2-58	1		2-11	
635-9610-002	1-50	1		2-12	
635-9614-001	2-32	1		2-13	
635-9615-001	2-55	1		2-14	
635-9616-001	1-68	2		2-15	
635-9626-005	1-67	1		2-20	
635-9635-001	1-52	1		2-23	
635-9636-001	1-53	1		2-27	
635-9639-001	1-55	1		2-28	10
635-9640-008	2-56	1	7207P3PD9V40B	2-16	1
635-9649-001	1-3	1	745-0704-000	3-7	1

NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ	PART NUMBER	FIG-ITEM	TTL REQ
745-0728-000	3-6				
	3-9				
	3-15				
	3-18				
	3-19				
	3-29				
	3-35				
	3-38				
	3-40	9			
745-0821-000	3-34	1			
745-0857-000	3-33	1			
7521	2-36	1			
805-014X5V0103Z	1-43	1			
87478-5	3-37	1			
87478-8	3-51	1			
913-1188-000	1-20				
	1-21				
	1-22				
	1-23				
	1-24				
	1-25				
	1-26				
	1-27				
	1-28				
	1-32				
	1-33				
	1-34				
	1-35				
	1-36				
	1-37				
	1-38				
	1-39	17			
913-3680-000	1-43	1			
97096900	1-61	5			

4. REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1	1-3	635-9649-001	A2A2R15	3-9	RCR07G271KS
A11	1-9	642-3135-001	A2A2R16	3-18	RCR07G271KS
A12	1-8	642-3137-001	A2A2R17	3-6	RCR07G271KS
A13	1-7	638-6896-001	A2A2R18	3-29	RCR07G271KS
A2	1-12	646-6815-001	A2A2R19	3-19	RCR07G271KS
A2	1-12	646-6815-002	A2A2R2	3-5	RN55D16R9F
A2	2-	646-6815-001	A2A2R20	3-7	RCR07G560KS
A2	2-	646-6815-002	A2A2R4	3-40	RCR07G271KS
A2A1	2-48	635-0825-013	A2A2R5	3-35	RCR07G271KS
A2A2	2-41	638-6873-002	A2A2R6	3-38	RCR07G271KS
A2A2	3-	638-6873-002	A2A2R7	3-34	RCR07G104KS
A2A2CR1	3-46	1N4454GE	A2A2R8	3-33	RCR07G105KS
A2A2CR10	3-36	1N4454GE	A2A3	2-42	635-0830-002
A2A2CR11	3-39	1N4454GE	A2A3	2-42	635-0830-001
A2A2CR12	3-10	1N4454GE	A2A4	2-43	638-6437-001
A2A2CR13	3-12	1N4454GE	A2A5	2-44	637-1781-008
A2A2CR14	3-13	1N4454GE	A2A5	2-44	637-1781-006
A2A2CR15	3-11	1N4454GE	A2A6	2-46	635-0899-001
A2A2CR16	3-48	1N4454GE	A2A6S23	2-47	29C81
A2A2CR17	3-47	1N4454GE	A2DS1	2-33	MS25237-327-15
A2A2CR2	3-50	1N4454GE	A2DS2	2-34	MS25237-327-15
A2A2CR21	3-53	1N4454GE	A2J1	2-40	M641-6-1
A2A2CR22	3-54	1N4454GE	A2LS1	2-37	X8014-1
A2A2CR25	3-44	1N4454GE	A2M1	2-36	7521
A2A2CR26	3-43	1N4454GE	A2P1	2-50	1-480426-0
A2A2CR29	3-1	1N4454GE	A2P2	2-39	1-480319-0
A2A2CR3	3-42	1N4454GE	A2S1	2-4	280611BF1
A2A2CR30	3-2	1N4454GE	A2S11	2-15	7101P4PD9V40B
A2A2CR32	3-27	1N4454GE	A2S12	2-14	7101P4PD9V40B
A2A2CR33	3-26	1N4454GE	A2S13	2-16	7207P3PD9V40B
A2A2CR34	3-30	1N4454GE	A2S15	2-30	280566BF1
A2A2CR35	3-32	1N4454GE	A2S16	2-26	382-0047-030
A2A2CR36	3-31	1N4454GE	A2S19	2-25	259-8017-030
A2A2CR37	3-25	1N4454GE	A2S2	2-12	7101P3PD9V40B
A2A2CR38	3-28	1N4454GE	A2S2	2-12	7101P4PD9V40B
A2A2CR39	3-24	1N4454GE	A2S21	2-19	280567BF1
A2A2CR4	3-55	1N4454GE	A2S22	2-18	280568BF1
A2A2CR40	3-23	1N4454GE	A2S24	2-6	MRB1-10SPC
A2A2CR41	3-16	1N4454GE	A2S25	2-7	MRB1-10SPC
A2A2CR42	3-20	1N4454GE	A2S26	2-8	MRB1-10SPC
A2A2CR43	3-45	1N4454GE	A2S27	2-9	MRB1-10SPC
A2A2CR44	3-49	1N4454GE	A2S28	2-53	NE15F01-0003-00
A2A2CR45	3-52	1N4454GE	A2S29	2-22	5-22641-766
A2A2CR46	3-57	1N4454GE	A2S3	2-11	7101P3PD9V40B
A2A2CR47	3-4	1N4454GE	A2S3	2-11	7101P4PD9V40B
A2A2CR48	3-56	1N4454GE	A2S4	2-13	7101P3PD9V40B
A2A2CR5	3-17	1N4454GE	A2S4	2-13	7101P4PD9V40B
A2A2CR6	3-14	1N4454GE	A2S5	2-10	7101P3PD9V40B
A2A2CR7	3-21	1N4454GE	A2S5	2-10	7101P4PD9V40B
A2A2CR8	3-8	1N4454GE	A2S6	2-23	7101P3PD9V40B
A2A2CR9	3-41	1N4454GE	A2S6	2-23	7101P4PD9V40B
A2A2C1	3-22	199D226X0015DB1	A2S7	2-27	7101P3PD9V40B
A2A2J1	3-37	87478-5	A2S7	2-27	7101P4PD9V40B
A2A2J2	3-51	87478-8	A2S8	2-20	7101P3PD9V40B
A2A2R1	3-3	RN55D1540F	A2S8	2-20	7101P4PD9V40B
A2A2R14	3-15	RCR07G271KS	A2S9	2-28	7101P3PD9V40B

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A2S9	2-28	7101P4PD9V40B			
A4	1-4	642-3572-001			
A6	1-5	642-3572-001			
C1	1-28	CK63AW103M			
C10	1-39	CK63AW103M			
C11	1-38	CK63AW103M			
C12	1-37	CK63AW103M			
C13	1-36	CK63AW103M			
C14	1-35	CK63AW103M			
C15	1-34	CK63AW103M			
C16	1-33	CK63AW103M			
C17	1-32	CK63AW103M			
C2	1-27	CK63AW103M			
C3	1-26	CK63AW103M			
C4	1-25	CK63AW103M			
C48	1-43	805-014X5V0103Z			
C5	1-24	CK63AW103M			
C6	1-23	CK63AW103M			
C7	1-22	CK63AW103M			
C8	1-21	CK63AW103M			
C9	1-20	CK63AW103M			
E1-E3	1-66	372-2601-027			
J10	1-63	637-9315-001			
J11	1-62	BS1225F28PFF			
J12	1-50	635-9610-002			
J13	1-52	635-9635-001			
J14	1-56	DBM25S			
J17	1-51	637-3761-001			
J18	1-53	635-9636-001			
J19	1-55	635-9639-001			
J20	1-54	637-3797-002			
J21	1-57	646-6893-001			
J3	1-60	BS1225F28PFF			
J4	1-61	BS1225F28PFF			
J47	1-45	1-480318-0			
J8	1-65	BS1020F65PAF			
J9	1-64	BS1020F65PAF			
TB1	1-30	353-18-12-001			
TB2	1-41	353-18-10-001			
TB3	1-46	353-18-03-001			

DIAGRAMS

HF-8094 Receiver Control

Rockwell International

diagrams

Collins Telecommunications Products Division
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1 January 1981

list of illustrations

Figure *Page*

List of Effective Pages

*The asterisk indicates pages changed, added, or deleted by the current change.

Page No	Issue	Page No	Issue
Title	1 Jan 81	29	1 Jan 81
List of Effective Pages	1 Jan 81	30 Blank	1 Jan 81
1 thru 3	1 Jan 81	31	1 Jan 81
4 Blank	1 Jan 81	32 Blank	1 Jan 81
5	1 Jan 81	33	1 Jan 81
6 Blank	1 Jan 81	34 Blank	1 Jan 81
7	1 Jan 81	35	1 Jan 81
8 Blank	1 Jan 81	36 Blank	1 Jan 81
9	1 Jan 81	37	1 Jan 81
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28 Blank	1 Jan 81		

Record of Revisions

RETAIN THIS RECORD IN THE FRONT OF MANUAL.
ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.

REV NO	REVISION DATE	INSERTION DATE	INITIALS	REV NO	REVISION DATE	INSERTION DATE	INITIALS
1st Ed	1 Jan 81						

diagrams

1. CONFIGURATION STATUS CONTROL

Collins Telecommunications Products Division of Rockwell International uses a 2-character (maximum) alphabetic identifier for configuration identification. The alphabetic identifier is preceded by the letters REV (revision) and starts with — (dash) if no changes have been made. The first change is identified as A, the second as B, and continuing through Z to AA, AB, and ultimately to ZZ.

Note

> The alphabetic identifier is not a serial number; therefore, many units or subassemblies may exist with the same identifier.

Incorporation of design changes in a unit or subassembly that has been returned to Rockwell-Collins for repair or that has been removed from the company's finished goods inventory is defined as rework. At the time of rework, the unit or subassembly is marked again to reflect the design level to which it is being upgraded. This is done by leaving the original marking on the unit or subassembly and adding the letters RWK (rework) followed by the alphabetic identifier of the latest change incorporated in the rework. For example, unit one is marked REV B — RWK F and unit two is marked REV F indicating that both units are at the design level of revision F, but unit one is reworked and they may not look exactly the same.

Note

> A reworked unit may not contain all design changes made prior to the reworked alphabetic identifier, but does contain all changes required to make unit operation identical to a newly manufactured unit with the same alphabetic identifier. Therefore, a unit reworked to a specific alphabetic identifier may physically appear different from a newly manufactured unit at the same alphabetic identifier.

Only alphabetic identifiers that result in schematic changes are covered in this section. Therefore, if a unit or subassembly has an identifier that alphabetically falls between identifiers on the schematic changes page or after the last identifier on the schematic changes page up to and including the latest effectivity listed below, the electrical configuration is represented by the earlier alphabetic identifier listed on the schematic changes page.

2. CONFIGURATION EFFECTIVITY

Refer to the schematic changes page preceding each schematic for any changes that may have occurred and the corresponding effectivity identifier.

Note

> Configuration history before 1 January 1981 is not recorded in this section.

Listed below are the unit/subassemblies with the latest effectivity covered in this section.

UNIT/ SUBASSEMBLY	PART NUMBER	LATEST EFFECTIVITY
HF-8094 Receiver Control	622-3477-001	REV A
	622-3477-002	REV A
Front panel assembly A2	646-6815-001	REV B
	646-6815-002	REV B
LED status display A2A1	635-0825-013	REV P
Switch mounting board A2A2	638-6873-002	REV D
Frequency switchboard A2A3	635-0830-001	REV H
	635-0830-002	REV H
DVBFO switchboard A2A4	638-6437-001	REV A
Frequency display A2A5	637-1781-006	REV G
	637-1781-008	REV G
Address selector switchboard A2A6	635-0899-001	REV A
Sideboard assembly	646-6823-001	REV —
	646-6823-002	REV —
Interconnect cable assembly (A1/B1)	646-6890-001	REV —
	646-6890-002	REV —
Interconnect cable assembly (A2/B2)	646-6891-001	REV —
	646-6891-002	REV —
Speaker cable assembly	637-9126-001	REV D
Status display cable	635-9639-001	REV C
Front panel switchboard cable (A2J2 to sideboard J12)	635-9610-002	REV E
Front panel switchboard cable (A2J1 to sideboard J21)	646-6893-001	REV —

UNIT/ SUBASSEMBLY	PART NUMBER	LATEST EFFECTIVITY
Front panel switchboard cable (A2J4 to sideboard J13)	635-9635-001	REV C
Front panel switchboard cable (A2J6 to sideboard J17)	637-3761-001	REV B
Front panel switchboard cable (A2J5 to sideboard P1)	637-1759-001	REV C
Front panel switchboard cable (A2J8 to sideboard J20)	637-3797-002	REV B
Front panel switchboard cable (A2J7 to sideboard J18)	635-9636-001	REV C

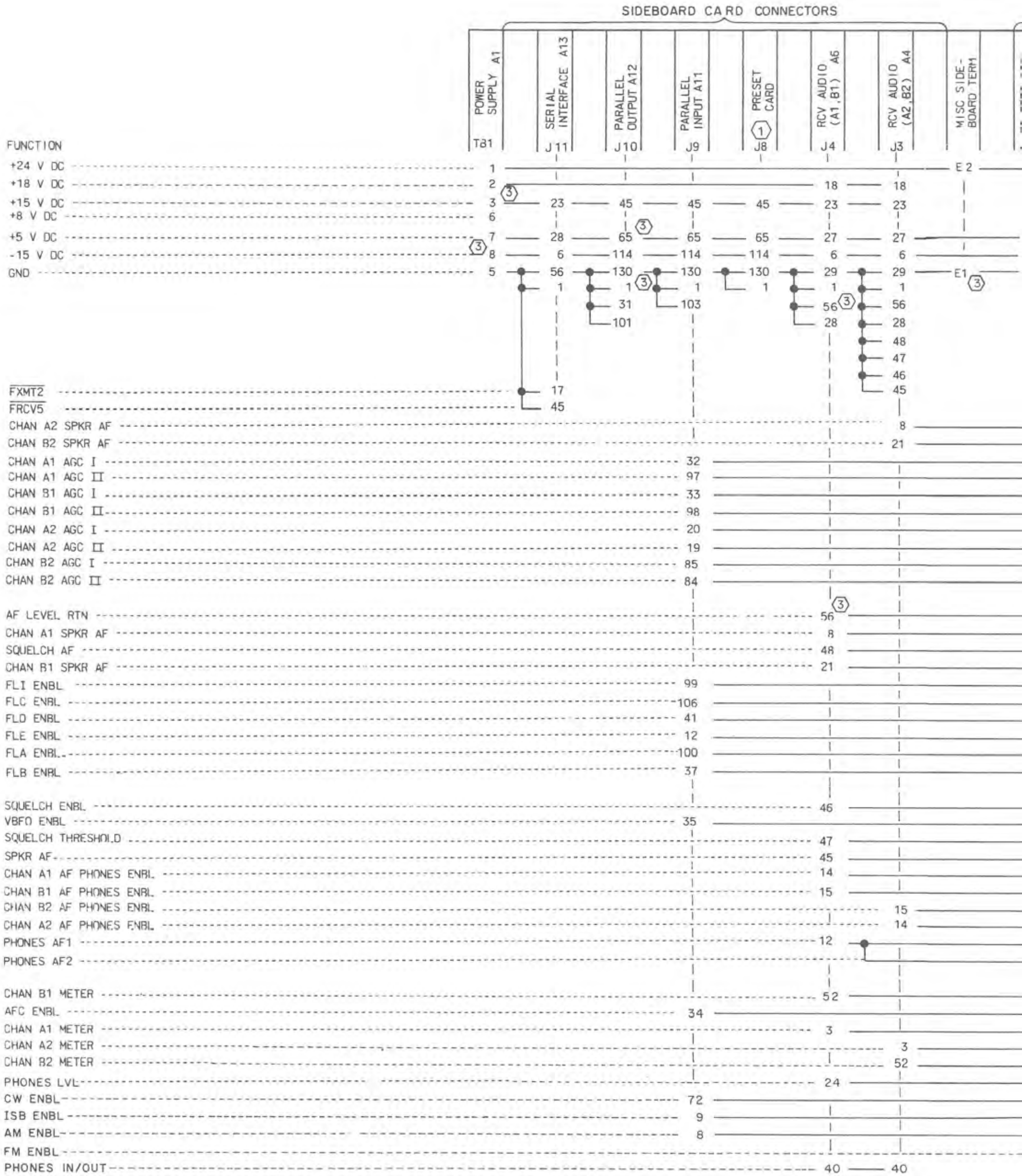
3. RIBBON CABLE INTERCONNECTION

The front panel (A2) assembly circuit board and controls are interconnected to the main chassis sideboard by ribbon-type cables and connectors. Refer to figure 3 for ribbon cable and connector interconnection information.

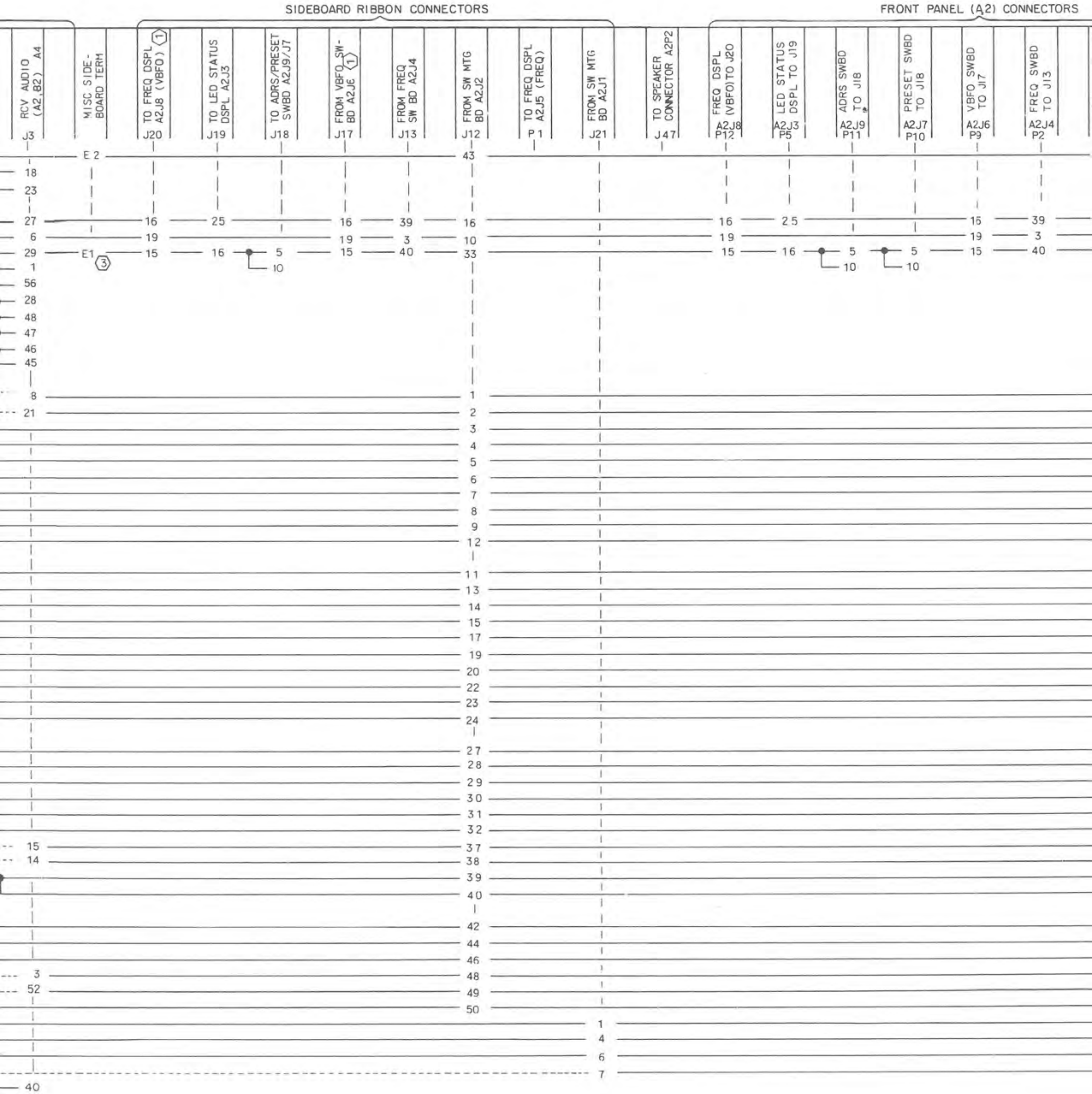
SCHEMATIC CHANGES

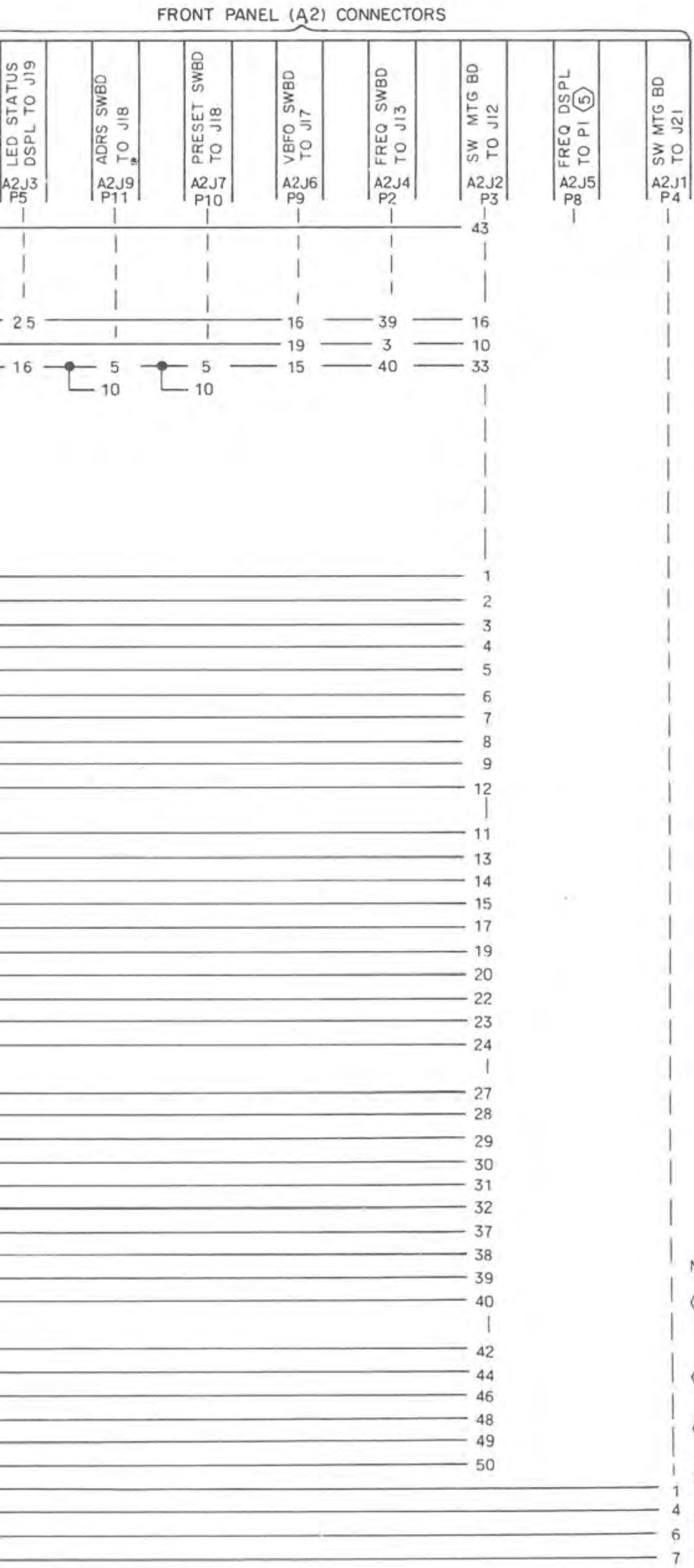
REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
	(This page will contain schematic revision information.)		

Chassis, Main Sideboard, and Ribbon Cabling,
Schematic Diagram
Figure 1 (Sheet A)



SIDEBOARD CARD CONNECTORS
POWER SUPPLY A1
SERIAL INTERFACE A13
PARALLEL OUTPUT A12
PARALLEL INPUT A11
PRESET CARD
RCV AUDIO (A1,B1) A6
RCV AUDIO (A2,B2) A4
MISC SIDE-BOARD TERM
FUNCTION
TB1
J11
J10
J9
J8
J4
J3
+24 V DC 1 E2
+18 V DC 2 18 18
+15 V DC 3 23 45 45 45 23 23
+8 V DC 6
+5 V DC 7 28 65 65 65 27 27
-15 V DC 8 6 114 114 114 6 6
GND 5 56 130 130 130 29 29 E1
1 1 1 1 1 1
31 103 56 56
101 28 28
48
47
46
45
FXMT2 17
FRCV5 45
CHAN A2 SPKR AF 8
CHAN B2 SPKR AF 21
CHAN A1 AGC I 32
CHAN A1 AGC II 97
CHAN B1 AGC I 33
CHAN B1 AGC II 98
CHAN A2 AGC I 20
CHAN A2 AGC II 19
CHAN B2 AGC I 85
CHAN B2 AGC II 84
AF LEVEL RTN 56
CHAN A1 SPKR AF 8
SQUELCH AF 48
CHAN B1 SPKR AF 21
FLI ENBL 99
FLC ENBL 106
FLD ENBL 41
FLE ENBL 12
FLA ENBL 100
FLB ENBL 37
SQUELCH ENBL 46
VBFO ENBL 35
SQUELCH THRESHOLD 47
SPKR AF 45
CHAN A1 AF PHONES ENBL 14
CHAN B1 AF PHONES ENBL 15
CHAN B2 AF PHONES ENBL 15
CHAN A2 AF PHONES ENBL 14
PHONES AF1 12
PHONES AF2
CHAN B1 METER 52
AFC ENBL 34
CHAN A1 METER 3
CHAN A2 METER 3
CHAN B2 METER 52
PHONES LVL 24
CW ENBL 72
ISB ENBL 9
AM ENBL 8
FM ENBL
PHONES IN/OUT 40 40


SIDEBOARD RIBBON CONNECTORS
FRONT PANEL (A2) CONNECTORS
RCV AUDIO (A2,B2) A4
J3
MISC SIDE-BOARD TERM
E2
E1
TO FREQ DSPL A2J8 (VBFO)
J20
TO LED STATUS DSPL A2J3
J19
TO ADRS/PRESET SWBD A2J9/J7
J18
FROM VBFO SW-BD A2J6
J17
FROM FREQ SW BD A2J4
J13
FROM SW MTG BD A2J2
J12
TO FREQ DSPL A2J5 (FREQ)
P1
FROM SW MTG BD A2J1
J21
TO SPEAKER CONNECTOR A2P2
J47
FREQ DSPL (VBFO) TO J20
A2J8 P12
LED STATUS DSPL TO J19
A2J3 P5
ADRS SWBD TO J18
A2J9 P11
PRESET SWBD TO J18
A2J7 P10
VBFO SWBD TO J17
A2J6 P9
FREQ SWBD TO J13
A2J4 P2



NOTES:

1. OPTIONAL CONNECTORS AND/OR CABLE ASSEMBLIES.
2. NONSTANDARD ABBREVIATION: FLT = FAULT.
3. THESE PINS ARE DUPLICATED FOR CLARITY.
4. STRAPPED FOR INTERNAL SPEAKER. FOR EXTERNAL SPEAKER, CONNECT JUMPER BETWEEN TB3-2 AND TB3-3.
5. P1 IS LOCATED ON THE BACK OF SIDEBOARD CONNECTOR J10.

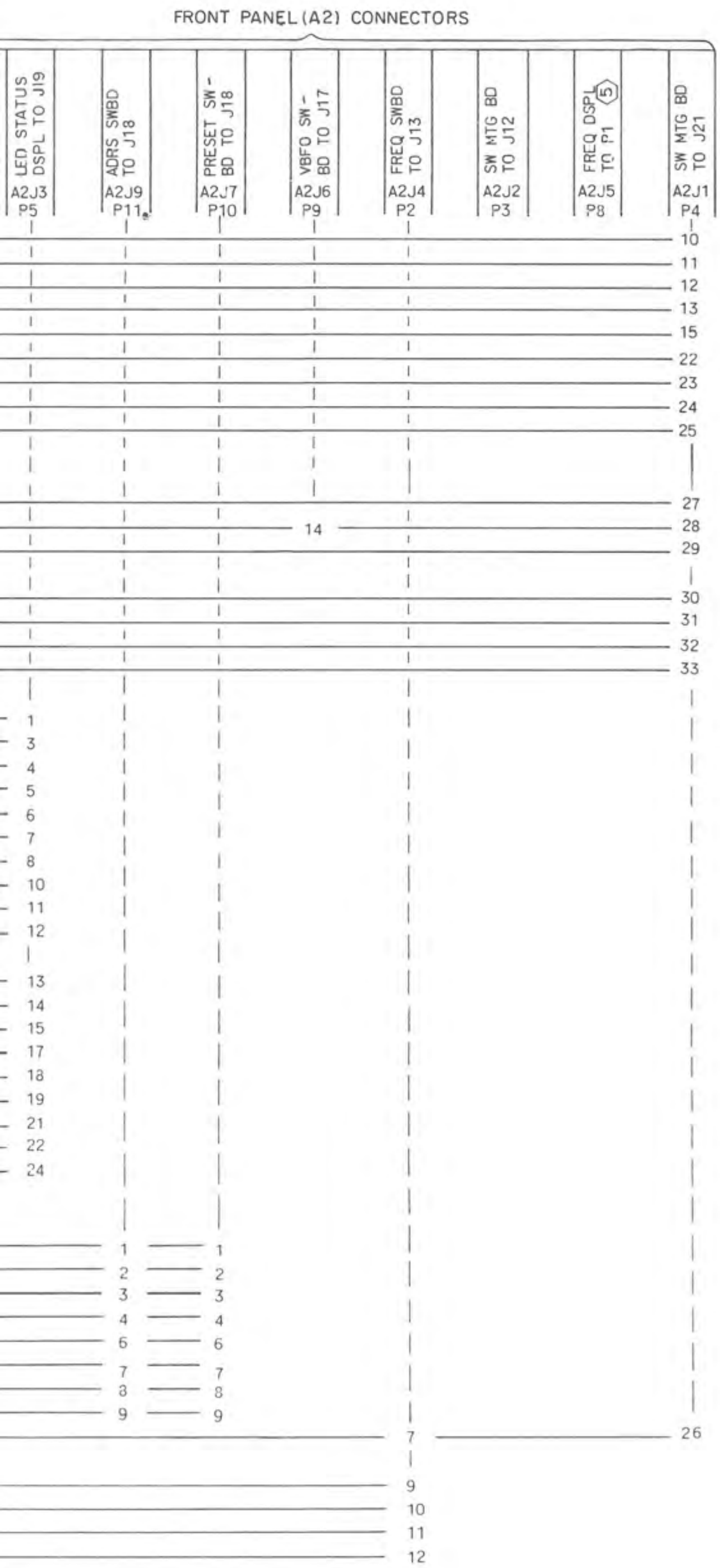
634-6908

Chassis, Main Sideboard, and Ribbon Cabling, Schematic Diagram
Figure 1 (Sheet 1 of 6)

SIDEBOARD CARD CONNECTORS

FUNCTION	POWER SUPPLY A1 TB1	SERIAL INTERFACE A13 J11	PARALLEL OUTPUT A12 J10	PARALLEL INPUT A11 J9	PRESET CARD (1) J8	RCV AUDIO (A1, BI) A6 J4	RCV AUDIO (A2, B2) A4 J3	MISC SIDE-BOARD TERM	TO FREQ DSPL A2J8 (VBFO) (1) J20
DATA NET ENBL				73					
B2 ENBL				74					
B1 ENBL				92					
A2 ENBL				21					
A1 ENBL				91					
A1 AGC BUS ENBL				14					
B1 AGC BUS ENBL				78					
A2 AGC BUS ENBL				79					
B2 AGC BUS ENBL				82					
MONITOR				80	80				
LOCAL ENBL				16	16				
PRESET SEND		25	71	6					
$\overline{S}$				38					
RF GAIN (2)				10					
RF GAIN (4)				75					
RF GAIN (8)				11					
RF GAIN (16)				76					
CHAN A1 IND			26						
CHAN A2 IND			17						
CHAN B1 IND			6						
CHAN B2 IND			74						
NET DATA IND			73						
PRESEL FLT			28						
BUSY IND			7						
AM IND			8						
AFC LOCK IND			27						
ISB IND			9						
(2) RCV FLT (FLASHER)			12						
RF OVLD IND			68						
CW IND			72						
FLB IND			37						
FLA IND			100						
FLE IND			3						
FLD IND			41						
FLC IND			106						
FLI IND			99						
RCV FLT (NO FLASH)			105						
ADB1		(3) 41							
ADB3		(3) 40							
ADB2		(3) 14							
ADB4		39 (3)							
PAB1					96				
PAB2					94				
PAB3					93				
PAB4					90				
LOCAL FREQ ENBL				15	15				
FREQ 1 Hz (1)				50	50				
FREQ 1 Hz (2)				115	115				
FREQ 1 Hz (4)				51	51				
FREQ 1 Hz (8)				116	116				

SIDEBOARD RIBBON CONNECTORS
FRONT PANEL (A2) CONNECTORS
MISC SIDE- BOARD TERM
TO FREQ DSPL A2J8 (VBFO) 1
J20
TO LED STATUS DSPL A2J3
J19
TO ADRS/PRESET SWBD A2J9/J7
J18
FROM VBFO SW- BD A2J6 1
J17
FROM FREQ SWBD A2J4
J13
FROM SW MTG BD A2J2
J12
TO FREQ DSPL A2J5 (FREQ)
P1
FROM SW MTG BD A2J1
J21
TO SPEAKER CONNECTOR A2P2
J47
FREQ DSPL (VBFO) TO J20
A2J3 P12
LED STATUS DSPL TO J19
A2J3 P5
ADRS SWBD TO J18
A2J9 P11
PRESET SW- BD TO J18
A2J7 P10
VBFO SW- BD TO J17
A2J6 P9
FREQ SWBD TO J13
A2J4 P2
SW MTG BD TO J12
A2J2 P3

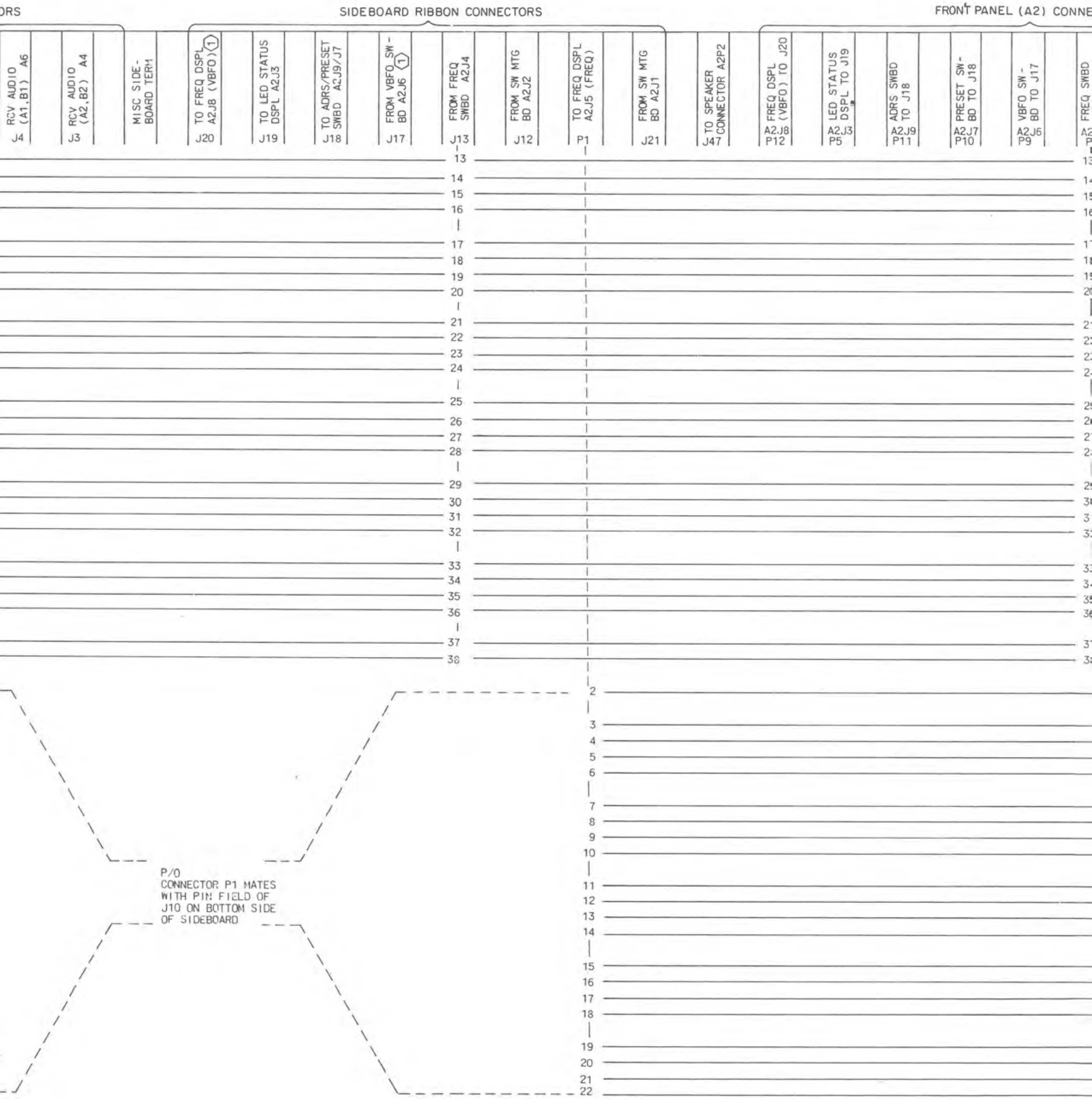


Chassis, Main Sideboard, and Ribbon Cabling, Schematic Diagram
Figure 1 (Sheet 2)

SIDEBOARD CARD CONNECTORS

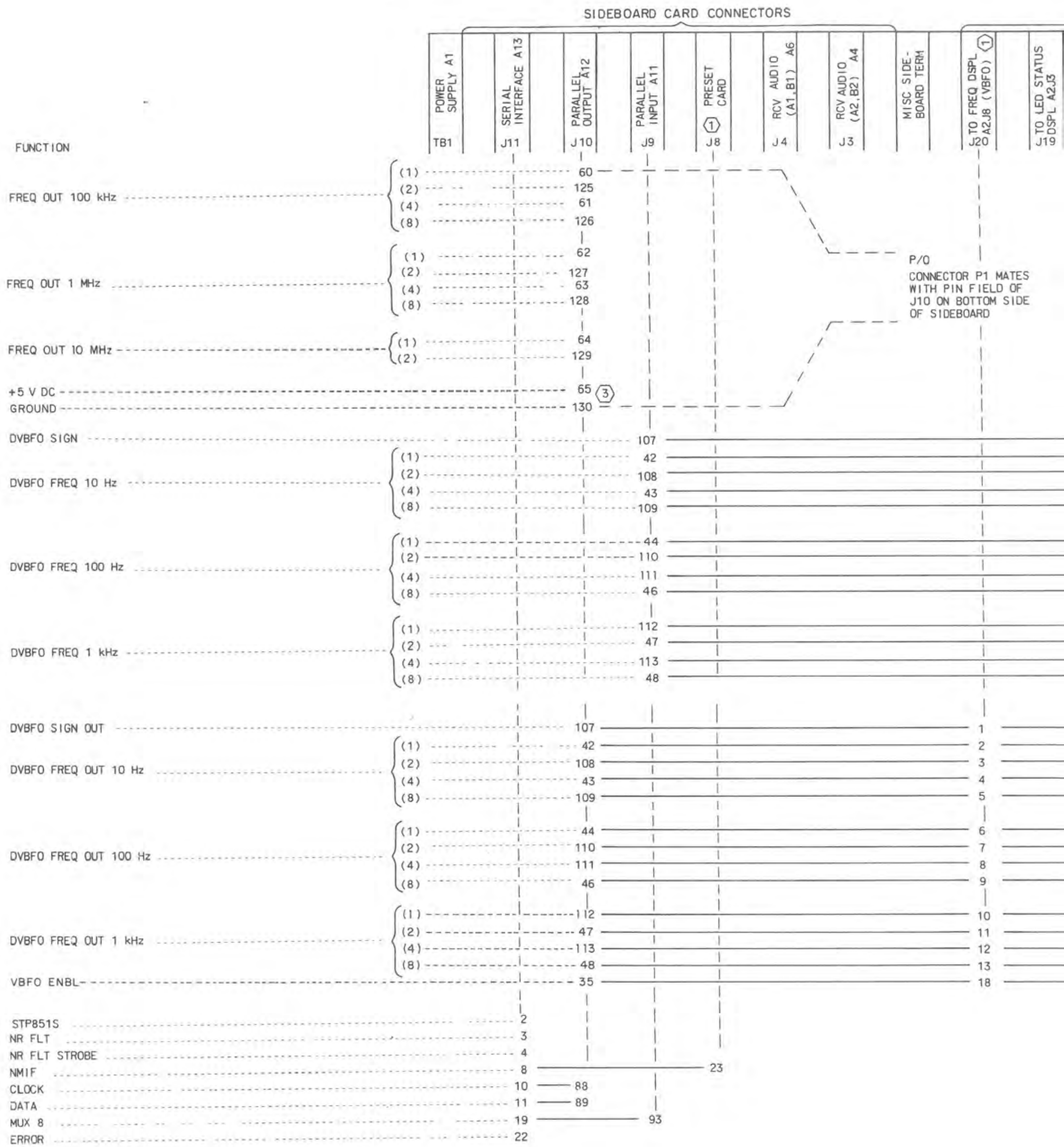
FUNCTION		POWER SUPPLY A1 TB1	SERIAL INTERFACE A13 J11	PARALLEL OUTPUT A12 J10	PARALLEL INPUT A11 J9	PRESET CARD ⟨1⟩ J8	RCV AUDIO (A1,B1) A6 J4	RCV AUDIO (A2,B2) A4 J3	MISC SIDE-BOARD TERM
FREQ 10 Hz	(1)				52	52			
	(2)				117	117			
	(4)				53	53			
	(8)				118	118			
FREQ 100 Hz	(1)				54	54			
	(2)				119	119			
	(4)				55	55			
	(8)				120	120			
FREQ 1 kHz	(1)				56	56			
	(2)				121	121			
	(4)				57	57			
	(8)				122	122			
FREQ 10 kHz	(1)				58	58			
	(2)				123	123			
	(4)				59	59			
	(8)				124	124			
FREQ 100 kHz	(1)				60	60			
	(2)				125	125			
	(4)				61	61			
	(8)				126	126			
FREQ 1 MHz	(1)				62	62			
	(2)				127	127			
	(4)				63	63			
	(8)				128	128			
FREQ 10 MHz	(1)				64	64			
	(2)				129	129			
-15 V DC				114 ⟨3⟩					
FREQ OUT 1 Hz	(1)			50					
	(2)			115					
	(4)			51					
	(8)			116					
FREQ OUT 10 Hz	(1)			52					
	(2)			117					
	(4)			53					
	(8)			118					
FREQ OUT 100 Hz	(1)			54					
	(2)			119					
	(4)			55					
	(8)			120					
FREQ OUT 1 kHz	(1)			56					
	(2)			121					
	(4)			57					
	(8)			122					
FREQ OUT 10 kHz	(1)			58					
	(2)			123					
	(4)			59					
	(8)			124					

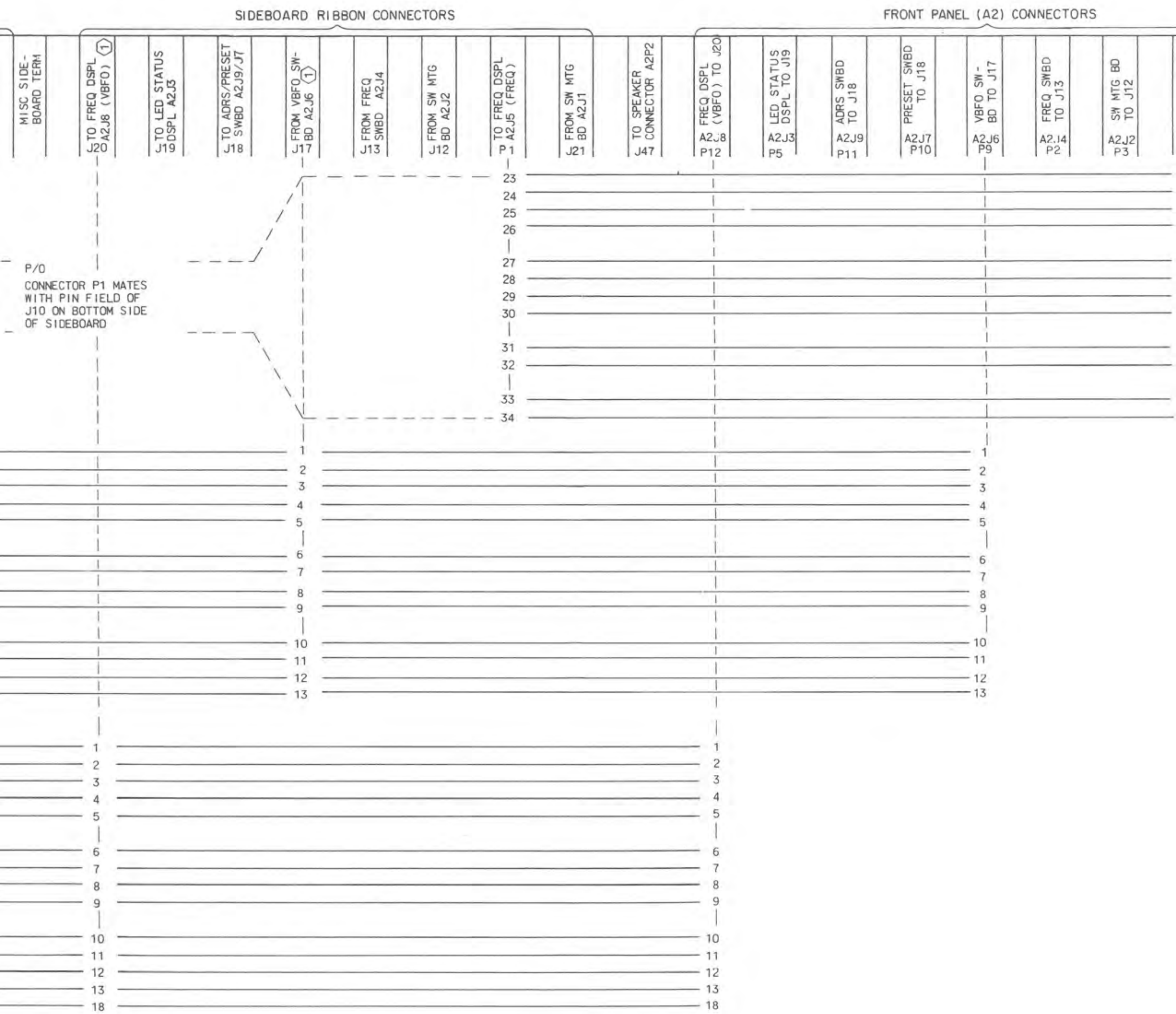
P/O
CON
WIT
J10
OF



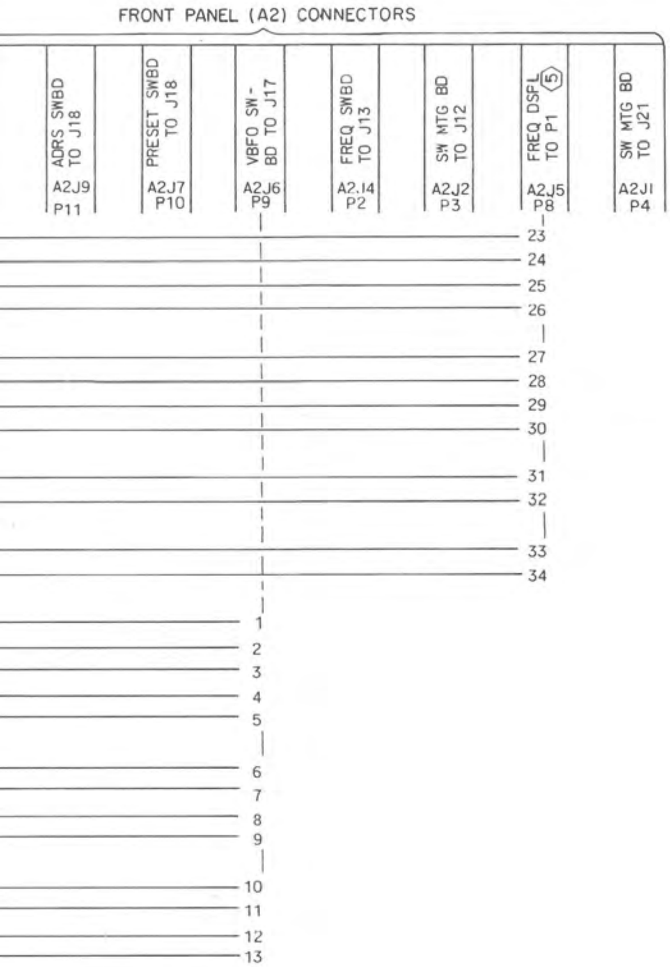
ORS
SIDEBOARD RIBBON CONNECTORS
FRONT PANEL (A2) CONNE
RCV AUDIO (A1,B1) A6
J4
RCV AUDIO (A2,B2) A4
J3
MISC SIDE- BOARD TERM
TO FREQ DSPL A2J8 (VBFO) 1
J20
TO LED STATUS DSPL A2J3
J19
TO ADRS/PRESET SWBD A2J9/J7
J18
FROM VBFO SW- BD A2J6 1
J17
FROM FREQ SWBD A2J4
J13
FROM SW MTG BD A2J2
J12
TO FREQ DSPL A2J5 (FREQ)
P1
FROM SW MTG BD A2J1
J21
TO SPEAKER CONNECTOR A2P2
J47
FREQ DSPL (VBFO) TO J20
A2J8 P12
LED STATUS DSPL TO J19
A2J3 P5
ADRS SWBD TO J18
A2J9 P11
PRESET SW- BD TO J18
A2J7 P10
VBFO SW- BD TO J17
A2J6 P9
FREQ SWBD
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
P/O CONNECTOR P1 MATES WITH PIN FIELD OF J10 ON BOTTOM SIDE OF SIDEBOARD

Chassis, Main Sideboard, and Ribbon Cabling,
Schematic Diagram
Figure 1 (Sheet 3)

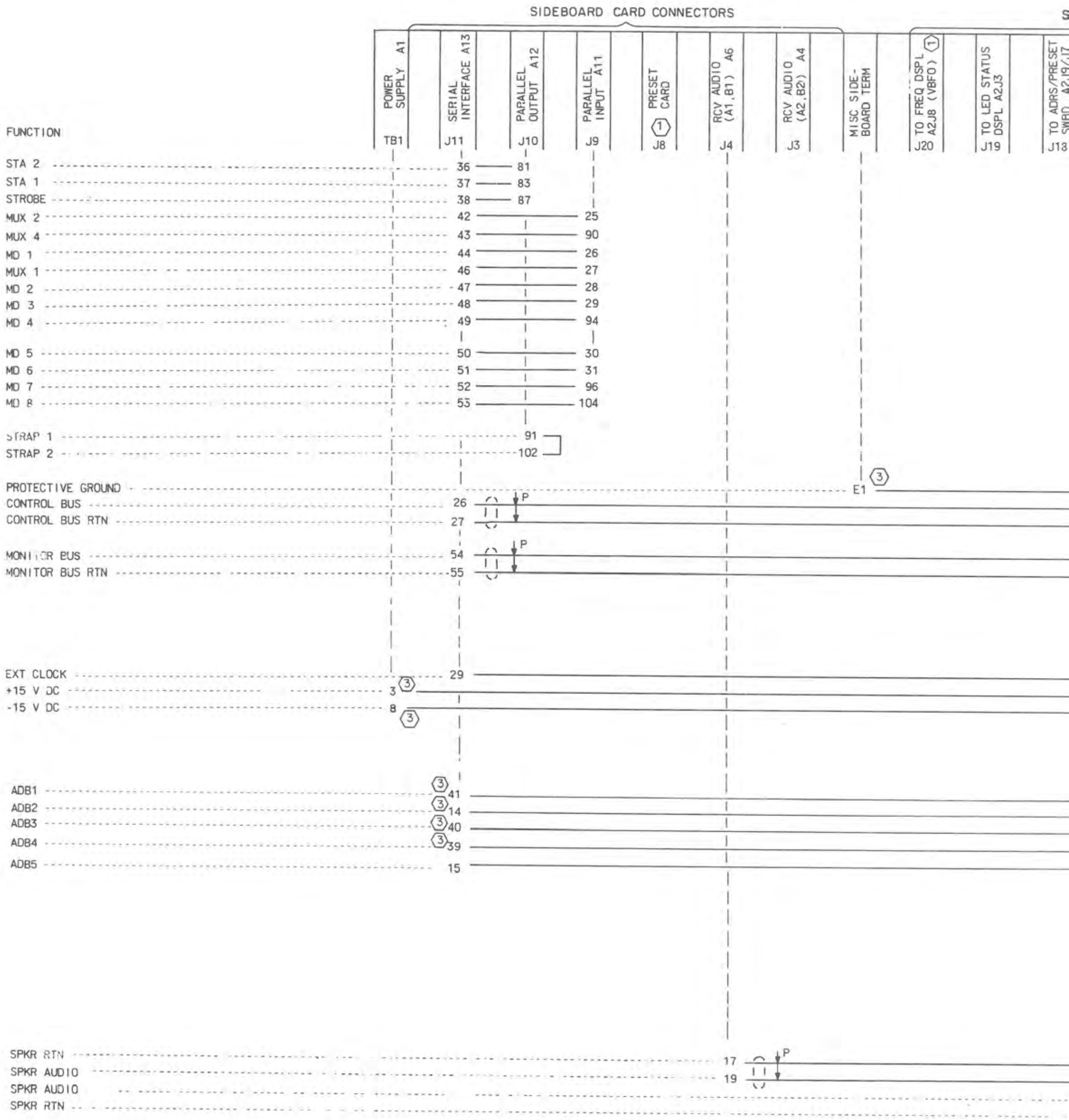

SIDEBOARD CARD CONNECTORS
POWER SUPPLY A1
SERIAL INTERFACE A13
PARALLEL OUTPUT A12
PARALLEL INPUT A11
PRESET CARD
RCV AUDIO (A1, B1) A6
RCV AUDIO (A2, B2) A4
MISC SIDE-BOARD TERM
TO FREQ DSPL A2J8 (VBFO)
TO LED STATUS DSPL A2J3
FUNCTION
TB1
J11
J10
J9
J8
J4
J3
J20
J19
FREQ OUT 100 kHz
FREQ OUT 1 MHz
FREQ OUT 10 MHz
+5 V DC
GROUND
DVBFO SIGN
DVBFO FREQ 10 Hz
DVBFO FREQ 100 Hz
DVBFO FREQ 1 kHz
DVBFO SIGN OUT
DVBFO FREQ OUT 10 Hz
DVBFO FREQ OUT 100 Hz
DVBFO FREQ OUT 1 kHz
VBFO ENBL-
STP851S
NR FLT
NR FLT STROBE
NMIF
CLOCK
DATA
MUX 8
ERROR
P/O
CONNECTOR P1 MATES WITH PIN FIELD OF J10 ON BOTTOM SIDE OF SIDEBOARD



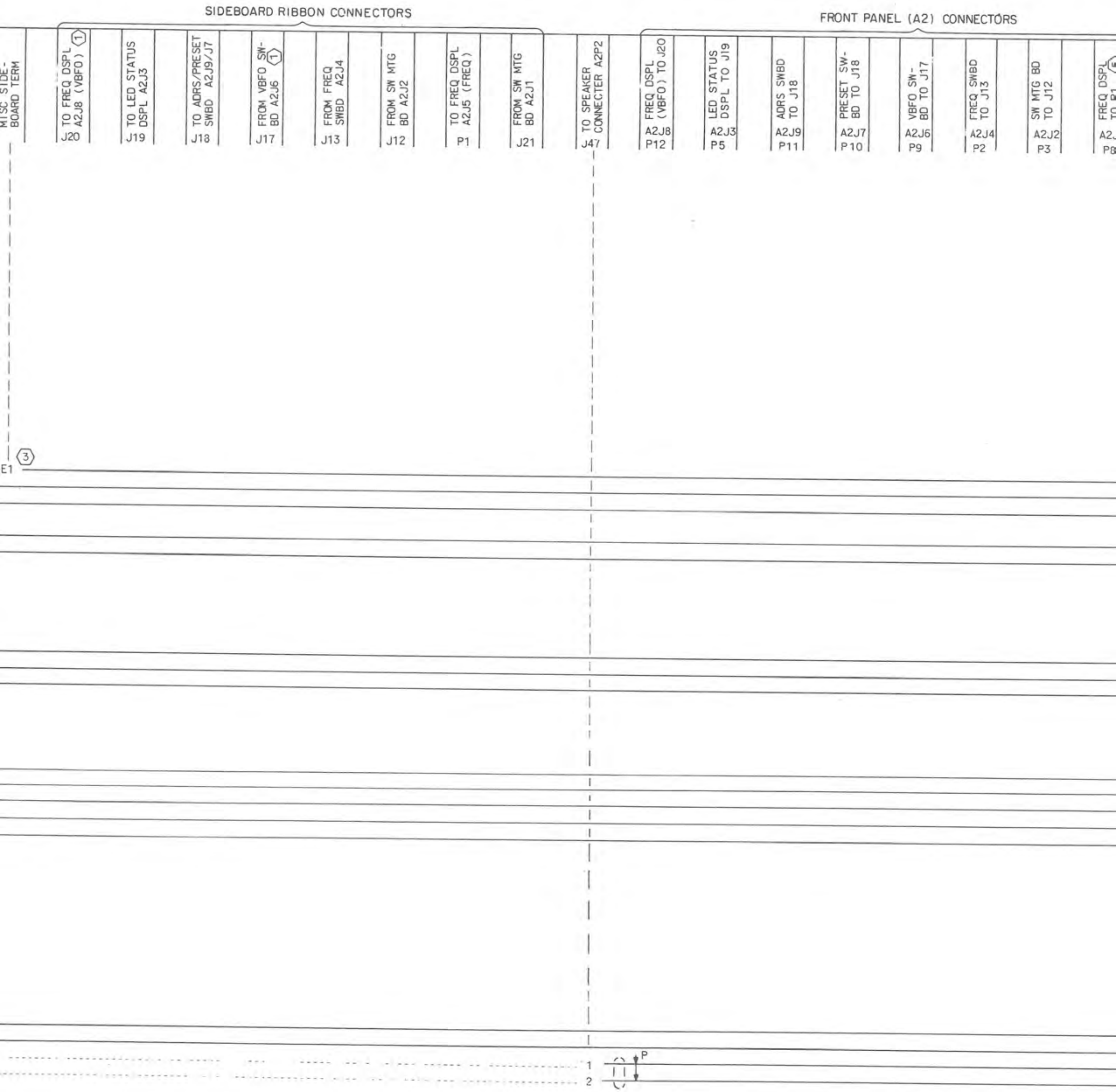
SIDEBOARD RIBBON CONNECTORS
FRONT PANEL (A2) CONNECTORS
MISC SIDE-BOARD TERM
TO FREQ DSPL A2J8 (VBFO) 1
J20
TO LED STATUS DSPL A2J3
J19
TO ADRS/PRESET SWBD A2J9/J7
J18
FROM VBFO SW-BD A2J6 1
J17
FROM FREQ SWBD A2J4
J13
FROM SW MTG BD A2J2
J12
TO FREQ DSPL A2J5 (FREQ)
P1
FROM SW MTG BD A2J1
J21
TO SPEAKER CONNECTOR A2P2
J47
FREQ DSPL (VBFO) TO J20
A2J8
P12
LED STATUS DSPL TO J19
A2J3
P5
ADRS SWBD TO J18
A2J9
P11
PRESET SWBD TO J18
A2J7
P10
VBFO SW-BD TO J17
A2J6
P9
FREQ SWBD TO J13
A2J4
P2
SW MTG BD TO J12
A2J2
P3
P/O
CONNECTOR P1 MATES WITH PIN FIELD OF J10 ON BOTTOM SIDE OF SIDEBOARD
23
24
25
26
27
28
29
30
31
32
33
34
1
2
3
4
5
6
7
8
9
10
11
12
13
18

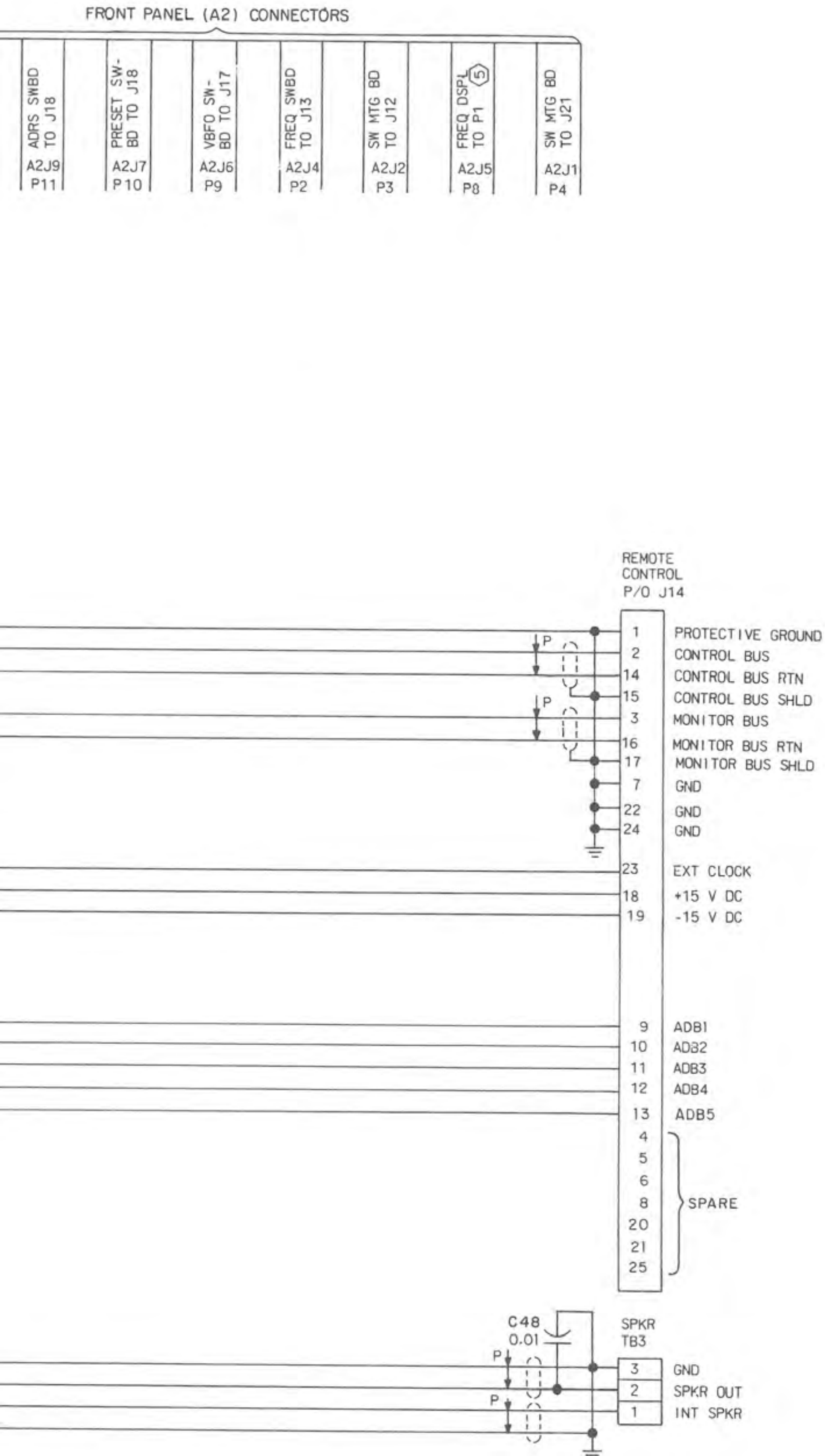


Chassis, Main Sideboard, and Ribbon Cabling, Schematic Diagram
Figure 1 (Sheet 4)



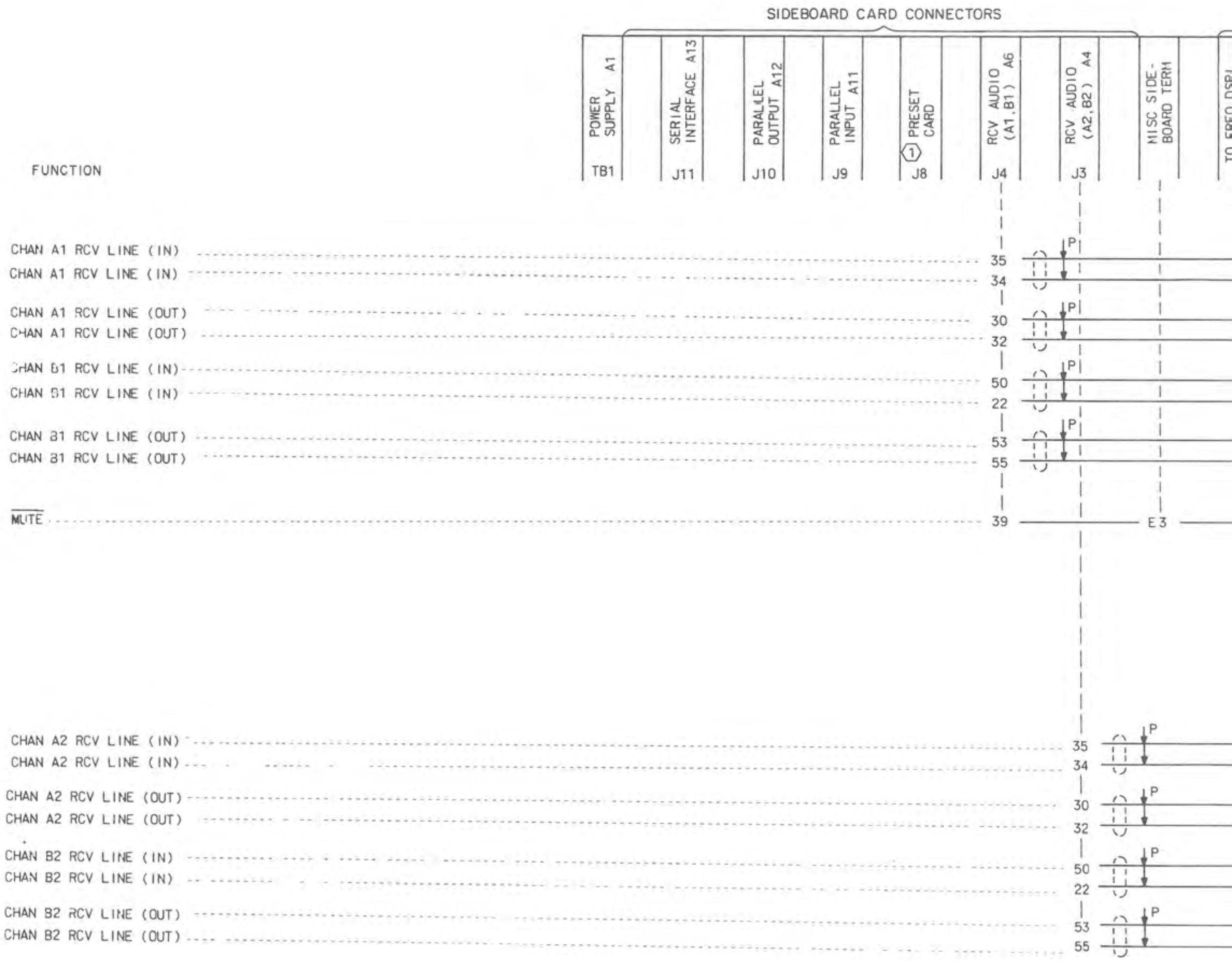
SIDEBOARD CARD CONNECTORS
POWER SUPPLY A1
SERIAL INTERFACE A13
PARALLEL OUTPUT A12
PARALLEL INPUT A11
PRESET CARD
RCV AUDIO (A1,B1) A6
RCV AUDIO (A2,B2) A4
MISC SIDE-BOARD TERM
TO FREQ DSPL A2J8 (VBFO)
TO LED STATUS DSPL A2J3
TO ADRS/PRESET SWBD A2J9/J7
FUNCTION
TB1
J11
J10
J9
J8
J4
J3
J20
J19
J18
STA 2
STA 1
STROBE
MUX 2
MUX 4
MD 1
MUX 1
MD 2
MD 3
MD 4
MD 5
MD 6
MD 7
MD 8
STRAP 1
STRAP 2
PROTECTIVE GROUND
CONTROL BUS
CONTROL BUS RTN
MONITOR BUS
MONITOR BUS RTN
EXT CLOCK
+15 V DC
-15 V DC
ADB1
ADB2
ADB3
ADB4
ADB5
SPKR RTN
SPKR AUDIO
SPKR AUDIO
SPKR RTN
E1
P


SIDEBOARD RIBBON CONNECTORS
FRONT PANEL (A2) CONNECTORS
MISC SIDE-BOARD TERM
TO FREQ DSPL A2J8 (VBFO)
J20
TO LED STATUS DSPL A2J3
J19
TO ADRS/PRESET SWBD A2J9/J7
J18
FROM VBFO SW-BD A2J6
J17
FROM FREQ SWBD A2J4
J13
FROM SW MTG BD A2J2
J12
TO FREQ DSPL A2J5 (FREQ)
P1
FROM SW MTG BD A2J1
J21
TO SPEAKER CONNECTER A2P2
J47
FREQ DSPL (VBFO) TO J20
A2J8
P12
LED STATUS DSPL TO J19
A2J3
P5
ADRS SWBD TO J18
A2J9
P11
PRESET SW-BD TO J18
A2J7
P10
VBFO SW-BD TO J17
A2J6
P9
FREQ SWBD TO J13
A2J4
P2
SW MTG BD TO J12
A2J2
P3
E1
1
2
P

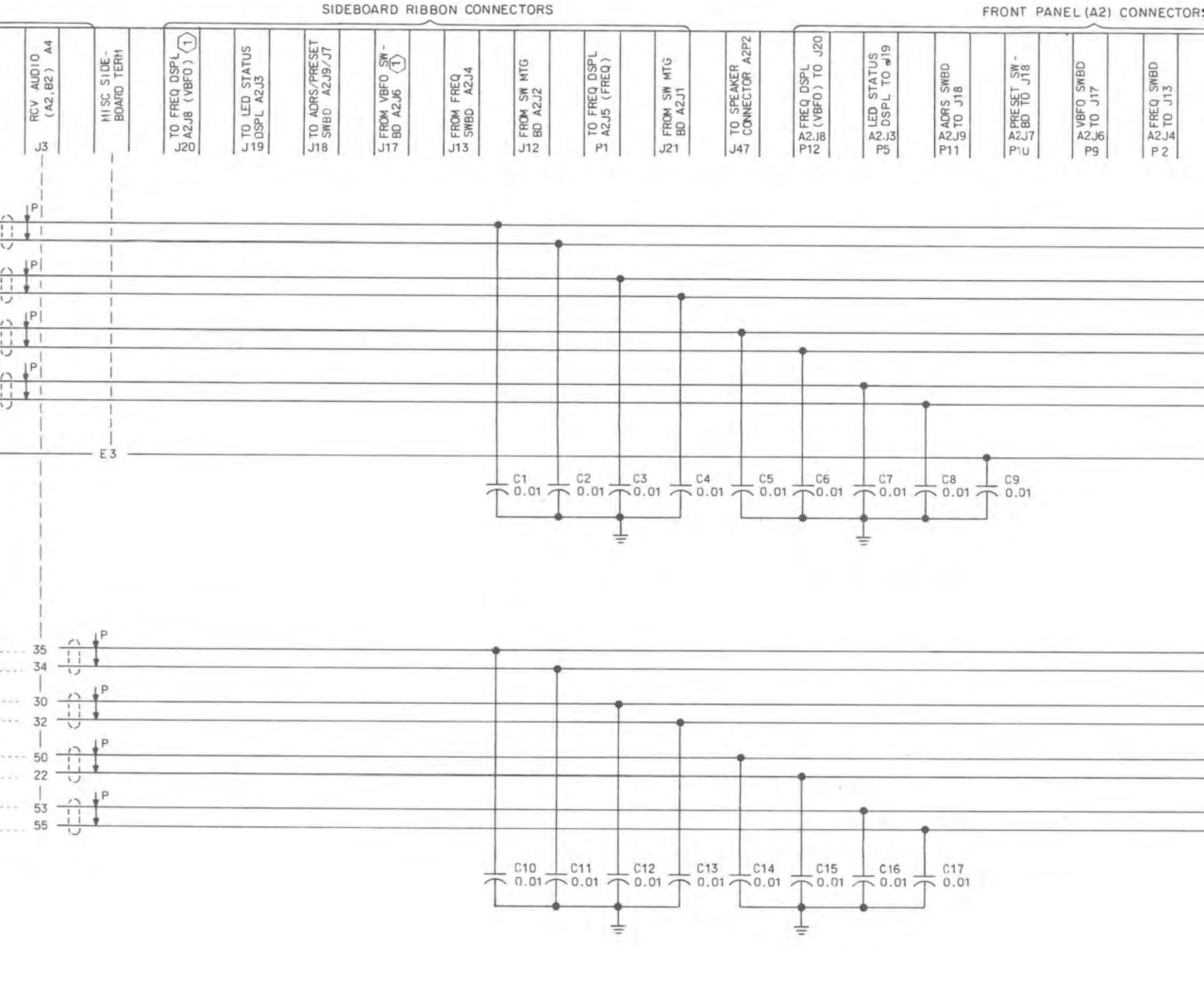


634-6908

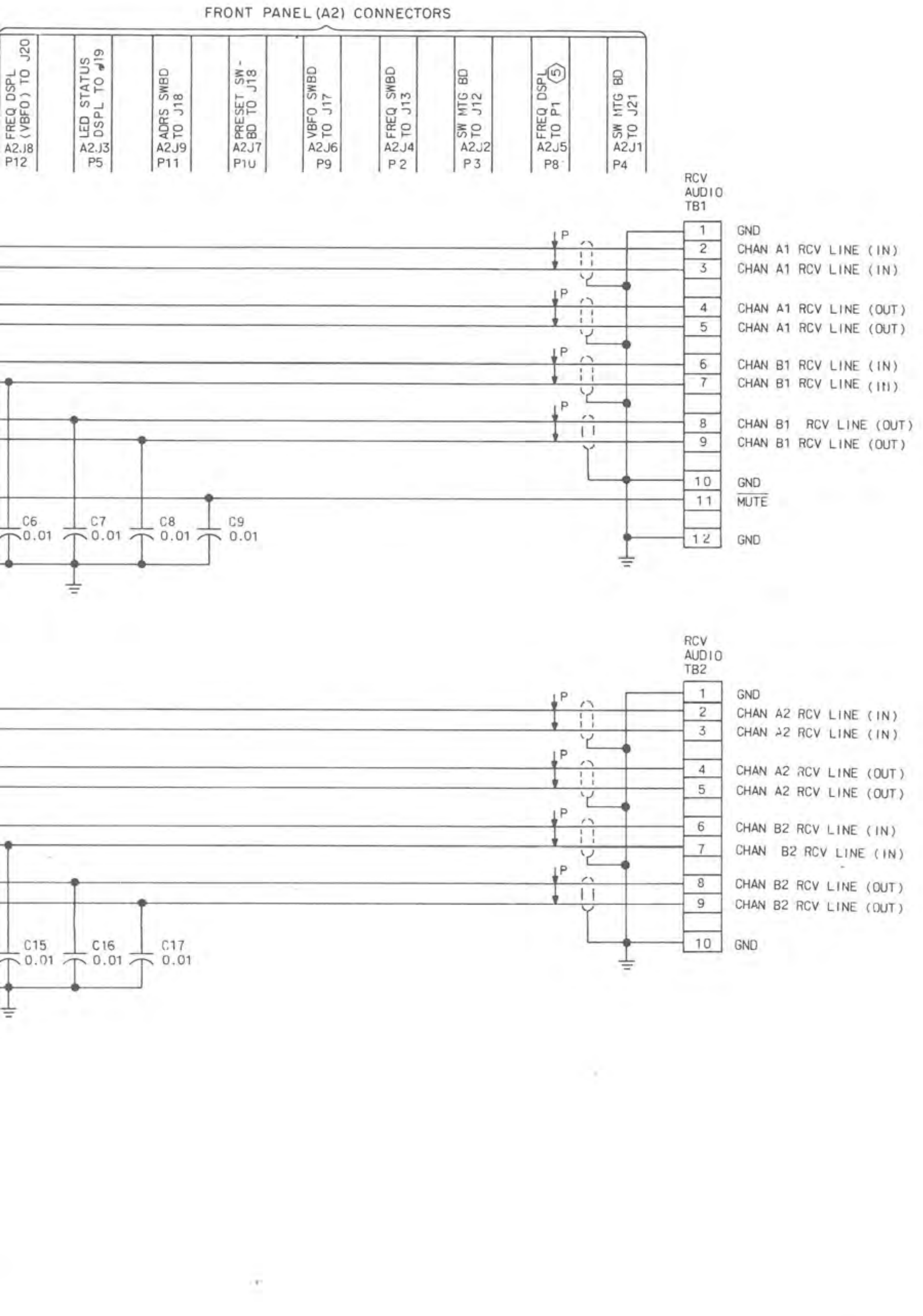
Chassis, Main Sideboard, and Ribbon Cabling, Schematic Diagram
Figure 1 (Sheet 5)



SIDEBOARD CARD CONNECTORS
POWER SUPPLY A1
SERIAL INTERFACE A13
PARALLEL OUTPUT A12
PARALLEL INPUT A11
1 PRESET CARD
RCV AUDIO (A1,B1) A6
RCV AUDIO (A2,B2) A4
MISC SIDE-BOARD TERM
TO FREQ DSPL
FUNCTION
TB1
J11
J10
J9
J8
J4
J3
CHAN A1 RCV LINE (IN) 35
CHAN A1 RCV LINE (IN) 34
CHAN A1 RCV LINE (OUT) 30
CHAN A1 RCV LINE (OUT) 32
CHAN B1 RCV LINE (IN) 50
CHAN B1 RCV LINE (IN) 22
CHAN B1 RCV LINE (OUT) 53
CHAN B1 RCV LINE (OUT) 55
MUTE 39
E3
CHAN A2 RCV LINE (IN) 35
CHAN A2 RCV LINE (IN) 34
CHAN A2 RCV LINE (OUT) 30
CHAN A2 RCV LINE (OUT) 32
CHAN B2 RCV LINE (IN) 50
CHAN B2 RCV LINE (IN) 22
CHAN B2 RCV LINE (OUT) 53
CHAN B2 RCV LINE (OUT) 55
P



SIDEBOARD RIBBON CONNECTORS
FRONT PANEL (A2) CONNECTORS
RCV AUDIO (A2,B2) A4
J3
MISC SIDE-BOARD TERM
TO FREQ DSPL A2J8 (VBFO) 1
J20
TO LED STATUS DSPL A2J3
J19
TO ADRS/PRESET SWBD A2J9/J7
J18
FROM VBFO SW-BD A2J6 1
J17
FROM FREQ SWBD A2J4
J13
FROM SW MTG BD A2J2
J12
TO FREQ DSPL A2J5 (FREQ)
P1
FROM SW MTG BD A2J1
J21
TO SPEAKER CONNECTOR A2P2
J47
FREQ DSPL (VBFO) TO J20
A2J8
P12
LED STATUS DSPL TO J19
A2J3
P5
ADRS SWBD TO J18
A2J9
P11
PRESET SW-BD TO J18
A2J7
P10
VBFO SWBD TO J17
A2J6
P9
FREQ SWBD TO J13
A2J4
P2
P
E3
C1 0.01
C2 0.01
C3 0.01
C4 0.01
C5 0.01
C6 0.01
C7 0.01
C8 0.01
C9 0.01
35
34
30
32
50
22
53
55
C10 0.01
C11 0.01
C12 0.01
C13 0.01
C14 0.01
C15 0.01
C16 0.01
C17 0.01

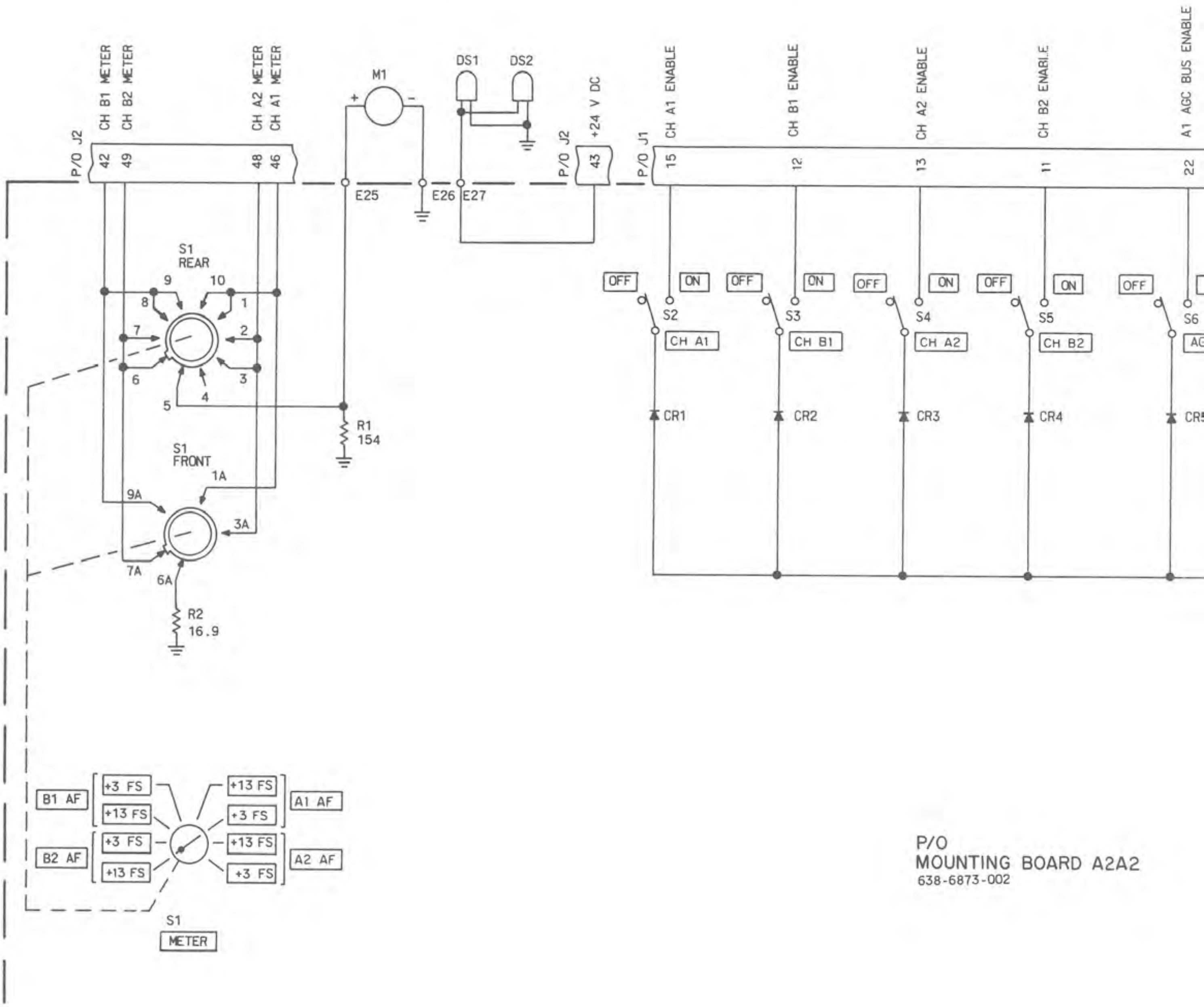


Chassis, Main Sideboard, and Ribbon Cabling, Schematic Diagram
Figure 1 (Sheet 6)

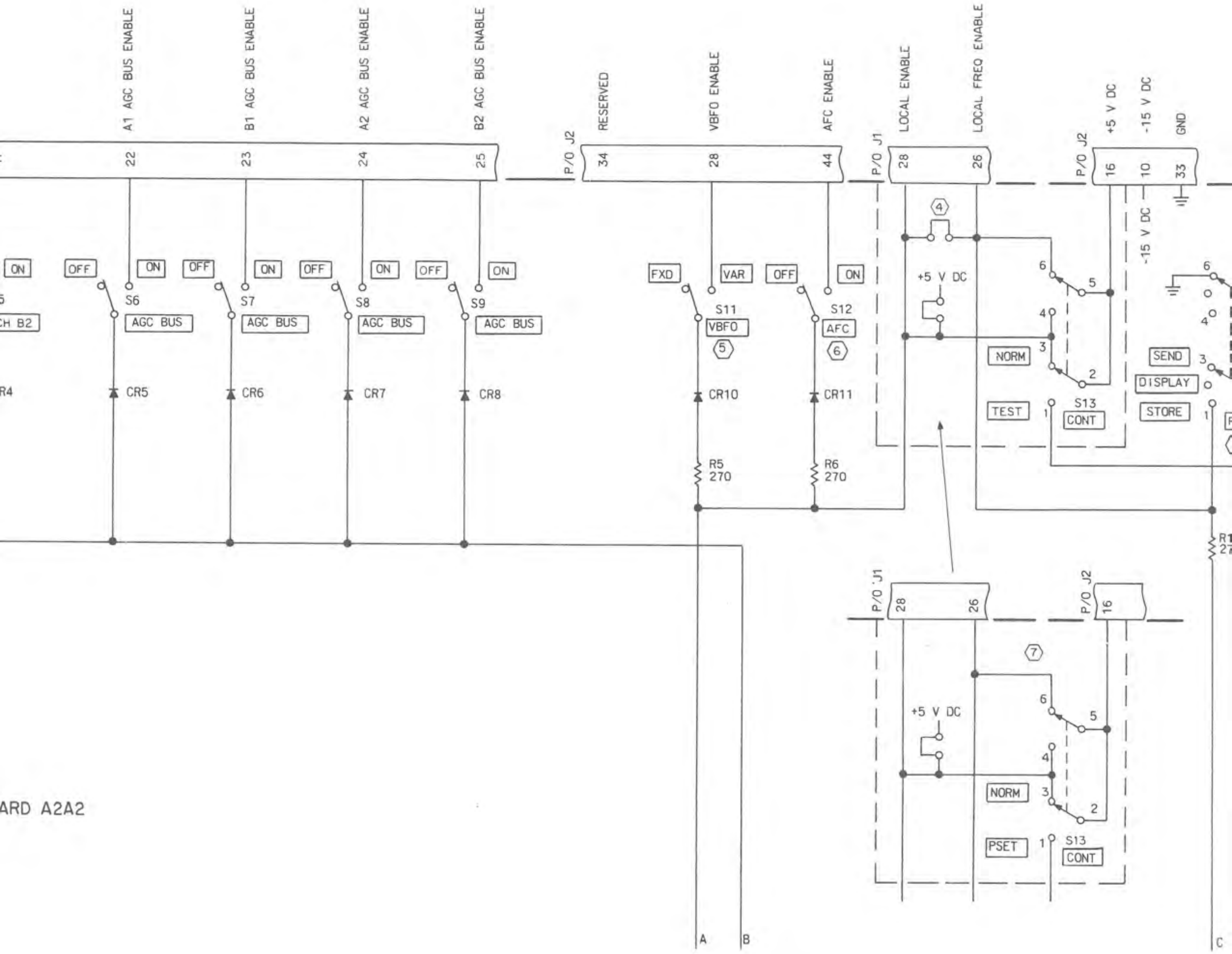
SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
	(This page will contain schematic revision information.)		

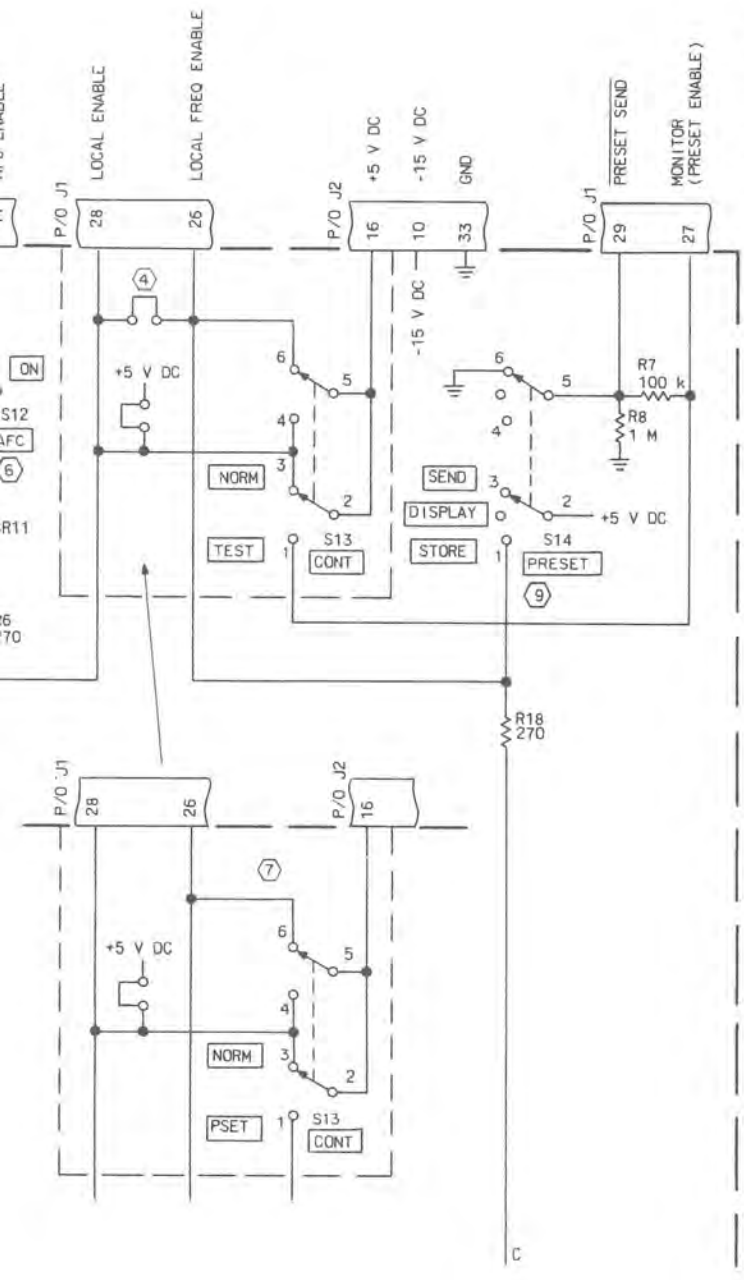
Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet A)



P/O
MOUNTING BOARD A2A2
638-6873-002



A1 AGC BUS ENABLE
B1 AGC BUS ENABLE
A2 AGC BUS ENABLE
B2 AGC BUS ENABLE
RESERVED
VBFO ENABLE
AFC ENABLE
LOCAL ENABLE
LOCAL FREQ ENABLE
+5 V DC
-15 V DC
GND
P/O J2
P/O J1
S6 AGC BUS
S7 AGC BUS
S8 AGC BUS
S9 AGC BUS
S11 VBFO
S12 AFC
S13 CONT
ON
OFF
FXD
VAR
NORM
TEST
PSET
SEND
DISPLAY
STORE
CR5
CR6
CR7
CR8
CR10
CR11
R5 270
R6 270
ARD A2A2



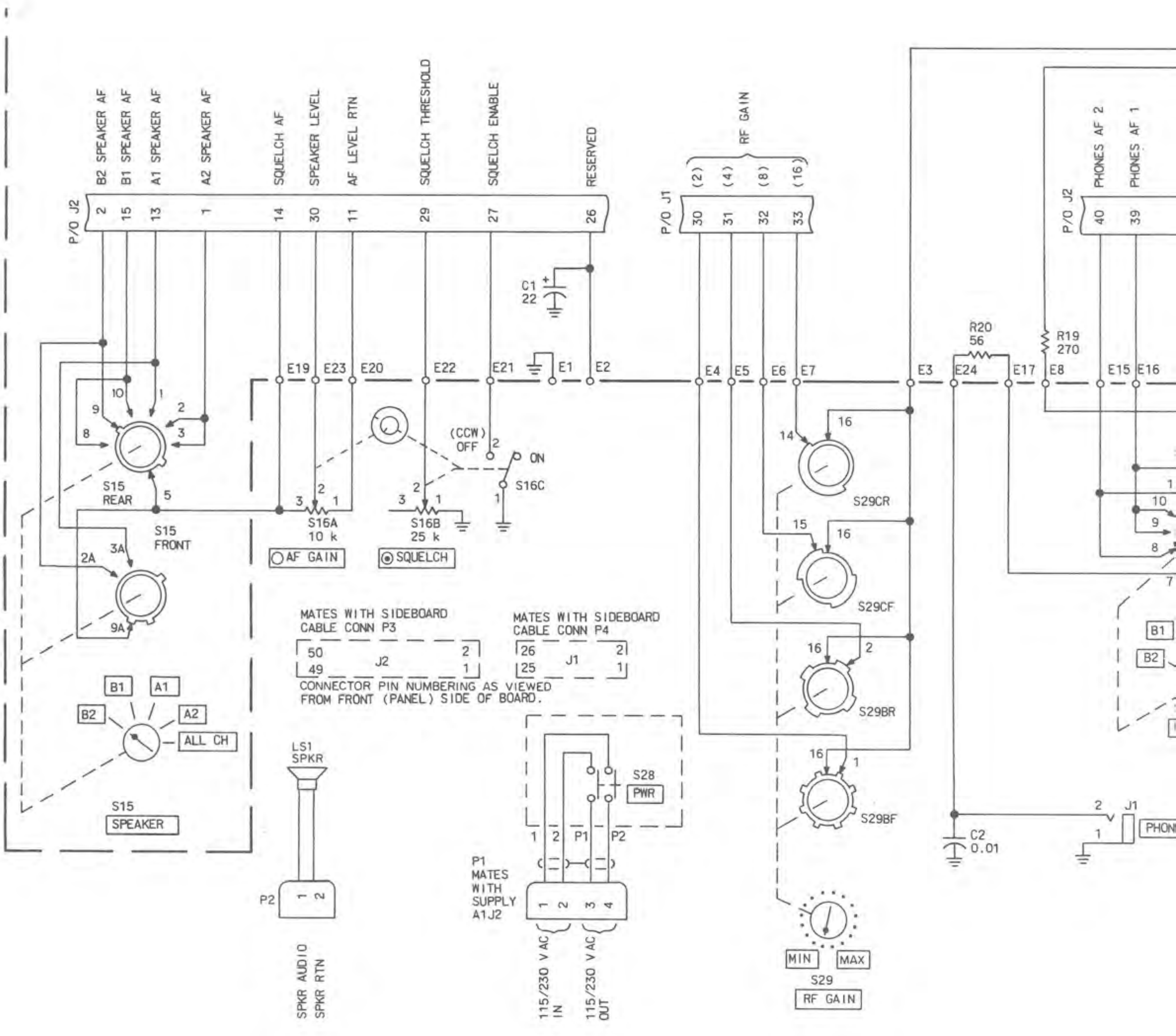
NOTES:

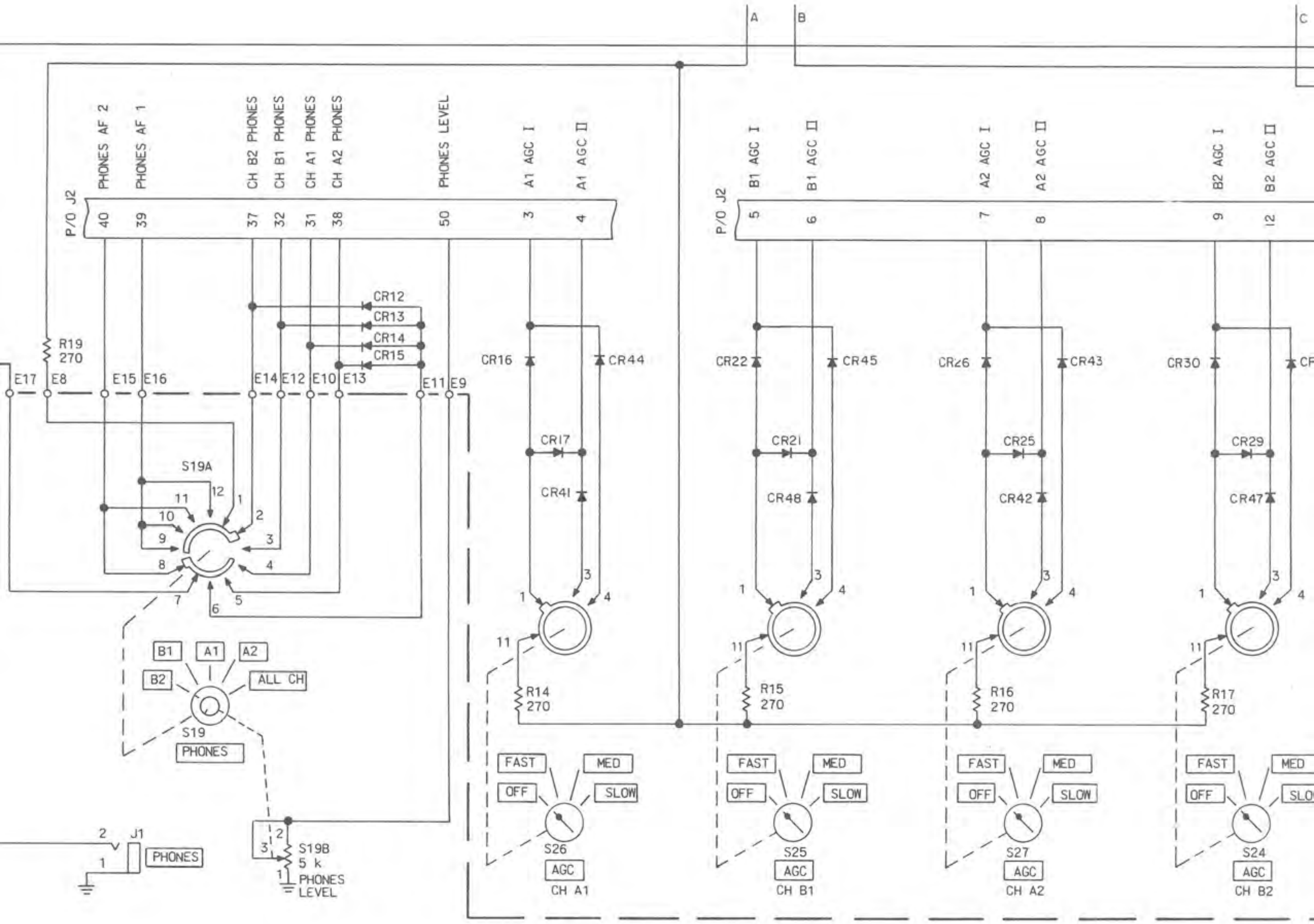
1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS AND DIODES ARE 1N4454.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. TYPE DESIGNATIONS SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.
4. REMOVE JUMPER FOR PRESET.
5. S11 USED WITH VBFO OPTION ONLY.
6. S12 USED WITH AFC OPTION ONLY.
7. ALTERNATE SWITCH LABELING WHEN PRESET OPTION IS USED.
8. NONSTANDARD ABBREVIATIONS:
   CH-CHANNEL
   PST-PRESET
9. S14 USED WITH PRESET OPTION ONLY.

