



Rockwell
International

instructions

DDS Control Interface (646-5905-003)

Collins Defense Communications Division

523-0773485-001211

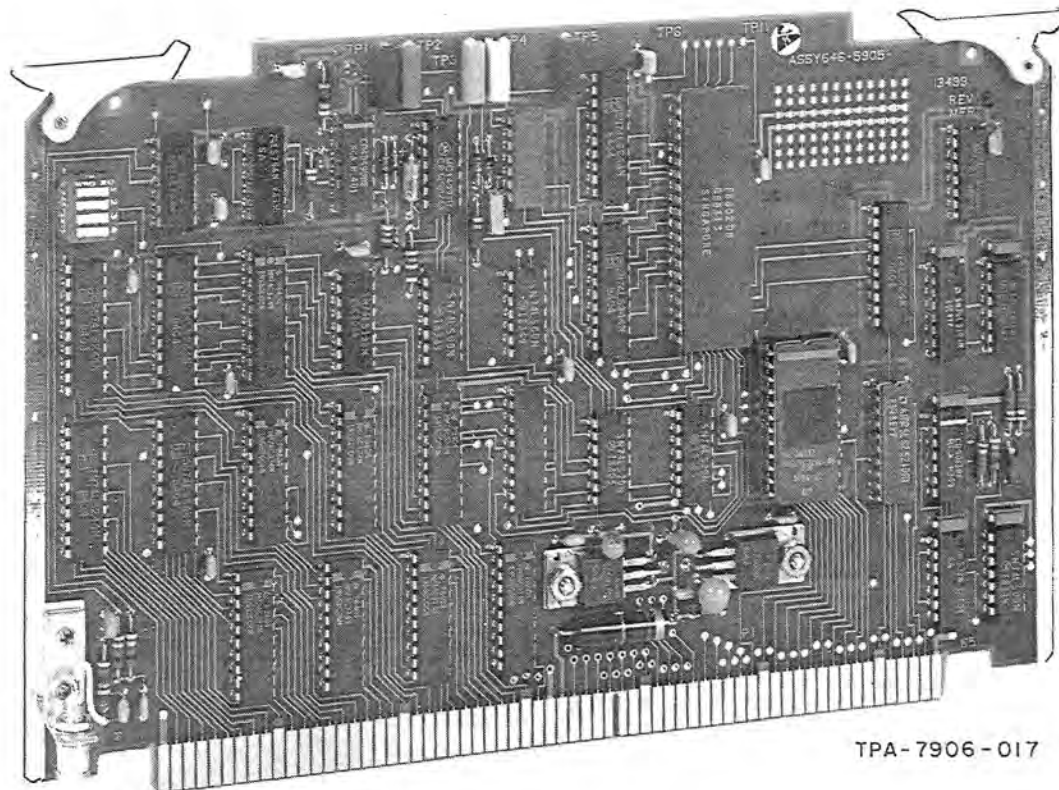
1 September 1984

Printed in USA

1. DESCRIPTION

The DDS control interface circuit card 646-5905-003, shown in figure 1, is a planar circuit card with an edge-on connector.

The DDS control interface consists of a microprocessor-controlled code conversion section, input and output latches, and a timing synchronizer.



DDS Control Interface (646-5905-003)
Figure 1

2. PRINCIPLES OF OPERATION

2.1 General

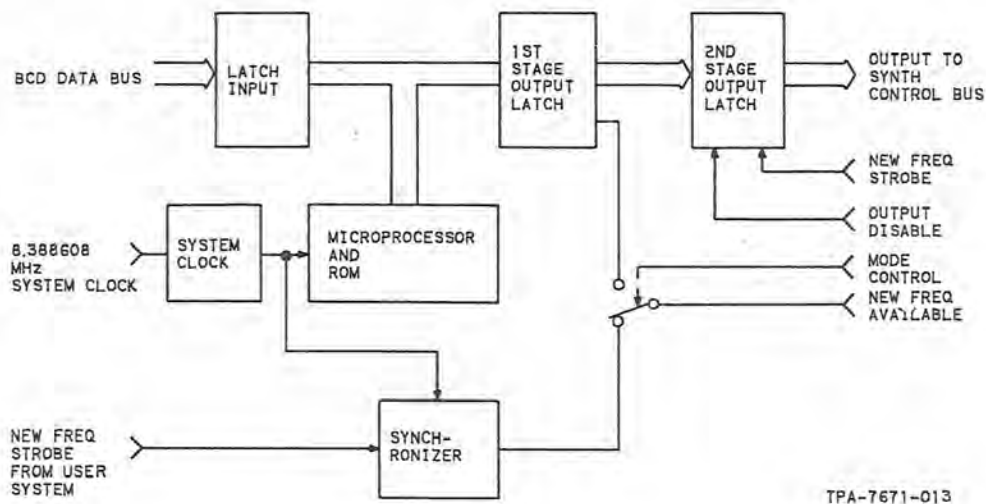
The DDS control interface serves three primary functions: code conversion; selection of the appropriate frequency control data; and switching local, remote, or parallel binary coded decimal (bcd), and auxiliary control inputs. In bcd control, frequency data from either the front panel switches, remote control, or parallel interface cards is used. The frequency data is converted to the direct digital synthesizer (DDS) specialized binary control code and placed on the internal frequency control bus. In the auxiliary control mode, the outputs of the DDS control interface go to a high impedance state and the internal frequency control bus is then controlled by the latches on the parallel interface card, allowing the synthesizer to be controlled directly from the rear panel of the unit for faster operation. Refer to the block diagram, figure 2.

2.2 Microprocessor and Read-Only Memory

Microprocessor U7 polls the bcd inputs, looking for a change of state. Upon detection of a change of state, the microprocessor begins to execute a code conversion algorithm based upon a repetitive addition and tables look-up process. The tables for look-up and the program of the microprocessor are stored in read-only memory (ROM) U25. Interface between the microprocessor and ROM are buffered by latches U15 and U16. The output of the microprocessor and inputs to the microprocessor are through bidirection latch U22. Control signals to control the selection of input data is output from the microprocessor through latch U6.

2.3 Input/Output Latches

The frequency data in bcd form is input to the DDS control interface through latches U9, U10, U17, and U18. Each latch inputs two binary coded frequency steps. The latches are gated on by a control signal from U12 under the control of the microprocessor. The output of frequency data is done in two stages to prevent erroneous frequency data from being assimilated. Latches U11, U19, U20, and U21 provide the first stage and receive the frequency information from the microprocessor. The data will be held in these latches until the blanker has operated and returns the strobe pulse. Upon return of the strobe, latches U27, U28, U29, and U30 accept the data from the first stage latches and output the frequency data to the frequency control bus.



DDS Control Interface, Block Diagram
Figure 2

2.4 Synchronizer Delay

The synchronizer delay consists of U40, U41, U42, U43, and U44. The purpose of the synchronizer delay is to delay the new frequency available pulse until the microprocessor puts the frequency data into the first stage output latches. The synchronizer then outputs the new frequency available pulse to the system. After the system has responded, the system will return a new frequency strobe to the second stage of output latches and the frequency data is output to the frequency control bus. Voltages used on the DDS control interface are regulated by U31 and U32 to +5 V dc from the +8-V dc input.

3. TEST EQUIPMENT

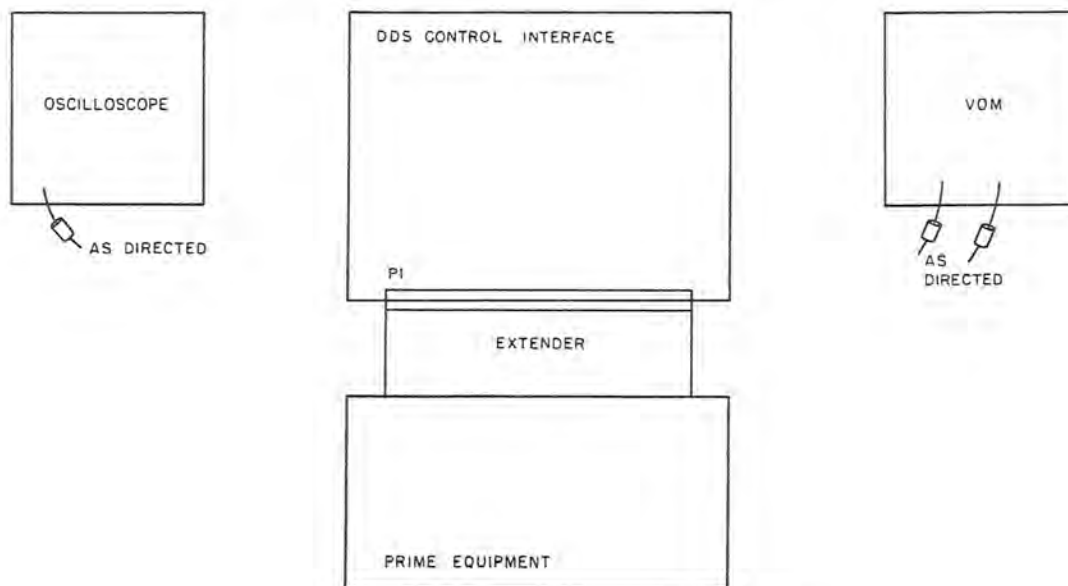
The test equipment necessary to test and troubleshoot the circuit card is listed in table 1. Equipment with equal or superior specifications may be substituted for models listed.

Table 1. Test Equipment.

ITEM	REPRESENTATIVE TYPE
Vom	Hewlett-Packard Model 3435A
Oscilloscope	Hewlett-Packard Model 1740A

4. TESTING/TROUBLESHOOTING PROCEDURES

The test procedures in table 2 check total performance of the circuit 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. Refer to figure 3 for a test setup diagram and to figure 4 for the schematic diagram.



Test Setup Diagram
Figure 3

Table 2. Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Voltage check	<p>a. Place card on appropriate extender and connect to prime equipment. Fault light DS1 should be off.</p> <p>b. Measure the following points for voltage levels in respect to ground at P1 pin 1.</p> <p style="padding-left: 40px;">P1 pin 33</p> <p style="padding-left: 40px;">P1 pin 98</p> <p style="padding-left: 40px;">U7 pin 35</p> <p style="padding-left: 40px;">U42 pin 9</p>	<p>+8 V dc</p> <p>+8 V dc</p> <p>+5 V dc</p> <p>+5 V dc</p>	<p>Check wiring to card or troubleshoot power supply card.</p> <p>Same as above</p> <p>Troubleshoot U31.</p> <p>Troubleshoot U32.</p>
2. System clock	<p>a. Perform step 1.a of voltage check.</p> <p>b. Monitor the signal at U7 pin 39 with oscilloscope.</p> <p>c. Disconnect system clock from E1.</p> <p>d. Reconnect system clock to E1.</p> <p>e. Ground the following test points one at a time.</p> <p style="padding-left: 40px;">TP4</p> <p style="padding-left: 40px;">TP3</p> <p style="padding-left: 40px;">TP2</p> <p style="padding-left: 40px;">TP1</p>	<p>8.388 608 MHz</p> <p>DS1 should light.</p> <p>DS1 should extinguish.</p> <p>DS1 should light.</p> <p>DS1 should light.</p> <p>DS1 should light.</p> <p>DS1 should light.</p>	<p>Troubleshoot U1 and U2.</p> <p>Check DS1, U3, U4, and U7.</p> <p>Check U23 and wiring.</p> <p>Same as above</p> <p>Same as above</p> <p>Same as above</p>
3. Input data	<p>a. Perform step 1.a of voltage check.</p> <p>b. Monitor the following pins with an oscilloscope while moving the 1-Hz thumb wheel on front panel.</p> <p style="padding-left: 40px;">U17 pin 12</p> <p style="padding-left: 40px;">U17 pin 14</p> <p style="padding-left: 40px;">U17 pin 16</p> <p style="padding-left: 40px;">U17 pin 18</p> <p>c. Follow the same procedure as step 3.b except use 10-Hz thumb wheel and the following pins.</p> <p style="padding-left: 40px;">U17 pin 9</p> <p style="padding-left: 40px;">U17 pin 7</p>	<p>Changing data</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>Changing data</p> <p>See above</p>	<p>Troubleshoot U17.</p> <p>See above</p> <p>See above</p> <p>See above</p> <p>Troubleshoot U17.</p> <p>See above</p>
(Cont)			