REF DES	SUBASSEMBLIES USED	646-6815-XXX -001	646-6815-XXX -002
A1	635-0825-013	X	X
A2	638-6873-002	X	X
A3	635-0830-001		X
	635-0830-002	X	
A4	638-6437-001	X	
A5	637-1781-006		X
	637-1781-008	X	
A6	635-0899-001		
S1	METER	X	X
S2	CH A1- ON/OFF	X	X
S3	CH B1-ON/OFF	X	X
S4	CH A2-ON/OFF	X	X
S5	CH B2-ON/OFF	X	X
S6	(A1) AGC BUS	X	X
S7	(B1) AGC BUS	X	X
S8	(A2) AGC BUS	X	X
S9	(B2) AGC BUS	X	X
S11	AFC	X	
S12	VBFO	X	
S13	CONT-NORM/TEST	X	X
	CONT-NORM/PSET		
S14	PRESET-SEND/DISPLAY/STORE		
S21	MODE-AM/CW/ISB/NET DATA	X	X
S22	BANDWIDTH	X	X
S24	(B2) AGC-FAST/MED/SLOW	X	X
S25	(B1) AGC- FAST/MED/SLOW	X	X
S26	(A1) AGC-FAST/MED/SLOW	X	X
S27	(A2) AGC-FAST/MED/SLOW	X	X
ALL THE ABOVE SWITCHES ADDED TO A2A2 AT NEXT HIGHER ASSEMBLY 646-6815-XXX			

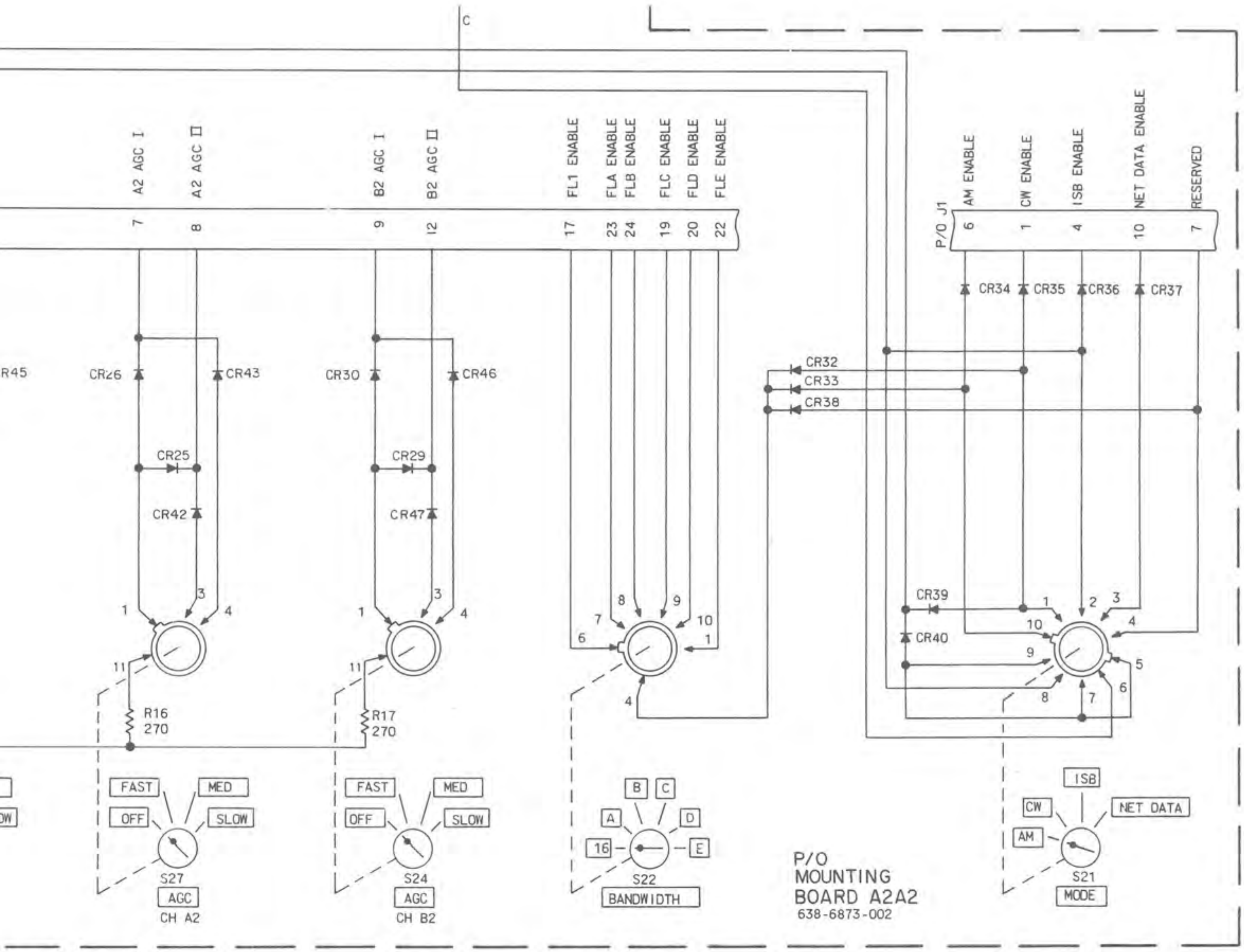
SH I
TPA-2762-065

Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 1 of 7)


P/O J2
B2 SPEAKER AF
B1 SPEAKER AF
A1 SPEAKER AF
A2 SPEAKER AF
SQUELCH AF
SPEAKER LEVEL
AF LEVEL RTN
SQUELCH THRESHOLD
SQUELCH ENABLE
RESERVED
P/O J1
RF GAIN
PHONES AF 2
PHONES AF 1
C1 22
E19 E23 E20 E22 E21 E1 E2
E4 E5 E6 E7
E3 E24 E17 E8 E15 E16
R20 56
R19 270
(CCW) OFF
ON
S16C
S15 REAR
S15 FRONT
S16A 10 k
S16B 25 k
AF GAIN
SQUELCH
S29CR
S29CF
S29BR
S29BF
MATES WITH SIDEBOARD CABLE CONN P3
MATES WITH SIDEBOARD CABLE CONN P4
CONNECTOR PIN NUMBERING AS VIEWED FROM FRONT (PANEL) SIDE OF BOARD.
S15
SPEAKER
B1 A1 B2 A2 ALL CH
LS1 SPKR
P2
SPKR AUDIO
SPKR RTN
S28
PWR
P1 MATES WITH SUPPLY A1J2
115/230 V AC IN
115/230 V AC OUT
C2 0.01
J1
PHON
MIN MAX
S29
RF GAIN

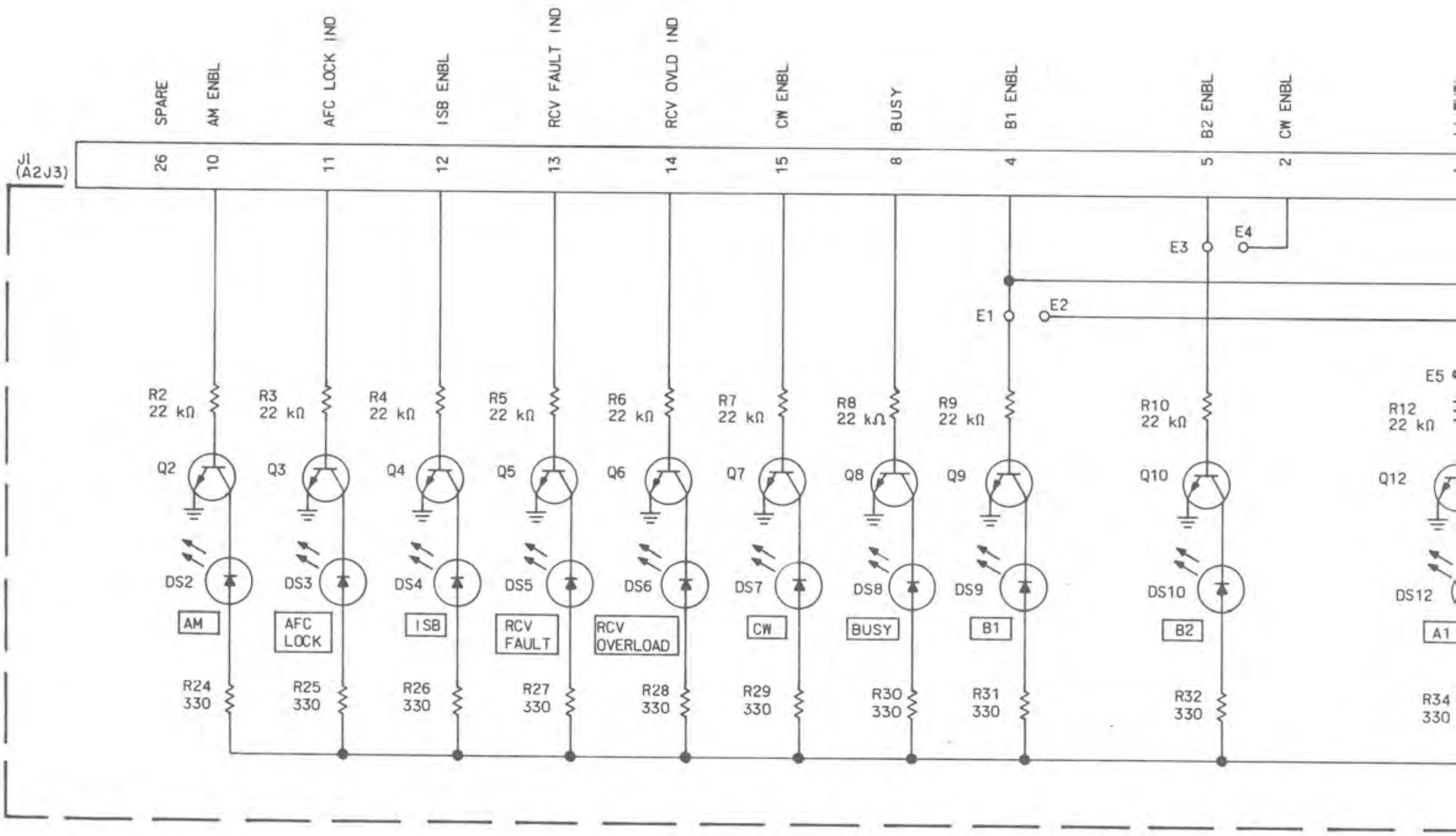


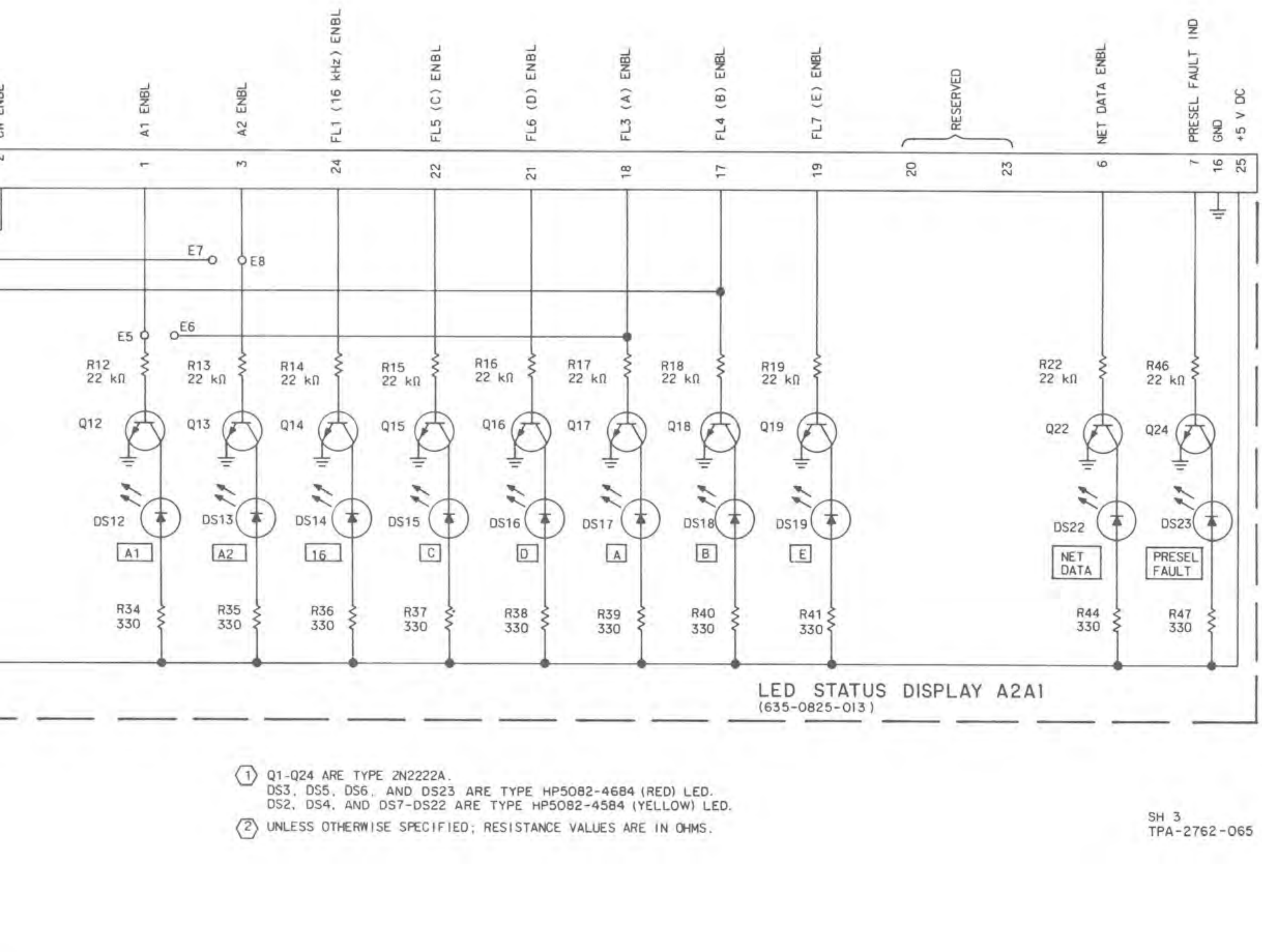
A
B
C
P/O J2
PHONES AF 2
PHONES AF 1
CH B2 PHONES
CH B1 PHONES
CH A1 PHONES
CH A2 PHONES
PHONES LEVEL
A1 AGC I
A1 AGC II
B1 AGC I
B1 AGC II
A2 AGC I
A2 AGC II
B2 AGC I
B2 AGC II
CR12
CR13
CR14
CR15
CR16
CR44
CR17
CR41
CR22
CR45
CR21
CR48
CR26
CR43
CR25
CR42
CR30
CR29
CR47
R19
270
E17
E8
E15
E16
E14
E12
E10
E13
E11
E9
S19A
B1
A1
A2
B2
ALL CH
S19
PHONES
J1
S19B
5 k
PHONES
LEVEL
R14
270
R15
270
R16
270
R17
270
FAST
MED
OFF
SLOW
S26
AGC
CH A1
S25
AGC
CH B1
S27
AGC
CH A2
S24
AGC
CH B2



SH 2
TPA-2762-065

Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 2)

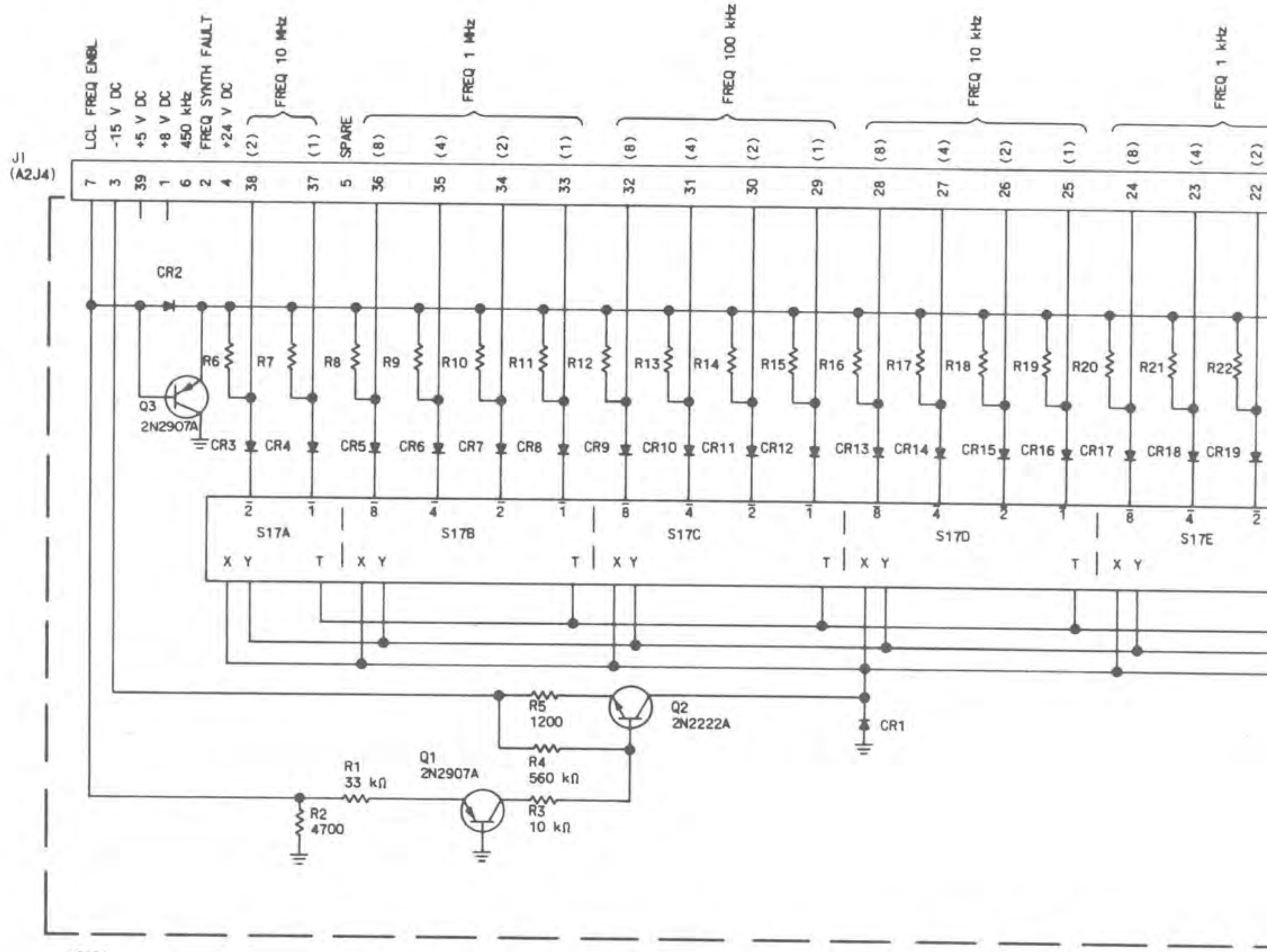

J1
(A2J3)
SPARE
AM ENBL
AFC LOCK IND
ISB ENBL
RCV FAULT IND
RCV OVLD IND
CW ENBL
BUSY
B1 ENBL
B2 ENBL
CW ENBL
26
10
11
12
13
14
15
8
4
5
2
E1
E2
E3
E4
E5
R2 22 kΩ
R3 22 kΩ
R4 22 kΩ
R5 22 kΩ
R6 22 kΩ
R7 22 kΩ
R8 22 kΩ
R9 22 kΩ
R10 22 kΩ
R12 22 kΩ
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q12
DS2
DS3
DS4
DS5
DS6
DS7
DS8
DS9
DS10
DS12
AM
AFC LOCK
ISB
RCV FAULT
RCV OVERLOAD
CW
BUSY
B1
B2
A1
R24 330
R25 330
R26 330
R27 330
R28 330
R29 330
R30 330
R31 330
R32 330
R34 330



1. Q1-Q24 ARE TYPE 2N2222A.
   DS3, DS5, DS6, AND DS23 ARE TYPE HP5082-4684 (RED) LED.
   DS2, DS4, AND DS7-DS22 ARE TYPE HP5082-4584 (YELLOW) LED.
2. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS.

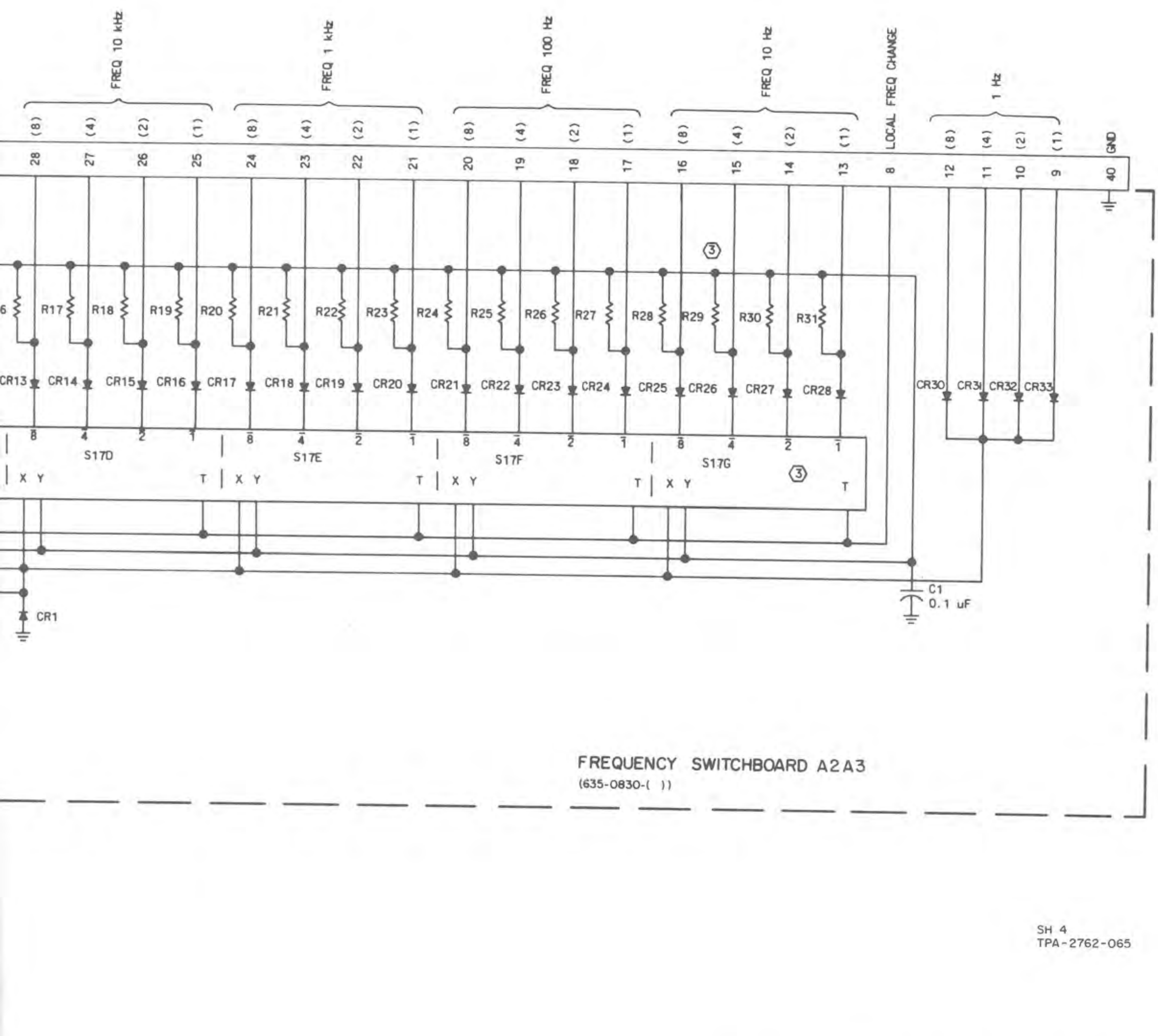
SH 3
TPA-2762-065

Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 3)



NOTES:

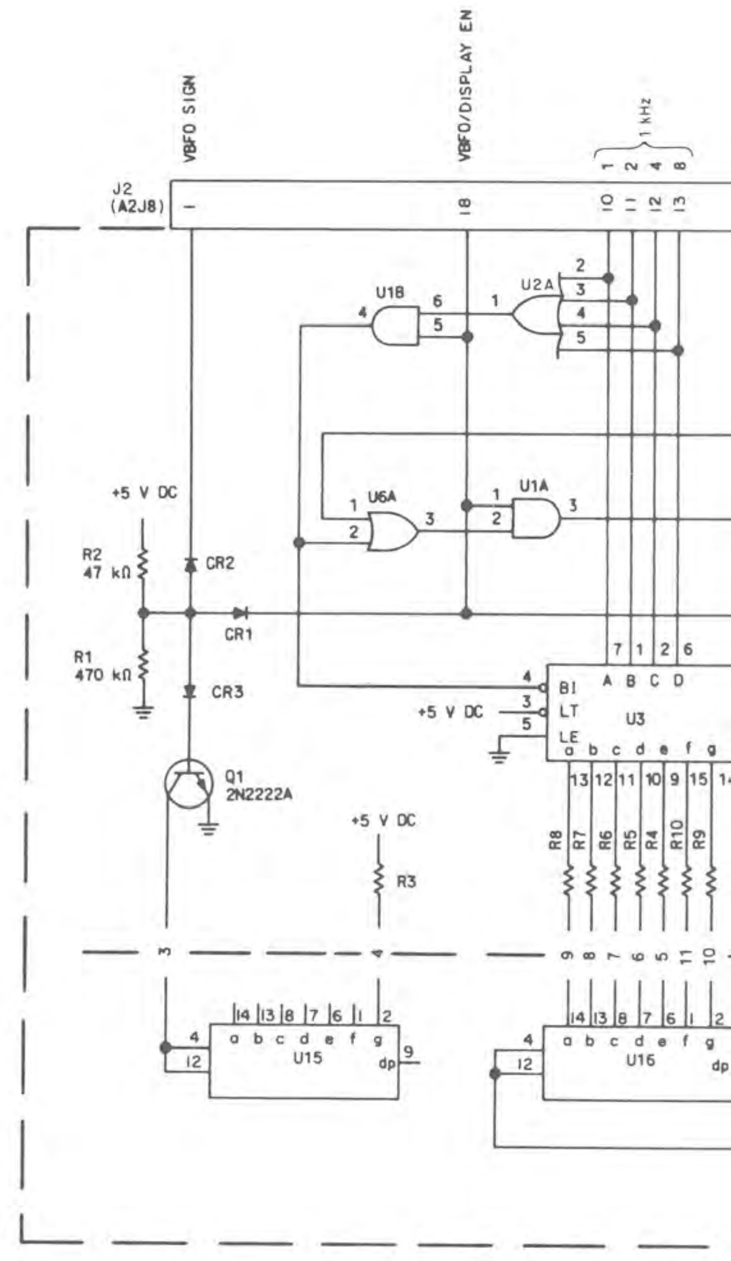
1. ALL DIODES ARE TYPE 1N4454.
2. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS. R6-R31 ARE 33 kΩ
3. THE 10 Hz FREQUENCY DIGIT S17G AND ASSOCIATED COMPONENTS R28 THRU R31 ARE PART OF 635-0830-002 ONLY. IN THE 635-0830-001 CR25 THRU CR28 CATHODES ARE CONNECTED THE SAME AS CR30 THRU CR33 CATHODES.

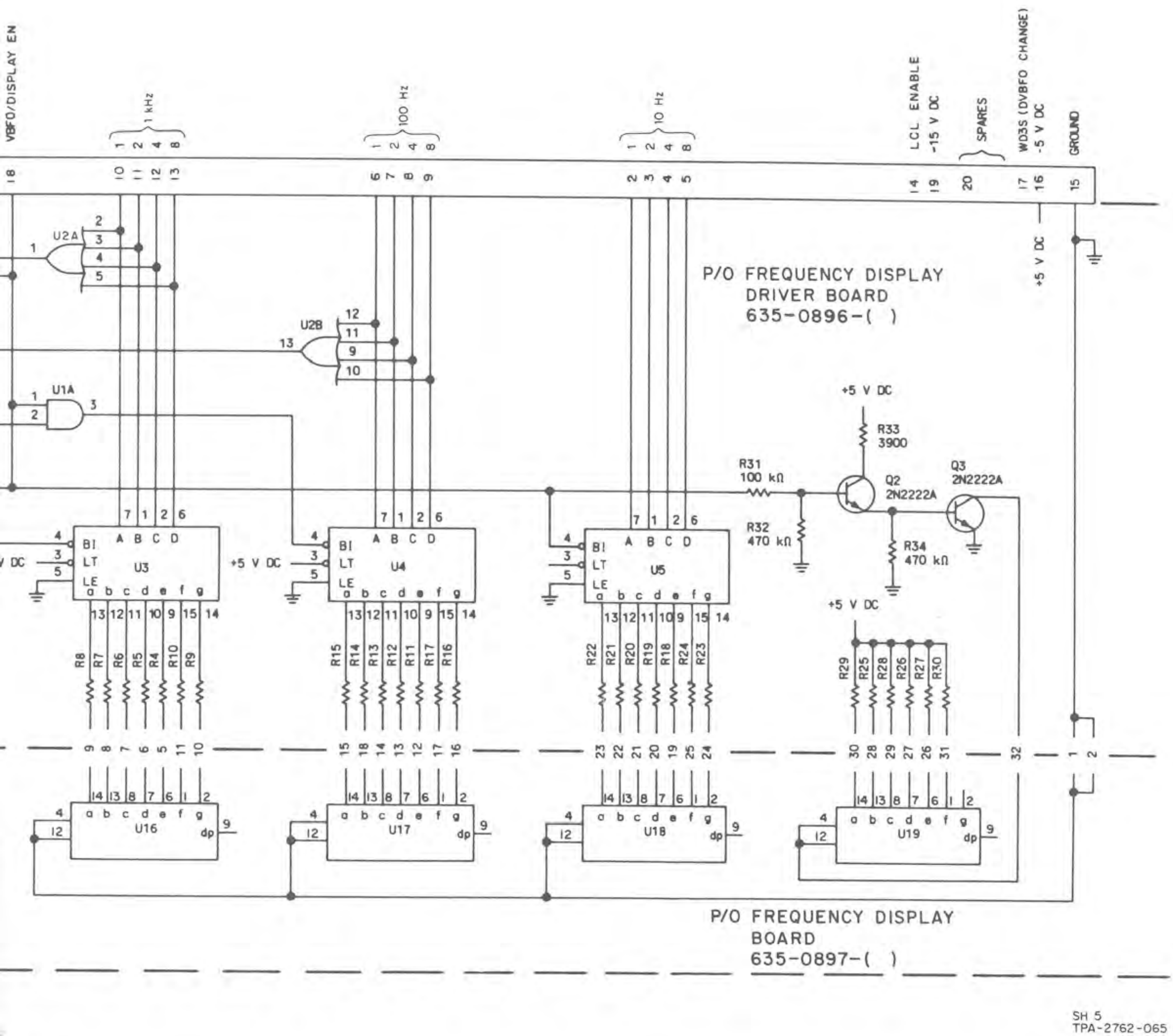


Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 4)

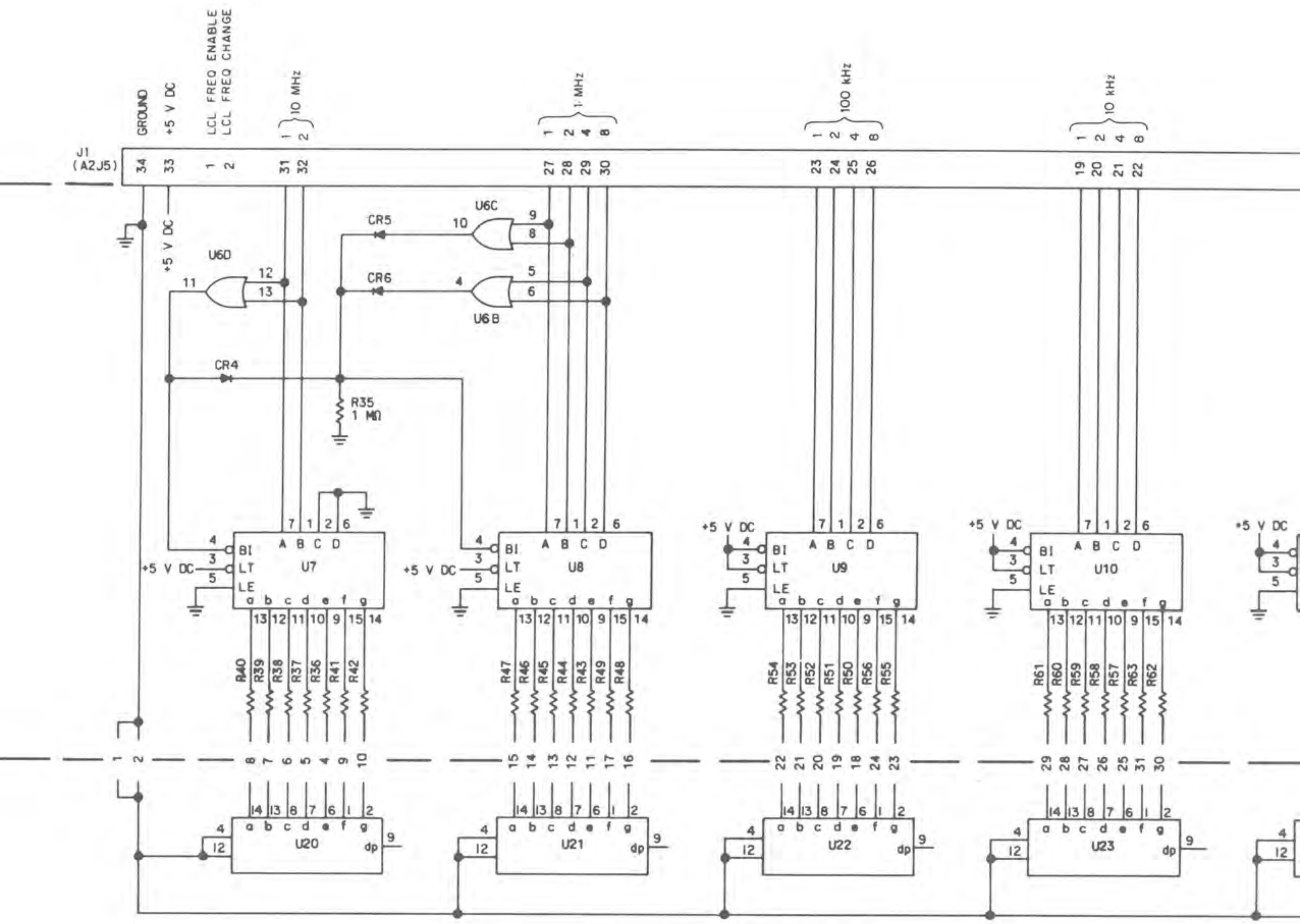
CIRCUITS USED PER FREQUENCY DISPLAY A2A5

Board	Group	Function	CIRCUIT	637-1781-( ) -006	637-1781-( ) -008
FREQUENCY DISPLAY DRIVER BOARD 635-0896-( )	VBFO DISPLAY DRIVERS	VBFO DISPLAY ENABLE	U1		X
			U2		X
		1 KHz	U3		X
		100 Hz	U4		X
		10 Hz	U5		X
	OPER FREQ DISPLAY DRIVERS	DISPLAY BLANKING	U6	X	X
		10 MHz	U7	X	X
		1 MHz	U8	X	X
		100 kHz	U9	X	X
		10 kHz	U10	X	X
		1 kHz	U11	X	X
		100 Hz	U12	X	X
		10 Hz	U13		X
		1 Hz	U14		X
FREQUENCY DISPLAY BOARD 635-0897-( )	VBFO DISPLAY	SIGN	U15		X
		1 kHz	U16		X
		100 Hz	U17		X
		10 Hz	U18		X
		1 Hz	U19		X
	OPER FREQ DISPLAY	10 MHz	U20	X	X
		1 MHz	U21	X	X
		100 kHz	U22	X	X
		10 kHz	U23	X	X
		1 kHz	U24	X	X
		100 Hz	U25	X	X
		10 Hz	U26		X
		1 Hz	U27		





Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 5)



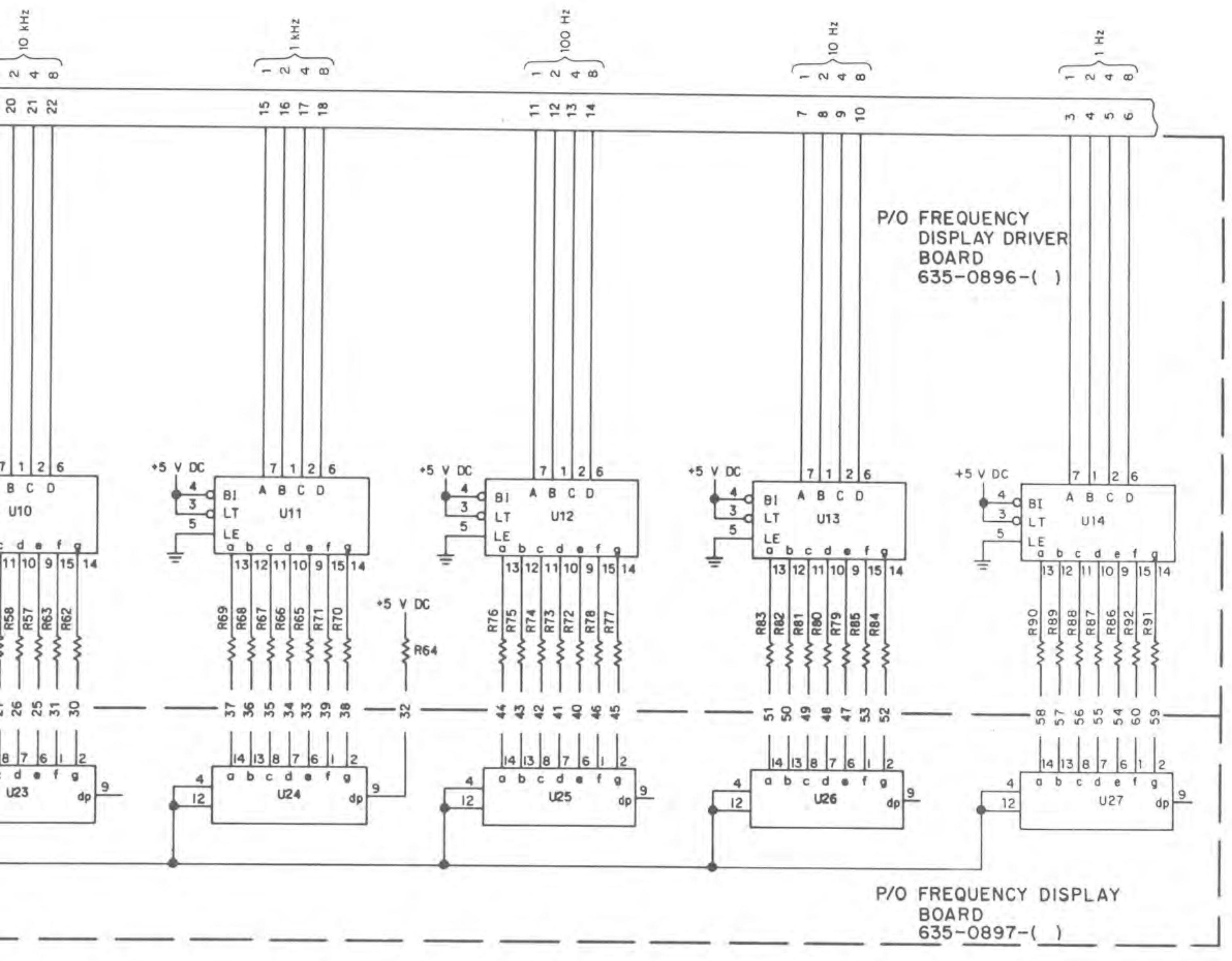
NOTES:

1. RESISTORS R3 THRU R30 AND R36 THRU R92 ARE 180 OHM.

2. DIODES ARE TYPE 1N4454.

3. POWER AND GROUND CONNECTIONS

U NO.	TYPE	POWER (V DC)	
		+5	GND
U1	MC14081BCP	14	7
U2	MC14072BCP	14	7
U3, U4, U5, AND U7 THRU U14	MC14511BCP	16	8
U6	MC14071BCP	14	7
U15 THRU U27	MAN3640A		

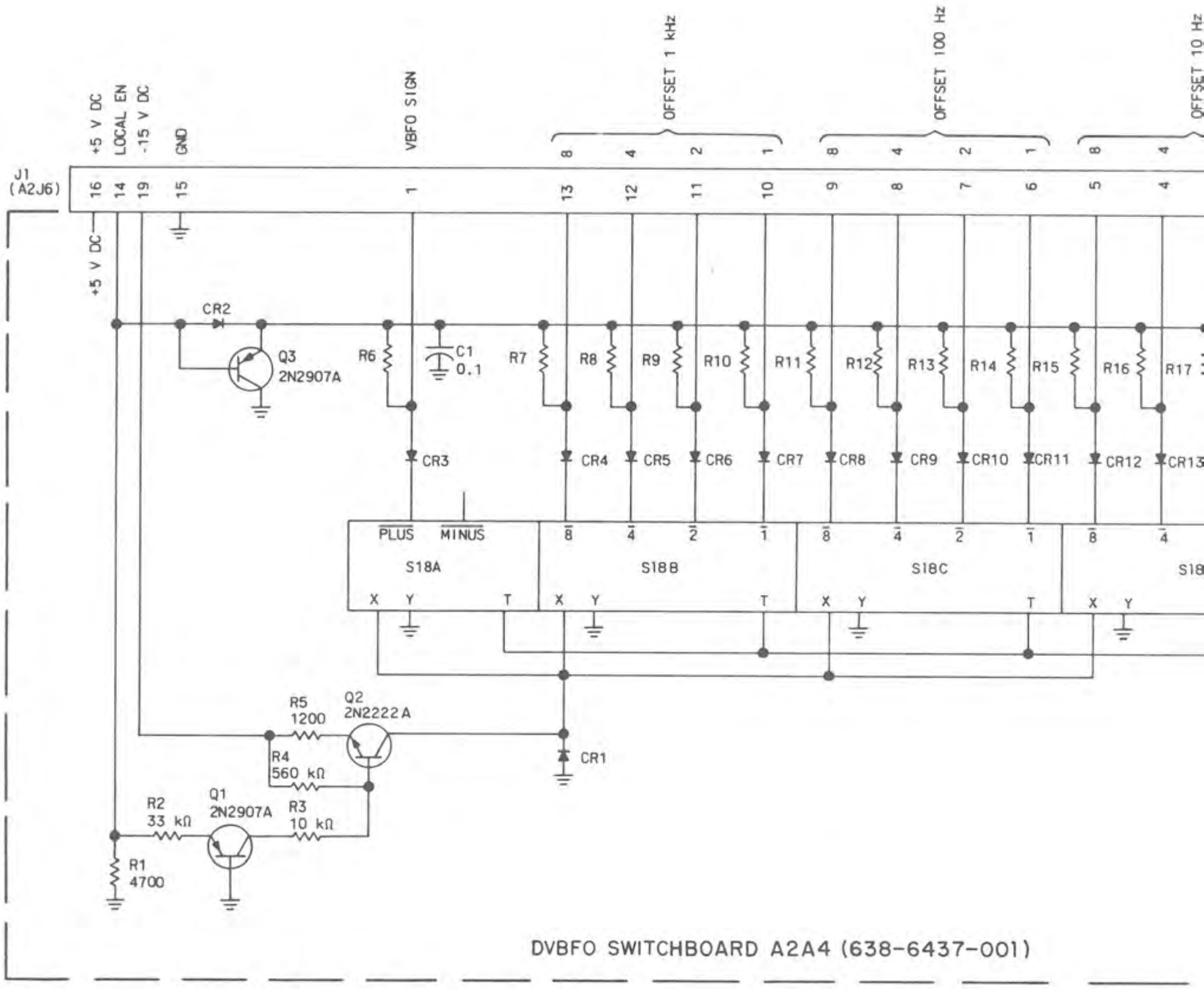


S

POWER (V DC)	
+5	GND
14	7
14	7
16	8
14	7

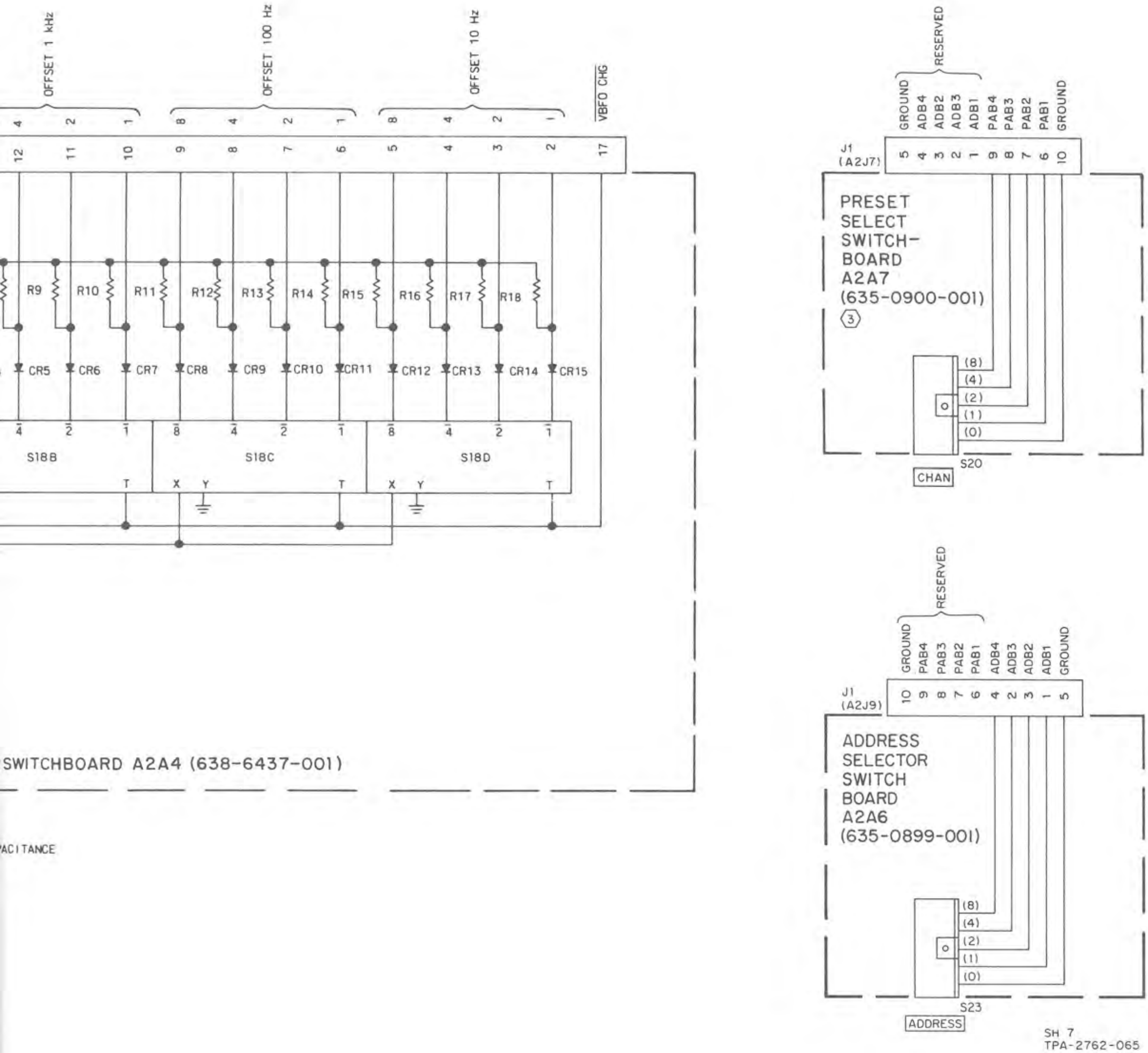
SH 6
TPA-2762-065

Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 6)



NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND DIODES ARE 1N4454.
2. R6-R18 ARE 33 kΩ.
3. USED WITH PRESET OPTION.

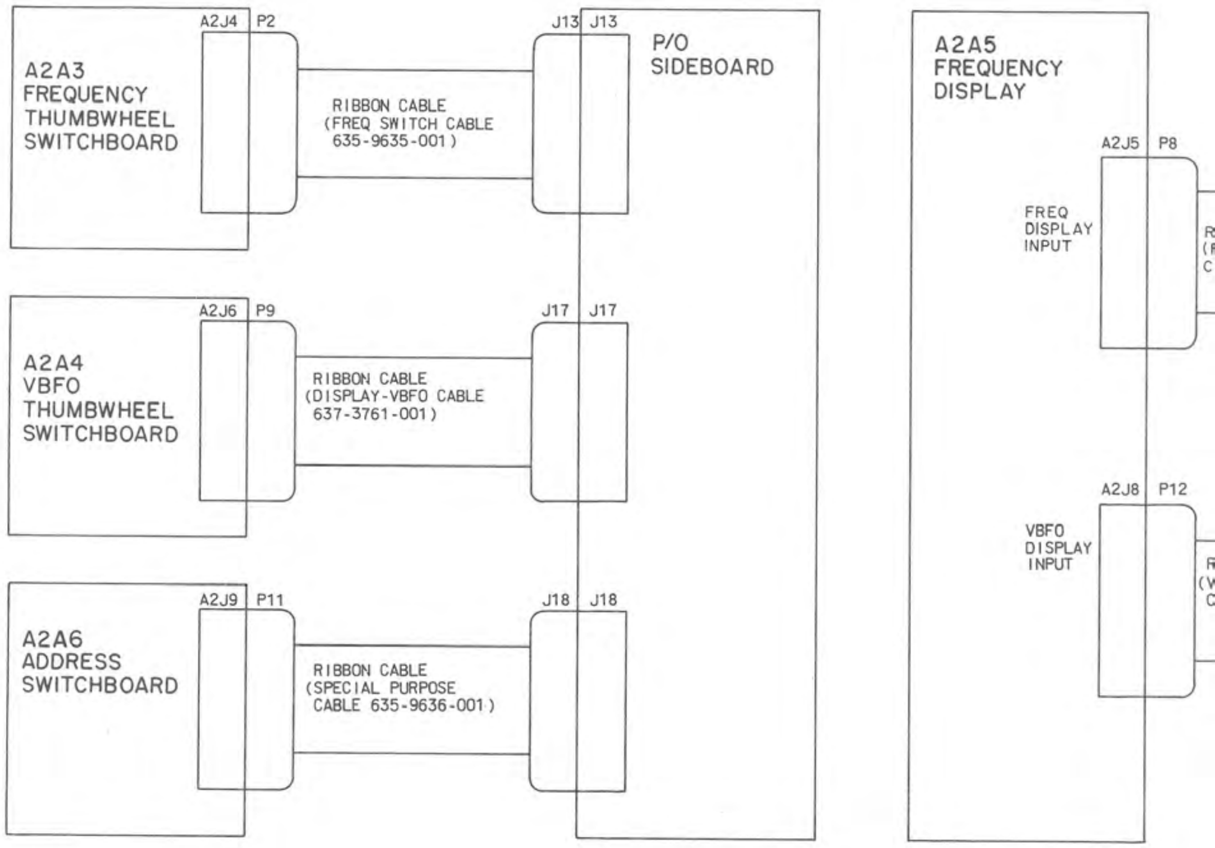


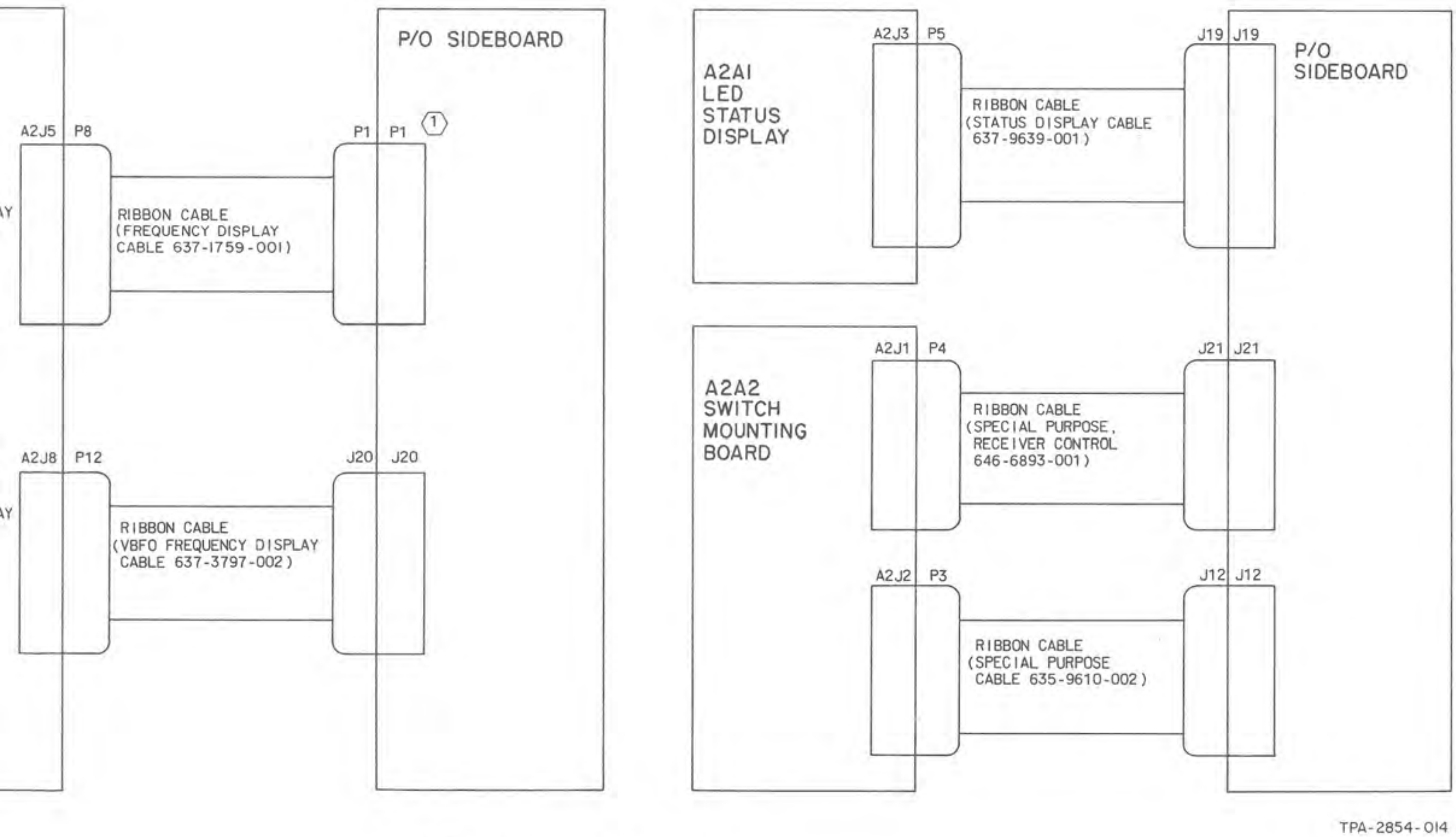
Front Panel Assembly A2 (646-6815-001), Schematic Diagram
Figure 2 (Sheet 7)

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
	(This page will contain schematic revision information.)		

Front Panel Ribbon Cabling and Connector, Interconnect Diagram
Figure 3 (Sheet A)


A2A3
FREQUENCY
THUMBWHEEL
SWITCHBOARD
A2J4
P2
RIBBON CABLE
(FREQ SWITCH CABLE
635-9635-001)
J13
J13
P/O
SIDEBOARD
A2A5
FREQUENCY
DISPLAY
A2J5
P8
FREQ
DISPLAY
INPUT
A2A4
VBFO
THUMBWHEEL
SWITCHBOARD
A2J6
P9
RIBBON CABLE
(DISPLAY-VBFO CABLE
637-3761-001)
J17
J17
A2J8
P12
VBFO
DISPLAY
INPUT
A2A6
ADDRESS
SWITCHBOARD
A2J9
P11
RIBBON CABLE
(SPECIAL PURPOSE
CABLE 635-9636-001)
J18
J18



(1) P1 IS LOCATED ON THE BACK OF SIDEBOARD CONNECTOR J10.

Front Panel Ribbon Cabling and Connector, Interconnect Diagram
Figure 3

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
	(This page will contain schematic revision information.)		

Receiver Control/Status Word Format and Pin Assignment
Figure 4 (Sheet A)

CONTROL / STATUS BIT WORD FORMAT						EXCITER, AND EXCITER CONTROL			RECEIVER, AND RECEIVER CONTROL		
HF-80 8-BIT			ASCII 7-BIT								
WORD NO	CHARACTER NO	BIT NO	WORD NO	CHARACTER NO	BIT WT	PARALLEL OUTPUT PIN NO	PARALLEL INPUT PIN NO	FUNCTION	PARALLEL OUTPUT PIN NO	PARALLEL INPUT PIN NO	FUNCTION
1	2	8	1	6	8			NOT USED			NOT USED
1	2	7	1	6	4			NOT USED			NOT USED
1	2	6	1	6	2	129	129	FREQ 10 MHz (2)	129	129	FREQ 10 MHz (2)
1	2	5	1	6	1	64	64	FREQ 10 MHz (1)	64	64	FREQ 10 MHz (1)
1	2	4	1	7	8	128	128	FREQ 1 MHz (8)	128	128	FREQ 1 MHz (8)
1	2	3	1	7	4	63	63	(4)	63	63	(4)
1	2	2	1	7	2	127	127	(2)	127	127	(2)
1	2	1	1	7	1	62	62	(1)	62	.62	(1)
1	3	8	1	8	8	126	126	FREQ 100 kHz (8)	126	126	FREQ 100 kHz (8)
1	3	7	1	8	4	61	61	(4)	61	61	(4)
1	3	6	1	8	2	125	125	(2)	125	125	(2)
1	3	5	1	8	1	60	60	(1)	60	60	(1)
1	3	4	1	9	8	124	124	FREQ 10 kHz (8)	124	124	FREQ 10 kHz (8)
1	3	3	1	9	4	59	59	(4)	59	59	(4)
1	3	2	1	9	2	123	123	(2)	123	123	(2)
1	3	1	1	9	1	58	58	(1)	58	58	(1)
1	4	8	1	10	8	122	122	FREQ 1 kHz (8)	122	122	FREQ 1 kHz (8)
1	4	7	1	10	4	57	57	(4)	57	57	(4)
1	4	6	1	10	2	121	121	(2)	121	121	(2)
1	4	5	1	10	1	56	56	(1)	56	56	(1)
1	4	4	1	11	8	120	120	FREQ 100 Hz (8)	120	120	FREQ 100 Hz (8)
1	4	3	1	11	4	55	55	(4)	55	55	(4)
1	4	2	1	11	2	119	119	(2)	119	119	(2)
1	4	1	1	11	1	54	54	(1)	54	54	(1)
1	5	8	1	12	8	118	118	FREQ 10 Hz (8)	118	118	FREQ 10 Hz (8)
1	5	7	1	12	4	53	53	(4)	53	53	(4)
1	5	6	1	12	2	117	117	(2)	117	117	(2)
1	5	5	1	12	1	52	52	(1)	52	52	(1)
1	5	4	1	13	8	116	116	FREQ 1 Hz (8)	116	116	FREQ 1 Hz (8)
1	5	3	1	13	4	51	51	(4)	51	51	(4)
1	5	2	1	13	2	115	115	(2)	115	115	(2)
1	5	1	1	13	1	50	50	(1)	50	50	(1)
2	2	8	2	6	8			NOT USED			NOT USED
2	2	7	2	6	4						NOT USED
2	2	6	2	6	2						NOT USED
2	2	5	2	6	1	76	76		76	76	RF GAIN (16)
2	2	4	2	7	8	11	11		11	11	(8)
2	2	3	2	7	4	75	75		75	75	(4)
2	2	2	2	7	2	10	10		10	10	(2)
2	2	1	2	7	1	22	87		22	87	(1)
2	3	8	2	8	8	3	12	NOT USED	3	12	FL7 (E) ENBL
2	3	7	2	8	4	41	41		41	41	FL6 (D) ENBL
2	3	6	2	8	2	106	106		106	106	FL5 (C) ENBL
2	3	5	2	8	1	37	37		37	37	FL4 (B) ENBL
2	3	4	2	9	8	84	84		84	84	B2 AGC (2)
2	3	3	2	9	4	85	85		85	85	B2 AGC (1)
2	3	2	2	9	2	19	19		19	19	A2 AGC (2)
2	3	1	2	9	1	20	20		20	20	A2 AGC (1)
2	4	8	2	10	8	100	100	NOT USED	100	100	FL3 (A) ENBL
2	4	7	2	10	4	99	99		99	99	FL1 (16 kHz) ENBL
2	4	6	2	10	2	35	35		35	35	VBFO ENBL
2	4	5	2	10	1	34	34		34	34	AFC ENBL
2	4	4	2	11	8	98	98		98	98	B1 AGC (2)
2	4	3	2	11	4	33	33		33	33	B1 AGC (1)
2	4	2	2	11	2	97	97		97	97	A1 AGC (2)
2	4	1	2	11	1	32	32	PEAK CLIPPER ENBL	32	32	A1 AGC (1)
2	5	8	2	12	8	73	73	NOT USED	73	73	DATA NET ENBL
2	5	7	2	12	4	8	8	AM ENBL	8	8	AM ENBL
2	5	6	2	12	2	72	72	CW ENBL	72	72	CW ENBL
2	5	5	2	12	1	9	9	ISB ENBL	9	9	ISB ENBL
2	5	4	2	13	8	74	74	B2 ENBL	74	74	B2 ENBL
2	5	3	2	13	4	6	92	B1 ENBL	6	92	B1 ENBL
2	5	2	2	13	2	26	91	A1 ENBL	26	91	A1 ENBL
2	5	1	2	13	1	17	21	A2 ENBL	17	21	A2 ENBL

CONTROL / STATUS BIT WORD FORMAT					
HF-80 8-BIT			ASCII 7-BIT		
WORD NO	CHARACTER NO	BIT NO.	WORD NO.	CHARACTER NO.	BIT WT.
3	2	8	3	6	8
3	2	7	3	6	4
3	2	6	3	6	2
3	2	5	3	6	1
3	2	4	3	7	8
3	2	3	3	7	4
3	2	2	3	7	2
3	2	1	3	7	1
3	3	8	3	8	8
3	3	7	3	8	4
3	3	6	3	8	2
3	3	5	3	8	1
3	3	4	3	9	8
3	3	3	3	9	4
3	3	2	3	9	2
3	3	1	3	9	1
3	4	8	3	10	8
3	4	7	3	10	4
3	4	6	3	10	2
3	4	5	3	10	1
3	4	4	3	11	8
3	4	3	3	11	4
3	4	2	3	11	2
3	4	1	3	11	1
3	5	8	3	12	8
3	5	7	3	12	4
3	5	6	3	12	2
3	5	5	3	12	1
3	5	4	3	13	8
3	5	3	3	13	4
3	5	2	3	13	2
3	5	1	3	13	1
4	2	8	4	6	8
4	2	7	4	6	4
4	2	6	4	6	2
4	2	5	4	6	1
4	2	4	4	7	8
4	2	3	4	7	4
4	2	2	4	7	2
4	2	1	4	7	1
4	3	8	4	8	8
4	3	7	4	8	4
4	3	6	4	8	2
4	3	5	4	8	1
4	3	4	4	9	8
4	3	3	4	9	4
4	3	2	4	9	2
4	3	1	4	9	1
4	4	8	4	10	8
4	4	7	4	10	4
4	4	6	4	10	2
4	4	5	4	10	1
4	4	4	4	11	8
4	4	3	4	11	4
4	4	2	4	11	2
4	4	1	4	11	1
4	5	8	4	12	8
4	5	7	4	12	4
4	5	6	4	12	2
4	5	5	4	12	1
4	5	4	4	13	8
4	5	3	4	13	4
4	5	2	4	13	2
4	5	1	4	13	1

RECEIVER, AND RECEIVER CONTROL FUNCTION
T USED
T USED
EQ 10 MHz (2)
EQ 10 MHz (1)
EQ 1 MHz (8)
(4)
(2)
(1)
EQ 100 kHz (8)
(4)
(2)
(1)
EQ 10 kHz (8)
(4)
(2)
(1)
EQ 1 kHz (8)
(4)
(2)
(1)
EQ 100 Hz (8)
(4)
(2)
(1)
EQ 10 Hz (8)
(4)
(2)
(1)
EQ 1 Hz (8)
(4)
(2)
(1)
T USED
T USED
T USED
GAIN (16)
(8)
(4)
(2)
(1)
7 (E) ENBL
5 (D) ENBL
5 (C) ENBL
4 (B) ENBL
AGC (2)
AGC (1)
AGC (2)
AGC (1)
(A) ENBL
(16 kHz) ENBL
) ENBL
ENBL
AGC (2)
AGC (1)
GC (2)
GC (1)
A NET ENBL
ENBL
ENBL
ENBL
ENBL
ENBL
ENBL
ENBL

CONTROL / STATUS BIT WORD FORMAT: HF-80 8-BIT WORD NO	HF-80 8-BIT CHARACTER NO	HF-80 8-BIT BIT NO.	ASCII 7-BIT WORD NO.	ASCII 7-BIT CHARACTER NO.	ASCII 7-BIT BIT WT.	EXCITER, AND EXCITER CONTROL: PARALLEL OUTPUT PIN NO.	EXCITER: PARALLEL INPUT PIN NO.	EXCITER: FUNCTION	RECEIVER, AND RECEIVER CONTROL: PARALLEL OUTPUT PIN NO.	RECEIVER: PARALLEL INPUT PIN NO.	RECEIVER: FUNCTION
3	2	8	3	6	8			NOT USED			NOT USED
3	2	7	3	6	4						NOT USED
3	2	6	3	6	2						NOT USED
3	2	5	3	6	1	107	107		107	107	VBFO SIGN
3	2	4	3	7	8	48	48		48	48	VBFO FREQ 1 kHz (8)
3	2	3	3	7	4	113	113		113	113	(4)
3	2	2	3	7	2	47	47		47	47	(2)
3	2	1	3	7	1	112	112		112	112	(1)
3	3	8	3	8	8			NOT USED	46	46	VBFO FREQ 100 Hz (8)
3	3	7	3	8	4				111	111	(4)
3	3	6	3	8	2				110	110	(2)
3	3	5	3	8	1				44	44	(1)
3	3	4	3	9	8				109	109	VBFO FREQ 10 Hz (8)
3	3	3	3	9	4				43	43	(4)
3	3	2	3	9	2				108	108	(2)
3	3	1	3	9	1				42	42	(1)
3	4	8	3	10	8	7	7	NOT USED	7	7	NOT USED
3	4	7	3	10	4	8	8		8	8	
3	4	6	3	10	2	10	10		10	10	
3	4	5	3	10	1	9	9		9	9	
3	4	4	3	11	8	3	3		3	3	
3	4	3	3	11	4	5	5		5	5	
3	4	2	3	11	2	6	6		6	6	
3	4	1	3	11	1	4	4		4	4	
3	5	8	3	12	8			NOT USED			NOT USED
3	5	7	3	12	4						
3	5	6	3	12	2						
3	5	5	3	12	1	18	81		18	81	
3	5	4	3	13	8	82	82	PILOT CARRIER ENBL	82	82	B2 AGC BUS
3	5	3	3	13	4	78	78	PA L PWR ENBL	78	78	B1 AGC BUS
3	5	2	3	13	2	14	14	PA HV ENBL	14	14	AI AGC BUS
3	5	1	3	13	1	79	79	PA LV ENBL	79	79	A2 AGC BUS
4	2	8	4	6	8			NOT USED			NOT USED
4	2	7	4	6	4			NOT USED			NOT USED
4	2	6	4	6	2	(12)	13	EXCTR FLT	(12)	13	RCVR FLT
4	2	5	4	6	1	92 (68)	68	REMOTE KEY (MON)	92 (68)	68	RF OVLD FLT
4	2	4	4	7	8		88	B2 AF MON		88	B2 AF MON
4	2	3	4	7	4		23	B1 AF MON		23	B1 AF MON
4	2	2	4	7	2		22	AI AF MON		22	AI AF MON
4	2	1	4	7	1		24	A2 AF MON		24	A2 AF MON
4	3	8	4	8	8	(2)	2	NOT USED	(2)	2	NOT USED
4	3	7	4	8	4	(40)	40	10 Hz LOCK IND	(40)	40	10 Hz LOCK IND
4	3	6	4	8	2		105	100 Hz LOCK IND		105	100 Hz LOCK IND
4	3	5	4	8	1		36	1 kHz LOCK IND		36	1 kHz LOCK IND
4	3	4	4	9	8		83	10 kHz LOCK IND		83	10 kHz LOCK IND
4	3	3	4	9	4		39	100 kHz LOCK IND		39	100 kHz LOCK IND
4	3	2	4	9	2		101	SYNTH OUT LOCK IND		101	SYNTH OUT LOCK IND
4	3	1	4	9	1		18	FREQ REF FLT		18	FREQ REF FLT
4	4	8	4	10	8	(69)	69	NOT USED	(69)	69	NOT USED
4	4	7	4	10	4	(77)	4	SUBCARRIER LOCK FLT	(77)	4	SUBCARRIER LOCK FLT
4	4	6	4	10	2	(5)	5	EXCTR RF MON	(5)	5	VBFO SYNTH FLT
4	4	5	4	10	1	(13)	70	EXCTR PS FLT	(13)	70	RCVR PS FLT
4	4	4	4	11	8	(67)	67	NOT USED	(67)	67	B2 AGC MON
4	4	3	4	11	4		49	EXT STANDARD		49	B1 AGC MON
4	4	2	4	11	2		86	A1 IF MON		86	A1 AGC MON
4	4	1	4	11	1	(105)	3	NOT USED	(105)	3	A2 AGC MON
4	5	8	4	12	8	(70)	77	PA READY	(70)	77	NOT USED
4	5	7	4	12	4	(104)	102	PA FLT	(104)	102	EXT STANDARD
4	5	6	4	12	2	(27)	7	PA RF MON	(27)	7	AFC LOCK MON
4	5	5	4	12	1	(92)	89	CPLR FLT	(92)	89	RF XLATOR MON
4	5	4	4	13	8	(28)	71	PRESEL FLT	(28)	71	PRESEL FLT
4	5	3	4	13	4	(29)	95	DATA ERROR	(29)	95	DATA ERROR
4	5	2	4	13	2	(95)	16	LOCAL CONTROL	(95)	16	LOCAL CONTROL
4	5	1	4	13	1	(30)	80	MONITOR	(30)	80	MONITOR

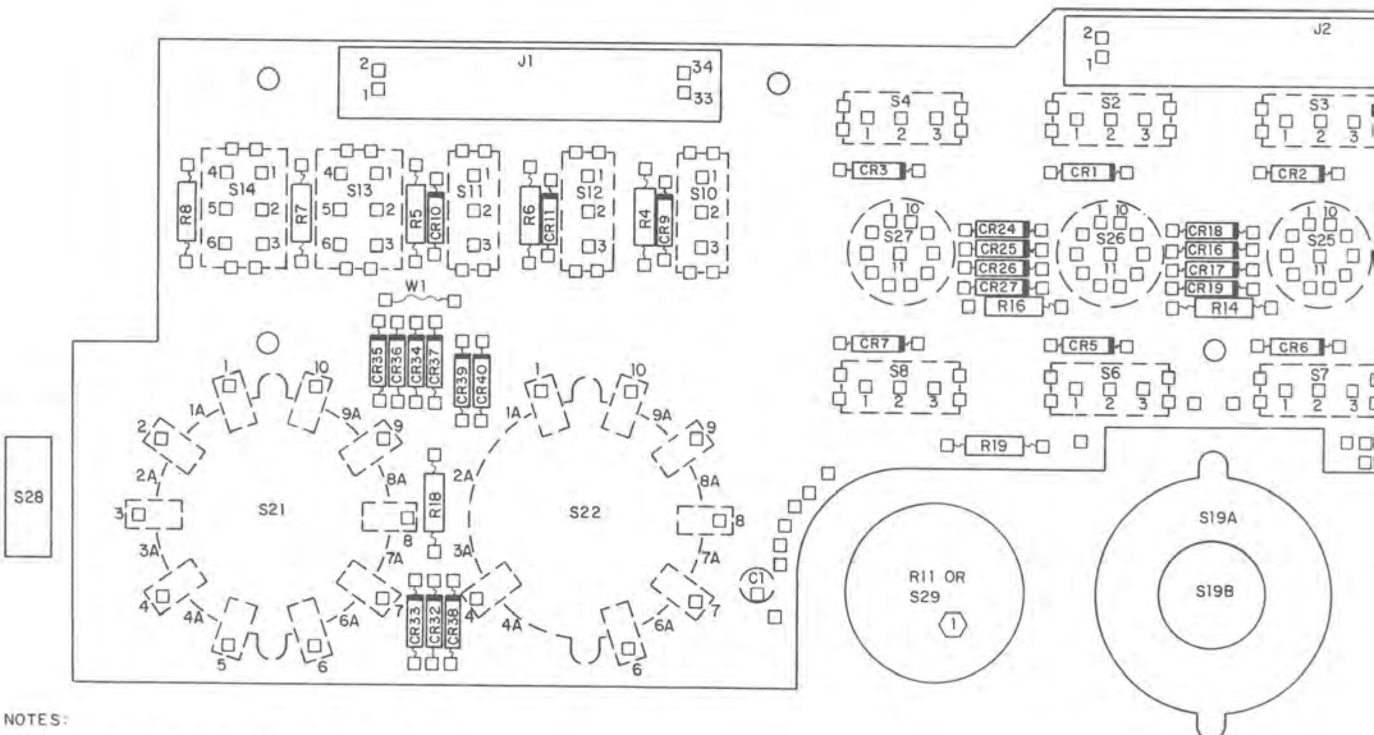
TPA-2876-014

Receiver Control/Status Word Format and Pin Assignment
Figure 4

SCHEMATIC CHANGES

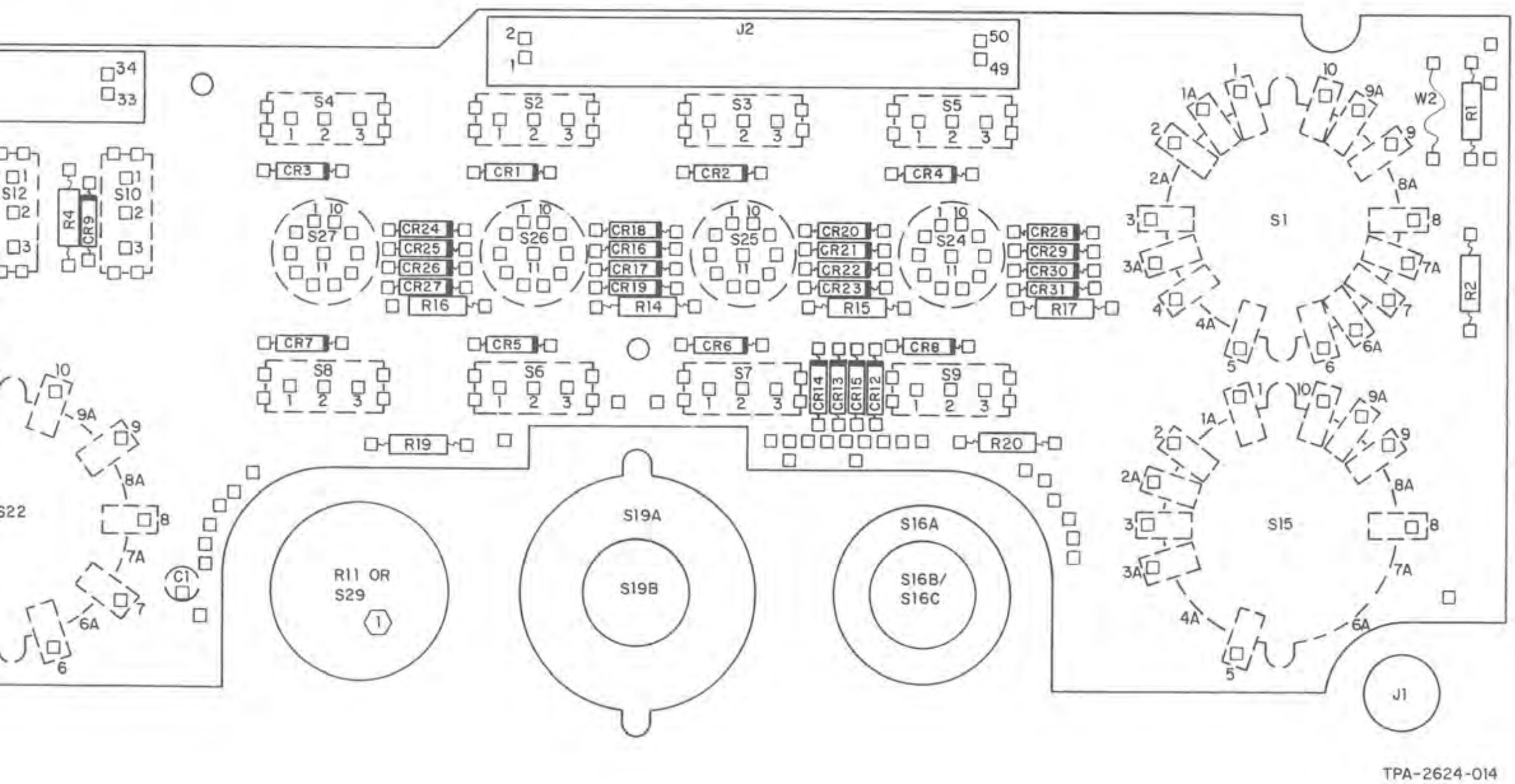
REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
	(This page will contain schematic revision information.)		

Switch Mounting Board A2A2, Layout and Pin Numbering
Figure 5 (Sheet A)



NOTES:

(1) R11 FOR HF-8054/8054A, S29 FOR HF-8094.



Switch Mounting Board A2A2, Layout and Pin Numbering
Figure 5

Power Supply
(635-9649-001)

523-0767948

Power Supply (635-9649-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0767948-202211
2nd Edition, 1 June 1978
2nd Revision, 1 January 1981

1. DESCRIPTION

Power Supply 635-9649-001, shown in figure 1, is a module that contains a power transformer, a 2-section input power strapping switch, six power regulators, and a planar circuit card with full-wave rectifiers and an output fault circuit.

The power supply module consists of four primary functional areas: input power switching, power transformer and rectifiers, regulators, and the output fault summary circuit. Refer to figure 2 for a block diagram of the power supply module.

2. PRINCIPLES OF OPERATION

2.1 General

This power supply is fuse protected (2 A for 100/115 V ac; 1 A for 215/230 V ac) and supplies a loss-of-output fault indication. The input power is switchable between 100-, 115-, 215-, and 230-V ac single phase. Output voltages supplied are +24, +18, +15, +8, +5, and -15 V dc.

2.2 Input Power Switching (Refer to figure 3.)

The input power circuit consists of a fuse protector, power on-off switch S2, power control switch S1, and power transformer T1.

Note that power control switch S1 is a dual switch having two 2-position switches. S1A (low pin numbers) selects between series connection (215, 230 V ac) and parallel connection (110, 115 V ac) of transformer T1. S1B (high pin numbers) selects between less-turns ratio (115, 230 V ac) and more-turns ratio (110, 215 V ac) of transformer T1.

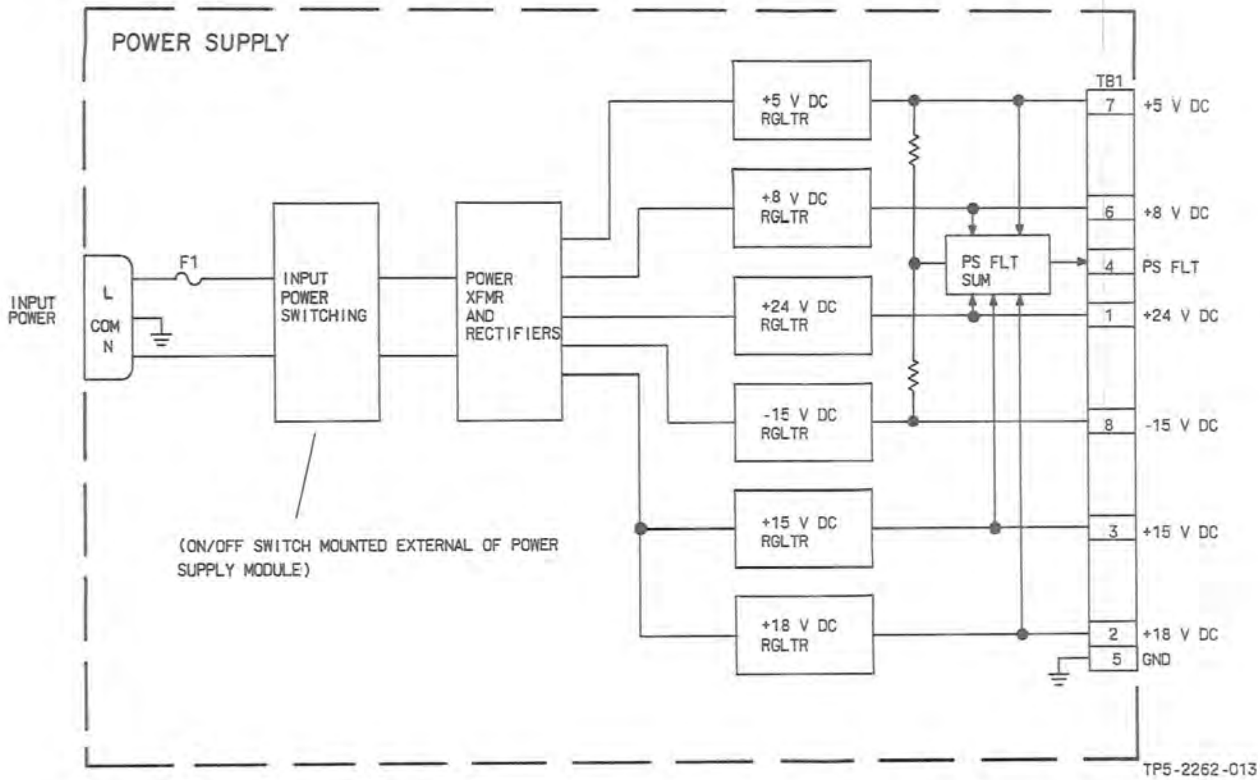
Power Supply
Figure 1

2.3 Power Transformer, Rectifiers, and Regulators (Refer to figure 4.)

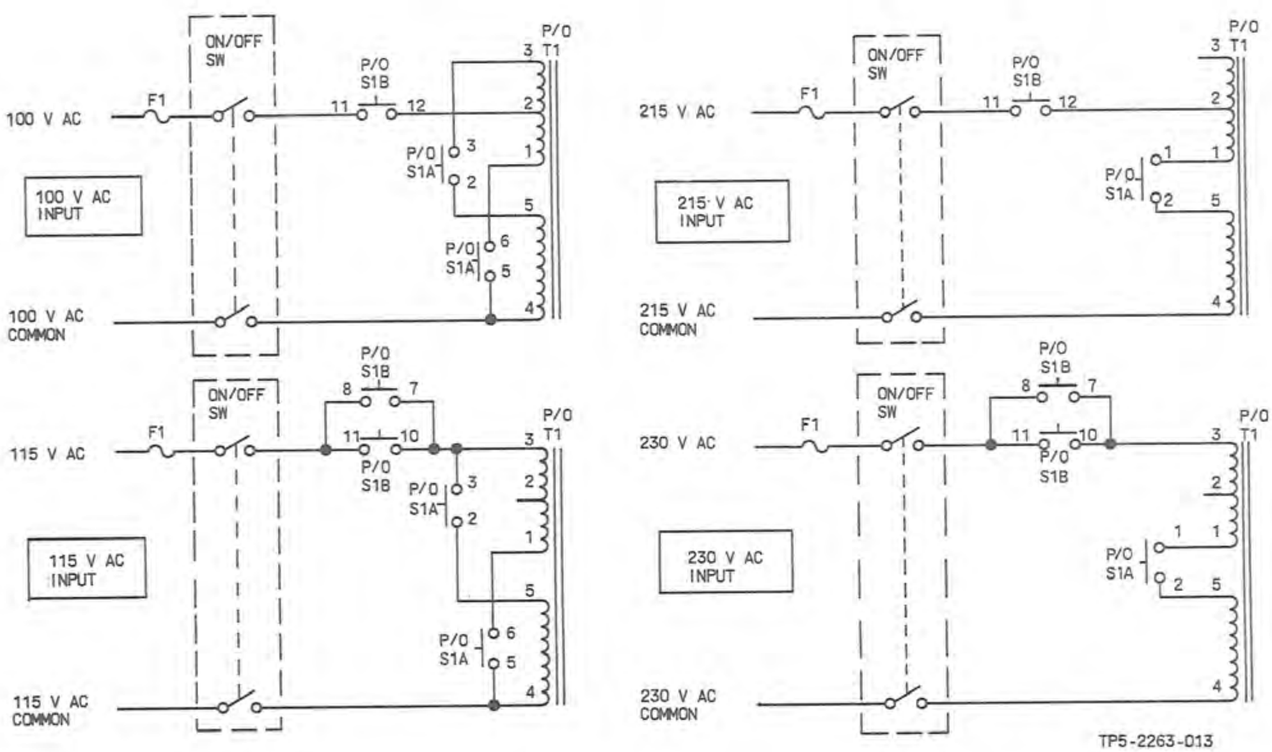
Power supply outputs are generated by the dual secondary of T1, full-wave rectified by five rectifier circuits, and regulated by six micromodule regulators. Each regulator has its own input rectifier circuit, except the +18- and +15-V dc regulators share a rectifier.

2.4 Fault Summary (Refer to figure 5.)

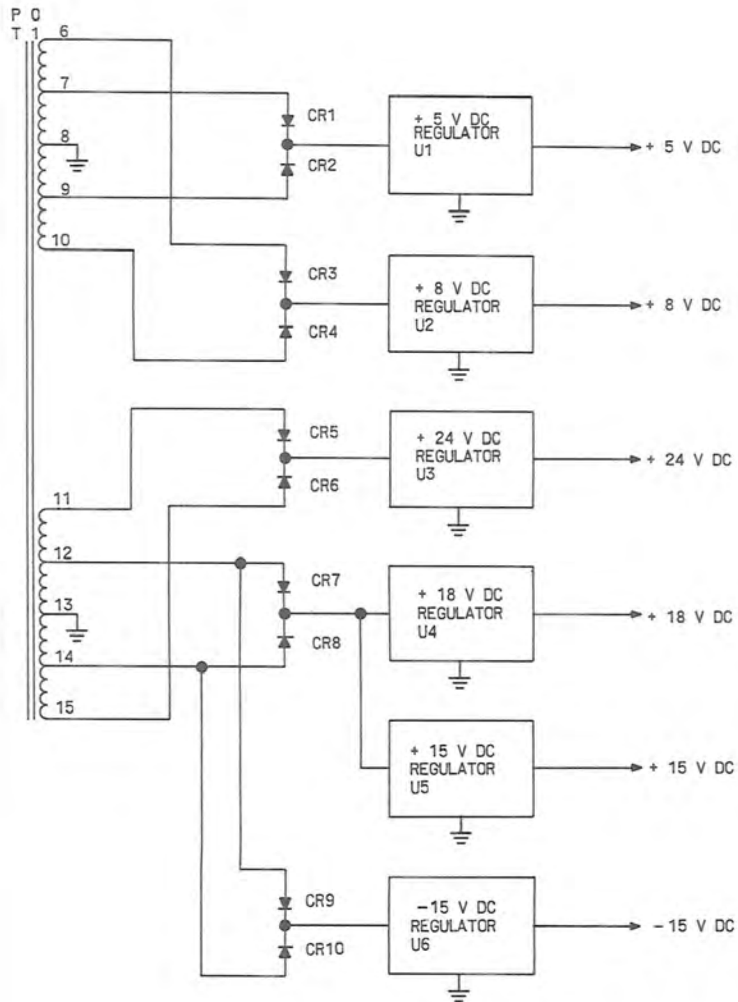
A fault summary circuit provides constant monitoring of power supply outputs and generates a fault output if any positive output drops below +5 V dc or if the negative output goes any more positive than -5 V dc.



Power Supply, Block Diagram
Figure 2

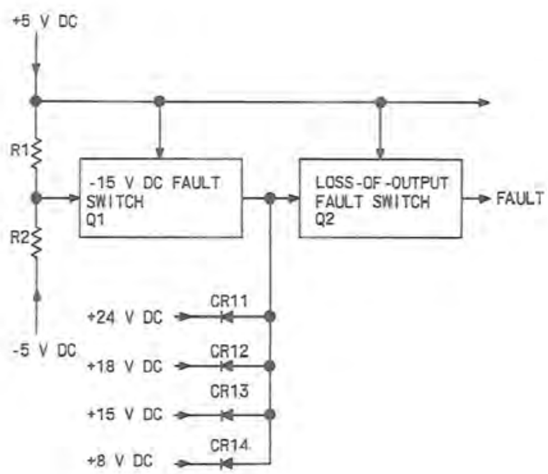


Input Power Transformer Switching
Figure 3



TP5-2260-013

Power Transformer, Rectifiers, and Regulators
Figure 4



TP5-2261-013

Fault Summary
Figure 5

With all outputs normal, Q1 is cut off and +5 V dc is supplied through R4 and R6 to switch on Q2. This provides a logic 0 (ground) fault summary output, indicating all supplies are operating.

If the +5-V dc output decreases to a level low enough to cut off Q2, the logic 0 (ground) fault signal is removed and a logic 1 (open circuit) fault signal is supplied.

With +5 V dc at normal, if the -15-V dc output goes positive to a level at approximately -5 V dc or less, Q1 switches on and supplies a ground signal through R6 to cut off Q2. The logic 0 (ground) fault signal is removed and a logic 1 (+5-V dc) fault signal is supplied.

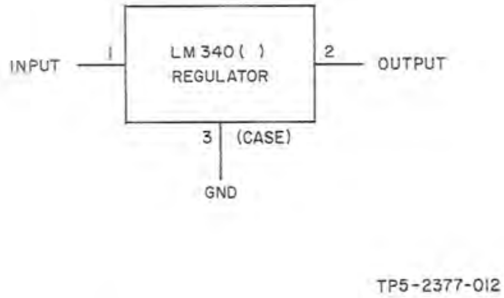
With +5 V dc at normal, if the +24-, +18-, +15-, or +8-V dc output falls below approximately +5 V dc, Q2 is cut off, the logic 0 (ground) fault signal is removed, and a logic 1 (+5-V dc) fault signal is supplied.

2.5 Voltage Regulators (Refer to figure 6 and to table 1.)

The LM340/320 series of three terminal regulators is available with several fixed output voltages, making them useful in a wide range of applications. One of these is local on-card regulation, eliminating the distribution problems associated with single-point regulation. The voltages available allow these regulators to be used in logic systems, instrumentation, and other solid-state electronic equipment. Although designed as fixed-voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

Table 1. Electrical Characteristics.

CHARACTERISTIC	LM340T-5/ 7805KC	LM340T-8/ 7808KC	LM340T-15/ 7815KC	LM320K-15	LM340T-18/ 7818KC	LM340T-24/ 7824KC
Max input voltage	35 V (except LM340T-24, 40 V)					
Operating temperature	0 to +70 °C (+32 to +158 °F)					
Storage temperature	-65 to +150 °C (-85 to +302 °F)					
Line regulation						
100 mA out	50 mV max	80 mV max	150 mV max	150 mV max	180 mV max	240 mV max
500 mA out	100 mV max	160 mV max	300 mV max	300 mV max	360 mV max	480 mV max
Output voltage	4.75 V min	7.6 V min	14.25 V min	14.25 V min	17.1 V min	22.8 V min
	5.25 V max	8.4 V max	15.75 V max	15.75 V max	18.9 V max	25.2 V max
Ripple rejection	60 dB typical	55 dB typical	50 dB typical	50 dB typical	48 dB typical	44 dB typical



Voltage Regulator
Figure 6

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the power supply module are listed in the maintenance section of this instruction book.

3.2 Testing

The test procedures in table 2 check total performance of the power supply module. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

Table 2. Power Supply, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove bottom cover of unit containing power supply to be tested. *Note* For a quick check these loads need not be installed. Leave power supply connected in unit and perform all test procedures. b. Disconnect all output leads from A1TB1. c. Connect the following loads between A1TB1 pins indicated and A1TB1-5 (black wire). A1TB1- (WIRE COLOR) LOAD 7 (violet) 5 Ω 6 (blue) 10 Ω 1 (brown) 40 Ω 2 (red) 22 Ω 3 (orange) 15 Ω 8 (gray) 22 Ω		
2. LINE SELECTOR switch	a. Connect power supply to 50-V ac source and set power on. b. Measure dc voltage at A1E5 with LINE SELECTOR switch set at each of the following positions:		Check CR5, CR6, S1A, S1B, and T1.
(Cont)	100 V	11.8 to 16.0 V dc	

Table 2. Power Supply, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	115 V	13.0 to 14.0 V dc	
	215 V	6.9 to 7.5 V dc	
	230 V	6.5 to 7.0 V dc	
	c. Set power off and remove 50-V ac source.		
3. Output voltage	a. Connect power supply to 103-V ac source.		
	b. Set LINE SELECTOR switch to 115 V and set power on.		
	c. Measure dc voltage at each of the following outputs:		Check the following components and circuits associated with each:
	A1TB1-		
	7 (+5 V)	+4.8 to +5.2 V dc.	U1, CR1, CR2, and T1.
	6 (+8 V)	+7.6 to +8.4 V dc.	U2, CR3, CR4, and T1.
	1 (+24 V)	+23 to +25 V dc.	U3, CR5, CR6, and T1.
	2 (+18 V)	+15.5 to +18.7 V dc.	U4, CR7, CR8, and T1.
	3 (+15 V)	+14.4 to +15.6 V dc.	U5, CR7, CR8, and T1.
	8 (-15 V)	-14.6 to -15.4 V dc.	U6, CR9, CR10, and T1.
	d. Set power off. Disconnect 103-V ac source and connect power supply to 127-V ac source.		
	e. Set power on and measure dc voltage at each of the following outputs:		
	A1TB1-		
	7 (+5 V)	+4.8 to +5.2 V dc.	U1, CR1, CR2, and T1.
	6 (+8 V)	+7.6 to +8.4 V dc.	U2, CR3, CR4, and T1.
	1 (+24 V)	+23 to +25 V dc.	U3, CR5, CR6, and T1.
	2 (+18 V)	+17.3 to +18.7 V dc.	U4, CR7, CR8, and T1.
	3 (+15 V)	+14.4 to +15.6 V dc.	U5, CR7, CR8, and T1.
	8 (-15 V)	-14.6 to -15.6 V dc.	U6, CR9, CR10, and T1.
	f. Set power off and disconnect 127-V ac source.		

Table 2. Power Supply, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Output ripple	a. Connect power supply to 103-V ac source.		
	b. Set LINE SELECTOR switch to 115 V and set power on.		
	c. Measure ac ripple voltage at each of the following outputs:		Check the following components and circuits associated with each.
	A1TB1-		
	7 (+5 V)	NMT 5 mV.	C14, CR1, CR2, and T1.
	6 (+8 V)	NMT 5 mV.	C15, CR3, CR4, and T1.
	1 (+24 V)	NMT 5 mV.	C16, CR5, CR6, and T1.
	2 (+18 V)	NMT 350 mV.	C17, CR7, CR8, and T1.
	3 (+15 V)	NMT 5 mV.	C18, CR7, CR8, and T1.
	8 (-15 V)	NMT 5 mV.	C18, CR9, CR10, and T1.
	d. Set power off. Disconnect 103-V ac source and connect power supply to 127-V ac source.		
	e. Set power on and measure ac ripple voltage at each of the following outputs:		
	A1TB1-		
	7 (+5 V)	NMT 5 mV.	C14, CR1, CR2, and T1.
	6 (+8 V)	NMT 5 mV.	C15, CR3, CR4, and T1.
	1 (+24 V)	NMT 5 mV.	C16, CR5, CR6, and T1.
	2 (+18 V)	NMT 5 mV.	C17, CR7, CR8, and T1.
	3 (+15 V)	NMT 5 mV.	C18, CR7, CR8, and T1.
	8 (-15 V)	NMT 5 mV.	C19, CR9, CR10, and T1.
	f. Set power off and disconnect 127-V ac source.		

Table 2. Power Supply, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Fault	a. Connect power supply to 103-V ac source. b. Set LINE SELECTOR switch to 115 V and set power on. c. Measure dc output voltage at A1TB1-4 (fault) as each of the following dc output voltages is shorted to A1TB1-5 (ground). **Note** Only one short applied at a time.	**Note** There is no +5-V dc output fault indication in the power supply. +5-V dc output fault indicated by associated control card circuits and front-panel indicator.	Check the following components and circuits associated with each.
	A1TB1-		
	7 (+5 V)	NMT 0.10 V dc.	R5, Q2, and Q1.
	6 (+8 V)	+4.5 to +5.5 V dc.	CR14.
	1 (+24 V)	+4.5 to +5.5 V dc.	CR11.
	2 (+18 V)	+4.5 to +5.5 V dc.	CR12.
	3 (+15 V)	+4.5 to +5.5 V dc.	CR13.
	8 (-15 V)	+4.5 to +5.5 V dc.	R1 and Q1.
	d. Measure dc output voltage at A1TB1-4 (fault) with no shorted outputs applied.	NMT 0.2 V dc.	R2, Q1, R4, R6, R3, and Q2.
	e. Check that all output voltages are restored when shorts are removed. f. Set power off and disconnect 103-V ac source.		
6. Transformer regulation	a. Remove all output loads. b. Connect power supply to 125-V ac source. c. Set LINE SELECTOR switch to 115 V and set power on.		
	d. Measure dc voltage at CR5 and CR6 cathode.	NMT 45.0 V dc.	Check T1 and associated circuits.
	e. Set power off and disconnect 127-V ac source.		

4. REPAIR

Repair of the power supply module is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

5. PARTS LIST/DIAGRAMS

5.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and also in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 7). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

5.2 Parts List

REF DES Column — Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column — Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses, and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column — Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column — Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column — Lists the manufacturer's part number for the selected parts.

Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

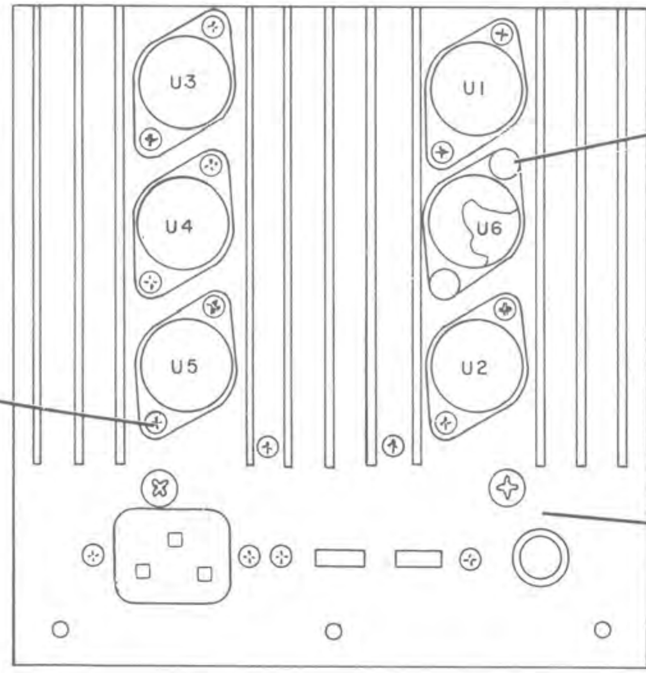
MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC P O BOX 3608 HARRISBURG PA 17105
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042
13103	THERMALLOY CO INC 2021 W VALLEY VIEW LANE P O BOX 34829 DALLAS TX 75234
13499	ROCKWELL INTERNATIONAL CORP COLLINS TELECOMMUNICATIONS PRODUCTS DIV PO BOX 728 855 35TH STREET NE CEDAR RAPIDS IA 52406
14099	SEMTECH CORP 652 MITCHELL ROAD NEWBURY PARK CA 91320
27014	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
56289	SPRAGUE ELECTRIC CO NORTH ADAMS MA 01247
71400	BUSSMANN MFG DIV MCGRAW-EDISON CO 502 EARTH CITY PLAZA P O BOX 14460 ST LOUIS MO 63178
71785	TRW CINCH CONNECTORS 1501 MORSE AVE ELK GROVE VILLAGE IL 60007
77147	PATTON-MACGUYER CO DIV OF AVID CORP 17 VIRGINIA AVE PROVIDENCE RI 02905
77250	PHEOLL MFG CO DIV OF ALLIED PRODUCTS CORP 5700 W ROOSEVELT RD CHICAGO IL 60650
79807	WROUGHT WASHER MFG INC 2100 S O BAY ST MILWAUKEE WI 53207
80205	NATIONAL AEROSPACE STANDARDS COMMITTEE AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA INC 1725 DE SALES N W WASHINGTON DC 20036
81349	MILITARY SPECIFICATION
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO 5555 N ELSTON AVE CHICAGO IL 60630
91314	LEWIS SPRING AND MFG CO 2652 W NORTH AVE CHICAGO IL 60647
91886	MALCO A MICRODOT CO 12 PROGRESS DR MONTGOMERYVILLE PA 18936
96906	MILITARY STANDARD
98330	POLYPHASE INSTRUMENT CO E FOURTH ST BRIDGEPORT PA 19405

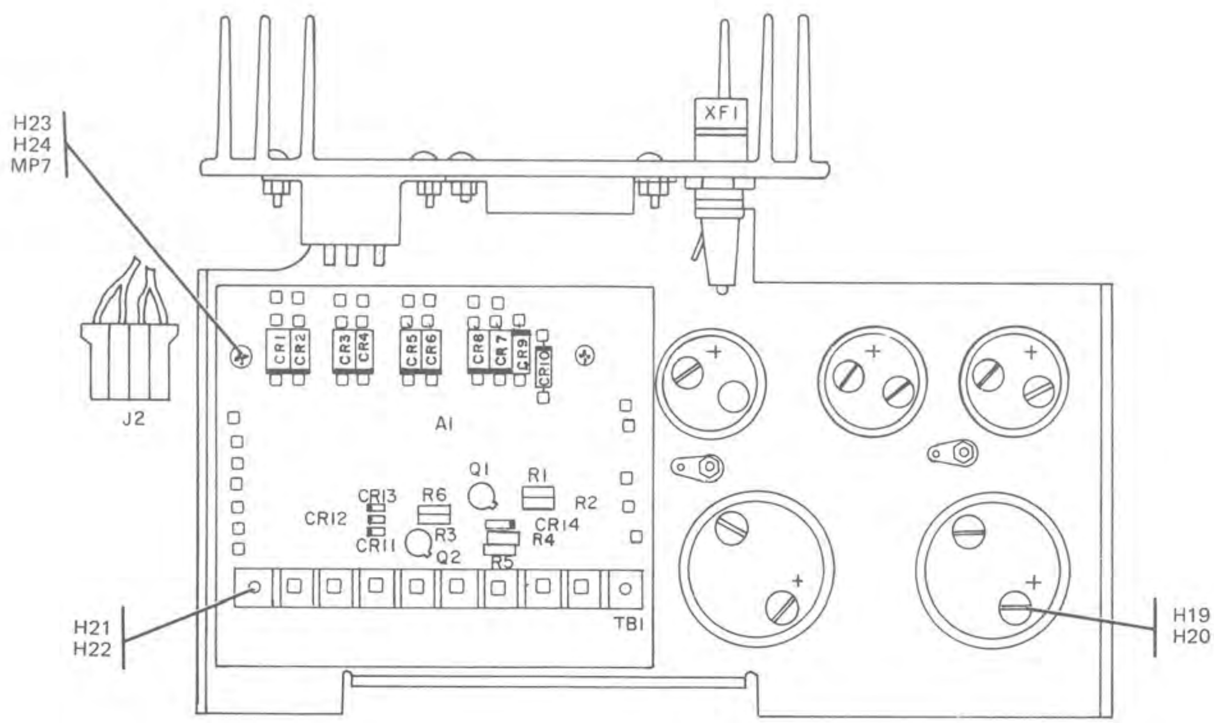
6.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Power Supply	635-9649-001	REV E
Power Supply Card	635-0903-001	REV B

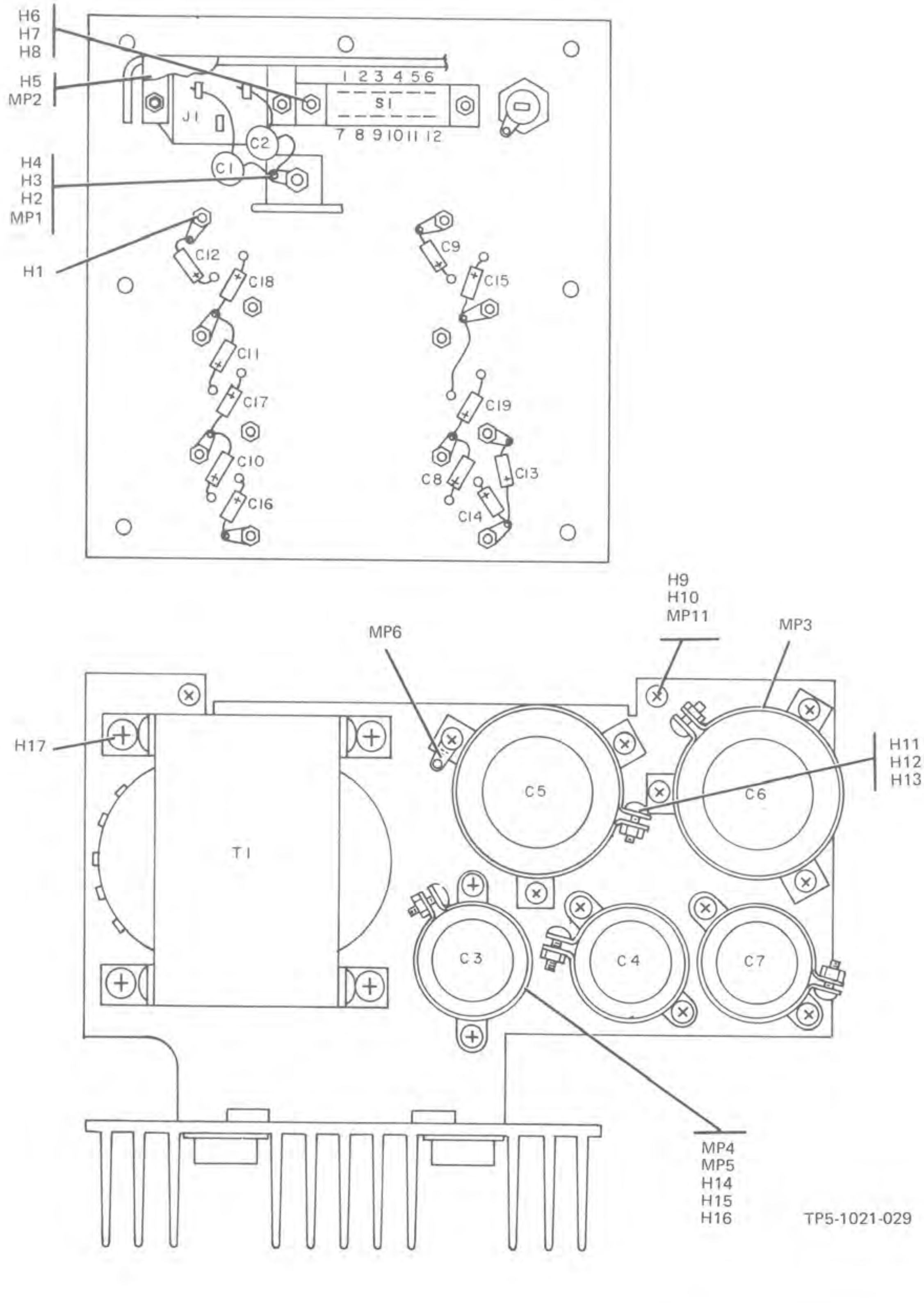


U3
U1
MP8
MP9
U4
U6
U5
U2
H18
MP10



H23
H24
MP7
XF1
J2
CR1
CR2
CR3
CR4
CR5
CR6
CR8
CR7
CR9
CR10
A1
Q1
R1
R2
CR13
R6
CR12
R3
CR14
R4
CR11
Q2
R5
TB1
H21
H22
H19
H20

TP5-1021-029



Power Supply, Schematic Diagram
Figure 7 (Sheet 1 of 3)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	POWER SUPPLY	635-9649-001			635-9649-001
A1	POWER SUPPLY CARD	635-0903-001			635-0903-001
C1,C2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 500V	913-3013-000		56289	36C175A
C3	CAPACITOR,FXD ELCTLT, 13000UF, P100%M10%, 15VDC	183-1278-080		56289	36D133G015AC2B
C4	CAPACITOR,FXD ELCTLT, 8200UF, 40%, 50V	183-1278-580		56289	36DX822G040AC2A
C5	CAPACITOR,FXD ELCTLT, 9000UF, P100%M10%, 50V	183-1278-380		56289	36D902G050BC2A
C6	CAPACITOR,FXD ELCTLT, 12000UF, P100%M10%, 40VDC	183-1278-190		56289	36D123G040BC2B
C7	CAPACITOR,FXD ELCTLT, 8200UF, 40%, 50V	183-1278-580		56289	36DX822G040AC2A
C8-C19	CAPACITOR,FXD ELCTLT, 4.7UF, 20%, 50V	184-9087-560		81349	M39003-01-2369
H1	SCREW,MACH NP BRS, 6-32 X 1/2 (QTY 2)	343-0332-000		77250	P343-0332-000
H2	SCREW,MACH SST, 10-32 X 1/2 (QTY 6)	343-0228-000		96906	MS51958-63
H3	WASHER,LOCK SST, 0.194 ID X 0.334 OD (QTY 14)	310-0284-000		96906	MS35338-138
H4	NUT,PLAIN,HEX SST, 10-32 (QTY 2)	313-0019-000		96906	MS35650-304
H5	SCREW,MACH STL, 4-40 X 7/16 (QTY 2)	343-0136-000		96906	MS51957-16
H6	SCREW,MACH SST, 4-40 X 5/16 (QTY 2)	343-0134-000		96906	MS51957-14
H7	WASHER,LOCK SST, 0.115 ID X 0.209 OD (QTY 2)	310-0279-000		96906	MS35338-135
H8	NUT,PLAIN,HEX SST, 4-40 (QTY 2)	313-0132-000		77250	P313-0132-000
H9	SCREW,MACH SST, 6-32 X 5/8 (QTY 2)	343-0173-000		96906	MS51957-31
H10	WASHER,FLAT BRS, 0.147 ID X 0.312 OD (QTY 18)	310-0055-000		79807	310-0055-000
H11	SCREW,MACH SST, 6-32 X 1/2 (QTY 2)	343-0171-000		96906	MS51957-30
H12	WASHER,LOCK SST, 0.150 ID X 0.317 OD (QTY 5)	373-8020-000		96906	MS35335-58
H13	NUT,PLAIN,HEX CRES,6-32 (QTY 5)	313-0002-000		96906	MS35649-264
H14	SCREW,MACH NP BRS, 6-32 X 3/8 (QTY 12)	343-0330-000		77250	P343-0330-000
H15	NUT,PLAIN,HEX NP BRS, 6-32 (QTY 26)	313-0140-000		77250	P313-0140-000
H16	WASHER,LOCK BRZ, 0.141 ID X 0.239 OD (QTY 28)	310-0078-000		79807	310-0078-000
H17	WASHER,FLAT PSVT CRES, 0.195 ID X 0.354 OD (QTY 4)	310-0740-520		80205	NAS620C10L
H18	SCREW,MACH NP BRS, 6-32 X 7/16 (QTY 10)	343-0331-000		77250	P343-0331-000
H19	SCREW,MACH NP BRS, 10-32 X 1/4 (QTY 10)	343-0343-000		77250	P343-0343-000
H20	WASHER,LOCK BRZ, 0.194 ID X 0.323 OD (QTY 10)	310-0081-000		79807	310-0081-000
H21	SCREW,MACH SST, 6-32 X 1/2 (QTY 5)	343-0171-000		96906	MS51957-30
H22	NUT,PLAIN,HEX SST, 6-32 (QTY 4)	313-0045-000		77250	P313-0045-000
H23	SCREW,MACH SST, 10-32 X 3/8 (QTY 4)	343-0226-000		96906	MS51958-61
H24	WASHER,FLAT BRS, 0.203 ID X 0.437 OD (QTY 4)	310-0059-000		79807	310-0059-000
J1	CONNECTOR,RCPT ELEC	368-0385-010		82389	EAC301
J2	HOUSING,SOCKET	372-5884-490		00779	1-480424-0
MP1	TERMINAL,LUG (QTY 1)	304-1466-010		91886	2115
MP2	COVER, CONN	635-9618-001			
MP3	CLAMP, MTG (QTY 2)	139-1183-000		56289	4586-48
MP4	RETAINER, CAP (QTY 3)	139-3284-000		56289	4586-97A
MP5	TERMINAL,LUG (QTY 12)	304-0016-000		77147	4007-6HT
MP6	TERMINAL,LUG (QTY 10)	304-1259-000		96906	MS25036-103
MP7	POST, HEX (QTY 4)	540-9540-003			540-9540-003
MP8	COVER,XSTR	352-9107-010		13103	8903NW
MP9	BUSHING,INSULATOR (QTY 2)	547-8177-014			547-8177-014
MP10	HEATSINK, POWER SUPPLY	635-9613-001			
MP11	RING,RETAINING (QTY 2)	340-0641-000		91314	340-0641-000
S1	SWITCH,SLIDE	266-0217-030		82389	11E1067
T1	TRANSFORMER,PWR	662-0605-010		98330	R103870
U1	REGULATOR,VOLT	351-1342-010		07263	UA78H05SC
U2	INTEGRATED CIRCUIT REGULATOR	351-1120-100		07263	7808KC
U3	INTEGRATED CIRCUIT REGULATOR	351-1120-140		07263	7824KC
U4	INTEGRATED CIRCUIT REGULATOR	351-1120-130		07263	7818KC
U5	INTEGRATED CIRCUIT REGULATOR	351-1120-120		07263	7815KC
U6	INTEGRATED CIRCUIT REGULATOR	351-1124-030		27014	LM320K15
XF1	FUSEHOLDER	265-1171-000		71400	HKPH
	POWER SUPPLY CARD A1	635-0903-001			635-0903-001
CR1-CR10	SEMICOND DEVICE	353-3718-040		14099	1N5550
CR11-CR14	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
Q1,Q2	TRANSISTOR	352-0661-020		07263	2N2222A
R1,R2	RESISTOR,FXD CMPSN, 5.6K, 10%, 1/4W	745-0776-000		81349	RCR07G562KS
R3,R4	RESISTOR,FXD CMPSN, 1.5K, 10%, 1/4W	745-0755-000		81349	RCR07G152KS
R5,R6	RESISTOR,FXD CMPSN, 5.6K, 10%, 1/4W	745-0776-000		81349	RCR07G562KS
TB1	TERMINAL,BOARD	367-1599-070		71785	8-176-2

MODIFICATION HISTORY

REVISION IDENT	DESCRIPTION OF REVISION AND REASON FOR CHANGE
A1	Changed: C3 from 10,000 μF to 13,000 μF U1 from type 7805KC to type UA78H05SC

IST

	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	635-9649-001			635-9649-001
	635-0903-001			635-0903-001
	913-3013-000		56289	36C175A
	183-1278-080		56289	36D133G015AC2B
	183-1278-580		56289	36DX822G040AC2A
V	183-1278-380		56289	36D902G050BC2A
	183-1278-190		56289	36D123G040BC2B
	183-1278-580		56289	36DX822G040AC2A
	184-9087-560		81349	M39003-01-2369
	343-0332-000		77250	P343-0332-000
	343-0228-000		96906	MS51958-63
4)	310-0284-000		96906	MS35338-138
	313-0019-000		96906	MS35650-304
	343-0136-000		96906	MS51957-16
	343-0134-000		96906	MS51957-14
)	310-0279-000		96906	MS35338-135
	313-0132-000		77250	P313-0132-000
	343-0173-000		96906	MS51957-31
8)	310-0055-000		79807	310-0055-000
	343-0171-000		96906	MS51957-30
)	373-8020-000		96906	MS35335-58
	313-0002-000		96906	MS35649-264
	343-0330-000		77250	P343-0330-000
	313-0140-000		77250	P313-0140-000
8)	310-0078-000		79807	310-0078-000
	310-0740-520		80205	NAS620C10L
	343-0331-000		77250	P343-0331-000
	343-0343-000		77250	P343-0343-000
0)	310-0081-000		79807	310-0081-000
	343-0171-000		96906	MS51957-30
	313-0045-000		77250	P313-0045-000
	343-0226-000		96906	MS51958-61
)	310-0059-000		79807	310-0059-000
	368-0385-010		82389	EAC301
	372-5884-490		00779	1-480424-0
	304-1466-010		91886	2115
	635-9618-001			
	139-1183-000		56289	4586-48
	139-3284-000		56289	4586-97A
	304-0016-000		77147	4007-6HT
	304-1259-000		96906	MS25036-103
	540-9540-003			540-9540-003
	352-9107-010		13103	8903NW
	547-8177-014			547-8177-014
	635-9613-001			
	340-0641-000		91314	340-0641-000
	266-0217-030		82389	11E1067
	662-0605-010		98330	R103870
	351-1342-010		07263	UA78H05SC
	351-1120-100		07263	7808KC
	351-1120-140		07263	7824KC
	351-1120-130		07263	7818KC
	351-1120-120		07263	7815KC
	351-1124-030		27014	LM320K15
	265-1171-000		71400	HKPH
	635-0903-001			635-0903-001
	353-3718-040		14099	1N5550
	353-3644-010		03508	1N4454GE
	352-0661-020		07263	2N2222A
	745-0776-000		81349	RCR07G562KS
	745-0755-000		81349	RCR07G152KS
	745-0776-000		81349	RCR07G562KS
	367-1599-070		71785	8-176-2

MODIFICATION HISTORY

REVISION IDENT	DESCRIPTION OF REVISION AND REASON FOR CHANGE	EFFECTIVITY
A1	Changed: C3 from 10,000 μF to 13,000 μF U1 from type 7805KC to type UA78H05SC	635-9649-001 REV E and above

LED Status Display, 635-0825-( )

Rockwell International

instructions

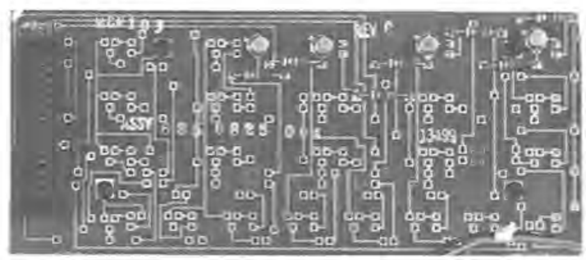
Collins Telecommunications Products Division

Printed in USA

523-0767946-004211
4th Edition, 1 October 1980

1. DESCRIPTION

The LED Status Display 635-0825-( ), shown in figure 1, consists of up to 23 transistor-switch-controlled 5-V dc LED's. LED's are lighted when +5 V dc is applied at connector pin 25, a ground is applied at connector pin 16, and a positive voltage is applied to the connector pin associated with the individual LED. Refer to table 1 and figure 2 for signals (positive to light) and their associated connector pins and LED's.



TP5-2347-017

LED Status Display
Figure 1

2. TESTING/TROUBLESHOOTING PROCEDURES

2.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the LED status display are listed in the maintenance section of this instruction book.

2.2 Testing

The test procedures in table 2 check total performance of the LED status display. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

3. REPAIR

Repair of the LED status display is accomplished using the standard planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

NOTICE: This section replaces third edition dated 1 June 1979.

Table 1. LED Status Display, Configuration Matrix.

LED	APPLIED SIGNAL [SILKSCREEN IF DIFFERENT]	JUMPER	INPUT PIN (A2J3)	LED STATUS DISPLAY									
				635-0825-( )									
				-001	-002	-003	-004	-005	-006	-007	-008	-009	-010
DS1	Sidetone en [RF OUT]		9		X	X		X	X	X		X	
DS2	PA READY ind		10		X	X		X	X	X		X	
DS3	PA FAULT ind		11		X	X		X	X	X		X	
DS4	KEY ind		12		X	X		X	X	X		X	
DS5	R/E FAULT ind		13			X			X				
DS5	RCV FAULT ind		13	X			X				X		X
DS5	EXCTR FAULT ind		13		X			X		X		X	
DS6	RCV OVERLOAD		14	X		X	X		X		X		X
DS7	AFC LOCK ind		15										X
DS8	COUPLER FAULT ind		8		X	X		X	X	X		X	
DS9	LSB (FL2)	R9 to E2	17		X	X						X	
DS9	AM en	R9 to E1	4	X							X		X
DS10	SSB en [SSB/CW]	R10 to E3	5	X							X		X
DS10	CW en	R10 to E4	2		X	X						X	
DS11	ISB en		1		X	X						X	
DS12	USB (FL1)	R12 to E6	18		X	X						X	
DS12	ISB en	R12 to E5	1	X							X		X
DS13	AM en	R13 to E7	4		X	X						X	
DS13	FM en	R13 to E8	3										X
DS14	16 (FL8)		24	X							X		X
DS15	A (FL3)		22	X							X		X
DS16	B (FL4)		21	X							X		X
DS17	USB (FL1) [U]		18	X							X		X
DS18	LSB (FL2) [L]		17	X							X		X
DS19	C (FL5)		19	X							X		X
DS20	D (FL6)		20	X							X		X
DS21	E (FL7)		23	X							X		X
DS22	BUSY		6	X	X	X						X	X
DS23	PRESEL FAULT ind		7	X		X	X		X	X	X	X	X
				-011	-012	-013	-014						
DS1	Sidetone enbl [RF OUT]		9		X		X						
DS2	PA READY ind		10		X		X						
DS2	AM enbl		10			X							
DS3	PA FAULT ind		11		X		X						
DS3	AFC LOCK ind		11			X							
DS4	KEY ind		12		X		X						

Table 1. LED Status Display, Configuration Matrix (Cont).

LED	APPLIED SIGNAL [SILKSCREEN IF DIFFERENT]	JUMPER	INPUT PIN (A2J3)	LED STATUS DISPLAY 635-0825-( )									
				-011	-012	-013	-014						
DS4	ISB enbl		12			X							
DS5	R/E FAULT ind		13				X						
DS5	RCV FAULT ind		13	X		X							
DS5	EXCTR FAULT ind		13		X								
DS6	RCV OVERLOAD		14	X		X	X						
DS7	AFC LOCK ind		15	X			X						
DS7	CW enbl		15			X							
DS8	COUPLER FAULT ind		8		X		X						
DS8	BUSY		8			X							
DS9	AM enbl	R9 to E1	4		X								
DS9	B1 enbl	R9 to E1	4			X							
DS10	CW enbl	R10 to E4	2		X								
DS10	B2 enbl	R10 to E3	5			X							
DS11	PEAK CLIPPER		1		X								
DS12	A1 enbl	R12 to E5	1			X							
DS13	PILOT CARRIER	R13 to E8	3		X								
DS13	A2 enbl	R13 to E8	3			X							
DS14	ISB ind		24		X								
DS14	FL1 enbl [16]		24			X							
DS15	B1 ind		22		X								
DS15	FL5 enbl [C]		22			X							
DS16	A1 ind		21		X								
DS16	FL6 enbl [D]		21			X							
DS17	FL3 enbl [A]		18			X							
DS18	B2 ind		17		X								
DS18	FL4 enbl [B]		17			X							
DS19	A2 ind		19		X								
DS19	FL7 enbl [E]		19			X							
DS20			20										
DS21			23										
DS22	NET DATA enbl		6			X							
DS23	PRESEL FAULT ind		7	X	X	X	X						

NOTES:

X indicates LED and associated circuit are installed in LED status display and any associated jumpers are installed.

A blank indicates LED and associated circuit are not installed in LED status display, and any associated jumpers are removed.

Table 2. LED Status Display, Testing and Troubleshooting Procedures.

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top cover of unit containing LED status display to be tested. b. If local unit, remove control card A10. Install A10 extender. If control unit, remove parallel output card A12. Install A12 extender. *Note* Control card A10 in local unit or parallel output card A12 in control unit is not installed during these tests. c. Connect a test lead to (+5 V dc). *Note* This test lead is used for biasing on the switching transistors.				
2. LED Status Display 635-0825-001 and 635-0825-008	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead. b. Check that each LED goes out when test lead is removed from associated extender pin. c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	74	1	ISB	DS12	DS12, Q12, R12, and R34.
	8	4	AM	DS9	DS9, Q9, R9, R31, Q23, and R45.
	72	5	SSB/CW	DS10	DS10, Q10, R10, and R32.
	7	6	BUSY	*DS22	DS22, Q22, R22, and R44.
	28	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	12	13	RCV FAULT	DS5	DS5, Q5, R5, and R27.
(Cont)	67	14	RCV OVERLOAD	DS6	DS6, Q6, R6, and R28

*Applicable only to 635-0825-001.

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	97	17	L	DS18	DS18, Q18, R18, and R40.
	32	18	U	DS17	DS17, Q17, R17, and R39.
	34	19	C	DS19	DS19, Q19, R18, and R41.
	35	20	D	DS20	DS20, Q20, R20, and R42.
	98	21	B	DS16	DS16, Q16, R16, and R38.
	33	22	A	DS15	DS15, Q15, R15, and R37.
	99	23	E	DS21	DS21, Q21, R21, and R43.
	100	24	16	DS14	DS14, Q14, R14, and R36.
	e. Connect +5 V dc to extender pin 72 (A2J3-5).			DS10 (SSB/CW) lights.	DS10, Q10, R10, R32, Q23, and R45.
	f. Connect test lead to extender pin 74 (A2J3-1).			DS12 (ISB) lights.	DS12, Q12, R12, and R24.
				DS10 (SSB/CW) goes out.	Q23 and R45.
	g. Remove +5 V dc from extender pin 72 and test lead from extender pin 74.				
3. LED Status Display 635-0825-002	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead.				
	b. Check that each LED goes out when test lead is removed from associated extender pin.				
	c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	74	1	ISB	DS11	DS11, Q11, R11, and R33.
	9	2	CW	DS10	DS10, Q10, R10, and R32.
(Cont)	8	4	AM	DS13	DS13, Q13, R13, and R35.

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	7	6	BUSY	DS22	DS22, Q22, R22, and R44.
	13	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	77	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	12	13	EXCTR FAULT	DS5	DS5, Q5, R5, and R27.
	97	17	LSB	DS9	DS9, Q9, R9, Q23, and R45.
	32	18	USB	DS12	DS12, Q12, R12, and Q34.
	e. Connect +5 V dc to extender pin 9 (A2J3-2)			DS10 (CW) lights.	DS10, Q10, R10, R32, Q23, and R45.
	f. Connect test lead to extender pin 74 (A2J3-1).			DS11 (ISB) lights.	DS11, Q11, R11, and R33.
				DS10 (CW) goes out.	Q23 and R45.
	g. Remove +5 V dc from extender pin 9 and test lead from extender pin 74.				
4. LED Status Display 635-0825-003	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead.				
	b. Check that each LED goes out when test lead is removed from associated extender pin.				
(Cont)	c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	74	1	ISB	DS11	DS11, Q11, R11, and R33.
	9	2	CW	DS10	DS10, Q10, R10, and R32.
	8	4	AM	DS13	DS13, Q13, R13, and R35.
	7	6	BUSY	DS22	DS22, Q22, R22, and R44.
	28	7	PRESEL	DS23	DS23, Q24, R46, and R47.
	13	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	77	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	12	13	R/E FAULT	DS5	DS5, Q5, R5, and R27.
	67	14	RCV OVERLOAD	DS6	DS6, Q6, R6, and R28.
	97	17	LSB	DS9	DS9, Q9, R9, R31, Q23, and R45.
	32	18	USB	DS12	DS12, Q12, R12, and Q34.
	e. Connect +5 V dc to extender pin 9 (A2J3-2).			DS10 (CW) lights.	DS9, Q9, R9, R31, Q23, and R45.
	f. Connect test leads to extender pin 74 (A2J3-1).			DS11 (ISB) lights.	DS11, Q11, R11, and R33.
				DS10 (CW) goes out.	Q23 and R45.
	g. Remove +5 V dc from extender pin 9 and test lead from extender pin 74.				
5. LED Status Display 635-0825-004 and 635-0825-011 (Cont)	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead. b. Check that each of the LED's go out when test lead is removed from associated extender pin.				

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	71	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	3	13	RCV FAULT	DS5	DS5, Q5, R5, and R27.
	67	14	RCV OVERLOAD	DS6	DS6, Q6, R6, and R28.
	2	15	AFC LOCK	*DS7	DS7, Q7, R7, and R29.
6. LED Status Display 635-0825-005	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead. b. Check that each LED goes out when test lead is removed from associated extender pin. c. Connect test lead to extender pin indicated in step d and check that the associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	70	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	4	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	3	13	EXCTR FAULT	DS5	DS5, Q5, R5, and R27.
7. LED Status 635-0825-006 and 635-0825-014 (Cont)	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead. b. Check that each LED goes out when test lead is removed from extender associated extender pin. c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				

*Applicable only to 635-0825-011.

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	71	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	70	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	4	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	3	13	R/E FAULT	DS5	DS5, Q5, R5, and R27.
	67	14	RCV OVERLOAD	DS6	DS6, Q6, R6, and R28.
	2	15	AFC LOCK	*DS7	DS7, Q7, R7, and R29.
8. LED Status Display 635-0825-007	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead.				
	b. Check that each LED goes out when test lead is removed from associated extender pin.				
	c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	71	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	70	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	4	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	3	13	EXCTR FAULT	DS5	DS5, Q5, R5, and R27.

*Applicable only to 635-0825-014.

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. LED Status Display 635-0825-009	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead. b. Check that each LED goes out when test lead is removed from associated extender pin. c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	74	1	ISB	DS11	DS11, Q11, R11, and R33.
	9	2	CW	DS10	DS10, Q10, R10, and R32.
	8	4	AM	DS13	DS13, Q13, R13, and R35.
	7	6	BUSY	DS22	DS22, Q22, R22, and R44.
	71	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	70	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	4	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	3	13	EXCTR FAULT	DS5	DS5, Q5, R5, and R27.
	97	17	LSB	DS9	DS9, Q9, R9, Q23, and R45.
	32	18	USB	DS12	DS12, Q12, R12, and Q34.
(Cont)					

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. (Cont)	e. Connect +5 V dc to extender pin 9 (A2J3-2).			DS10 (CW) lights.	DS10, Q10, R10, R32, Q23, and R45.
	f. Connect test lead to extender pin 74 (A2J3-1).			DS11 (ISB) lights.	DS11, Q11, R11, and R33.
				DS10 (CW) goes out.	Q23 and R45.
	g. Remove +5 V dc from extender pin 9 and test lead from extender pin 74.				
10. LED Status Display 635-0825-010	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead.				
	b. Check that each LED goes out when test lead is removed from associated extender pin.				
	c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	74	1	ISB	DS12	DS12, Q12, R12, and R34.
	73	3	FM	DS13	DS13, Q13, R13, and R35.
	8	4	AM	DS9	DS9, Q9, R9, R31, Q23, and R45.
	72	5	SSB/CW	DS10	DS10, Q10, R10, and R32.
	7	6	BUSY	DS22	DS22, Q22, R22, and R44.
	28	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	12	13	RCV FAULT	DS5	DS5, Q5, R5, and R27.
	67	14	RCV OVERLOAD	DS6	DS6, Q6, R6, and R28.
	2	15	AFC LOCK	DS7	DS7, Q7, R7, and R29.
	97	17	L	DS18	DS18, Q18, R18, and R40.
	32	18	U	DS17	DS17, Q17, R17, and R39.
(Cont)	34	19	C	DS19	DS19, Q19, R18, and R41.

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	35	20	D	DS20	DS20, Q20, R20, and R42.
	98	21	B	DS16	DS16, Q16, R16, and R38.
	33	22	A	DS15	DS15, Q15, R15, and R37.
	99	23	E	DS21	DS21, Q21, R21, and R43.
	100	24	16	DS14	DS14, Q14, R14, and R36.
	e. Connect +5 V dc to extender pin 72 (A2J3-5).			DS10 (SSB/CW) lights.	DS10, Q10, R10, R32, Q23, and R45.
	f. Connect test lead to extender pin 74 (A2J3-1).			DS12 (ISB) lights.	DS12, Q12, R12, and R24.
				DS10 (SSB/CW) goes out.	Q23 and R45.
	g. Remove +5 V dc from extender pin 72 and test lead from extender pin 74.				
11. LED Status Display 635-0825-012	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead.				
	b. Check that each LED goes out when test lead is removed from associated extender pin.				
	c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A3J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	74	1	PEAK CLIPPER	DS11	DS11, Q11, R11, and R33.
	9	2	CW	DS10	DS10, Q10, R10, and R32.
	73	3	PILOT CARRIER	DS13	DS13, Q13, R13, and R35.
	8	4	AM	DS9	DS9, Q9, R9, and R31.
	71	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
(Cont)	70	8	COUPLER FAULT	DS8	DS8, Q8, R8, and R30.

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
11. (Cont)	EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	5	9	RF OUT	DS1	DS1, Q1, R1, and R23.
	69	10	PA READY	DS2	DS2, Q2, R2, and R24.
	4	11	PA FAULT	DS3	DS3, Q3, R3, and R25.
	68	12	KEY	DS4	DS4, Q4, R4, and R26.
	3	13	EXCTR FAULT	DS5	DS5, Q5, R5, and R27.
	NA (A2J2-24)	17	B2	DS18	DS18, Q18, R18, and R40.
	NA (A2J2-22)	19	A2	DS19	DS19, Q19, R19, and R41.
	NA (A2J2-20)	21	A1	DS16	DS16, Q16, R16, and R38.
	NA (A2J2-19)	22	B1	DS15	DS15, Q15, R15, and R37.
	NA (J9-9)	24	ISB	DS14	DS14, Q14, R14, and R36.
12. LED Status Display 635-0825-013	a. Check that none of the LED's listed in step d are lighted before associated extender pin is connected to test lead. b. Check that each LED goes out when test lead is removed from associated extender pin. c. Connect test lead to extender pin indicated in step d and check that associated LED lights when test lead is connected.				
	d. EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	26	1	A1	DS12	DS12, Q12, R12, and R34.
	17	3	A2	DS13	DS13, Q13, R13, and R35.
	6	4	B1	DS9	DS9, Q9, R9, R31, Q23, and R45.
	74	5	B2	DS10	DS10, Q10, R10, and R32.
	73	6	NET DATA	DS22	DS22, Q22, R22, and R44.
(Cont)					

Table 2. LED Status Display, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE			NORMAL INDICATION	IF INDICATION IS ABNORMAL
12. (Cont)	EXTENDER PIN NO	A2J3 PIN NO	PANEL MARKING	ASSOCIATED LED	CHECK
	71	7	PRESEL FAULT	DS23	DS23, Q24, R46, and R47.
	NA (J14-10)	9	FM	DS1	DS, Q1, R1, and R23.
	8	10	AM	DS2	DS2, Q2, R2, and R24.
	66	11	AFC LOCK	DS3	DS3, Q3, R3, and R25.
	9	12	ISB	DS4	DS4, Q4, R4, and R26.
	13	13	RCV FAULT	DS5	DS5, Q5, R5, and R27.
	68	14	RCV OVERLOAD	DS6	DS6, Q6, R6, and R28.
	72	15	CW	DS7	DS7, Q7, R7, and R29.
	NA (J9-37)	17	FLB	DS18	DS18, Q18, R18, and R40.
	NA (J9-100)	18	FLA	DS17	DS17, Q17, R17, and R39.
	NA (J9-12)	19	FLE	DS19	DS19, Q19, R18, and R41.
	NA (J9-41)	21	FLD	DS16	DS16, Q16, R16, and R38.
	NA (J9-106)	22	FLC	DS15	DS15, Q15, R15, and R37.
	NA (J9-99)	24	16 kHz	DS14	DS14, Q14, R14, and R36.

4. PARTS LIST/DIAGRAMS

4.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and also in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 2). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

4.2 Parts List

REF DES Column — Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column — Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column — Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column — Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column — Lists the manufacturer's part number for the selected parts.

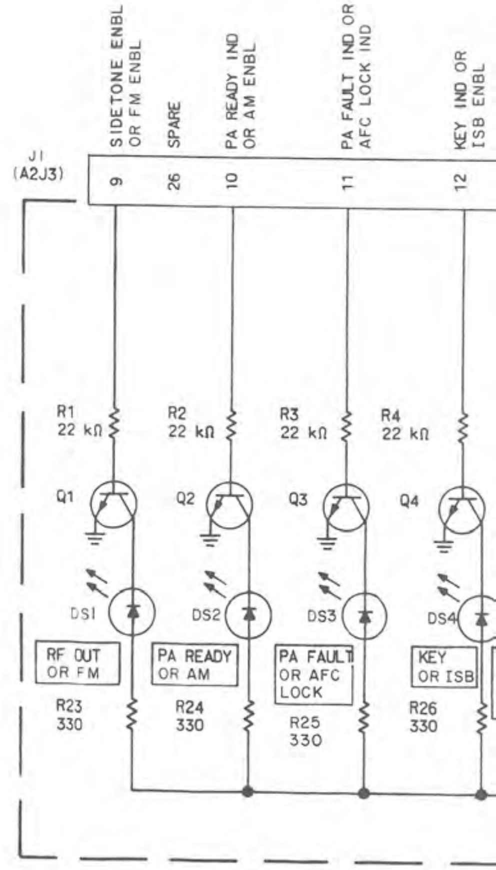
Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

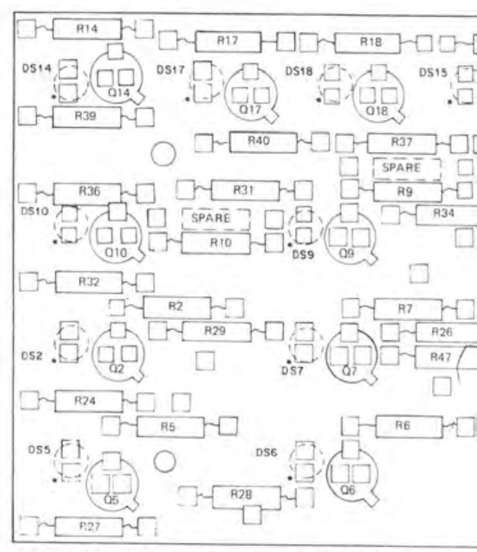
CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC P O BOX 3608 HARRISBURG PA 17105
04404	HEWLETT-PACKARD CO AUTOMATIC MEASUREMENT DIV 974 E ARQUES AVE SUNNYVALE CA 94086
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042
81349	MILITARY SPECIFICATION

4.3 Equipment Covered

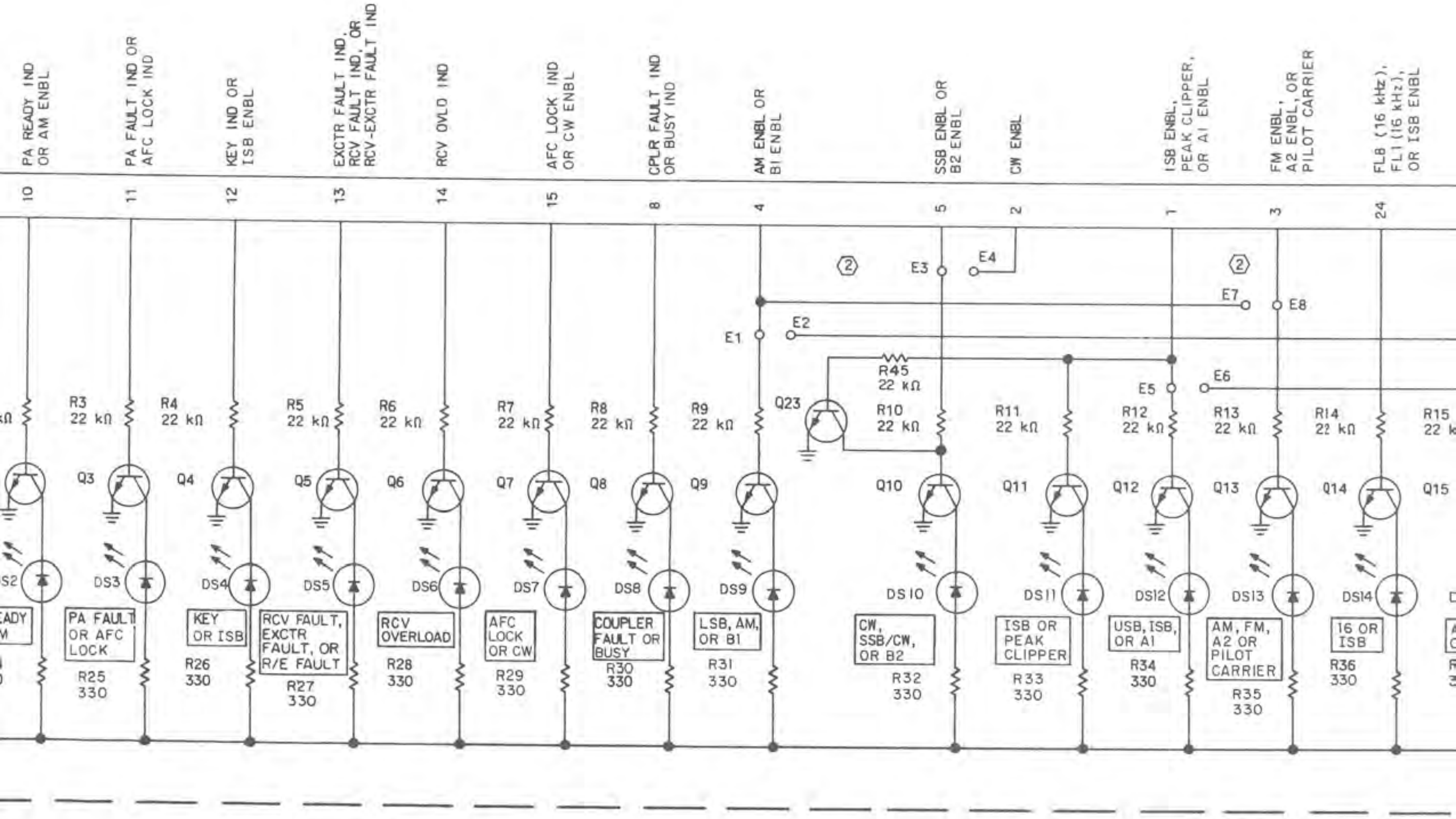
Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
LED status display	635-0825-001	REV C
LED status display	635-0825-002	REV E
LED status display	635-0825-003	REV E
LED status display	635-0825-004	REV D
LED status display	635-0825-005	REV D
LED status display	635-0825-006	REV D
LED status display	635-0825-007	REV G
LED status display	635-0825-008	REV J
LED status display	635-0825-009	REV J
LED status display	635-0825-010	REV —
LED status display	635-0825-011	REV P
LED status display	635-0825-012	REV P
LED status display	635-0825-013	REV N
LED status display	635-0825-014	REV —





NOTE: ALL LEDS ARE MOUNTED ON BOTTOM OF BO



NOTES:

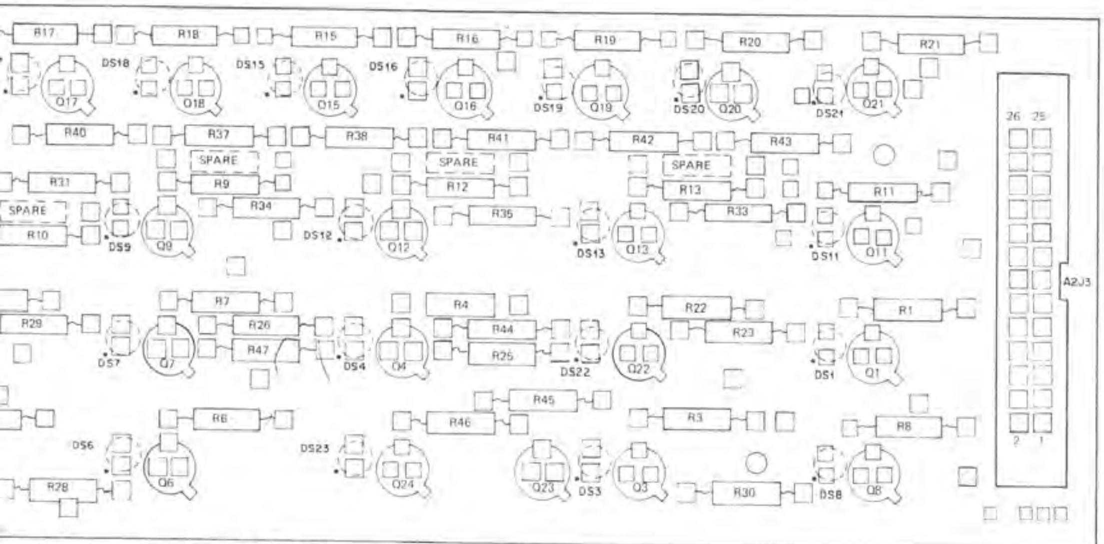
1. Q1-Q24 ARE TYPE 2
DS3, DS5, DS6, DS8,
DS1, DS2, DS4, DS7,

2. E1 THRU E8 CON

JUMPER	
	-001
R9 TO E1	X
R9 TO E2	
R10 TO E3	X
R10 TO E4	
R12 TO E5	X
R12 TO E6	
R13 TO E7	
R13 TO E8	

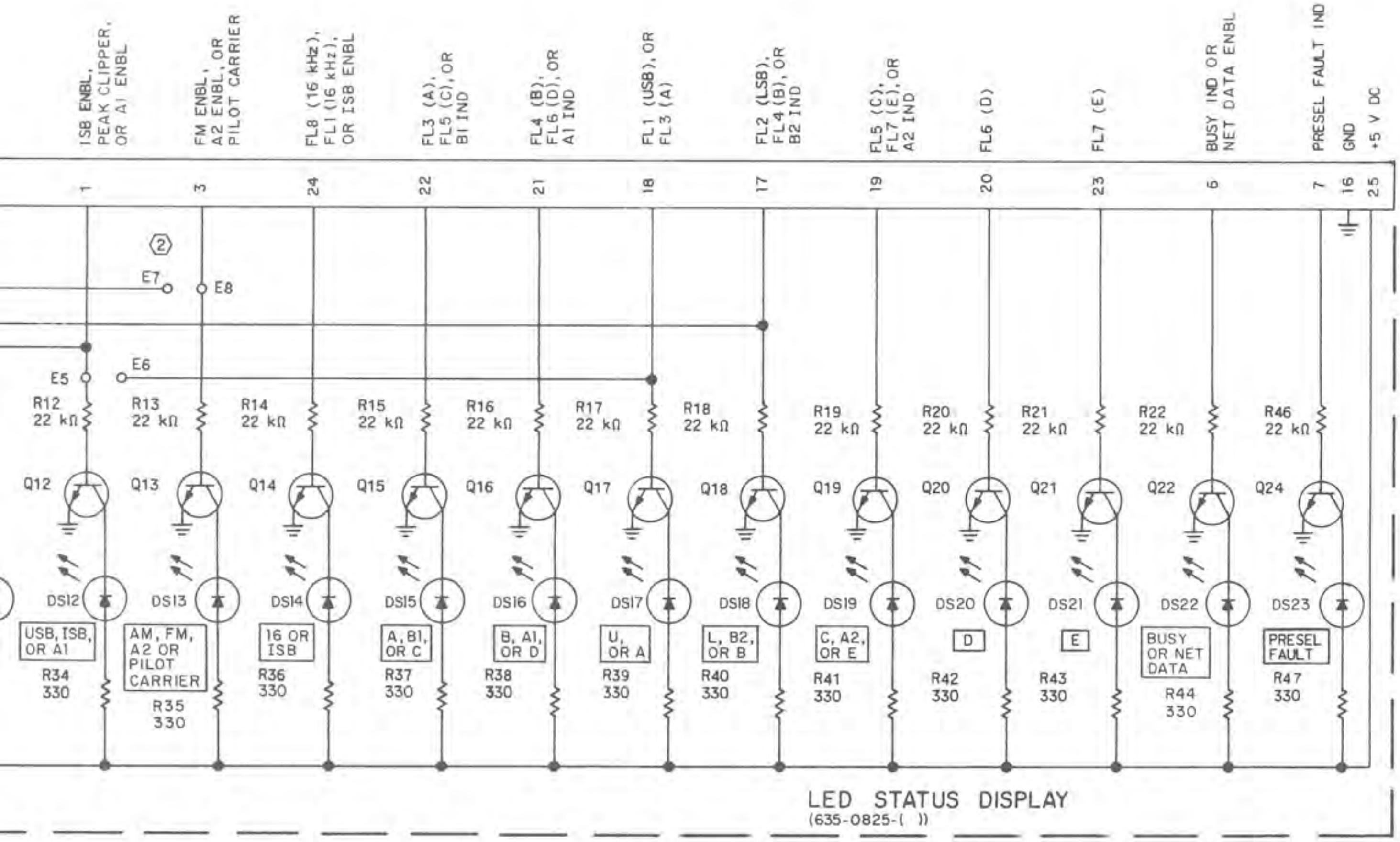
3. UNLESS OTHERWISE

4. REFER TO PARTS
OF THE LED STAT



RE MOUNTED ON BOTTOM OF BOARD

TP5-1156-013



NOTES:

1. Q1-Q24 ARE TYPE 2N2222A.
DS3, DS5, DS6, DS8, AND DS23 ARE TYPE HP5082-4684 (RED) LED.
DS1, DS2, DS4, DS7, AND DS9-DS22 ARE TYPE HP5082-4584 (YELLOW) LED.

2. E1 THRU E8 CONNECTED AS FOLLOWS:

JUMPER	635-0825-( )													
	-001	-002	-003	-004	-005	-006	-007	-008	-009	-010	-011	-012	-013	-014
R9 TO E1	X							X		X		X	X	
R9 TO E2		X	X						X					
R10 TO E3	X							X		X			X	
R10 TO E4		X	X						X			X		
R12 TO E5	X							X		X			X	
R12 TO E6		X	X						X					
R13 TO E7		X	X						X					
R13 TO E8										X		X	X	

3. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS.

4. REFER TO PARTS LIST FOR ACTUAL CIRCUITS USED IN EACH CONFIGURATION OF THE LED STATUS DISPLAY.

TPA-2371-014

LED Status Display, Schematic Diagram
Figure 2 (Sheet 1 of 3)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	LED STATUS DISPLAY	635-0825-001			
DS1-DS4	NOT USED				
DS5,DS6	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS7,DS8	NOT USED				
DS9,DS10	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS11	NOT USED				
DS12	DIODE LIGHT EMI	353-0232-010		04404	HLMP1401
DS13	NOT USED				
DS14- DS22	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS23	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q4	NOT USED				
Q5,Q6	TRANSISTOR	352-0661-020		07263	2N2222A
Q7,Q8	NOT USED				
Q9,Q10	TRANSISTOR	352-0661-020		07263	2N2222A
Q11	NOT USED				
Q12	TRANSISTOR	352-0661-020		07263	2N2222A
Q13	NOT USED				
Q14-Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R4	NOT USED				
R5,R6	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R7,R8	NOT USED				
R9,R10	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R11	NOT USED				
R12	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R13	NOT USED				
R14-R22	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R23-R26	NOT USED				
R27,R28	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R29,R30	NOT USED				
R31,R32	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R33	NOT USED				
R34	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R35	NOT USED				
R36-R44	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R45,R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-002			
DS1,DS2	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS3	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS4	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS5	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS6,DS7	NOT USED				
DS8	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS9-DS13	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS14- DS21	NOT USED				
DS22	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q5	TRANSISTOR	352-0661-020		07263	2N2222A
Q6,Q7	NOT USED				
Q8-Q13	TRANSISTOR	352-0661-020		07263	2N2222A
Q14-Q21	NOT USED				
Q22,Q23	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R5	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R6,R7	NOT USED				
R8-R13	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R14-R21	NOT USED				
R22	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R23-R27	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R28,R29	NOT USED				
R30-R35	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R36-R43	NOT USED				
R44	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R45	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
	LED STATUS DISPLAY	635-0825-003			
DS1,DS2	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS3	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS4	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS5,DS6	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS7	NOT USED				
DS8	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS9-DS13	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS14- DS21	NOT USED				
DS22	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS23	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q6	TRANSISTOR	352-0661-020		07263	2N2222A
Q7	NOT USED				
Q8-Q13	TRANSISTOR	352-0661-020		07263	2N2222A
Q14-Q21	NOT USED				
Q22-Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R6	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R7	NOT USED				
R8-R13	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R14-R21	NOT USED				
R22	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R23-R28	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE
R29	NOT USED		
R30-R35	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R36-R43	NOT USED		
R44	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R45,R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
	LED STATUS DISPLAY	635-0825-004	
DS1-DS4	NOT USED		
DS5,DS6	DIODE, LIGHT EMI	353-0232-030	
DS7-DS22	NOT USED		
DS23	DIODE, LIGHT EMI	353-0232-030	
J1	HOUSING,CONN,EL	372-0043-410	
Q1-Q4	NOT USED		
Q5,Q6	TRANSISTOR	352-0661-020	
Q7-Q23	NOT USED		
Q24	TRANSISTOR	352-0661-020	
R1-R4	NOT USED		
R5,R6	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R7-R26	NOT USED		
R27,R28	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R29-R45	NOT USED		
R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
	LED STATUS DISPLAY	635-0825-005	
DS1,DS2	DIODE, LIGHT EMI	353-0232-010	
DS3	DIODE, LIGHT EMI	353-0232-030	
DS4	DIODE, LIGHT EMI	353-0232-010	
DS5	DIODE, LIGHT EMI	353-0232-030	
DS6,DS7	NOT USED		
DS8	DIODE, LIGHT EMI	353-0232-030	
J1	HOUSING,CONN,EL	372-0043-410	
Q1-Q5	TRANSISTOR	352-0661-020	
Q6,Q7	NOT USED		
Q8	TRANSISTOR	352-0661-020	
R1-R5	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R6,R7	NOT USED		
R8	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R9-R22	NOT USED		
R23-R27	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R28,R29	NOT USED		
R30	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
	LED STATUS DISPLAY	635-0825-006	
DS1,DS2	DIODE, LIGHT EMI	353-0232-010	
DS3	DIODE, LIGHT EMI	353-0232-030	
DS4	DIODE, LIGHT EMI	353-0232-010	
DS5,DS6	DIODE, LIGHT EMI	353-0232-030	
DS7	NOT USED		
DS8	DIODE, LIGHT EMI	353-0232-030	
DS9-DS22	NOT USED		
DS23	DIODE, LIGHT EMI	353-0232-030	
J1	HOUSING,CONN,EL	372-0043-410	
Q1-Q6	TRANSISTOR	352-0661-020	
Q7	NOT USED		
Q8	TRANSISTOR	352-0661-020	
Q9-Q23	NOT USED		
Q24	TRANSISTOR	352-0661-020	
R1-R6	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R7	NOT USED		
R8	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R9-R22	NOT USED		
R23-R28	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R29	NOT USED		
R30	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R31-R45	NOT USED		
R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
	LED STATUS DISPLAY	635-0825-007	
DS1,DS2	DIODE, LIGHT EMI	353-0232-010	
DS3	DIODE, LIGHT EMI	353-0232-030	
DS4	DIODE, LIGHT EMI	353-0232-010	
DS5	DIODE, LIGHT EMI	353-0232-030	
DS6,DS7	NOT USED		
DS8	DIODE, LIGHT EMI	353-0232-030	
DS9-DS22	NOT USED		
DS23	DIODE, LIGHT EMI	353-0232-030	
J1	HOUSING,CONN,EL	372-0043-410	
Q1-Q5	TRANSISTOR	352-0661-020	
Q6,Q7	NOT USED		
Q8	TRANSISTOR	352-0661-020	
Q9-Q23	NOT USED		
Q24	TRANSISTOR	352-0661-020	
R1-R5	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R6,R7	NOT USED		
R8	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000	
R9-R22	NOT USED		
R23-R27	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	
R28,R29	NOT USED		
R30	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000	

PARTS LIST (Cont)

DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
Y	635-0825-004			
	353-0232-030		04404	HLMP1301
	353-0232-030		04404	HLMP1301
	372-0043-410		00779	87478-4
	352-0661-020		07263	2N2222A
	352-0661-020		07263	2N2222A
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
Y	635-0825-005			
	353-0232-010		04404	HLMP1401
	353-0232-030		04404	HLMP1301
	353-0232-010		04404	HLMP1401
	353-0232-030		04404	HLMP1301
	353-0232-030		04404	HLMP1301
	372-0043-410		00779	87478-4
	352-0661-020		07263	2N2222A
	352-0661-020		07263	2N2222A
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
Y	635-0825-006			
	353-0232-010		04404	HLMP1401
	353-0232-030		04404	HLMP1301
	353-0232-010		04404	HLMP1401
	353-0232-030		04404	HLMP1301
	353-0232-030		04404	HLMP1301
	353-0232-030		04404	HLMP1301
	372-0043-410		00779	87478-4
	352-0661-020		07263	2N2222A
	352-0661-020		07263	2N2222A
	352-0661-020		07263	2N2222A
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
Y	635-0825-007			
	353-0232-010		04404	HLMP1401
	353-0232-030		04404	HLMP1301
	353-0232-010		04404	HLMP1401
	353-0232-030		04404	HLMP1301
	353-0232-030		04404	HLMP1301
	353-0232-030		04404	HLMP1301
	372-0043-410		00779	87478-4
	352-0661-020		07263	2N2222A
	352-0661-020		07263	2N2222A
	352-0661-020		07263	2N2222A
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
N, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
R31-R45	NOT USED				
R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-008			
DS1-DS4	NOT USED				
DS5,DS6	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS7,DS8	NOT USED				
DS9,DS10	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS11	NOT USED				
DS12	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS13	NOT USED				
DS14-DS21	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS22	NOT USED				
DS23	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q4	NOT USED				
Q5,Q6	TRANSISTOR	352-0661-020		07263	2N2222A
Q7,Q8	NOT USED				
Q9,Q10	TRANSISTOR	352-0661-020		07263	2N2222A
Q11	NOT USED				
Q12	TRANSISTOR	352-0661-020		07263	2N2222A
Q13	NOT USED				
Q14-Q21	TRANSISTOR	352-0661-020		07263	2N2222A
Q22	NOT USED				
Q23,Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R4	NOT USED				
R5,R6	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R7,R8	NOT USED				
R9,R10	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R11	NOT USED				
R12	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R13	NOT USED				
R14-R21	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R22-R26	NOT USED				
R27,R28	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R29,R30	NOT USED				
R31,R32	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R33	NOT USED				
R34	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R35	NOT USED				
R36-R43	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R44	NOT USED				
R45,R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-009			
DS1-DS2	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS3	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS4	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS5	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS6,DS7	NOT USED				
DS8	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS9-DS13	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS14-DS21	NOT USED				
DS22	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS23	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q5	TRANSISTOR	352-0661-020		07263	2N2222A
Q6,Q7	NOT USED				
Q8-Q13	TRANSISTOR	352-0661-020		07263	2N2222A
Q14-Q21	NOT USED				
Q22-Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R5	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R6,R7	NOT USED				
R8-R13	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R14-R21	NOT USED				
R22	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R23-R27	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R28,R29	NOT USED				
R30-R35	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R36-R43	NOT USED				
R44	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R45,R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-010			
DS1-DS4	NOT USED				
DS5,DS6	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
DS7	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS8	NOT USED				
DS9,DS10	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS11	NOT USED				
DS12	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS13	NOT USED				
DS14-DS22	DIODE, LIGHT EMI	353-0232-010		04404	HLMP1401
DS23	DIODE, LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q4	NOT USED				

REF DES
Q5-Q7
Q8
Q9,Q10
Q11
Q12
Q13
Q14-Q2
R1-R4
R5-R7
R8
R9,R10
R11
R12
R13
R14-R2
R23-R2
R27-R2
R30
R31,R3
R33
R34
R35
R36-R4
R45,R4
R47
DS1-DS
DS5,DS
DS7
DS8-DS
DS23
J1
Q1-Q4
Q5-Q7
Q8-Q23
Q24
R1-R4
R5-R7
R8-R26
R27-R2
R30-R4
R45,R4
R47
DS1,DS
DS3
DS4
DS5
DS6,DS
DS8
DS9-DS
DS12
DS13-
DS16
DS17
DS18,
DS19
DS20-
DS22
DS23
J1
Q1-Q5
Q6,Q7
Q8-Q1
Q12
Q13-Q
Q17
Q18,Q
Q20-Q
Q24
R1-R5
R6,R7
R8-R1
R12
R13-R
R17
R18,R
R20-R
R23-R
R28,R
R30-R
R34
R35-R
R39
R40,R
R42-R
R46
R47

MFR PART NUMBER
RCR07G223KS
RCR07G331KS
HLMP1301
HLMP1401
HLMP1401
HLMP1401
HLMP1301
87478-4
2N2222A
2N2222A
2N2222A
2N2222A
2N2222A
RCR07G223KS
RCR07G223KS
RCR07G223KS
RCR07G223KS
RCR07G331KS
RCR07G331KS
RCR07G331KS
RCR07G331KS
RCR07G223KS
RCR07G331KS
HLMP1401
HLMP1301
HLMP1401
HLMP1301
HLMP1301
HLMP1401
HLMP1401
HLMP1301
87478-4
2N2222A
2N2222A
2N2222A
RCR07G223KS
RCR07G223KS
RCR07G223KS
RCR07G331KS
RCR07G331KS
RCR07G331KS
RCR07G223KS
RCR07G331KS
HLMP1301
HLMP1401
HLMP1401
HLMP1401
HLMP1401
HLMP1301
87478-4

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
Q5-Q7	TRANSISTOR	352-0661-020		07263	2N2222A
Q8	NOT USED				
Q9,Q10	TRANSISTOR	352-0661-020		07263	2N2222A
Q11	NOT USED				
Q12	TRANSISTOR	352-0661-020		07263	2N2222A
Q13	NOT USED				
Q14-Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R4	NOT USED				
R5-R7	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R8	NOT USED				
R9,R10	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R11	NOT USED				
R12	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R13	NOT USED				
R14-R22	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R23-R26	NOT USED				
R27-R29	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R30	NOT USED				
R31,R32	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R33	NOT USED				
R34	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R35	NOT USED				
R36-R44	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R45,R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-011			
DS1-DS4	NOT USED				
DS5,DS6	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS7	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS8-DS22	NOT USED				
DS23	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q4	NOT USED				
Q5-Q7	TRANSISTOR	352-0661-020		07263	2N2222A
Q8-Q23	NOT USED				
Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R4	NOT USED				
R5-R7	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R8-R26	NOT USED				
R27-R29	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R30-R44	NOT USED				
R45,R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-012			
DS1,DS2	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS3	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS4	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS5	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS6,DS7	NOT USED				
DS8	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS9-DS11	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS12	NOT USED				
DS13-DS16	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS17	NOT USED				
DS18,DS19	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS20-DS22	NOT USED				
DS23	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q5	TRANSISTOR	352-0661-020		07263	2N2222A
Q6,Q7	NOT USED				
Q8-Q11	TRANSISTOR	352-0661-020		07263	2N2222A
Q12	NOT USED				
Q13-Q16	TRANSISTOR	352-0661-020		07263	2N2222A
Q17	NOT USED				
Q18,Q19	TRANSISTOR	352-0661-020		07263	2N2222A
Q20-Q23	NOT USED				
Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R5	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R6,R7	NOT USED				
R8-R11	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R12	NOT USED				
R13-R16	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R17	NOT USED				
R18,R19	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R20-R22	NOT USED				
R23-R27	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R28,R29	NOT USED				
R30-R33	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R34	NOT USED				
R35-R38	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R39	NOT USED				
R40,R41	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R42-R45	NOT USED				
R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS

LED Status Display, Schematic Diagram
Figure 2 (Sheet 2)

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	LED STATUS DISPLAY	635-0825-013			
DS1	NOT USED				
DS2	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS3	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS4	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS5,DS6	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS7-DS10	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS11	NOT USED				
DS12-DS19	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS20, DS21	NOT USED				
DS22	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS23	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1	NOT USED				
Q2-Q10	TRANSISTOR	352-0661-020		07263	2N2222A
Q11	NOT USED				
Q12-Q19	TRANSISTOR	352-0661-020		07263	2N2222A
Q20,Q21	NOT USED				
Q22	TRANSISTOR	352-0661-020		07263	2N2222A
Q23	NOT USED				
Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1	NOT USED				
R2-R10	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R11	NOT USED				
R12-R19	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R20,R21	NOT USED				
R22	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R23	NOT USED				
R24-R32	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R33	NOT USED				
R34-R41	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R42,R43	NOT USED				
R44	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R45	NOT USED				
R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
	LED STATUS DISPLAY	635-0825-014			
DS1,DS2	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS3	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS4	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS5,DS6	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS7	DIODE,LIGHT EMI	353-0232-010		04404	HLMP1401
DS8	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
DS9-DS22	NOT USED				
DS23	DIODE,LIGHT EMI	353-0232-030		04404	HLMP1301
J1	HOUSING,CONN,EL	372-0043-410		00779	87478-4
Q1-Q8	TRANSISTOR	352-0661-020		07263	2N2222A
Q9-Q23	NOT USED				
Q24	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R8	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R9-R22	NOT USED				
R23-R30	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS
R31-R45	NOT USED				
R46	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R47	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1/4W	745-0731-000		81349	RCR07G331KS

LED Status Display, Schematic Diagram
Figure 2 (Sheet 3)

Frequency Switchboard (635-0830-001, -002)

Rockwell International

instructions

Collins Telecommunications Products Division

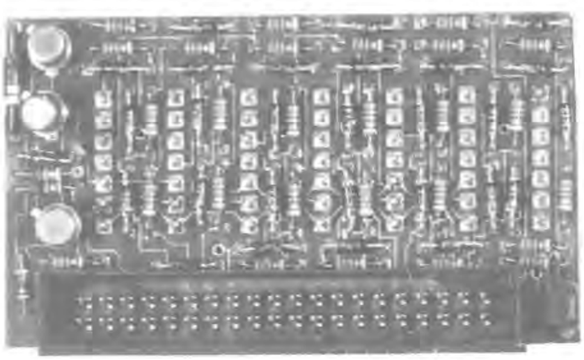
Printed in USA

523-076947-003211
3rd Edition, 1 October 1980

1. DESCRIPTION

Frequency Switchboard 635-0830-001, -002, shown in figure 1, consists of a 7/8-section thumb-wheel frequency selector switch, a local frequency enable circuit, and logic pullup for logic outputs.

The thumb-wheel frequency selector switches are set for the appropriate digits of the desired frequency, and a parallel bcd frequency control output is supplied from the frequency switchboard. Refer to table 1 and figure 2 for a logic truth table and the pins associated with the bcd outputs.



TP5-2346-017

Frequency Switchboard
Figure 1

Table 1. Frequency Switchboard, Logic Truth Table.

THUMB WHEEL (kHz)	A2J4 PIN NO			
10,000	37	38	NA	NA
1,000	33	34	35	36
100	29	30	31	32
10	25	26	27	28
1	21	22	23	24
.1	17	18	19	20
* .01	13	14	15	16
FREQUENCY DIGIT	BCD OUTPUT			
	1	2	4	8
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1

*Not used on 635-0830-001

2. TESTING/TROUBLESHOOTING PROCEDURES

2.1 Test Equipment and Power Requirements

Test equipment and power sources required to voltage test, troubleshoot, and repair the frequency

NOTICE: This section replaces second edition dated 1 June 1978.

switchboard are listed in the maintenance section of this instruction book.

2.2 Testing

The test procedures in table 2 check total performance of the frequency switchboard. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

3. REPAIR

Repair of the frequency switchboard is accomplished using the standard planar card repair procedures.

Table 2. Frequency Switchboard, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top cover of unit containing frequency switchboard to be tested. **Note** Testing procedures (test 2) on frequency switchboard used in the controls (HF-8090/8091/8092) can be accomplished with the top cover in place. b. If local unit, remove control card A10. Install A10 extender. If control unit, remove parallel input card A11. Install A11 extender. **Note** Control card A10 in local unit or parallel input card A11 in control unit are not installed during tests 3 through 5. c. Apply power to unit.		
2. Testing procedures when installed in control	a. Set CONT switch to TEST. b. Rotate frequency switches through their complete range.	Note that frequency display readout agrees with frequency switch setting.	Proceed to test 3.
3. Testing and troubleshooting procedures	a. Set CONT switch to LCL or NORM. b. Connect dvm to first extender pin shown in chart. c. Rotate associated thumb wheel through its range.	Refer to chart.	If no logic 1 indications, check Q3 and CR2. If no logic 0 indications, check Q1, Q2, and associated components.

Table 2. Frequency Switchboard, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)			If other malfunctions exist, check components associated with A2J4 pin number of thumb wheel in question.
(Cont)	d. Repeat steps b and c for each extender pin shown in chart.		

THUMB WHEEL (kHz)	BCD OUTPUT	EXTENDER PIN NO	A2J4 PIN NO	THUMB-WHEEL POSITION									
				0	1	2	3	4	5	6	7	8	9
10 000	2	129	38	0	0	1		Not applicable					
	1	64	37	0	1	0							
1000	8	128	36	0	0	0	0	0	0	0	0	1	1
	4	63	35	0	0	0	0	1	1	1	1	0	0
	2	127	34	0	0	1	1	0	0	1	1	0	0
	1	62	33	0	1	0	1	0	1	0	1	0	1
100	8	126	32	0	0	0	0	0	0	0	0	1	1
	4	61	31	0	0	0	0	1	1	1	1	0	0
	2	125	30	0	0	1	1	0	0	1	1	0	0
	1	60	29	0	1	0	1	0	1	0	1	0	1
10	8	124	28	0	0	0	0	0	0	0	0	1	1
	4	59	27	0	0	0	0	1	1	1	1	0	0
	2	123	26	0	0	1	1	0	0	1	1	0	0
	1	58	25	0	1	0	1	0	1	0	1	0	1
1	8	122	24	0	0	0	0	0	0	0	0	1	1
	4	57	23	0	0	0	0	1	1	1	1	0	0
	2	121	22	0	0	1	1	0	0	1	1	0	0
	1	56	21	0	1	0	1	0	1	0	1	0	1
0.1	8	120	19	0	0	0	0	0	0	0	0	1	1
	4	55	18	0	0	0	0	1	1	1	1	0	0
	2	119	17	0	0	1	1	0	0	1	1	0	0
	1	54	16	0	1	0	1	0	1	0	1	0	1
*0.01	8	118	15	0	0	0	0	0	0	0	0	1	0
	4	53	14	0	0	0	0	1	1	1	1	0	0
	2	117	13	0	0	1	1	0	0	1	1	0	0
	1	52	12	0	1	0	1	0	1	0	1	0	1

Logic 1 = NLT +3.0 V dc.

Logic 0 = NMT 0.5 V dc.

*Applicable only to 635-0830-002.

Table 2. Frequency Switchboard, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Frequency change signal	a. Set CONT switch to LCL or NORM.		
	b. Connect dvm to extender pin 47 (local unit A10 extender) or extender pin 13 (control unit A11 extender).		
	c. Slowly rotate each frequency switch through its complete range.	Note a logic 1 spike between each frequency switch position.	Replace associated switch thumb wheel.
	Note Steps d and e are applicable only to frequency switchboards installed in local units.		
	d. Set CONT switch to REM (not applicable to controls).	Note that there is no logic 1 spike between each frequency switch position.	Unit malfunction.
	e. Rotate all frequency switches through their complete range.	Note the voltage at the associated A2J4 pins for each frequency setting of each switch. 0 V on all pins.	Unit malfunction.

Refer to the maintenance section of this instruction book for planar card repair procedures.

4. PARTS LIST/DIAGRAMS

4.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 2). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

4.2 Parts List

REF DES Column - Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column - Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column - Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column - Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applied to all models.

MFR CODE Column - Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column - Lists the manufacturer's part number for the selected parts.

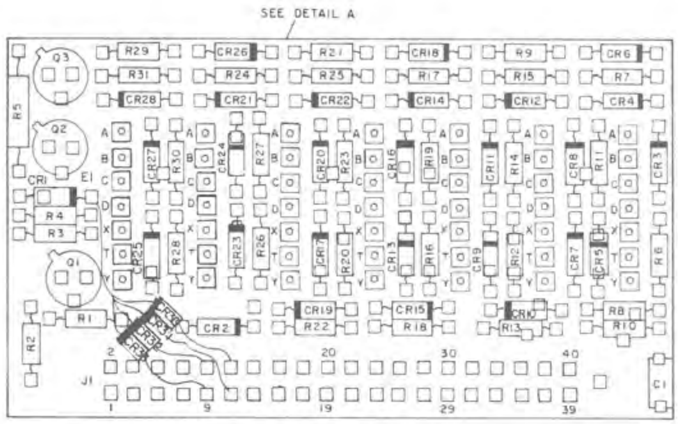
Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP, Inc. P.O. Box 3608 Harrisburg, PA 17105
03508	General Electric Co. Semi-Conductor Products Dept. W. Genesee St. Auburn, NY 13021
04713	Motorola, Inc. Semiconductor Products Group 5005 E. McDowell Rd. Phoenix, AZ 85008
07126	Digitran Co., The 855 South Arroyo Parkway Pasadena, CA 91105
07263	Fairchild Camera and Instrument Corp. Semiconductor Div. 464 Ellis St. Mountain View, CA 94042
81349	Military Specifications

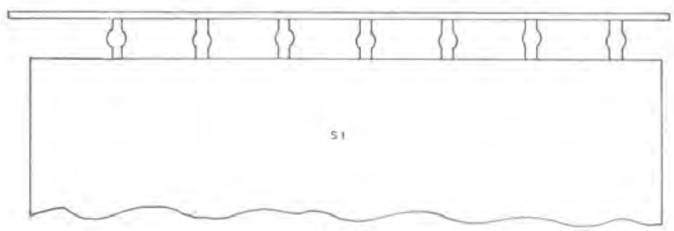
4.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Frequency switchboard	635-0830-001	REV H
Frequency switchboard	635-0830-002	REV H



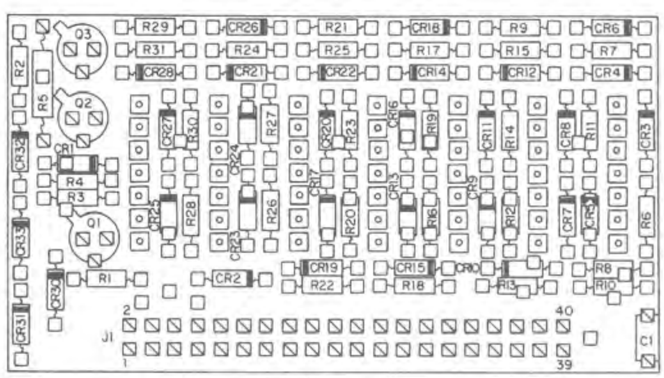
NOTE: CR30 THRU CR33 ARE MOUNTED ON BOTTOM OF BOARD



DETAIL A

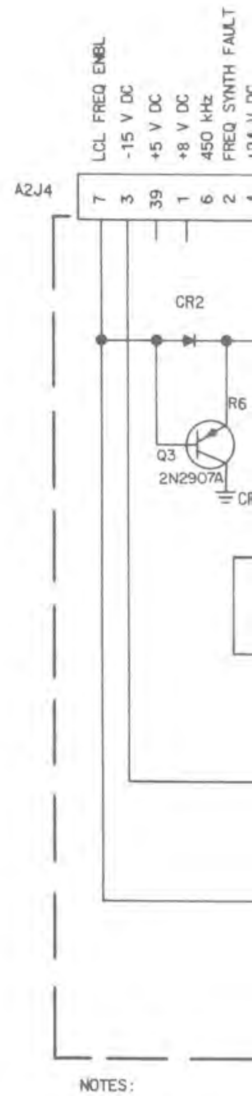
CI 77123

TPS-1040-019



CI 77273

TPA-2404-011

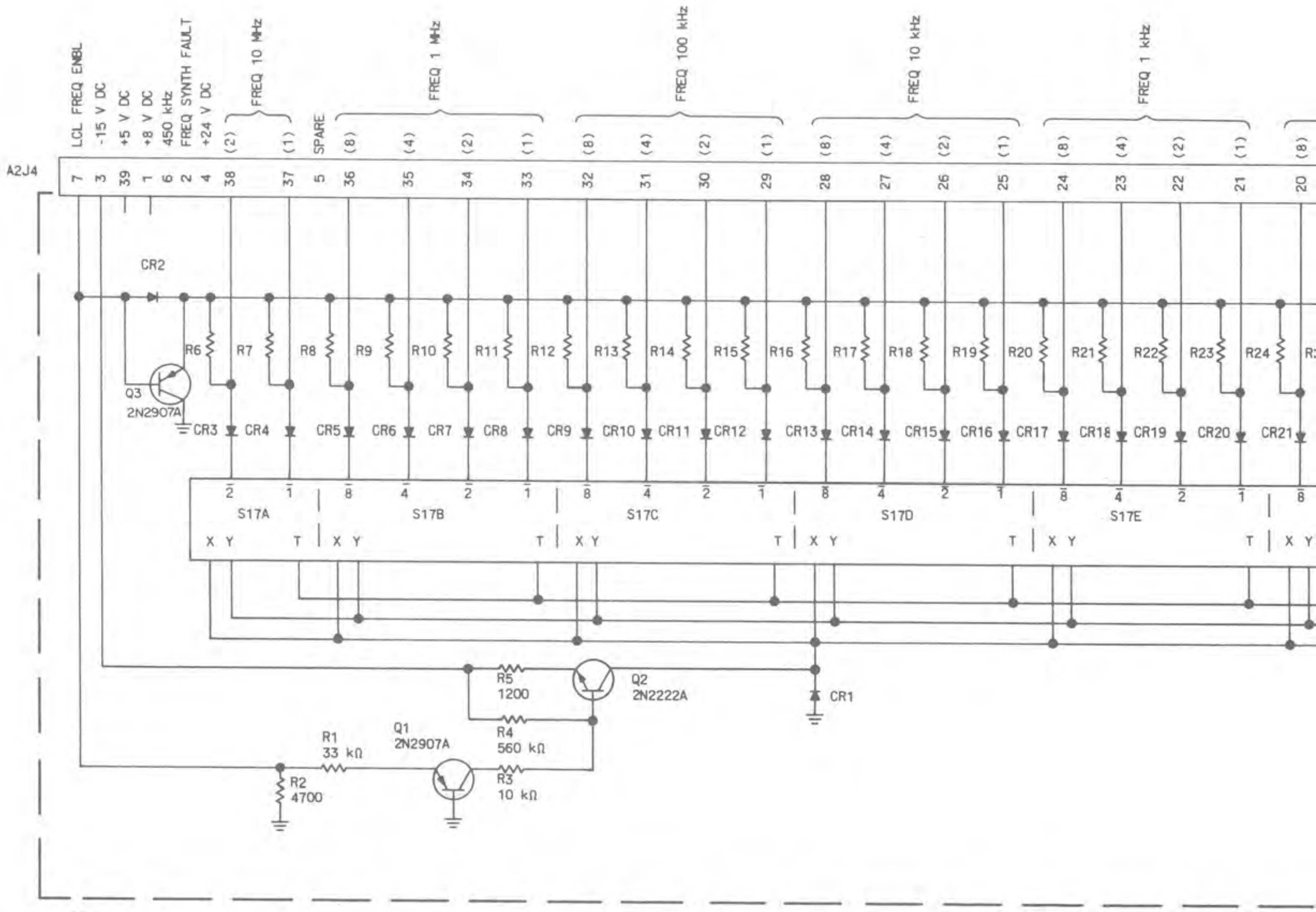


NOTES:

(1) ALL DIODES AR

(2) UNLESS OTHER

(3) THE 10 Hz FRE
PART OF 635-C
ARE CONNECT

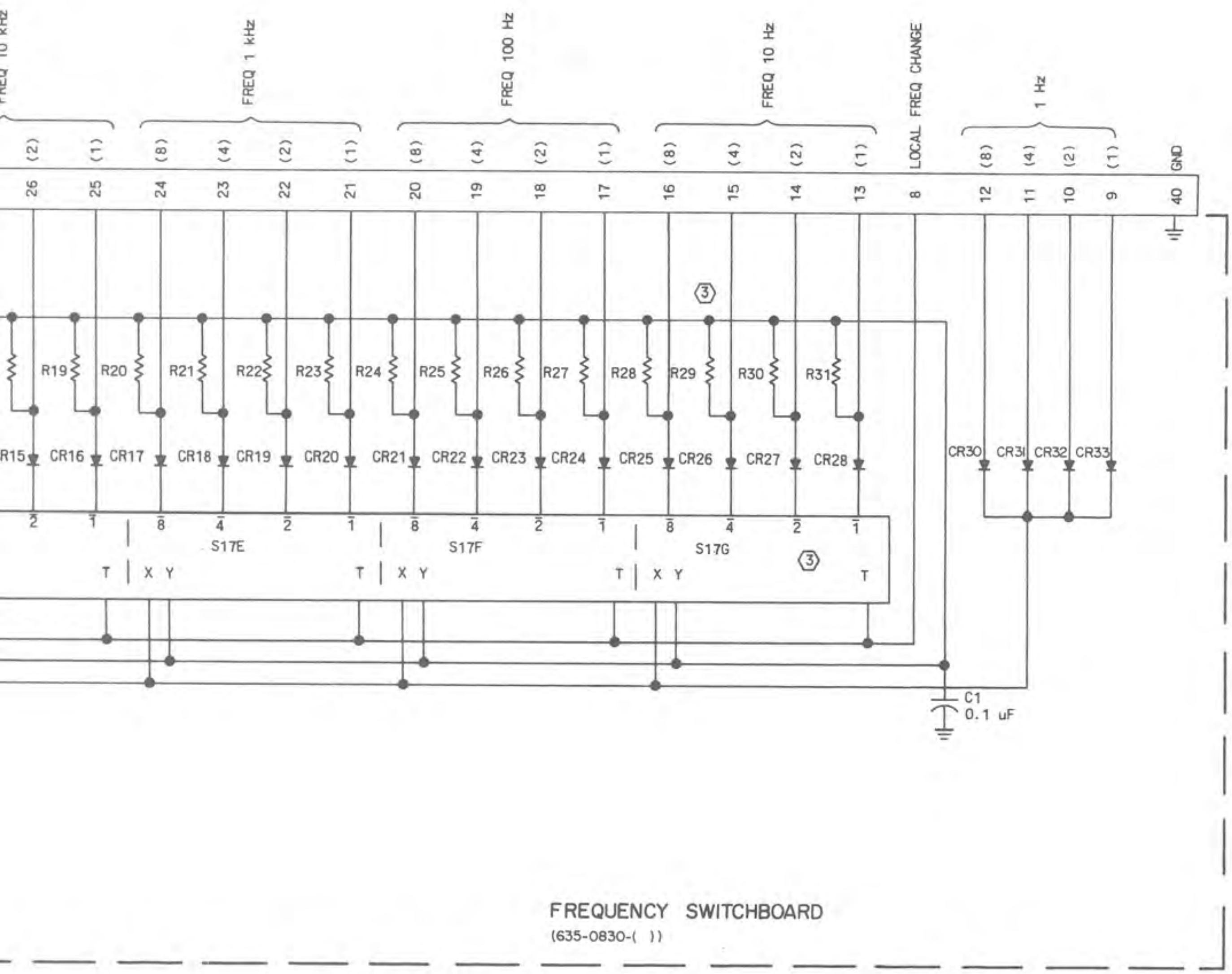


NOTES:

(1) ALL DIODES ARE TYPE 1N4454.

(2) UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS. R6-R31 ARE 33 kΩ

(3) THE 10 Hz FREQUENCY DIGIT S17G AND ASSOCIATED COMPONENTS R28 THRU R31 ARE PART OF 635-0830-002 ONLY. IN THE 635-0830-001 CR25 THRU CR28 CATHODES ARE CONNECTED THE SAME AS CR30 THRU CR33 CATHODES.



TPA-0155-014

Frequency Switchboard, Schematic Diagram
Figure 2 (Sheet 1 of 2)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	FREQUENCY SWITCHBOARD	635-0830-001	A		
	FREQUENCY SWITCHBOARD	635-0830-002	B		
CR1-CR28	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
CR29	NOT USED				
CR30-CR33	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1	CAPACITOR,FXD CER DIEL, 0.1UF, PORM10%, 50V	913-5019-320		81349	CK05BX104K
J4	HOUSING,CONN,EL	372-0043-480		00779	87478-7
Q1	TRANSISTOR	352-0551-010		04713	2N2907A
Q2	TRANSISTOR	352-0661-020		07263	2N2222A
Q3	TRANSISTOR	352-0551-010		04713	2N2907A
R1	RESISTOR,FXD CMPSN, 33K, 10%, 1/8W	745-2395-000		81349	RCR05G333KS
R2	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/8W	745-2365-000		81349	RCR05G472KS
R3	RESISTOR,FXD CMPSN, 10K, 10%, 1/8W	745-2377-000		81349	RCR05G103KS
R4	RESISTOR,FXD CMPSN, 560K, 10%, 1/8W	745-2440-000		81349	RCR05G564KS
R5	RESISTOR,FXD CMPSN, 1.2K, 10%, 1/4W	745-0752-000		81349	RCR07G122KS
R6-R27	RESISTOR,FXD CMPSN, 33K, 10%, 1/8W	745-2395-000		81349	RCR05G333KS
R28-R31	RESISTOR,FXD CMPSN, 33K, 10%, 1/8W	745-2395-000	B	81349	RCR05G333KS
S1	SWITCH ASSEMBLY	259-9651-010	A	07126	29C63
S1	SWITCH ASSEMBLY	259-9651-020	B	07126	29C64

DVBFO Switchboard (638-6437-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0770518-001211
1 October 1980

1. DESCRIPTION

The DVBFO Switchboard 638-6437-001, shown in figure 1, consists of a 4-section thumb-wheel frequency selector switch with sign, a local frequency enable circuit, and logic pullup for logic outputs.

The dvbfo switchboard is used to generate a frequency offset output. This is accomplished by setting the thumb-wheel frequency selector switches to the appropriate digits of the desired frequency, and a parallel bcd frequency control output is supplied. Refer to table 1 for a logic truth table, and to figure 2 for the bcd output pins.

Refer to the dvbfo switchboard schematic, figure 2. The S18A section of the thumbwheel switch is used to generate a (+) or (-) sign output. With S18A set to the (+) position the output equals a logic 0, and in the (-) position the output equals a logic 1.

TPA-2447-017

DVBFO Switchboard
Figure 1

Table 1. DVBFO Switchboard, Logic Truth Table.

FREQUENCY DIGIT	SELECTOR (Hz)	1000 (S18B)				100 (S18C)				10 (S18D)			
	BCD OUTPUT	8	4	2	1	8	4	2	1	8	4	2	1
	A2J6 PIN NO	13	12	11	10	9	8	7	6	5	4	3	2
0		0	0	0	0	0	0	0	0	0	0	0	0
1		0	0	0	1	0	0	0	1	0	0	0	1
2		0	0	1	0	0	0	1	0	0	0	1	0
3		0	0	1	1	0	0	1	1	0	0	1	1
4		0	1	0	0	0	1	0	0	0	1	0	0

Table 1. DVBFO Switchboard, Logic Truth Table (Cont).

FREQUENCY DIGIT	SELECTOR (Hz)	1000 (S18B)				100 (S18C)				10 (S18D)			
	BCD OUTPUT	8	4	2	1	8	4	2	1	8	4	2	1
	A2J6 PIN NO	13	12	11	10	9	8	7	6	5	4	3	2
5		0	1	0	1	0	1	0	1	0	1	0	1
6		0	1	1	0	0	1	1	0	0	1	1	0
7		0	1	1	1	0	1	1	1	0	1	1	1
8		1	0	0	0	1	0	0	0	1	0	0	0
9		1	0	0	1	1	0	0	1	1	0	0	1

2. TESTING/TROUBLESHOOTING PROCEDURES

2.1 Test Equipment and Power Requirements

Test equipment and power required to test, troubleshoot, and repair the dvbfo switchboard are listed in the maintenance section of the related instruction book.