Table 2. Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	U17 pin 5	See above	See above
	U17 pin 3	See above	See above
	d. Follow the same procedure as step 3.b except use 100-Hz thumb wheel and the following pins.		
	U18 pin 12	Changing data	Troubleshoot U18.
	U18 pin 14	See above	See above
	U18 pin 16	See above	See above
	U18 pin 18	See above	See above
	e. Follow the same procedure as step 3.b except use 1-kHz thumb wheel and the following pins.		
	U18 pin 9	Changing data	Troubleshoot U18.
	U18 pin 7	See above	See above
	U18 pin 5	See above	See above
	U18 pin 3	See above	See above
	f. Follow the same procedure as step 3.b except use 10-kHz thumb wheel and the following pins.		
	U9 pin 12	Changing data	Troubleshoot U9.
	U9 pin 14	See above	See above
	U9 pin 16	See above	See above
	U9 pin 18	See above	See above
	g. Follow the same procedure as step 3.b except use 100-kHz thumb wheel and the following pins.		
	U9 pin 9	Changing data	Troubleshoot U9.
	U9 pin 7	See above	See above
	U9 pin 5	See above	See above
	U9 pin 3	See above	See above
	h. Follow the same procedure as step 3.b except use 1-MHz thumb wheel and the following pins.		
	U10 pin 7	Changing data	Troubleshoot U10.
	U10 pin 5	See above	See above
	U10 pin 3	See above	See above
	(Cont)	U10 pin 14	See above

Table 2. Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL														
3. (Cont)	i. Follow the same procedure as step 3.b except use 10-MHz thumb wheel and the following pins. U10 pin 16 U10 pin 18	Changing data See above	Troubleshoot U10. See above														
4. Output data	a. Perform step 1.a of voltage check. b. Set the front panel thumb wheels to the following setting. Using an oscilloscope, check pins P1-67 through P1-92 for level indicated, with P1-67 being the least significant bit and P1-92 the most significant bit. The output digits are grouped in six groups of four and one group of two (CR4, CR5). The output code is hexadecimal. <p style="text-align: center;">Note</p> <p style="text-align: center;">The first output code should read: 0000 1110 10110001 0010 1111 01 from P1-67 to P1-92.</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;"><u>FREQUENCY SETTING</u></th> <th style="text-align: left;"><u>OUTPUT CODE</u></th> </tr> </thead> <tbody> <tr> <td>00.000000</td> <td>2F48C70</td> </tr> <tr> <td>11.111111</td> <td>24B01A9</td> </tr> <tr> <td>22.222222</td> <td>1A176E2</td> </tr> <tr> <td>24.444444</td> <td>17F8E54</td> </tr> <tr> <td>28.888888</td> <td>13BBD38</td> </tr> <tr> <td>20.000000</td> <td>1C35F70</td> </tr> </tbody> </table>	<u>FREQUENCY SETTING</u>	<u>OUTPUT CODE</u>	00.000000	2F48C70	11.111111	24B01A9	22.222222	1A176E2	24.444444	17F8E54	28.888888	13BBD38	20.000000	1C35F70		If any output is incorrect, check the latch associated with that pin. If the latch is working, replace U17 or U25. The latches involved are U18 through U21 and U27 through U30.
<u>FREQUENCY SETTING</u>	<u>OUTPUT CODE</u>																
00.000000	2F48C70																
11.111111	24B01A9																
22.222222	1A176E2																
24.444444	17F8E54																
28.888888	13BBD38																
20.000000	1C35F70																
5. Synchronizer tests	a. Perform step 1.a of voltage check. b. Apply a 250-Hz TTL square wave to P1 pin 101. With oscilloscope, observe P1 pin 101 and P1 pin 94. Verify that pin 94 has a TTL level pulse of approximately 1-microsecond duration approximately 550 microseconds after each low-to-high transition at pin 101.		Troubleshoot U40 through U44.														

5. ALIGNMENT/ADJUSTMENT

No alignment or adjustment is required on the DDS control interface. If levels are not proper at points tested, the faulty component should be located and replaced.

6. REPAIR

Repair of the circuit card is accomplished using the procedures detailed in the Circuit Card Repair instructions (523-0772831) contained elsewhere within this manual.

7. DIAGRAMS

7.1 Configuration Status Control

Collins Defense Communications 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, 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 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 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. This indicates 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