2.2 Testing

The test procedures in table 2 check the total performance of the dvbfo switchboard. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

3. REPAIR

Repair of the dvbfo switchboard is accomplished using the standard planar card repair procedures. Refer to the maintenance section of the related instruction book for planar card repair procedures.

Table 2. DVBFO Switchboard, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top cover of unit containing dvbfo switchboard to be tested. **Note** Testing procedures (test 2) on dvbfo switchboard used in the controls (HF-8090/8091/8092) can be accomplished with the top cover in place. b. If control unit, remove parallel input card A11. Install it on an extender card and place it in the control unit. c. Apply power to unit.		
2. Testing procedures when installed in control	a. Set CONT switch to LCL, set VBFO switch to VAR. b. Rotate dvbfo frequency switches through their complete range.	Note that dvbfo frequency display readout agrees with frequency switch setting.	Proceed to test 3.

Table 2. DVBFO Switchboard, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Testing and troubleshooting procedures	a. Set CONT switch to LCL, set VBFO switch to VAR. b. Connect dvm to first connector pin shown in chart. c. Rotate associated thumb wheel through its range. d. Repeat steps b and c for each connector pin shown on card.	Refer to chart.	If no logic 1 indications, check Q3 and CR2. If no logic 0 indications, check Q1, Q2, and associated components. If other malfunctions exist, check components associated with A2J6 pin number of thumb wheel in question.

THUMB WHEEL (kHz)	BCD OUTPUT	EXTENDER PIN NO	A2J6 PIN NO	THUMB-WHEEL POSITION									
				0	1	2	3	4	5	6	7	8	9
1000	8		13	0	0	0	0	0	0	0	0	1	1
	4		12	0	0	0	0	1	1	1	1	0	0
	2		11	0	0	1	1	0	0	1	1	0	0
	1		10	0	1	0	1	0	1	0	1	0	1
100	8		9	0	0	0	0	0	0	0	0	1	1
	4		8	0	0	0	0	1	1	1	1	0	0
	2		7	0	0	1	1	0	0	1	1	0	0
	1		6	0	1	0	1	0	1	0	1	0	1
10	8		5	0	0	0	0	0	0	0	0	1	1
	4		4	0	0	0	0	1	1	1	1	0	0
	2		3	0	0	1	1	0	0	1	1	0	0
	1		2	0	1	0	1	0	1	0	1	0	1

Logic 1 = NLT +3.0 V dc.
Logic 0 + NMT 0.5 V dc.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Dvbfo frequency change signal	**Note** Applicable only to dvbfo switchboards installed in control units. a. Set CONT switch to NORM. b. Connect dvm to A11 extender. c. Slowly rotate each dvbfo frequency switch through its complete range.	Note a logic 0 spike between each switch position.	Replace associated switch thumb wheel.

Table 2. DVBFO Switchboard, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Local/remote operation	**Note** Applicable only to dvbfo frequency switchboards installed in local units. a. Set CONT switch to REM. b. Rotate all dvbfo frequency switches through their complete range.	Note the voltage at the associated A2J6 pins for each setting of each switch. 0 V on all pins.	Unit malfunction.

4. PARTS LIST/DIAGRAMS

4.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 2). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

4.2 Parts List

REF DES Column - Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column - Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column - Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column - Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column - Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column - Lists the manufacturer's part number for the selected parts.

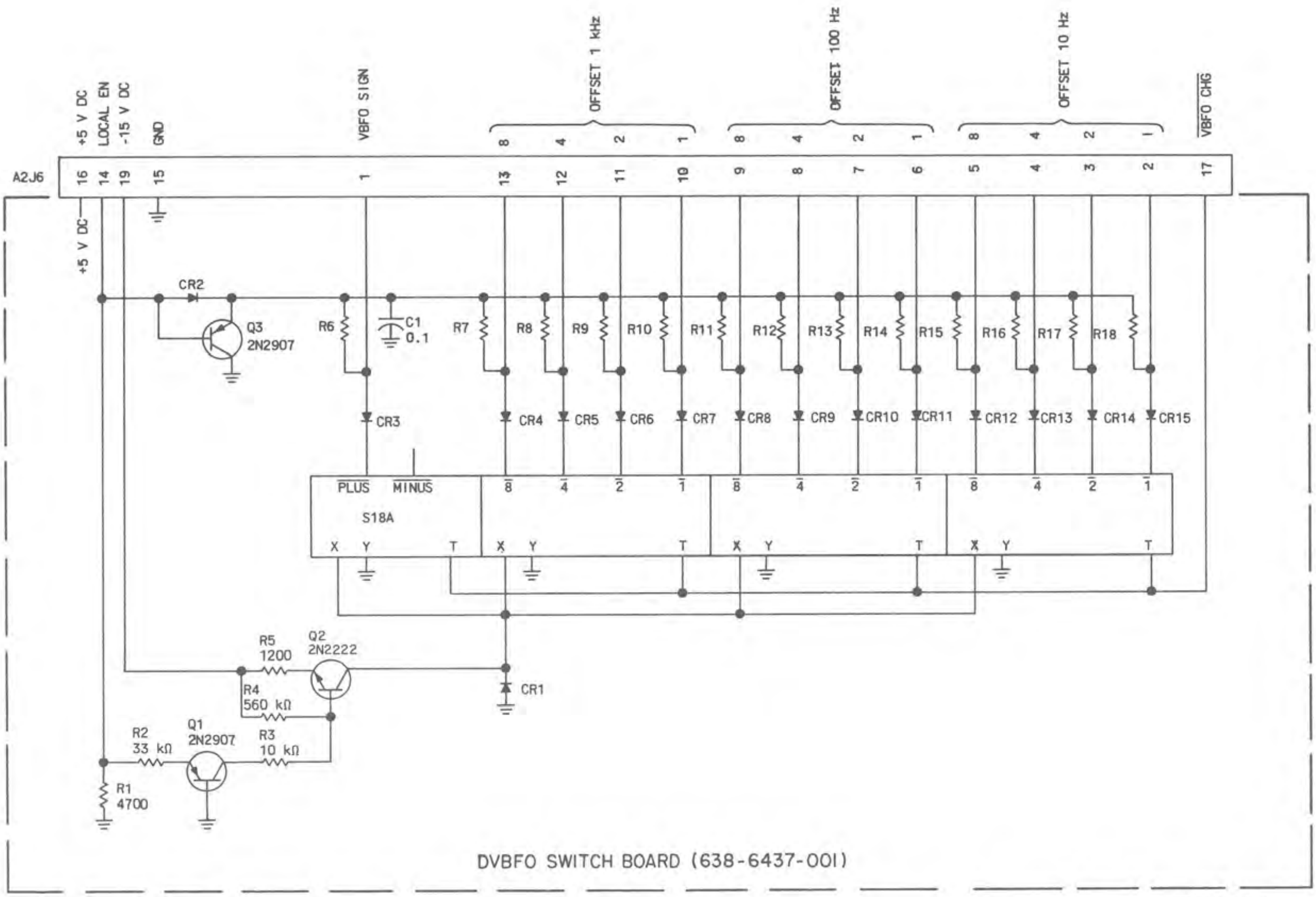
Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC P O BOX 3608 HARRISBURG PA 17105
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
07126	DIGITRAN CO THE 855 SOUTH ARROYO PARKWAY PASADENA CA 91105
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042
15818	TELEDYNE SEMICONDUCTOR 1300 TERRA BELLA AVE MOUNTAIN VIEW CA 94043
81349	MILITARY SPECIFICATION

4.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Dvbfo switchboard	638-6437-001	REV A

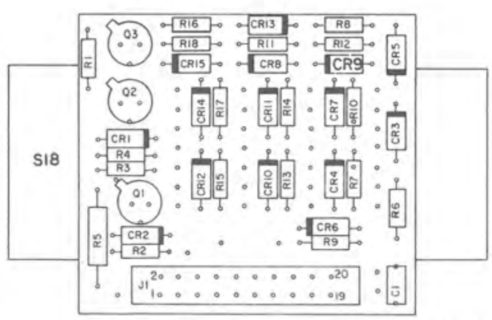


TPA-0361-014

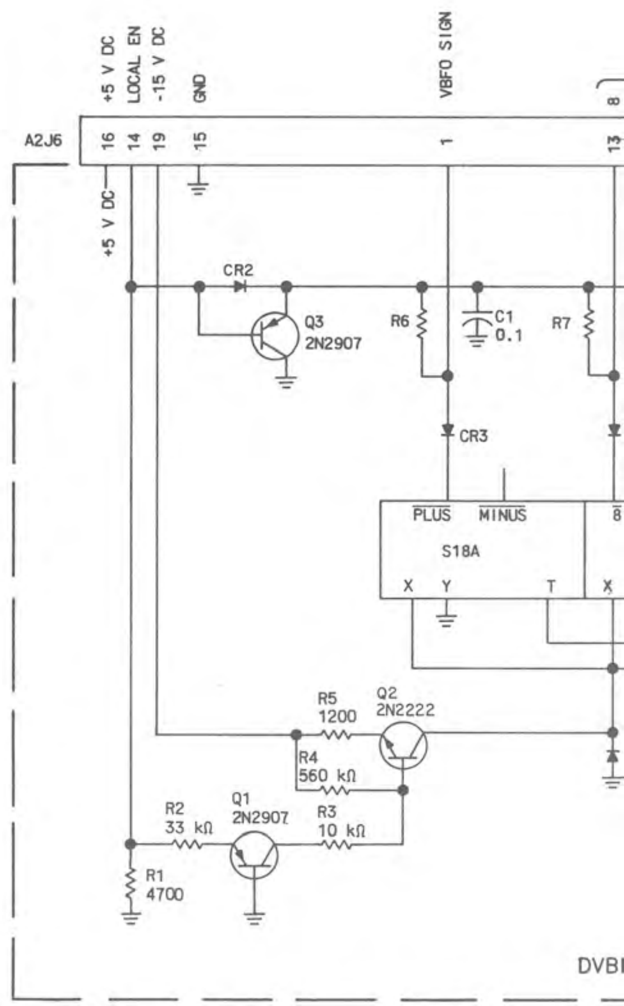
NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND DIODES ARE IN4454.
2. R6-R18 ARE 33 kΩ.

DVBFO Switchboard, Schematic Diagram
Figure 2 (Sheet 1 of 2)



TPA-2430-011



NOTES:

(1) UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, VALUES ARE IN MICROFARADS, AND DIODES ARE IN4454.

(2) R6-R18 ARE 33 kΩ.

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	DVBFO SWITCHBOARD	638-6437-001			
CR1-CR15	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1	CAPACITOR,FXD CER DIEL, 0.1UF, PORM10%, 50V	913-5019-320		81349	CK05BX104K
J1	HOUSING,CONN,EL	372-0043-380		00779	87478-3
Q1	TRANSISTOR	352-0551-010		15818	2N2907A
Q2	TRANSISTOR	352-0661-020		07263	2N2222A
Q3	TRANSISTOR	352-0551-010		15818	2N2907A
R1	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/8W	745-2365-000		81349	RCR05G472KS
R2	RESISTOR,FXD CMPSN, 33K, 10%, 1/8W	745-2395-000		81349	RCR05G333KS
R3	RESISTOR,FXD CMPSN, 10K, 10%, 1/8W	745-2377-000		81349	RCR05G103KS
R4	RESISTOR,FXD CMPSN, 560K, 10%, 1/8W	745-2440-000		81349	RCR05G564KS
R5	RESISTOR,FXD CMPSN, 1.2K, 10%, 1/4W	745-0752-000		81349	RCR07G122KS
R6-R18	RESISTOR,FXD CMPSN, 33K, 10%, 1/8W	745-2395-000		81349	RCR05G333KS
S1-S17	NOT USED				
S18	SWITCH ASSEMBLY	259-9651-060		07126	29C80

Frequency Display (637-1781-( ))

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0767975-004211
4th Edition, 1 June 1979

1. DESCRIPTION

The Frequency Display 635-1781-( ) consists of two subassemblies hard-wired together. One subassembly, the frequency display driver board, contains the logic and decoder/driver circuits. The other, the frequency display board, contains the 7-segment displays. The subassemblies are 2-layer circuit boards with a cable connector on the section containing the decoder/drivers. Figure 1 is a picture of the assembled subassemblies.

TP5-2370-017

Frequency Display
Figure 1

2. PRINCIPLES OF OPERATION

2.1 General

The frequency display configuration differences are as follows:

a. 637-1781-001, -006, 100 Hz operating frequency display and no BFO frequency display.
b. 637-1781-002, -007, 10 Hz operating frequency display and no BFO frequency display.
c. 637-1781-003, -008, 10 Hz operating frequency display and BFO frequency display of ±0-9990 Hz (operating frequency can be expanded to 1 Hz by adding display device U27).
d. 637-1781-004, -009, 1 Hz operating frequency display and BFO frequency display of ±0-9990 Hz.
e. 637-1781-005, -010, 100 Hz operating frequency display and no BFO frequency display (can be expanded to 10/1 Hz operating frequency display and/or BFO frequency display by adding display devices U26/U27 and/or U15 through U19).

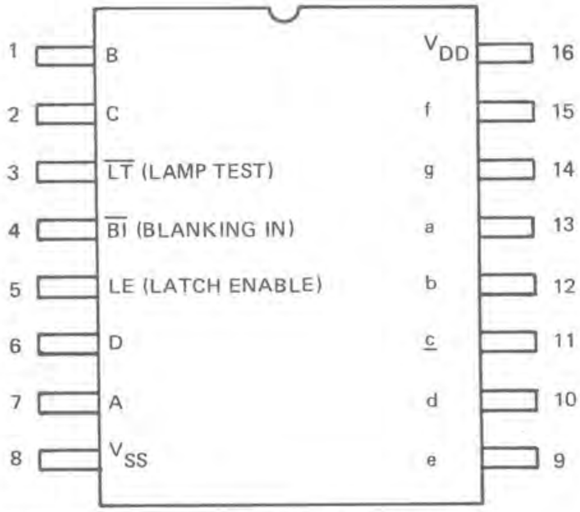
2.2 Theory of Operation (Refer to figure 4.)

For each frequency digit, a 4-bit binary input is applied to the decoder/driver. This input data is decoded into seven binary outputs. These logic-level outputs are applied directly to the 7-segment display associated with the decoder/driver. Each output causes a certain LED segment to light to form a part of the numeral equivalent to the 4-bit binary input to the board.

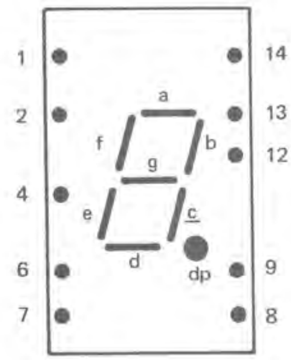
Figure 2 shows the decoder/driver input-output truth table and the 7-segment display connections.

The units and tens megahertz displays are blanked if the frequency is not within the 1- to 30-MHz range (for which these digits would be needed). This suppresses the leading zeros in lower frequency displays. The blanking (suppression) input ($\overline{BI}$ at logic 0 level) is generated by OR gates U6B-U6D. When all inputs

NOTICE: This section replaces third edition dated 1 January 1979.



BCD–TO–7–SEGMENT DECODER/DRIVER



TRUTH TABLE

INPUTS							OUTPUTS							
LE	$\overline{BI}$	$\overline{LT}$	D	C	B	A	a	b	c	d	e	f	g	DISPLAY
0	0	1	X	X	X	X	0	0	0	0	0	0	0	BLANK
0	1	1	0	0	0	0	1	1	1	1	1	1	0	0
0	1	1	0	0	0	1	0	1	1	0	0	0	0	1
0	1	1	0	0	1	0	1	1	0	1	1	0	1	2
0	1	1	0	0	1	1	1	1	1	1	0	0	1	3
0	1	1	0	1	0	0	0	1	1	0	0	1	1	4
0	1	1	0	1	0	1	1	0	1	1	0	1	1	5
0	1	1	0	1	1	0	0	0	1	1	1	1	1	6
0	1	1	0	1	1	1	1	1	1	0	0	0	0	7
0	1	1	1	0	0	0	1	1	1	1	1	1	1	8
0	1	1	1	0	0	1	1	1	1	0	0	1	1	9
0	1	1	1	0	1	0	0	0	0	0	0	0	0	BLANK
0	1	1	1	0	1	1	0	0	0	0	0	0	0	BLANK
0	1	1	1	1	0	0	0	0	0	0	0	0	0	BLANK
0	1	1	1	1	0	1	0	0	0	0	0	0	0	BLANK
0	1	1	1	1	1	0	0	0	0	0	0	0	0	BLANK
0	1	1	1	1	1	1	0	0	0	0	0	0	0	BLANK

X = DON'T CARE

7–SEGMENT LED DISPLAY

PIN NO.	PIN CONNECTIONS
1	ANODE F
2	ANODE G
3	NO PIN
4	COMMON CATHODE
5	NO PIN
6	ANODE E
7	ANODE D
8	ANODE C
9	ANODE DP
10	NO PIN
11	NO PIN
12	COMMON CATHODE
13	ANODE B
14	ANODE A

TP5-2300-011

Decoder/Driver and Display Elements Operation
Figure 2

to the decoder/driver are at logic 0, the OR gate outputs cause the $\overline{BI}$ input to be logic 0, causing a blanking command to be applied to the display. For this input to the indicators, no LED segments light and the display remains off, or blank.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test and troubleshoot the frequency display board are listed in the maintenance section of this instruction book.

3.2 Testing

The test procedures in table 1 check the total performance of the frequency display. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

Table 1. Frequency Display Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Test setup	Set PWR switch on and CONT switch to TEST. Set FREQUENCY KHZ display for all O's.		
2. Zero suppression and decimal point display	Set FREQUENCY KHZ display for 500 kHz. Observe FREQUENCY KHZ readout display.	Units' and tens' zeros of MHz range suppressed (blanked). Zeros for kHz and tenths displayed. Decimal point after fifth digit from left displayed.	If MHz-range zeros displayed, check U6B, U6C, U6D, and U7. If decimal point not displayed, check U24.
3. Digit selection and display (applicable only when used with thumbwheel frequency control switches)	Rotate each FREQUENCY kHz switch through all its positions. (Leftmost switch has positions 0, 1, and 2 only.) Observe readout display to see that corresponding selected digit is displayed. **Note** Wait approx 1 second after switching for time delay to elapse and circuit to strobe in new digit. If switch is changed too slowly, strobe signal may be generated while old number is still applied to circuit. In this case, the new number will not be displayed even though switch is set to new position. Switch away from and back to new position if this occurs.	Readout digit displayed corresponds to that selected on thumbwheel switch.	Refer to schematic diagram and check decoder/driver and readout unit corresponding to digit showing malfunction. For normal display, decoder/driver inputs and outputs at logic 1 are listed below for each digit. DIGIT — INPUTS — OUTPUTS 0 — (all 0's) — a+b+c+d+e+f 1 — A — b+c 2 — B — a+b+c+e+g 3 — A+B — a+b+c+d+g 4 — C — b+c+f+g 5 — A+C — a+c+d+f+g 6 — B+C — c+d+e+f+g 7 — A+B+C — a+b+c 8 — D — a+b+c+d+e+f+g 9 — A+D — a+b+c+f+g
4. Frequency display (applicable only when used with incremental tuning frequency control)	Set DIAL switch to FINE. Rotate TUNING dial through complete frequency range and observe FREQUENCY KHZ display.	All digits are displayed in sequence through complete frequency range of unit under test.	Same as test 3.

Table 1. Frequency Display Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Vbfo digit selection and display (applicable only when used with thumb-wheel dvbfo control switches)	Set BFO switch to VAR. Rotate each VBFO OFFSET Hz switch through all its positions. Observe readout display to see that corresponding selected digit is displayed. **Note** Wait approx 1 second after switching for time delay to elapse and circuit to strobe in new digit. If switch is changed too slowly, strobe signal may be generated while old number is still applied to circuit. In this case, the new number will not be displayed even though switch is set to new position. Switch away from and back to new position if this occurs.	Readout digit displayed corresponds to that selected on thumb-wheel switch.	Same as test 3.
6. Vbfo display (applicable only when used with incremental tuning vbfo control)	Set BFO switch to TUNE. Rotate TUNING dial through complete vbfo range and observe VBFO OFFSET HZ display.	All digits are displayed in sequence through complete vbfo range of unit under test.	Same as test 3.

4. REPAIR

Repair of the frequency display is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

5. PARTS LIST/DIAGRAMS

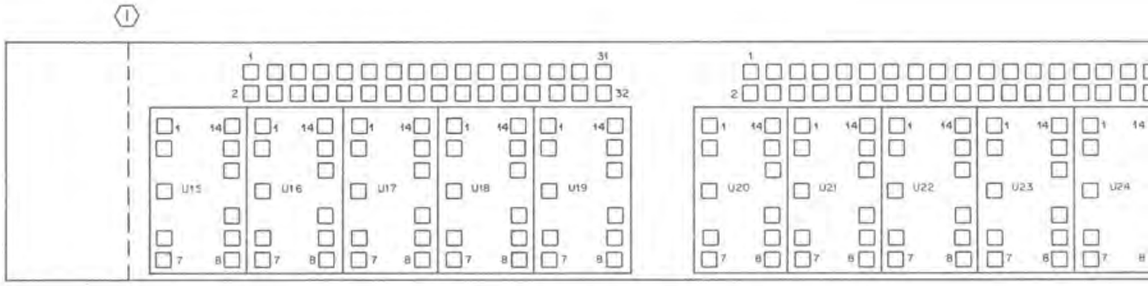
This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 3). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator.

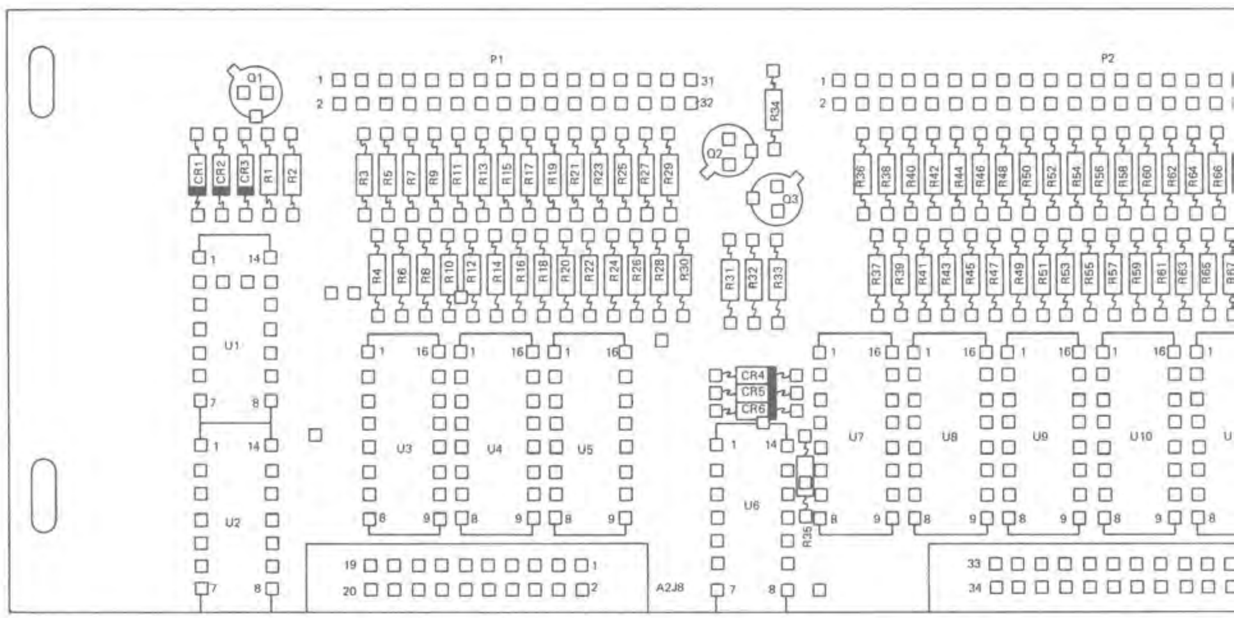
Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

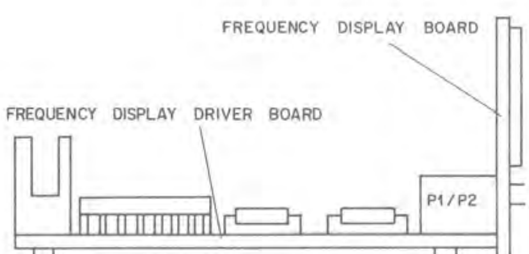
COLLINS CIRCUIT CARD/ SUBASSEMBLY	PART NUMBER	LATEST EFFECTIVITY
Frequency Display	637-1781-001	REV B
Frequency Display	637-1781-002	REV B
Frequency Display	637-1781-003	REV F
Frequency Display	637-1781-004	REV F
Frequency Display	637-1781-005	REV F
Frequency Display	637-1781-006	REV G
Frequency Display	637-1781-007	REV G
Frequency Display	637-1781-008	REV G
Frequency Display	637-1781-009	REV G
Frequency Display	637-1781-010	REV G
Frequency Display Driver Board	635-0896-001	REV H
Frequency Display Driver Board	635-0896-002	REV H
Frequency Display Driver Board	635-0896-004	REV G
Frequency Display Board	635-0897-001	REV C
Frequency Display Board	635-0897-002	REV C
Frequency Display Board	635-0897-003	REV D
Frequency Display Board	635-0897-004	REV E
Frequency Display Board	635-0897-005	REV F
Frequency Display Board	635-0897-006	REV F
Frequency Display Board	635-0897-007	REV F
Frequency Display Board	635-0897-008	REV F



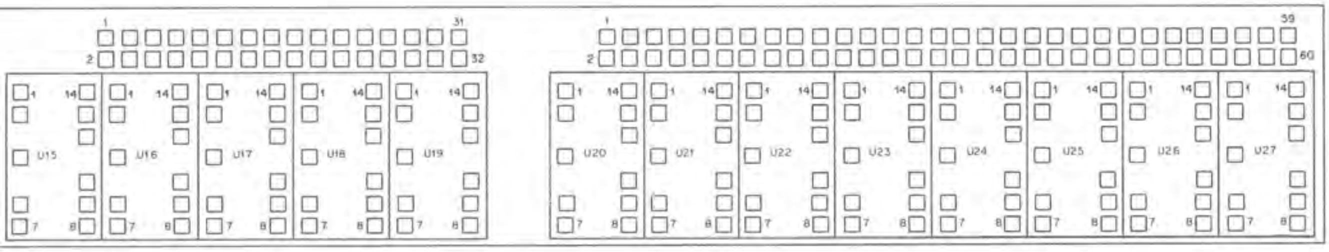
FREQUENCY DISPLAY BOARD 635-0897-( )



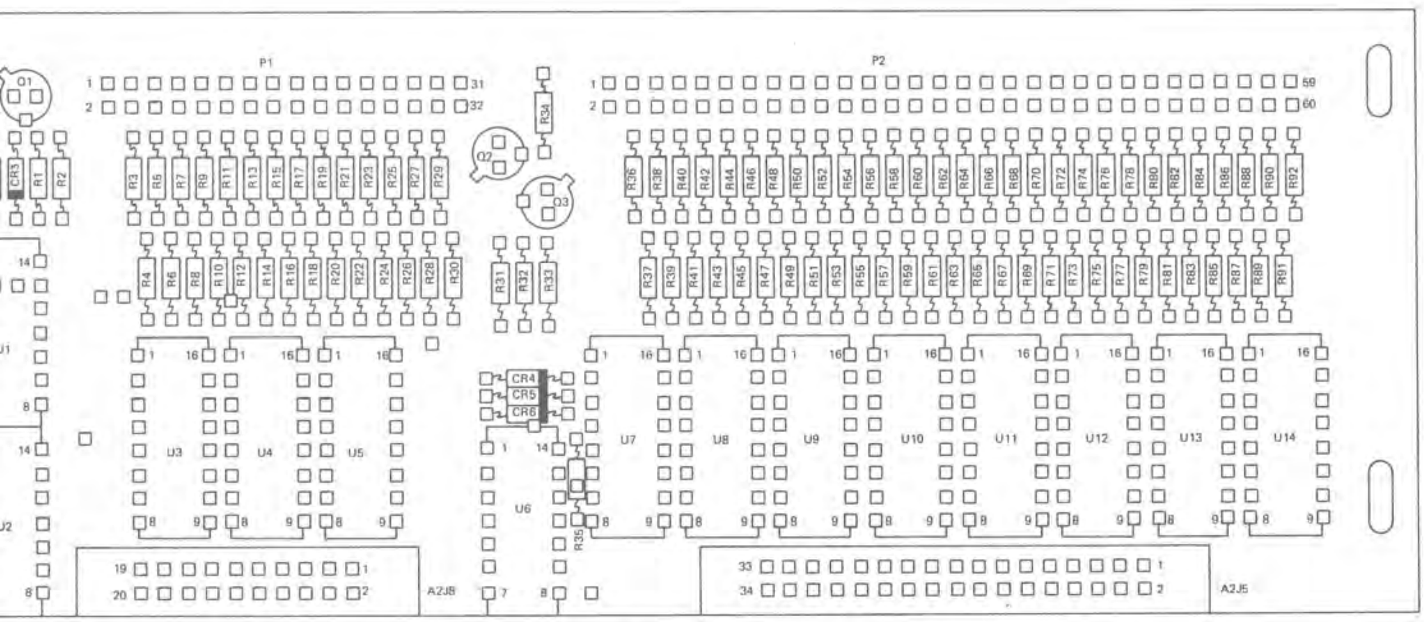
FREQUENCY DISPLAY DRIVER BOARD 635-0896-( )



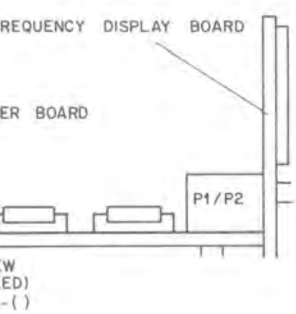
SIDE VIEW
(ASSEMBLED)
637-1781-( )



FREQUENCY DISPLAY BOARD 635-0897-( )



FREQUENCY DISPLAY DRIVER BOARD 635-0896-( )



NOTE:
(1) FREQUENCY DISPLAY BOARD 635-0895-005, -006, -007, AND -008 IS A SHORTENED BOARD.

TP5-1039-014

Frequency Display, Schematic Diagram
Figure 3 (Sheet 1 of 4)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	FREQUENCY DISPLAY	637-1781-001	A		
	FREQUENCY DISPLAY	637-1781-002	B		
	FREQUENCY DISPLAY	637-1781-003	C		
	FREQUENCY DISPLAY	637-1781-004	D		
	FREQUENCY DISPLAY	637-1781-005	E		
	FREQUENCY DISPLAY	637-1781-006	F		
	FREQUENCY DISPLAY	637-1781-007	G		
	FREQUENCY DISPLAY	637-1781-008	H		
	FREQUENCY DISPLAY	637-1781-009	J		
	FREQUENCY DISPLAY	637-1781-010	K		
	FREQUENCY DISPLAY DRIVER BD	635-0896-001	A,F		
	FREQUENCY DISPLAY DRIVER BD	635-0896-002	B,G		
	FREQUENCY DISPLAY DRIVER BD	635-0896-004	C,D,E,H J,K		
	FREQUENCY DISPLAY BD	635-0897-001	A,E		
	FREQUENCY DISPLAY BD	635-0897-002	B		
	FREQUENCY DISPLAY BD	635-0897-003	C		
	FREQUENCY DISPLAY BD	635-0897-004	D		
	FREQUENCY DISPLAY BD	635-0897-005	F,K		
	FREQUENCY DISPLAY BD	635-0897-006	G		
	FREQUENCY DISPLAY BD	635-0897-007	H		
	FREQUENCY DISPLAY BD	635-0897-008	J		
	FREQUENCY DISPLAY DRIVER BD	635-0896-001			
CR1-CR3	NOT USED				
CR4-CR6	SEMICOND BEVICE 1N4454	353-3644-010		03508	1N4454GE
J1-J4	NOT USED				
J5	HOUSING,CONN,EL	372-0043-450		00779	87478-5
P1	CONNECTOR,HDR	372-0028-030		00779	1-87566-6
P2	CONNECTOR,HDR	372-0028-040		00779	3-87566-0
R1-R34	NOT USED				
R35	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/8W	745-2449-000		81349	RCR05G105KS
R36-R78	RESISTOR,FXD CMPSN, 180 OHMS, 10%, 1/8W	745-2314-000		81349	RCR05G181KS
U1-U5	NOT USED				
U6	INTEGRATED CIRCUIT MC14071BCP	351-8287-010		04713	MC14071BCP
U7-U12	INTEGRATED CIRCUIT MC14511BCP	351-8304-010		04713	MC14511BCP
	FREQUENCY DISPLAY DRIVER BD	635-0896-002	B,G		
CR1-CR3	NOT USED				
CR4-CR6	SEMICOND DEVICE 1N4454	353-3644-010		03508	1N4454GE
J1-J4	NOT USED				
J5	HOUSING,CONN,EL	372-0043-450		00779	87478-5
P1	CONNECTOR,HDR	372-0028-030		00779	1-87566-6
P2	CONNECTOR,HDR	372-0028-040		00779	3-87566-0
R1-R34	NOT USED				
R35	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/8W	745-2449-000		81349	RCR05G105KS
R36-R85	RESISTOR,FXD CMPSN, 180 OHMS, 10%, 1/8W	745-2314-000		81349	RCR05G181KS
U1-U5	NOT USED				
U6	INTEGRATED CIRCUIT MC14071BCP	351-8287-010		04713	MC14071BCP
U7-U13	INTEGRATED CIRCUIT MC14511BCP	351-8304-010		04713	MC14511BCP
	FREQUENCY DISPLAY DRIVER BD	635-0896-004	C,D,E,H J,K		
CR1-CR6	SEMICOND DEVICE 1N4454	353-3644-010		03508	1N4454GE
J1-J4	NOT USED				
J5	HOUSING,CONN,EL	372-0043-450		00779	87478-5
J6,J7	NOT USED				
J8	HOUSING,CONN,EL	372-0043-380		00779	87478-3
Q1-Q3	TRANSISTOR 2N2222A	352-0661-020		07263	2N2222A
R1	RESISTOR,FXD CMPSN, 470K, 10%, 1/8W	745-2437-000		81349	RCR05G474KS
R2	RESISTOR,FXD CMPSN, 47K, 10%, 1/8W	745-2401-000		81349	RCR05G473KS
R3-R30	RESISTOR,FXD CMPSN, 180 OHMS, 10%, 1/8W	745-2314-000		81349	RCR05G181KS
R31	RESISTOR,FXD CMPSN, 100K, 10%, 1/8W	745-2413-000		81349	RCR05G104KS
R32	RESISTOR,FXD CMPSN, 470K, 10%, 1/8W	745-2437-000		81349	RCR05G474KS
R33	RESISTOR,FXD CMPSN, 3.9K, 10%, 1/8W	745-2362-000		81349	RCR05G392KS
R34	RESISTOR,FXD CMPSN, 470K, 10%, 1/8W	745-2437-000		81349	RCR05G474KS
R35	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/8W	745-2449-000		81349	RCR05G105KS
R36-R92	RESISTOR,FXD CMPSN, 180 OHMS, 10%, 1/8W	745-2314-000		81349	RCR05G181KS
U1	INTEGRATED CIRCUIT MC14081BCP	351-8287-030		04713	MC14081BCP
U2	INTEGRATED CIRCUIT MC14072BCP	351-8287-040		04713	MC14072BCP
U3-U5	INTEGRATED CIRCUIT MC14511BCP	351-8304-010		04713	MC14511BCP
U6	INTEGRATED CIRCUIT MC14071BCP	351-8287-010		04713	MC14071BCP
U7-U14	INTEGRATED CIRCUIT MC14511BCP	351-8304-010		04713	MC14511BCP
	FREQUENCY DISPLAY BD	635-0897-001	A,E		
U1-U19	NOT USED				
U20-U25	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A
	FREQUENCY DISPLAY BD	635-0897-002	B		
U1-U19	NOT USED				
U20-U26	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A
	FREQUENCY DISPLAY BD	635-0897-003	C		
U1-U14	NOT USED				
U15-U27	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A
	FREQUENCY DISPLAY BD	635-0897-004	D		
U1-U14	NOT USED				
U15-U27	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A
	FREQUENCY DISPLAY BD	635-0897-005	F,K		
U1-U19	NOT USED				
U20-U25	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A

PARTS

REF DES	DESCRIPTION
	FREQUENCY DISPLAY BD
U1-U19	NOT USED
U20-U26	SEMICOND DEVICE MAN3640A
	FREQUENCY DISPLAY BD
U1-U14	NOT USED
U15-U26	SEMICOND DEVICE MAN3640A
	FREQUENCY DISPLAY BD
U1-U14	NOT USED
U15-U26	SEMICOND DEVICE MAN3640A

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	FREQUENCY DISPLAY BD	635-0897-006	G		
U1-U19	NOT USED				
U20-U26	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A
	FREQUENCY DISPLAY BD	635-0897-007	H		
U1-U14	NOT USED				
U15-U26	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A
	FREQUENCY DISPLAY BD	635-0897-008			
U1-U14	NOT USED				
U15-U26	SEMICOND DEVICE MAN3640A	262-1461-010		50522	MAN3640A

R
RT NUMBER

454GE

78-5
7566-6
7566-0

05G105KS
05G181KS

4071BCP
4511BCP

454GE

78-5
7566-6
7566-0

05G105KS
05G181KS

4071BCP
4511BCP

454GE

78-5

78-3
222A
05G474KS
05G473KS
05G181KS
05G104KS
05G474KS
05G392KS
05G474KS
05G105KS
05G181KS
4081BCP
4072BCP
4511BCP
4071BCP
4511BCP

N3640A

N3640A

N3640A

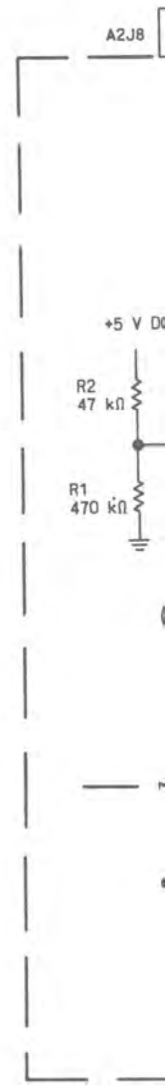
N3640A

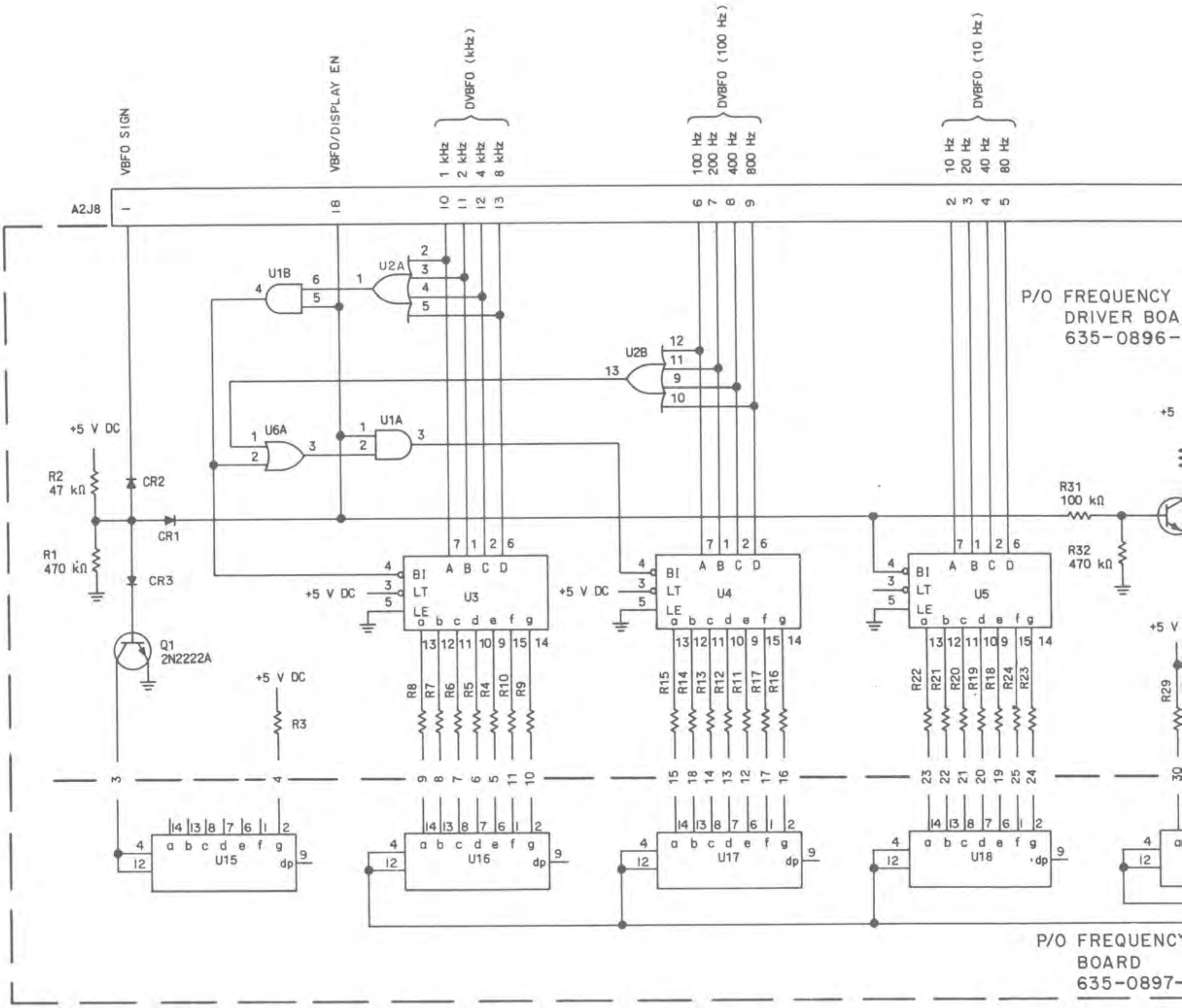
N3640A

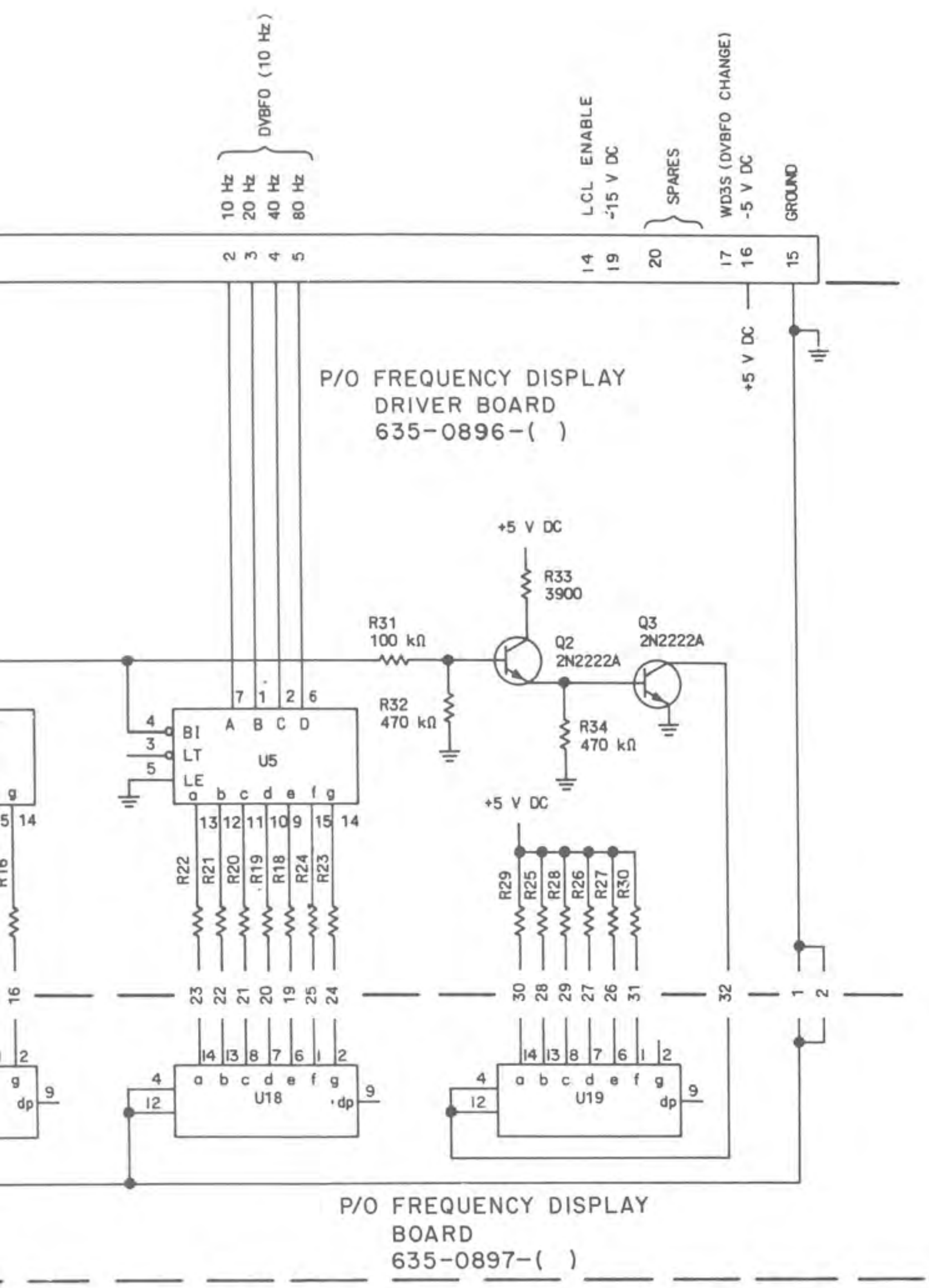
Frequency Display, Schematic D
Figure 3 (Sheet 2)

CIRCUITS USED PER FREQUENCY DISPLAY

Board	Function		CIRCUIT	637-1781-() -001	-002	-003	-004	-005	-006	-007	-008	-009	-010
FREQUENCY DISPLAY DRIVER BOARD	VBFO DISPLAY ENABLE	VBFO DISPLAY ENABLE	U1			X	X	X			X	X	X
			U2			X	X	X			X	X	X
		1 kHz	U3			X	X	X			X	X	X
		100 Hz	U4			X	X	X			X	X	X
		10 Hz	U5			X	X	X			X	X	X
	OPER FREQ DISPLAY DRIVERS	DISPLAY BLANKING	U6	X	X	X	X	X	X	X	X	X	X
		10 MHz	U7	X	X	X	X	X	X	X	X	X	X
		1 MHz	U8	X	X	X	X	X	X	X	X	X	X
		100 kHz	U9	X	X	X	X	X	X	X	X	X	X
		10 kHz	U10	X	X	X	X	X	X	X	X	X	X
		1 kHz	U11	X	X	X	X	X	X	X	X	X	X
		100 Hz	U12	X	X	X	X	X	X	X	X	X	X
		10 Hz	U13		X	X	X	X		X	X	X	X
		1 Hz	U14			X	X	X			X	X	X
FREQUENCY DISPLAY BOARD	VBFO DISPLAY	SIGN	U15			X	X				X	X	
		1 kHz	U16			X	X				X	X	
		100 Hz	U17			X	X				X	X	
		10 Hz	U18			X	X				X -	X	
		1 Hz	U19			X	X				X	X	
	OPER FREQ DISPLAY	10 MHz	U20	X	X	X	X	X	X	X	X	X	X
		1 MHz	U21	X	X	X	X	X	X	X	X	X	X
		100 kHz	U22	X	X	X	X	X	X	X	X	X	X
		10 kHz	U23	X	X	X	X	X	X	X	X	X	X
		1 kHz	U24	X	X	X	X	X	X	X	X	X	X
		100 Hz	U25	X	X	X	X	X	X	X	X	X	X
		10 Hz	U26		X	X	X			X	X	X	
		1 Hz	U27				X*					X	

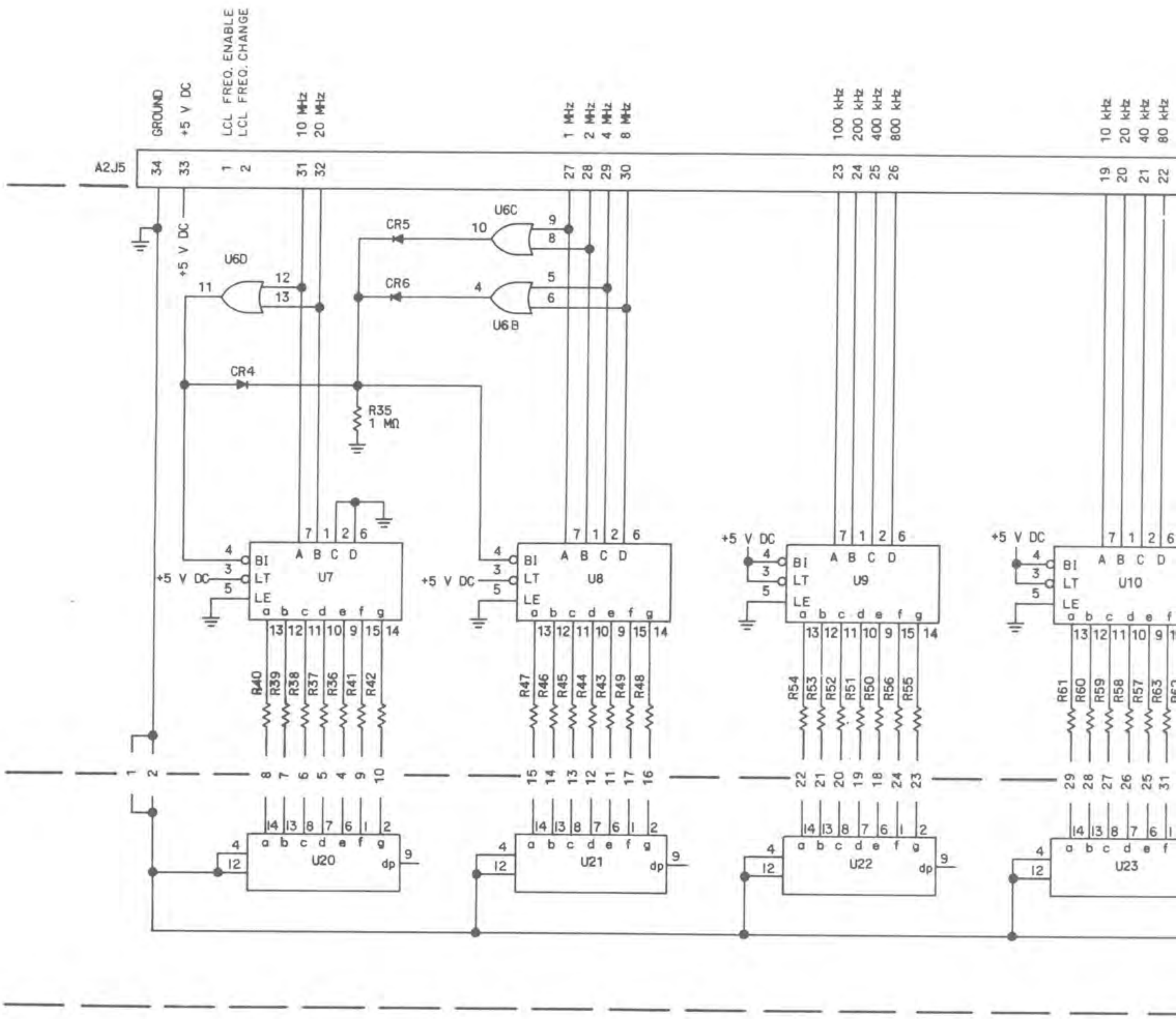



VBFO SIGN
VBFO/DISPLAY EN
DVBFO (kHz)
1 kHz
2 kHz
4 kHz
8 kHz
DVBFO (100 Hz)
100 Hz
200 Hz
400 Hz
800 Hz
DVBFO (10 Hz)
10 Hz
20 Hz
40 Hz
80 Hz
A2J8
P/O FREQUENCY
DRIVER BOA
635-0896-
U1B
U2A
U2B
U6A
U1A
+5 V DC
R2
47 kΩ
CR2
CR1
R1
470 kΩ
CR3
Q1
2N2222A
R3
R31
100 kΩ
R32
470 kΩ
U3
U4
U5
R8
R7
R6
R5
R4
R10
R9
R15
R14
R13
R12
R11
R17
R16
R22
R21
R20
R19
R18
R24
R23
R29
U15
U16
U17
U18
P/O FREQUENCY
BOARD
635-0897-



TPA-0277-025

Frequency Display, Schematic Diagram
Figure 3 (Sheet 3)



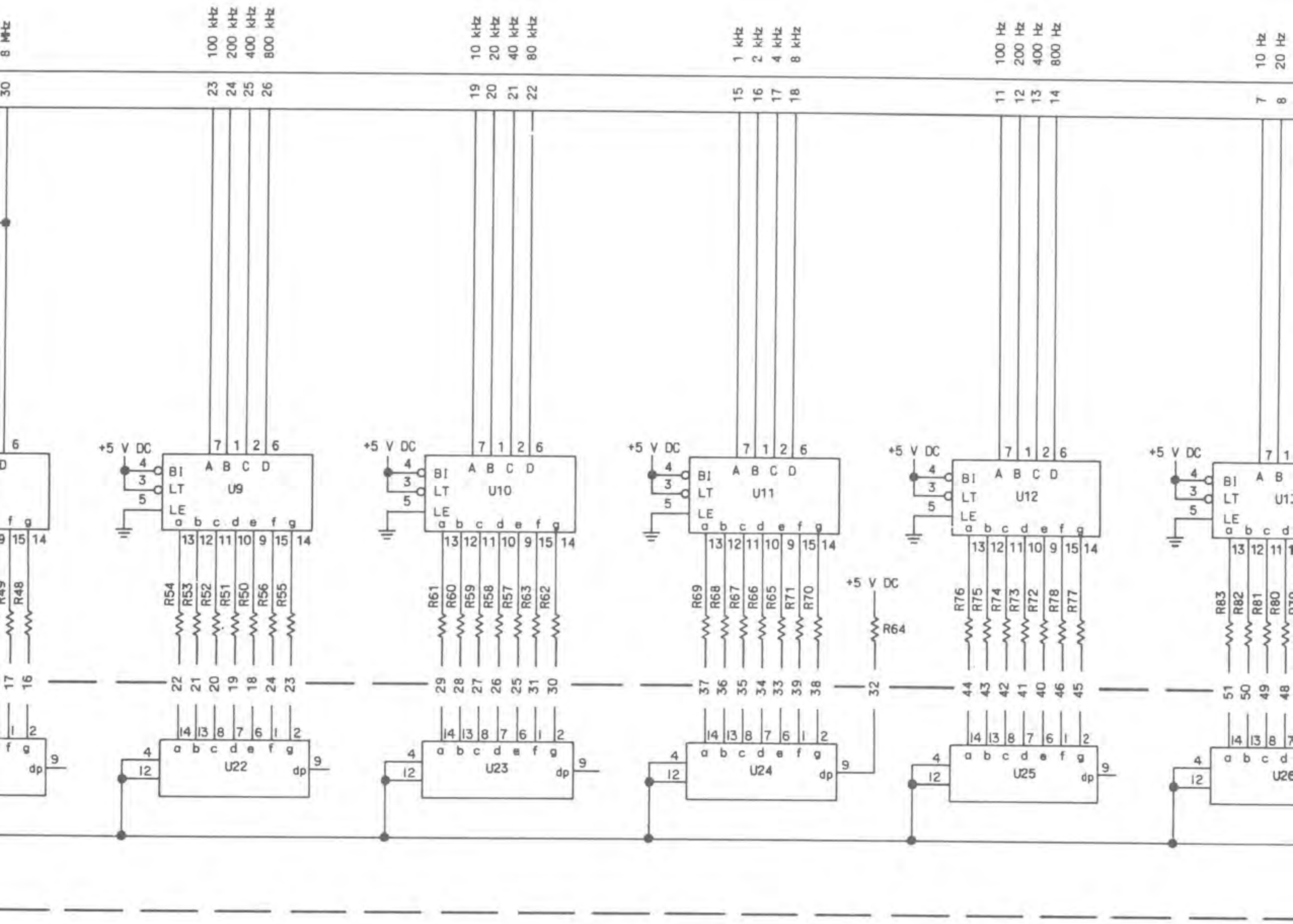
NOTES:

(1) RESISTORS R3 THRU R30 AND R36 THRU R92 ARE 180 OHM.

(2) DIODES ARE TYPE 1N4454.

(3) POWER AND GROUND CONNECTIONS

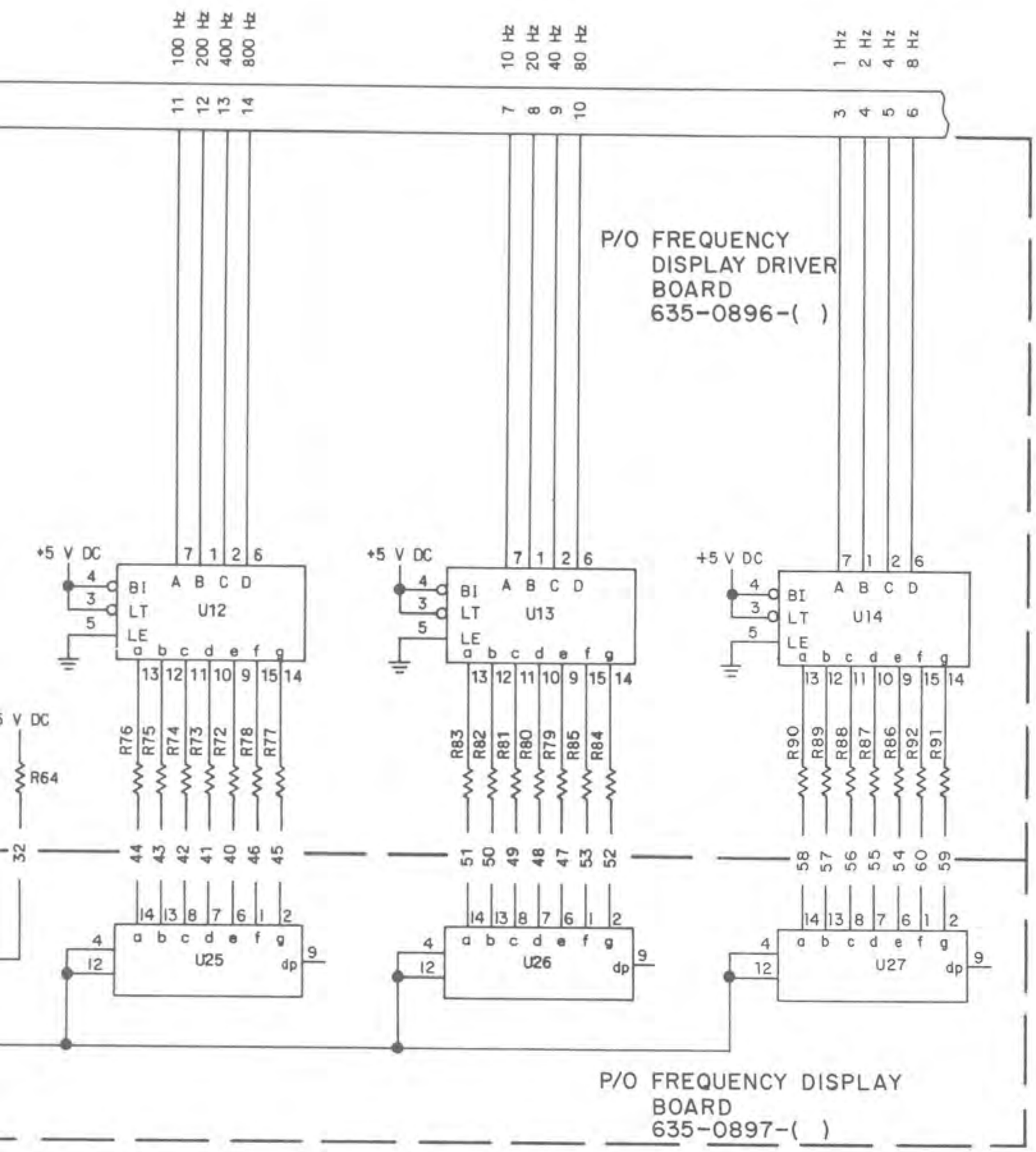
U NO.	TYPE	POWER
		+5
U1	MC14081BCP	14
U2	MC14072BCP	14
U3, U4, U5, AND U7 THRU U14	MC14511BCP	16
U6	MC14071BCP	14
U15 THRU U27	MAN3640A	



180 OHM.

(3) POWER AND GROUND CONNECTIONS

U NO.	TYPE	POWER (V DC)	
		+5	GND
U1	MC14081BCP	14	7
U2	MC14072BCP	14	7
U3, U4, U5, AND U7 THRU U14	MC14511BCP	16	8
U6	MC14071BCP	14	7
U15 THRU U27	MAN3640A		



TPA-0277-025

Frequency Display, Schematic Diagram
Figure 3 (Sheet 4)

Control Receive Audio (642-3572-( ))

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0770969-001211
1 January 1981

1. DESCRIPTION

Control Receive Audio 642-3572-( ), shown in figure 1, is a 2-layer planar card with a 56-pin (2-layers, 28 pins each) edge-on connectors. All test points and adjustable resistors are mounted at the top edge of the card for easy access with the card installed in the unit.

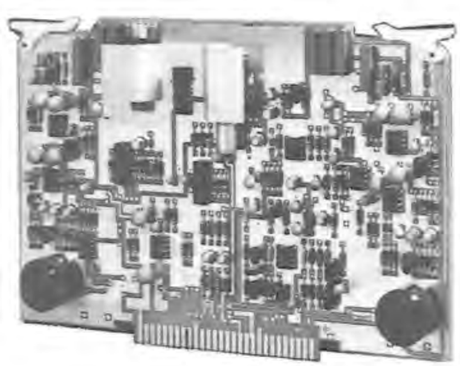
The control receive audio card configuration differences are as follows:

a. 642-3572-001 has an output transformer for use with 4-channel type radios.
b. 642-3572-002 has an output transformer for use with 2-channel type radios.

2. PRINCIPLES OF OPERATION

2.1 General

The control receive audio card consists of four primary circuits: (1) channel A line amplifier, (2) channel B line amplifier, (3) headphone amplifier, and (4) squelch circuit, including speaker amplifier. Additionally, two zener diodes are used to develop voltages for the squelch amplifier and headphone channel selector switching transistors. Other circuit voltages are applied directly from the unit power supply.



TPA-3179-017

Control Receive Audio
Figure 1

2.2 Line Audio Amplifiers (Refer to figure 2.)

Since the channel A and channel B line preamplifier/amplifier circuits are the same, only the channel A circuit is discussed.

The line input to channel A is amplified by U1B and applied to U1A through the CH A SPKR LVL potentiometer. The output of U1A is applied to U10A for application to the speaker selector switch, to headphone amplifier channel selector switch U6D, and to U2B through the CH A LINE ADJ potentiometer. Amplifier U2B is a driver for push-pull amplifier Q1/Q2. The output of Q1/Q2 goes to transformer T1 for output to external circuits and to U2A for rectification and filtering to develop the channel A receive metering signal.

2.3 Headphone Amplifier (Refer to figure 2.)

Amplification of the line amplifier output signals to the headphones is by a 2-stage amplifier. A level control (on the unit front panel) provides the operator with manual control of headphone signal level. This control is a gain adjustment for one stage of the amplifier circuit.

Signals to the headphone amplifier input are selectable between channel A and channel B. With channel A selected (by the front panel switch), Q9 conducts applying an enable signal to U6D through U6A. Switch U6D couples the line audio amplifier signal to the headphone amplifier circuit. Similar operation occurs when channel B is selected. Only one channel at a time can be selected for application to the headphone amplifier.

2.4 Squelch Circuit and Speaker Amplifier (Refer to figure 2.)

The output from speaker amplifier U9 is controlled by two sources: the front panel af gain control and the squelch amplifier. Input to the speaker amplifier passes through FET Q8. The FET serves as a squelch gate. With the squelch circuit disable (squelch enable line grounded), Q8 will conduct all signals applied to it. These signals are obtained from the channel A and B line amplifiers through the front panel speaker channel selector switch and the af gain control potentiometer.

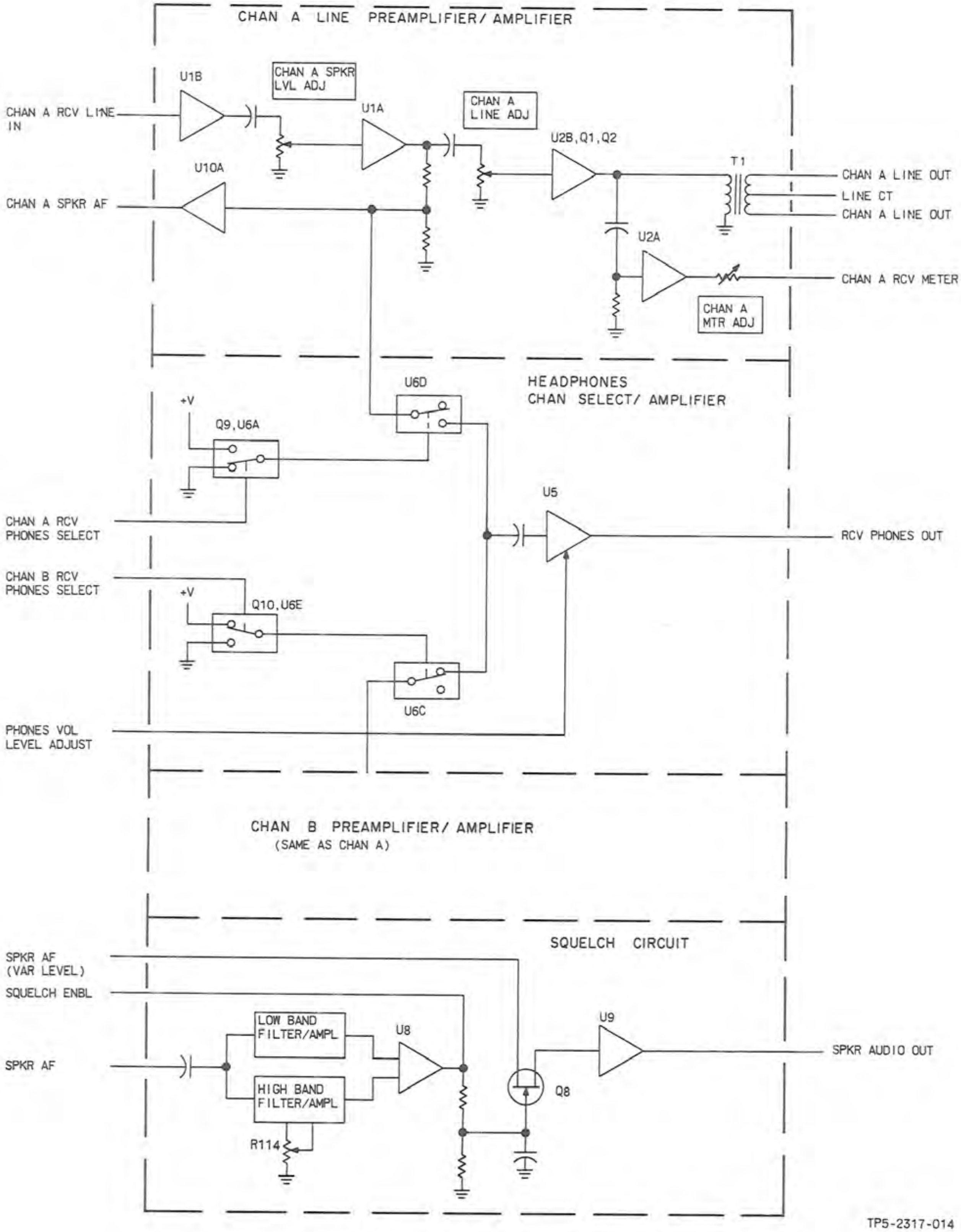
With squelch enabled, Q8 will conduct only when gated on by the output of a comparator in the squelch circuit. (The af signal level to he input of the speaker amplifier is controlled, as when squelch is disabled, by the front panel af gain control.) The squelch gating signal is developed from a comparison between the high and low frequencies of the audio signal from the line audio amplifier. A low frequency (voice) signal level greater than the high frequency (background noise) level will cause the squelch comparator to turn on the FET gate. This permits the audio signal to be applied to the speaker amplifier. With less low frequency signal level, the high frequency signals cause the comparator to keep Q8 gated off. The level at which Q8 gates on is adjustable by the squelch threshold signal from the front panel squelch control.

Paragraph 2.5 discusses the squelch circuit operation in detail.

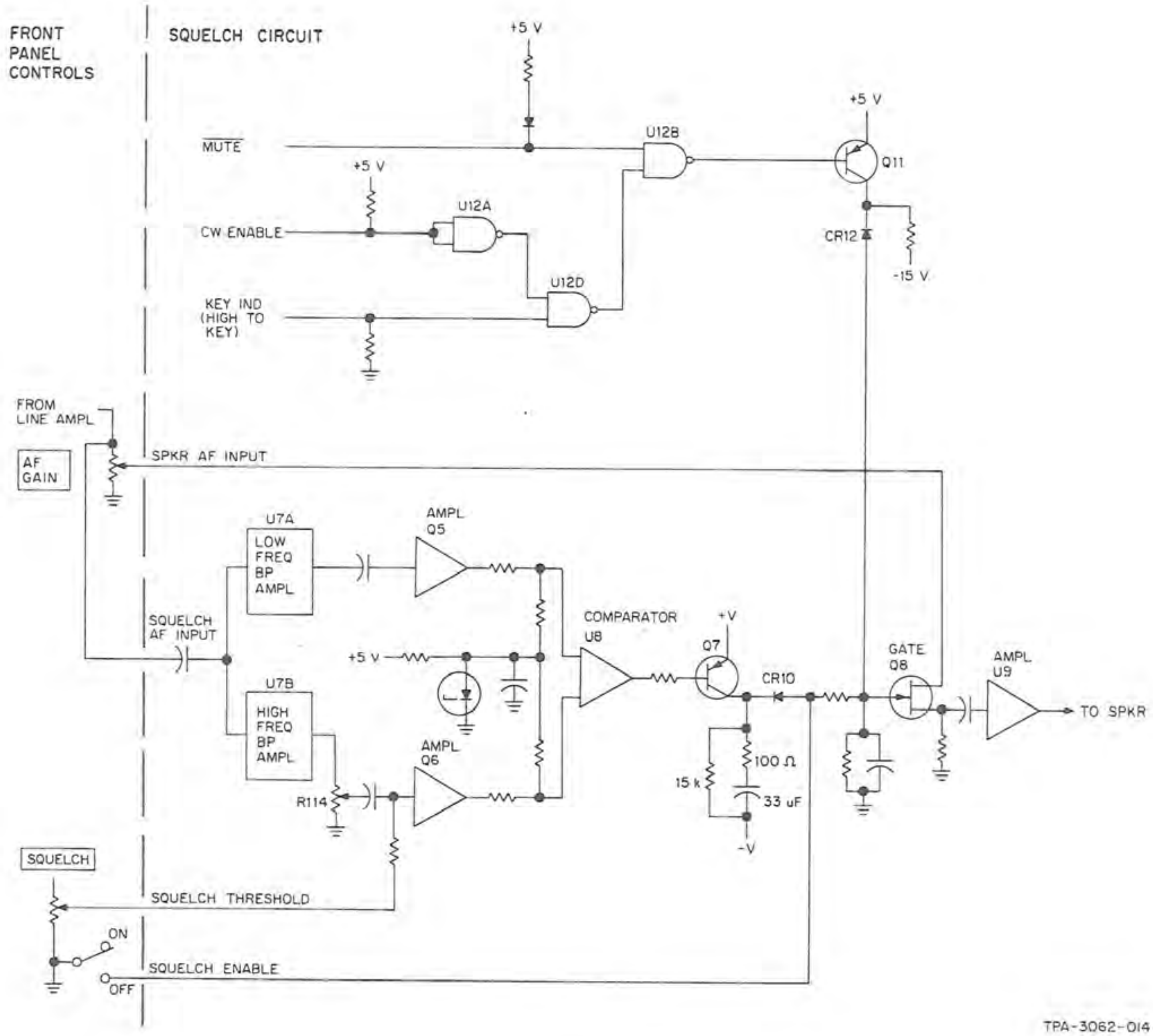
2.5 Squelch Circuit (Refer to figure 3.)

When the squelch circuit is enabled, the front panel squelch switch is disconnected from ground and the signal coupled through CR10 controls the gate voltage of Q8. (If no voltage is applied, Q8 is in the fully conducting mode. A negative voltage will cause Q8 to turn off.) This is the squelch gating for the received audio signal.

The squelch af signal is the received audio signal coupled from the line audio amplifier through the front panel speaker selection switch. This signal is applied in parallel to the low-frequency and high-frequency bandpass amplifiers. The low-frequency bandpass is centered on 600 Hz and the high-frequency bandpass on 2400 Hz. The high-frequency amplifier output is applied to amplifier Q6 through potentiometer R114. This permits adjusting the signal to Q6 to be greater than the signal applied directly to Q5 from the low-frequency amplifier. Because of this difference in levels, when no received audio signal is present the high-frequency signal input to comparator U8 will be greater than the low-frequency input to the comparator. Under this condition, the comparator output will keep transistor Q7 reverse biased. This causes CR10 to conduct, applying a negative voltage to the gate of Q8. With the gate negative, Q8 is biased off and no audio signals can be applied to the speaker amplifier. When a received audio signal is present, the low-frequency amplifier output is increased (due to the low-frequency components of voice characteristics). As the low frequency input to the comparator exceeds the high-frequency input, the comparator output forward biases Q7. This reverse biases CR10 and permits Q8 to conduct the received audio signals to the speaker amplifier.



Control Receive Audio, Simplified Diagram
Figure 2

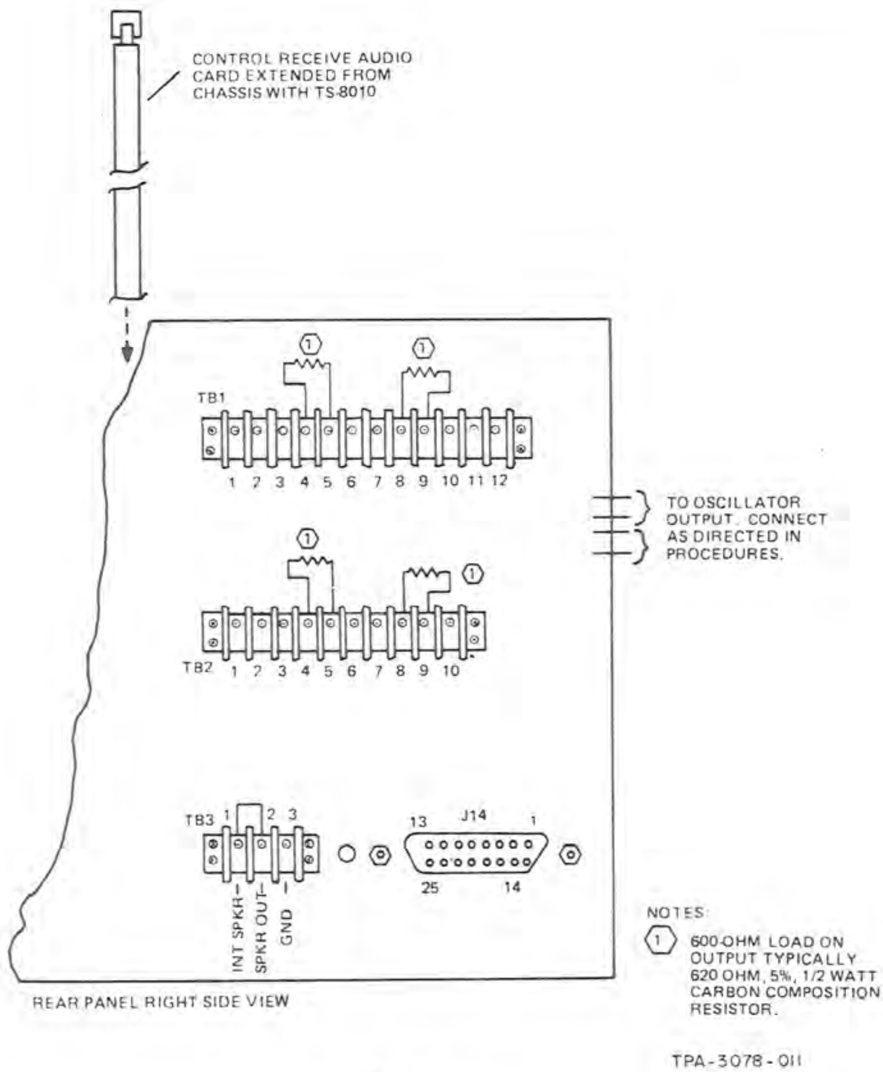


Squelch Circuit Diagram
Figure 3

The threshold at which squelch operation becomes effective is operator-adjustable at the front panel squelch control. This control is a potentiometer in the input circuit to Q6. By decreasing the squelch threshold, the comparator input from Q6 is changed to approach the inptu level of Q5. This decrease in the difference in signal levels to the comparator causes Q8 to be gated on sooner.

The speaker amplifier output is also controlled by the $\overline{\text{MUTE}}$, CW ENABLE and KEY IND logic inputs. To continuously mute the speaker audio, the $\overline{\text{MUTE}}$ input is utilized. A logic 0 $\overline{\text{MUTE}}$ ($\overline{\text{MUTE}}$ input grounded) input to U12B produces a logic 1 at the base of Q11, cutting off Q11. With Q11 cutoff a negative voltage is applied to the gate of Q8 through CR12. With the gate negative, Q8 is biased off and no audio signals can be applied to speaker amplifier U9.

The KEY IND and CW ENABLE inputs are for use with the HF-8092 Receiver-Exciter Control to control the speaker amplifier output during cw operation and when a microphone input is used.



Test Setup
Figure 4

When a microphone input is used, speaker to microphone feedback is prevented by the KEY IND input going to logic 1 when the microphone is keyed (MUTE is logic 1 and CW ENABLE is logic 0). This combination of logic inputs produces a logic 1 at the base of Q11 and, as described above, no audio can be applied to the speaker amplifier.

For cw operation, it is desirable to have speaker audio. To prevent the key input (KEY IND) from muting the speaker, the CW ENABLE input is a logic 1 ($\overline{\text{MUTE}}$ is also logic 1). The $\overline{\text{MUTE}}$ and CW ENABLE inputs produce a logic 0 at the base of Q11 (the logic 1 and 0 input at KEY IND input cannot affect the signal now at the base of Q11). A logic 0 on the base of Q11 causes Q11 to conduct. With Q11 conducting, a positive voltage is applied to the gate of Q8. With the gate positive, Q8 conducts and the audio is applied to the speaker amplifier.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the control receive audio card are listed in the maintenance section of this instruction book.

3.2 *Testing*

The test procedures in table 1 check total performance of the control receive audio card. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

4. ALIGNMENT/ADJUSTMENT

Procedures for adjusting the variable controls on the control receive audio card are contained in the test procedures (table 1).

Perform the test setup step in the table. Refer to steps refrenced below for the applicable circuit adjustment.

Preamplifiers and line amplifiers	Step 2
Squelch	Step 4
Meter amplifier	Step 7

5. REPAIR

Repair of the control receive audio card is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for circuit card repair procedures.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Test setup	a. Make sure the PWR switch is off. b. Remove the control audio card to be tested. Install it on an extender card and connect it to J4 in the control unit. c. Refer to test setup diagram and make connections shown.		
2. Preamplifiers and line amplifiers	**Note** For testing purposes, the preamplifier/amplifier gain is standardized at unity (signal in = signal out). The gains are operator adjustable and may be set later as desired for individual unit operating conditions.		
2.1 Channel A	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Set R6 and R15 fully cw (max gain). Turn on PWR switch.		
2.1.1 Signal presence	Adjust oscillator output to 1000 ±100 Hz and 0.77 V ac (0 dB mW). Check for output at TB1-4 and -5 (CH A1 RCV AF 600 ohms OUT).	Signal present. (Level not critical.)	If signal not present, check for signal at U1B-7. If no signal there, troubleshoot that circuit. If present, troubleshoot R6/U1A circuit. If signal present at U1A-1, set METER switch to A1AF +13FS and check for meter indication. If meter indicates output, troubleshoot T1 circuit. If output not present, check for signal at U2B-7. If no signal, troubleshoot U2B/R15 circuit. If signal is there, troubleshoot Q1, Q2 circuit.
2.1.2 Gain (Cont)	Measure output level at TB1-4 and -5.	Output not less than 3.9 V ac (+14 dB mW).	If output is less, measure signal level at U1B-7. If level less than 0.72 V ac, troubleshoot U1B circuit for low gain. If level equal to or greater than 0.72 V ac check level at U1A-1 for 8.0 V ac. If level at U1A-1 less than 8.0 V ac, troubleshoot

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2.1.2 (Cont)			U1A circuit for low gain. If level more than 8.0 V ac, trouble-shoot U2B/Q1, Q2 circuit for low gain.
	a. Adjust R6 as required to obtain 4.3 ±0.5 V ac (+15 ±1 dB mW) at TB1-4 and -5. b. Adjust R15 as required to obtain 0.77 ±0.05 V ac (0 ±1 dB mW) at TB1-4 and -5.		
2.2 Channel B	Disconnect oscillator from TB1-2 and -3, and connect it to TB1-6 and -7 (CH B1 RCV AF 600 OHMS IN). Set R39 and R48 fully cw (max gain). Check that PWR switch is on.		
2.2.1 Signal presence	Adjust oscillator output to 1000 ±100 Hz and 0.77 V ac (0 dB mW). Check for output at TB1-8 and -9 (CH B1 RCV AF 600 OHMS OUT)	Signal present. (Level not critical.)	If signal not present, check for signal at U3B-7. If no signal there, troubleshoot that circuit. If pre-sent troubleshoot R39/U3A circuit. If signal is present at U3A-1, set METER switch to B1 AF (+13FS) and check for meter indication. If meter indicates out-put, troubleshoot T2 circuit. If no output, check for signal at U4B-7. If no signal there, troubleshoot U4B/R48 circuit. If signal is there, troubleshoot Q3, Q4 circuit.
2.2.2 Gain (Cont)	Measure output level at TB1-8 and -9.	Output not less than 3.9 V ac (+14 dB mW).	If output less, mea-sure signal level at U3B-7. If level less than 0.72 V ac, troubleshoot U3B circuit for low gain. If level equal to or greater than 0.72 V ac, check level at U3A-1 for 8.0 V ac. If level at U3A-1 less than 8.0 V ac, trouble-shoot U3A circuit for low gain. If level more than 8.0 V ac, trouble-shoot U4B/Q3, Q4 circuit for low gain.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2.2.2 (Cont)	a. Adjust R39 as required to obtain 4.3 ±0.5 V ac (+15 ±1 dB mW) at TB1-8 and -9. b. Adjust R48 as required to obtain 0.77 ±0.05 V ac (0 ±1 dB mW) at TB1-8 and -9.		
3. Headphone amplifier	Perform test setup (test 1) and connect oscillator output to TB1-6 and -7. Adjust oscillator for 1000 ±100 Hz and 0.77-V ac (0-dB mW) output. Set PHONES switch to B1, and connect headphones to PHONES jack or connect 600-Ω resistor across PHONES jack. Adjust PHONES level to midrange.		
3.1 Signal presence	Check headphone output for signal presence. (Adjust PHONES level as required.)	Signal present. (Level not critical.)	If signal not present, check for signal at U5A-1. If no signal there, troubleshoot U5A circuit. If signal is present, troubleshoot U5B and A2S19 circuits.
3.2 Gain	Set PHONES level to max cw position. Measure output level at PHONES jack (across headphones connector terminals, or 600-Ω resistor if used).	Output not less than 2.5 V ac (+10 dB mW).	If output less, troubleshoot U5A and U5B circuits for low gain.
4. Squelch	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Set SPEAKER switch to A1. Turn on PWR switch. Turn on SQUELCH control and set to minimum (max ccw position before detent). Adjust AF GAIN to midrange or comfortable listening level.		
4.1 Operation	a. Set oscillator output level to 0 dB mW. Slowly vary frequency from 500 toward 3000 Hz until squelch occurs (audio output inhibited). Not frequency at which squelch occurs.	Squelch occurs between 1000 and 2000 Hz.	Perform squelch adjustment. If squelch not normal after adjustment, troubleshoot U8, Q6, Q7, and Q8 circuits.
	b. Measure the squelch delay for a fast frequency change from 600 to 3000 Hz.	The delay shall not exceed 3 seconds.	If delay is excessive, check delay at TP3. If delay is normal at TP3, troubleshoot Q8 circuit. If delay is abnormal at TP3, troubleshoot Q7 circuit.
	c. Reset oscillator frequency to 500 Hz and increase SQUELCH setting to midrange. Slowly increase frequency until squelch occurs. Note frequency at squelch.	Frequency at squelch is less than frequency noted in step a.	Same as step a.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4.2 Adjustment	Set oscillator output level to -20 dB mW and frequency to 500 Hz.		
	a. Observe ac voltage at TP4 while slowly increasing oscillator frequency from 500 to 700 Hz. Note maximum voltage at TP4.	Voltage reaches a peak at frequency between 500 and 700 Hz.	Troubleshoot U7A circuit.
	b. Observe ac voltage at TP5 while slowly increasing oscillator frequency from 2000 to 2800 Hz. Note maximum voltage at TP5.	Voltage reaches a peak at frequency between 2000 and 2800 Hz.	Troubleshoot U7B circuit.
	c. Adjust R114 to obtain TP5 voltage 12 dB below that noted at TP4.		
5. Speaker amplifier	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Adjust oscillator for 1000 Hz and 0-dB mW output. Set SPEAKER switch to A1, AF GAIN to maximum (max cw position), and SQUELCH to off (max ccw position). Turn on PWR switch.		
	Measure ac voltage across TB3-2 and -3 (speaker).	Voltage not less than 3.5 V ac.	Troubleshoot U9 circuit.
6. Switching	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Adjust oscillator for 1000 ±100 Hz and 0.77 V ac (0 dB mW). Connect headphones or 600-Ω load to PHONES jack.		
6.1 Channel A phones	Set PHONES switch to A1. Adjust PHONES level control to midrange or comfortable volume level.		
	a. Check for signal at PHONES jack.	Signal present.	Troubleshoot Q9, U6A, and U6D circuits.
	b. Set PHONES switch to B1. Check for signal at PHONES jack.	No signal.	Troubleshoot Q9, U6A, and U6D circuits.
6.2 Channel B phones	Disconnect oscillator from TB1-2 and -3 and connect it to TB1-6 and -7.		
	a. Check for signal at PHONES jack.	Signal present.	Troubleshoot Q10, U6B, and U6C circuits.
	b. Set PHONES switch to A1. Check for signal at PHONES jack.	No signal.	Troubleshoot Q10, U6B, and U6C circuits.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. Meter amplifier	Perform test setup (test 1). Connect oscillator output to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Adjust oscillator for 1000 ±100 Hz. Turn on PWR switch.		
7.1 Channel A	Adjust oscillator output level to obtain +10-dB mW signal at TB1-4 and -5 (CH A1 RCV AF 600 OHMS OUT).		
	a. Set METER switch to A1 AF +13FS and adjust R30 as required to obtain +10 DBM on meter.	+10 DBM attainable on meter.	Troubleshoot U2A circuit.
	b. Adjust oscillator output level to obtain 0-dB mW signal at TB1-4 and -5.		
	c. Set METER switch to A1 AF +3FS and observe meter indication.	Meter indicates 0 ±1 DBM.	Troubleshoot U2A circuit. If circuit check normal, troubleshoot front panel meter circuit.
7.2 Channel B	Disconnect oscillator from TB1-2 and -3 and connect it to TB1-6 and -7 (CH B1 RCV AF 600 OHMS IN). Adjust oscillator output level to obtain +10-dB mW signal at TB1-8 and -9 (CH B1 RCV AF 600 OHMS OUT).		
	a. Set METER switch to B1 AF +13FS and adjust R63 as required to obtain +10 DBM on meter.	+10 DBM attainable on meter.	Troubleshoot U4A circuit.
	b. Adjust oscillator output level to obtain 0-dB mW signal at TB1-8 and -9.		
	c. Set METER switch to B1 AF +3FS and .observe meter indication.	Meter indicates 0 ±1 DBM.	Troubleshoot U4A circuit. If circuit checks normal, troubleshoot front panel meter circuit.
8. Mute	a. Perform test setup 1. Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Turn on PWR switch.		
	b. Adjust oscillator for 1000 Hz and 0-dB mW output.		
	c. Set SPEAKER switch to A1, AF GAIN to maximum (max cw position), and SQUELCH to off (max ccw position).		
	d. Ground TB1-11 and check for signal at speaker.	No signal present.	Troubleshoot CR12, Q11 and U12B circuits.
(Cont)	e. Remove ground from TB1-11 and check for signal at speaker.	Signal present.	Troubleshoot U12B circuit.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	f. Ground J3 pin 38 and check for signal at speaker.	Signal present.	Troubleshoot U12D circuit.
	g. Connect +5 V dc to J3 pin 37 and check for signal at speaker.	No signal present.	Troubleshoot U12B, U12D and U12A circuits.
	h. Remove ground from J3 pin 38 and check for signal at speaker.	Signal present.	Troubleshoot U12B, U12D and U12A circuits.
	i. Remove the +5 V dc from J3 pin 37.		

6. PARTS LIST/DIAGRAMS

6.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 5). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

6.2 Parts List

REF DES Column - Reference designator of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column - Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column - Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column - Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column - Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column - Lists the manufacturer's part number for the selected parts.

Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

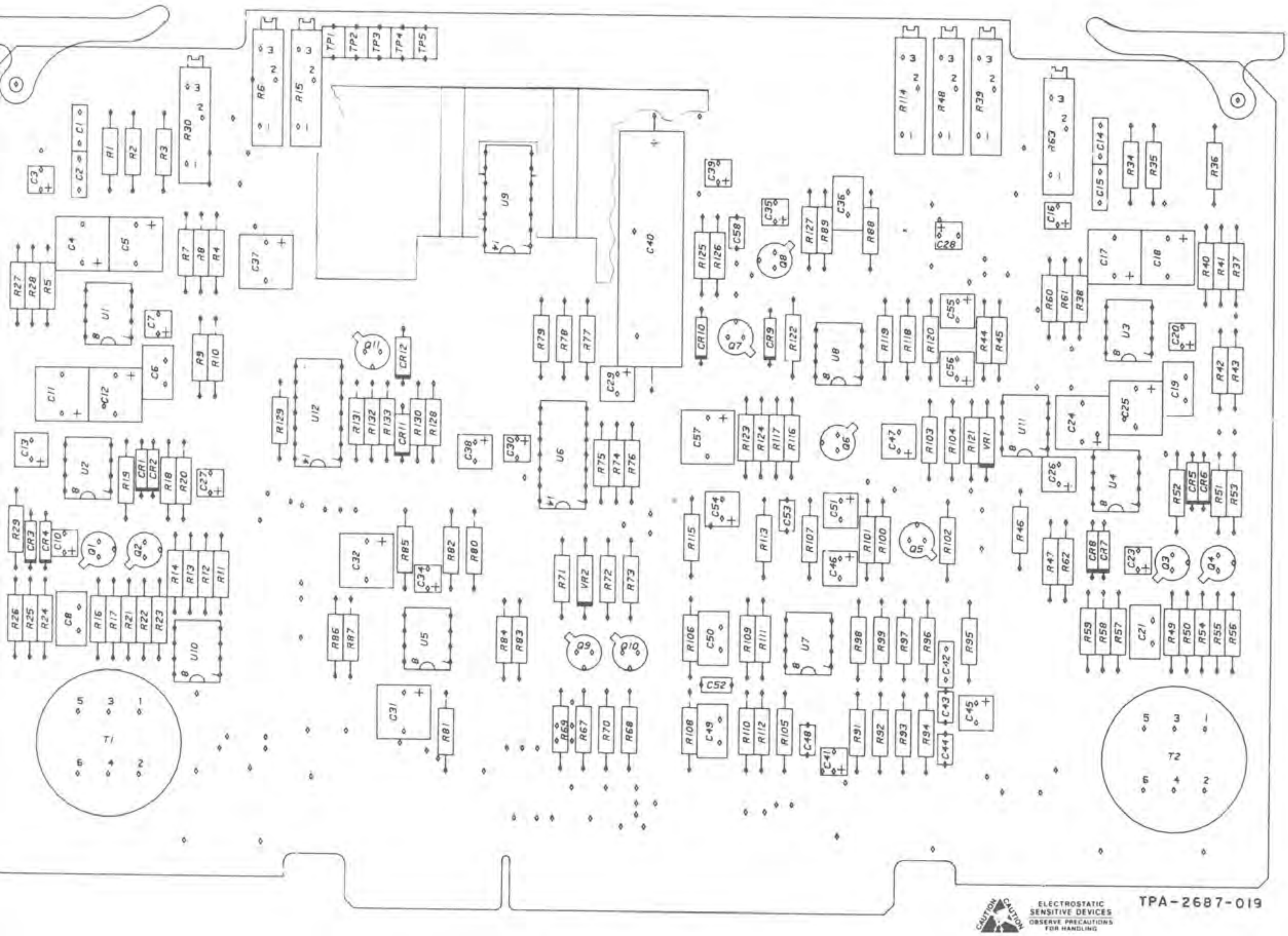
CODE	MANUFACTURER'S NAME AND ADDRESS
00872	Teledyne Systems Co. Microelectronics Div. 12964 Panama St. Los Angeles, CA 90066
02735	RCA Corp. Solid State Division Route 202 Somerville, NJ 08876
03508	General Electric Co. Semi-Conductor Products Dept. W Genesee St. Auburn, NY 13021
04713	Motorola Inc. Semiconductor Products Group 5005 E McDowell Rd. Phoenix, AZ 85008
07263	Fairchild Camera and Instrument Corp. Semiconductor Div. 464 Ellis St. Mountain View, CA 94042
15818	Teledyne Semiconductor 1300 Terra Bella Ave. Mountain View, CA 94043
16546	Globe-Union Inc. USCC/Centralab Electrics Div. 4561 Colorado Los Angeles, CA 90039
27014	National Semiconductor Corp. 2900 Semiconductor Dr. Santa Clara, CA 95051
56289	Sprague Electric Co. North Adams, MA 01247

CODE	MANUFACTURER'S NAME AND ADDRESS
73386	Freed Transformer Co., Inc. 1736 Weirfield St. Brooklyn, NY 11227
74970	Johnson E.F. Co. 299 10th Ave. SW Waseca, MN 56093
80294	Bourns Inc. Instrument Div. 6135 Magnolia Ave. Riverside, CA 92506
81349	Military Specification
98330	Polyphase Instrument Co. E Fourth St. Bridgeport, PA 19405

6.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Control Receive Audio	642-3572-001	REV A
Control Receive Audio	642-3572-002	REV A



Control Receive Audio, Schematic Diagram
Figure 5 (Sheet 1 of 4)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	CONTROL RECEIVE AUDIO (ESDS)	642-3572-001	A		
	CONTROL RECEIVE AUDIO (ESDS)	642-3572-002	B		
CR1-CR12	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1,C2	CAPACITOR,FXD CER DIEL, 1UF, 20%, 50V	913-3279-270		16546	CY30C105M
C3	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C4,C5	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C6	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 500V	912-3873-000		81349	CM04ED820J03
C7	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C8	CAPACITOR,FXD MICA DIEL, 150PF, 5%, 500V	912-3891-000		81349	CM04FD151J03
C9	NOT USED				
C10	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C11,C12	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C13	CAPACITOR,FXD TNTLM ELCTLT, 10UF, 20%, 20V	184-9102-170		56289	199D106X0020CB1
C14,C15	CAPACITOR,FXD CER DIEL, 1UF, 20%, 50V	913-3279-270		16546	CY30C105M
C16	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C17,C18	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C19	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 500V	912-3873-000		81349	CM04ED820J03
C20	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C21	CAPACITOR,FXD MICA DIEL, 150PF, 5%, 500V	912-3891-000		81349	CM04FD151J03
C22	NOT USED				
C23	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C24,C25	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C26	CAPACITOR,FXD TNTLM ELCTLT, 10UF, 20%, 20V	184-9102-170		56289	199D106X0020CB1
C27,C28	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C29	CAPACITOR,FXD TNTLM ELCTLT, 10UF, 20%, 20V	184-9102-170		56289	199D106X0020CB1
C30	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C31,C32	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C33	NOT USED				
C34	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C35	CAPACITOR,FXD TNTLM ELCTLT, 0.47UF, 20%, 35V	184-9102-330		56289	199D474X0035AB1
C36	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 500V	912-3873-000		81349	CM04ED820J03
C37	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C38	CAPACITOR,FXD TNTLM ELCTLT, 0.47UF, 20%, 35V	184-9102-330		56289	199D474X0035AB1
C39	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C40	CAPACITOR,FXD ELCTLT, 220UF, M10%P75%, 20V	183-1277-200		56289	600D227G020DG5
C41	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C42	CAPACITOR,FXD CER DIEL, 0.022UF, PORM10%, 100V	913-5019-360		81349	CK06BX223K
C43,C44	CAPACITOR,FXD CER DIEL, 0.01UF, PORM10%, 100V	913-5019-200		81349	CK05BX103K
C45-C47	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
C48	CAPACITOR,FXD CER DIEL, 0.01UF, PORM10%, 100V	913-5019-200		81349	CK05BX103K
C49,C50	CAPACITOR,FXD MICA DIEL, 330PF, 5%, 100V	912-3915-000		81349	CM04FA331J03
C51	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
C52	CAPACITOR,FXD CER DIEL, 680PF, 10%, 200V	913-4016-000		81349	CK05BX681K
C53	CAPACITOR,FXD CER DIEL, 0.01UF, PORM10%, 100V	913-5019-200		81349	CK05BX103K
C54-C56	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
C57	CAPACITOR,FXD TNTLM ELCTLT, 33UF, 20%, 25V	184-9102-700		56289	199D1024
C58	CAPACITOR,FXD CER DIEL, 3300PF, PORM10%, 100V	913-5019-140		81349	CK05BX332K
Q1	TRANSISTOR	352-0661-020		07263	2N2222A
Q2	TRANSISTOR	352-0551-010		15818	2N2907A
Q3	TRANSISTOR	352-0661-020		07263	2N2222A
Q4	TRANSISTOR	352-0551-010		15818	2N2907A
Q5,Q6	TRANSISTOR	352-0661-020		07263	2N2222A
Q7	TRANSISTOR	352-0551-010		15818	2N2907A
Q8	TRANSISTOR (ESDS)	352-0759-020		00872	2N4092
Q9,Q10	TRANSISTOR	352-0661-020		07263	2N2222A
Q11	TRANSISTOR	352-0551-010		15818	2N2907A
R1	RESISTOR,FXD FILM, 604 OHMS, 1%, 1/8W	705-3600-860		81349	RN55D6040F
R2-R5	RESISTOR,FXD FILM, 100K, 1%, 1/8W	705-1092-000		81349	RN55D1003F
R6	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R7,R8	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R9	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R10	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R11	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R12,R13	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R14	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R15	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R16	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R17	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W	745-0809-000		81349	RCR07G473KS
R18	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R19,R20	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R21,R22	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W	745-0701-000		81349	RCR07G470KS
R23	RESISTOR,FXD FILM, 140 OHMS, 1%, 1/8W	705-0955-000		81349	RN55D1400F
R24,R25	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R26	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W	745-0788-000		81349	RCR07G123KS
R27,R28	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R29	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W	745-0740-000		81349	RCR07G561KS
R30	RESISTOR,VAR CERMET, 5K, 10%, 3/4W	382-0012-280		80294	3006P1-502
R31-R33	NOT USED				
R34	RESISTOR,FXD FILM, 604 OHMS, 1%, 1/8W	705-3600-860		81349	RN55D6040F
R35-R38	RESISTOR,FXD FILM, 100K, 1%, 1/8W	705-1092-000		81349	RN55D1003F
R39	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R40,R41	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R42	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R43	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R44	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R45,R46	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R47	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R48	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R49	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	US ON CO
R50	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W	745-0809-000	
R51	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000	
R52,R53	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R54,R55	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W	745-0701-000	
R56	RESISTOR,FXD FILM, 140 OHMS, 1%, 1/8W	705-0955-000	
R57,R58	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R59	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W	745-0788-000	
R60,R61	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000	
R62	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W	745-0740-000	
R63	RESISTOR,VAR CERMET, 5K, 10%, 3/4W	382-0012-280	
R64-R66	NOT USED		
R67,R68	RESISTOR,FXD CMPSN, 82K, 10%, 1/4W	745-0818-000	
R69,R70	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000	
R71	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R72,R73	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R74-R77	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R78,R79	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000	
R80	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R81,R82	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000	
R83	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R84	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R85	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R86	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R87	RESISTOR,FXD CMPSN, 0.12MEGO, 10%, 1/4W	745-0824-000	
R88,R89	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R90	NOT USED		
R91	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000	
R92	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000	
R93,R94	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W	705-1065-000	
R95,R96	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W	705-0982-000	
R97	RESISTOR,FXD FILM, 13K, 1%, 1/8W	705-3605-530	
R98	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000	
R99	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W	705-1080-000	
R100	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W	705-1068-000	
R101	RESISTOR,FXD FILM, 5.76K, 1%, 1/8W	705-3605-360	
R102	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R103	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R104	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000	
R105	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R106	RESISTOR,FXD FILM, 75K, 1%, 1/8W	705-1086-000	
R107, R108	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W	705-0982-000	
R109, R110	RESISTOR,FXD FILM, 150K, 1%, 1/8W	705-3604-090	
R111	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000	
R112	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W	705-1080-000	
R113	RESISTOR,FXD CMPSN, 3.3K, 10%, 1/4W	745-0767-000	
R114	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290	
R115	RESISTOR,FXD FILM, 5.11K, 1%, 1/8W	705-1030-000	
R116	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W	705-1068-000	
R117	RESISTOR,FXD FILM, 24.9K, 1%, 1/8W	705-1063-000	
R118	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R119	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R120	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000	
R121	RESISTOR,FXD CMPSN, 680 OHMS, 10%, 1/4W	745-0743-000	
R122	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000	
R123	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000	
R124	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000	
R125	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R126	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000	
R127	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R128	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000	
R129	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R130	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R131	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R132	RESISTOR,FXD CMPSN, 0.15MEGO, 10%, 1/4W	745-0827-000	
R133	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
TP1	JACK,TIP BRN	360-0484-070	
TP2	JACK,TIP RED	360-0484-020	
TP3	JACK,TIP ORN	360-0484-050	
TP4	JACK,TIP YEL	360-0484-060	
TP5	JACK,TIP GRN	360-0484-040	
T1,T2	TRANSFORMER	667-0327-010	A
T1,T2	TRANSFORMER,AUD	677-0410-010	B
U1-U5	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070	
U6	INTEGRATED CIRCUIT (ESDS)	351-8252-010	
U7	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070	
U8	INTEGRATED CIRCUIT	351-1110-020	
U9	INTEGRATED CIRCUIT	351-1118-010	
U10,U11	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070	
U12	INTEGRATED CIRCUIT DGTL MOS (ESDS)	351-8159-340	
VR1	SEMICOND DEVICE	353-2710-000	
VR2	SEMICOND DEVICE	353-3591-060	

PARTS LIST (Cont)

COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
642-3572-001	A		
642-3572-002	B		
353-3644-010		03508	1N4454GE
913-3279-270		16546	CY30C105M
184-9102-320		56289	199D334X0035AB1
184-9102-630		56289	199D1022
912-3873-000		81349	CM04ED820J03
184-9102-320		56289	199D334X0035AB1
912-3891-000		81349	CM04FD151J03
184-9102-350		56289	199D105X0035BB1
184-9102-630		56289	199D1022
184-9102-170		56289	199D106X0020CB1
913-3279-270		16546	CY30C105M
184-9102-320		56289	199D334X0035AB1
184-9102-630		56289	199D1022
912-3873-000		81349	CM04ED820J03
184-9102-320		56289	199D334X0035AB1
912-3891-000		81349	CM04FD151J03
184-9102-350		56289	199D105X0035BB1
184-9102-630		56289	199D1022
184-9102-170		56289	199D106X0020CB1
184-9102-350		56289	199D105X0035BB1
184-9102-170		56289	199D106X0020CB1
184-9102-320		56289	199D334X0035AB1
184-9102-630		56289	199D1022
184-9102-350		56289	199D105X0035BB1
184-9102-330		56289	199D474X0035AB1
912-3873-000		81349	CM04ED820J03
184-9102-630		56289	199D1022
184-9102-330		56289	199D474X0035AB1
184-9102-320		56289	199D334X0035AB1
183-1277-200		56289	600D227G020DG5
184-9102-350		56289	199D105X0035BB1
913-5019-360		81349	CK06BX223K
913-5019-200		81349	CK05BX103K
184-9102-390		56289	199D475X0035DB1
913-5019-200		81349	CK05BX103K
912-3915-000		81349	CM04FA331J03
184-9102-390		56289	199D475X0035DB1
913-4016-000		81349	CK05BX681K
913-5019-200		81349	CK05BX103K
184-9102-390		56289	199D475X0035DB1
184-9102-700		56289	199D1024
913-5019-140		81349	CK05BX332K
352-0661-020		07263	2N2222A
352-0551-010		15818	2N2907A
352-0661-020		07263	2N2222A
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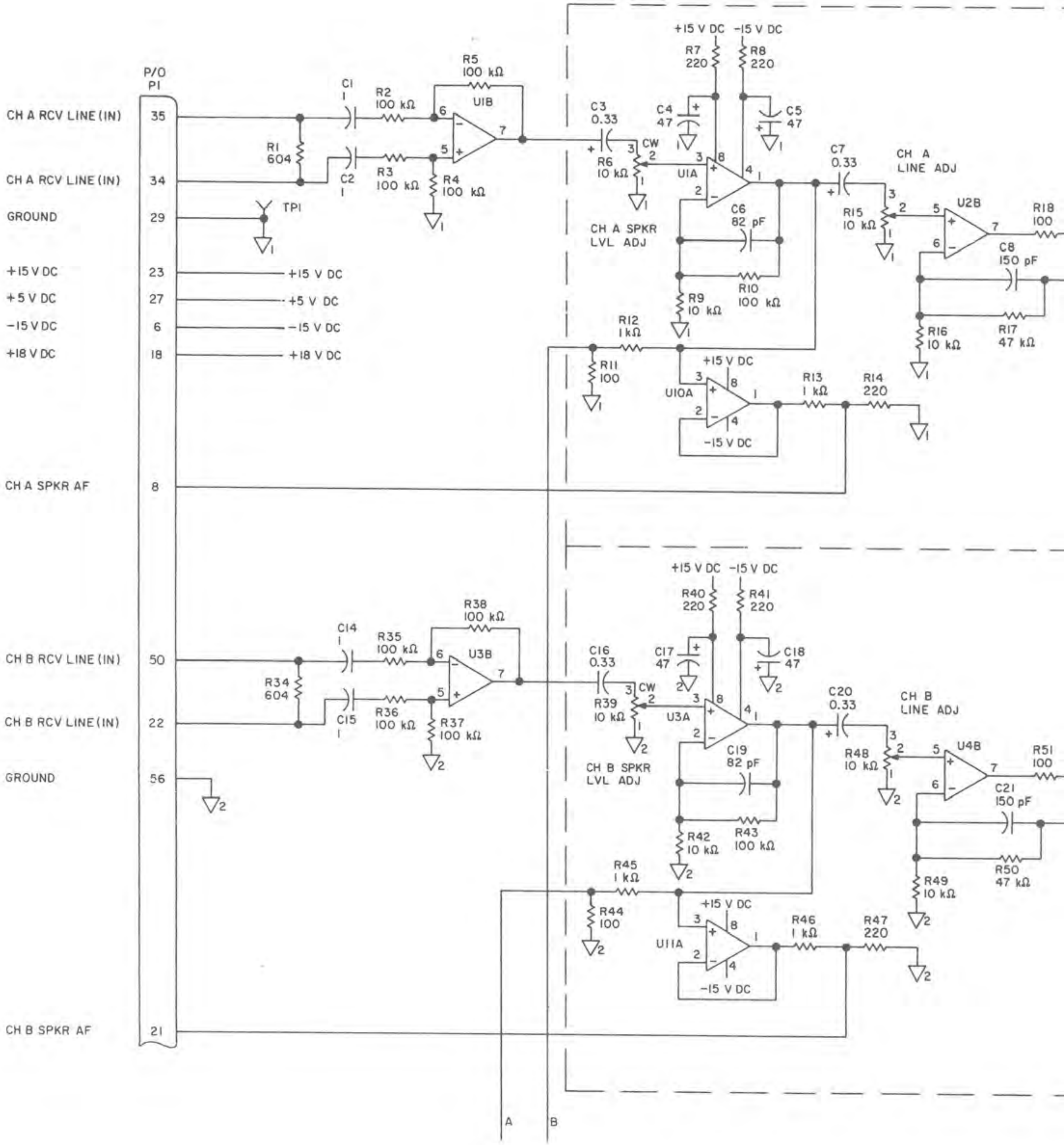
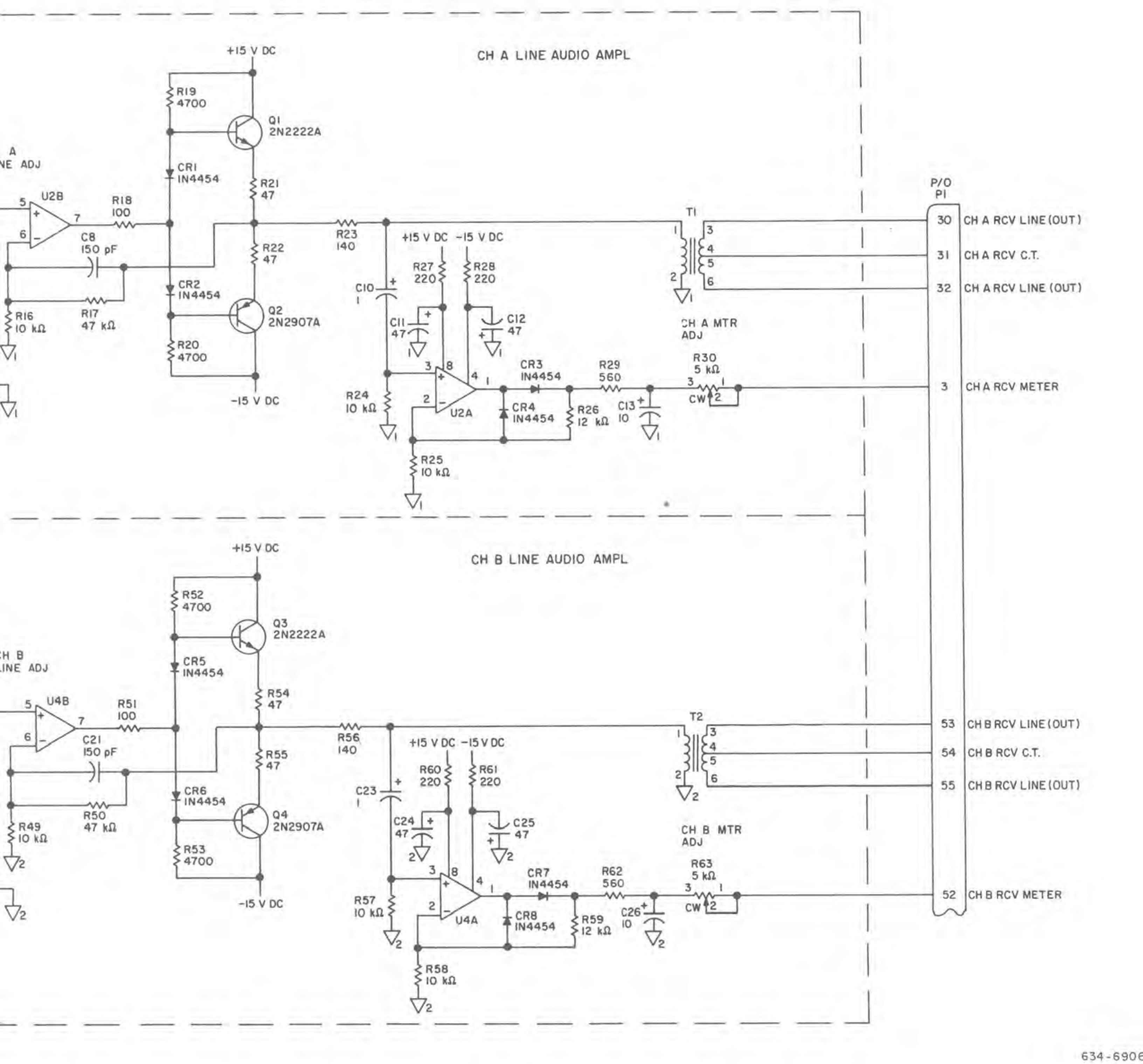
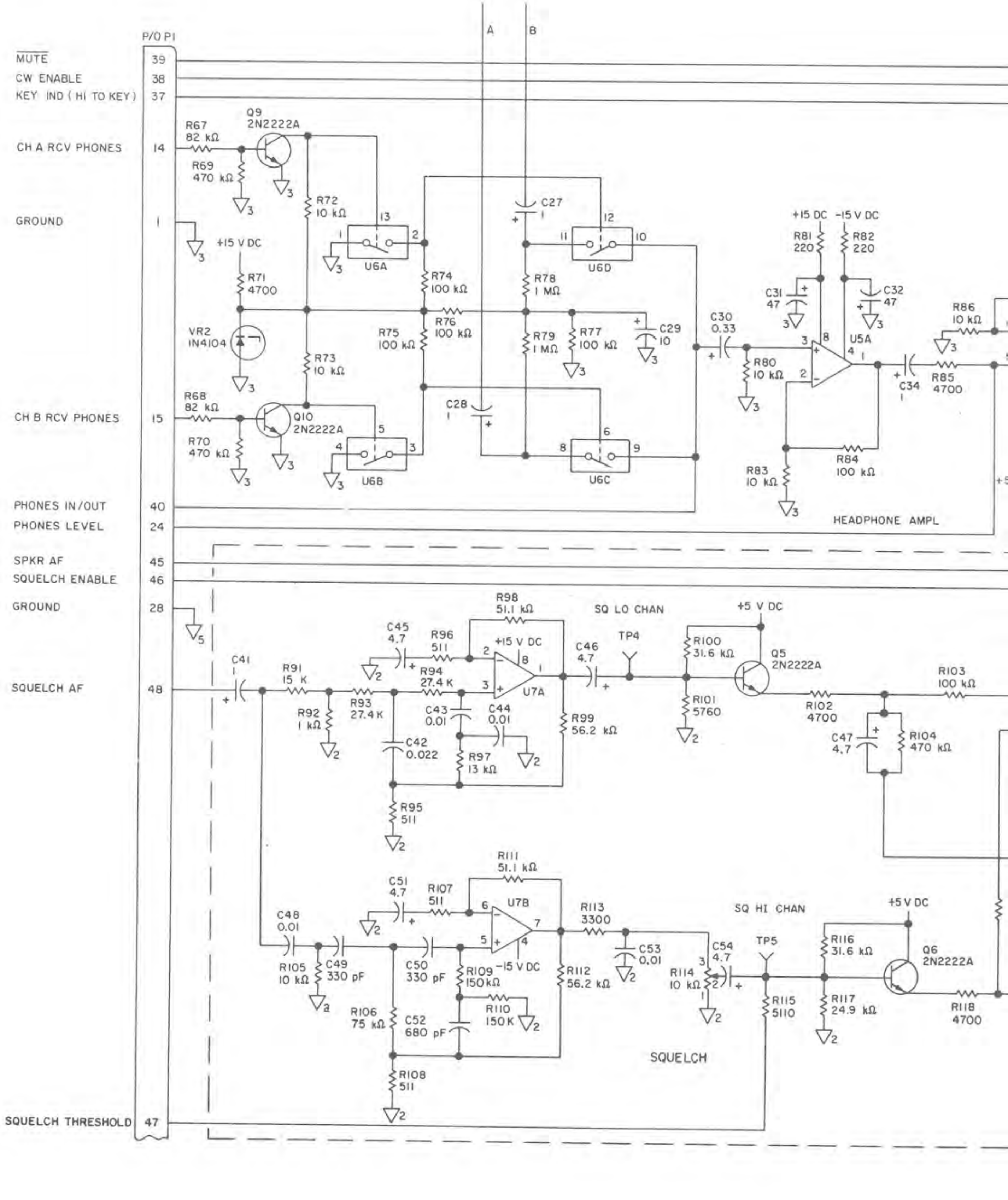
352-0551-010		15818	2N2907A
352-0759-020		00872	2N4092
352-0661-020		07263	2N2222A
352-0551-010		15818	2N2907A
705-3600-860		81349	RN55D6040F
705-1092-000		81349	RN55D1003F
382-0012-290		80294	3006P1-103
745-0725-000		81349	RCR07G221KS
745-0785-000		81349	RCR07G103KS
745-0821-000		81349	RCR07G104KS
745-0713-000		81349	RCR07G101KS
745-0749-000		81349	RCR07G102KS
745-0725-000		81349	RCR07G221KS
382-0012-290		80294	3006P1-103
745-0785-000		81349	RCR07G103KS
745-0809-000		81349	RCR07G473KS
745-0713-000		81349	RCR07G101KS
745-0773-000		81349	RCR07G472KS
745-0701-000		81349	RCR07G470KS
705-0955-000		81349	RN55D1400F
745-0785-000		81349	RCR07G103KS
745-0788-000		81349	RCR07G123KS
745-0725-000		81349	RCR07G221KS
745-0740-000		81349	RCR07G561KS
382-0012-280		80294	3006P1-502
705-3600-860		81349	RN55D6040F
705-1092-000		81349	RN55D1003F
382-0012-290		80294	3006P1-103
745-0725-000		81349	RCR07G221KS
745-0785-000		81349	RCR07G103KS
745-0821-000		81349	RCR07G104KS
745-0713-000		81349	RCR07G101KS
745-0749-000		81349	RCR07G102KS
745-0725-000		81349	RCR07G221KS
382-0012-290		80294	3006P1-103
745-0785-000		81349	RCR07G103KS

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
R50	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W	745-0809-000		81349	RCR07G473KS
R51	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R52,R53	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R54,R55	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W	745-0701-000		81349	RCR07G470KS
R56	RESISTOR,FXD FILM, 140 OHMS, 1%, 1/8W	705-0955-000		81349	RN55D1400F
R57,R58	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R59	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W	745-0788-000		81349	RCR07G123KS
R60,R61	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R62	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W	745-0740-000		81349	RCR07G561KS
R63	RESISTOR,VAR CERMET, 5K, 10%, 3/4W	382-0012-280		80294	3006P1-502
R64-R66	NOT USED				
R67,R68	RESISTOR,FXD CMPSN, 82K, 10%, 1/4W	745-0818-000		81349	RCR07G823KS
R69,R70	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R71	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R72,R73	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R74-R77	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R78,R79	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R80	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R81,R82	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R83	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R84	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R85	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R86	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R87	RESISTOR,FXD CMPSN, 0.12MEGO, 10%, 1/4W	745-0824-000		81349	RCR07G124KS
R88,R89	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R90	NOT USED				
R91	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000		81349	RCR07G153KS
R92	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R93,R94	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W	705-1065-000		81349	RN55D2742F
R95,R96	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W	705-0982-000		81349	RN55D5110F
R97	RESISTOR,FXD FILM, 13K, 1%, 1/8W	705-3605-530		81349	RN55D1302F
R98	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000		81349	RN55D5112F
R99	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W	705-1080-000		81349	RN55D5622F
R100	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W	705-1068-000		81349	RN55D3162F
R101	RESISTOR,FXD FILM, 5.76K, 1%, 1/8W	705-3605-360		81349	RN55D5761F
R102	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R103	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R104	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R105	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R106	RESISTOR,FXD FILM, 75K, 1%, 1/8W	705-1086-000		81349	RN55D7502F
R107, R108	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W	705-0982-000		81349	RN55D5110F
R109, R110	RESISTOR,FXD FILM, 150K, 1%, 1/8W	705-3604-090		81349	RN55D1503F
R111	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000		81349	RN55D5112F
R112	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W	705-1080-000		81349	RN55D5622F
R113	RESISTOR,FXD CMPSN, 3.3K, 10%, 1/4W	745-0767-000		81349	RCR07G332KS
R114	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R115	RESISTOR,FXD FILM, 5.11K, 1%, 1/8W	705-1030-000		81349	RN55D5111F
R116	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W	705-1068-000		81349	RN55D3162F
R117	RESISTOR,FXD FILM, 24.9K, 1%, 1/8W	705-1063-000		81349	RN55D2492F
R118	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R119	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R120	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R121	RESISTOR,FXD CMPSN, 680 OHMS, 10%, 1/4W	745-0743-000		81349	RCR07G681KS
R122	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R123	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000		81349	RCR07G153KS
R124	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R125	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R126	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R127	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R128	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R129	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R130	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R131	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R132	RESISTOR,FXD CMPSN, 0.15MEGO, 10%, 1/4W	745-0827-000		81349	RCR07G154KS
R133	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
TP1	JACK,TIP BRN	360-0484-070		74970	105-1108-011
TP2	JACK,TIP RED	360-0484-020		74970	105-1102-011
TP3	JACK,TIP GRN	360-0484-050		74970	105-1106-011
TP4	JACK,TIP YEL	360-0484-060		74970	105-1107-011
TP5	JACK,TIP GRN	360-0484-040		74970	105-1104-011
T1,T2	TRANSFORMER	667-0327-010	A	98330	T4465
T1,T2	TRANSFORMER,AUD	677-0410-010	B	73326	41712
U1-U5	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070		07263	UA1458TC
U6	INTEGRATED CIRCUIT (ESDS)	351-8252-010		02735	CD4066BE
U7	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070		07263	UA1458TC
U8	INTEGRATED CIRCUIT	351-1110-020		07263	UA741TC
U9	INTEGRATED CIRCUIT	351-1118-010		27014	LM380N
U10,U11	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070		07263	UA1458TC
U12	INTEGRATED CIRCUIT DGTL MOS (ESDS)	351-8159-340		07263	4011BPC
VR1	SEMICOND DEVICE	353-2710-000		07263	1N751A
VR2	SEMICOND DEVICE	353-3591-060		04713	1N4104

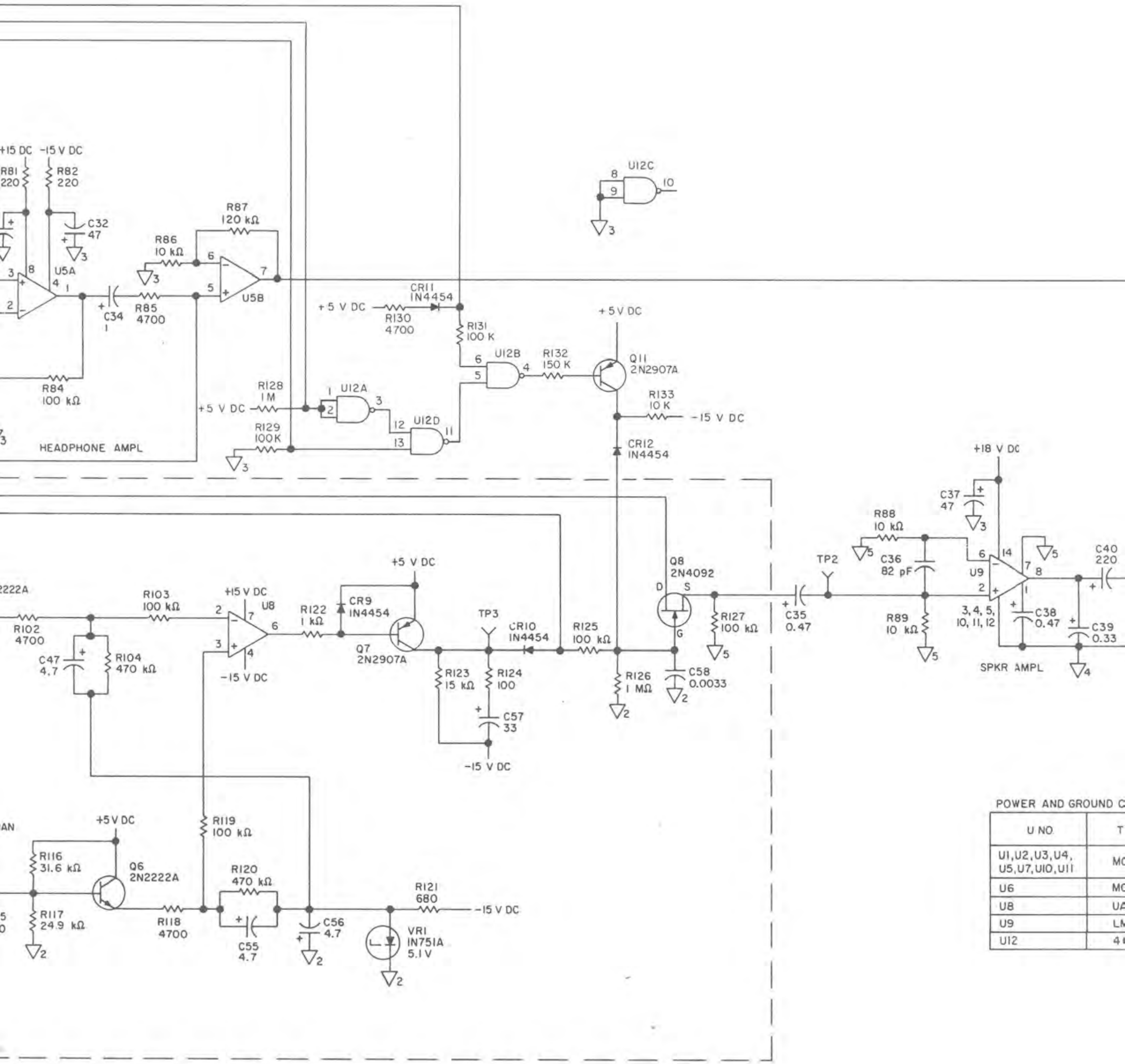

P/O
P1
CH A RCV LINE (IN)
35
CH A RCV LINE (IN)
34
GROUND
29
+15 V DC
23
+5 V DC
27
-15 V DC
6
+18 V DC
18
CH A SPKR AF
8
CH B RCV LINE (IN)
50
CH B RCV LINE (IN)
22
GROUND
56
CH B SPKR AF
21
TP1
C1
1
C2
1
R1
604
R2
100 kΩ
R3
100 kΩ
R4
100 kΩ
R5
100 kΩ
U1B
C3
0.33
R6
10 kΩ
CW
CH A SPKR
LVL ADJ
+15 V DC
-15 V DC
R7
220
R8
220
C4
47
C5
47
U1A
C6
82 pF
R9
10 kΩ
R10
100 kΩ
R11
100
R12
1 kΩ
U10A
R13
1 kΩ
R14
220
C7
0.33
CH A
LINE ADJ
R15
10 kΩ
U2B
R18
100
C8
150 pF
R16
10 kΩ
R17
47 kΩ
C14
1
C15
1
R34
604
R35
100 kΩ
R36
100 kΩ
R37
100 kΩ
R38
100 kΩ
U3B
C16
0.33
R39
10 kΩ
CH B SPKR
LVL ADJ
R40
220
R41
220
C17
47
C18
47
U3A
C19
82 pF
R42
10 kΩ
R43
100 kΩ
R44
100
R45
1 kΩ
U11A
R46
1 kΩ
R47
220
C20
0.33
CH B
LINE ADJ
R48
10 kΩ
U4B
R51
100
C21
150 pF
R49
10 kΩ
R50
47 kΩ
A
B



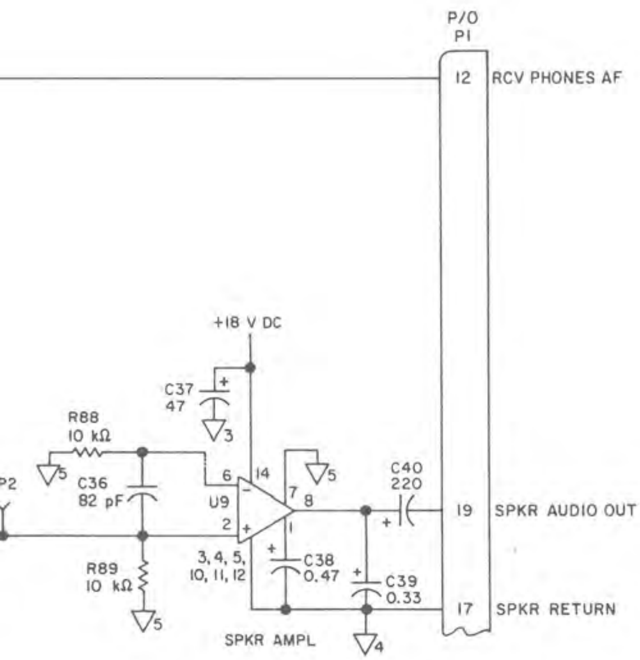
Control Receive Audio, Schematic Diagram
Figure 5 (Sheet 3)



P/O P1
MUTE 39
CW ENABLE 38
KEY IND (HI TO KEY) 37
CH A RCV PHONES 14
GROUND 1
CH B RCV PHONES 15
PHONES IN/OUT 40
PHONES LEVEL 24
SPKR AF 45
SQUELCH ENABLE 46
GROUND 28
SQUELCH AF 48
SQUELCH THRESHOLD 47
A
B
R67 82 kΩ
Q9 2N2222A
R69 470 kΩ
R72 10 kΩ
U6A
+15 V DC
R71 4700
VR2 1N4104
R73 10 kΩ
R68 82 kΩ
Q10 2N2222A
R70 470 kΩ
U6B
R74 100 kΩ
R75 100 kΩ
R76 100 kΩ
C27 1
C28 1
R78 1 MΩ
R79 1 MΩ
R77 100 kΩ
U6D
U6C
C29 10
C30 0.33
R80 10 kΩ
+15 DC
-15 V DC
R81 220
R82 220
C31 47
C32 47
U5A
R83 10 kΩ
R84 100 kΩ
C34 1
R85 4700
R86 10 kΩ
HEADPHONE AMPL
C41 1
R91 15 K
R92 1 kΩ
R93 27.4 K
C45 4.7
R96 511
R94 27.4 K
R98 51.1 kΩ
+15 V DC
U7A
C43 0.01
C44 0.01
C42 0.022
R97 13 kΩ
R95 511
R99 56.2 kΩ
SQ LO CHAN
C46 4.7
TP4
+5 V DC
R100 31.6 kΩ
R101 5760
Q5 2N2222A
R102 4700
R103 100 kΩ
C47 4.7
R104 470 kΩ
C48 0.01
R105 10 kΩ
C49 330 pF
C51 4.7
R107 511
R111 51.1 kΩ
U7B
C50 330 pF
R109 150 kΩ
-15 V DC
R110 150 K
R106 75 kΩ
C52 680 pF
R108 511
R112 56.2 kΩ
R113 3300
C53 0.01
R114 10 kΩ
C54 4.7
SQ HI CHAN
TP5
R115 5110
R116 31.6 kΩ
R117 24.9 kΩ
+5 V DC
Q6 2N2222A
R118 4700
SQUELCH



HEADPHONE AMPL
SPKR AMPL
U5A
U5B
U8
U9
U12A
U12B
U12C
U12D
Q6 2N2222A
Q7 2N2907A
Q8 2N4092
Q11 2N2907A
CR9 1N4454
CR10 1N4454
CR11 1N4454
CR12 1N4454
VR1 1N751A 5.1 V
TP2
TP3
R81 220
R82 220
R84 100 kΩ
R85 4700
R86 10 kΩ
R87 120 kΩ
R88 10 kΩ
R89 10 kΩ
R102 4700
R103 100 kΩ
R104 470 kΩ
R116 31.6 kΩ
R117 24.9 kΩ
R118 4700
R119 100 kΩ
R120 470 kΩ
R121 680
R122 1 kΩ
R123 15 kΩ
R124 100
R125 100 kΩ
R126 1 MΩ
R127 100 kΩ
R128 1 M
R129 100K
R130 4700
R131 100 K
R132 150 K
R133 10 K
C32 47
C34 1
C35 0.47
C36 82 pF
C37 47
C38 0.47
C39 0.33
C40 220
C47 4.7
C55 4.7
C56 4.7
C57 33
C58 0.0033
+15 DC
-15 V DC
+15 V DC
+5 V DC
+18 V DC
POWER AND GROUND C
U NO
U1,U2,U3,U4, U5,U7,U10,U11
U6
U8
U9
U12



POWER AND GROUND CONNECTIONS

U NO	TYPE	POWER (VDC)				
		+15	+10	+5	GND	−15
U1,U2,U3,U4, U5,U7,U10,U11	MC1458P1					
U6	MC14066BCP		14		7 ▽3	
U8	UA741TC					
U9	LM380N					
U12	4011			14	7 ▽3	

NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. TYPE DESIGNATIONS SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.
4. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.

634-6906

Control Receive Audio, Schematic Diagram
Figure 5 (Sheet 4)

Parallel Input
(642-3135-001)

523-0770711

Parallel Input (642-3135-001)

Rockwell International

instructions

Collins Telecommunications Products Division

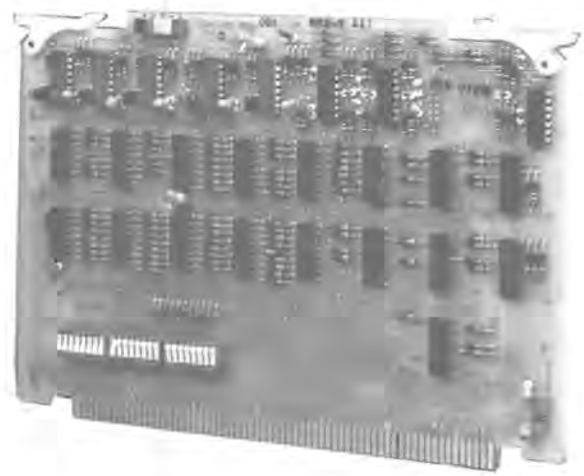
Printed in USA

523-0770711-001211
1 January 1981

1. DESCRIPTION

Parallel Input 642-3135-001, shown in figure 1, is a 2-layer planar card with a 130-pin (2 layers, 65 pins each) edge-on connector. All test points are mounted at the top edge of the card for easy access with the card installed in the unit.

The parallel input card consists of sixteen 8-channel data selectors (multiplexers), ten multivibrators (gate generators), and three 8-section dip switches.



TPA-2840-017

Parallel Input
Figure 1

2. PRINCIPLES OF OPERATION

2.1 General (Refer to figure 2.)

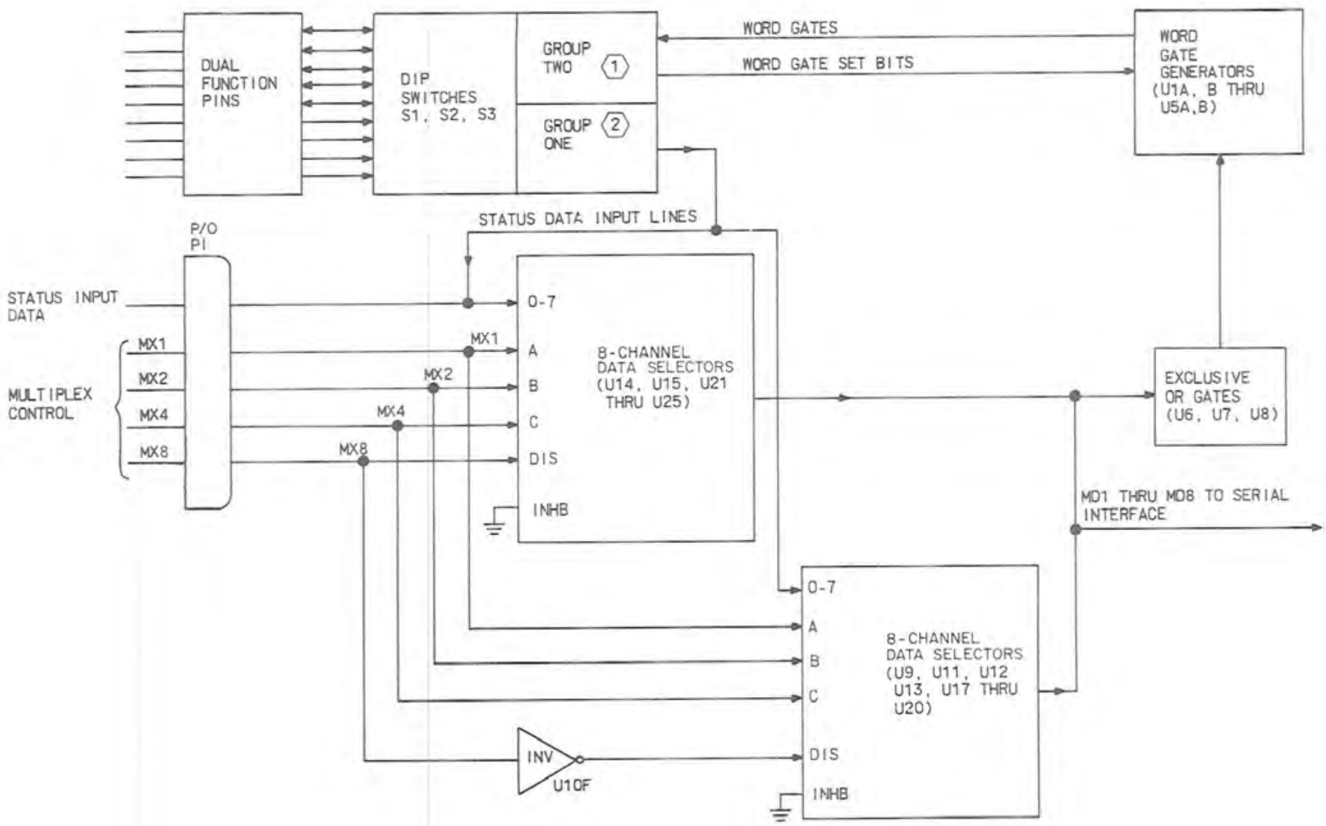
The parallel input card is designed for use in HF-80 four-channel and two-channel equipment. Dip switches S1, S2, and S3 are placed on the card to permit selection of the desired configuration.

The parallel input card consists of two primary circuits: the 8-channel data selectors and the gate generators. Each data selector receives up to eight inputs developed by the unit front-panel controls and monitor circuits. Address bits, from the serial interface card, select individual inputs for transfer to the single output from the data selectors. These address bits are developed from word gate signals produced by the multivibrator circuits when the card is configured for two-channel equipment. When the card is configured for four-channel equipment, the address bits are generated on the serial interface card.

2.2 Multiplexers (Refer to figure 2 and figure 3, the schematic diagram.)

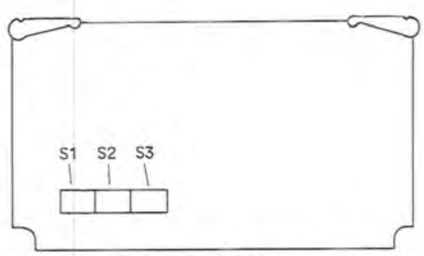
The multiplexers are integrated circuits functioning as 8-channel data selectors. (Refer to table 1 for a truth table of the data selector.) The circuit arrangement is two sections of eight multiplexers each. The MX8 input selects the active section. When at a logic 1 level, the disable input to a multiplexer keeps its output at a high impedance. A logic 0 disable input permits an output to be transferred from one of the eight input lines. MUX 8 is connected to the disable inputs of the first section and inverted by U10F and applied to the disable inputs of the second section to ensure one section is always disabled while the other is enabled.

The MX1, MX2, and MX4 inputs, applied simultaneously to all multiplexers, control which of

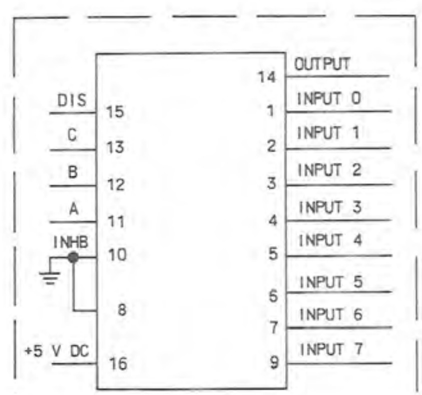


NOTES:

1. GROUP TWO (S2, SWITCHES 2 THRU 8 AND S3, SWITCHES 1 THRU 8) CLOSED FOR 2-CHANNEL EQUIPMENT. GROUP ONE OPEN.
2. GROUP ONE (S1, SWITCHES 1 THRU 8, AND S2, SWITCH 1) CLOSED FOR 4-CHANNEL EQUIPMENT. GROUP TWO OPEN.



DIPSWITCH LOCATION



CHANNEL SELECTOR CONFIGURATION

TPA-2623-014

Parallel Input, Block Diagram
Figure 2

the eight input signals (0-7) to each multiplexer is transferred to the output line. (Refer to the truth table of table 1.) The resulting output signals from the eight multiplexers are the eight data bits (MD1 through MD8) of the control word for the unit under control. These data bits are coupled to the serial interface card for parallel-to-serial conversion, word formation, ASCII or 8-bit formatting, and application to the control bus.

2.3 Gate Generators (Refer to figure 2 and figure 3, the schematic diagram.)

When the parallel input card is configured for two-channel equipment and a front-panel control is switched to a different position, a gate signal is developed by one of five gate generators. Each of these generator circuits is two multivibrators connected in series, that develop a single output pulse. The output is a word or address gate signal, determined by the inputs to the exclusive OR gates, and applied to the serial interface card.

An input pulse to the first multivibrator causes an output pulse from that multivibrator of about 0.1-second width which is the input to the second multivibrator. The second circuit does not trigger until the end (1-to-0 transition) of the first output pulse. This delay gives time for switch settling into the final position selected.

The output from the second multivibrator is a 0.1-millisecond pulse for the word gates and a 10-microsecond pulse for the address gate.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the parallel input card are listed in the maintenance section of this instruction book.

3.2 Testing

The test procedures in tables 2 and 3 check the total performance of the parallel input card. The procedures in table 2 are for the following equipments:

HF-8010/8010A Exciter
HF-8050/8050A Receiver
HF-8070/8070A Receiver-Exciter
851S Receiver
HF-8090, HF-8091, HF-8092, and HF-8095 Controls.

The procedures in table 3 are for the following equipments:

HF-8014/8014A Exciter
HF-8054/8054A Receiver
HF-8093 and HF-8094 Controls.

These procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic diagram to trace the source of the fault.

Table 1. 8-Channel Data Selector Truth Table.

C	B	A	INHIBIT	DISABLE	OUTPUT
0	0	0	0	0	X0
0	0	1	0	0	X1
0	1	0	0	0	X2
0	1	1	0	0	X3
1	0	0	0	0	X4
1	0	1	0	0	X5
1	1	0	0	0	X6
1	1	1	0	0	X7
M	M	M	1	0	0
M	M	M	M	1	HIGH IMPED-ANCE

X = transfer to output

M = don't care

Table 2. Parallel Input, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	**Note** The testing and troubleshooting procedures herein are for 1- or 2-channel configurations of the HF-8010/8010A, HF-8050/8050A, HF-8070/8070A, 851S, HF-8090, HF-8091, HF-8092, and HF-8095. These testing and troubleshooting procedures are based on using a control unit and an associated local unit. The most effective method of testing and troubleshooting is obtained by installing the questionable parallel input in the control unit. During these tests when a control unit is referred to it is a receiver-exciter control, an exciter control, or a receiver control. When a local unit is referred to it is a receiver-exciter, an exciter, or a receiver. a. Remove top cover of unit containing parallel input to be tested. b. Remove parallel input. c. Set the dip switches for two-channel operation. (Group 1 open, group 2 closed). Refer to figure 2 for dip switch location. d. Place the parallel input card on the card extender and place it in the unit. e. Set control unit and local unit LINE SELECTOR switches to 115 V.	-	
(Cont)			

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. (Cont)	f. Connect control unit and local unit to 115-V ac power source and set power on.		
	g. Measure dc voltages, on the card under test, between the following pins and ground (TP1, brown):		
	P1-45 P1-65 P1-114	+15 ±1.0 V dc. +5 ±0.5 V dc. -15 ±1.0 V dc.	
	h. Strap local unit for address 0.		
	i. Connect local unit to control unit.		
2. Word and address gates	a. Connect oscilloscope to TP2 (red).		
	b. Set control unit KEY switch to LOCK and note oscilloscope.	A logic level 1, 100-μs (nominal) pulse.	Check U2A, U2B, U8D, and associated circuit.
	c. Set control unit KEY switch to NORM and note oscilloscope.	Same as step b.	Same as step b.
	d. Connect oscilloscope to TP3 (orange).		
	e. Set control unit PA PWR switch to STBY and note oscilloscope.	A logic level 1, 100-μs (nominal) pulse.	Check U3A, U3B, U10A, S3, and associated circuit.
	f. Set control unit PA PWR switch to OFF and note oscilloscope.	Same as step e.	Same as step e.
	g. Connect oscilloscope to TP 4 (yellow).		
	h. Rotate each control unit FREQUENCY KHZ thumb wheel and note oscilloscope when changing positions.	A logic level 1, 100-μs (nominal) pulse.	Check U1A, U1B, S2 and associated circuit.
	i. Connect oscilloscope to TP5 (green).		
(Cont)	j. Set control unit MODE switch to each mode position and note oscilloscope when changing positions.	A logic level 1, 100-μs (nominal) pulse.	Check U5A, U5B, U6, U7, U10C, S3, and associated circuit.

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	k. Connect oscilloscope to P1-88.		
	l. Rotate control unit ADDRESS switch and note oscilloscope when changing positions.	A logic level 1, 100-μs (nominal) pulse.	Check U4A, U4B, S3 and associated circuit.
	m. Connect +5-V dc input to P1-66.		
	n. Check voltage levels at:		
	TP2	NLT +4.0 V dc.	Check CR1.
	TP3	NLT +4.0 V dc.	Check CR2.
	TP4	NLT +4.0 V dc.	Check CR4.
	TP5	NLT +4.0 V dc.	Check CR3.
	o. Remove +5 V dc from P1-66.		

Note

Tests 3 through 18 are output tests. During all of these tests serial interface card A13 is removed from unit under test and mux inputs are strapped according to word and character being tested. To strap a logic 1 input, connect a 4700-Ω resistor in series between the mux input pin and +5 V dc. To strap a logic 0 input, connect directly from the mux input pin to ground. See following chart and figure for mux input/output strapping and setup requirements. Where front-panel controls are shown, these controls may be used to apply the appropriate inputs. If they are not used their associated front-panel connector must be disconnected.

MUX CONTROL LINES INPUT STRAPPING				*OUTPUTS PRESENTED BY PARALLEL INPUT CARD									
				WORD NO	CHARACTER NO	OUTPUT BIT NO							
MX8	MX4	MX2	MX1			1	2	3	4	5	6	7	8
P1-93	P1-90	P1-25	P1-27			P1-26	P1-28	P1-29	P1-94	P1-30	P1-31	P1-96	P1-104
0	0	0	0	1	2	P1-62	P1-127	P1-63	P1-128	P1-64	P1-129	P1-38	P1-103
0	0	0	1	1	3	P1-58	P1-123	P1-59	P1-124	P1-60	P1-125	P1-61	P1-126
0	0	1	0	1	4	P1-54	P1-119	P1-55	P1-120	P1-56	P1-121	P1-57	P1-122
0	0	1	1	1	5	P1-50	P1-115	P1-51	P1-116	P1-52	P1-117	P1-53	P1-118
0	1	0	0	2	2	P1-87	P1-10	P1-75	P1-11	P1-76	NA	NA	NA
0	1	0	1	2	3	P1-20	P1-19	P1-85	P1-84	P1-37	P1-106	P1-41	NA

*Outputs presented at the bit no pins are the inputs at the bit no pins associated with the word no/character no.

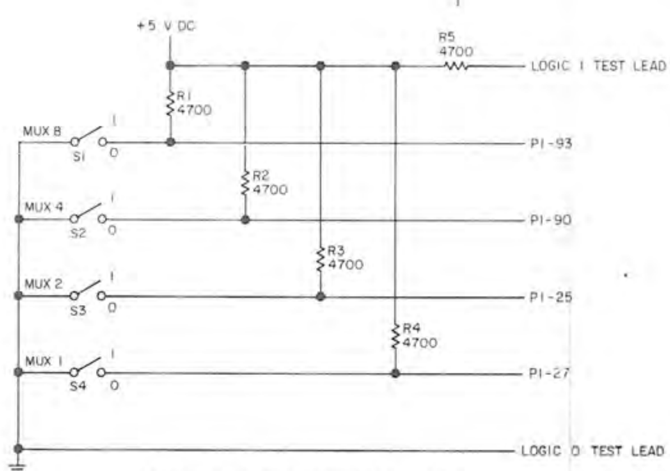
(Cont)

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)			

MUX CONTROL LINES INPUT STRAPPING				*OUTPUTS PRESENTED BY PARALLEL INPUT CARD									
				WORD NO	CHARACTER NO	OUTPUT BIT NO							
MX8	MX4	MX2	MX1			1	2	3	4	5	6	7	8
P1-93	P1-90	P1-25	P1-27			P1-26	P1-28	P1-29	P1-94	P1-30	P1-31	P1-96	P1-104
0	1	1	0	2	4	P1-32	P1-97	P1-33	P1-98	P1-34	P1-35	P1-99	P1-100
0	1	1	1	2	5	P1-21	P1-91	P1-92	P1-74	P1-9	P1-72	P1-8	P1-73
1	0	0	0	3	2	P1-112	P1-47	P1-113	P1-48	P1-107	NA	NA	NA
1	0	0	1	3	3	P1-42	P1-108	P1-43	P1-109	P1-44	P1-110	P1-111	P1-46
1	0	1	0	3	4	NA	NA	NA	NA	NA	NA	NA	NA
1	0	1	1	3	5	P1-79	P1-14	P1-78	P1-82	P1-81	NA	NA	NA
1	1	0	0	4	2	NA	NA	NA	NA	P1-68	NA	NA	NA
1	1	0	1	4	3	P1-18	P1-101	P1-39	P1-83	P1-36	P1-105	P1-40	P1-2
1	1	1	0	4	4	P1-3	P1-86	P1-49	P1-67	P1-70	P1-5	P1-4	P1-69
1	1	1	1	4	5	P1-80	P1-16	P1-95	P1-71	NA	NA	NA	NA

*Outputs presented at the bit no pins are the inputs at the bit no pins associated with the word no/character no.



TYPICAL MUX INPUT/OUTPUT TEST SETUP

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Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Word 1, character 2 outputs	a. Strap mux control lines for word 1, character 2.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 2 (see chart). **Note** FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position these switches apply logic 0 inputs.	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 1, character 2 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
1 MHz	1	1	62	26	U25, U18
	2	2	127	28	U15, U19
	4	3	63	29	U23, U20
	8	4	128	94	U21, U17
10 MHz	1	5	64	30	U24, U11
	2	6	129	31	U16, U13
NA		7	38	96	U22, U12
NA		8	103	104	U14, R42, U9

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Word 1, character 3 outputs	a. Strap mux control lines for word 1, character 3.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 3 (see chart). **Note** FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position, these switches apply logic 0 inputs.	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 1, character 3 (see chart).	Verify that associated outputs are at logic 0.	

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	(see chart below)		

FRONT-PANEL CONTROL		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
10 kHz	1	1	58	26	U25, U18
	2	2	123	28	U15, U19
	4	3	59	29	U23, U20
	8	4	124	94	U21, U17
100 kHz	1	5	60	30	U24, U11
	2	6	125	31	U16, U13
	4	7	61	96	U22, U12
	8	8	126	104	U14, U9

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Word 1, character 4 outputs	a. Strap mux control lines for word 1, character 4.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 4 (see chart).	Verify that associated outputs are at logic 1.	
	Note FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position, these switches apply logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 1, character 4 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
100 Hz	1	1	54	26	U25, U18
	2	2	119	28	U15, U19
	4	3	55	29	U23, U20
	8	4	120	94	U21, U17
1 kHz	1	5	56	30	U24, U11
	2	6	121	31	U16, U13
	4	7	57	96	U22, U12
	8	8	122	104	U14, U9

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6. Word 1, character 5 outputs	a. Strap mux control lines for word 1, character 5.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 5 (see chart).	Verify that associated outputs are at logic 1.	
	Note FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position, these switches apply logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 1, character 5 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA		1	50	26	U25, R68, U18
NA		2	115	28	U15, R64, U19
NA		3	51	29	U23, R60, U20
NA		4	116	94	U21, R56, U17
*10 Hz	1	5	52	30	U24, R52, U11
*10 Hz	2	6	117	31	U16, R49, U13
*10 Hz	4	7	53	96	U22, R46, U12
*10 Hz	8	8	118	104	U14, R43, U9

*Applicable only with 10-Hz front-panel tuning.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. Word 2, character 2 outputs	a. Strap mux control lines for word 2, character 2.	**Note** Grounded input as noted in chart will always be logic 0 output.	
(Cont)	b. Apply logic 1 inputs at inputs associated with word 2, character 2 (see chart).	Verify that associated outputs are at logic 1.	

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	**Note** RF GAIN switch applies logic 1 input in the position indicated in the chart (positions read as MAX minus X number of positions). In the MAX position, this switch applies logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 2, character 2 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA		1	87	26	U25, R69, U18
RF GAIN	MAX-1	2	10	28	U15, R65, U19
	MAX-2	3	75	29	U23, R61, U20
	MAX-4	4	11	94	U21, R57, U17
	MAX-8	5	76	30	U24, R53, U11
NA		6	*	31	U16, U13
NA		7	38	96	U22, U12
NA		8	103	104	U14, R42, U9

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. Word 2, character 3 outputs	a. Strap mux control lines for word 2, character 3.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 2, character 3 (see chart).	Verify that associated ouputs are at logic 1.	
	Note AGC switch applies logic 1 input in the position indicated in the chart. In the AGC-SLOW position, this switch applies logic 0 inputs.		
(Cont)	c. Apply logic 0 inputs at inputs associated with word 2, character 3 (see chart).	Verify that associated outputs are at logic 0.	

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)			

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
AGC-FAST (B)	1	20	26	U25, U18
AGC-OFF (B)	2	19	28	U15, U19
AGC-FAST (A)	3	85	29	U23, U20
AGC-OFF (A)	4	84	94	U21, U17
NA	5	37	30	U24, U11
NA	6	106	31	U16, U13
NA	7	41	96	U22, U12
NA	8	*	104	U14, U9

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. Word 2, character 4 outputs	a. Strap mux control lines for word 2, character 4.		
	b. Apply logic 1 inputs at inputs associated with word 2, character 4 (see chart).	Verify that associated outputs are at logic 1.	
	Note MODE switch and/or BANDWIDTH switch applies logic 1 input in the position indicated in the chart. In the ISB position, the MODE switch applies logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 2, character 4 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL (MODE)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
SSB/CW-USB or USB	1	32	26	U25, R70, U18
SSB/CW-LSB or LSB	2	97	28	U15, R66, U19
*SSB/CW-A	3	33	29	U23, R62, U20
*SSB/CW-B	4	98	94	U21, R58, U17
*SSB/CW-C	5	34	30	U24, R54, U11
*SSB/CW-D	6	35	31	U16, R50, U13
*SSB/CW-E	7	99	96	U22, R47, U12
*SSB/CW-16	8	100	104	U14, R44, U9

*SSB/CW applicable only on receiver control.

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. Word 2, character 5 outputs	a. Strap mux control lines for word 2, character 5.		
	b. Apply logic 1 inputs at inputs associated with word 2, character 5 (see chart).	Verify that associated outputs are at logic 1.	
	Note MODE switch applies logic 1 input in the position indicated in the chart. In any other position, the MODE switch applies logic 0 input.		
	c. Apply logic 0 inputs at inputs associated with word 2, character 5 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL (MODE)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	21	26	U25, R71, U18
NA	2	91	28	U15, R67, U19
NA	3	92	29	U23, R63, U20
ISB	4	74	94	U21, R59, U17
*CW	5	9	30	U24, R55, U11
CW, LSB, USB, ISB, or SSB/CW	6	72	31	U16, R51, U13
AM	7	8	96	U22, R48, U12
NA	8	73	104	U14, R45, U9

*CW applicable only on exciter control and receiver-exciter control.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
11. Word 3, character 2 outputs	a. Strap mux control lines for word 3, character 2.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 3, character 2 (see chart).	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 3, character 2 (see chart).	Verify that associated outputs are at logic 0.	

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
11. (Cont)			

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	112	26	U18, R103, U25
NA	2	47	28	U19, R97, R15
NA	3	113	29	U20, R91, U23
NA	4	48	94	U17, R86, U21
NA	5	107	30	U11, R81, U24
NA	6	*	31	U13, U16
NA	7	38	96	U12, U22
NA	8	103	104	U9, R42, U14

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12. Word 3, character 3 outputs	a. Strap mux control lines for word 3, character 3.		
	b. Apply logic 1 inputs at inputs associated with word 3, character 3 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 3, character 3 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	42	26	U18, R104, U25
NA	2	108	28	U19, R98, U15
NA	3	43	29	U20, R92, U23
NA	4	109	94	U17, R87, U21
NA	5	44	30	U11, R82, U24
NA	6	110	31	U13, R78, U16
NA	7	111	96	U12, R75, U22
NA	8	46	104	U9, R72, U14

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13. Word 3, character 4 outputs	a. Strap mux control lines for word 3, character 4.	**Note** Grounded input as noted in chart will always be logic 0 output. Verify that all associated outputs are at logic 0.	

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	*	26	U18, U25
NA	2	*	28	U19, U15
NA	3	*	29	U20, U23
NA	4	*	94	U17, U21
NA	5	*	30	U11, U24
NA	6	*	31	U13, U16
NA	7	*	96	U12, U22
NA	8	*	104	U9, U14

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. Word 3, character 5 outputs	a. Strap mux control lines for word 3, character 5.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 3, character 5 (see chart). **Note** PA PWR and P CAR switches apply logic 1 inputs in the positions indicated in the chart. In the OFF positions these switches apply logic 0 inputs.	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 3, character 5 (see chart).	Verify that associated outputs are at logic 0.	

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. (Cont)	(see chart below)		
15. Word 4, character 2 outputs	a. Strap mux control lines for word 4, character 2.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 4, character 2 (see chart). **Note** KEY switch in the LOCK position applies a logic 1 input and in the NORM position applies a logic 0 input.	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 4, character 2 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
PA PWR-STBY	1	79	26	U18, R105, U25
PA PWR-HIGH PWR	2	14	28	U19, R99, U15
PA PWR-LOW PWR	3	78	29	U20, R93, U23
P CAR-ON	4	82	94	U17, R8, U21
NA	5	81	30	U11, R83, U24
NA	6	*	31	U13, U16
NA	7	*	96	U12, U22
NA	8	*	104	U9, U14

*Grounded input.

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15. (Cont)	(see chart)		

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	*	26	U18, U25
NA	2	*	28	U19, U15
NA	3	*	29	U20, U23
NA	4	*	94	U17, U21
KEY-LOCK	5	68	30	U11, R12, U24
NA	6	*	31	U13, U16
NA	7	38	96	U12, U22
NA	8	103	104	U9, R42, U14

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
16. Word 4, character 3 outputs	a. Strap mux control lines for word 4, character 3.		
	b. Apply logic 1 inputs at inputs associated with word 4, character 3 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 4, character 3 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	18	26	U18, R106, U25
NA	2	101	28	U19, R100, U15
NA	3	39	29	U20, R94, U23
NA	4	83	94	U17, R88, U21
NA	5	36	30	U11, R84, U24
NA	6	105	31	U13, R79, U16
NA	7	40	96	U12, R76, U22
NA	8	2	104	U9, R73, U14

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
17. Word 4, character 4 outputs	a. Strap mux control lines for word 4, character 4.		
	b. Apply logic 1 inputs at inputs associated with word 4, character 4 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 4, character 4 (see chart).	Verify that associated outputs are at logic 0.	

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	3	26	U18, R107, U25
NA	2	86	28	U19, R101, U15
NA	3	49	29	U20, R95, U23
NA	4	67	94	U17, R89, U21
NA	5	70	30	U11, R85, U24
NA	6	5	31	U13, R80, U16
NA	7	4	96	U12, R77, U22
NA	8	69	104	U9, R74, U14

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
18. Word 4, character 5 outputs	a. Strap mux control lines for word 4, character 5.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 4, character 5 (see chart).	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 4, character 5 (see chart).	Verify that associated outputs are at logic 0.	

Table 2. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
18. (Cont)			

FRONT-PANEL CONTROL	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	1	80	26	U18, R108, U25
NA	2	16	28	U19, R102, CR24, C28, U15
NA	3	95	29	U20, R96, U23
NA	4	71	94	U17, R90, U21
NA	5	*	30	U11, U24
NA	6	*	31	U13, U16
NA	7	*	96	U12, U22
NA	8	*	104	U9, U14

*Grounded input.

Table 3. Parallel Input, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	**Note** The testing and troubleshooting procedures herein are for 1-, 2-, 3-, or 4-channel configurations of the HF-8014/8014A, HF-8054/8054A, HF-8093, and HF-8094. These testing and troubleshooting procedures are based on using a control unit and an associated local unit. The most effective method of testing and troubleshooting is obtained by installing the questionable parallel input in the control unit. During these tests when a control unit is referred to it is an exciter control, or a receiver control. When a local unit is referred to it is a receiver-exciter, an exciter, or a receiver. a. Remove top cover of unit containing parallel input to be tested. b. Remove parallel input. c. Set the dip switches for four-channel operation. (Group 1 closed, group 2 open.) Refer to figure 2 for dip switch location. d. Place the parallel input card on the card extender and place it in the unit. e. Set control unit and local unit LINE SELECTOR switches to 115 V. f. Connect control unit and local unit to 115-V ac power source and set power on.		
(Cont)			

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. (Cont)	g. Measure dc voltages, on the card under test, between the following pins and ground (TP1, brown):		
	P1-45	+15 ± 1.0 V dc.	
	P1-65	+5 ±0.5 V dc.	
	P1-114	-15 ±1.0 V dc.	
	h. Strap local unit for address 0.		
	i. Connect local unit to control unit.		

Note

Tests 2 through 17 are output tests. During all of these tests serial interface card A13 is removed from unit uder test and mux inputs are strapped according to word and character being tested. To strap a logic 1 input, connect a 4700-Ω resistor in series between the mux input pin and +5 V dc. To strap a logic 0 input, connect directly from the mux input pin to ground. See following chart and figure for mux input/output strapping and setup requirements. Where front-panel controls are shown, these controls may be used to apply the appropriate inputs. If they are not used their associated front-panel connector must be disconnected. Signal names are given in parentheses ( ) where there is not a front-panel control.

MUX CONTROL LINES INPUT STRAPPING				*OUTPUTS PRESENTED BY PARALLEL INPUT CARD									
				WORD NO	CHARACTER NO	OUTPUT BIT NO							
MX8	MX4	MX2	MX1			1	2	3	4	5	6	7	8
P1-93	P1-90	P1-25	P1-27			P1-26	P1-28	P1-29	P1-94	P1-30	P1-31	P1-96	P1-104
0	0	0	0	1	2	P1-62	P1-127	P1-63	P1-128	P1-64	P1-129	P1-38	P1-103
0	0	0	1	1	3	P1-58	P1-123	P1-59	P1-124	P1-60	P1-125	P1-61	P1-126
0	0	1	0	1	4	P1-54	P1-119	P1-55	P1-120	P1-56	P1-121	P1-57	P1-122
0	0	1	1	1	5	P1-50	P1-115	P1-51	P1-116	P1-52	P1-117	P1-53	P1-118
0	1	0	0	2	2	P1-87	P1-10	P1-75	P1-11	P1-76	NA	NA	NA
0	1	0	1	2	3	P1-20	P1-19	P1-85	P1-84	P1-37	P1-106	P1-41	P1-12

*Outputs presented at the bit no pins are the inputs at the bit no pins associated with the word no/character no.

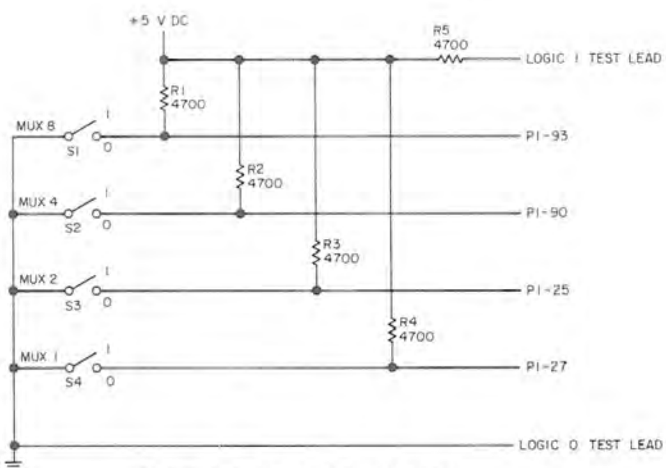
(Cont)			

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. (Cont)			

MUX CONTROL LINES INPUT STRAPPING				*OUTPUTS PRESENTED BY PARALLEL INPUT CARD									
				WORD NO	CHARACTER NO	OUTPUT BIT NO							
MX8	MX4	MX2	MX1			1	2	3	4	5	6	7	8
P1-93	P1-90	P1-25	P1-27			P1-26	P1-28	P1-29	P1-94	P1-30	P1-31	P1-96	P1-104
0	1	1	0	2	4	P1-32	P1-97	P1-33	P1-98	P1-34	P1-35	P1-99	P1-100
0	1	1	1	2	5	P1-21	P1-91	P1-92	P1-74	P1-9	P1-72	P1-8	P1-73
1	0	0	0	3	2	P1-112	P1-47	P1-113	P1-48	P1-107	NA	NA	NA
1	0	0	1	3	3	P1-42	P1-108	P1-43	P1-109	P1-44	P1-110	P1-111	P1-46
1	0	1	0	3	4	P2-4	P2-6	P2-5	P2-3	P2-9	P2-10	P2-8	P2-7
1	0	1	1	3	5	P1-79	P1-14	P1-78	P1-82	P1-81	NA	NA	NA
1	1	0	0	4	2	P1-24	P1-22	P1-23	P1-88	P1-68	P1-13	NA	NA
1	1	0	1	4	3	P1-18	P1-101	P1-39	P1-83	P1-36	P1-105	P1-40	P1-2
1	1	1	0	4	4	P1-3	P1-86	P1-49	P1-67	P1-70	P1-5	P1-4	P1-69
1	1	1	1	4	5	P1-80	P1-16	P1-95	P1-71	P1-89	P1-7	P1-102	P1-77

*Outputs presented at the bit no pins are the inputs at the bit no pins associated with the word no/character no.



TYPICAL MUX INPUT/OUTPUT TEST SETUP

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Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. Word 1, character 2 outputs	a. Strap mux control lines for word 1, character 2.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 2 (see chart).	Verify that associated outputs are at logic 1.	
	Note FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position these switches apply logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 1, character 2 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)		RECEIVER FRONT-PANEL CONTROL (SIGNAL)		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
1 MHz	1	1 MHz	1	1	62	26	U25, U18
	2		2	2	127	28	U15, U19
	4		4	3	63	29	U23, U20
	8		8	4	128	94	U21, U17
10 MHz	1	10 MHz	1	5	64	30	U24, U11
	2		2	6	129	31	U16, U13
NA		NA		7	38	96	U22, U12
NA		NA		8	103	104	U14, R42, U9

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Word 1, character 3 outputs	a. Strap mux control lines for word 1, character 3.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 3 (see chart).	Verify that associated outputs are at logic 1.	
	Note FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position, these switches apply logic 0 inputs.		
(Cont)	c. Apply logic 0 inputs at inputs associated with word 1, character 3 (see chart).	Verify that associated outputs are at logic 0.	

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)			

EXCITER FRONT-PANEL CONTROL (SIGNAL)		RECEIVER FRONT-PANEL CONTROL (SIGNAL)		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
10 kHz	1	10 kHz	1	1	58	26	U25, U18
	2		2	2	123	28	U15, U19
	4		4	3	59	29	U23, U20
	8		8	4	124	94	U21, U17
100 kHz	1	100 kHz	1	5	60	30	U24, U11
	2		2	6	125	31	U16, U13
	4		4	7	61	96	U22, U12
	8		8	8	126	104	U14, U9

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Word 1, character 4 outputs	a. Strap mux control lines for word 1, character 4.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 4 (see chart).	Verify that associated outputs are at logic 1.	
	Note FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position, these switches apply logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 1, character 4 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)		RECEIVER FRONT-PANEL CONTROL (SIGNAL)		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
100 Hz	1	100 Hz	1	1	54	26	U25, U18
	2		2	2	119	28	U15, U19
	4		4	3	55	29	U23, U20
	8		8	4	120	94	U21, U17
1 kHz	1	1 kHz	1	5	56	30	U24, U11
	2		2	6	121	31	U16, U13
	4		4	7	57	96	U22, U12
	8		8	8	122	104	U14, U9

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Word 1, character 5 outputs	a. Strap mux control lines for word 1, character 5.		
	b. Apply logic 1 inputs at inputs associated with word 1, character 5 (see chart).	Verify that associated outputs are at logic 1.	
	Note FREQUENCY KHZ switches apply logic 1 inputs in the positions indicated in the chart. In the 0 position, these switches apply logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 1, character 5 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	NA	1	50	26	U25, R68, U18
NA	NA	2	115	28	U15, R64, U19
NA	NA	3	51	29	U23, R60, U20
NA	NA	4	116	94	U21, R56, U17
*10 Hz 1	*10 Hz 1	5	52	30	U24, R52, U11
*10 Hz 2	*10 Hz 2	6	117	31	U16, R49, U13
*10 Hz 4	*10 Hz 4	7	53	96	U22, R46, U12
*10 Hz 8	*10 Hz 8	8	118	104	U14, R43, U9

*Applicable only with 10-Hz front-panel tuning.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6. Word 2, character 2 outputs	a. Strap mux control lines for word 2, character 2.	**Note** Grounded input as noted in chart will always be logic 0 output.	
(Cont)	b. Apply logic 1 inputs at inputs associated with word 2, character 2 (see chart).	Verify that associated outputs are at logic 1.	

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6. (Cont)	**Note** RF GAIN switch applies logic 1 input in the position indicated in the chart (positions read as MAX minus X number of positions). In the MAX position, this switch applies logic 0 inputs.		
	c. Apply logic 0 inputs at inputs associated with word 2, character 2 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	RF GAIN (1)	1	87	26	U25, R69, U18
NA	RF GAIN (2)	2	10	28	U15, R65, U19
NA	RF GAIN (4)	3	75	29	U23, R61, U20
NA	RF GAIN (8)	4	11	94	U21, R57, U17
NA	RF GAIN (16)	5	76	30	U24, R53, U11
NA	NA	6	*	31	U16, U13
NA	NA	7	38	96	U22, U12
NA	NA	8	103	104	U14, R42, U9

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. Word 2, character 3 outputs	a. Strap mux control lines for word 2, character 3.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 2, character 3 (see chart).	Verify that associated ouputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 2, character 3 (see chart).	Verify that associated outputs are at logic 0.	
(Cont)			

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)			

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	AGC-A2 (1)	1	20	26	U25, U18
NA	AGC-A2 (2)	2	19	28	U15, U19
NA	AGC-B2 (1)	3	85	29	U23, U20
NA	AGC-B2 (2)	4	84	94	U21, U17
NA	FL4 (B) ENBL	5	37	30	U24, U11
NA	FL5 (C) ENBL	6	106	31	U16, U13
NA	FL6 (D) ENBL	7	41	96	U22, U12
NA	FL7 (E) ENBL	8	12	104	U14, U9

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. Word 2, character 4 outputs	a. Strap mux control lines for word 2, character 4.		
	b. Apply logic 1 inputs at inputs associated with word 2, character 4 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 2, character 4 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
PEAK CLIP ENABLE	AGC-A1 (1)	1	32	26	U25, R70, U18
NA	AGC-A1 (2)	2	97	28	U15, R66, U19
NA	AGC-B1 (1)	3	33	29	U23, R62, U20
NA	AGC-B1 (2)	4	98	94	U21, R58, U17
NA	AFC ENBL	5	34	30	U24, R54, U11
NA	VBFO ENBL	6	35	31	U16, R50, U13
NA	FL1 ENBL	7	99	96	U22, R47, U12
NA	FL3 (A) ENBL	8	100	104	U14, R44, U9

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. Word 2, character 5 outputs	a. Strap mux control lines for word 2, character 5.		
	b. Apply logic 1 inputs at inputs associated with word 2, character 5 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 2, character 5 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (MODE) (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (MODE) (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
12 ENBL	A2 ENBL	1	21	26	U25, R71, U18
A1 ENBL	A1 ENBL	2	91	28	U15, R67, U19
B1 ENBL	B1 ENBL	3	92	29	U23, R63, U20
B2 ENBL	B2 ENBL	4	74	94	U21, R59, U17
ISB ENBL	ISB ENBL	5	9	30	U24, R55, U11
CW ENBL	CW ENBL	6	72	31	U16, R51, U13
AM ENBL	AM ENBL	7	8	96	U22, R48, U12
NA	DATA NET ENBL	8	73	104	U14, R45, U9

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. Word 3, character 2 outputs	a. Strap mux control lines for word 3, character 2.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 3, character 2 (see chart).	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 3, character 2 (see chart).	Verify that associated outputs are at logic 0.	

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)			

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA		1	1	112	26	U18, U103, U25
NA	VBFO	2	2	47	28	U19, R97, R15
NA	1 kHz	4	3	113	29	U20, R91, U23
NA		8	4	48	94	U17, R86, U21
NA	(VBFO SIGN)		5	107	30	U11, R81, U24
NA	NA		6	*	31	U13, U16
NA	NA		7	38	96	U12, U22
NA	NA		8	103	104	U9, R42, U14

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
11. Word 3, character 3 outputs	a. Strap mux control lines for word 3, character 3.		
	b. Apply logic 1 inputs at inputs associated with word 3, character 3 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 3, character 3 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)		BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA		1	1	42	26	U18, R104, U25
NA	VBFO	2	2	108	28	U19, R98, U15
NA	10 Hz	4	3	43	29	U20, R92, U23
NA		8	4	109	94	U17, R87, U21
NA		1	5	44	30	U11, R82, U24
NA	VBFO	2	6	110	31	U13, R78, U16
NA	100 Hz	4	7	111	96	U12, R75, U22
NA		8	8	46	104	U9, R72, U14

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12. Word 3, character 4 outputs	a. Strap mux control lines for word 3, character 4.	**Note** Grounded input as noted in chart will always be logic 0 output. Verify that all associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P2-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	NA	1	4	26	U18, U25
NA	NA	2	6	28	U19, U15
NA	NA	3	5	29	U20, U23
NA	NA	4	3	94	U17, U21
NA	NA	5	9	30	U11, U24
NA	NA	6	10	31	U13, U16
NA	NA	7	8	96	U12, U22
NA	NA	8	7	104	U9, U14

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13. Word 3, character 5 outputs	a. Strap mux control lines for word 3, character 5.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 3, character 5 (see chart). **Note** PA PWR and PILOT CARR switches apply logic 1 inputs in the positions indicated in the chart. In the OFF positions these switches apply logic 0 inputs.	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 3, character 5 (see chart).	Verify that associated outputs are at logic 0.	

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13. (Cont)			

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
PA PWR-STBY	A2 AGC BUS	1	79	26	U18, R105, U25
PA PWR-HIGH PWR	A1 AGC BUS	2	14	28	U19, R99, U15
PA PWR-LOW PWR	B1 AGC BUS	3	78	29	U20, R93, U23
PILOT CARR-ON	B2 AGC BUS	4	82	94	U17, R8, U21
NA	NA	5	81	30	U11, R83, U24
NA	NA	6	*	31	U13, U16
NA	NA	7	*	96	U12, U22
NA	NA	8	*	104	U9, U14

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. Word 4, character 2 outputs	a. Strap mux control lines for word 4, character 2.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 4, character 2 (see chart).	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 4, character 2 (see chart).	Verify that associated outputs are at logic 0.	

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. (Cont)			

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
(A2 AF MON)	(A2 AF MON)	1	24	26	U18, U25
(A1 AF MON)	(A1 AF MON)	2	22	28	U19, U15
(B1 AF MON)	(B1 AF MON)	3	23	29	U20, U23
(B2 AF MON)	(B2 AF MON)	4	88	94	U17, U21
(REMOTE KEY (MON))	(RF OVLD MON)	5	68	30	U11, R12, U24
(EXCITER FLT)	(RECEIVER FLT)	6	13	31	U13, U16
NA	NA	7	38	96	U12, U22
NA	NA	8	103	104	U9, R42, U14

*Grounded input.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15. Word 4, character 3 outputs	a. Strap mux control lines for word 4, character 3.		
	b. Apply logic 1 inputs at inputs associated with word 4, character 3 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 4, character 3 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
(FREQ REF FLT)	(FREQ REF FLT)	1	18	26	U18, R106, U25
(SYNTH OUT LOCK FLT)	(SYNTH OUT LOCK FLT)	2	101	28	U19, R100, U15
(100 kHz LOCK FLT)	(100 kHz LOCK FLT)	3	39	29	U20, R94, U23
(10 kHz LOCK FLT)	(10 kHz LOCK FLT)	4	83	94	U17, R88, U21
(1 kHz LOCK FLT)	(1 kHz LOCK FLT)	5	36	30	U11, R85, U24
(100 Hz LOCK FLT)	(100 Hz LOCK FLT)	6	105	31	U13, R79, U16
(10 Hz LOCK FLT)	(10 Hz LOCK FLT)	7	40	96	U12, R76, U22
NA	NA	8	2	104	U9, R73, U14

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
16. Word 4, character 4 outputs	a. Strap mux control lines for word 4, character 4.		
	b. Apply logic 1 inputs at inputs associated with word 4, character 4 (see chart).	Verify that associated outputs are at logic 1.	
	c. Apply logic 0 inputs at inputs associated with word 4, character 4 (see chart).	Verify that associated outputs are at logic 0.	

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
NA	(A2 AGC MON)	1	3	26	U18, R107, U25
(A1 IF MON)	(A1 AGC MON)	2	86	28	U19, R101, U15
(EXT STANDARD)	(B1 AGC MON)	3	49	29	U20, R95, U23
NA	(B2 AGC MON)	4	67	94	U17, R89, U21
(EXCTR PS FLT)	(RCVR PS FLT)	5	70	30	U11, R85, U24
(EXCTR RF MON)	(VBFO SYNTH FLT)	6	5	31	U13, R80, U16
(SUBCARR LOCK FLT)	(SUBCARR LOCK FLT)	7	4	96	U12, R77, U22
NA	NA	8	69	104	U9, R74, U14

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
17. Word 4, character 5 outputs	a. Strap mux control lines for word 4, character 5.	**Note** Grounded input as noted in chart will always be logic 0 output.	
	b. Apply logic 1 inputs at inputs associated with word 4, character 5 (see chart).	Verify that associated outputs are at logic 1.	
(Cont)	c. Apply logic 0 inputs at inputs associated with word 4, character 5 (see chart).	Verify that associated outputs are at logic 0.	

Table 3. Parallel Input, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
17. (Cont)			

EXCITER FRONT-PANEL CONTROL (SIGNAL)	RECEIVER FRONT-PANEL CONTROL (SIGNAL)	BIT NO	INPUTS P1-( )	OUTPUTS P1-( )	IF ABNORMAL CHECK
(MONITOR)	(MONITOR)	1	80	26	U18, R108, U25
(LCL CONT)	(LCL CONT)	2	16	28	U19, R102, CR24, C28, U15
(DATA ERROR)	(DATA ERROR)	3	95	29	U20, R96, U23
(PRESEL FLT)	(PRESEL FLT)	4	71	94	U17, R90, U21
(CPLR FLT)	(RF XLATOR MON)	5	*	30	U11, U24
(PA RF MON)	(AFC LOCK MON)	6	*	31	U13, U16
(PA FLT)	(EXT STANDARD)	7	*	96	U12, U22
(PA READY)	NA	8	*	104	U9, U14

*Grounded input.

4. REPAIR

Repair of the parallel input card is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

5. PARTS LIST/DIAGRAMS

5.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 3). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

5.2 Parts List

REF DES Column — Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column — Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column — Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column — Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column — Lists the manufacturer's part number for the selected parts.