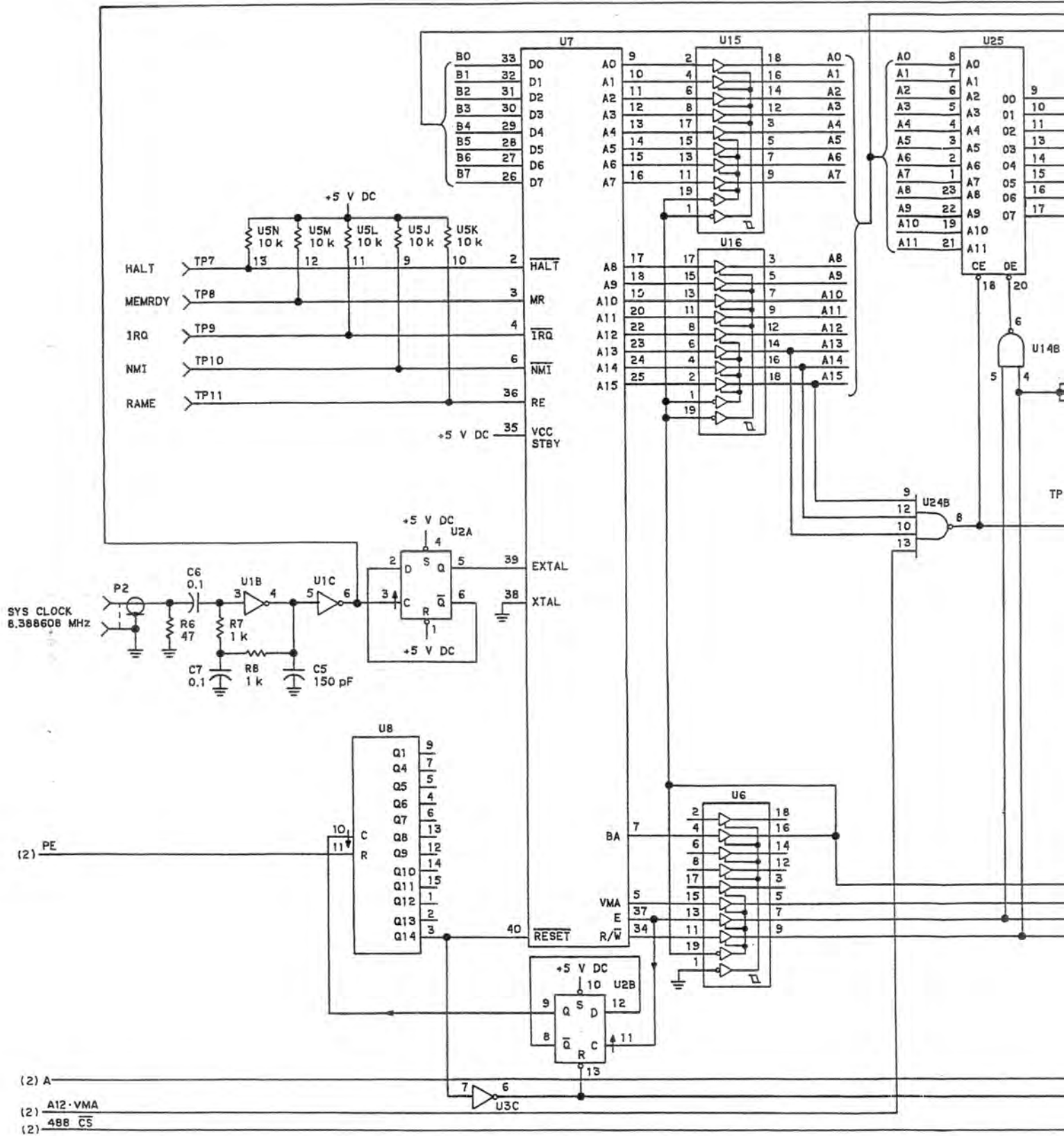
A reworked unit may not contain all design changes made prior to the reworked alphabetic identifier, but does contain all changes required to make unit operation identical to a newly manufactured unit having the same alphabetic identifier. Therefore, a unit reworked to a specific alphabetic identifier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

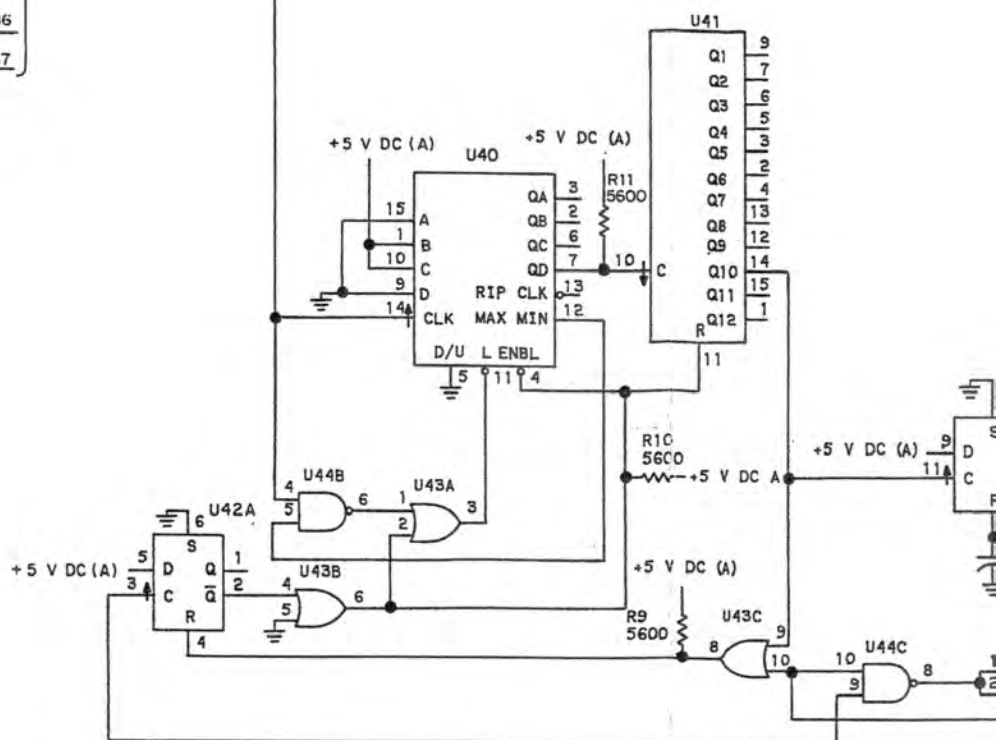
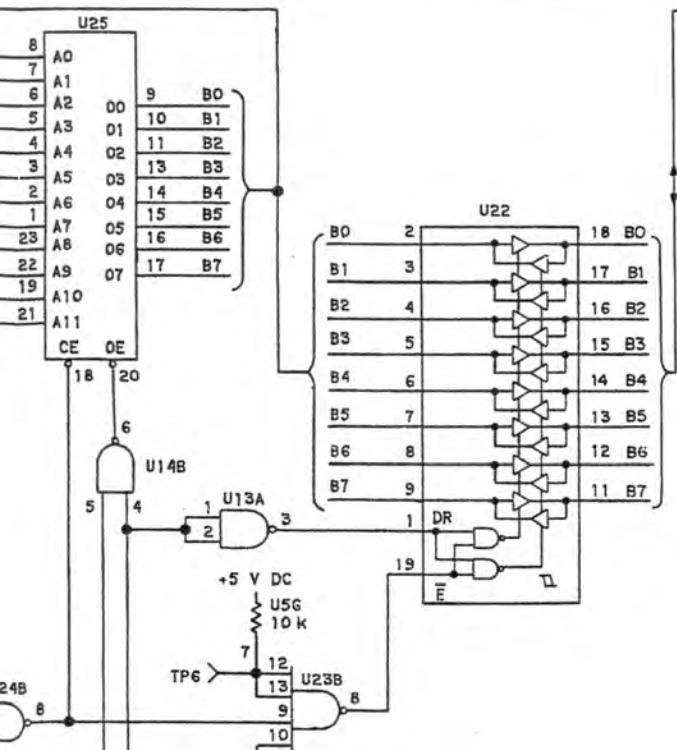
Only alphabetic identifiers that result in schematic changes are covered in this section. Therefore, if a unit or subassembly has an alphabetic identifier that falls between identifiers on the schematic changes page, or after the last identifier on the schematic changes page up to and including the latest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

7.2 Configuration Effectivity

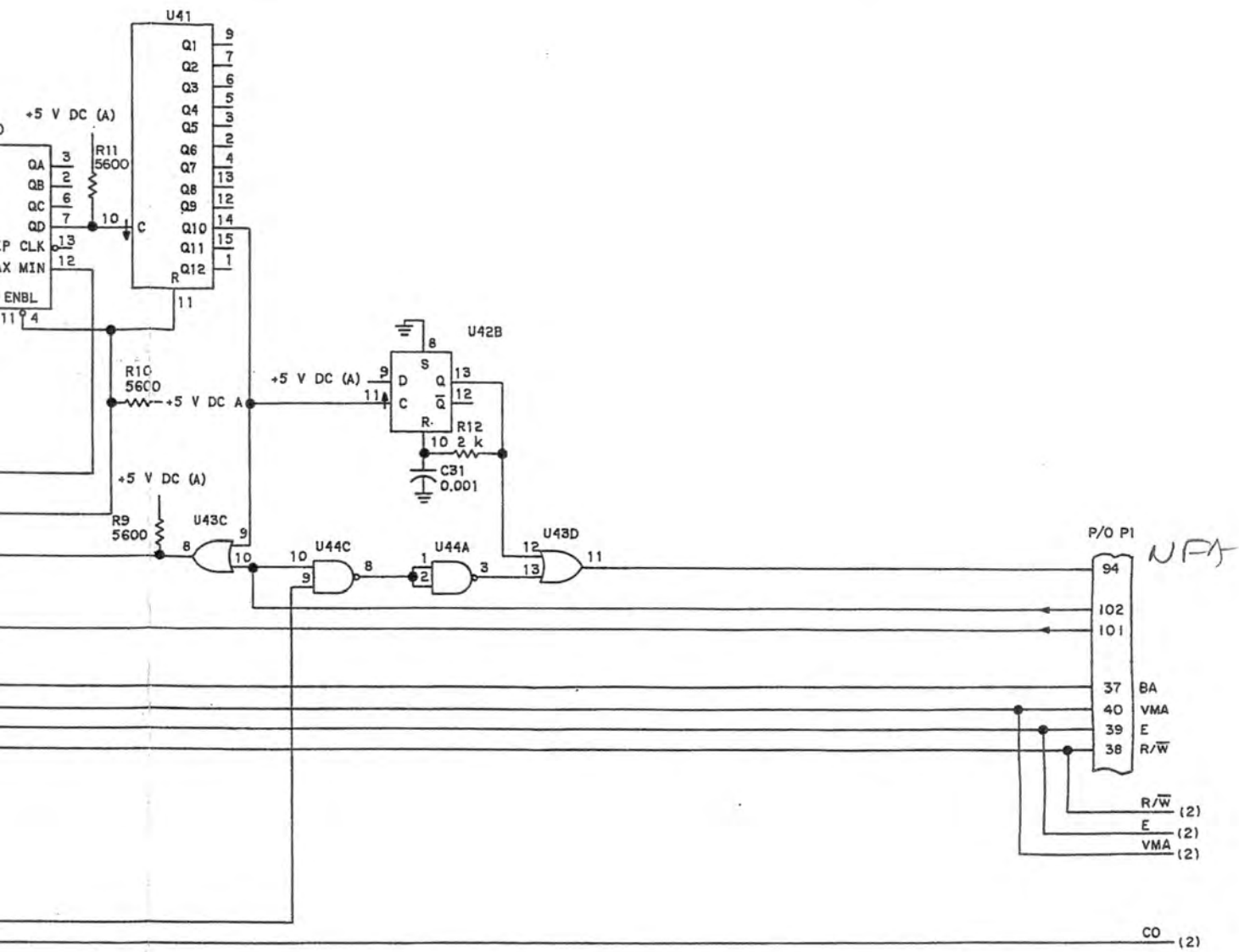
Listed below are the units/subassemblies with the latest alphabetic identifier covered by this document.

<u>CARD/SUBASSEMBLY</u>	<u>PART NUMBER</u>	<u>LATEST EFFECTIVITY</u>
DDS Control Interface	646-5905-003	G