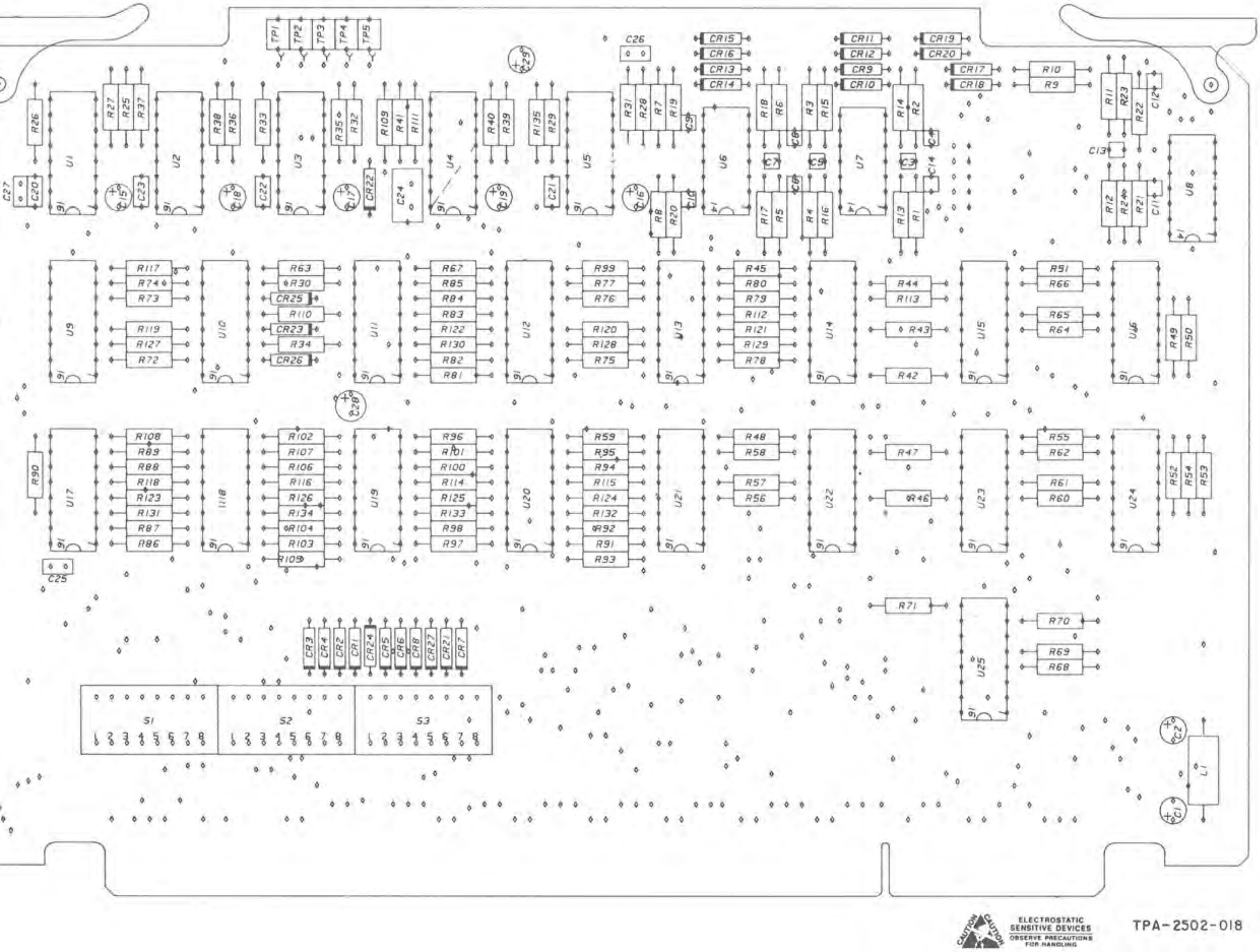
Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042
16546	GLOBE-UNION INC USCC/CENTRALAB ELECTRICS DIV 4561 COLORADO LOS ANGELES CA 90039
27264	MOLEX INC CORPORATE HQ 2222 WELLINGTON COURT LISLE IL 60532
56289	SPRAGUE ELECTRIC CO NORTH ADAMS MA 01247
74970	JOHNSON E F CO 299 10TH AVE S W WASECA MN 56093
81349	MILITARY SPECIFICATION
96906	MILITARY STANDARD

5.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

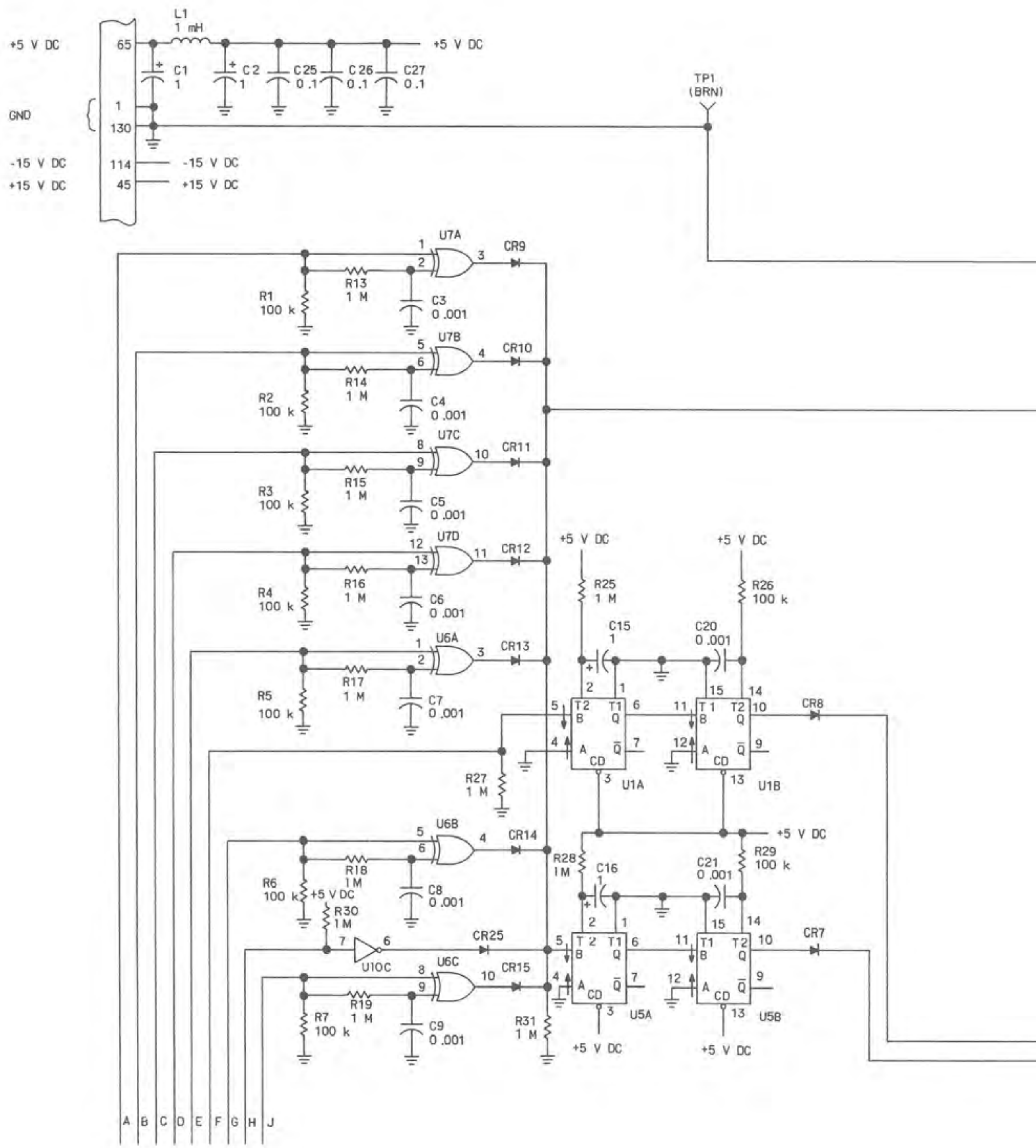
CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Parallel Input	642-3135-001	REV D



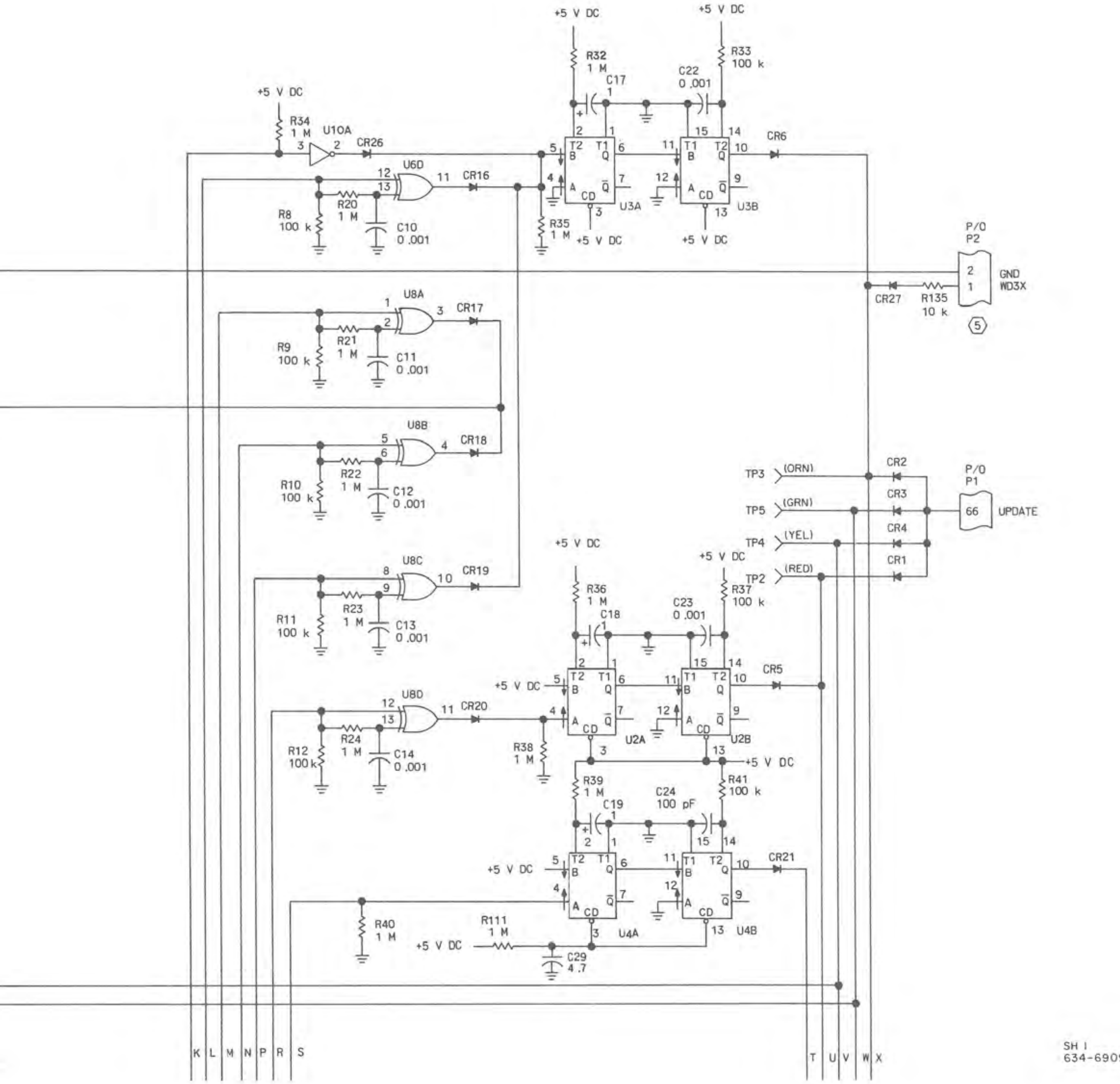
Parallel Input, Schematic Diagram
Figure 3 (Sheet 1 of 6)

PARTS LIST

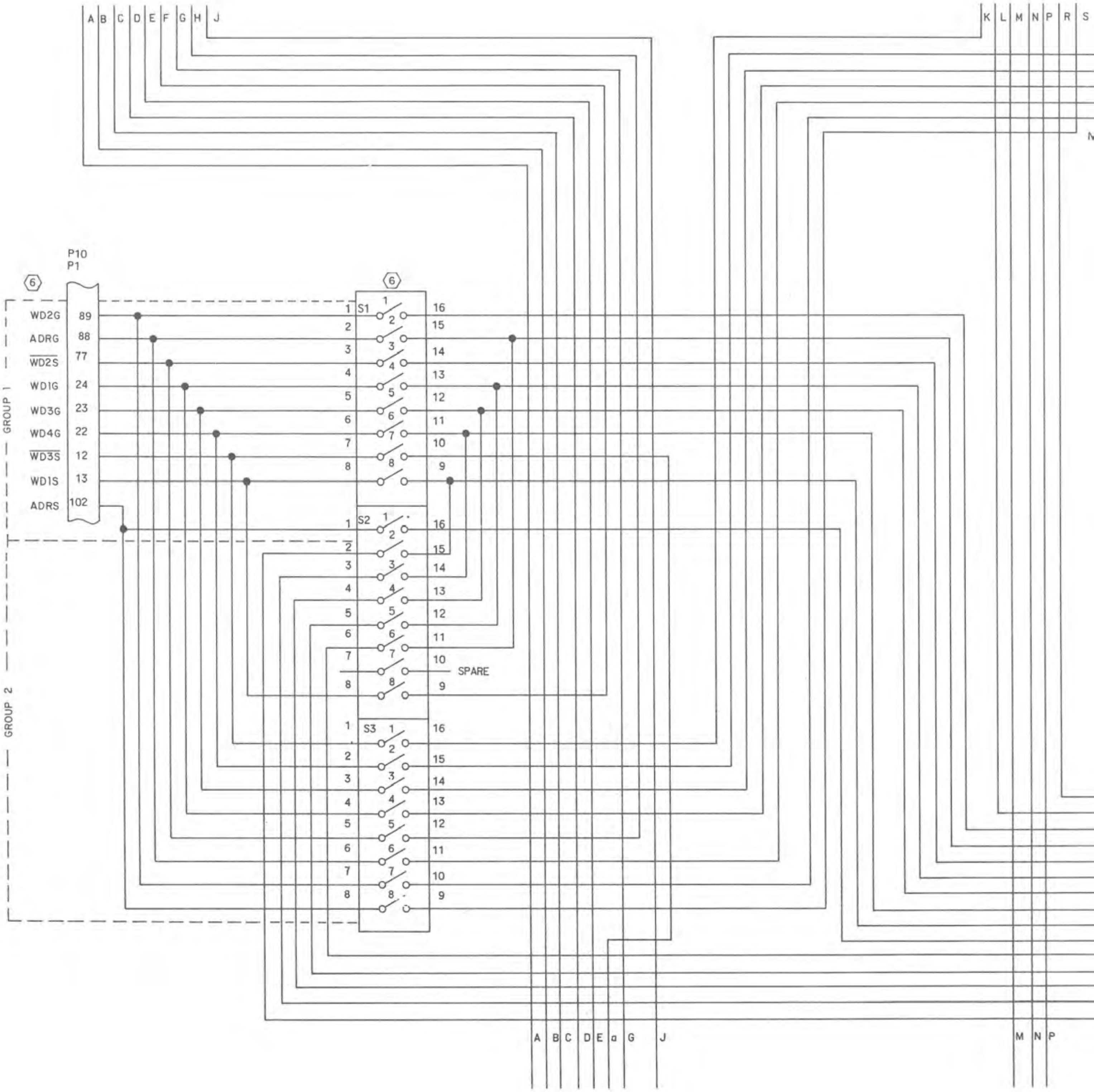
REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	PARALLEL INPUT (ESDS)	642-3135-001			
CR1-CR27	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1,C2	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C3-C14	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 50V	913-3279-030		16546	CY10C102M
C15-C19	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C20-C23	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V	913-4018-000		81349	CK05BX102K
C24	CAPACITOR,FXD MICA DIEL, 100PF, 5%, 500V	912-3879-000		81349	CM04FD101J03
C25-C27	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V	913-3279-680		16546	CY20C104M
C28,C29	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
L1	COIL,RF 1000UH	240-2540-000		96906	MS90539-15
R1-R12	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R13-R25	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R26	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R27,R28	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R29	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R30-R32	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R33	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R34-R36	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R37	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R38-R40	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R41	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R42-R108	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R109	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R110	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R111-R118	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R119-R126	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R127-R134	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R135	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
S1-S3	SWITCH,DUAL PKG	266-0243-050		27264	A10040-108
TP1	JACK,TIP BRN	360-0484-070		74970	105-1108-011
TP2	JACK,TIP RED	360-0484-020		74970	105-1102-011
TP3	JACK,TIP ORN	360-0484-050		74970	105-1106-011
TP4	JACK,TIP YEL	360-0484-060		74970	105-1107-011
TP5	JACK,TIP GRN	360-0484-040		74970	105-1104-011
U1-U5	INTEGRATED CIRCUIT (ESDS)	351-8421-020		07263	4528BPC
U6-U8	INTEGRATED CIRCUIT (ESDS)	351-8407-010		04713	MC14070BCP
U9	INTEGRATED CIRCUIT DATA SELECTOR	351-8420-020		04713	MC14512BCP
U10	INTEGRATED CIRCUIT (ESDS)	351-8159-210		07263	F4049BPC
U11-U25	INTEGRATED CIRCUIT DATA SELECTOR	351-8420-020		04713	MC14512BCP



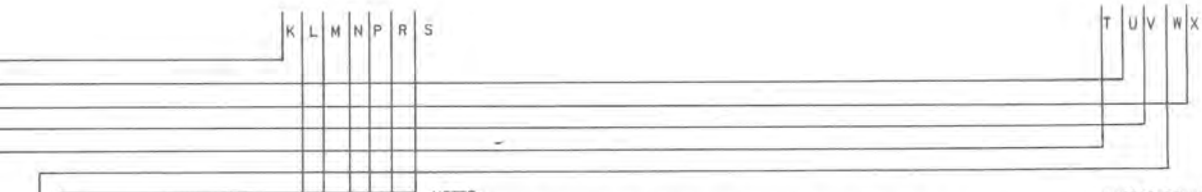
+5 V DC
GND
-15 V DC
+15 V DC
65
1
130
114
45
L1
1 mH
C1
1
C2
1
C25
0.1
C26
0.1
C27
0.1
+5 V DC
-15 V DC
+15 V DC
TP1
(BRN)
U7A
CR9
R1
100 k
R13
1 M
C3
0.001
U7B
CR10
R2
100 k
R14
1 M
C4
0.001
U7C
CR11
R3
100 k
R15
1 M
C5
0.001
U7D
CR12
R4
100 k
R16
1 M
C6
0.001
U6A
CR13
R5
100 k
R17
1 M
C7
0.001
R25
1 M
R26
100 k
C15
1
C20
0.001
U1A
U1B
CR8
R27
1 M
U6B
CR14
R6
100 k
R18
1 M
C8
0.001
R28
1M
C16
1
C21
0.001
R29
100 k
R30
1 M
U10C
CR25
U6C
CR15
R7
100 k
R19
1 M
C9
0.001
R31
1 M
U5A
U5B
CR7
A B C D E F G H J



Parallel Input, Schematic Diagram
Figure 3 (Sheet 3)



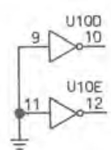
A B C D E F G H J
K L M N P R S
P10
P1
6
WD2G 89
ADRG 88
WD2S 77
WD1G 24
WD3G 23
WD4G 22
WD3S 12
WD1S 13
ADRS 102
GROUP 1
GROUP 2
S1
S2
S3
SPARE
A B C D E a G J
M N P



NOTES:

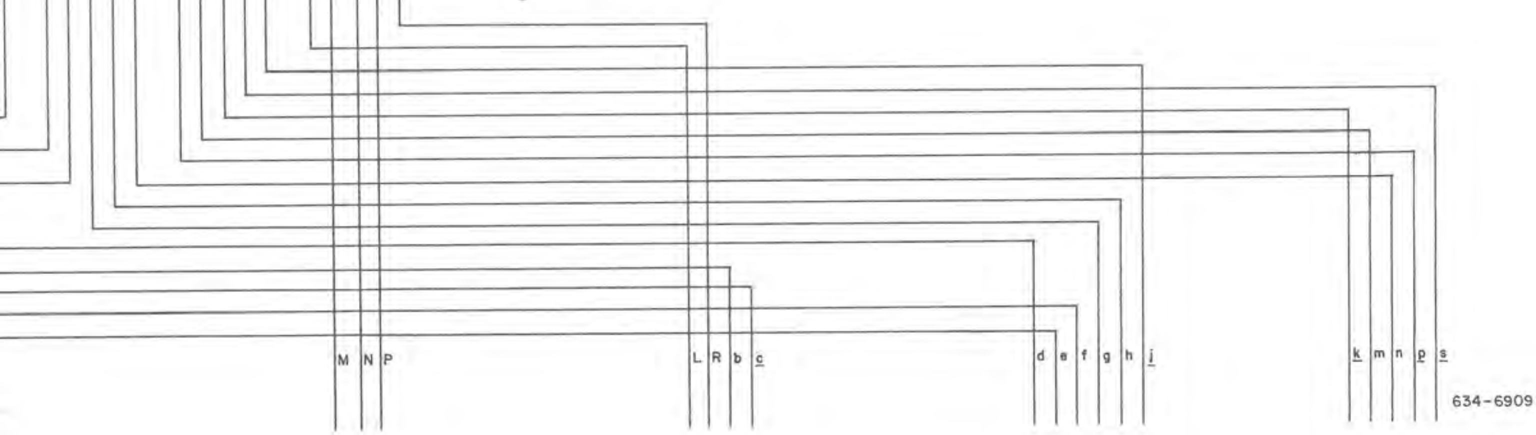
1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. TYPE DESIGNATION SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.
4. UNLESS OTHERWISE SPECIFIED DIODES ARE TYPE 1N4454.
5. P2 IS A CABLE CONNECTOR FIELD. THIS CABLE CONNECTOR (372-0043-010) IS NOT IN 642-3135-001 CONFIGURATION.
6. S1, S2 AND S3 ARE DIPSWITCHES WITH 8 SWITCHES ON EACH. INDIVIDUAL SWITCHES ARE NUMBERED 1 TO 8 ON EACH DIPSWITCH. THE INDIVIDUAL SWITCHES ARE DIVIDED INTO TWO GROUPS. TO OPERATE A 4-CHANNEL RADIO CLOSE GROUP 1 SWITCHES ONLY. TO OPERATE ANY OTHER RADIO OR ANY TYPE OF CONTROL UNIT CLOSE GROUP 2 SWITCHES ONLY. CONNECTOR PINS P1-12, -13, -22, -23, -24, -77, -88, -89, AND -102, ARE DUAL FUNCTION PINS. SIGNAL NAMES SHOWN FOR THESE PINS ARE WITH GROUP 2 SWITCHES CLOSED. WHEN GROUP 1 SWITCHES ARE CLOSED, THESE PINS ARE ASSOCIATED WITH CONTROL/STATUS BITS.
7. SIGNAL NAMES ARE NOT SHOWN FOR P1 AND P2 PINS ARE ASSOCIATED WITH CONTROL/STATUS BITS. THESE PINS HAVE DIFFERENT SIGNAL NAMES DEPENDING ON THE EQUIPMENT THIS CARD IS USED IN. REFER TO TABLE FOR PIN FUNCTIONS (SIGNAL NAMES). ALL PIN NUMBERS IN TABLE ARE ON P1, EXCEPT WORD 3, CHARACTER 4 WHICH ARE ON P2.
8. NONSTANDARD ABBREVIATION:
   FLT- FAULT
9. PIN NUMBERS IN PARENTHESIS IN TABLE ARE STATUS OUTPUTS IN CONTROL UNITS ONLY.
10. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.

SPARES



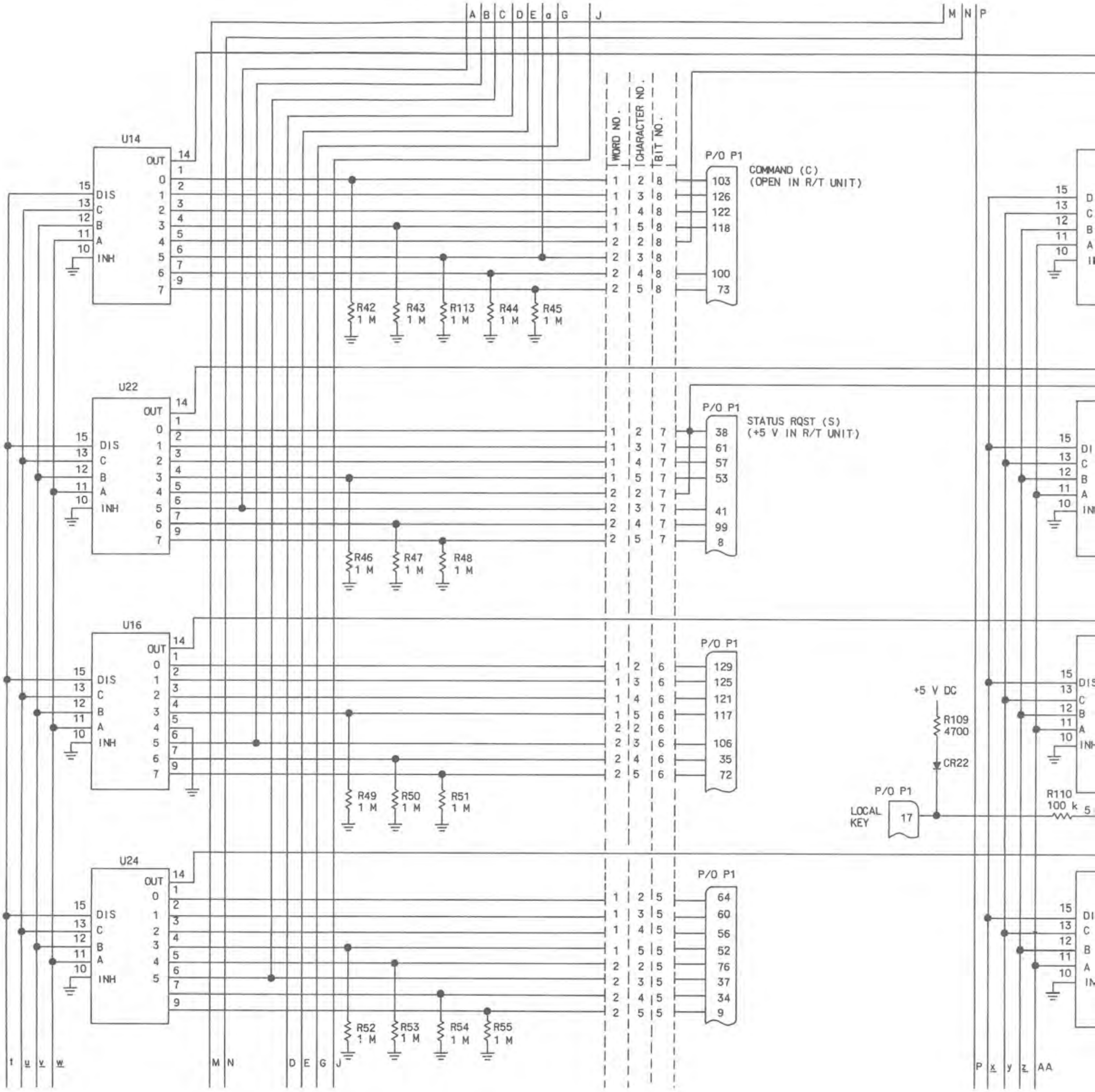
MICROCIRCUIT INFORMATION

REF DES	COMMON DEVICE	PWR(V DC) +5	PWR(V DC) GND
U1	MC14528BCP	16	8
U2	MC14528BCP	16	8
U3	MC14528BCP	16	8
U4	MC14528BCP	16	8
U5	MC14528BCP	16	8
U6	4070B	14	7
U7	4070B	14	7
U8	4070B	14	7
U9	MC14512CP	16	8
U10	F4049BPC	1	8
U11	MC14512CP	16	8
U12	MC14512CP	16	8
U13	MC14512CP	16	8
U14	MC14512CP	16	8
U15	MC14512CP	16	8
U16	MC14512CP	16	8
U17	MC14512CP	16	8
U18	MC14512CP	16	8
U19	MC14512CP	16	8
U20	MC14512CP	16	8
U21	MC14512CP	16	8
U22	MC14512CP	16	8
U23	MC14512CP	16	8
U24	MC14512CP	16	8
U25	MC14512CP	16	8

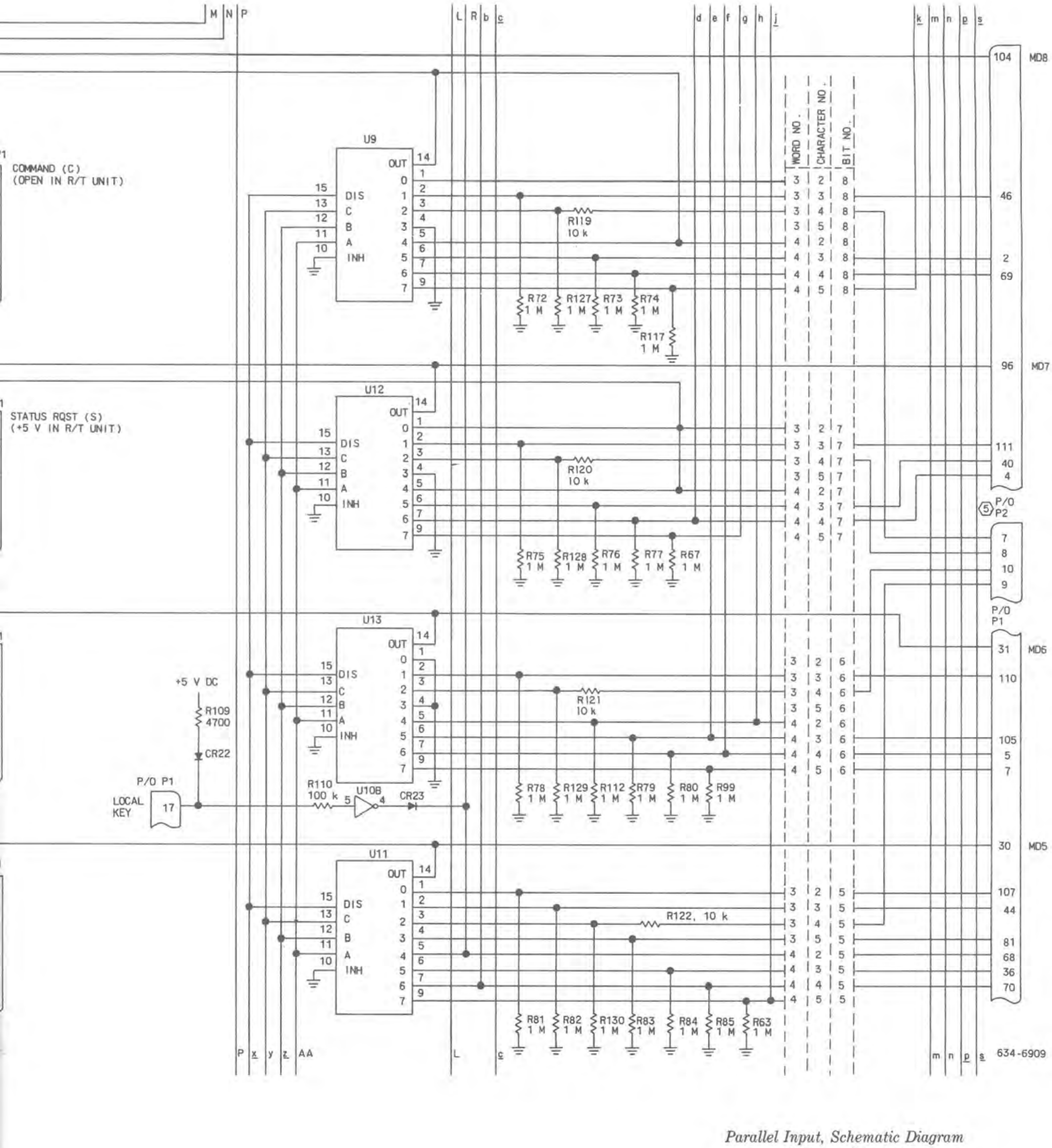


634-6909

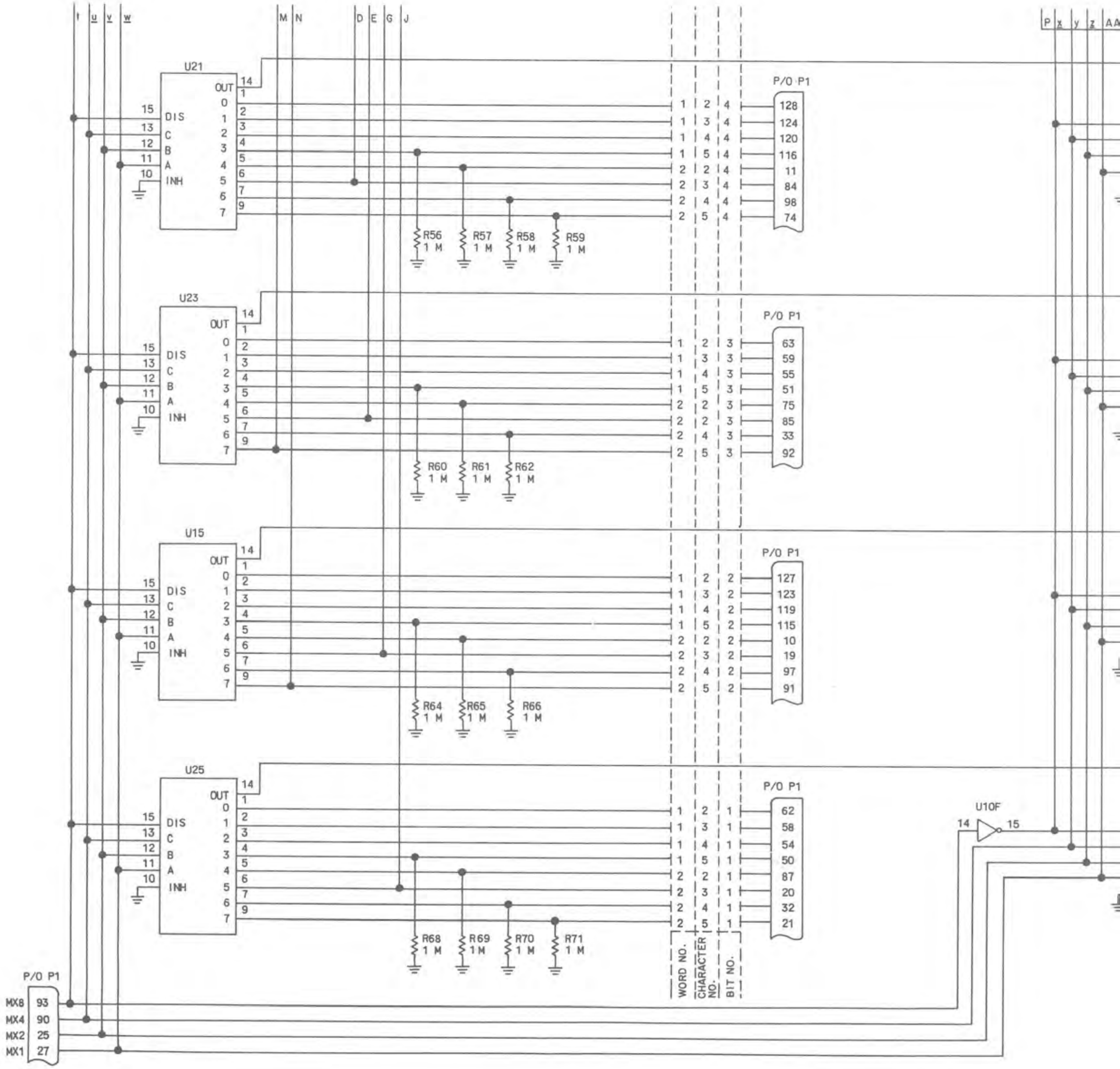
Parallel Input, Schematic Diagram
Figure 3 (Sheet 4)



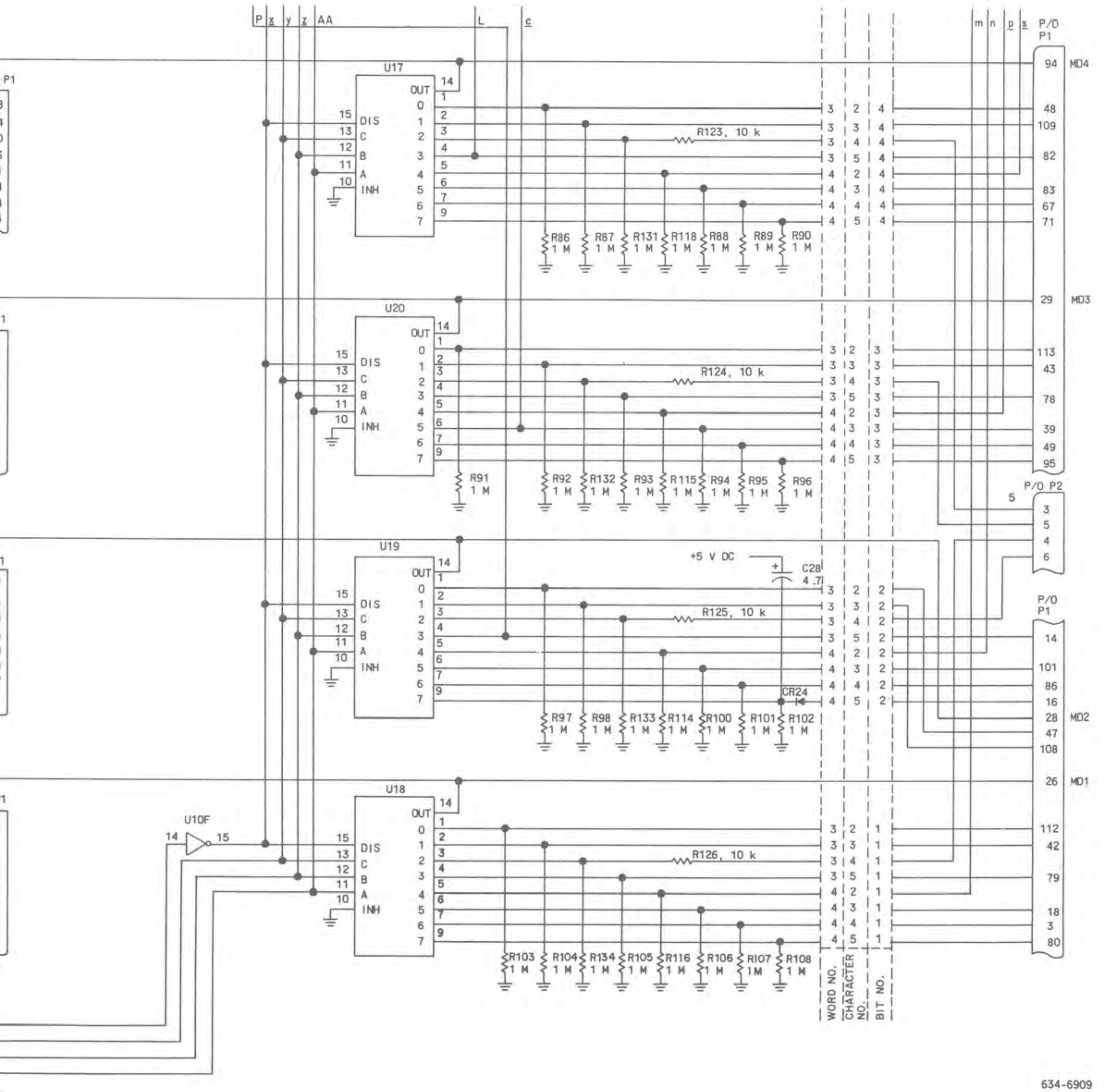
U14
U22
U16
U24
OUT
DIS
INH
P/O P1
COMMAND (C)
(OPEN IN R/T UNIT)
STATUS RQST (S)
(+5 V IN R/T UNIT)
WORD NO.
CHARACTER NO.
BIT NO.
R42 1 M
R43 1 M
R113 1 M
R44 1 M
R45 1 M
R46 1 M
R47 1 M
R48 1 M
R49 1 M
R50 1 M
R51 1 M
R52 1 M
R53 1 M
R54 1 M
R55 1 M
+5 V DC
R109 4700
CR22
LOCAL KEY
R110 100 k



Parallel Input, Schematic Diagram
Figure 3 (Sheet 5)



U21
U23
U15
U25
U10F
P/O P1
OUT
DIS
C
B
A
INH
R56 1 M
R57 1 M
R58 1 M
R59 1 M
R60 1 M
R61 1 M
R62 1 M
R64 1 M
R65 1 M
R66 1 M
R68 1 M
R69 1 M
R70 1 M
R71 1 M
WORD NO.
CHARACTER NO.
BIT NO.
MX8 93
MX4 90
MX2 25
MX1 27



Parallel Input, Schematic Diagram
Figure 3 (Sheet 6)

Parallel Output
(642-3137-001)

523-0770712

Parallel Output (642-3137-001)

Rockwell International

instructions

Collins Telecommunications Products Division

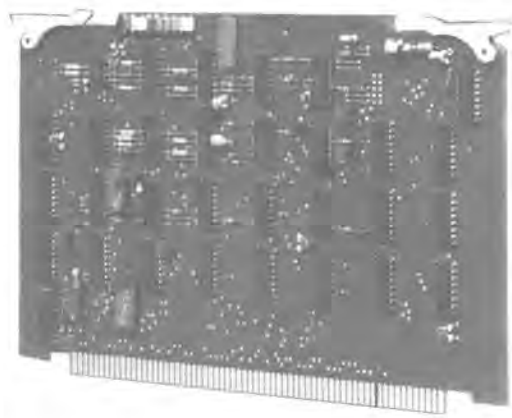
Printed in USA

523-0770712-001211
1 January 1981

1. DESCRIPTION

Parallel Output 642-3137-001, shown in figure 1, is a 2-layer planar card with a 130-pin (2 layers, 65 pins each) edge-on connector. All test points are mounted at the top edge of the card for easy access with the card installed in the unit.

The parallel output card consists of 6 primary circuits: 16 serial-to-parallel shift registers (4 for each parallel output word), 4 power-on-clear flip-flops, a strobe multiplexer, an rf gain control, a fault indicator flasher, and an update/busy indicator/address gate (ADRG) generator.



TPA-2838-017

Parallel Output
Figure 1

2. PRINCIPLES OF OPERATION (Refer to figure 2.)

2.1 General

The parallel output card receives the serial input data from the serial interface card. The shift registers convert the serial data to parallel outputs for application to front panel indicators. The rf gain control circuit is only used in the remote mode of the receiver circuits. The power-on-clear circuit initially sets all the outputs to clear. After initial turn-on, update, address gate, and busy indicator signals are continually generated for use by control unit circuits.

2.2 Power-On-Clear (Refer to figure 2 and figure 3, the schematic diagram.)

When power is applied to the parallel output card, the rc time constants of C15 and R28, and C19 and R37, generate a logic 1 voltage for approximately 1 second. These momentary logic 1's are applied to the set terminals of flip-flops U5B, U17A, U17B, and U5A. The logic 1 at the set inputs drives the $\overline{Q}$ output to a logic 0. The logic 0 is applied to the enable lines of the 16 shift register, clearing all the shift registers to an initial open-circuit condition.

2.3 Serial-to-Parallel Shift Registers

The 16 shift registers are electronically arranged in 4 groups of 4. Each group of shift registers represents one word, each shift register represents one character of the word, and each register output represents one of the eight data bits of the word. (This information is shown in detail in the table of the schematic diagram (figure 3).)

When the local enable signal at P1-16 is logic 0, the enable input to all the shift registers is logic 1 which enables their operation. In this condition, the data input (P1-89) is applied to the character-5 register of each word group. The clock input (P1-88) clocks the data serially through each of the registers in a word group. When all 8 bits of characters 2 through 4 are loaded, a strobe signal at the register strobe inputs will cause the data to be stored in the registers. With the enable inputs at logic 1, the stored data is applied through buffers to the eight outputs of the shift registers.

Strobe signals to each of the word groups of registers are generated by multiplexer U7. Outputs from this 8-channel multiplexer are determined by the inputs to the A (STA 1) and B (STA 2) control inputs (P1-83 and -81).

2.4 Fault Indicator Flasher (Refer to figure 2 and the schematic diagram.)

Free-running astable multivibrator U8, positive edge trigger monostable multivibrator U32, and exclusive OR gate U12B develop an on-off (flash) signal to indicate a receiver-exciter fault. During normal operation, the strobe signal to the U32 retrigger input occurs at a rate that keeps the multivibrator continuously triggered. The output of U32 is connected to the external reset of U8. The output of U8 (a logic 1) is synchronized with the strobe signal and applied to exclusive OR gate U12B.

The other input to exclusive OR gate U12B is connected to either U16 or U15 using E6. When connected to U16, word 4, character 4, bit 1 (2-channel receiver/exciter fault bit) is applied to U12B. When connected to U15, word 4, character 2, bit 5(4-channel receiver/exciter fault bit) is applied to U12B.

When the receiver/exciter fault bit is logic 0 and the output from multivibrator U8 is logic 1, a fault indication (logic 1) is produced at the output of exclusive OR gate U12B-4. Since multivibrator U8 if free-running, the fault indication will be an on-off (flashing) signal. A steady fault indication is provided at connector P1-105.

In the event a malfunction interrupts monitor data transmission between the control and remote units (interconnection interruption or serial interface card malfunction, for example) the strobe signal to the U32 retrigger input goes to logic 0 allowing multivibrator U8 to free run at a 0.25-Hz rate.

2.5 RF Gain Control (Refer to figure 2 and the schematic diagram.)

The rf gain control circuits develops a dc voltage output proportional to the binary input signals to multiplexers U2 and U10. Control input signals (pins A, B, and C) to the multiplexers are obtained from serial-to-parallel shift register U18. The various dc output levels are developed by changing the input resistors to U1A.

In the remote mode of operation, the inputs to U9A and B are at logic 0. The rf gain (U18-7) signal is logic 0; this causes multiplexer U10 to be enabled and U2 to be inhibited. When the rf gain level is adjusted to the point where the rf gain signal goes to logic 1, U10 is inhibited and U2 is enabled (through inverter U11E). Thus the various input resistor values are selected to control the dc output level from amplifiers U1A and U1B.

2.6 Update/Busy Indicator/Address Gate Generator

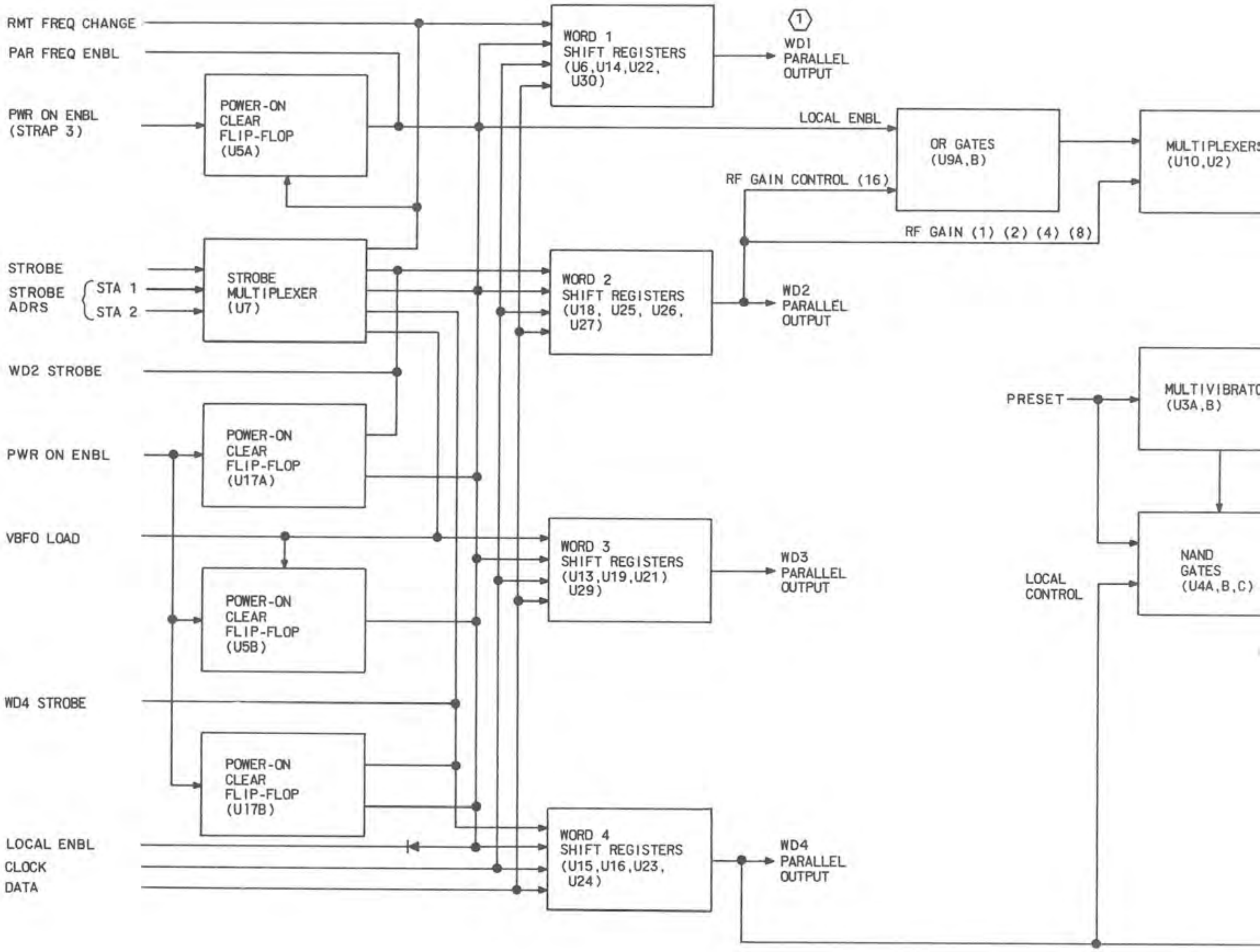
This circuit develops address gate and update pulses, and a driving voltage for the unit front-panel BUSY indicator. (These signals are used in the control unit only.)

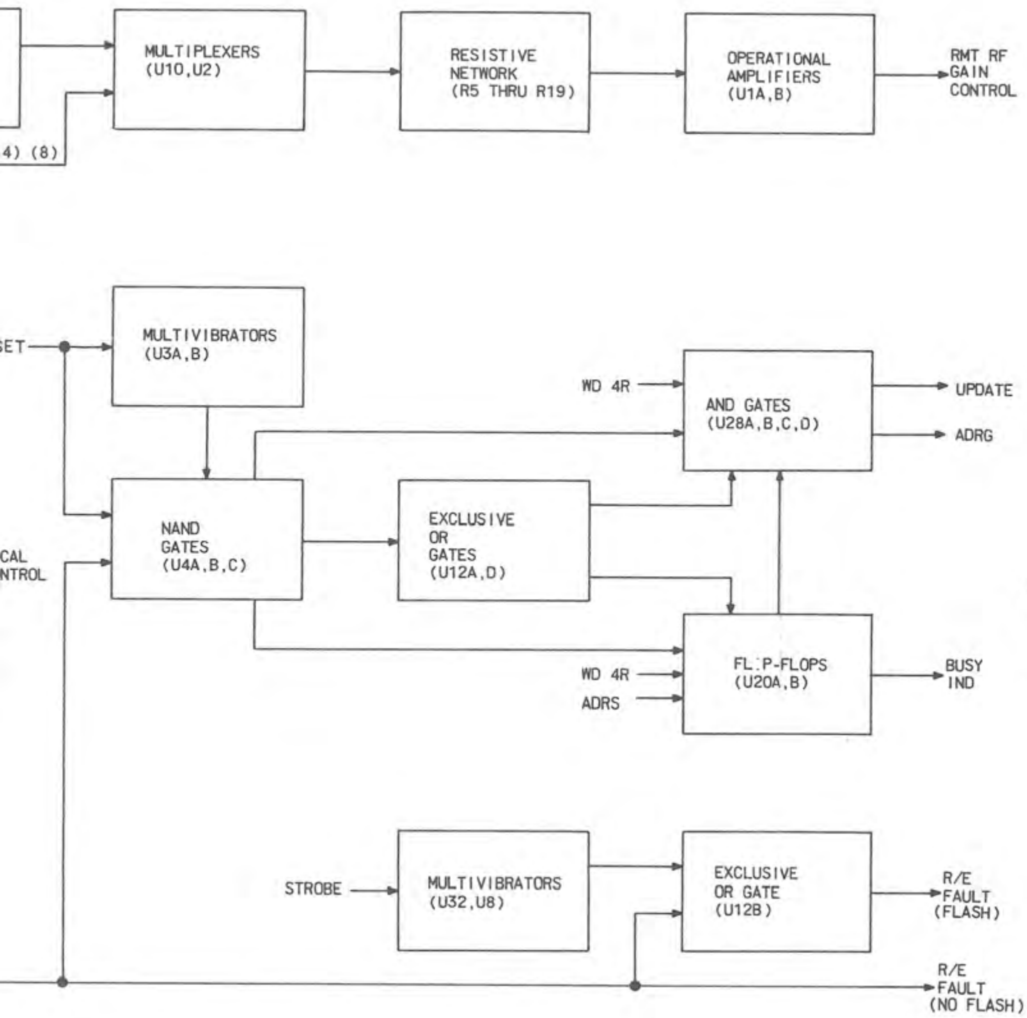
Whith the unit front-panel CONT switch in NORM and no busy signal input from the unit being controlled, the input to U4A-1 is logic 0 and the input to U4A-2 is logic 1. This develops a logic 0 from exclusive OR gate U12D and AND gate U28B preventing the BUSY indicator on the unit front panel from lighting. This same signal is clocked through U20A to inhibit U28D from gating out WD4R pulses which are used as update requests.

When a busy signal input is received in the monitor data, the input to U4A-1 goes to logic 1. This develops a logic 1 to U28A-2 and to the busy indicator output causing the BUSY indicator to light and causing an output of continuous WD4R pulses as an address gate signal. The input to U28C-8 is logic 0 keeping the update output inhibited.

When the front panel CONT switch is changed from NORM to TEST in a not-busy condition, U4A-1 is logic 0 keeping the busy indicator output at logic 0. Switching from NORM to TEST causes U12C to develop a momentary output pulse that triggers U3A, causing a logic 0 output from U4B-4. This causes the exclusive OR gate to momentarily go to logic 1 and set U20A-1 to logic 1. The momentary logic 1 at U28D-13 permits one WD4R pulse to be gated out (P1-66) as an update pulse.

With a busy signal present (U4A-1 at logic 1) when the CONT switch is placed in the TEST position, the


RMT FREQ CHANGE
PAR FREQ ENBL
PWR ON ENBL
(STRAP 3)
POWER-ON
CLEAR
FLIP-FLOP
(U5A)
WORD 1
SHIFT REGISTERS
(U6,U14,U22,
U30)
1
WD1
PARALLEL
OUTPUT
LOCAL ENBL
OR GATES
(U9A,B)
MULTIPLEXERS
(U10,U2)
RF GAIN CONTROL (16)
RF GAIN (1) (2) (4) (8)
STROBE
STROBE
ADRS
STA 1
STA 2
STROBE
MULTIPLEXER
(U7)
WORD 2
SHIFT REGISTERS
(U18, U25, U26,
U27)
WD2
PARALLEL
OUTPUT
WD2 STROBE
PRESET
MULTIVIBRATO
(U3A,B)
PWR ON ENBL
POWER-ON
CLEAR
FLIP-FLOP
(U17A)
VBFO LOAD
WORD 3
SHIFT REGISTERS
(U13,U19,U21)
U29)
WD3
PARALLEL
OUTPUT
LOCAL
CONTROL
NAND
GATES
(U4A,B,C)
POWER-ON
CLEAR
FLIP-FLOP
(U5B)
WD4 STROBE
POWER-ON
CLEAR
FLIP-FLOP
(U17B)
LOCAL ENBL
CLOCK
DATA
WORD 4
SHIFT REGISTERS
(U15,U16,U23,
U24)
WD4
PARALLEL
OUTPUT



NOTES:

1. REFER TO THE SCHEMATIC DIAGRAM FOR WORD FORMAT.
2. NONSTANDARD ABBREVIATIONS:
   ADRG = ADDRESS REGISTER
   R/E = RECEIVER/EXCITER

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Parallel Output, Block Diagram
Figure 2

set pulse to U20A-6 is developed as previously described; however, the resulting logic 1 from U4A-3 causes U12D-11 to be logic 0. This switches off the front-panel BUSY indicator, and causes the Q output from U20A to go to logic 0. The resulting update output is one logic 1 pulse and the ADRG output is inhibited.

When the front-panel CONT switch is changed from TEST to NORM, the logic 1 output pulse from U3B-10 is developed as previously described. With a not-busy signal present, U4A-3 is logic 1 enabling U28C to gate the WD4R pulses to U28D. The logic 1 at U12D-13 inhibits gate U28B. The logic 0 output from U28B-4 is the BUSY indicator output, the D input to U20A, and an inhibiting input to U28A. The resulting Q output from U20A inhibits gate U28D, developing a logic 0 update output.

With a busy signal present when the CONT switch is set to NORM, U4A-3 is logic 0 which causes the update output to be logic 0. The logic 1 outputs a logic 1 BUSY indicator signal and enables gate U28A. The WD4R input to U28A-1 is then gated out as continuous ADRG pulses.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the parallel output card are listed in the maintenance section of this instruction book.

3.2 Testing

The test procedures in tables 1 and 2 check the total performance of the parallel output card. The procedures in table 1 are for the following equipments:

HF-8010/8010A Exciter
HF-8050/8050A Receiver
HF-8070/8070A Receiver-Exciter
851S Receiver
HF-8090, HF-8091, HF8092, and HF-8095 Controls.

The procedures in table 2 are for the following equipments:

HF-8014/8014A Exciter
HF-8054/8054A Receiver
HF-8093 and HF-8094 Controls.

These procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic diagram (figure 3) to trace the source of the fault.

Table 1. Parallel Output, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	**Note** The testing and troubleshooting procedures herein are for 1- or 2-channel configurations of the HF-8010/8010A, HF-8050/8050A, HF-8070/8070A, 851S, HF-8090, HF-8091, HF-8092, and HF-8095. These testing and troubleshooting procedures are based on using a control unit and an associated local unit. The most effective method of testing and troubleshooting is obtained by installing the questionable parallel output in the control unit. During these tests when a control unit is referred to it is a receiver-exciter control, or a receiver control. When a local unit is referred to it is a receiver-exciter, an exciter, or a receiver.		

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. (Cont)	a. Remove top cover of unit containing the parallel output that is to be tested.		
	b. Remove parallel output. Strap pin pair E6 between middle and right pins. Install it on an extender card and place it in the control unit.		
	c. Set control unit and local unit LINE SELECTOR switches to 115 V.		
	d. Connect control unit and local unit to 115-V ac power source and set power on.		
	e. Measure dc voltages, on the card under test, between the following pins and ground (TP1, brown):		
	P1-45 P1-65 P1-114	+15 ±1.0 V dc. +5 ±0.5 V dc. -15 ±1.0 V dc.	Check associated power supply.
	f. Strap local unit for address 0.		
	g. Connect local unit to control unit.		
2. Data inputs, word 1	a. Set control unit CONT switch to TEST.		
	Note Word 1 tests can also be accomplished with the control unit CONT switch in NORM and local unit CONT switch in LCL. Then set local unit controls to positions indicated.		
	b. Set control unit FREQUENCY KHZ controls for 29 999.9(9).	Frequency display reads 29 999.9(9). Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
(Cont)			

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	c. Set control unit FREQUENCY KHZ controls for 16 666.6(6).	Frequency display reads 16 666.6(6). Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	d. Set control unit FREQUENCY KHZ controls for 02 000.0(0).	Frequency display reads 02 000.0(0). Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	Note Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

BCD OUTPUT SIGNAL		PARALLEL OUTPUT PIN NO P1-( )	LOGIC LEVELS			IF ABNORMAL CHECK
			29 999.9(9)	16 666.6(6)	02 000.0(0)	
10 MHz	(2)	129	1	0	0	U6, U5, U7, U11, and associated circuits.
	(1)	64	0	1	0	
1 MHz	(8)	128	1	0	0	
	(4)	63	0	1	0	
	(2)	127	0	1	1	
	(1)	62	1	0	0	
100 kHz	(8)	126	1	0	0	U14, U5, U7, U11, and associated circuits.
	(4)	61	0	1	0	
	(2)	125	0	1	0	
	(1)	60	1	0	0	
10 kHz	(8)	124	1	0	0	
	(4)	59	0	1	0	
	(2)	123	0	1	0	
	(1)	58	1	0	0	

(Cont)

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)			

BCD OUTPUT SIGNAL		PARALLEL OUTPUT PIN NO P1-( )	LOGIC LEVELS 29 999.9(9)	16 666.6(6)	02 000.0(0)	IF ABNORMAL CHECK
1 kHz	(8)	122	1	0	0	U22, U5, U7, U11, and associated circuits.
	(4)	57	0	1	0	
	(2)	121	0	1	0	
	(1)	56	1	0	0	
100 Hz	(8)	120	1	0	0	
	(4)	55	0	1	0	
	(2)	119	0	1	0	
	(1)	54	1	0	0	
10 Hz (with no 10-Hz tuning)	(8)	118	0	0	0	U30, U5, U7, U11, and associated circuits.
	(4)	53	0	0	0	
	(2)	117	0	0	0	
	(1)	52	0	0	0	
10 Hz (with 10-Hz tuning)	(8)	118	1	0	0	
	(4)	53	0	1	0	
	(2)	117	0	1	0	
	(1)	52	1	0	0	
1 Hz (with no 1-Hz tuning)	(8)	116	0	0	0	U30, U5, U7, U11, and associated circuits.
	(4)	51	0	0	0	
	(2)	115	0	0	0	
	(1)	50	0	0	0	
1 Hz (with 1-Hz tuning)	(8)	116	1	0	0	
	(4)	51	0	1	0	
	(2)	115	0	1	0	
	(1)	50	1	0	0	

Note

If a processor control is used, the 1-Hz outputs can be checked in the same manner that the other frequency outputs are checked.

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Data inputs, word 2	a. Set control unit CONT switch to TEST. **Note** Word 2 tests can also be accomplished with the control unit CONT switch in NORM and local unit CONT switch in REM. Then measure voltages at local unit or control unit parallel output card (the card being tested). Rf gain test, steps b and c, is applicable to receiver and receiver-exciter controls only. b. Set control unit RF GAIN control to MAX. c. Connect a dvm to TP5 (green).	Note dc levels as shown in chart for different RF GAIN positions.	Check U18, U9, U11, U1, and associated circuits. Check also circuit indicated in chart.

RF GAIN CONTROL SETTINGS		TP5 (DC VOLTS)	IF ABNORMAL CHECK
MAX	1	0.000 ±0.010	None
	*	-0.158 ±0.010	R20
	2	-0.316 ±0.010	R19
	*	-0.475 ±0.020	R19, R20
	3	-0.634 ±0.020	R18
	*	-0.792 ±0.030	R18, R20
rotated	4	-0.950 ±0.030	R17
from MAX	*	-1.108 ±0.040	R17, R20
ccw toward	5	-1.266 ±0.040	R16
MIN	*	-1.417 ±0.050	R16, R20
	6	-1.568 ±0.050	R15
	*	-1.712 ±0.060	R15, R20
	7	-1.855 ±0.060	R14
	*	-2.022 ±0.070	R14, R20
	8	-2.188 ±0.070	R13
MIN	*	-2.332 ±0.080	R13, R20

and U10.

(Cont)

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)			

RF GAIN CONTROL SETTINGS		TP5 (DC VOLTS)	IF ABNORMAL CHECK
MAX	9	-2.465 ±0.080	R12
	*	-2.619 ±0.090	R12, R20
	10	-2.773 ±0.090	R11
	*	-3.002 ±0.100	R11, R20
	11	-3.130 ±0.100	R10
	*	-3.283 ±0.110	R10, R20
rotated	12	-3.439 ±0.110	R9
from MAX	*	-3.570 ±0.120	R9, R20
ccw toward	13	-3.700 ±0.120	R8
MIN	*	-3.886 ±0.130	R8, R20
	14	-4.072 ±0.130	R7
	*	-4.218 ±0.140	R7, R20
	15	-4.363 ±0.140	R6
	*	-4.532 ±0.150	R6, R20
	16	-4.700 ±0.150	R5
MIN	*	-4.858 ±0.160	R5, R20

and U2.

*Controlled by least significant bcd input for rf gain control, available only on processor controls. Bcd for least significant bcd signal at MAX setting is bit wt 0. Bcd signal for most significant bcd signal at one step beyond MIN setting is bit wt 31.

Note

AGC tests, steps d through f, are applicable to the receiver and receiver-exciter controls only.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	d. Set control unit AGC switch to FAST.	Check logic levels at the associated parallel output pin numbers as shown in chart.	
	e. Set control unit AGC switch to OFF.	Check logic levels at the associated parallel output pin numbers as shown in chart.	
(Cont)	f. Set control unit AGC switch to SLOW.	Check logic levels at the associated parallel output pin numbers as shown in chart.	

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	**Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

PARALLEL OUTPUT	PIN NO P1-( )	AGC SWITCH POSITION			IF ABNORMAL CHECK
		FAST	OFF	SLOW	
CH A AGC OFF	84	0	1	0	U26, U17, U7, U11, and associated circuits.
CH A AGC FAST	85	1	0	0	
CH B AGC OFF	19	0	1	0	
CH B AGC FAST	20	1	0	0	

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note Bandwidth tests, steps g and h, are applicable to the receiver control only.		
	g. Set control unit MODE switch to SSB/CW.		
	h. Set control unit BANDWIDTH switch to each of its positions.	The display associated with the BANDWIDTH switch positions lights. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
(Cont)	**Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	(see chart below)		
	Note Mode tests, step i, are applicable to the receiver control only. i. Set MODE switch (receiver control only) to each of its positions. **Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.	The display associated with the MODE switch position lights. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
(Cont)			

PARALLEL OUTPUT	PIN NO P1-( )	BANDWIDTH SWITCH POSITION								IF ABNORMAL CHECK
		16	A	B	USB	LSB	C	D	E	
FL8	100	1	0	0	0	0	0	0	0	U27, U17, U7, U11, and associated circuits.
FL3	33	0	1	0	0	0	0	0	0	
FL4	98	0	0	1	0	0	0	0	0	
FL1	32	0	0	0	1	0	0	0	0	
FL2	97	0	0	0	0	1	0	0	0	
FL5	34	0	0	0	0	0	1	0	0	
FL6	35	0	0	0	0	0	0	1	0	
FL7	99	0	0	0	0	0	0	0	1	

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	(see chart below)		
	Note Mode tests, step j, are applicable to the exciter and receiver-exciter controls only. j. Set MODE switch (exciter and receiver-exciter controls only) to each of its positions. *Note* Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.	The display associated with the MODE switch position lights. Refer to chart for logic levels and associated parallel output pin numbers.	
(Cont)			

PARALLEL OUTPUT	PIN NO P1-( )	MODE SWITCH POSITION			IF ABNORMAL CHECK
		*SSB/CW	*AM	ISB	
SSB EN	72	1	0	1	U25, U17, U7, U11, and associated circuits.
AM EN	8	0	1	0	
FM EN	73	0	0	0	
CW EN	9	0	0	0	
ISB EN	74	0	0	1	

*In these positions the display and logic levels associated with the BANDWIDTH switch position are also activated.

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

<table>
<tr><th>TEST</th><th>PROCEDURE</th><th>NORMAL INDICATION</th><th>IF INDICATION IS ABNORMAL</th></tr>
<tr><td>3. (Cont)</td><td colspan="3">
<table>
<tr><th rowspan="2">PARALLEL OUTPUT</th><th rowspan="2">PIN NO P1-( )</th><th colspan="5">MODE SWITCH POSITION</th><th rowspan="2">IF ABNORMAL CHECK</th></tr>
<tr><th>CW</th><th>LSB</th><th>USB</th><th>AM</th><th>ISB</th></tr>
<tr><td>SSB EN</td><td>72</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td rowspan="5">U25, U17, U7, U11, and associated circuits.</td></tr>
<tr><td>AM EN</td><td>8</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>FM EN</td><td>73</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>CW EN</td><td>9</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>ISB EN</td><td>74</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>FL1 (USB) EN</td><td>32</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td rowspan="2">U27, U17, U7, U11, and associated circuits.</td></tr>
<tr><td>FL2 (LSB) EN</td><td>97</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>4. Data inputs, word 3</td><td>a. Set control unit CONT switch to TEST.

Note

Word 3 tests can also be accomplished with control unit CONT switch in NORM and local unit CONT switch in REM. Then measure voltages at local unit parallel output card (the card being tested).

Pa tests, steps b through e, are applicable to the exciter and receiver-exciter controls only.</td><td></td><td></td></tr>
<tr><td></td><td>b. Set control unit PA PWR switch to OFF.</td><td>Check logic levels at the associated parallel output pin numbers as shown in chart.</td><td></td></tr>
<tr><td></td><td>c. Set control unit PA PWR switch to STBY.</td><td>Check logic levels at the associated parallel output pin numbers as shown in chart.</td><td></td></tr>
<tr><td>(Cont)</td><td>d. Set control unit PA PWR switch to HIGH PWR.</td><td>Check logic levels at the associated parallel output pin numbers as shown in chart.</td><td></td></tr>
</table>

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	e. Set control unit PA PWR switch to LOW PWR. **Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.	Check logic levels at the associated parallel output pin numbers as shown in chart.	

PARALLEL OUTPUT	PIN NO P1-( )	PA PWR SWITCH POSITION				IF ABNORMAL CHECK
		OFF	STBY	HIGH PWR	LOW PWR	
PA LV EN	79	0	1	1	1	U19, U5, U7, U11, and associated circuits.
PA HV EN	14	0	0	1	1	
LO PWR EN	78	0	0	0	1	

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note Pilot carrier tests, steps f and g, are applicable to the exciter and receiver-exciter controls only.		
	f. Set control unit P CAR switch to OFF.	Logic level 0 at P1-82 (NMT 0.5 V dc).	Check U19, U5, U7, U11, and associated circuits.
	g. Set control unit P CAR switch to ON.	Logic level 1 at P1-82 (NLT +3.0 V dc).	
	Note Dvbfo tests, steps h through k, are applicable only to the receiver and receiver-exciter controls with a dvbfo option installed.		
(Cont)	h. Set the control unit MODE switch to SSB/CW or CW and BFO switch to VAR.		

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	i. Set digital VBFO controls for +9990 Hz.	VBFO frequency display reads +9990. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	j. Set digital VBFO controls for -6660 Hz.	VBFO frequency display reads -6660. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	k. Set digital VBFO controls for +1000 Hz.	VBFO frequency display reads +1000. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	Note Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

BCD OUTPUT SIGNAL		PARALLEL OUTPUT PIN NO P1-( )	LOGIC LEVELS +9990	-6660	+1000	IF ABNORMAL CHECK
DVBFO 1 kHz	(8)	48	1	0	0	U29, U5, U7, U11, and associated circuits.
	(4)	113	0	1	0	
	(2)	47	0	1	0	
	(1)	112	1	0	1	
DVBFO 100 Hz	(8)	46	1	0	0	U21, U5, U7, U11, and associated circuits.
	(4)	111	0	1	0	
	(2)	110	0	1	0	
	(1)	44	1	0	0	
DVBFO 10 Hz	(8)	109	1	0	0	
	(4)	43	0	1	0	
	(2)	108	0	1	0	
	(1)	42	1	0	0	
DVBFO SIGN		107	1	0	1	U29, U5, U7, U11, and associated circuits.

(Cont)

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	**Note** Analog vbfo tests, steps l and m, are applicable only to the receiver and receiver-exciter controls with an analog vbfo option installed. l. Set the control unit MODE switch to SSB/CW or CW and BFO switch to VAR. m. Rotate the BFO control through its complete range.	Check logic levels at the associated parallel output pin numbers as shown in chart.	

BCD OUTPUT SIGNAL		LOGIC LEVELS				LOGIC DISPLAY	IF ABNORMAL CHECK
		PARALLEL OUTPUT PIN NO P1-( )					
		48	113	47	112		
- (Full ccw)	1	1	1	1	1		U29, U5, U7, U11, and associated circuits.
	2	1	1	1	0		
	3	1	1	0	1		
	4	1	1	0	0		
	5	1	0	1	1		
	6	1	0	1	0		
	7	1	0	0	1		
Rotated from - cw toward +	8	1	0	0	0		
	9	0	1	1	1		
	10	0	1	1	0		
	11	0	1	0	1		
	12	0	1	0	0		
	13	0	0	1	1		
	14	0	0	1	0		
	15	0	0	0	1		
+ (Full cw)	16	0	0	0	0		

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Data inputs, word 4	a. Set control unit CONT switch to NORM.		
	b. Set local unit CONT switch to LCL.		
	Note System key test, steps c and d, is applicable only to exciter and receiver-exciter controls.		
	c. Set local unit KEY switch to LOCK.	Control unit KEY display lights. Logic level 1 at P1-68 (NLT +3.0 V dc).	Check U15, U17, U7, U11, and associated circuits.
	d. Set local unit KEY switch to NORM.	Control unit KEY display goes out. Logic level 0 at P1-68 (NMT 0.5 V dc).	
	e. Set local unit PWR switch off and back on.	Control unit EXCTR FAULT, RCV FAULT, or R/E FAULT lights. Logic level 1 at P1-12 (NLT +3.0 V dc).	Check U16, U12, U32, U8, U17, U7, U11, and associated circuits.
	f. Change any frequency control on local unit front panel.	Control unit EXCTR FAULT, RCV FAULT, or R/E FAULT goes out. Logic level 0 at P1-12 (NMT 0.5 V dc).	
	Note Receive overload test, steps g and h, is applicable only to receiver and receiver-exciter controls.		
	g. Connect +5 V dc to local unit J16-27.	Control unit RCV OVERLOAD lights. Logic level 1 at P1-67 (NLT +3.0 V dc)	Check U16, U17, U7, U11, and associated circuits.
	h. Remove +5 V dc from local unit J16-27.	Control unit RCV OVERLOAD goes out. Logic level 0 at P1-67 (NMT 0.5 V dc).	Same as step g.
(Cont)	**Note** Coupler fault test, steps i and j, is applicable only to exciter and receiver-exciter controls.		

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	i. Connect +5 V dc to local unit J15-1.	Control unit COUPLER FAULT lights. Logic level 1 at P1-13 (NLT +3.0 V dc).	Same as step g.
	j. Remove +5 V dc from local unit J15-1.	Control unit COUPLER FAULT lights. Logic level 0 at P1-13 (NMT 0.5 V dc).	Same as step g.
	Note Rf out test, steps k and l, is applicable only to exciter and receiver-exciter controls.		
	k. Connect ground signal to local unit J15-5.	Control unit RF OUT lights. Logic level 1 at P1-5 (NLT +3.0 V dc).	Same as step g.
	l. Remove ground signal from local unit J15-5.	Control unit RF OUT goes out. Logic level 0 at P1-5 (NMT 0.5 V dc).	Same as step g.
	Note Pa fault test, steps m and n, is applicable only to exciter and receiver-exciter controls.		
	m. Connect +5 V dc to local unit J15-3.	Control unit PA FAULT lights. Logic level 1 at P1-77 (NLT +3.0 V dc).	Same as step g.
	n. Remove +5 V dc from local unit J15-3.	Control unit PA FAULT goes out. Logic level 0 at P1-77 (NMT 0.5 V dc).	Same as step g.
	Note Pa ready test, steps o and p, is applicable only to exciter and receiver-exciter controls.		
(Cont)	o. Connect ground signal to local unit J15-21.	Control unit PA READY lights. Logic level 0 at P1-69 (NMT 0.5 V dc).	Same as step g.

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	p. Remove ground signal from local unit J15-21.	Control unit PA READY goes out. Logic level 0 at P1-69 (NMT 0.5 V dc).	Same as step g.
	q. Press and hold local unit CONT switch to MON.	Logic level 1 at P1-30 (NLT +3.0 V dc).	
	r. Set local unit CONT switch to REM.	Logic level 0 at P1-30 (NMT 0.5 V dc).	Check U24, U17, U7, U11, and associated circuits.
	s. Set local unit CONT switch to LCL.	Logic level 1 at P1-95 (NLT +3.0 V dc).	
		Control unit BUSY indicator lights. Logic level 1 at P1-7 (NLT +3.0 V dc).	Check U28, U20, U12, U4, U24, U17, U7, U11, and associated circuits.
	t. Set local unit CONT switch to REM.	After short delay logic level 0 at P1-95 (NMT 0.5 V dc).	
		After short delay control unit BUSY indicator goes out. Logic level 0 at P1-7 (NMT 0.5 V dc).	Same as step s.
	u. Set local unit CONT switch to LCL.		
	v. Apply a ground to local unit A13U51A-6.		
	w. Apply a ground to local unit A13U51A-3.		
	x. Remove ground from local unit A13U51A-3.		
	y. Apply ground to local unit A13U16A-1, 2, 8.		
	z. Remove ground from local unit A13U16A-1, 2, 8.	Logic level 1 at P1-29 (NLT +3.0 V dc).	
	aa. Remove ground from local unit A13U51A-6.		Same as step q.
(Cont)	ab. Apply ground to local unit A13U42A-3.	Logic level 0 at P1-29 (NMT 0.5 V dc).	

Table 1. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	ac. Remove ground from local unit A13U42A-3.		Same as step q.
	ad. Apply +5 V dc to local unit J16-8.	Control unit PRESEL FAULT lights. Logic level 1 at P1-28 (NLT +3.0 V dc).	
	ae. Remove +5 V dc from local unit J16-8.	Control unit PRESEL FAULT goes out. Logic level 0 at P1-28 (NMT 0.5 V dc).	

Table 2. Parallel Output, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	**Note** The testing and troubleshooting procedures herein are for 1-, 2-, 3-, and 4-channel configurations of the HF-8014/8014A, HF-8054/8054A, HF-8093, and HF-8094 These testing and troubleshooting procedures are based on using a control unit and an associated local unit. The most effective method of testing and troubleshooting is obtained by installing the questionable parallel output in the control unit. During these tests when a control unit is referred to it is an exciter control, or a receiver control. When a local unit is referred to it is an exciter, or a receiver. a. Remove top cover of unit containing the parallel output that is to be tested. b. Remove parallel output. Strap pin pair E6 between middle and left pins. Install it on an extender card and place it in the control unit. c. Set control unit and local unit LINE SELECTOR switches to 115 V. d. Connect control unit and local unit to 115-V ac power source and set power on. e. Measure dc voltages, on the card under test, between the following pins and ground (TP1, brown): P1-45 P1-65 P1-114	 +15 ±1.0 V dc. +5 ±0.5 V dc. -15 ±1.0 V dc.	Check associated power supply.
	f. Strap local unit for address 0. g. Connect local unit to control unit.		
2. Data inputs, word 1 (Cont)	a. Set control unit CONT switch to TEST. **Note** Word 1 tests can also be accomplished with the control unit CONT switch in NORM and local unit CONT switch in LCL. Then set local unit controls to positions indicated. b. Set control unit FREQUENCY KHZ controls for 29 999.9(9).	Frequency display reads 29 999.9(9). Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	c. Set control unit FREQUENCY KHZ controls for 16 666.6(6).	Frequency display reads 16 666.6(6). Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	d. Set control unit FREQUENCY KHZ controls for 02 000.0(0).	Frequency display reads 02 000.0(0). Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.

Note

Logic 1 = NLT +3.0 V dc.
Logic 0 = NMT 0.5 V dc.

BCD OUTPUT SIGNAL		PARALLEL OUTPUT PIN NO P1-( )	LOGIC LEVELS 29 999.9(9)	LOGIC LEVELS 16 666.6(6)	LOGIC LEVELS 02 000.0(0)	IF ABNORMAL CHECK
10 MHz	(2)	129	1	0	0	U6, U5, U7, U11, and associated circuits.
	(1)	64	0	1	0	
1 MHz	(8)	128	1	0	0	
	(4)	63	0	1	0	
	(2)	127	0	1	1	
	(1)	62	1	0	0	
100 kHz	(8)	126	1	0	0	U14, U5, U7, U11, and associated circuits.
	(4)	61	0	1	0	
	(2)	125	0	1	0	
	(1)	60	1	0	0	
10 kHz	(8)	124	1	0	0	
	(4)	59	0	1	0	
	(2)	123	0	1	0	
	(1)	58	1	0	0	

(Cont)

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)			

BCD OUTPUT SIGNAL		PARALLEL OUTPUT PIN NO P1-( )	LOGIC LEVELS 29 999.9(9)	16 666.6(6)	02 000.0(0)	IF ABNORMAL CHECK
1 kHz	(8)	122	1	0	0	U22, U5, U7, U11, and associated circuits.
	(4)	57	0	1	0	
	(2)	121	0	1	0	
	(1)	56	1	0	0	
100 Hz	(8)	120	1	0	0	
	(4)	55	0	1	0	
	(2)	119	0	1	0	
	(1)	54	1	0	0	
10 Hz (with no 10-Hz tuning)	(8)	118	0	0	0	U30, U5, U7, U11, and associated circuits.
	(4)	53	0	0	0	
	(2)	117	0	0	0	
	(1)	52	0	0	0	
10 Hz (with 10-Hz tuning)	(8)	118	1	0	0	
	(4)	53	0	1	0	
	(2)	117	0	1	0	
	(1)	52	1	0	0	
1 Hz (with no 1-Hz tuning)	(8)	116	0	0	0	U30, U5, U7, U11, and associated circuits.
	(4)	51	0	0	0	
	(2)	115	0	0	0	
	(1)	50	0	0	0	
1 Hz (with 1-Hz tuning)	(8)	116	1	0	0	
	(4)	51	0	1	0	
	(2)	115	0	1	0	
	(1)	50	1	0	0	

Note

If a processor control is used, the 1-Hz outputs can be checked in the same manner that the other frequency outputs are checked.

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Data inputs, word 2	a. Set control unit CONT switch to TEST.		
	Note Word 2 tests can also be accomplished with the control unit CONT switch in NORM and local unit CONT switch in REM. Then measure voltages at local unit or control unit parallel output card (the card being tested). Rf gain test, steps b and c, is applicable to receiver controls only.		
	b. Set control unit RF GAIN control to MAX.		
	c. Connect a dvm to TP5 (green).	Note dc levels as shown in chart for different RF GAIN positions.	Check U18, U9, U11, U1, and associated circuits. Check also circuit indicated in chart.
(Cont)			

RF GAIN CONTROL SETTINGS		TP5 (DC VOLTS)	IF ABNORMAL CHECK
MAX	1	0.000 ±0.010	None
	*	-0.158 ±0.010	R20
	2	-0.316 ±0.010	R19
	*	-0.475 ±0.020	R19, R20
	3	-0.634 ±0.020	R18
	*	-0.792 ±0.030	R18, R20
rotated	4	-0.950 ±0.030	R17
from MAX	*	-1.108 ±0.040	R17, R20
ccw toward	5	-1.266 ±0.040	R16 and U10.
MIN	*	-1.417 ±0.050	R16, R20
	6	-1.568 ±0.050	R15
	*	-1.712 ±0.060	R15, R20
	7	-1.855 ±0.060	R14
	*	-2.022 ±0.070	R14, R20
	8	-2.188 ±0.070	R13
MIN	*	-2.332 ±0.080	R13, R20

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	(see nested table below)		

RF GAIN CONTROL SETTINGS		TP5 (DC VOLTS)	IF ABNORMAL CHECK
MAX	9	-2.465 ±0.080	R12
	*	-2.619 ±0.090	R12, R20
	10	-2.773 ±0.090	R11
	*	-3.002 ±0.100	R11, R20
	11	-3.130 ±0.100	R10
	*	-3.283 ±0.110	R10, R20
rotated	12	-3.439 ±0.110	R9
from MAX	*	-3.570 ±0.120	R9, R20
ccw toward	13	-3.700 ±0.120	R8
MIN	*	-3.886 ±0.130	R8, R20
	14	-4.072 ±0.130	R7
	*	-4.218 ±0.140	R7, R20
	15	-4.363 ±0.140	R6
	*	-4.532 ±0.150	R6, R20
	16	-4.700 ±0.150	R5
MIN	*	-4.858 ±0.160	R5, R20

(R12 through R5, R20: and U2.)

*Controlled by least significant bcd input for rf gain control, available only on processor controls. Bcd for least significant bcd signal at MAX setting is bit wt 0. Bcd signal for most significant bcd signal at one step beyond MIN setting is bit wt 31.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note AGC tests, steps d through f, are applicable to the receiver controls only.		
	d. Set channel A1 AGC BUS switch to ON.	Check logic levels at the associated parallel output pin numbers as shown in chart.	
	e. Rotate channel A1 AGC control switch through all its positions.	Check logic levels at the associated parallel output pin numbers as shown in chart.	
(Cont)	f. Repeat steps d and e for channels A2, B1, and B2.	Check logic levels at the associated parallel output pin numbers as shown in chart.	

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	**Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

PARALLEL OUTPUT	PIN NO P1-( )	AGC SWITCH POSITION				IF ABNORMAL CHECK
		OFF	FAST	MEDIUM	SLOW	
CH A1 AGC 1	32	1	0	0	1	Check U26,U27, &17, U7, U11, and associated circuits.
CH A1 AGC 2	97	1	0	1	0	
CH A2 AGC 1	20	1	0	0	1	
CH A2 AGC 2	19	1	0	1	0	
CH B1 AGC 1	33	1	0	0	1	
CH B1 AGC 2	98	1	0	1	0	
CH B2 AGC 1	85	1	0	0	1	
CH B2 AGC 2	84	1	0	1	0	

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note Bandwidth tests, steps g and h, are applicable to the receiver control only.		
	g. Set control unit MODE switch to SSB/CW.		
	h. Set control unit BANDWIDTH switch to each of its positions.	The display associated with the BANDWIDTH switch positions lights. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
(Cont)	**Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)			

PARALLEL OUTPUT	PIN NO P1-( )	BANDWIDTH SWITCH POSITION								IF ABNORMAL CHECK
		16	A	B			C	D	E	
FL3	100	0	1	0			0	0	0	
FL4	37	0	0	1			0	0	0	
FL1	99	1	0	0			0	0	0	U26, U27, U17, U7, U11, and associated circuits.
FL5	106	0	0	0			1	0	0	
FL6	41	0	0	0			0	1	0	
FL7	3	0	0	0			0	0	1	

Note

Mode tests, step i, are applicable to the receiver control only.

PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
i. Set MODE switch (receiver control only) to each of its positions.	The display associated with the MODE switch position lights. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.

PARALLEL OUTPUT	PIN NO P1-( )	MODE SWITCH POSITION				IF ABNORMAL CHECK
		NET DATA	*CW	*AM	ISB	
AM EN	8	0	0	1	0	
DATA NET EN	73	1	0	0	0	U25, U17, U7, U11, and associated circuits.
CW EN	72	0	1	0	0	
ISB EN	9	0	0	0	1	

*In these positions the display and logic levels associated with the BANDWIDTH switch position are also activated.

Note

Mode tests, step j, are applicable to the exciter controls only.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
(Cont)	j. Set MODE switch (exciter controls only) to each of its positions.	The display associated with the MODE switch position lights. Refer to chart for logic levels and	

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	j. (Cont) Note Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc. Note Channel select tests, steps k through m, are applicable to receiver control only.	associated parallel output pin numbers.	
	k. Place MODE switch in the ISB position.		
	l. Place CH B2 switch to ON position.	The display associated with the CH B2 ON position lights. Refer to chart for logic levels and associated parallel output pin numbers.	
	m. Repeat step l for CH B1, CH A1, and CH A2 switches.		

PARALLEL OUTPUT	PIN NO P1-( )	CH SWITCH POSITION		IF ABNORMAL CHECK
		ON	OFF	
A2 ENBL	17	1	0	Check U25, U17, U7, U11, and associated circuits.
A1 ENBL	26	1	0	
B1 ENBL	6	1	0	
B2 ENBL	74	1	0	

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note Channel select tests, steps n through p, are applicable to exciter control only.		
	n. Place MODE switch in ISB position.		
	o. Place channel A1 CHANNEL ENABLE switch in LINE position and then to MIC position.	The display associated with channel A1 lights. Refer to chart for logic levels and associated parallel output pin numbers.	
(Cont)	p. Repeat step o for channels A2, B1, and B2.	Same as step o.	

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	(see nested table below)		

PARALLEL INPUT	PIN NO P1-( )	CHANNEL ENABLE SWITCH POSITION			IF ABNORMAL CHECK
		LINE	OFF	MIC	
A2 ENBL	17	1	0	1	U25, U17, U7, U11, and associated circuits.
A1 ENBL	26	1	0	1	
B1 ENBL	6	1	0	1	
B2 ENBL	74	1	0	1	

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note Vbfo and AFC enable tests, steps q through t, are applicable to receiver controls only.		
	q. Set control unit AFC switch to OFF.	Logic level 0 at P1-34. (NMT 0.5 V dc.)	
	r. Set control unit AFC switch to ON.	Logic level 1 at P1-34. (NLT +3.0 V dc.)	Check U26, U27, U17, U7, U11, and associated circuits.
	s. Set control unit VBFO switch to FXO.	Logic level 0 at P1-35. (NMT 0.5 V dc.)	
	t. Set control unit VBFO switch to VAR.	Logic level 1 at P1-35. (NLT 3.0 V dc.)	Same as step s.
(Cont)	**Note** Peak clip enable test, step u and v, are applicable to exciter controls only.		

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	u. Set control unit PEAK CLIP switch to OFF.	Logic level 0 at P1-32. (NMT 0.5 V dc.)	Same as step s.
	v. Set control unit PEAK CLIP switch to ON.	Logic level 1 at P1-32. (NLT 3.0 V dc.)	
4. Data inputs, word 3	a. Set control unit CONT switch to TEST. **Note** Word 3 tests can also be accomplished with control unit CONT switch in NORM and local unit CONT switch in REM. Then measure voltages at local unit parallel output card (the card being tested). Pa tests, steps b through e, are applicable to the exciter and receiver-exciter controls only.		
	b. Set control unit PA PWR switch to OFF.	Check logic levels at the associated parallel output pin numbers as shown in chart.	
	c. Set control unit PA PWR switch to STBY.	Check logic levels at the associated parallel output pin numbers as shown in chart.	
(Cont)	d. Set control unit PA PWR switch to HIGH PWR.	Check logic levels at the associated parallel output pin numbers as shown in chart.	

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	e. Set control unit PA PWR switch to LOW PWR. **Note** Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.	Check logic levels at the associated parallel output pin numbers as shown in chart.	

PARALLEL OUTPUT	PIN NO P1-( )	PA PWR SWITCH POSITION				IF ABNORMAL CHECK
		OFF	STBY	HIGH PWR	LOW PWR	
PA LV EN	79	0	1	1	1	U19, U5, U7, U11, and associated circuits.
PA HV EN	14	0	0	1	1	
LO PWR EN	78	0	0	0	1	

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note Pilot carrier tests, steps f and g, are applicable to the exciter controls only.		
	f. Set control unit PILOT CARR switch to OFF.	Logic level 0 at P1-82 (NMT 0.5 V dc).	Check U19, U5, U7, U11, and associated circuits.
	g. Set control unit PILOT CARR switch to ON.	Logic level 1 at P1-82 (NLT +3.0 V dc).	
	Note Dvbfo tests, steps h through k, are applicable only to the receiver with a dvbfo option installed.		
(Cont)	h. Set the control unit MODE switch to CW and the VBFO switch to VAR.		

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	i. Set digital VBFO controls for +9990 Hz.	VBFO frequency display reads +9990. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	j. Set digital VBFO controls for -6660 Hz.	VBFO frequency display reads -6660. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	k. Set digital VBFO controls for +1000 Hz.	VBFO frequency display reads +1000. Refer to chart for logic levels and associated parallel output pin numbers.	Measure logic levels as indicated in chart.
	Note Logic 1 = NLT +3.0 V dc. Logic 0 = NMT 0.5 V dc.		

BCD OUTPUT SIGNAL		PARALLEL OUTPUT PIN NO P1-( )	LOGIC LEVELS			IF ABNORMAL CHECK
			+9990	-6660	+1000	
DVBFO 1 kHz	(8)	48	1	0	0	U29, U5, U7, U11, and associated circuits.
	(4)	113	0	1	0	
	(2)	47	0	1	0	
	(1)	112	1	0	1	
DVBFO 100 Hz	(8)	46	1	0	0	U21, U5, U7, U11, and associated circuits.
	(4)	111	0	1	0	
	(2)	110	0	1	0	
	(1)	44	1	0	0	
DVBFO 10 Hz	(8)	109	1	0	0	
	(4)	43	0	1	0	
	(2)	108	0	1	0	
	(1)	42	1	0	0	
DVBFO SIGN		107	1	0	1	U29, U5, U7, U11, and associated circuits.

(Cont)

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	a. Set control unit CONT switch to NORM.		
	b. Set local unit CONT switch to LCL.		
	Note System key test, steps c and d, is applicable only to exciter controls.		
	c. Set local unit KEY switch to LOCK.	Control unit KEY display lights. Logic level 1 at P1-68 (NLT +3.0 V dc).	Check U15, U17, U7, U11, and associated circuits.
	d. Set local unit KEY switch to NORM.	Control unit KEY display goes out. Logic level 0 at P1-68 (NMT 0.5 V dc).	
	e. Set local unit PWR switch off.	Control unit EXCTR FAULT flashes. Logic level 1 follows light at P1-12 (NLT +3.0 V dc.)	Check U16, U12, U32, U8, U17, U7, U11, and associated circuits.
	f. Set local unit PWR switch to ON. Change any frequency control on local unit front panel.	Control unit EXCTR FAULT goes out. Logic level 0 at P1-12 (NMT 0.5 V dc).	
	Note Receive overload test, steps g and h, is applicable only to receiver controls.		
	g. Connect +5 V dc to local unit J16-27.	Control unit RF OVERLOAD lights. Logic level 1 at P1-68 (NLT-+3.0 V dc)	Check U16, U17, U7, U11, and associated circuits.
	h. Remove +5 V dc from local unit J16-27.	Control unit RF OVERLOAD goes out. Logic level 0 at P1-68 (NMT 0.5 V dc).	Same as step g.
(Cont)	**Note** Coupler fault test, steps i and j, is applicable only to exciter controls.		

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	i. Connect +5 V dc to local unit J15-1.	Control unit COUPLER FAULT lights. Logic level 1 at P1-92 (NLT +3.0 V dc).	Same as step g.
	j. Remove +5 V dc from local unit J15-1.	Control unit COUPLER FAULT lights. Logic level 0 at P1-92 (NMT 0.5 V dc).	
	Note Rf out test, steps k and l, is applicable only to exciter controls.		
	k. Connect ground signal to local unit J15-5.	Control unit RF OUT lights. Logic level 1 at P1-5 (NLT +3.0 V dc).	
	l. Remove ground signal from local unit J15-5.	Control unit RF OUT goes out. Logic level 0 at P1-5 (NMT 0.5 V dc).	
	Note Pa fault test, steps m and n, is applicable only to exciter controls.		
	m. Connect +5 V dc to local unit J15-3.	Control unit PA FAULT lights. Logic level 1 at P1-104 (NLT +3.0 V dc).	
	n. Remove +5 V dc from local unit J15-3.	Control unit PA FAULT goes out. Logic level 0 at P1-104 (NMT 0.5 V dc).	
	Note Pa ready test, steps o and p, is applicable only to exciter controls.		
(Cont)	o. Connect ground signal to local unit J15-21.	Control unit PA READY lights. Logic level 0 at P1-70 (NMT 0.5 V dc).	

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	p. Remove ground signal from local unit J15-21.	Control unit PA READY goes out. Logic level 0 at P1-70 (NMT 0.5 V dc).	Same as step g.
	q. Press and hold local unit CONT switch to MON.	Logic level 1 at P1-30 (NLT +3.0 V dc).	Check U24, U17, U7, U11, and associated circuits.
	r. Set local unit CONT switch to REM.	Logic level 0 at P1-30 (NMT 0.5 V dc).	
	s. Set local unit CONT switch to LCL.	Logic level 1 at P1-95 (NLT +3.0 V dc).	
		Control unit BUSY indicator lights. Logic level 1 at P1-7 (NLT +3.0 V dc).	Check U28, U20, U12, U4, U24, U17, U7, U11, and associated circuits.
	t. Set local unit CONT switch to REM.	After short delay logic level 0 at P1-95 (NMT 0.5 V dc).	Same as step s.
		After short delay control unit BUSY indicator goes out. Logic level 0 at P1-7 (NMT 0.5 V dc).	
	u. Set local unit CONT switch to LCL.		
	v. Apply a ground to local unit A13U51A-6.		
	w. Apply a ground to local unit A13U51A-3.		
	x. Remove ground from local unit A13U51A-3.		
	y. Apply ground to local unit A13U16A-1, 2, 8.		
	z. Remove ground from local unit A13U16A-1, 2, 8.	Logic level 1 at P1-29 (NLT +3.0 V dc).	Same as step q.
	aa. Remove ground from local unit A13U51A-6.		
(Cont)	ab. Apply ground to local unit A13U42A-3.	Logic level 0 at P1-29 (NMT 0.5 V dc).	

Table 2. Parallel Output, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	ac. Remove ground from local unit A13U42A-3.		Same as step q.
	ad. Apply +5 V dc to local unit J16-8.	Control unit PRE-SEL FAULT lights. Logic level 1 at P1-28 (NLT +3.0 V dc).	
	ae. Remove +5 V dc from local unit J16-8.	Control unit PRE-SEL FAULT goes out. Logic level 0 at P1-28 (NMT 0.5 V dc).	

4. UNIT STRAPPING

The parallel output card must be strapped for proper operation at initial installation and/or following testing and troubleshooting. Strapping is accomplished using jumper clips over the square pins marked E1 through E6.

Place jumper connectors (quantity 4) on each of the square pin pairs labeled E1 through E4.

Pin pair E5 is strapped between the middle and top pins for a flashing fault indicator or strapped between the middle and bottom pins for a nonflashing fault indicator.

Pin pair E6 is strapped between the middle and right pins for character 4, bit 1 fault position (2-channel equipment) or character 2, bit 6 fault position (4-channel equipment).

5. REPAIR

Repair of the parallel output card is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

6. PARTS LIST/DIAGRAMS

6.1 Introduction

Caution

> This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).
>
> All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 3). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

6.2 Parts List

REF DES Column — Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column — Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column — Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column — Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column — Lists the manufacturer's part number for the selected parts.

Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

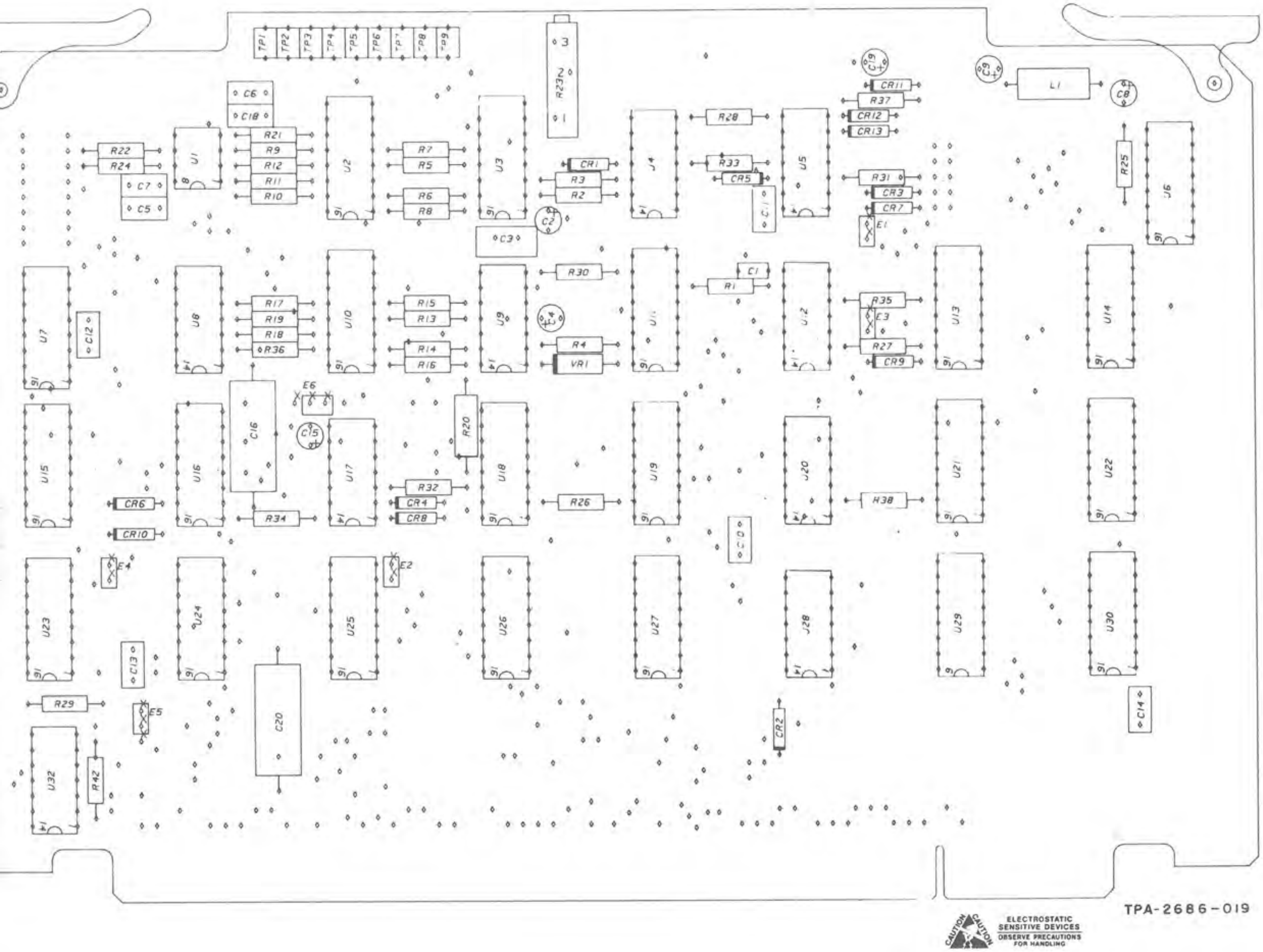
MFR CODE	MANUFACTURER'S NAME AND ADDRESS
02735	RCA CORP SOLID STATE DIVISION ROUTE 202 SOMERVILLE NJ 08876

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
04099	CAPCO INC FORESIGHT INDUSTRIAL PARK P O BOX 2164 GRAND JUNCTION CO 81501
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042
16546	GLOBE-UNION INC USCC/CENTRALAB ELECTRICS DIV 4561 COLORADO LOS ANGELES CA 90039
22526	BERG ELECTRONICS INC YOUK EXPRESSWAY NEW CUMBERLAND PA 17070
56289	SPRAGUE ELECTRIC CO NORTH ADAMS MA 01247
74970	JOHNSON E F CO 299 10TH AVE S W WASECA MN 56093
80294	BOURNS INC INSTRUMENT DIV 6135 MAGNOLIA AVE RIVERSIDE CA 92506
81349	MILITARY SPECIFICATION
96906	MILITARY STANDARD

6.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Parallel Output	642-3137-001	REV F



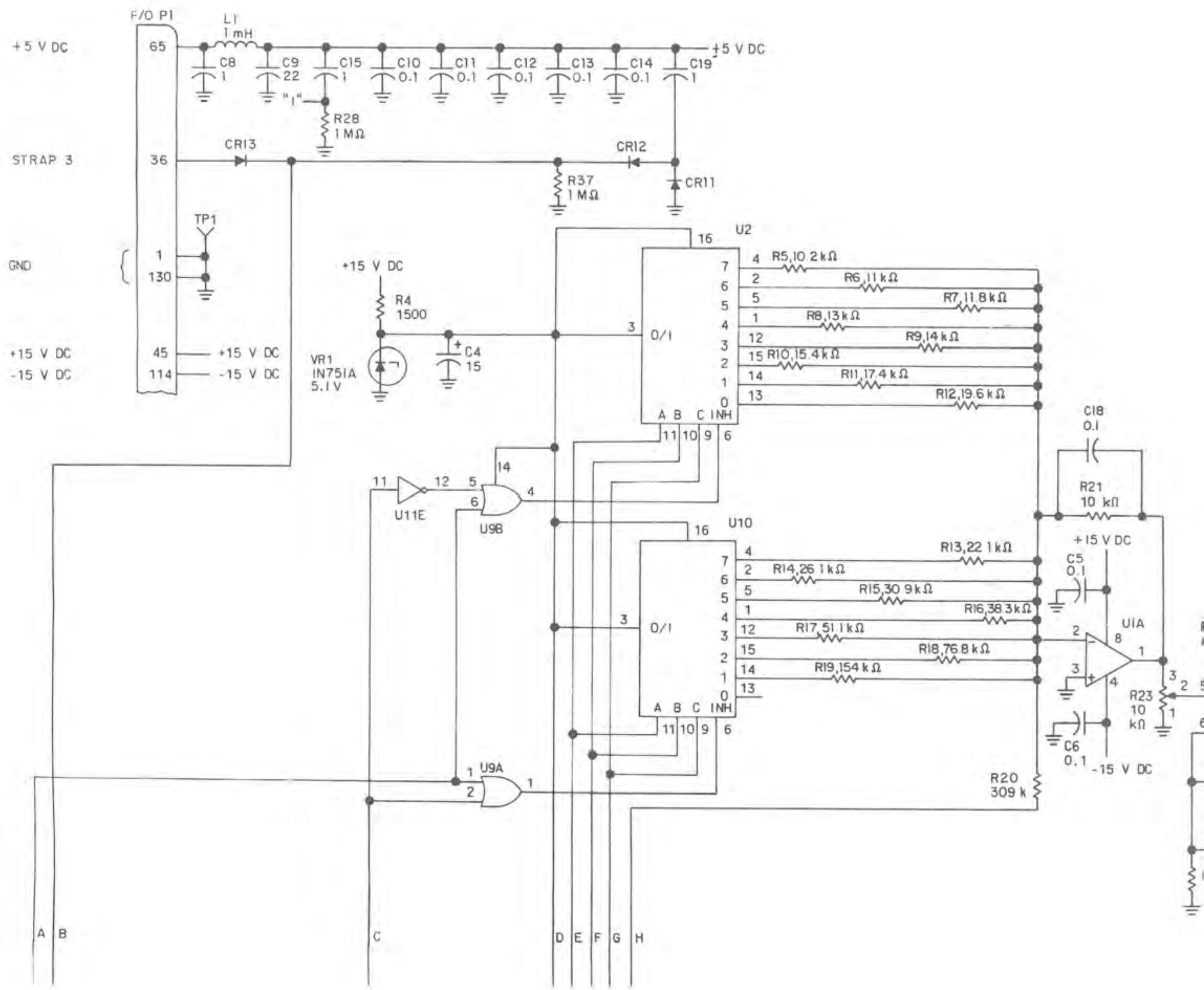
Parallel Output, Schematic Diagram
Figure 3 (Sheet 1 of 6)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	PARALLEL OUTPUT (ESDS)	642-3137-001			
CR1-CR13	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V	913-4018-000		81349	CK05BX102K
C2	CAPACITOR,FXD TNTLM ELCTLT, 0.47UF, 20%, 35V	184-9102-330		56289	199D474X0035AB1
C3	CAPACITOR,FXD MICA DIEL, 100PF, 5%, 500V	912-3879-000		81349	CM04FD101J03
C4	CAPACITOR,FXD TNTLM ELCTLT, 15UF, 20%, 15V	184-9102-130		56289	199D156X0015CB1
C5-C7	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V	913-3279-200		16546	CY30C104M
C8	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C9	CAPACITOR,FXD TNTLM ELCTLT, 22UF, 20%, 10V	184-9102-080		56289	199D226X0010CB1
C10-C14	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V	913-3279-200		16546	CY30C104M
C15	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C16	CAPACITOR,FXD PLSTC DIEL, 1UF, 10%, 50V	933-1081-200		04099	CRC1-200
C17	NOT USED				
C18	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V	913-3279-200		16546	CY30C104M
C19	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C20	CAPACITOR,FXD PLSTC DIEL, 1UF, 10%, 50V	933-1081-200		04099	CRC1-200
E1-E6	CONNECTOR,JMPR SYS	372-0046-010		22526	65474-001
L1	COIL,RF 1000UH	240-2540-000		96906	MS90539-15
R1	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R2,R3	RESISTOR,FXD CMPSN, 1.8MEGO, 10%, 1/4W	745-0866-000		81349	RCR07G185KS
R4	RESISTOR,FXD CMPSN, 1.5K, 10%, 1/4W	745-0755-000		81349	RCR07G152KS
R5	RESISTOR,FXD FILM, 10.2K, 1%, 1/8W	705-3605-480		81349	RN55D1022F
R6	RESISTOR,FXD FILM, 11K, 1%, 1/8W	705-1046-000		81349	RN55D1102F
R7	RESISTOR,FXD FILM, 11.8K, 1%, 1/8W	705-3605-510		81349	RN55D1182F
R8	RESISTOR,FXD FILM, 13K, 1%, 1/8W	705-3605-530		81349	RN55D1302F
R9	RESISTOR,FXD FILM, 14K, 1%, 1/8W	705-1051-000		81349	RN55D1402F
R10	RESISTOR,FXD FILM, 15.4K, 1%, 1/8W	705-1053-000		81349	RN55D1542F
R11	RESISTOR,FXD FILM, 17.4K, 1%, 1/8W	705-3605-590		81349	RN55D1742F
R12	RESISTOR,FXD FILM, 19.6K, 1%, 1/8W	705-1058-000		81349	RN55D1962F
R13	RESISTOR,FXD FILM, 22.1K, 1%, 1/8W	705-3605-640		81349	RN55D2212F
R14	RESISTOR,FXD FILM, 26.1K, 1%, 1/8W	705-1064-000		81349	RN55D2612F
R15	RESISTOR,FXD FILM, 30.9K, 1%, 1/8W	705-3605-710		81349	RN55D3092F
R16	RESISTOR,FXD FILM, 38.3K, 1%, 1/8W	705-1072-000		81349	RN55D3832F
R17	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000		81349	RN55D5112F
R18	RESISTOR,FXD FILM, 76.8K, 1%, 1/8W	705-3605-900		81349	RN55D7682F
R19	RESISTOR,FXD FILM, 154K, 1%, 1/8W	705-1101-000		81349	RN55D1543F
R20	RESISTOR,FXD FILM, 309K, 1%, 1/4W	705-3601-230		81349	RN60D3093F
R21,R22	RESISTOR,FXD FILM, 10K, 1%, 1/8W	705-1044-000		81349	RN55D1002F
R23	RESISTOR,VAR 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R24	RESISTOR,FXD FILM, 1K, 1%, 1/8W	705-0996-000		81349	RN55D1001F
R25,R26	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R27	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R28-R35	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R36	RESISTOR,FXD CMPSN, 0.68MEGO, 10%, 1/4W	745-0851-000		81349	RCR07G684KS
R37,R38	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R39-R41	NOT USED				
R42	RESISTOR,FXD CMPSN, 2.7MEGO, 10%, 1/4W	745-0872-000		81349	RCR07G275KS
TP1	JACK,TIP BRN	360-0484-070		74970	105-1108-011
TP2	JACK,TIP RED	360-0484-020		74970	105-1102-011
TP3	JACK,TIP ORN	360-0484-050		74970	105-1106-011
TP4	JACK,TIP YEL	360-0484-060		74970	105-1107-011
TP5	JACK,TIP GRN	360-0484-040		74970	105-1104-011
TP6	JACK,TIP BLU	360-0484-080		74970	105-1110-011
TP7	JACK,TIP VIO	360-0484-090		74970	105-1112-011
TP8	JACK,TIP GRA	360-0484-100		74970	105-1113-011
TP9	JACK,TIP WHT	360-0484-010		74970	105-1101-011
U1	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070		07263	UA1458TC
U2	INTEGRATED CKT (ESDS)	351-8227-010		07263	F4051PC
U3	INTEGRATED CIRCUIT (ESDS)	351-8479-010		04713	MC14538BCP
U4	INTEGRATED CIRCUIT (ESDS)	351-8159-040		04713	MC14011UBCP
U5	INTEGRATED CIRCUIT (ESDS)	351-8159-110		07263	4013BPC
U6	INTEGRATED CIRCUIT REGISTER (ESDS)	351-8346-010		02735	CD4094BE
U7	INTEGRATED CKT (ESDS)	351-8227-010		07263	F4051PC
U8	MICROCIRCUIT (ESDS)	351-8200-020		02735	CD4047BE
U9	INTEGRATED CIRCUIT MOS GATE (ESDS)	351-8287-010		02735	CD4071BE
U10	INTEGRATED CKT (ESDS)	351-8227-010		07263	F4051PC
U11	INTEGRATED CIRCUIT (ESDS)	351-8159-210		07263	F4049BPC
U12	INTEGRATED CIRCUIT (ESDS)	351-8407-010		04713	MC14070BCP
U13-U16	INTEGRATED CIRCUIT REGISTER (ESDS)	351-8346-010		02735	CD4094BE
U17	INTEGRATED CIRCUIT (ESDS)	351-8159-110		07263	4013BPC
U18,U19	INTEGRATED CIRCUIT REGISTER (ESDS)	351-8346-010		02735	CD4094BE
U20	INTEGRATED CIRCUIT (ESDS)	351-8159-110		07263	4013BPC
U21-U27	INTEGRATED CIRCUIT REGISTER (ESDS)	351-8346-010		02735	CD4094BE
U28	INTEGRATED CIRCUIT MOS GATE (ESDS)	351-8287-030		02735	CD4081BE
U29,U30	INTEGRATED CIRCUIT REGISTER (ESDS)	351-8346-010		02735	CD4094BE
U31	NOT USED				
U32	MICROCIRCUIT (ESDS)	351-8200-020		02735	CD4047BE
VR1	SEMICOND DEVICE	353-2710-000		07263	1N751A

NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. TYPE DESIGNATION SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.
4. UNLESS OTHERWISE SPECIFIED, DIODES ARE TYPE IN4454.
5. P2 IS A CABLE CONNECTOR FIELD. THIS CABLE CONNECTOR (372-0043-010) IS NOT IN 642-3137-001 CONFIGURATION.
6. THE FOLLOWING PARTS PROVIDE FOR REMOTE CONTROL OF LOCAL/REMOTE IN A RADIO AND ARE NOT IN 642-3137-001 CONFIGURATION: R39, R40, R41, Q1, Q2, AND U31.
7. SIGNAL NAMES ARE NOT SHOWN FOR P1 AND P2 PINS THAT ARE A CONTROL/STATUS BITS. THESE PINS HAVE DIFFERENT SIGNAL N THE EQUIPMENT THIS CARD IS USED IN. REFER TO TABLE FOR NAMES). ALL PIN NUMBERS IN TABLE ARE ON P1, EXCEPT WORD WHICH ARE ON P2.
8. NONSTANDARD ABBREVIATION; FLT = FAULT
9. PIN NUMBERS IN PARENTHESIS IN TABLE ARE STATUS OUTPUTS
10. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSIT SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED T DAMAGE.



NS THAT ARE ASSOCIATED WITH
RENT SIGNAL NAMES DEPENDING ON
TO TABLE FOR PIN FUNCTIONS (SIGNAL
, EXCEPT WORD 3, CHARACTER 4

ATUS OUTPUTS IN CONTROL UNITS ONLY.

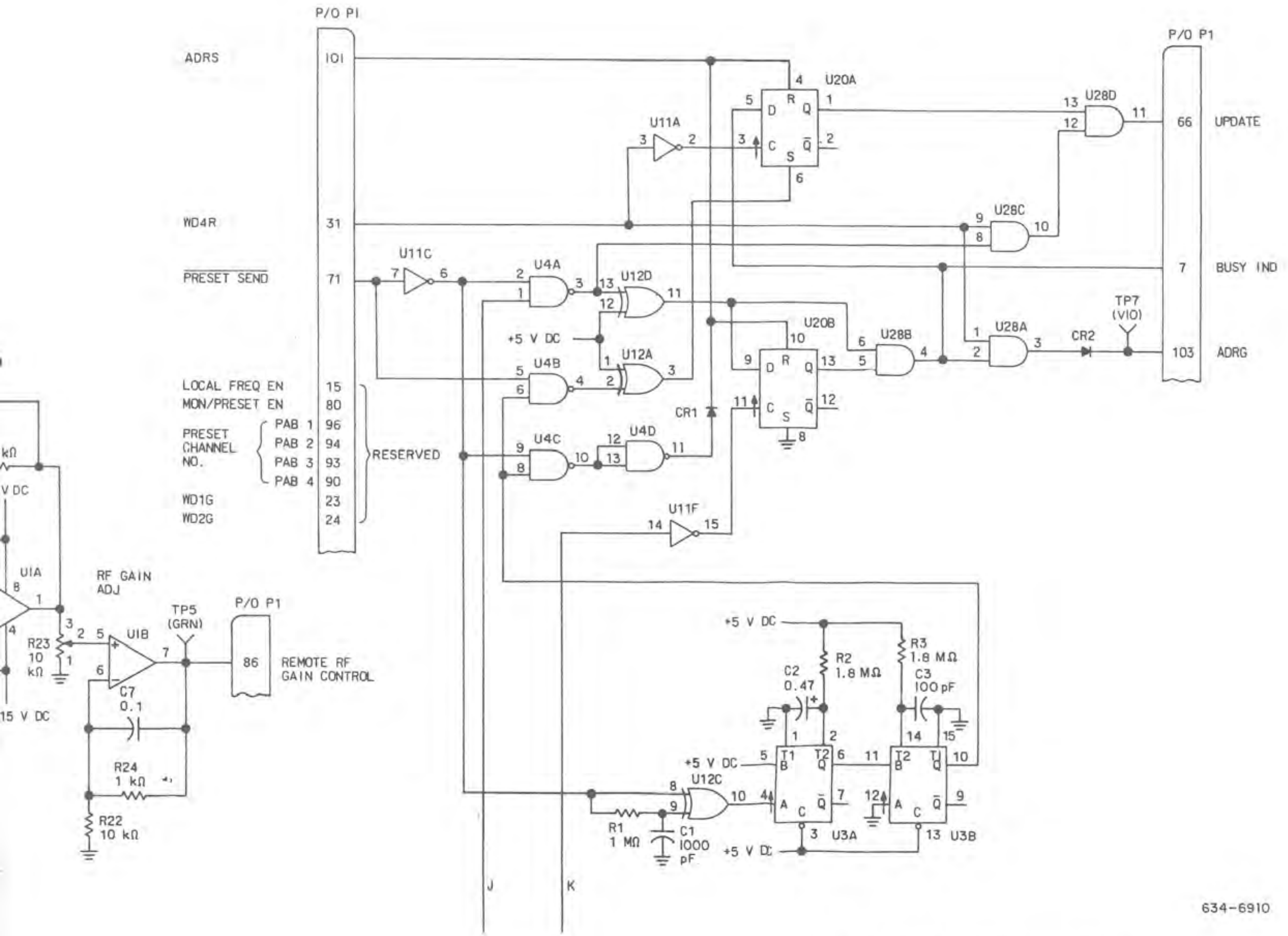
CHARGE SENSITIVE (ESDS) DEVICES.
UST BE USED TO PREVENT EQUIPMENT

MICROCIRCUIT INFORMATION

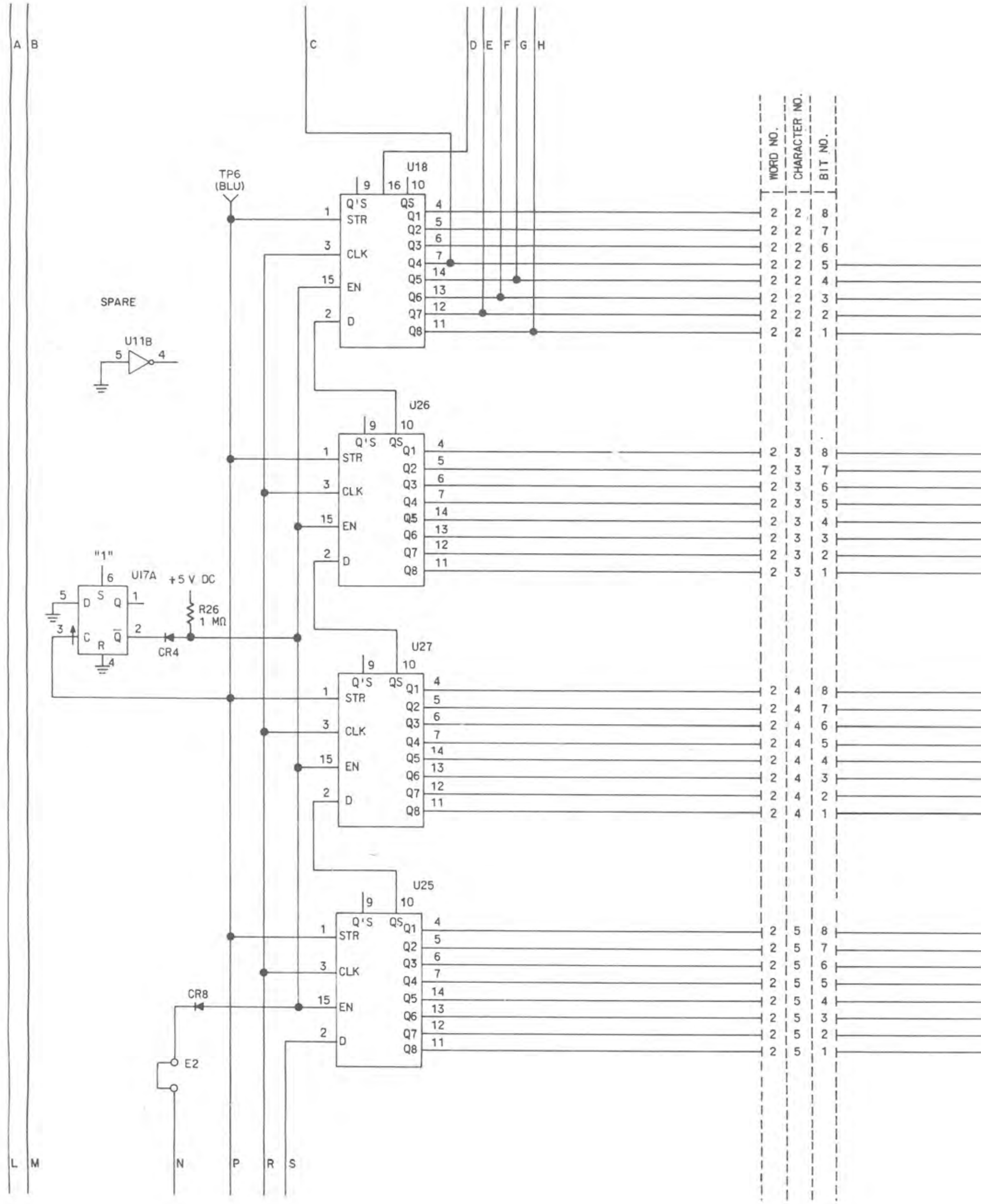
REF DES	COMMON DEVICE OR COLLINS PN	PWR(V DC) +5	PWR(V DC) GND
U1	MC1458P1		
U2	F4051PC	16	8,7
U3	MC14538BCP	16	8
U4	MC14011CP	14	7
U5	F4013BPC	14	7
U6	CD4094BE	16	8
U7	F4051PC	16	8,7
U8	CD4047AE	14	7
U9	MC14071BCP		7
U10	F4051PC	16	8,7
U11	F4049BPC	1	8
U12	MC14070BCP	14	7
U13	CD4094BE	16	8
U14	CD4094BE	16	8
U15	CD4094BE	16	8
U16	CD4094BE	16	8

MICROCIRCUIT INFORMATION

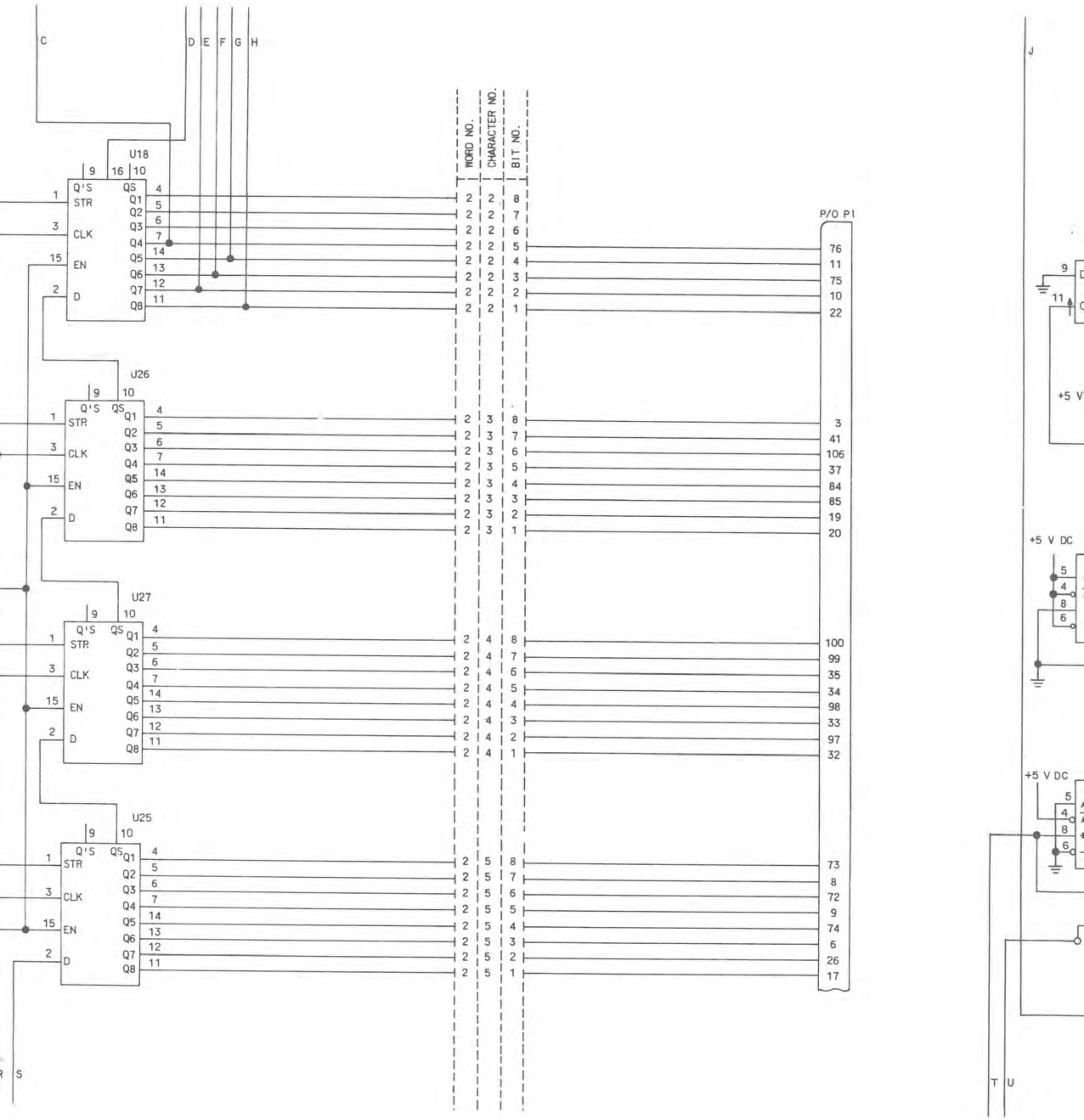
REF DES	COMMON DEVICE OR COLLINS PN	PWR(V DC) +5	PWR(V DC) GND
U17	F4013BPC	14	7
U18	CD4094BE	16	8
U19	CD4094BE	16	8
U20	F4013BPC	14	7
U21	CD4094BE	16	8
U22	CD4094BE	16	8
U23	CD4094BE	16	8
U24	CD4094BE	16	8
U25	CD4094BE	16	8
U26	CD4094BE	16	8
U27	CD4094BE	16	8
U28	MC14081BCP	14	7
U29	CD4094BE	16	8
U30	CD4094BE	16	8
U31	CD4094BE	16	8
U32	CD4047AE	14	7



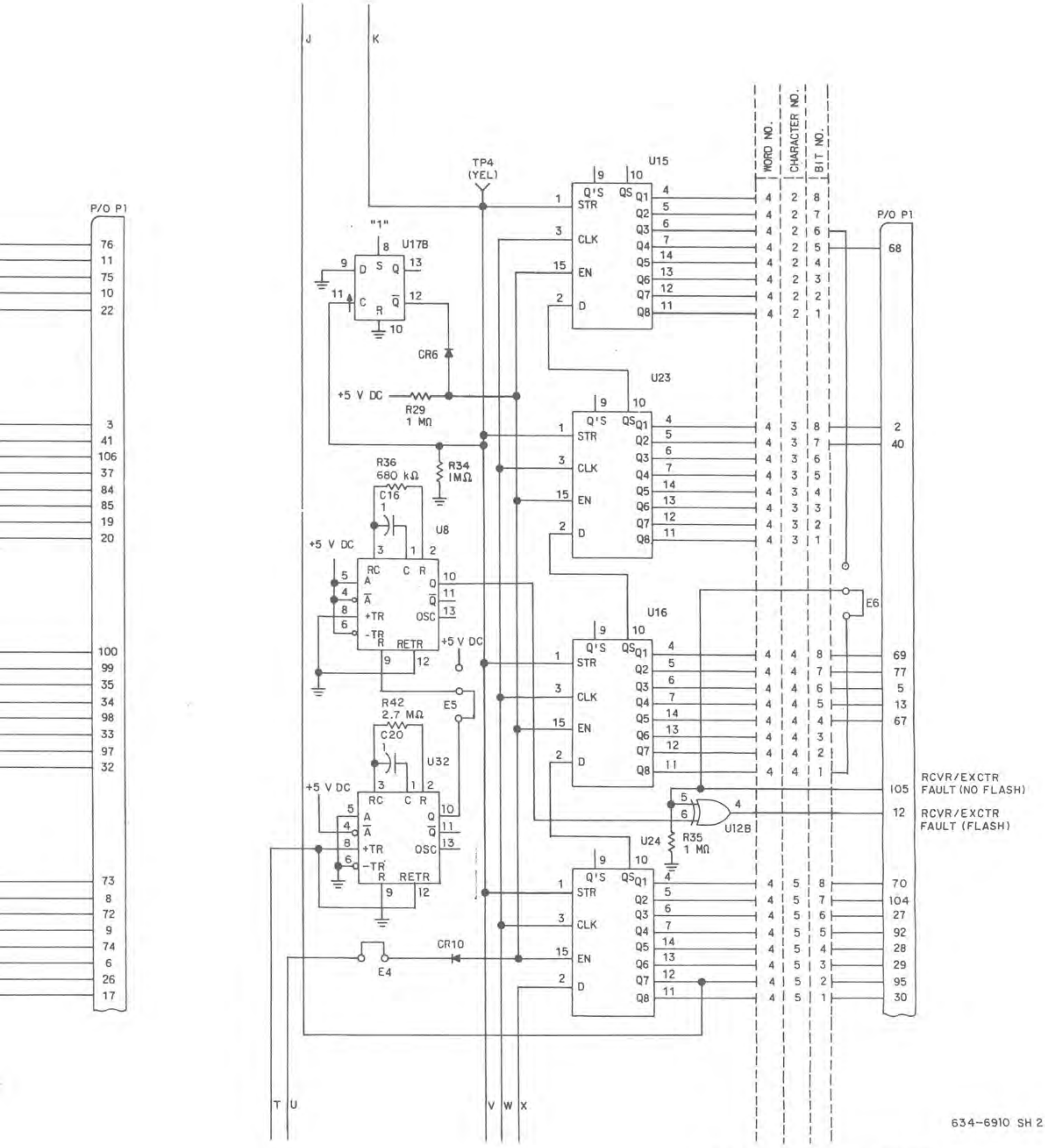
Parallel Output, Schematic Diagram
Figure 3 (Sheet 3)



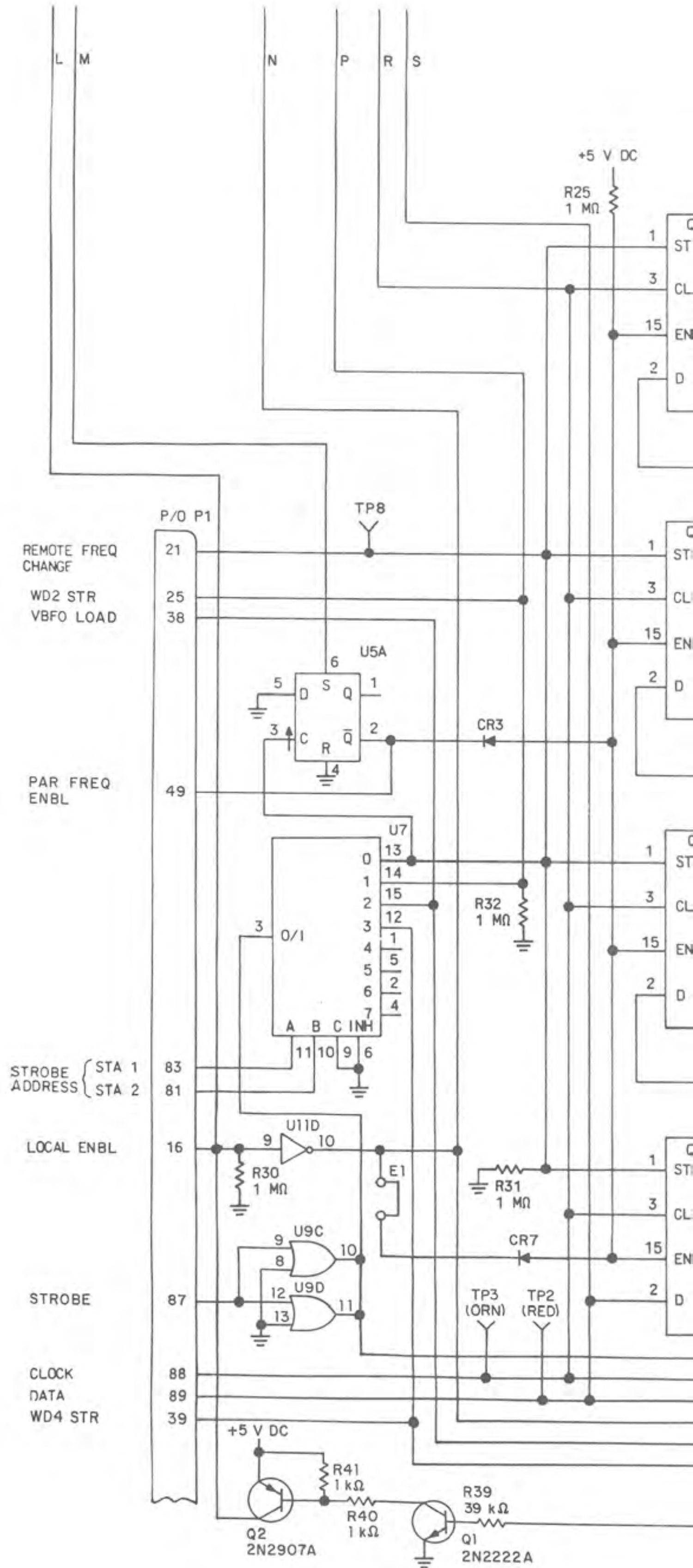
A
B
C
D
E
F
G
H
L
M
N
P
R
S
U18
U26
U27
U25
TP6 (BLU)
SPARE
U11B
U17A
"1"
+5 V DC
R26 1 MΩ
CR4
CR8
E2
STR
CLK
EN
D
Q'S
QS
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
WORD NO.
CHARACTER NO.
BIT NO.



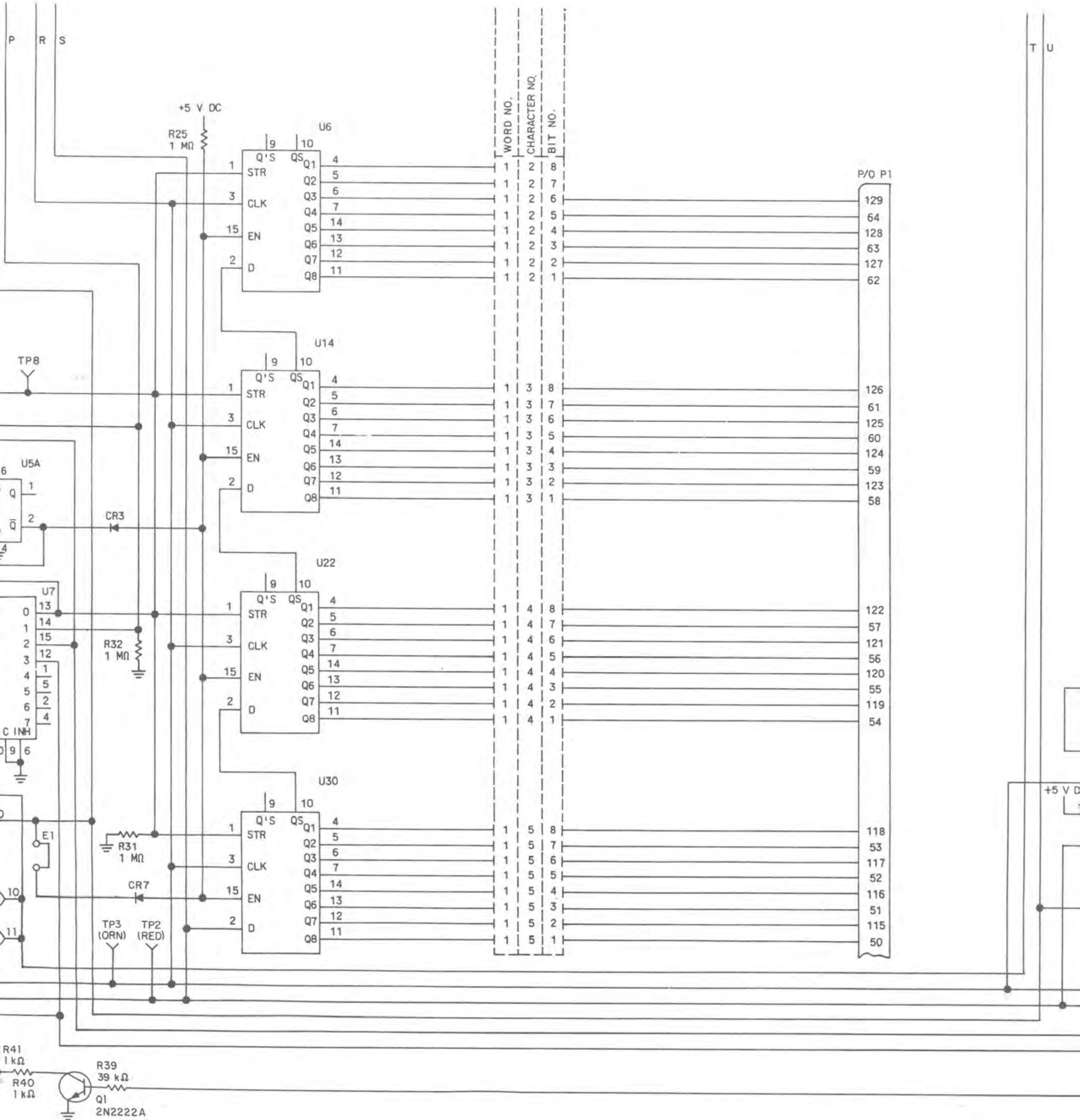
C
D
E
F
G
H
J
U18
U26
U27
U25
Q'S
QS
STR
CLK
EN
D
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
WORD NO.
CHARACTER NO.
BIT NO.
P/O P1
+5 V DC
R
S
T
U



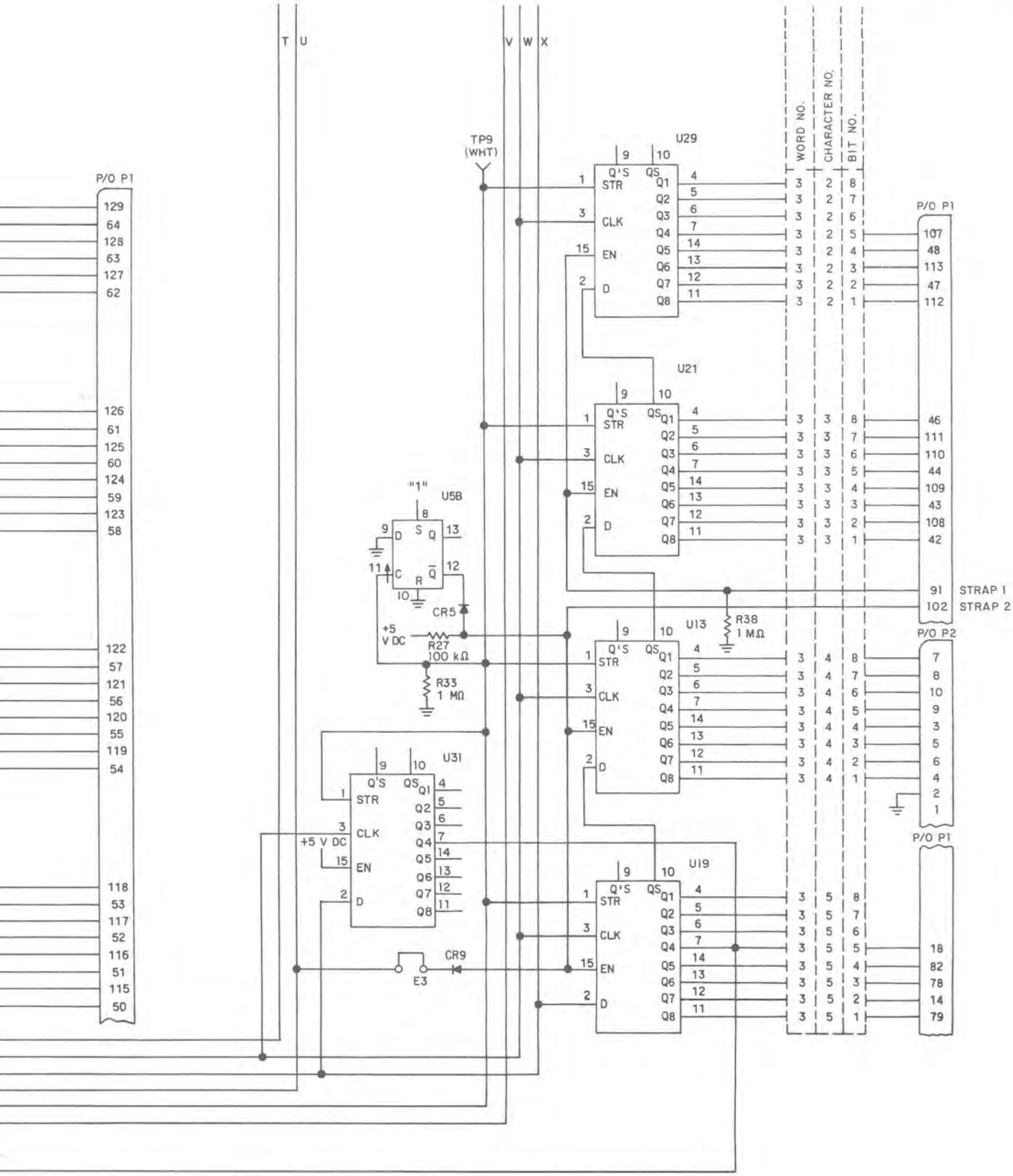
Parallel Output, Schematic Diagram
Figure 3 (Sheet 4)



L
M
N
P
R
S
+5 V DC
R25
1 MΩ
P/O P1
TP8
REMOTE FREQ CHANGE
21
WD2 STR
25
VBFO LOAD
38
U5A
CR3
PAR FREQ ENBL
49
U7
0/1
INH
R32
1 MΩ
STROBE ADDRESS
STA 1
83
STA 2
81
LOCAL ENBL
16
U11D
R30
1 MΩ
E1
R31
1 MΩ
U9C
U9D
CR7
STROBE
87
TP3 (ORN)
TP2 (RED)
CLOCK
88
DATA
89
WD4 STR
39
+5 V DC
R41
1 kΩ
R40
1 kΩ
R39
39 kΩ
Q2
2N2907A
Q1
2N2222A
ST
CL
EN
D



P
R
S
T
U
+5 V DC
R25
1 MΩ
U6
U14
U22
U30
Q'S
QS
STR
CLK
EN
D
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
WORD NO.
CHARACTER NO.
BIT NO.
P/O P1
129
64
128
63
127
62
126
61
125
60
124
59
123
58
122
57
121
56
120
55
119
54
118
53
117
52
116
51
115
50
TP8
U5A
CR3
U7
C INH
R32
1 MΩ
E1
R31
1 MΩ
CR7
TP3
(ORN)
TP2
(RED)
R41
1 kΩ
R40
1 kΩ
R39
39 kΩ
Q1
2N2222A



634-6910 SH 3

Parallel Output, Schematic Diagram
Figure 3 (Sheet 5)

CONTROL / STATUS BIT WORD FORMAT — EQUIPMENT TYPE

HF-80 8-BIT			ASCII 7-BIT			HF-80XX 2-CHANNEL RADIOS AND HF-80XX 2-CHANNEL CONTROLS			851S-1/2, HF-8095			4-CHANNEL EXCITER, AND 4-CHANNEL EXCITER CONTROL			4-CHAN… 4-CHAN…	
WORD NO.	CHARACTER NO.	BIT NO.	WORD NO.	CHARACTER NO.	BIT WT.	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.
1	2	8	1	6	8		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)			NOT USED		
1	2	7	1	6	4		38	$\overline{\text{STATUS REQUEST}}$ ($\overline{S}$)		38	$\overline{\text{STATUS REQUEST}}$ ($\overline{S}$)			NOT USED		
1	2	6	1	6	2	129	129	FREQ 10 MHz (2)	129	129	FREQ 10 MHz (2)	129	129	FREQ 10 MHz (2)	129	12
1	2	5	1	6	1	64	64	FREQ 10 MHz (1)	64	64	FREQ 10 MHz (1)	64	64	FREQ 10 MHz (1)	64	6
1	2	4	1	7	8	128	128	FREQ 1 MHz (8)	128	128	FREQ 1 MHz (8)	128	128	FREQ 1 MHz (8)	128	12
1	2	3	1	7	4	63	63	(4)	63	63	(4)	63	63	(4)	63	6
1	2	2	1	7	2	127	127	(2)	127	127	(2)	127	127	(2)	127	12
1	2	1	1	7	1	62	62	(1)	62	62	(1)	62	62	(1)	62	6
1	3	8	1	8	8	126	126	FREQ 100 kHz (8)	126	126	FREQ 100 kHz (8)	126	126	FREQ 100 kHz (8)	126	12
1	3	7	1	8	4	61	61	(4)	61	61	(4)	61	61	(4)	61	6
1	3	6	1	8	2	125	125	(2)	125	125	(2)	125	125	(2)	125	12
1	3	5	1	8	1	60	60	(1)	60	60	(1)	60	60	(1)	60	6
1	3	4	1	9	8	124	124	FREQ 10 kHz (8)	124	124	FREQ 10 kHz (8)	124	124	FREQ 10 kHz (8)	124	12
1	3	3	1	9	4	59	59	(4)	59	59	(4)	59	59	(4)	59	5
1	3	2	1	9	2	123	123	(2)	123	123	(2)	123	123	(2)	123	12
1	3	1	1	9	1	58	58	(1)	58	58	(1)	58	58	(1)	58	5
1	4	8	1	10	8	122	122	FREQ 1 kHz (8)	122	122	FREQ 1 kHz (8)	122	122	FREQ 1 kHz (8)	122	12
1	4	7	1	10	4	57	57	(4)	57	57	(4)	57	57	(4)	57	5
1	4	6	1	10	2	121	121	(2)	121	121	(2)	121	121	(2)	121	12
1	4	5	1	10	1	56	56	(1)	56	56	(1)	56	56	(1)	56	5
1	4	4	1	11	8	120	120	FREQ 100 Hz (8)	120	120	FREQ 100 Hz (8)	120	120	FREQ 100 Hz (8)	120	12
1	4	3	1	11	4	55	55	(4)	55	55	(4)	55	55	(4)	55	5
1	4	2	1	11	2	119	119	(2)	119	119	(2)	119	119	(2)	119	11
1	4	1	1	11	1	54	54	(1)	54	54	(1)	54	54	(1)	54	5
1	5	8	1	12	8	118	118	FREQ 10 Hz (8)	118	118	FREQ 10 Hz (8)	118	118	FREQ 10 Hz (8)	118	11
1	5	7	1	12	4	53	53	(4)	53	53	(4)	53	53	(4)	53	5
1	5	6	1	12	2	117	117	(2)	117	117	(2)	117	117	(2)	117	11
1	5	5	1	12	1	52	52	(1)	52	52	(1)	52	52	(1)	52	5
1	5	4	1	13	8	116	116	FREQ 1 Hz (8)	116	116	FREQ 1 Hz (8)	116	116	FREQ 1 Hz (8)	116	11
1	5	3	1	13	4	51	51	(4)	51	51	(4)	51	51	(4)	51	5
1	5	2	1	13	2	115	115	(2)	115	115	(2)	115	115	(2)	115	115
1	5	1	1	13	1	50	50	(1)	50	50	(1)	50	50	(1)	50	5
2	2	8	2	6	8		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)			NOT USED		
2	2	7	2	6	4		38	STATUS REQUEST ($\overline{S}$)		38	$\overline{\text{STATUS REQUEST}}$ ($\overline{S}$)					
2	2	6	2	6	2			NOT USED			NOT USED					
2	2	5	2	6	1	76	76	RF GAIN (16)	76	76	RF GAIN (16)	76	76		76	7
2	2	4	2	7	8	11	11	(8)	11	11	(8)	11	11		11	1
2	2	3	2	7	4	75	75	(4)	75	75	(4)	75	75		75	75
2	2	2	2	7	2	10	10	(2)	10	10	(2)	10	10		10	1
2	2	1	2	7	1	22	87	(1)	22	87	(1)	22	87		22	8
2	3	8	2	8	8	3		NOT USED	3		NOT USED	3	12	NOT USED	3	12
2	3	7	2	8	4	41	41	VBFO ENBL	41	41	VBFO ENBL	41	41		41	41
2	3	6	2	8	2	106	106	AFC ENBL	106	106	RESERVED	106	106		106	106
2	3	5	2	8	1	37	37	AGC CROWBAR ENBL	37	37	AGC CROWBAR ENBL	37	37		37	37
2	3	4	2	9	8	84	84	USB AGC OFF	84	84	USB AGC OFF	84	84		84	84
2	3	3	2	9	4	85	85	USB AGC FAST	85	85	USB AGC FAST	85	85		85	85
2	3	2	2	9	2	19	19	LSB AGC OFF	19	19	LSB AGC OFF	19	19		19	19
2	3	1	2	9	1	20	20	LSB AGC FAST	20	20	LSB AGC FAST	20	20		20	20
2	4	8	2	10	8	100	100	FL8 ENBL	100	100	FL8 ENBL	100	100	NOT USED	100	100
2	4	7	2	10	4	99	99	FL7 ENBL	99	99	FL7 ENBL	99	99		99	99
2	4	6	2	10	2	35	35	FL6 ENBL	35	35	FL6 ENBL	35	35		35	35
2	4	5	2	10	1	34	34	FL5 ENBL	34	34	FL5 ENBL	34	34		34	34
2	4	4	2	11	8	98	98	FL4 ENBL	98	98	FL4 ENBL	98	98		98	98
2	4	3	2	11	4	33	33	FL3 ENBL	33	33	FL3 ENBL	33	33		33	33
2	4	2	2	11	2	97	97	FL2 ENBL	97	97	FL2 ENBL	97	97		97	97
2	4	1	2	11	1	32	32	FL1 ENBL	32	32	FL1 ENBL	32	32	PEAK CLIPPER ENBL	32	32
2	5	8	2	12	8	73	73	FM ENBL	73	73	FM ENBL	73	73	NOT USED	73	73
2	5	7	2	12	4	8	8	AM ENBL	8	8	AM ENBL	8	8	AM ENBL	8	8
2	5	6	2	12	2	72	72	SSB ENBL	72	72	SSB ENBL	72	72	CW ENBL	72	72
2	5	5	2	12	1	9	9	CW ENBL	9	9	CW ENBL	9	9	ISB ENBL	9	9
2	5	4	2	13	8	74	74	ISB ENBL	74	74	ISB ENBL	74	74	B2 ENBL	74	74
2	5	3	2	13	4	6	92	RESERVED	6	92	RESERVED	6	92	B1 ENBL	6	92
2	5	2	2	13	2	26	91	RESERVED	26	91	RESERVED	26	91	A1 ENBL	26	91
2	5	1	2	13	1	17	21	RESERVED	17	21	RESERVED	17	21	A2 ENBL	17	21

PIN FUNCTION (SIGNAL NAME) TABLE

EQUIPMENT TY

...CITER, AND ...CITER CONTROL: FUNCTION	4-CHANNEL RECEIVER, AND 4-CHANNEL RECEIVER CONTROL: PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	CONTROL / STATUS BIT WORD FORMAT — HF-80 8-BIT: WORD NO.	CHARACTER NO.	BIT NO.	ASCII 7-BIT: WORD NO.	CHARACTER NO.	BIT WT.	HF-80XX 2-CHANNEL RADIOS AND HF-80XX 2-CHANNEL CONTROLS: PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	851S-1/2, HF-8095: PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION
USED			NOT USED	3	2	8	3	6	8		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)
USED			NOT USED	3	2	7	3	6	4		38	$\overline{\text{STATUS}}$ $\overline{\text{REQUEST}}$ ($\overline{S}$)		38	$\overline{\text{STATUS}}$ $\overline{\text{REQUEST}}$ ($\overline{S}$)
10 MHz (2)	129	129	FREQ 10 MHz (2)	3	2	6	3	6	2			NOT USED			NOT USED
10 MHz (1)	64	64	FREQ 10 MHz (1)	3	2	5	3	6	1	107	107	VBFO SIGN	107	107	VBFO SIGN
1 MHz (8)	128	128	FREQ 1 MHz (8)	3	2	4	3	7	8	48	48	VBFO FREQ 1 kHz (8)	48	48	VBFO FREQ 1 kHz (8)
(4)	63	63	(4)	3	2	3	3	7	4	113	113	(4)	113	113	(4)
(2)	127	127	(2)	3	2	2	3	7	2	47	47	(2)	47	47	(2)
(1)	62	62	(1)	3	2	1	3	7	1	112	112	(1)	112	112	(1)
100 kHz (8)	126	126	FREQ 100 kHz (8)	3	3	8	3	8	8	46	46	VBFO FREQ 100 Hz (8)	46	46	VBFO FREQ 100 Hz (8)
(4)	61	61	(4)	3	3	7	3	8	4	111	111	(4)	111	111	(4)
(2)	125	125	(2)	3	3	6	3	8	2	110	110	(2)	110	110	(2)
(1)	60	60	(1)	3	3	5	3	8	1	44	44	(1)	44	44	(1)
10 kHz (8)	124	124	FREQ 10 kHz (8)	3	3	4	3	9	8	109	109	VBFO FREQ 10 Hz (8)	109	109	VBFO FREQ 10 Hz (8)
(4)	59	59	(4)	3	3	3	3	9	4	43	43	(4)	43	43	(4)
(2)	123	123	(2)	3	3	2	3	9	2	108	108	(2)	108	108	(2)
(1)	58	58	(1)	3	3	1	3	9	1	42	42	(1)	42	42	(1)
1 kHz (8)	122	122	FREQ 1 kHz (8)	3	4	8	3	10	8	7	7	NOT USED	7	7	NOT USED
(4)	57	57	(4)	3	4	7	3	10	4	8	8		8	8	
(2)	121	121	(2)	3	4	6	3	10	2	10	10		10	10	
(1)	56	56	(1)	3	4	5	3	10	1	9	9		9	9	
100 Hz (8)	120	120	FREQ 100 Hz (8)	3	4	4	3	11	8	3	3		3	3	
(4)	55	55	(4)	3	4	3	3	11	4	5	5		5	5	
(2)	119	119	(2)	3	4	2	3	11	2	6	6		6	6	
(1)	54	54	(1)	3	4	1	3	11	1	4	4		4	4	
10 Hz (8)	118	118	FREQ 10 Hz (8)	3	5	8	3	12	8			NOT USED			NOT USED
(4)	53	53	(4)	3	5	7	3	12	4						
(2)	117	117	(2)	3	5	6	3	12	2						
(1)	52	52	(1)	3	5	5	3	12	1	18	81		18	81	
1 Hz (8)	116	116	FREQ 1 Hz (8)	3	5	4	3	13	8	82	82	PILOT CARRIER ENBL	82	82	VBFO TUNE
(4)	51	51	(4)	3	5	3	3	13	4	78	78	PA L PWR ENBL	78	78	VBFO PARALLEL ENBL
(2)	115	115	(2)	3	5	2	3	13	2	14	14	PA HV ENBL	14	14	FINE TUNE
(1)	50	50	(1)	3	5	1	3	13	1	79	79	PA LV ENBL	79	79	RESERVED
SED			NOT USED	4	2	8	4	6	8		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)		103	$\overline{\text{COMMAND}}$ ($\overline{C}$)
			NOT USED	4	2	7	4	6	4		38	$\overline{\text{STATUS}}$ $\overline{\text{REQUEST}}$ ($\overline{S}$)		38	$\overline{\text{STATUS}}$ $\overline{\text{REQUEST}}$ ($\overline{S}$)
			NOT USED	4	2	6	4	6	2			NOT USED	27	105	UP/$\overline{\text{DOWN}}$
	76	76	RF GAIN (16)	4	2	5	4	6	1	92 (68)	68	REMOTE KEY (MON)	92	68	TUNE RATE (16)
	11	11	(8)	4	2	4	4	7	8			NOT USED	28	4	(8)
	75	75	(4)	4	2	3	4	7	4				29	39	(4)
	10	10	(2)	4	2	2	4	7	2				95	5	(2)
	22	87	(1)	4	2	1	4	7	1				30	70	(1)
ED	3	12	FL7 (E) ENBL	4	3	8	4	8	8	(2)	2	AFC LOCK	(2)	2	NOT USED
	41	41	FL6 (D) ENBL	4	3	7	4	8	4	(40)	40	EXCTR RF MON	(40)	40	NOT USED
	106	106	FL5 (C) ENBL	4	3	6	4	8	2		105	CHAN A XMT AF MON		105	NOT USED
	37	37	FL4 (B) ENBL	4	3	5	4	8	1		36	CHAN A RCV AF MON		36	CHAN A AF MON
	84	84	B2 AGC (2)	4	3	4	4	9	8		83	CHAN A AGC MON		83	CHAN A AGC MON
	85	85	B2 AGC (1)	4	3	3	4	9	4		39	CHAN B XMT MON		39	NOT USED
	19	19	A2 AGC (2)	4	3	2	4	9	2		101	CHAN B RCV MON		101	CHAN B AF MON
	20	20	A2 AGC (1)	4	3	1	4	9	1		18	CHAN B AGC MON		18	CHAN B AGC MON
SED	100	100	FL3 (A) ENBL	4	4	8	4	10	8	(69)	69	PA RDY	(69)	69	NOT USED
	99	99	FL1 (16 kHz) ENBL	4	4	7	4	10	4	(77)	4	PA FLT	(77)	4	
	35	35	VBFO ENBL	4	4	6	4	10	2	(5)	5	PA RF MON	(5)	5	
	34	34	AFC ENBL	4	4	5	4	10	1	(13)	70	CPLR FLT	(13)	70	
	98	98	B1 AGC (2)	4	4	4	4	11	8	(67)	67	RF OVLD FLT	(67)	67	RF OVLD FLT
	33	33	B1 AGC (1)	4	4	3	4	11	4		49	SYNTH FLT		49	SYNTH
	97	97	A1 AGC (2)	4	4	2	4	11	2		86	PS FLT		86	PS FLT
LIPPER ENBL	32	32	A1 AGC (1)	4	4	1	4	11	1	(12)	3	RCVR/EXCTR FLT	(12)	3	RCVR FLT
SED	73	73	DATA NET ENBL	4	5	8	4	12	8	(70)		NOT USED	(70)		NOT USED
BL	8	8	AM ENBL	4	5	7	4	12	4	(104)		NOT USED	(104)		NOT USED
BL	72	72	CW ENBL	4	5	6	4	12	2	(27)	7	VBFO SYNTH FLT	(27)	7	VBFO SYNTH FLT
NBL	9	9	ISB ENBL	4	5	5	4	12	1	(92)		NOT USED	(92)		NOT USED
BL	74	74	B2 ENBL	4	5	4	4	13	8	(28)	71	PRESEL FLT	(28)	71	PRESEL FLT
BL	6	92	B1 ENBL	4	5	3	4	13	4	(29)	95	DATA ERROR	(29)	95	DATA ERROR
L	26	91	A1 ENBL	4	5	2	4	13	2	(95)	16	LOCAL CONTROL	(95)	16	LOCAL CONTROL
L	17	21	A2 ENBL	4	5	1	4	13	1	(30	80	MONITOR	(30)	80	MONITOR

EQUIPMENT TYPE

...OS AND ...TROLS	851S-1/2, HF-8095			4-CHANNEL EXCITER, AND 4-CHANNEL EXCITER, CONTROL			4-CHANNEL RECEIVER, AND 4-CHANNEL RECEIVER CONTROL		
...N	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION	PARALLEL OUTPUT PIN NO.	PARALLEL INPUT PIN NO.	FUNCTION
(C)		103	COMMAND (C)			NOT USED			NOT USED
EST (S)		38	STATUS REQUEST (S)						NOT USED
			NOT USED						NOT USED
	107	107	VBFO SIGN	107	107		107	107	VBFO SIGN
kHz (8)	48	48	VBFO FREQ 1 kHz (8)	48	48		48	48	VBFO FREQ 1 kHz (8)
(4)	113	113	(4)	113	113		113	113	(4)
(2)	47	47	(2)	47	47		47	47	(2)
(1)	112	112	(1)	112	112		112	112	(1)
00 Hz (8)	46	46	VBFO FREQ 100 Hz (8)			NOT USED	46	46	VBFO FREQ 100 Hz (8)
(4)	111	111	(4)				111	111	(4)
(2)	110	110	(2)				110	110	(2)
(1)	44	44	(1)				44	44	(1)
Hz (8)	109	109	VBFO FREQ 10 Hz (8)				109	109	VBFO FREQ 10 Hz (8)
(4)	43	43	(4)				43	43	(4)
(2)	108	108	(2)				108	108	(2)
(1)	42	42	(1)				42	42	(1)
	7	7	NOT USED	7	7	NOT USED	7	7	NOT USED
	8	8		8	8		8	8	
	10	10		10	10		10	10	
	9	9		9	9		9	9	
	3	3		3	3		3	3	
	5	5		5	5		5	5	
	6	6		6	6		6	6	
	4	4		4	4		4	4	
			NOT USED			NOT USED			NOT USED
	18	81		18	81		18	81	
R ENBL	82	82	VBFO TUNE	82	82	PILOT CARRIER ENBL	82	82	B2 AGC BUS
L	78	78	VBFO PARALLEL ENBL	78	78	PA LO PWR ENBL	78	78	B1 AGC BUS
	14	14	FINE TUNE	14	14	PA HV ENBL	14	14	AI AGC BUS
	79	79	RESERVED	79	79	PA LV ENBL	79	79	A2 AGC BUS
(C)		103	COMMAND (C)			NOT USED			NOT USED
ST (S)		38	STATUS REQUEST (S)			NOT USED			NOT USED
	27	105	UP/DOWN	(12)	13	EXCTR FLT	(12)	13	RCVR FLT
MON)	92	68	TUNE RATE (16)	92 (68)	68	REMOTE KEY (MON)	92 (68)	68	RF OVLD FLT
	28	4	(8)		88	B2 AF MON		88	B2 AF MON
	29	39	(4)		23	B1 AF MON		23	B1 AF MON
	95	5	(2)		22	AI AF MON		22	AI AF MON
	30	70	(1)		24	A2 AF MON		24	A2 AF MON
	(2)	2	NOT USED	(2)	2	NOT USED	(2)	2	NOT USED
	(40)	40	NOT USED	(40)	40	10 Hz LOCK IND	(40)	40	10 Hz LOCK IND
F MON		105	NOT USED		105	100 Hz LOCK IND		105	100 Hz LOCK IND
F MON		36	CHAN A AF MON		36	1 kHz LOCK IND		36	1 kHz LOCK IND
ION		83	CHAN A AGC MON		83	10 kHz LOCK IND		83	10 kHz LOCK IND
ION		39	NOT USED		39	100 kHz LOCK IND		39	100 kHz LOCK IND
ION		101	CHAN B AF MON		101	SYNTH OUT LOCK IND		101	SYNTH OUT LOCK IND
ION		18	CHAN B AGC MON		18	FREQ REF FLT		18	FREQ REF FLT
	(69)	69	NOT USED	(69)	69	NOT USED	(69)	69	NOT USED
	(77)	4		(77)	4	SUBCARRIER LOCK FLT	(77)	4	SUBCARRIER LOCK FLT
	(5)	5		(5)	5	EXCTR RF MON	(5)	5	VBFO SYNTH FLT
	(13)	70		(13)	70	EXCTR PS FLT	(13)	70	RCVR PS FLT
	(67)	67	RF OVLD FLT	(67)	67	NOT USED	(67)	67	B2 AGC MON
		49	SYNTH		49	EXT STANDARD		49	B1 AGC MON
		86	PS FLT		86	A1 IF MON		86	A1 AGC MON
FLT	(12)	3	RCVR FLT	(105)	3	NOT USED	(105)	3	A2 AGC MON
	(70)		NOT USED	(70)	77	PA READY	(70)	77	NOT USED
	(104)		NOT USED	(104)	102	PA FLT	(104)	102	EXT STANDARD
LT	(27)	7	VBFO SYNTH FLT	(27)	7	PA RF MON	(27)	7	AFC LOCK MON
	(92)		NOT USED	(92)	89	CPLR FLT	(92)	89	RF XLTR MON
	(28)	71	PRESEL FLT	(28)	71	PRESEL FLT	(28)	71	PRESEL FLT
	(29)	95	DATA ERROR	(29)	95	DATA ERROR	(29)	95	DATA ERROR
L	(95)	16	LOCAL CONTROL	(95)	16	LOCAL CONTROL	(95)	16	LOCAL CONTROL
	(30)	80	MONITOR	(30)	80	MONITOR	(30)	80	MONITOR

634-6910

Parallel Output, Schematic Diagram
Figure 3 (Sheet 6)

Serial Interface
(638-6896-001)

523-0770713

Serial Interface (638-6896-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

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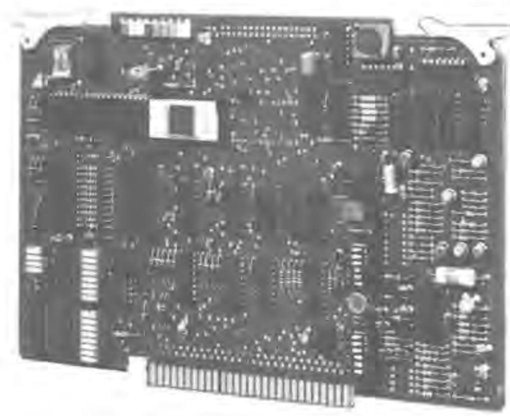
1. DESCRIPTION

Serial Interface 638-6896-001, shown in figure 1, is a 2-layer planar card with a 56-pin edge-on connector (2 layers, 28 pins each).

The serial interface card consists of the following primary circuits; an FSK/RS-232 select switch, an FSK receiver, an RS-232 receiver, an asynchronous communications interface adapter (ACIA), a microprocessor circuit, a parallel-to-serial output shift register, a strobe decoder, a word subaddress latch, a bit/band rate and clock generator, data input buffers, an FSK keyer, FSK transmit enable gate, and an RS-232 driver.



TPA-2843-017

Serial Interface
Figure 1

2. PRINCIPLES OF OPERATION

2.1 General (Refer to figure 2.)

As a serial data receiver, the serial interface card receives FSK, RS-232C, of MIL-STD-188C serial data control signals and checks for address, command status, and data errors. It then provides error, clock, word subaddress, strobe, and serial data outputs for decoding by a parallel output card.

As a serial data transmitter, the serial interface card receives parallel data inputs and a transmit word initiate and provides FSK, RS-232C, or MIL-STD-188C serial data monitor signals. The serial data monitor signals are supplied to the associated unit/control.

2.2 Serial Data Inputs and Outputs

When strapped accordingly, the serial interface card receives and transmits data according to one of the following types of control techniques.

a. FSK (mark = 1280 Hz, space = 2133 Hz) with mark equivalent to logic 1 data and space equivalent to logic 0 data. Data is transmitted/received at 75, 109, 150, 300, or 600 bauds.
b. EIA RS-232C (mark = -6 ±1 V dc, space = +6 ±1 V dc) with mark equivalent to logic 1 data and space equivalent to logic 0 data. Data is transmitted/received at 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, or 19,200 bauds.
c. MIL-STD-188C (mark = +6 ±1 V dc, space = -6 ±1 V dc) with mark equivalent to logic 1 data and space equivalent to logic 0 data. Data is transmitted/received at 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, or 19,200 bauds.

The control word inputs may be in either HF-80 8-bit format or ASCII 7-bit format. When applied to the asynchronous communications interface adapter, the control word is reformatted so that each control word is composed of five 11-bit characters. The last two or three bits of each character group are stop and parity bits. The first bit is a start bit. In the 8-bit format, the first character of each control word is reserved for equipment address, word identification (subaddress), and word sync information. Bits seven and eight of the second character in each word are reserved for command and status request control bits. The remaining characters of each word carry frequency, control, and monitor information. In the 7-bit format, separate characters are used for equipment address, subaddress, word sync, and command and status request control bits.

Refer to figure 3. Control (and monitor) word timing is accomplished by a crystal-controlled oscillator on the microprocessor chip. A divider reduces the frequency to the desired values. Strapping permits selection of the baud rate for clock inputs to the various circuits. Selection is from 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, and 19,200 bauds. (Clock frequency is 16 times baud rate).

Refer to figure 2. Monitor data (serial data input) is applied to the microprocessor on the serial interface card. Word and status information is decoded from the monitor data and is used to determine strobe address information. The monitor data is then applied serially through a shift register to the data input of four word serial-to-parallel converters on the associated parallel output card. Each serial-to-parallel converter is enabled before it accepts and processes the monitor data. This occurs when the strobe address input is decoded and an enable signal is generated by the word enable circuit.

Refer to figure 2. Control information (serial data output) is stored in the multiplexers on the associated parallel input card. Mux control is supplied by the microprocessor through the multiplexer output latch on the serial interface card. The mux address information enables the applicable multiplexer on the parallel input card, which transfers the stored parallel information to the serial interface card. The serial interface card then formats the information into 8-bit or 7-bit format and outputs it serially, using the ACIA, through the FSK keyer or RS-232C driver circuit to the control data output.

2.3 Monitor Data (Refer to figure 2.)

Monitor data (serial data input) is received by the FSK/RS-232C select and applied to the appropriate receiver. In FSK, the FSK receiver applies the received FSK signal to the FSK demodulator where a 1280-Hz signal is converted to a logic 1 output and a 2133-Hz signal is converted to a logic 0 output.

In RS-232C or MIL-STD-188C operation, the RS-232C receiver converts a +6-V dc input to a logic 0 (ground) output and converts a -6-V dc input to a logic 1 (+4.7-V dc) output.

The asynchronous communications interface adapter (ACIA) receives the monitor data input and converts it to HF-80 8-bit format and applies it to the microprocessor. If the monitor data is command data (command bit = 0), the microprocessor converts the data word to parallel receive data outputs and clocks the data through the parallel to serial converter to the appropriate storage registers on the parallel output card. The serial interface card then supplies the word subaddress and strobe so that the data is accepted into the appropriate storage register in the associated parallel output card as determined by the word subaddress.

2.4 Control Data (Refer to figure 2.)

Control data (serial data output) is transmitted by an FSK keyer (for FSK operation) or by a line driver (for RS-232C or MIL-STD-188C operation).

In FSK operation, the FSK keyer converts logic 0 outputs from the asynchronous communications interface adapter (ACIA) to 1280-Hz FSK signals and logic 1 outputs from the ACIA to 2133 Hz.

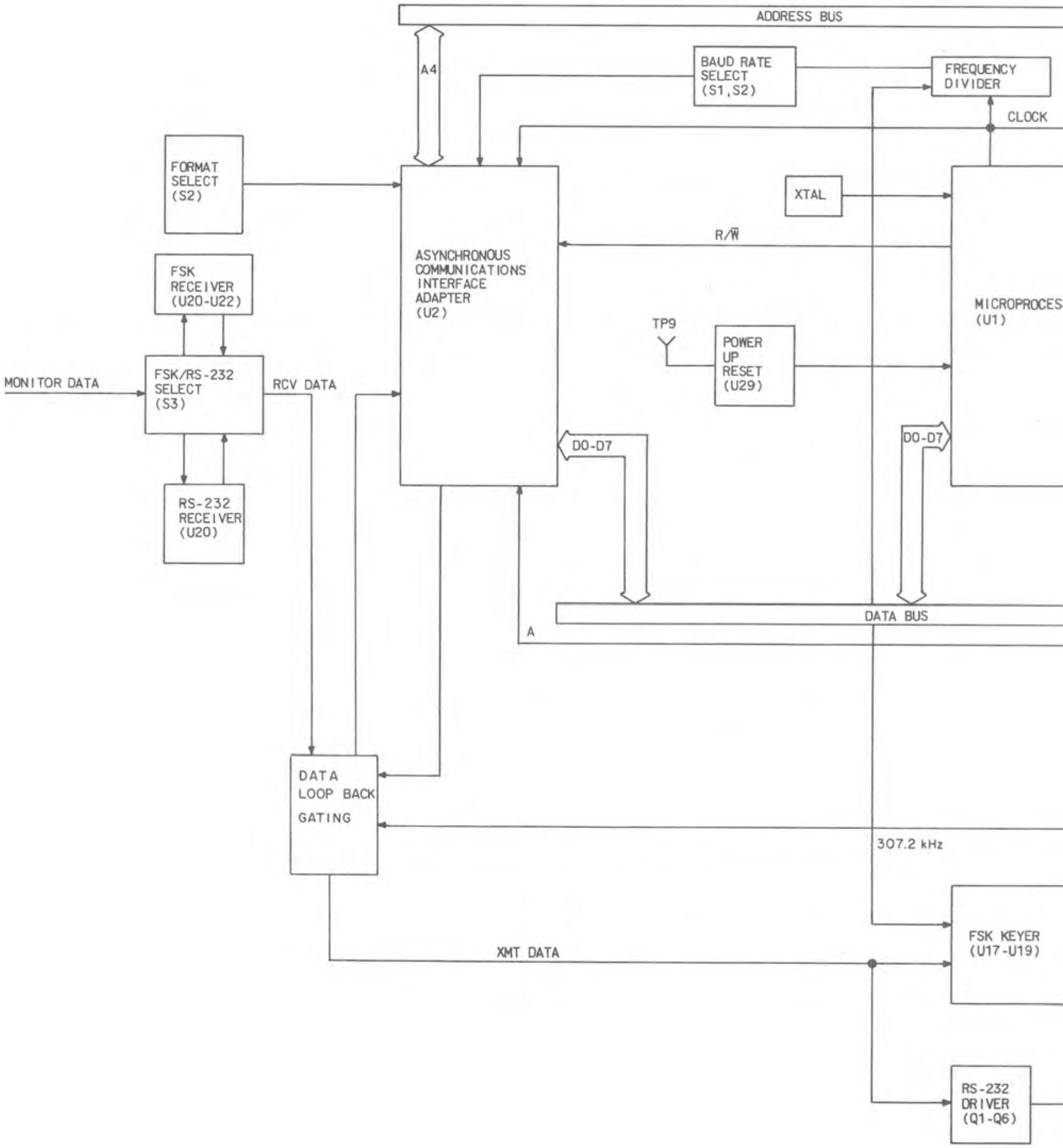
In RS-232 operation, the line driver converts logic 0 inputs to the line driver to +6 V dc and logic 1 inputs to the line driver to -6 V dc.

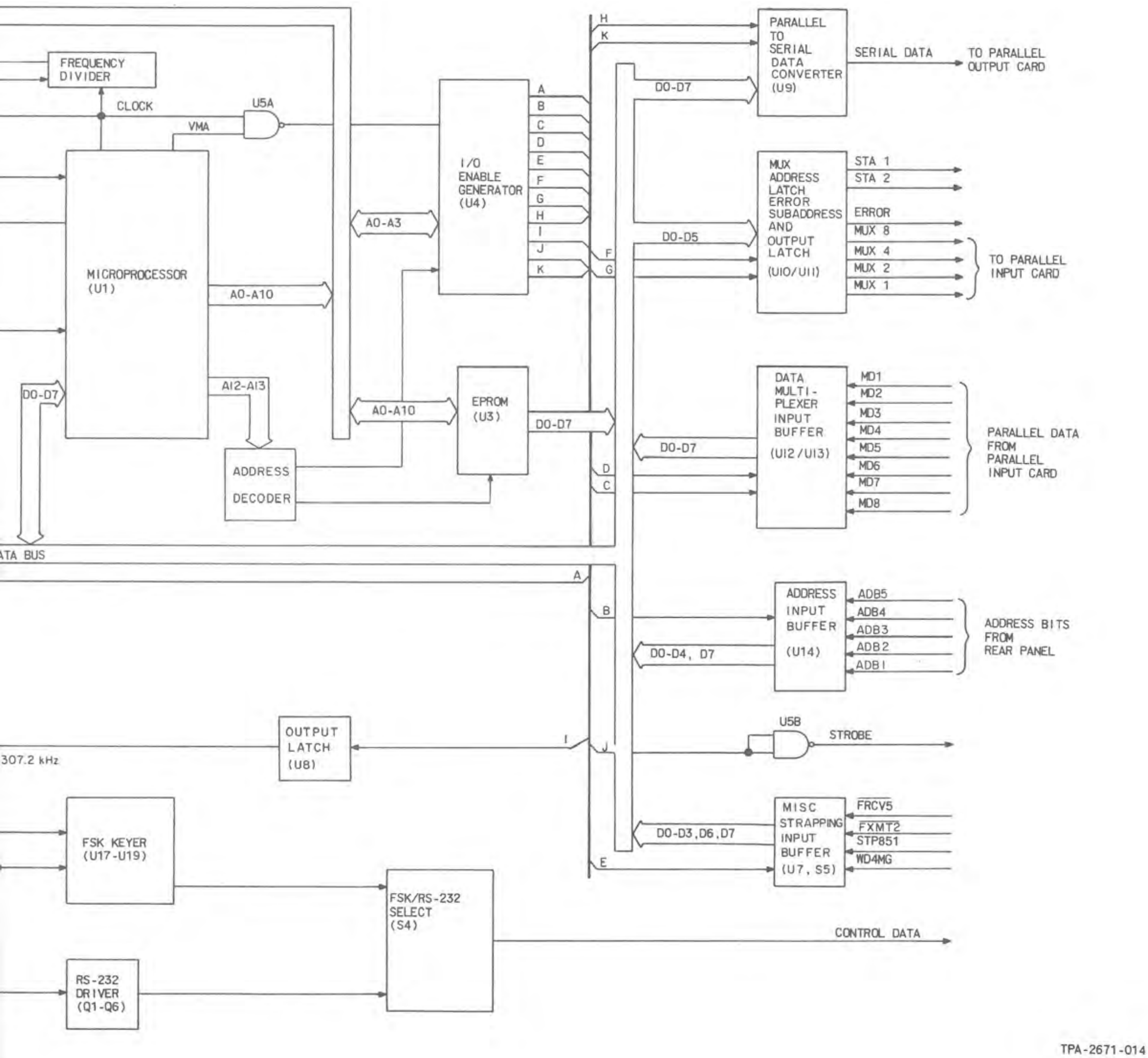
In MIL-STD-188C operation, the line driver converts logic 0 inputs to the line driver to -6 V dc and logic 1 line inputs to the line driver to +6 V dc.

Parallel input data are address selected by the microprocessor and applied to the ACIA. The ACIA supplies the data as serial output (so) data to the line driver or FSK keyer. The serial data is converted to the appropriate signal data and supplied to the associated remote unit/control.

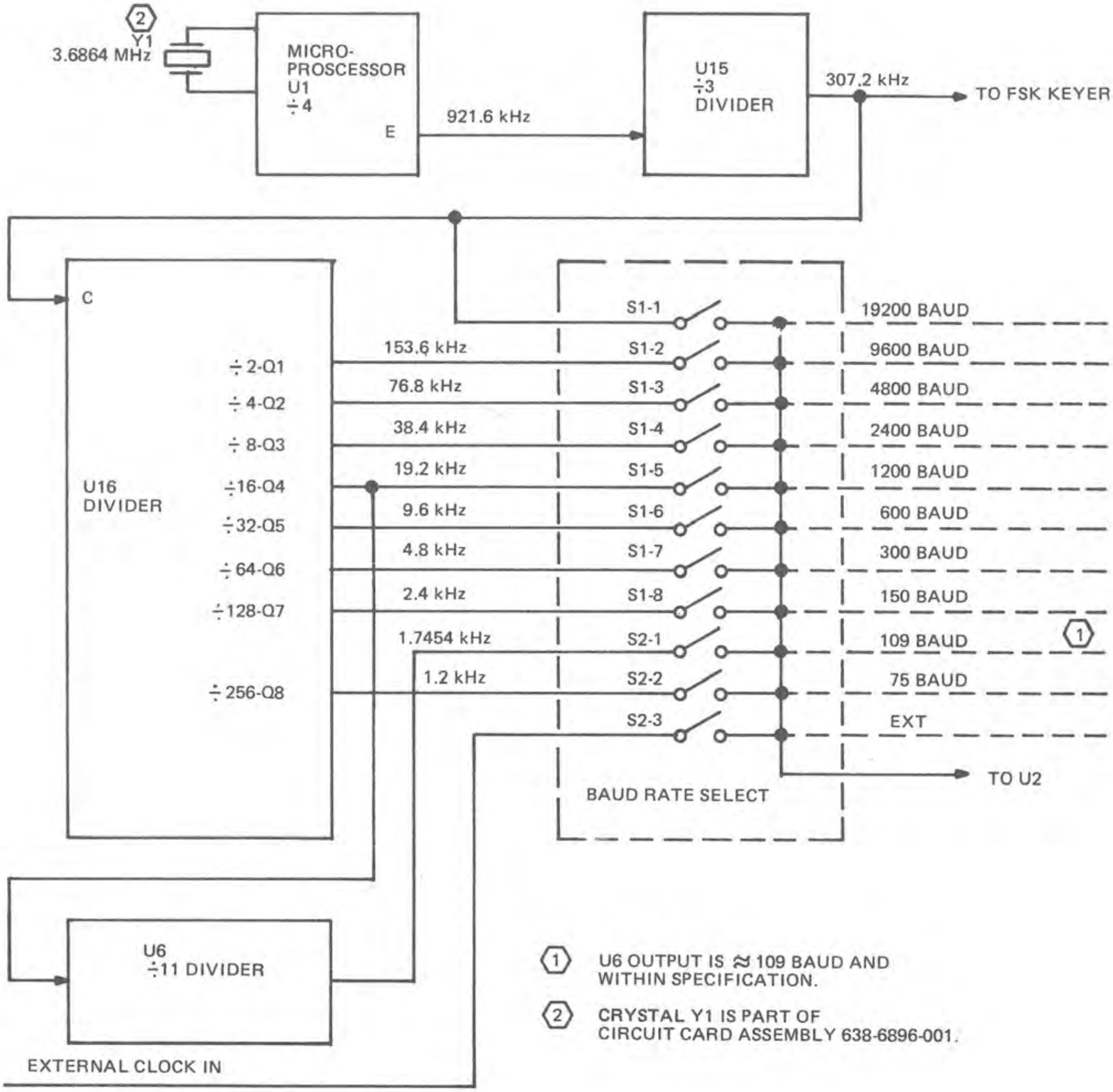
2.5 Purpose of Strapping

Unit strapping is accomplished using five dipswitches located on the UUT, S1 through S5. These control baud rate, FSK/RS-232 signaling, word format, EIA/MIL-STD-188C polarity, parity, number of stop bits, radio or control, and address recognition enable/disable. The card outline in figure 4 shows the location of these dipswitches. Switch 1 of each dipswitch is towards the top of the card.


ADDRESS BUS
A4
BAUD RATE SELECT (S1,S2)
FREQUENCY DIVIDER
CLOCK
FORMAT SELECT (S2)
XTAL
R/$\overline{W}$
ASYNCHRONOUS COMMUNICATIONS INTERFACE ADAPTER (U2)
FSK RECEIVER (U20-U22)
MICROPROCESS
(U1)
TP9
POWER UP RESET (U29)
MONITOR DATA
FSK/RS-232 SELECT (S3)
RCV DATA
D0-D7
D0-D7
RS-232 RECEIVER (U20)
DATA BUS
A
DATA LOOP BACK GATING
307.2 kHz
FSK KEYER (U17-U19)
XMT DATA
RS-232 DRIVER (Q1-Q6)



Serial Interface, Block Diagram
Figure 2

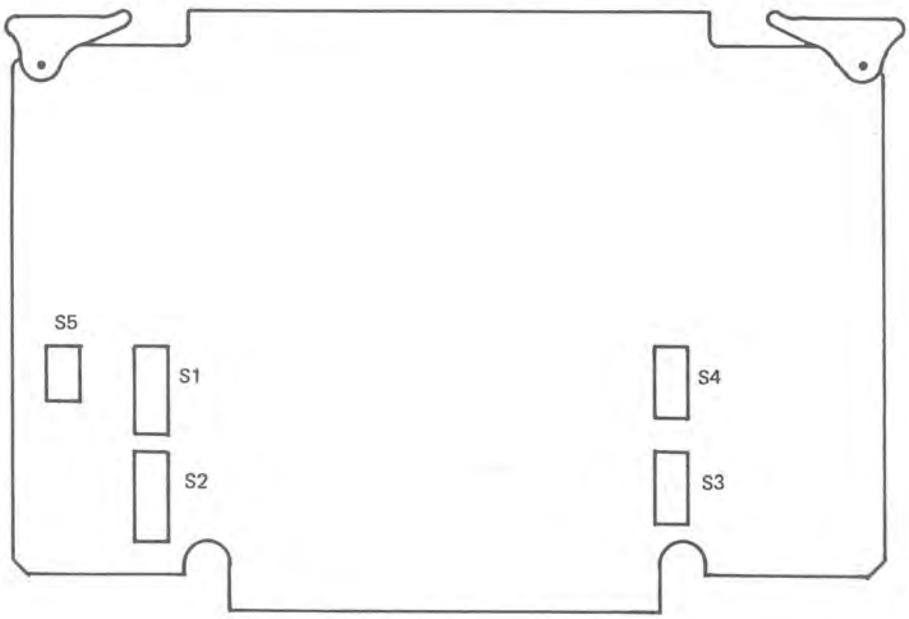


1 U6 OUTPUT IS ≈ 109 BAUD AND WITHIN SPECIFICATION.

2 CRYSTAL Y1 IS PART OF CIRCUIT CARD ASSEMBLY 638-6896-001.

TPA-2678-011

Bit and Baud Rate Generator, Block Diagram
Figure 3



Dipswitch Location
Figure 4

Address strapping is accomplished by applying the necessary logic levels to ADB1 through ADB5 (pins 41, 14, 40, 39, and 15 respectively).

2.5.1 FSK Control

Close only switches 1, 2, and 3 of S3 and S4 for FSK. Open switch 4 of S2 for FSK (to provide EIA data polarity).

2.5.2 RS-232C Control

Close only switches 4, 5, and 6 of S3 and S4 for RS-232C.

2.5.3 EIA-MIL-STD-188C Control

Open switch 4 of S2 for EIA data polarity. Close switch 4 of S2 for MIL-STD-188C polarity.

2.5.4 Parity, HF-ASCII Word Format, and Number of Stop Bits

Switches 6, 7, and 8 of S2 control the basic character format according to tabulation below:

*SWITCH			WORD FORMAT	PARITY	NO OF STOP BITS
8	7	6			
C	C	C	ASCII	Even	2
C	C	O	ASCII	Odd	2
C	O	C	ASCII	Even	1
C	O	O	ASCII	Odd	1
O	C	C	HF-80	None	2
O	C	O	HF-80	None	1
O	O	C	HF-80	Even	1
O	O	O	HF-80	Odd	1

*O = Open, C = Closed

2.5.5 Address Recognition

Open switch 1 of S5 to enable address recognition. Close switch 1 of S5 to disable address recognition. When address recognition is disabled, the UUT will accept a word with any address if the word is otherwise correct.

2.5.6 Radio/Control Selection

Open switch 5 of S2 for radio. Close switch 5 of S2 for control.

All eight of the switches in S1 and switches 1, 2, and 3 of S2 control the baud rate. Closing one and only one of these switches will select the baud rate as given:

BAUD RATE SELECTION		
DIPSWITCH	SWITCH	BAUD RATE
S1	1	19,200
S1	2	9,600
S1	3	4,800
S1	4	2,400
S1	5	1,200
S1	6	600
S1	7	300
S1	8	150
S2	1	109
S2	2	75
S2	8	EXTERNAL

2.5.7 Polling Control

In addition to the internal strapping options listed above, an additional strapping option permits a control unit to function in a polling mode of operation. This mode of operation is intended for use when an auxiliary system status display is used to display the current status of several or more remote equipments.

In the polling mode of operation, the control unit automatically and sequentially requests status information from all sixteen possible remote addresses. As a status information is received from each addressed remote unit, it is then transmitted by the control unit, on the common system control bus, to a remote status display for update of the display. The remote status display must be connected to the system control bus to receive the updated display information. If no status response is received from a polled unit, no status data is transmitted to the status display by the control unit.

Since the status display device connects to the common system control bus, it is programmed to recognize its own unique address, and the remote control unit is programmed to use this same address (00-000 for ADB5 through ADB1) when communicating with the status display. Therefore, when using the polling capability along with an external system status display and the 8-bit byte character data format, only fifteen of the sixteen address combinations are available for remote unit assignment, since the display unit itself requires one of the addresses. If, however, the 7-bit ASCII character data format is used in the system, all sixteen remote unit addresses are available for use because the address assigned to the status display is not among the sixteen addresses (of the 32 possible in this format) controlled by the thumbwheel address selector switch of the remote control unit.

Open switch 2 of S5 to disable polling. Close switch 2 of S5 to enable polling.

2.6 Asynchronous Communications Interface Adapter (ACIA) (Refer to figure 5.)

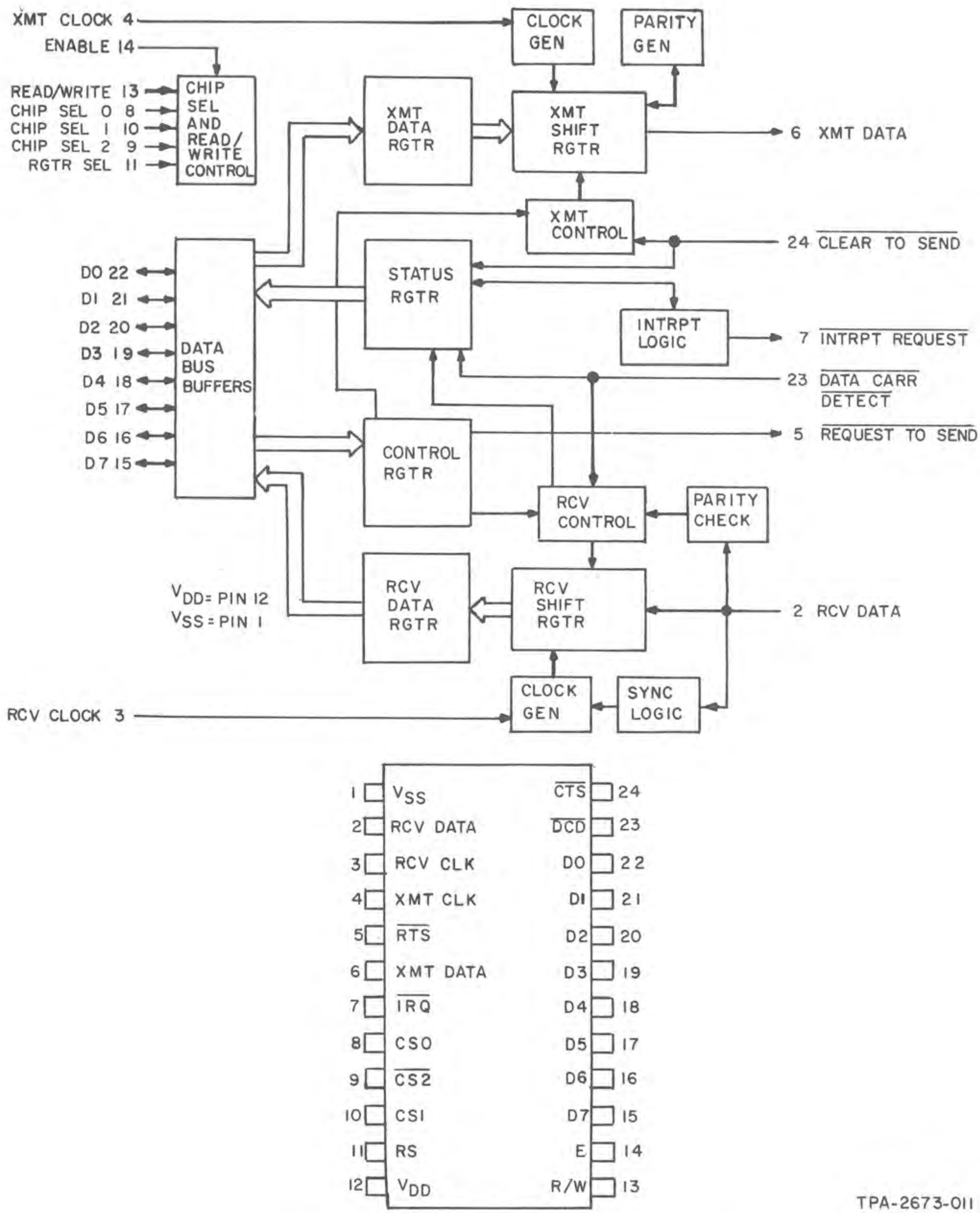
The ACIA is an LSI subsystem which allows the user to use either ASCII or HF-80 8-bit word formatting. When used in conjunction with a microprocessor, the ACIA has the flexibility to handle various baud rates, parity modes, bits per word, and number of stop bits per word. The device is constructed on a single 24-lead dual-in-line package. All inputs and outputs are directly compatible with MTOS/MTNS logic, and also with TTL/DTL/CMOS logic without the need for interfacing components. The strobed outputs (D0 through D7) are interfaced directly with the microprocessor data bus.

2.7 Processor (Refer to figure 2.)

Processor circuit controls all operations on the serial interface card through the use of a software program packaged in a 16K (2K x 8) EPROM.

The processor circuit consists of the following components with associated gating circuits:

a. Microprocessing unit (MPU)
b. Electrically programmable read-only memory (EPROM)
c. ACIA
d. Clock generator
e. I/O enable generator



Asynchronous Communications Interface Adapter 351-8455-010
Figure 5

2.7.1 Microprocessor (Refer to figure 6.)

Microprocessing unit (MPU) is the central processing device. Through the software program, the MPU controls the receiving and transmitting of control and monitor information, address generation, strobe generation and timing, display programing, and system polling. The MPU is controlled by the following inputs:

a. Clock - Provides timing/gating signals. The crystal mounted external to the MPU provides a stable reference which is divided by four on the MPU.
b. Reset - Used to reset and start MPU from a power-down condition resulting from a power failure or initial startup.

The MPU generates two control signals that are used to enable peripherals: valid memory address (VMA) and read/write ($R/\overline{W}$). The VMA signal is gated with the clock in U5A and then is applied to I/O enable generator U4. This signal indicates to the peripherals that a valid memory address from the MPU is on the address bus. The $R/\overline{W}$ output signal is used by the ACIA to set its circuits in a read or write operation. The 8-bit data bus (D0 through D7) provides bidirectional bus for transferring data to and from memory and the peripherals. The address bus (A0 through A15), a 16-bit bus, provides 65 kilabytes of addressing for the MPU to retrieve and transmit information.

The reset pulse is generated by U29 whenever the +5 V dc is interrupted and then reapplied.

2.7.2 EPROM (Refer to figure 7.)

The electrically programmable read-only memory (U3) contains the program for the MPU. The program in the EPROM controls the MPU after startup. The MPU communicates with the EPROM through the address bus and the data bus. The EPROM consists of a 16, 384-bit cell matrix, X and Y address decoders, Y gating circuit, output data buffers and program circuits. The EPROM is packaged in a ceramic, 24-lead dual-in-line package and is TTL, CMOS, and DTL logic compatible.

2.7.3 I/O Generator - Decoder/Demultiplexer (Refer to figure 8.)

I/O enable generator U4 is a binary decoder that decodes address bus lines A0, A1, A2, and A3, (refer to table 1) generating enabling signals to enable the

Table 1. I/O Generator Truth Table.

INPUTS						OUTPUTS															
G1	G2	D	C	B	A	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	L	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H
L	L	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H
L	L	H	L	L	L	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H
L	L	H	L	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H
L	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H
L	L	H	H	L	L	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
L	L	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L
L	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	L	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = High level, L = Low level, X = Don't care various input and output decoders and the ACIA. The I/O generator employs low-power Schottky transistor-to-transistor logic (TTL) and is packaged in a dual-in-line configuration.

2.8 Noninverting, 3-State Buffer (Refer to figure 9.)

Data multiplexer inputs U12, U13, address select inputs U14, and miscellaneous strapping input are accessed by the processor through noninverting, 3-state buffers. Inputs/outputs 1 through 4 are controlled by disable A while inputs/outputs 5 and 6 are controlled by disable B.

3. TESTING AND TROUBLESHOOTING

3.1 Test Equipment and Power Requirements

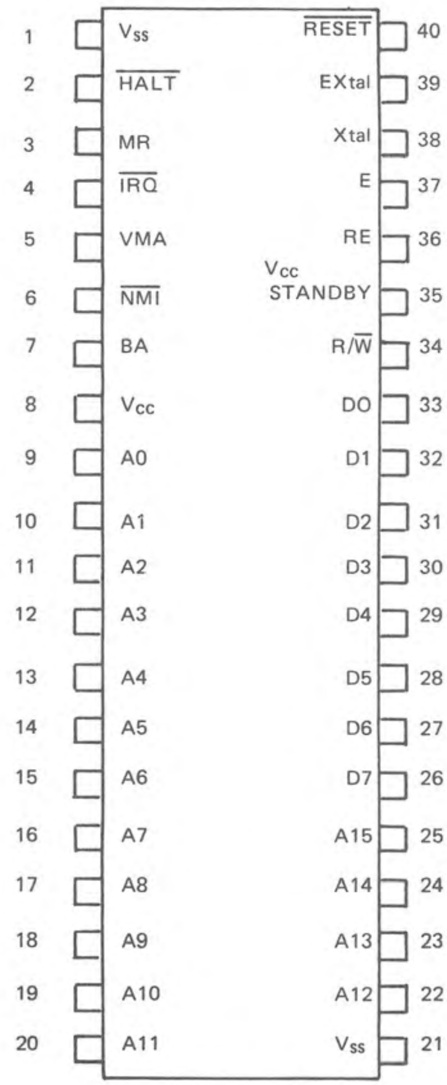
Test equipment and power sources required to test, troubleshoot, and repair the serial interface card are listed in the maintenance section of this instruction book.

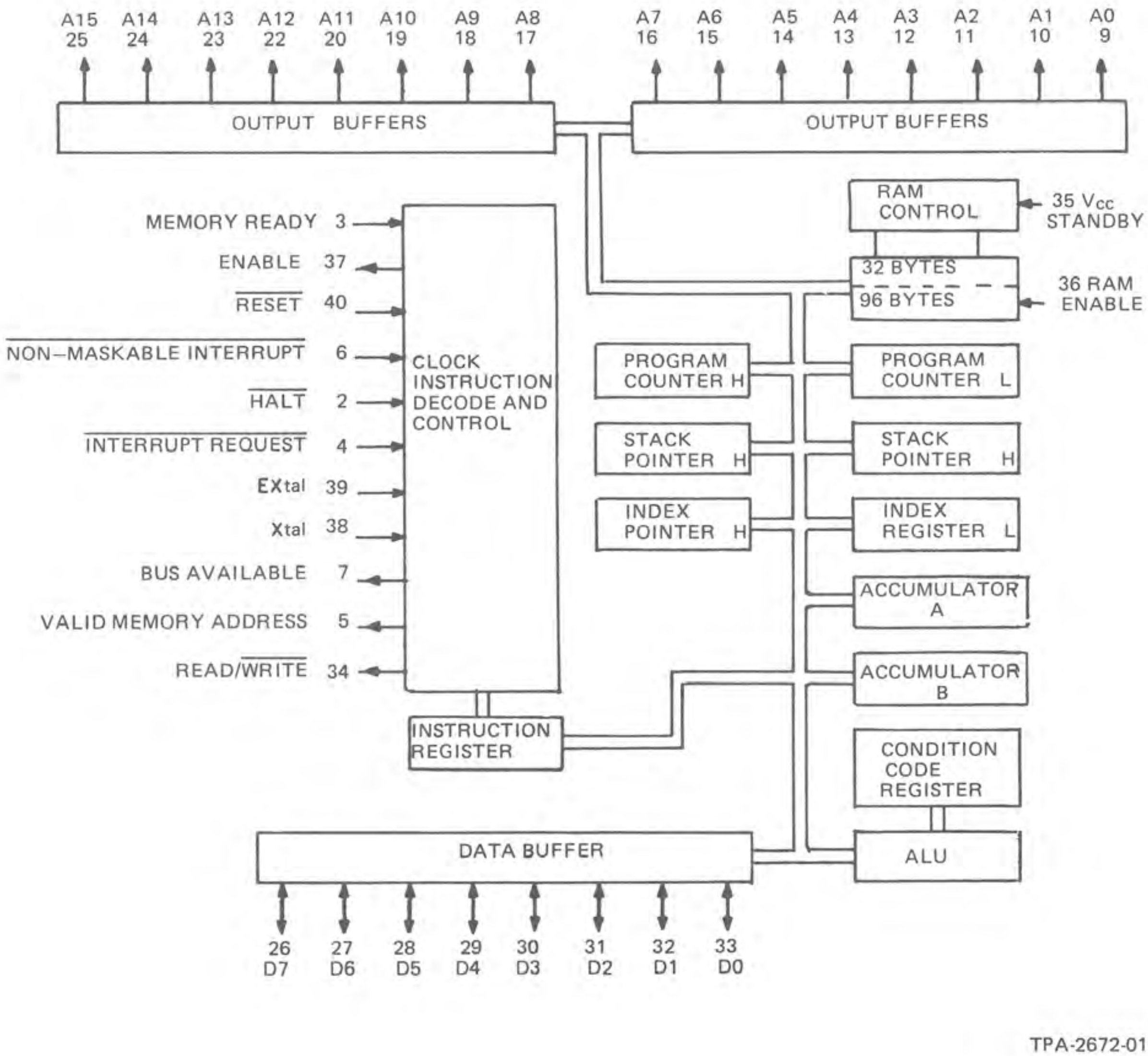
3.2 Testing

The test procedures in table 2 check total performance of the serial interface card. These test procedures will confirm that a problem exists on the serial interface card and isolate it to a functional area.