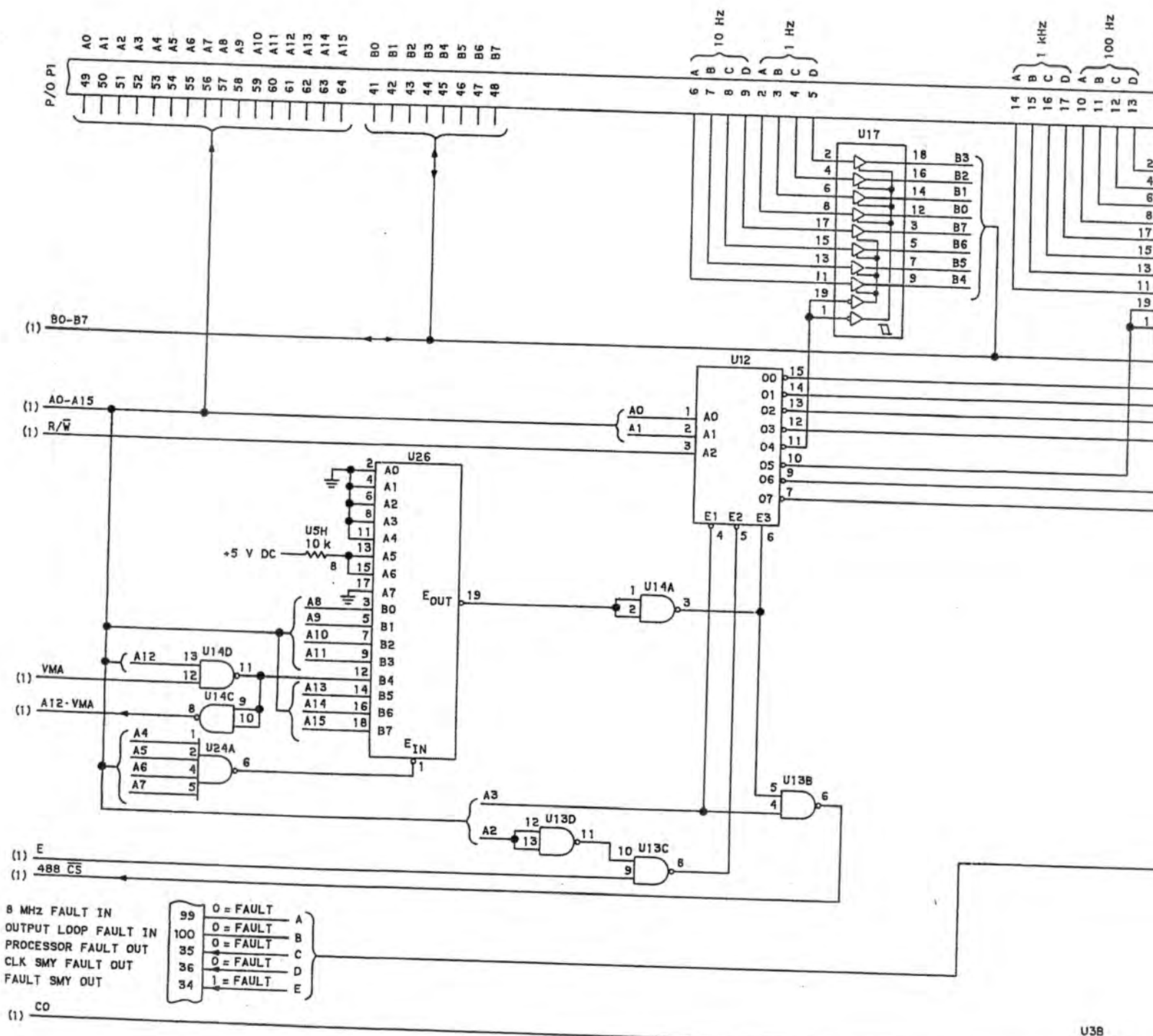


AO-A15 (2)
BO-B7 (2)

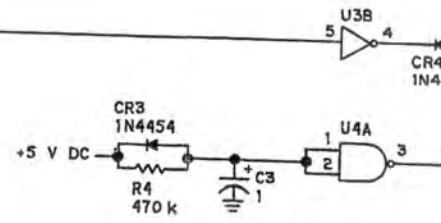


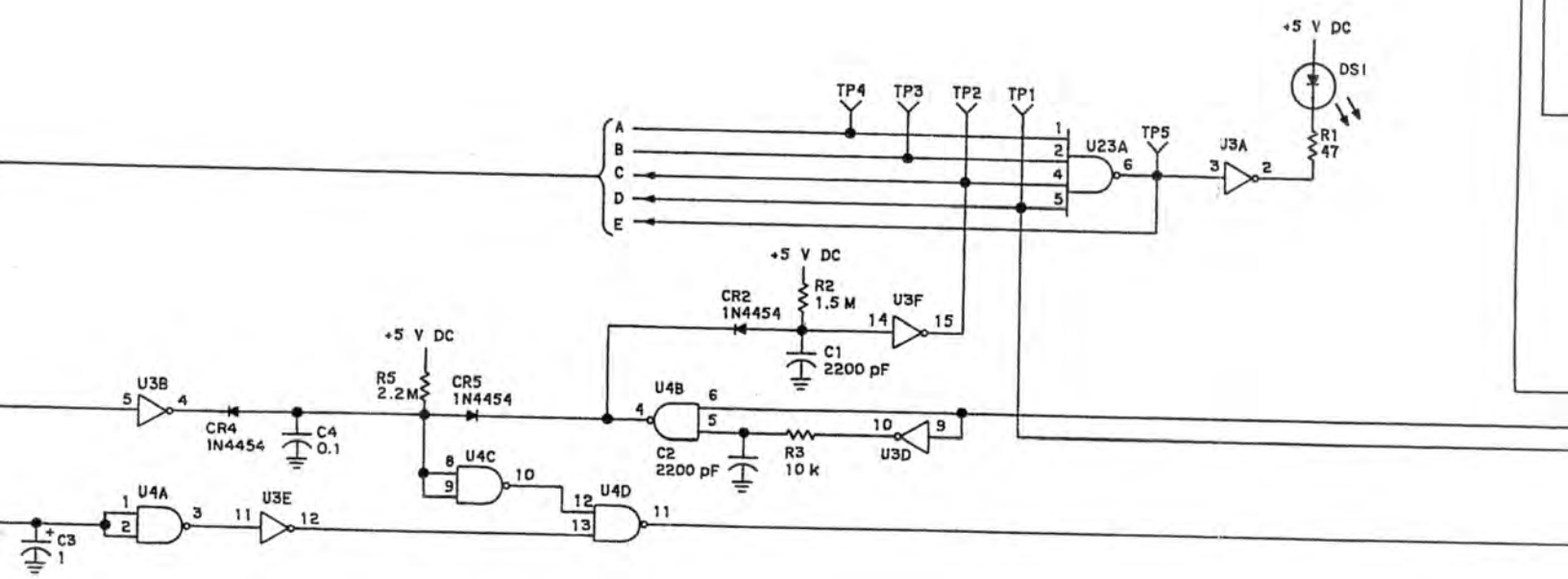
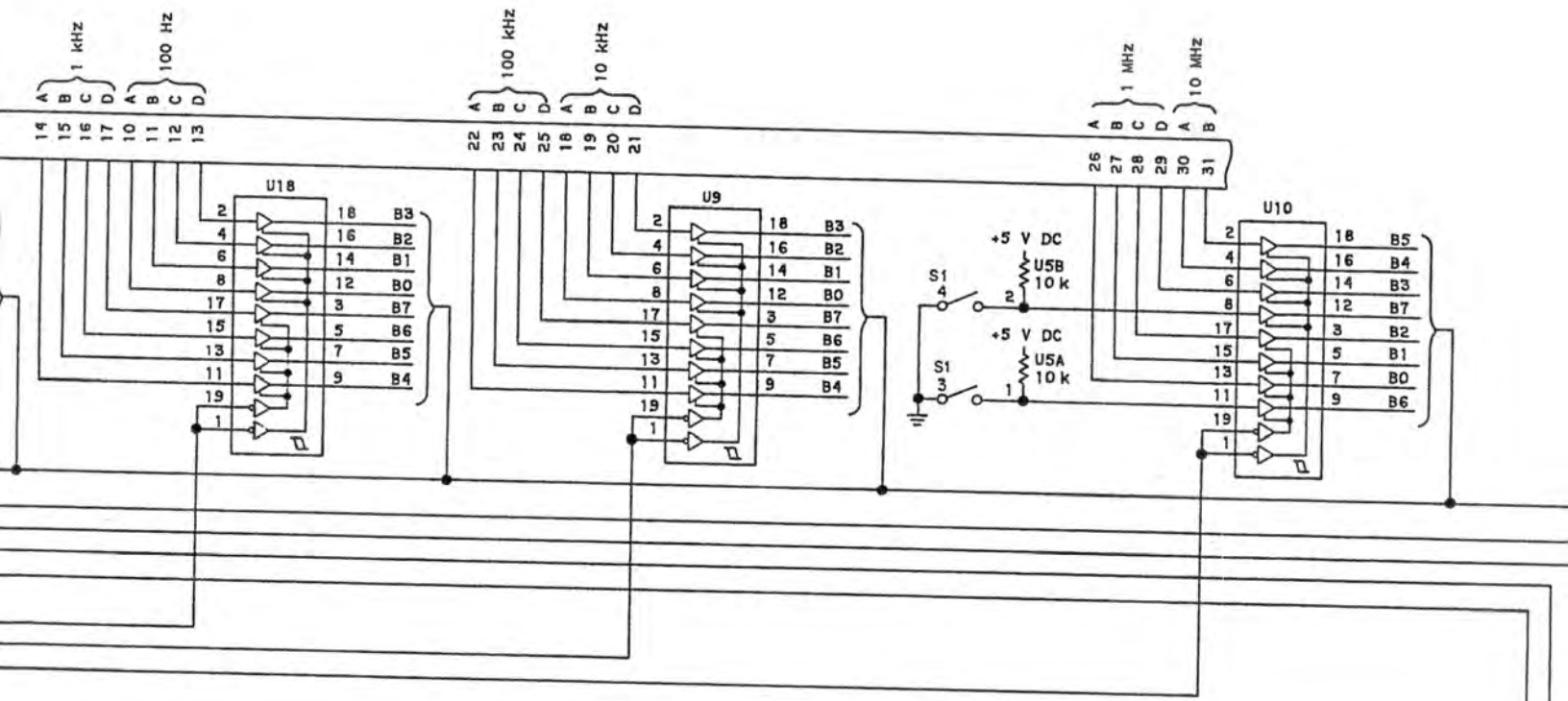
651-5365

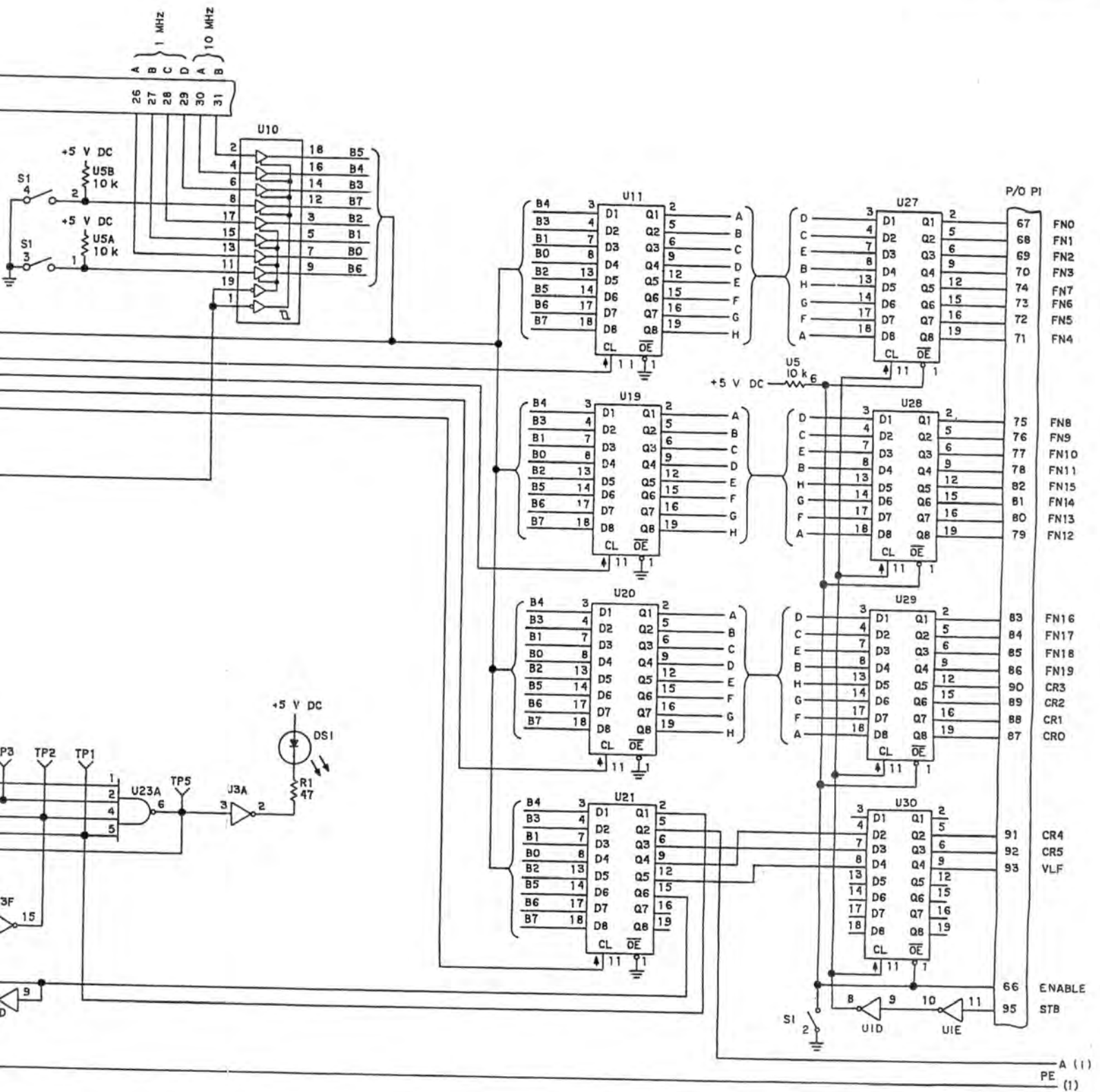
DDS Control Interface,
Schematic Diagram
Figure 4 (Sheet 1 of 3)