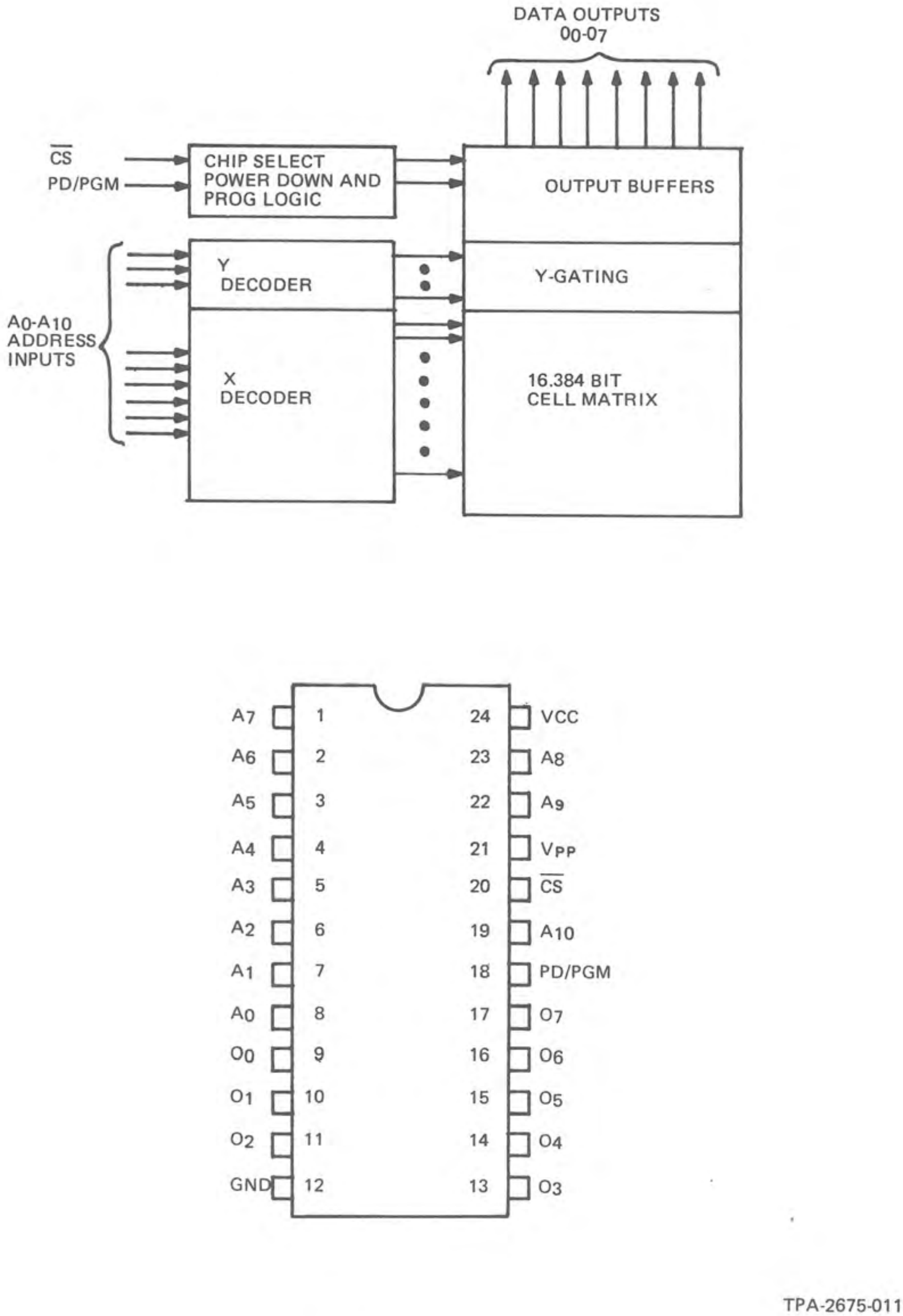
3.3 Troubleshooting

It is recommended that the serial interface card be returned to Collins Telecommunications Products Division for repair. The serial interface card is controlled by the microprocessor running a software program stored in the EPROM. It is necessary to have the software program and a method of controlling the program to isolate a fault to a specific component or circuit.

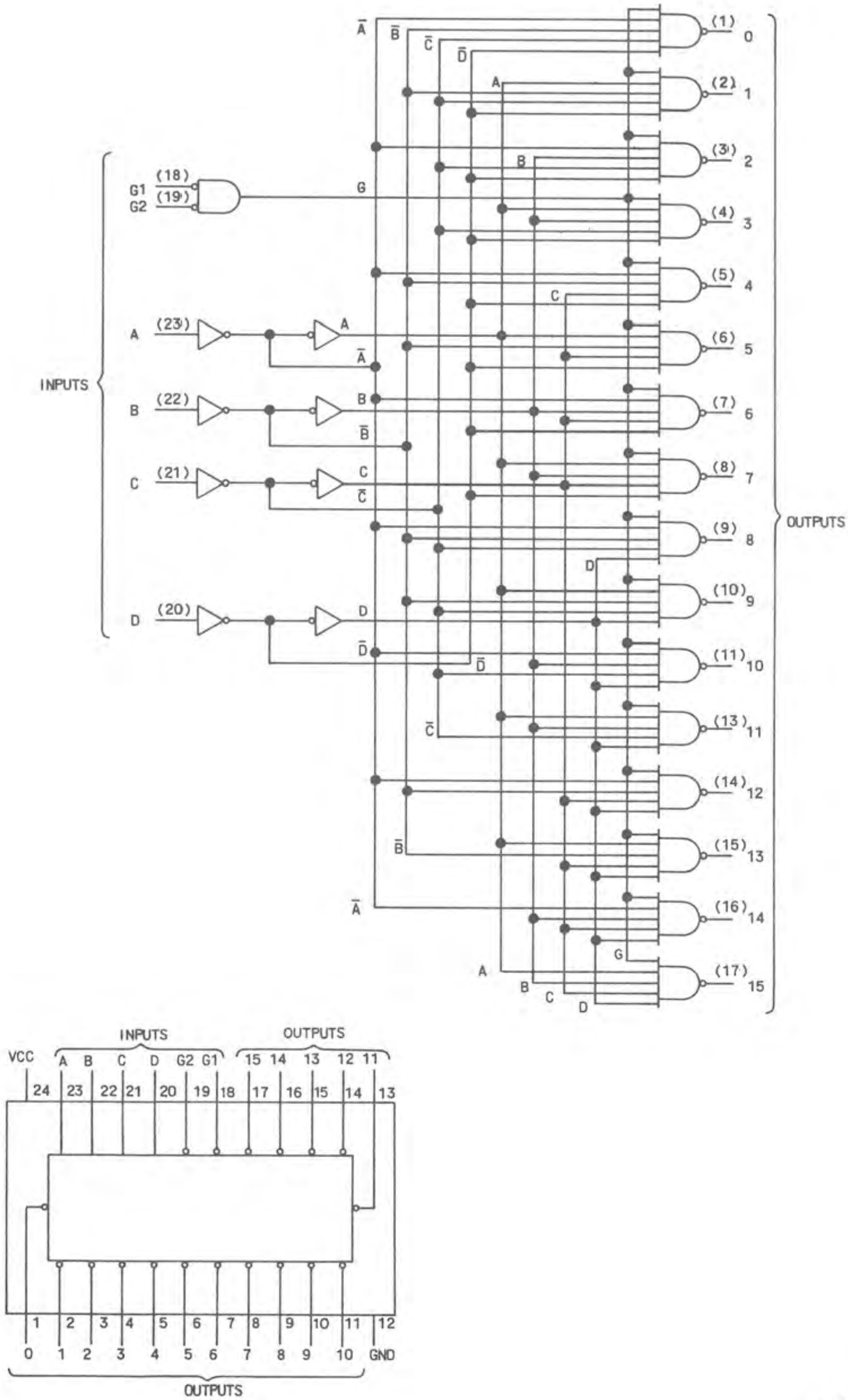

1 V_{SS}
2 $\overline{HALT}$
3 MR
4 $\overline{IRQ}$
5 VMA
6 $\overline{NMI}$
7 BA
8 V_{CC}
9 A0
10 A1
11 A2
12 A3
13 A4
14 A5
15 A6
16 A7
17 A8
18 A9
19 A10
20 A11
40 $\overline{RESET}$
39 EXtal
38 Xtal
37 E
36 RE
35 V_{CC} STANDBY
34 $R/\overline{W}$
33 DO
32 D1
31 D2
30 D3
29 D4
28 D5
27 D6
26 D7
25 A15
24 A14
23 A13
22 A12
21 V_{SS}



Microprocessor 351-8676-010
Figure 6



EPROM 647-2751-001
Figure 7



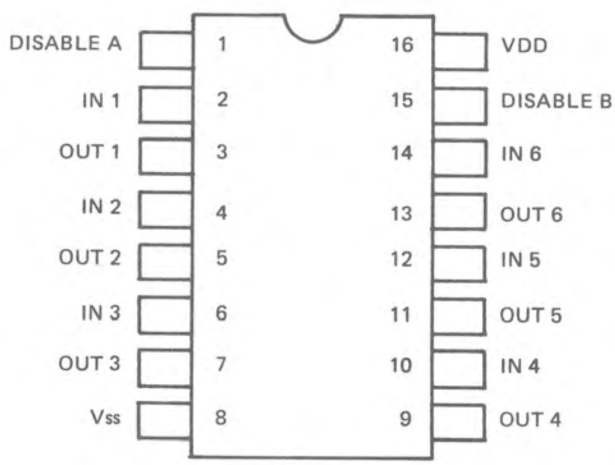
TPA-2677-014

Decode/Demultiplexer 351-1526-090
Figure 8

IN_n	APPROPRIATE DISABLE INPUT	OUT_n
0	0	0
1	0	1
X	1	HIGH IMPEDANCE

NOTE: X = DON'T CARE

TRUTH TABLE



PIN CONFIGURATION

TPA-2676-011

Noninverting, 3-State Buffer 351-8490-010
Figure 9

Table 2. Serial Interface, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	**Note** These testing and troubleshooting procedures are based on using a control unit and an associated local unit. The most effective method of testing and troubleshooting is obtained by installating the questionable serial interface in the control unit. During these tests when a control unit is referred to it is a receiver-exciter control, an exciter control, or a receiver control. When a local unit is referred to it is a receiver-exciter, an exciter, or a receiver. For all tests, the serial interface card is strapped for HF-80 8-bit format. (Refer to paragraph 2.5.4.)		
	a. Remove top cover of unit containing the serial interface to be tested.		
	b. Remove serial interface. Install it on an extender card and place it in the control unit.		
	c. Set unit LINE SELECTOR switches to 115 V.		
	d. Connect units to 115-V ac power source and set power on.		
	e. Measure dc voltages between the following pins and ground (TP1, brown):		
	J1-23 J1-28 J1-6	+15 ±1.0 V dc. +5 ±0.5 V dc. -15 +1.0 V dc.	Check associated power supply.
	f. Strap local unit for address 0.		
	g. Connect local unit to a control unit.		
2. FSK data levels	**Note** UUT must be strapped for FSK operation.		
	a. Connect an audio voltmeter between J1-26 and J1-27.		
(Cont)	b. Open EIA-MIL-STD-188C polarity switch.		

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont)

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	c. Note audio voltmeter reading. d. Close EIA-MIL-STD-188C polarity switch. e. Note audio voltmeter reading. f. Open EIA-MIL-STD-188C polarity switch.	0 ±5 dB mW. Step c reading ±5 dB mW.	Check U18, U17 and associated circuits.
3. Serial data command with status request (Cont)	a. Set local unit front-panel CONT switch to REM. b. Set control unit ADDRESS to 0. Note Local unit is strapped for address 0 recognition. c. Set control unit front-panel controls as follows: FREQUENCY KHZ to 29999.9 (0). MODE to ISB. CH A1 to ON (receiver only) RF GAIN to full ccw (receiver only) CH A1 AGC to DATA and AGC BUS to ON (receiver only) CHANNEL ENABLE A1 to LINE (exciter only) KEY to NORM (exciter only) PA PWR to STBY (exciter only) PILOT CARR to OFF (exciter only) PEAK CLIP to OFF (exciter only) CONT to NORM. d. Set control unit ADDRESS to 1. e. Change any and all of controls in step c. f. Note response signals on the control unit as follows:		

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	EQUIPMENT STATUS indicators	No change in indications.	Check U14, and associated address circuits.
	BANDWIDTH indicators (receiver only).	No change in indications.	
	FREQUENCY KHZ indicators.	No change in indications.	
	g. Set control unit ADDRESS to 0.		
	h. Note response signals on the control unit as follows:		
	EQUIPMENT STATUS indicators.	No fault indications, MODE indicates A1 ISB (exciter and receiver).	Check U7, U9, U10, U11, U1, U2, U3, U4, and associated circuits.
	FREQUENCY KHZ indicators.	Indicates 29999.9 (0) kHz.	
	Note Do not connect ground lead to J1-30 until frequency indication is normal (29999.9).		
	i. Connect a storage oscilloscope to TP6 (blue). Sweep time = 10 ms. Trigger = TRIGGER. Vert scale = 1 V per division. Horiz sweep = Normal. Display = STORE.		
	j. Connect a jumper from J1-30 to ground.	R/E FAULT indicator flashes at 0.5-Hz rate (2 s on, 2 s off). **Note** Flashing starts approximately 7 seconds after ground connected to J1-30.	
	k. On control unit, change any FREQUENCY KHZ control (thumbwheel control only).	Oscilloscope display should look similar to command word with status request word 1 (refer to figure 10). Each frequency change changes data pattern.	Check U1 thru U4, U7, U24, U9, U29, U30, and associated circuits.
(Cont)			

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)		**Note** Without special equipment it is impossible to note exact waveform. Look at spacing and bits of data.	
	l. Erase scope and repeat step k as often as necessary to obtain a good result. **Note** 10-MHz and 1-MHz frequency controls change bit pattern of word 1, character 2. 100-kHz and 10-kHz frequency controls change bit pattern of word 1, character 3. 1-kHz and 100-Hz frequency controls change bit pattern of word 1, character 4. 10-Hz and 1-Hz frequency controls (if applicable) change bit pattern of word 1, character 5.		
	m. Erase scope. On control unit, change RF GAIN control position.	Oscilloscope display should look similar to command word with status request, word 2 (refer to figure 10). Each RF GAIN control changes data pattern. Refer to note of step k.	Same as step k.
(Cont)	n. Erase scope and repeat step m as necessary to obtain a good result. **Note** RF GAIN control changes bit pattern of word 2, character 2. A1 AGC switch changes bit pattern of word 2, character 4. VBFO enable switch (if applicable) changes bit pattern of word 2, character 4. MODE control changes bit pattern of word 2, character 5.		

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	o. Erase scope. On control unit, change PA PWR control position.	Oscilloscope display should look similar to command word with status request word 3 (refer to figure 10). Each PA PWR control change changes data pattern. Refer to note of step k.	Same as step k.
	p. Erase scope and repeat step o as often as necessary to obtain a good result. **Note** VBFO 1-kHz and sign controls (if applicable) change bit pattern of word 3, character 2. VBFO 100-Hz and 10-Hz controls (if applicable) change bit pattern of word 3, character 3. PA PWR control changes bit pattern of word 3, character 5. P CAR switch changes bit pattern of word 3, character 5.		
	q. Erase scope. On control unit, change KEY control position.	Oscilloscope display should look similar to command word with status request word 4. (Refer to figure 10.) Each application or removal of a key changes data pattern. Refer to note of step k.	Same as step k.
	r. Erase scope and repeat step q as often as necessary to obtain a good result.		
	s. Erase scope. On control unit (with continuous tuning control) set DIAL switch to FINE and rotate TUNING knob.	Oscilloscope display should look similar to command word with status request word 4. (Refer to figure 10.) Each change of TUNING knob rotation speed changes data pattern. Refer to note of step k.	Same as step k.
(Cont)			

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	t. Erase scope and repeat step s as often as necessary to obtain a good result.		
	u. Remove jumper from J1-30 to ground.		
4. Serial data status only	a. Repeat steps 3.a. through 3.i.		Same as test 3.
	b. Set local unit front-panel controls as follows:		
	FREQUENCY KHZ to 29999.9 (0).		
	MODE to ISB.		
	RF GAIN to full ccw (receiver only).		
	CH A1 AGC to DATA (receiver only).		
	CH A1 AGC BUS to ON (receiver only).		
	CHANNEL ENABLE A1 to LINE (exciter only).		
	KEY to NORM (exciter only).		
	PA PWR to STBY (exciter only).		
	PILOT CARR to OFF (exciter only).		
	CONT to LCL.		
	c. Change any or all of the above front-panel controls on the control unit.		
	d. Note response signals on the control unit.	No changes.	
	e. Set control unit ADDRESS to 0.		
	f. Note response signals on the control unit as follows:		
	EQUIPMENT STATUS indicators.	No fault indications, mode indicates ISB (exciter and receiver).	
		BUSY indicator is lit.	
	ISB indicators (receiver only).	Indicate A1.	
(Cont)	FREQUENCY KHZ indicators.	Indicates 29999.9 (0) kHz.	

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	g. Connect a storage oscilloscope to TP6 (blue). Sweep time = 20 ms. Trigger = INTERNAL. Vert scale = 1 V per division. Horiz sweep = SINGLE SWEEP. Display = STORE.		
	h. Note oscilloscope waveform.	Should look similar to status request only words (refer to figure 10). **Note** Without special equipment it will be impossible to note exact waveform. Look at spacing and bits of data.	
	i. Repeat steps g and h as often as necessary to obtain a good result.		
5. Serial data status only	a. Repeat steps 3.a through 3.i.		Same as test 3.
	b. Set local unit front-panel controls as follows: FREQUENCY KHZ to 29999.9 (0). MODE to ISB. RF GAIN to full ccw (receiver only). CH A1 AGC to DATA (receiver only). CH A1 AGC BUS to ON (receiver only). CHANNEL ENABLE A1 to LINE (exciter only). KEY to NORM (exciter only). PA PWR to STBY (exciter only). PILOT CARR to OFF (exciter only). CONT to LCL.		
(Cont)	c. Change any or all of the above front-panel controls on the control unit.		

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	d. Note response signals on the control unit.	No changes.	
	e. Set control unit ADDRESS to 0.		
	f. Note response signals on the control unit as follows:		
	EQUIPMENT STATUS indicators.	No fault indications mode indicates ISB (exciter and receiver). BUSY indicator is lit.	
	ISB indicators.	Indicate A1.	
	FREQUENCY KHZ indicators.	Indicates 29999.9 (0) kHz.	
	g. Connect a storage oscilloscope to TP5 (green). Sweep time = 20 ms. Trigger = INTERNAL. Vert scale = 1 V per division. Horiz sweep = SINGLE SWEEP. Display = STORE.		
	h. Note oscilloscope waveform.	Should look similar to monitor word(s)/ command word(s) with no status request, (refer to figure 10). **Note** Without special equipment it will be impossible to note exact waveform. Look at spacing and bits of data.	
	i. Repeat steps g and h as often as necessary to obtain a good result.		
6. FSK receiver sensitivity	a. Connect local unit to a control unit through a 40-dB attenuator in both the monitor and data lines.		Check U34A and associated circuits.
	b. Repeat test 3.	Results should be same as test 3 results.	

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. Address recognition	a. Set local unit CONT switch to REM.		
	b. Set control unit ADDRESS to 0.		
	c. Set control unit front-panel controls as follows:		
	FREQUENCY KHZ to 29999.9(9).		
	MODE to ISB.		
	RF GAIN to full ccw (receiver only).		
	CH A1 AGC to DATA (receiver only).		
	CH A1 AGC BUS to ON (receiver only).		
	CHANNEL ENABLE A1 to LINE (exciter only).		
	KEY to NORM (exciter only).		
	PA PWR to STBY (exciter only).		
	PILOT CARR to OFF (exciter only).		
	d. Note response signals on the control unit as follows:		
	EQUIPMENT STATUS indicators.	No fault indications mode indicates ISB.	Check U1 thru U4, U7, U6, U8, U9, U20, U21, U11, U12, and associated circuits.
		PA READY might be lit (exciter only).	
	ISB indicators.	Indicates A1.	
	FREQUENCY KHZ indicators.	Indicates 29999.9 (9) kHz.	
	e. Set control unit ADDRESS to 1.		
	f. Note response signals on the control unit as follows:		
	EQUIPMENT STATUS indicators.	EXCTR FAULT, RCV FAULT, or R/E FAULT indicator flashes at a 0.25-Hz rate (on 2 seconds, off 2 seconds). All other indications should remain the same.	Check U1, U2, U3, U4, U5, U27, U28, U29, U30, U8, and associated circuits. Check also busy circuit on parallel output.
(Cont)	ISB indicators.	No change from step d.	

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

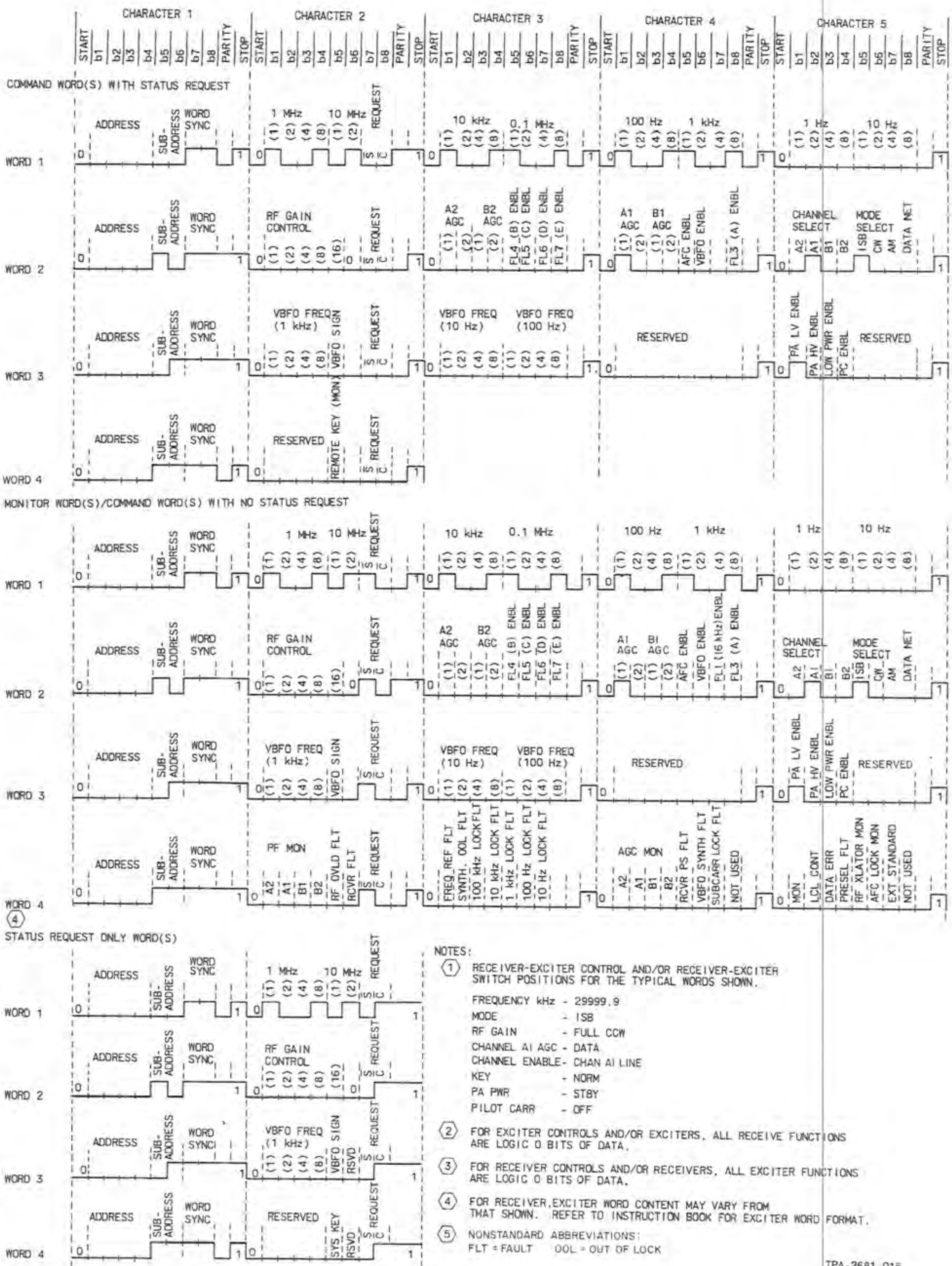
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	FREQUENCY KHZ indicators. g. Note response signals on the control unit with the ADDRESS to each position 2 through 15.	No change from step d. Same as step f.	Check U1, U2, U3, U4, U5, U27, U28, U29, U30, U8, and associated circuits. Check also busy circuit on parallel output.
8. Word 4 continuous transmit	a. Set control unit ADDRESS to 0. b. Set control unit CONT switch to NORM. c. Connect oscilloscope to TP6 (blue). Sweep time = 20 ms. Trigger = INTERNAL. Vert scale = 1 V per division. Horiz sweep = NORMAL d. Apply a ground to J1-30. e. Remove J1-30 ground.	Continuous data monitored on oscilloscope should look similar to status request only word, word 4. Continuous data on oscilloscope is terminated.	Check U1 thru U4, U7, U23, U24 and associated circuits. Same as step c.
9. Data loop back (Cont)	a. Set control unit address to 0. b. Disconnect control unit from local unit. c. Set control unit CONT switch to TEST. d. Connect a dual-trace storage oscilloscope with upper trace to TP6 (blue) and lower trace to TP5 (green). e. Set oscilloscope as follows: Sweep time = 20 ms. Trigger = INTERNAL. Vert scale = 1 V per division. Horiz sweep = NORMAL. f. Set control unit front-panel controls as follows: FREQUENCY KHZ to 29999.0 (9). MODE to ISB. RF GAIN to full ccw (receiver only). CH A1 AGC to DATA (receiver only). CH A1 AGC BUS to ON (receiver only). CHANNEL ENABLE A1 to LINE (exciter only).		

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. (Cont)	KEY to NORM (exciter only). PA PWR to STBY (exciter only). PILOT CARR to OFF (exciter only).		
	g. Set oscilloscope display to STORE.		
	h. Erase display. Set FREQUENCY KHZ to 29999.9(9).	Both oscilloscope traces are identical and look similar to command word with status request, word 1. (Refer to figure 10.)	Check U1 through U4 and associated circuits.
	i. Erase display. Set MODE control to AM.	Both oscilloscope traces are identical and look similar to command word with status request, word 2. (Refer to figure 10.)	Same as step h.
	j. Erase display. Set PA PWR to HIGH PWR.	Both oscilloscope traces are identical and look similar to command word with status request, word 3. (Refer to figure 10.)	Same as step h.
	k. Erase display. Set KEY control to LOCK.	Both oscilloscope traces are identical and look similar to command word with status request, word 4. (Refer to figure 10.)	Same as step h.
	l. Set control unit CONT switch to NORM.		
	m. Repeat steps g through j.	Upper trace same as steps g through j. Lower trace, straight line.	Same as step h.
10. Baud rate check	a. Note baud rate strapped in unit.	Reference.	
	b. Strap baud rate for 75.		
	c. Repeat test 10.	Same as test 10 except monitor word spacing increases as baud rate decreases and vice versa.	Same as test 10.
(Cont)			

Table 2. Serial Interface, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	d. Strap baud rate for 19 200. e. Repeat test 10. f. Return to baud rate strapping referenced in step a.		



NOTES:

1. RECEIVER-EXCITER CONTROL AND/OR RECEIVER-EXCITER SWITCH POSITIONS FOR THE TYPICAL WORDS SHOWN.

   FREQUENCY kHz - 29999.9
   MODE - ISB
   RF GAIN - FULL CCW
   CHANNEL A1 AGC - DATA
   CHANNEL ENABLE - CHAN A1 LINE
   KEY - NORM
   PA PWR - STBY
   PILOT CARR - OFF

2. FOR EXCITER CONTROLS AND/OR EXCITERS, ALL RECEIVE FUNCTIONS ARE LOGIC 0 BITS OF DATA.
3. FOR RECEIVER CONTROLS AND/OR RECEIVERS, ALL EXCITER FUNCTIONS ARE LOGIC 0 BITS OF DATA.
4. FOR RECEIVER, EXCITER WORD CONTENT MAY VARY FROM THAT SHOWN. REFER TO INSTRUCTION BOOK FOR EXCITER WORD FORMAT.
5. NONSTANDARD ABBREVIATIONS:
   FLT = FAULT   OOL = OUT OF LOCK

TPA-2681-015

Timing Diagram/Typical Waveforms
Figure 10

4. ALIGNMENT/ADJUSTMENT

4.1 Control Data Strapping

For strapping instructions and information, refer to paragraph 2.5 of this instruction.

4.2 Adjustment of FSK Detector Symmetry

a. Perform test setup of table 2, test 1.
b. Strap card for FSK signaling (refer to paragraph 2.5.1).
c. Strap card for 1200 bauds (refer to paragraph 2.5.6).
d. Strap for odd parity (refer to paragraph 2.5.4).
e. Apply a 0-dB mW FSK signal with a symmetrical 1:1 (mark, space) data pattern between P1-54 and P1-55.
f. Using an oscilloscope, monitor the waveform at TP5 (green) to ground (TP1, brown).
g. Adjust R67 to obtain best symmetry of the waveform at TP5.

5. REPAIR

Repair of the serial interface card is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

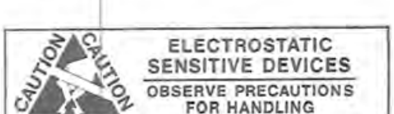
6. PARTS LIST/DIAGRAMS

6.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol



This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 11). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

6.2 Parts List

REF DES Column — Reference designators of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column — Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column — Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column — Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column — Lists the manufacturer's part number for the selected parts.

Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

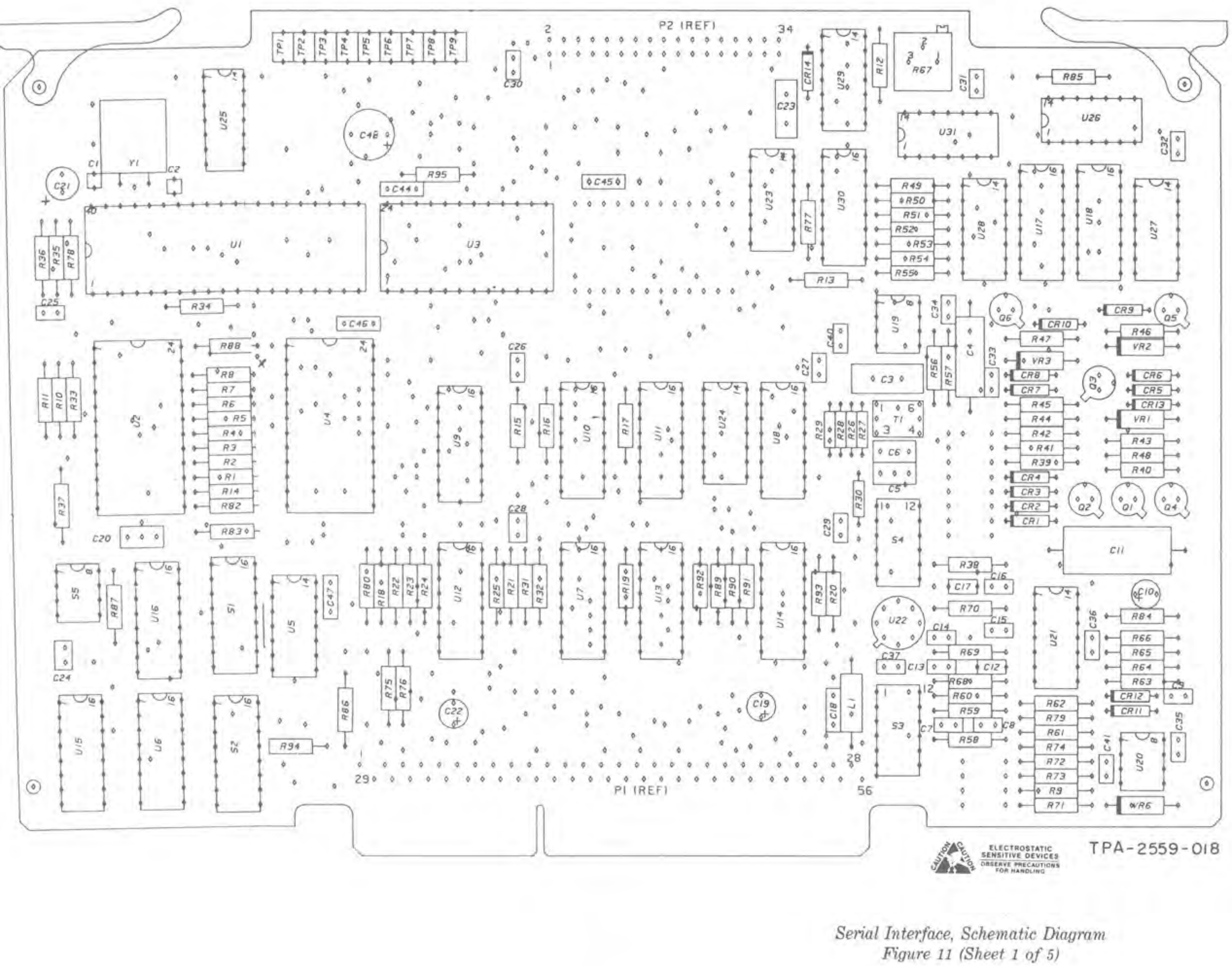
MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00136	MCCOY ELECTRONICS CO WATTS AND CHESTNUT ST MT HOLLY SPRINGS PA 17065
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP 13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49 DALLAS TX 75222
02735	RCA CORP SOLID STATE DIVISION ROUTE 202 SOMERVILLE NJ 08876
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042
07388	TOROTEL INC 13402 S 71 HIGHWAY GRANDVIEW MO 64030
12040	NATIONAL SEMICONDUCTOR CORP COMMERCE DR P O BOX 443 DANBURY CT 06810
12954	SIEMENS CORP COMPONENTS GROUP 8700 E THOMAS RD P O BOX 1390 SCOTTSDALE AZ 85252
15818	TELEDYNE SEMICONDUCTOR 1300 TERRA BELLA AVE MOUNTAIN VIEW CA 94043
16546	GLOBE-UNION INC USCC/CENTRALAB ELECTRICS DIV 4561 COLORADO LOS ANGELES CA 90039
18324	SIGNETICS CORP 811 E ARQUES SUNNYVALE CA 94086
27014	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051
27264	MOLEX INC CORPORATE HQ 2222 WELLINGTON COURT LISLE IL 60532
27735	F-DYNE ELECTRONICS 449 HOWARD AVE BRIDGEPORT CT 06605

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
56289	SPRAGUE ELECTRIC CO NORTH ADAMS MA 01247
72136	ELECTRO MOTIVE CORP SUBSIDIARY OF INTERNATIONAL ELECTRONICS CORP LAUTER AVE P O BOX 7600 FLORENCE SC 29501
72982	ERIE TECHNOLOGICAL PRODUCTS INC 644 W 12TH ST ERIE PA 16512
74970	JOHNSON E F CO 299 10TH AVE S W WASECA MN 56093
81349	MILITARY SPECIFICATION
81483	INTERNATIONAL RECTIFIER 9220 SUNSET BLVD P O BOX 2321 TERMINAL ANNEX LOS ANGELES CA 90054
96906	MILITARY STANDARD

6.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Serial Interface	638-6896-001	REV F



Serial Interface, Schematic Diagram
Figure 11 (Sheet 1 of 5)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	SERIAL INTERFACE (ESDS)	638-6896-001			
CR1-CR14	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1,C2	CAPACITOR,FXD CER DIEL, 27PF, 10%, 100V	913-1098-570		72982	8111A100C0G0-270 K
C3	CAPACITOR,FXD MICA DIEL, 470PF, 5%, 500V	912-2864-000		72136	DM15F471J300WV4C R
C4	CAPACITOR,FXD PLSTC DIEL, 0.0056UF, 10%, 80V	933-1039-320		27735	PE1S0056-80-10
C5,C6	CAPACITOR,FXD CER DIEL, 1UF, 20%, 50V	913-3279-270		16546	CY30C105M
C7-C9	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V	913-3279-680		16546	CY20C104M
C10	CAPACITOR,FXD TNTLM ELCTLT, 15UF, 20%, 15V	184-9102-130		56289	199D156X0015CB1
C11	CAPACITOR,FXD PLSTC DIEL, 0.047UF, 10%, 200V	933-1039-040		27735	PE1S047-200-10
C12	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V	913-4018-000		81349	CK05BX102K
C13	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V	913-3279-680		16546	CY20C104M
C14-C16	CAPACITOR,FXD CER DIEL, 0.01UF, 20%, 50V	913-3279-110		16546	CY20C103M
C17	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V	913-4018-000		81349	CK05BX102K
C18	CAPACITOR,FXD CER DIEL, 0.47UF, PORM10%, 50V	913-5019-520		81349	CK06BX474K
C19	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C20	CAPACITOR,FXD CER DIEL, 0.22UF, 20%, 50V	913-3279-220		16546	CY30C224M
C21	CAPACITOR,FXD TNTLM ELCTLT, 68UF, 20%, 6V	184-9102-040		56289	199D686X0006DB1
C22	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C23	CAPACITOR,FXD CER DIEL, 1.5UF, 20%, 50V	913-3279-280		16546	CY40C155M
C24-C37	CAPACITOR,FXD CER DIEL, 0.01UF, 20%, 50V	913-3279-110		16546	CY20C103M
C38,C39	NOT USED				
C40,C41	CAPACITOR,FXD CER DIEL, 0.01UF, 20%, 50V	913-3279-110		16546	CY20C103M
C42,C43	NOT USED				
C44-C47	CAPACITOR,FXD CER DIEL, 0.47UF, PORM10%, 50V	913-5019-520		81349	CK06BX474K
C48	CAPACITOR,FXD TNTLM ELCTLT, 100UF, 20%, 10V	184-9102-100		56289	196D235
L1	COIL,RF 1UH	240-2715-130		96906	MS75088-1
Q1	TRANSISTOR	352-0551-010		15818	2N2907A
Q2	TRANSISTOR	352-0661-020		07263	2N2222A
Q3	TRANSISTOR	352-0551-010		15818	2N2907A
Q4	TRANSISTOR	352-0661-020		07263	2N2222A
Q5	TRANSISTOR	352-0551-010		15818	2N2907A
Q6	TRANSISTOR	352-0661-020		07263	2N2222A
R1-R8	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R9	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R10-R21	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R22-R25	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R26-R30	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/8W	745-2449-000		81349	RCR05G105KS
R31,R32	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R33-R38	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R39-R41	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R42	RESISTOR,FXD CMPSN, 1.5K, 10%, 1/4W	745-0755-000		81349	RCR07G152KS
R43	RESISTOR,FXD CMPSN, 390 OHMS, 10%, 1/4W	745-0734-000		81349	RCR07G391KS
R44,R45	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R46,R47	RESISTOR,FXD CMPSN, 680 OHMS, 10%, 1/4W	745-0743-000		81349	RCR07G681KS
R48	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R49-R52	RESISTOR,FXD FILM, 20.5K, 1%, 1/8W	705-1059-000		81349	RN55D2052F
R53,R54	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R55,R56	RESISTOR,FXD FILM, 48.7K, 1%, 1/8W	705-1077-000		81349	RN55D4872F
R57,R58	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W	745-0740-000		81349	RCR07G561KS
R59,R60	RESISTOR,FXD CMPSN, 22K, 10%, 1/4W	745-0797-000		81349	RCR07G223KS
R61	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R62	RESISTOR,FXD CMPSN, 2.2K, 10%, 1/4W	745-0761-000		81349	RCR07G222KS
R63	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R64	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000		81349	RCR07G153KS
R65	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R66	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R67	RESISTOR,VAR WW, 2K, PORM5%, 3/4W	381-1721-050		81349	RT22C2P202
R68-R70	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R71	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R72	RESISTOR,FXD CMPSN, 0.82MEGO, 10%, 1/4W	745-0854-000		81349	RCR07G824KS
R73	RESISTOR,FXD CMPSN, 0.18MEGO, 10%, 1/4W	745-0830-000		81349	RCR07G184KS
R74	RESISTOR,FXD CMPSN, 2.2K, 10%, 1/4W	745-0761-000		81349	RCR07G222KS
R75-R77	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R78	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R79	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R80	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R81,R82	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R83	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R84	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R85	RESISTOR,FXD CMPSN, 2.2K, 10%, 1/4W	745-0761-000		81349	RCR07G222KS
R86,R87	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000		81349	RCR07G105KS
R88	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R89-R94	RESISTOR,FXD CMPSN, 0.39MEGO, 10%, 1/4W	745-0842-000		81349	RCR07G394KS
R95	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
S1,S2	SWITCH,DUAL PKG	266-0243-050		27264	A10040-108
S3,S4	SWITCH,DUAL PKG	266-0243-030		27264	A10040-106
S5	SWITCH,DUAL PKG	266-0243-010		27264	A10040-104
TP1	JACK,TIP BRN	360-0484-070		74970	105-1108-011
TP2	JACK,TIP RED	360-0484-020		74970	105-1102-011
TP3	JACK,TIP ORN	360-0484-050		74970	105-1106-011
TP4	JACK,TIP YEL	360-0484-060		74970	105-1107-011
TP5	JACK,TIP GRN	360-0484-040		74970	105-1104-011
TP6	JACK,TIP BLU	360-0484-080		74970	105-1110-011
TP7	JACK,TIP VIO	360-0484-090		74970	105-1112-011
TP8	JACK,TIP GRA	360-0484-100		74970	105-1113-011
TP9	JACK,TIP WHT	360-0484-010		74970	105-1101-011
T1	TRANSFORMER, RF	677-0324-320		07388	26077
U1	MICROPROCESSOR (ESDS)	351-8676-010		04713	MC6802P
U2	INTEGRATED CIRCUIT COMM INTFC ADAPTER (ESDS)	351-8455-010		04713	MC6850P
U3	INTEGRATED CIRCUIT EPROM (ESDS)	647-2751-001			2716

PARTS LIST (Cont)

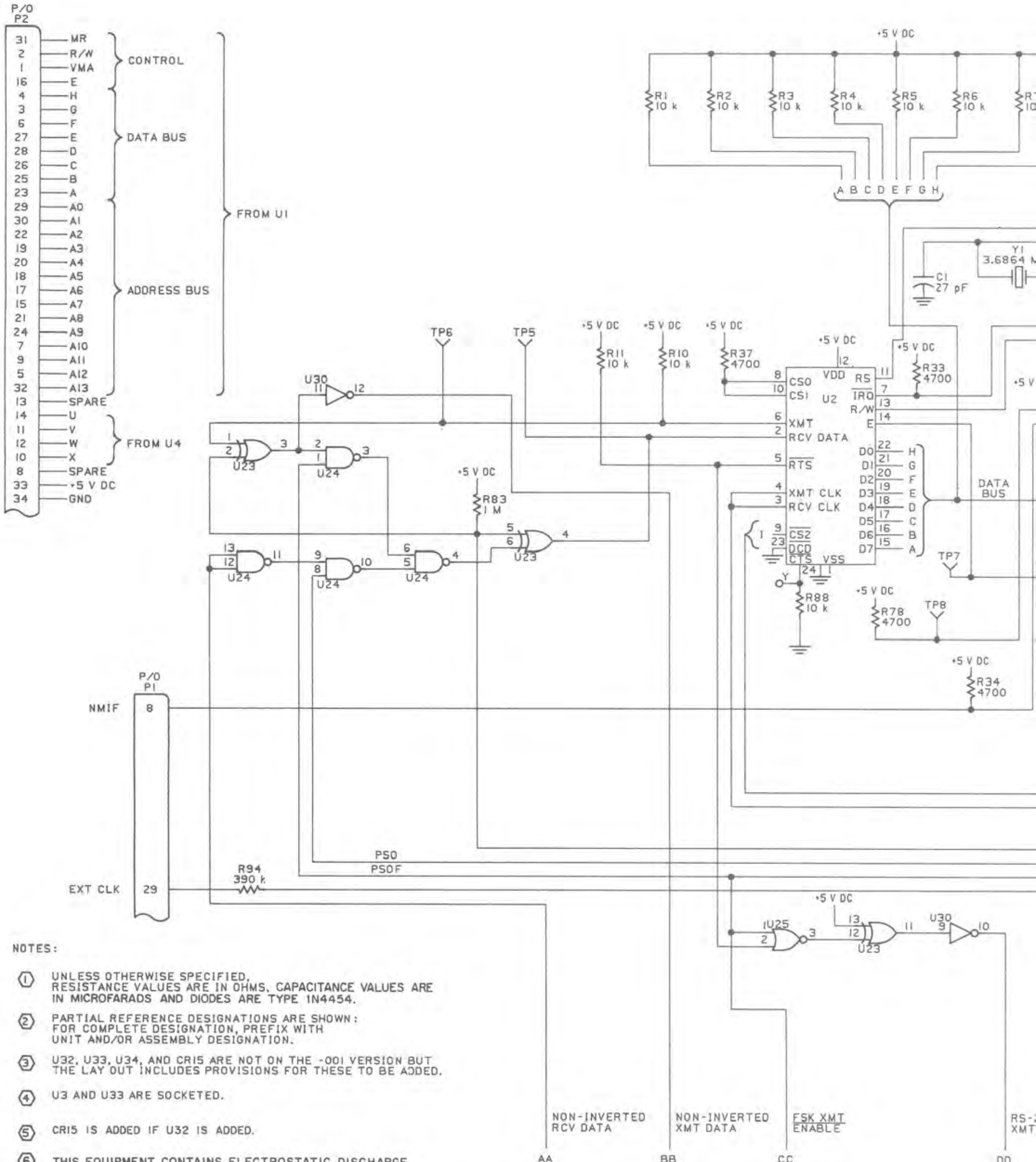
REF DES	DESCRIPTION	COLLINS PART NUMBER
U4	INTEGRATED CIRCUIT DECODER	351-152
U5	INTEGRATED CIRCUIT LOGIC GATE	351-152
U6	INTEGRATED CIRCUIT COUNTER (ESDS)	351-827
U7	INTEGRATED CIRCUIT (ESDS)	351-849
U8	INTEGRATED CIRCUIT (ESDS)	351-815
U9	INTEGRATED CIRCUIT (ESDS)	351-815
U10,U11	INTEGRATED CIRCUIT (ESDS)	351-815
U12-U14	INTEGRATED CIRCUIT (ESDS)	351-849
U15	INTEGRATED CIRCUIT (ESDS)	351-815
U16	INTEGRATED CIRCUIT (ESDS)	351-815
U17	INTEGRATED CIRCUIT (ESDS)	351-831
U18	INTEGRATED CIRCUIT (ESDS)	351-825
U19	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-107
U20	INTEGRATED CIRCUIT AMPLIFIER	351-128
U21	INTEGRATED CIRCUIT	351-111
U22	INTEGRATED CIRCUIT COMPARATOR	351-109
U23	INTEGRATED CIRCUIT (ESDS)	351-840
U24	INTEGRATED CIRCUIT (ESDS)	351-815
U25,U26	INTEGRATED CIRCUIT (ESDS)	351-815
U27	INTEGRATED CIRCUIT (ESDS)	351-815
U28	INTEGRATED CIRCUIT (ESDS)	351-840
U29	INTEGRATED CIRCUIT (ESDS)	351-834
U30	INTEGRATED CIRCUIT (ESDS)	351-815
U31	INTEGRATED CIRCUIT (ESDS)	351-815
VR1	SEMICOND DEVICE	353-293
VR2,VR3	SEMICOND DEVICE	353-271
VR4,VR5	NOT USED	
VR6	SEMICOND DEVICE	353-270
Y1	CRYSTAL UNIT,QTZ 3.6864MHZ	289-712

IST

	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	638-6896-001			
	353-3644-010		03508	1N4454GE
	913-1098-570		72982	8111A100C0G0-270K
	912-2864-000		72136	DM15F471J300WV4CR
V	933-1039-320		27735	PE1S0056-80-10
	913-3279-270		16546	CY30C105M
	913-3279-680		16546	CY20C104M
	184-9102-130		56289	199D156X0015CB1
V	933-1039-040		27735	PE1S047-200-10
	913-4018-000		81349	CK05BX102K
	913-3279-680		16546	CY20C104M
	913-3279-110		16546	CY20C103M
	913-4018-000		81349	CK05BX102K
IV	913-5019-520		81349	CK06BX474K
	184-9102-350		56289	199D105X0035BB1
	913-3279-220		16546	CY30C224M
	184-9102-040		56289	199D686X0006DB1
	184-9102-350		56289	199D105X0035BB1
	913-3279-280		16546	CY40C155M
	913-3279-110		16546	CY20C103M
	913-3279-110		16546	CY20C103M
0V	913-5019-520		81349	CK06BX474K
/	184-9102-100		56289	196D235
	240-2715-130		96906	MS75088-1
	352-0551-010		15818	2N2907A
	352-0661-020		07263	2N2222A
	352-0551-010		15818	2N2907A
	352-0661-020		07263	2N2222A
	352-0551-010		15818	2N2907A
	352-0661-020		07263	2N2222A
	745-0785-000		81349	RCR07G103KS
	745-0857-000		81349	RCR07G105KS
	745-0785-000		81349	RCR07G103KS
	745-0857-000		81349	RCR07G105KS
	745-2449-000		81349	RCR05G105KS
	745-0857-000		81349	RCR07G105KS
	745-0773-000		81349	RCR07G472KS
	745-0785-000		81349	RCR07G103KS
	745-0755-000		81349	RCR07G152KS
	745-0734-000		81349	RCR07G391KS
	745-0749-000		81349	RCR07G102KS
	745-0743-000		81349	RCR07G681KS
	745-0749-000		81349	RCR07G102KS
	705-1059-000		81349	RN55D2052F
	745-0785-000		81349	RCR07G103KS
	705-1077-000		81349	RN55D4872F
	745-0740-000		81349	RCR07G561KS
	745-0797-000		81349	RCR07G223KS
	745-0845-000		81349	RCR07G474KS
	745-0761-000		81349	RCR07G222KS
	745-0773-000		81349	RCR07G472KS
	745-0791-000		81349	RCR07G153KS
	745-0785-000		81349	RCR07G103KS
	745-0773-000		81349	RCR07G472KS
	381-1721-050		81349	RT22C2P202
	745-0785-000		81349	RCR07G103KS
	745-0821-000		81349	RCR07G104KS
	745-0854-000		81349	RCR07G824KS
	745-0830-000		81349	RCR07G184KS
	745-0761-000		81349	RCR07G222KS
	745-0857-000		81349	RCR07G105KS
	745-0773-000		81349	RCR07G472KS
	745-0845-000		81349	RCR07G474KS
	745-0857-000		81349	RCR07G105KS
	745-0785-000		81349	RCR07G103KS
	745-0857-000		81349	RCR07G105KS
	745-0845-000		81349	RCR07G474KS
	745-0761-000		81349	RCR07G222KS
	745-0857-000		81349	RCR07G105KS
	745-0785-000		81349	RCR07G103KS
	745-0842-000		81349	RCR07G394KS
	745-0785-000		81349	RCR07G103KS
	266-0243-050		27264	A10040-108
	266-0243-030		27264	A10040-106
	266-0243-010		27264	A10040-104
	360-0484-070		74970	105-1108-011
	360-0484-020		74970	105-1102-011
	360-0484-050		74970	105-1106-011
	360-0484-060		74970	105-1107-011
	360-0484-040		74970	105-1104-011
	360-0484-080		74970	105-1110-011
	360-0484-090		74970	105-1112-011
	360-0484-100		74970	105-1113-011
	360-0484-010		74970	105-1101-011
	677-0324-320		07388	26077
	351-8676-010		04713	MC6802P
DS)	351-8455-010		04713	MC6850P
	647-2751-001			2716

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
U4	INTEGRATED CIRCUIT DECODER	351-1526-090		27014	DM74LS154N
U5	INTEGRATED CIRCUIT LOGIC GATE	351-1523-110		18324	N74LS00N
U6	INTEGRATED CIRCUIT COUNTER (ESDS)	351-8277-010		04713	MC14526BCP
U7	INTEGRATED CIRCUIT (ESDS)	351-8490-010		04713	MC14503BCP
U8	INTEGRATED CIRCUIT (ESDS)	351-8159-160		07263	4042BPC
U9	INTEGRATED CIRCUIT (ESDS)	351-8159-230		07263	4021BPC
U10,U11	INTEGRATED CIRCUIT (ESDS)	351-8159-160		07263	4042BPC
U12-U14	INTEGRATED CIRCUIT (ESDS)	351-8490-010		04713	MC14503BCP
U15	INTEGRATED CIRCUIT (ESDS)	351-8159-180		07263	4027BPC
U16	INTEGRATED CIRCUIT (ESDS)	351-8159-240		07263	4040BPC
U17	INTEGRATED CIRCUIT (ESDS)	351-8315-010		07263	F4520PC
U18	INTEGRATED CIRCUIT (ESDS)	351-8253-010		04713	MC14018BCP
U19	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070		07263	UA1458TC
U20	INTEGRATED CIRCUIT AMPLIFIER	351-1286-010		07263	UA1558RM
U21	INTEGRATED CIRCUIT	351-1114-010		27014	LM565CN
U22	INTEGRATED CIRCUIT COMPARATOR	351-1094-060		12040	LM311H
U23	INTEGRATED CIRCUIT (ESDS)	351-8407-010		04713	MC14070BCP
U24	INTEGRATED CIRCUIT (ESDS)	351-8159-340		07263	4011BPC
U25,U26	INTEGRATED CIRCUIT (ESDS)	351-8159-320		07263	4001BPC
U27	INTEGRATED CIRCUIT (ESDS)	351-8159-340		07263	4011BPC
U28	INTEGRATED CIRCUIT (ESDS)	351-8407-010		04713	MC14070BCP
U29	INTEGRATED CIRCUIT (ESDS)	351-8342-010		02735	CD4093BE
U30	INTEGRATED CIRCUIT (ESDS)	351-8159-210		07263	F4049BPC
U31	INTEGRATED CIRCUIT (ESDS)	351-8159-320		07263	4001BPC
VR1	SEMICOND DEVICE	353-2938-000		01295	1N746A
VR2,VR3	SEMICOND DEVICE	353-2712-000		12954	1N752A
VR4,VR5	NOT USED				
VR6	SEMICOND DEVICE	353-2708-000		81483	1N750A
Y1	CRYSTAL UNIT,QTZ 3.6864MHZ	289-7120-060		00136	289-7120-060M20



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS AND DIODES ARE TYPE 1N4454.

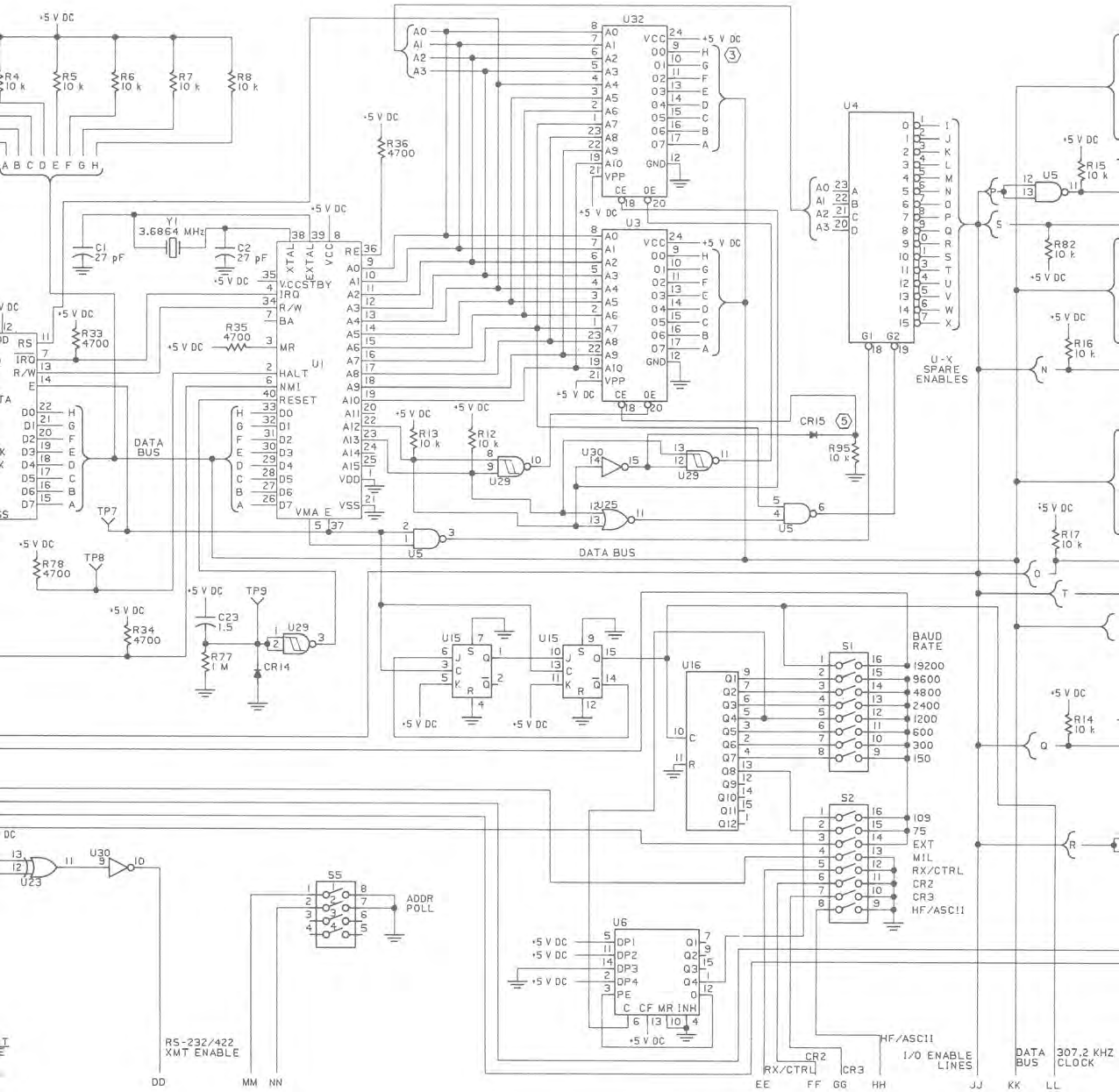
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.

3. U32, U33, U34, AND CR15 ARE NOT ON THE -001 VERSION BUT THE LAY OUT INCLUDES PROVISIONS FOR THESE TO BE ADDED.

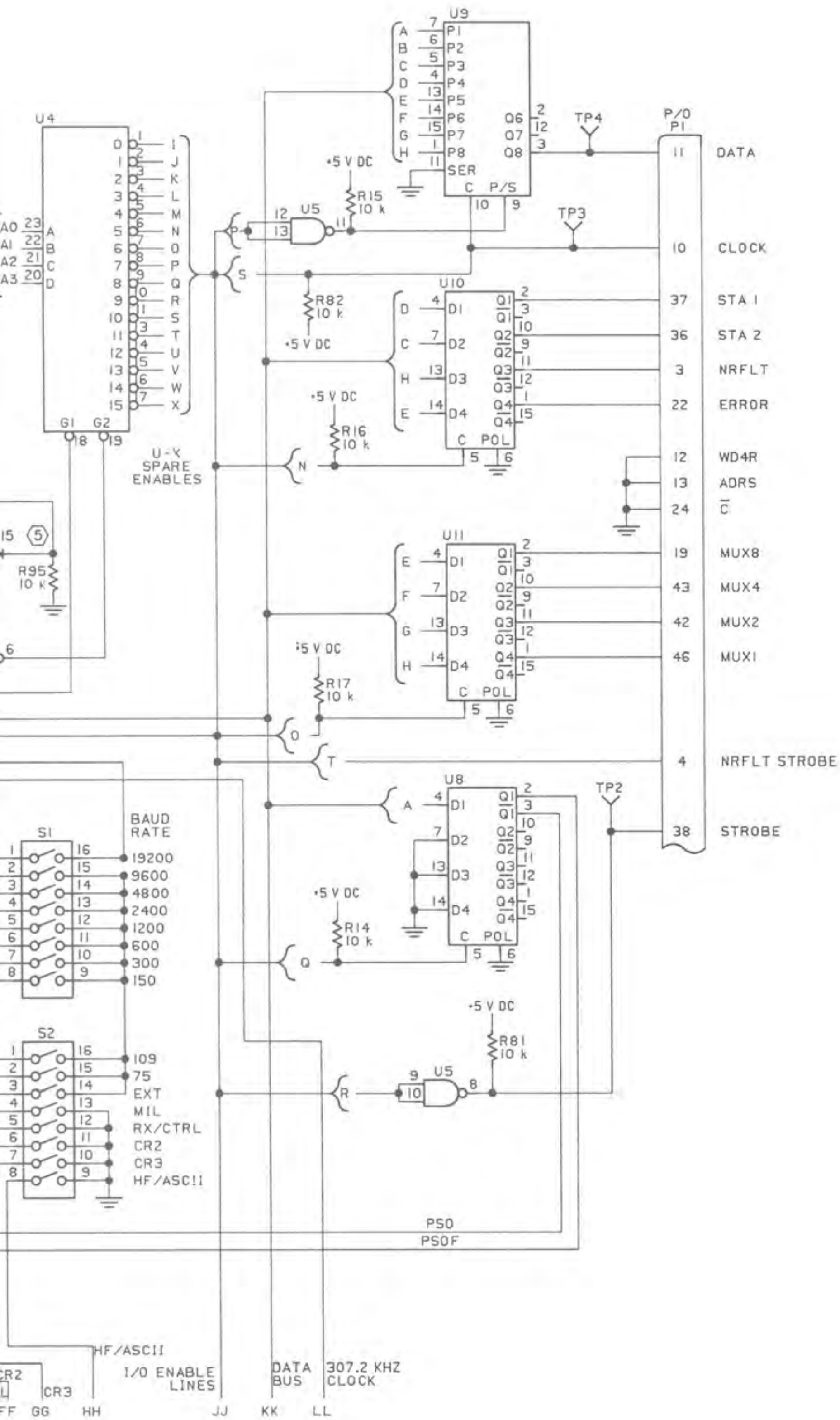
4. U3 AND U33 ARE SOCKETED.

5. CR15 IS ADDED IF U32 IS ADDED.

6. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.

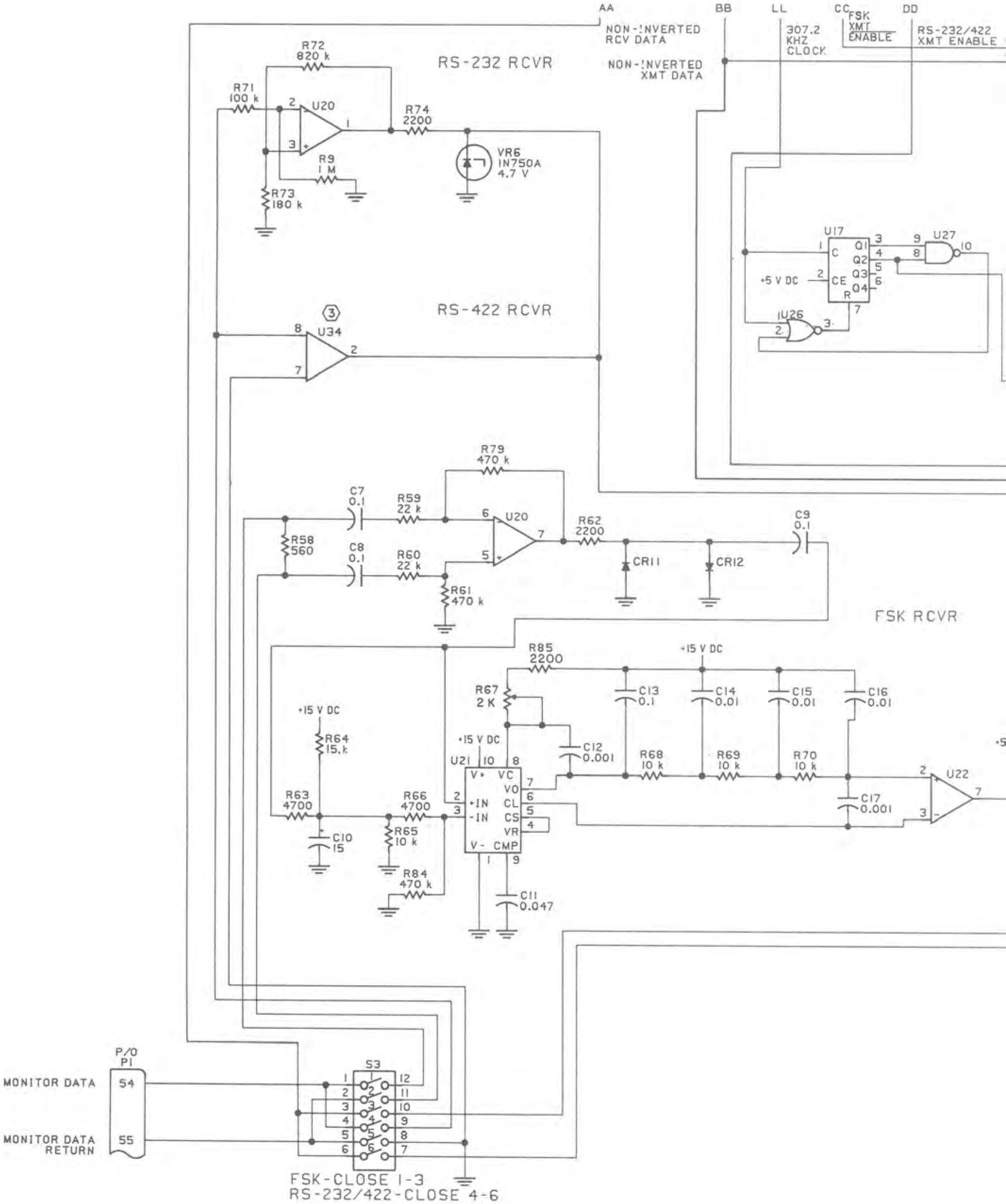


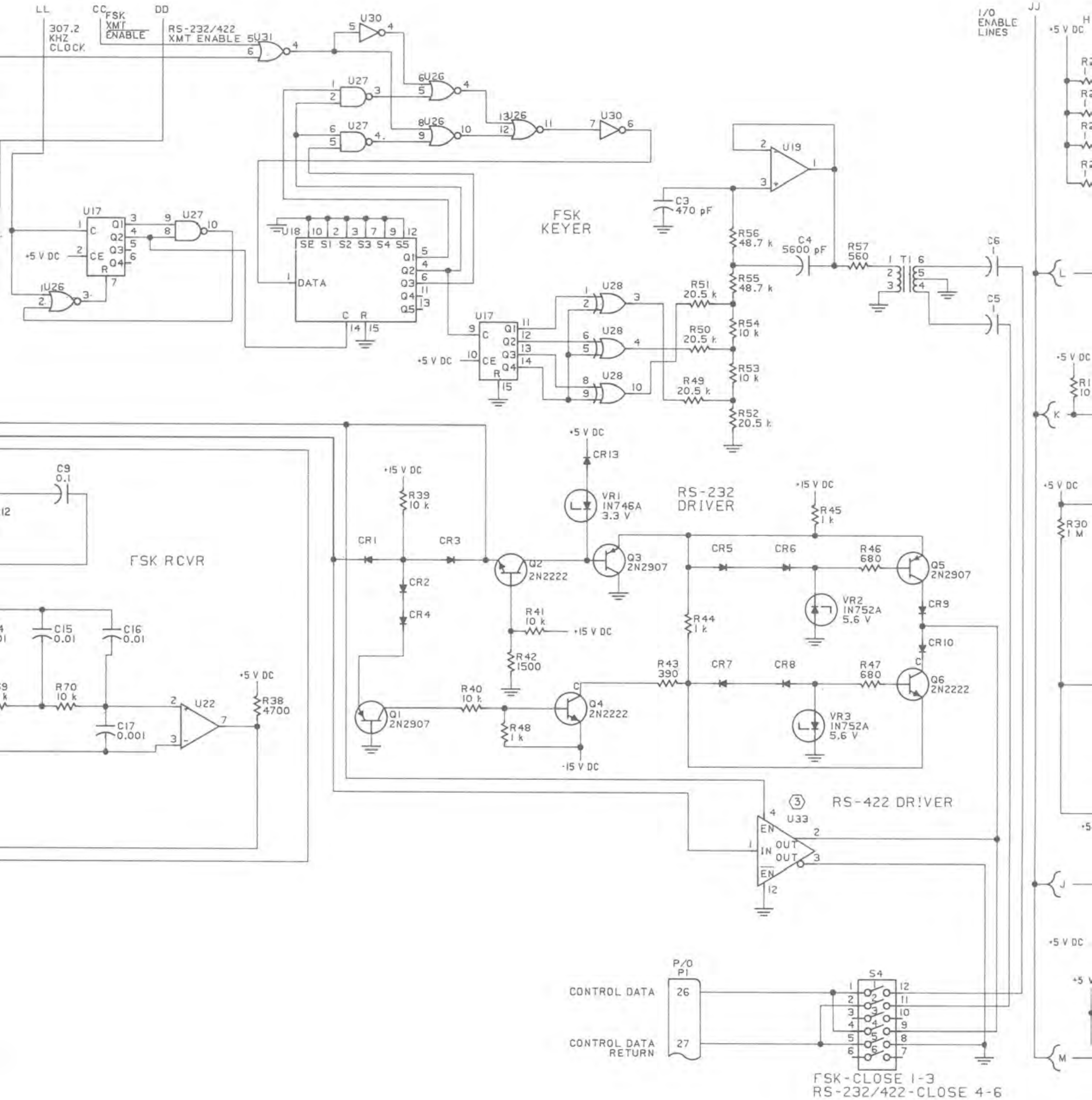
+5 V DC
R4 10 k
R5 10 k
R6 10 k
R7 10 k
R8 10 k
A B C D E F G H
U32
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 VPP
VCC D0 D1 D2 D3 D4 D5 D6 D7 GND
CE OE
U3
U4
U-X SPARE ENABLES
R36 4700
Y1 3.6864 MHz
C1 27 pF
C2 27 pF
XTAL EXTAL VCC
VCCSTBY IRQ R/W BA MR HALT NMI RESET
VMA E VDD VSS
U1
R33 4700
R35 4700
DATA BUS
TP7
TP8
TP9
R78 4700
R34 4700
C23 1.5
R77 1 M
CR14
U29
R13 10 k
R12 10 k
U30
U25
U5
CR15
R95 10 k
R15 10 k
R82 10 k
R16 10 k
R17 10 k
R14 10 k
U15
U16
S1
BAUD RATE
19200
9600
4800
2400
1200
600
300
150
S2
109
75
EXT
MIL
RX/CTRL
CR2
CR3
HF/ASCII
S5
ADDR POLL
U6
DP1 DP2 DP3 DP4 PE
C CF MR INH
U23
RS-232/422 XMT ENABLE
I/O ENABLE LINES
DATA BUS
307.2 KHZ CLOCK
DD
MM
NN
EE
FF
GG
HH
JJ
KK
LL



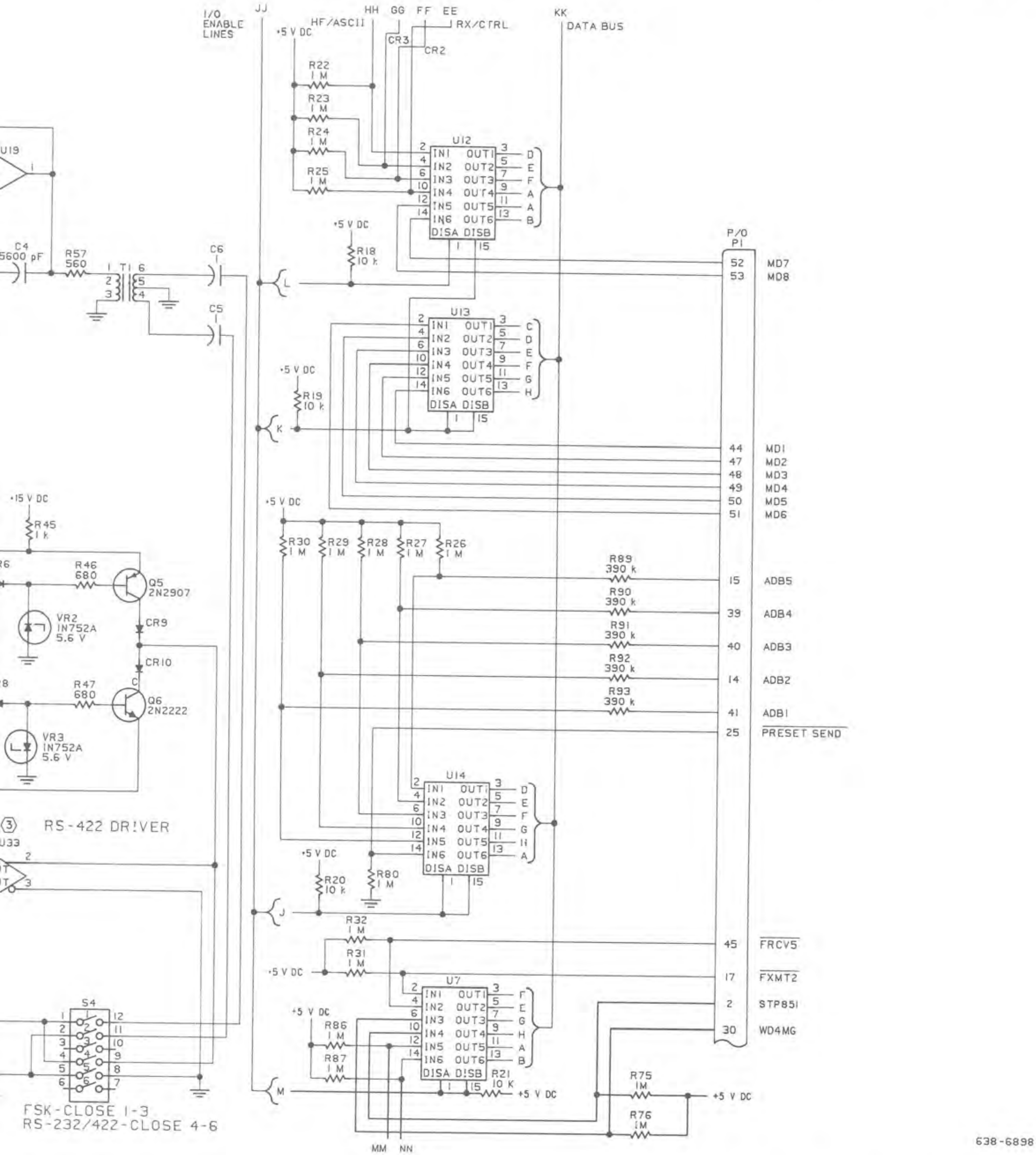
638-6898

Serial Interface, Schematic Diagram
Figure 11 (Sheet 3)

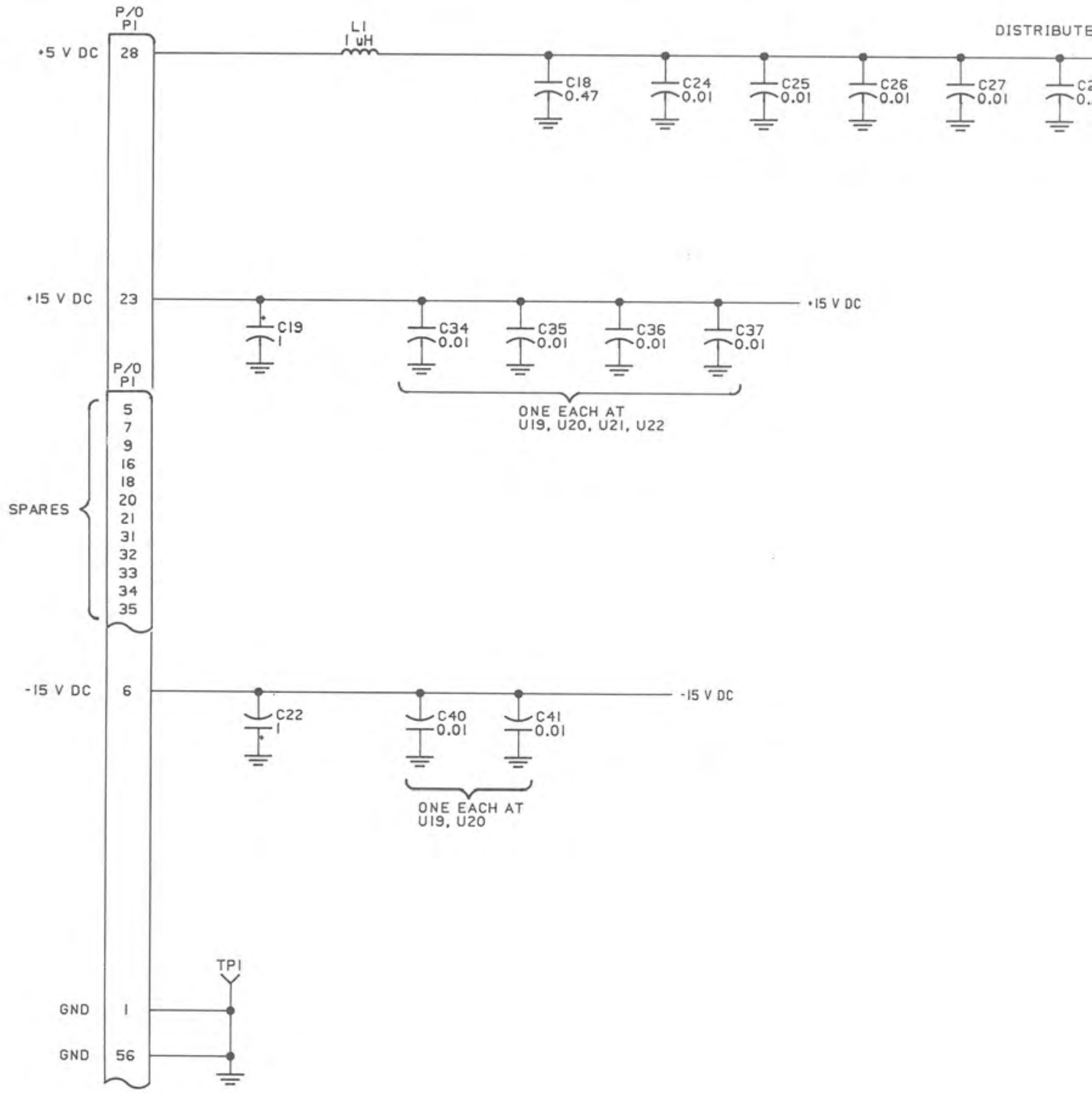

AA
NON-INVERTED RCV DATA
BB
NON-INVERTED XMT DATA
LL
307.2 KHZ CLOCK
CC
FSK XMT ENABLE
DD
RS-232/422 XMT ENABLE
RS-232 RCVR
R72 820 k
R71 100 k
U20
R74 2200
VR6 IN750A 4.7 V
R9 1 M
R73 180 k
RS-422 RCVR
U34
R79 470 k
C7 0.1
R59 22 k
R58 560
C8 0.1
R60 22 k
R61 470 k
R62 2200
CR11
CR12
C9 0.1
FSK RCVR
U17
U27
U26
+5 V DC
R85 2200
+15 V DC
R67 2 K
C12 0.001
C13 0.1
C14 0.01
C15 0.01
C16 0.01
R68 10 k
R69 10 k
R70 10 k
C17 0.001
U22
U21
R64 15 k
R63 4700
R66 4700
R65 10 k
C10 15
R84 470 k
C11 0.047
P/O P1
MONITOR DATA
MONITOR DATA RETURN
S3
FSK-CLOSE 1-3
RS-232/422-CLOSE 4-6

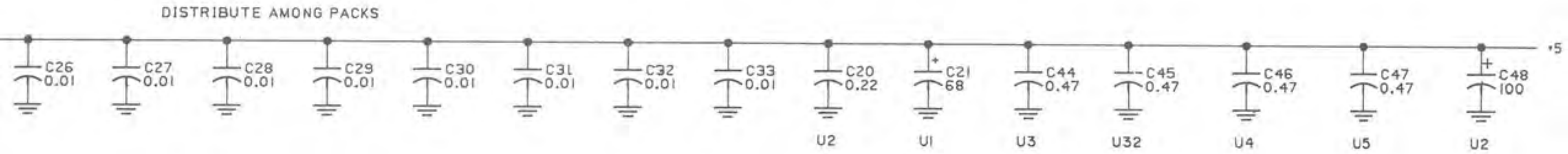


307.2 KHZ CLOCK
FSK XMT ENABLE
RS-232/422 XMT ENABLE
FSK KEYER
I/O ENABLE LINES
FSK RCVR
RS-232 DRIVER
RS-422 DRIVER
CONTROL DATA
CONTROL DATA RETURN
FSK-CLOSE 1-3
RS-232/422-CLOSE 4-6



Serial Interface, Schematic Diagram
Figure 11 (Sheet 4)


P/O
P1
+5 V DC
28
L1
1 uH
DISTRIBUTE
C18
0.47
C24
0.01
C25
0.01
C26
0.01
C27
0.01
+15 V DC
23
C19
1
C34
0.01
C35
0.01
C36
0.01
C37
0.01
+15 V DC
ONE EACH AT
U19, U20, U21, U22
SPARES
5
7
9
16
18
20
21
31
32
33
34
35
-15 V DC
6
C22
1
C40
0.01
C41
0.01
-15 V DC
ONE EACH AT
U19, U20
TP1
GND
1
GND
56



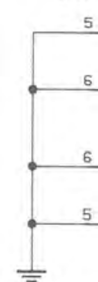
V DC

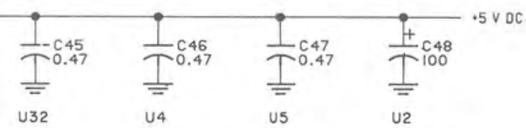
U NO.	TYPE	POWER					
		+5 V DC	+12 V DC	+15 V DC	-5 V DC	-15 V DC	GND
U1	MC6802	8,35					1,21
U2	MC6850	12					1
U3	2716	24,21					12
U4	74LS154	24					12
U5	74LS00	14					7
U6	4526	16					8
U7	4503	16					8
U8	4042	16					8
U9	4021	16					8
U10	4042	16					8
U11	4042	16					8
U12	4503	16					8
U13	4503	16					8
U14	4503	16					8
U15	4027	16					8
U16	4040	16					8
U17	4520	16					8
U18	4018	16					8
U19	MC1458			8		4	
U20	MC1558			8		4	
U21	NE565			10			1
U22	LM311H			8			1,4
U23	4070	14					7
U24	4011	14					7
U25	4001	14					7
U26	4001	14					7
U27	4011	14					7
U28	4070	14					7
U29	4093	14					7
U30	4049	1					8
U31	4001	14					7
U32	2716	24,21					12
3 U33	AM26LS31	16					8
U34	9637	1					4
U35							
U36							
U37							
U38							
U39							
U40							

HIGHEST NUMBERS

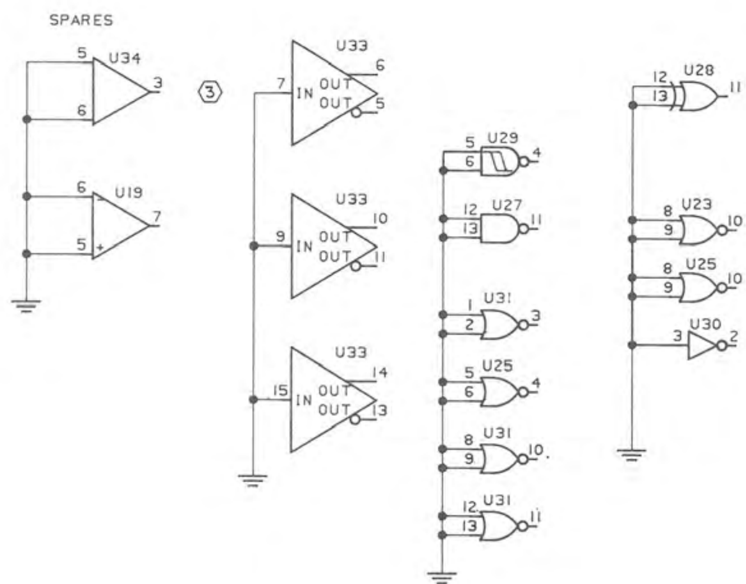
U34
R95
C48
CR15
VR6
L1

SPAR





GND
1,21
1
12
12
7
8
8
8
8
8
8
8
8
8
8
8
8
8
1
1,4
7
7
7
7
7
7
7
8
·7
12
8
4



638-6898

Serial Interface, Schematic Diagram
Figure 11 (Sheet 5)

TS-8010 Card Extender Kit (622-3431-001, -002)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0767968-003211
3rd Edition, 1 January 1981

1. DESCRIPTION

The TS-8010 Card Extender Kit 622-3431-001, -002 contains all cables and extender cards necessary for extending cards and modules in the HF-80 series receivers, exciters, and controls. These extenders enable testing and troubleshooting of individual circuit cards in hot mockup or in on-line situations without the need of sophisticated test fixtures or test equipment.

The TS-8010 622-3431-001 contains all cables and extenders necessary for testing and troubleshooting the HF-80 series receivers, exciters, receiver-exciters, and controls; and the 851S-( ) series receivers.

The TS-8010 622-3431-002 contains only those extenders necessary for testing and troubleshooting the HF-80 series controls.

Refer to figure 1 and table 1 for the complement of these card extender kits.

TS-8010 Card Extender Kit
Figure 1

NOTICE: This section replaces second edition dated 1 June 1978.

Table 1. TS-8010 Card Extender Kit Complement.

ITEM NO	COLLINS PART NUMBER	DESCRIPTION	622-3431-	
			001	002
1	635-0913-001	130-pin edge-on extender	X	X
2	635-0915-001	56-pin edge-on extender	X	X
3	635-0915-002	Rf module extender	X	
4	635-9686-001	Subminiax coax extender	7	
5	635-9686-002	Subminiax coax/BNC extender	X	
6	637-2843-001	Synthesizer extender	X	

2. REPAIR

Repair of the TS-8010 Card Extender Kit is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

3. PARTS LIST/DIAGRAMS

This paragraph assists in identification, requisition, and issuance of parts, and in maintenance of the equipment. The Collins part number and description for each nonstandard replacement part are listed in table 2.

All pins and shields of the extenders are one-to-one connections; therefore a schematic diagram of the extenders is not shown.

Table 2. TS-8010 Card Extender Kit Parts List.

DESCRIPTION	COLLINS PART NUMBER
130-pin edge-on extender	635-0913-001
Card guide (mounts inside extender frames)	150-0810-040
Connector	372-2274-060
Printed wiring board	600-1993-770
Extender frame (left)	635-9683-001
Extender frame (right)	635-9683-002
56-pin edge-on extender	635-0915-001
Card guide (mounts inside extender frames)	150-0810-040
Connector	372-7515-040
Printed wiring board	600-1993-771
Extender frame (left)	635-9685-001
Extender frame (right)	635-9685-002

Table 2. TS-8010 Card Extender Kit Parts List (Cont).

DESCRIPTION	COLLINS PART NUMBER
Rf module extender	635-0915-002
Connector	372-7515-040
Printed wiring board	600-1993-771
Extender frame	635-9681-001
Subminiax coax extender	635-9686-001
Rf connector	357-7207-010
Rf connector	357-7207-020
Coaxial cable, RG-316/U	425-0146-010
Subminiax coax/BNC extender	635-9686-002
Rf connector	357-7207-010
Rf connector, BNC	357-7279-010
Coaxial cable, RG-316/U	425-0146-010
Synthesizer extender	637-2843-001
Card guide (mounts inside extender brackets)	150-0810-030
Connector	372-7515-050
Printed wiring board	600-1993-050
Extender bracket (left)	637-1775-001
Extender bracket (right)	637-1776-001

OPTIONS

AC-8017/8017A 100-Hz to 10-Hz Conversion Kit (622-3453-001, -002)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0768676-002211
2nd Edition, 1 January 1981

1. DESCRIPTION

AC-8017 100-Hz to 10-Hz Conversion Kit 622-3453-001 contains a 10-Hz frequency switchboard assembly and a synthesizer decade card. When installed, the AC-8017 100-Hz to 10-Hz conversion kit provides 10-Hz tuning on all applicable units listed in table 1.

Note

If 100-Hz frequency display has been installed in unit it should be replaced with a 10-Hz display during installation of this kit.

Table 1. AC-8017/8017A 100-Hz to 10-Hz Conversion Kit, Equipment Used On.

EQUIPMENT	COLLINS PART NUMBER
AC-8017 100-Hz TO 10-Hz CONVERSION KIT 622-3453-001	
HF-8010 Exciter	622-3389-( )
HF-8010A Exciter	622-3395-( )
HF-8014 Exciter	622-3472-( )
HF-8014A Exciter	622-3473-( )
HF-8050 Receiver	622-3385-( )
HF-8050A Receiver	622-3393-( )
HF-8054 Receiver	622-3474-( )
HF-8054A Receiver	622-3475-( )
HF-8070 Receiver-Exciter	622-3387-( )
HF-8070A Receiver-Exciter	622-3394-( )
AC-8017A 100-Hz TO 10-Hz CONVERSION KIT 622-3453-002	
HF-8090 Exciter Control	622-3390-( )
HF-8091 Receiver Control	622-3391-( )
HF-8092 Receiver-Exciter Control	622-3392-( )
HF-8093 Exciter Control	622-3476-( )
HF-8094 Receiver Control	622-3477-( )

NOTICE: This section replaces first edition dated 1 June 1978.

The AC-8017A 100-Hz to 10-Hz Conversion Kit 622-3453-002 contains a 10-Hz frequency switchboard assembly and a 10-Hz to 29-MHz frequency display. When installed, the AC-8017A 100-Hz to 10-Hz conversion kit provides 10-Hz tuning and a 10-Hz display on all applicable units listed in table 1.

2. INSTALLATION

Installation instructions for the AC-8017/8017A are divided into two procedures; instructions for installation of 622-3453-001 and instructions for installation of 622-3453-002.

Installation of AC-8017 100-Hz to 10-Hz Conversion Kit 622-3453-001 consists of replacing the existing frequency switchboard assembly with one from the kit, and configuring the synthesizer assembly for 10-Hz operation using the 100/10-Hz decade card supplied with the kit.

Installation of AC-8017A 100-Hz to 10-Hz Conversion Kit 622-3453-002 consists of replacing the existing frequency switchboard and frequency display assemblies using the assemblies supplied with the kit.

2.1 AC-8017 100-Hz to 10-Hz Conversion Kit 622-3453-001 Installation

a. Frequency Switchboard Replacement

Note

Retain hardware removed during disassembly for use in reassembly. Refer to unit parts list as an aid in disassembly and assembly.

1. Remove unit top cover.
2. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during removal of upper overlay panel.

3. Remove upper overlay panel from front panel as follows:
   (a) Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   (b) Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   (c) Lift upper edge bar from front panel.
   (d) Carefully remove upper overlay panel.
4. Remove cover plate on back of front panel by removing five Phillips-head screws and attaching hardware (screws on front of front panel).
5. Disconnect plug P2 from frequency switchboard jack A2J4.
6. Remove frequency switchboard 635-0830-001 by removing four Phillips-head screws and attaching hardware (screwheads on front of front panel).
7. Secure frequency switchboard 635-0830-002 supplied in kit to front panel using four Phillips-head screws and attaching hardware (screwheads on front of front panel).
8. Connect plug P2 to jack A2J4 on frequency switchboard.
9. Secure cover plate to back of front panel with five Phillips-head screws and attaching hardware (screwheads on front side of front panel).

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during replacement of upper overlay panel.

10. Insert upper overlay panel into slot on panel support (middle bar on front panel).
11. Replace edge bar on top of front panel ensuring upper overlay panel fits properly.
12. Secure upper overlay panel to front panel with eight Phillips-head screws and lockwashers.
13. Secure front panel to unit with four hexhead screws and attaching hardware.

b. Configuring Synthesizer Assembly 635-9697-001 for 10-Hz Operation

1. Remove synthesizer assembly top cover.
2. Remove END DECADE from A18 slot and install into A17 slot.
3. Install decade card 623-2080-004 into the A18 slot.
4. Reinstall synthesizer assembly top cover.
5. Reinstall unit top cover.

c. Configuring Synthesizer Assembly 634-8201-001 for 10-Hz Operation

1. Remove synthesizer assembly top cover.
2. Remove END DECADE from A19 slot and install into A18 slot.

3. Install decade card 623-2080-004 into the A19 slot.
4. Reinstall synthesizer assembly top cover.
5. Reinstall unit top cover.

2.2 AC-8017A 100-Hz to 10-Hz Conversion Kit 622-3452-002 Installation

Note

Retain hardware removed during disassembly for reassembly. Refer to unit parts list as an aid in disassembly and assembly.

a. Remove unit top cover.
b. Remove frequency display as follows:
   1. Remove four Phillips-head screws and attaching hardware.
   2. Disconnect plug P8 from jack A2J5 on frequency display.
c. Remove front panel from unit by removing four hexhead screws and attaching hardware.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during removal of upper overlay panel.

d. Remove upper overlay panel from front panel as follows:
   1. Remove four Phillips-head screws and lockwashers that secure back of front panel to upper edge bar.
   2. Remove four Phillips-head screws and lockwashers that secure back of front panel to panel support (middle bar on front panel).
   3. Lift upper edge bar from front panel.
   4. Carefully remove upper overlay panel.
e. Disconnect plug P2 from frequency switchboard jack A2J4.
f. Remove frequency switchboard 635-0830-001 by removing four Phillips-head screws and attaching hardware (screwheads on front of front panel).
g. Secure frequency switchboard 635-0830-002 supplied in kit to front panel using four Phillips-head screws and attaching hardware (screwheads on front of front panel).
h. Connect plug P2 to jack A2J4 on frequency switchboard.

Caution

Upper overlay panel (plexiglass) is brittle; exercise care during replacement of upper overlay panel.

i. Insert upper overlay panel into slot on panel support (middle bar on front panel).
j. Replace edge bar on top of front panel ensuring upper overlay panel fits properly.
k. Secure upper overlay panel to front panel with eight Phillips-head screws and attaching hardware.
l. Secure front panel to unit with four hexhead screws and attaching hardware.
m. Install frequency display 637-1781-002 as follows:
   1. Connecting plug P8 to jack A2J5 on frequency display.
   2. Securing frequency display to mounts with four Phillips-head screws and attaching hardware.
n. Reinstall unit top cover.

3. REPAIR

Repair of the AC-8017/8017A 100-Hz to 10-Hz Conversion Kit is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

4. PARTS LIST/DIAGRAMS

This paragraph assists in identification, requisition, and issuance of parts, and in maintenance of the equipment. The Collins part number and description for each nonstandard replacement part are listed in table 2.

These cards are covered in the following instructions which are included in the associated instruction book.

a. Frequency display (637-1781-001, -002) instructions (Collins part number 523-0767975).
b. Frequency switchboard (635-0830-001, -002) instructions (Collins part number 523-0767947).
c. Synthesizer decade (623-2080-001, -002, -003, -004) instructions (Collins part number 523-0767972).

Table 2. AC-8017/8017A 100-Hz to 10-Hz Conversion Kit Parts List.

DESCRIPTION	COLLINS PART NUMBER
AC-8017	622-3453-001
Frequency switchboard	635-0830-002
Synthesizer decade	623-2080-004
AC-8017A	622-3453-002
Frequency switchboard	635-0830-002
Frequency display	637-1781-002