99	0 = FAULT	A
100	0 = FAULT	B
35	0 = FAULT	C
36	0 = FAULT	D
34	1 = FAULT	E

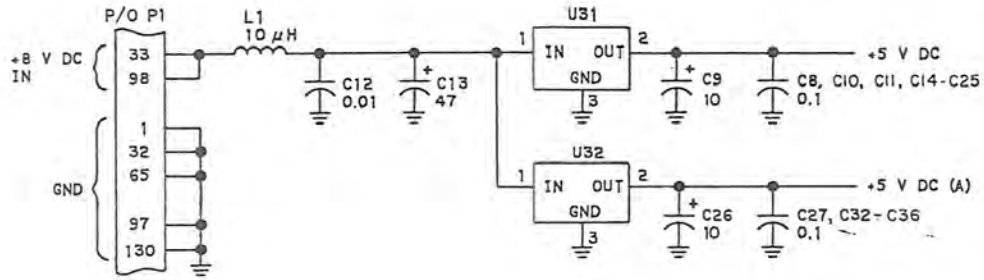






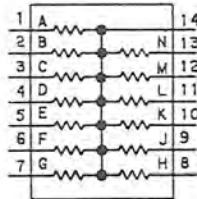
651-5365

DDS Control Interface,
Schematic Diagram
Figure 4 (Sheet 2)



NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS, PREFIX WITH UNIT NUMBER 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.
5. U5, 10 k.



MICROCIRCUIT INFO

REF DES	COMMON DEVICE	PWR (V DC)		
		+5	+5 (A)	GND
U1	74LS04	14		7
U2	74LS74	14		7
U3	4049	1		8
U4	4093	14		7
U5	NOTE 5	14		
U6	74LS244	20		10
U7	6802	8		1, 21
U8	4020	16		8
U9	74LS244	20		10
U10	74LS244	20		10
U11	74C374	20		10
U12	74LS138	16		8
U13	74LS00	14		7
U14	74LS00	14		7
U15	74LS244	20		10
U16	74LS244	20		10
U17	74LS244	20		10
U18	74LS244	20		10
U19	74C374	20		10
U20	74C374	20		10

REF DES	COMMON DEVICE	PWR (V DC)		
		+5	+5 (A)	GND
U21	74C374	20		10
U22	74LS245	20		10
U23	74LS20	14		7
U24	74LS20	14		7
U25	2732	24		12
U26	74LS521	20		10
U27	74C374	20		10
U28	74C374	20		10
U29	74C374	20		10
U30	74C374	20		10
U31	7805			
U32	7805			
U33				
U34				
U35				
U36				
U37				
U38				
U39				

REF DES	COMMON DEVICE	PWR (V DC)		
		+5	+5 (A)	GND
U40	74LS191		16	8
U41	4040		16	8
U42	4013		14	7
U43	74LS32		14	7
U44	74LS00		14	7

651-5365

DDS Control Interface,
Schematic Diagram
Figure 4 (Sheet 3)

8. PARTS LIST

8.1 Introduction

Caution

If this equipment contains electrostatic discharge sensitive (ESDS) devices as indicated in the parts list, special handling methods and materials must be used to prevent equipment damage. Refer to the applicable repair sections/paragraphs before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All parts list illustrations containing ESDS items are shown with the following symbol:



This paragraph assists in identification and requisition of parts. A parts location illustration, parts list tabulation, and modification history are included. The parts location illustration is a design engineering drawing that shows component placement on the circuit cards.

8.2 Parts List

REF DES Column — Reference designators and/or item numbers for each part/subassembly are listed in alphanumeric or numeric sequence. These are the reference designators and/or item numbers shown on the parts location illustration. Only the reference designators are shown on the schematic diagram.

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

Modifications are identified by two methods: An alphanumeric identifier is assigned to each electrical design change and listed in the **REVISION IDENT** column of the modification history. 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.

NA (not applicable) in the **REVISION IDENT** column indicates a documentation change and/or mechanical change. This revision activity will be noted in the **DESCRIPTION** column of the parts list only. This change does not affect the circuit card/subassembly components or the schematic. Each change relates to the **REV** (revision identifier) stamped on the circuit card/subassembly and is listed in the **EFFECTIVITY** column of the modification history. A dash (—) denotes original; letter A first change; letter B second change, etc.

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.

8.3 How To Use This Parts List

To locate a part number, locate the part and item number and/or reference designator on the illustration. Turn to the parts list page and find the item number and/or reference designator to determine its description and part number.

To locate the illustration for a part, if the reference designator and/or part number are known, refer to the parts list and find the figure and item number indicated in the parts list for location on the illustration.

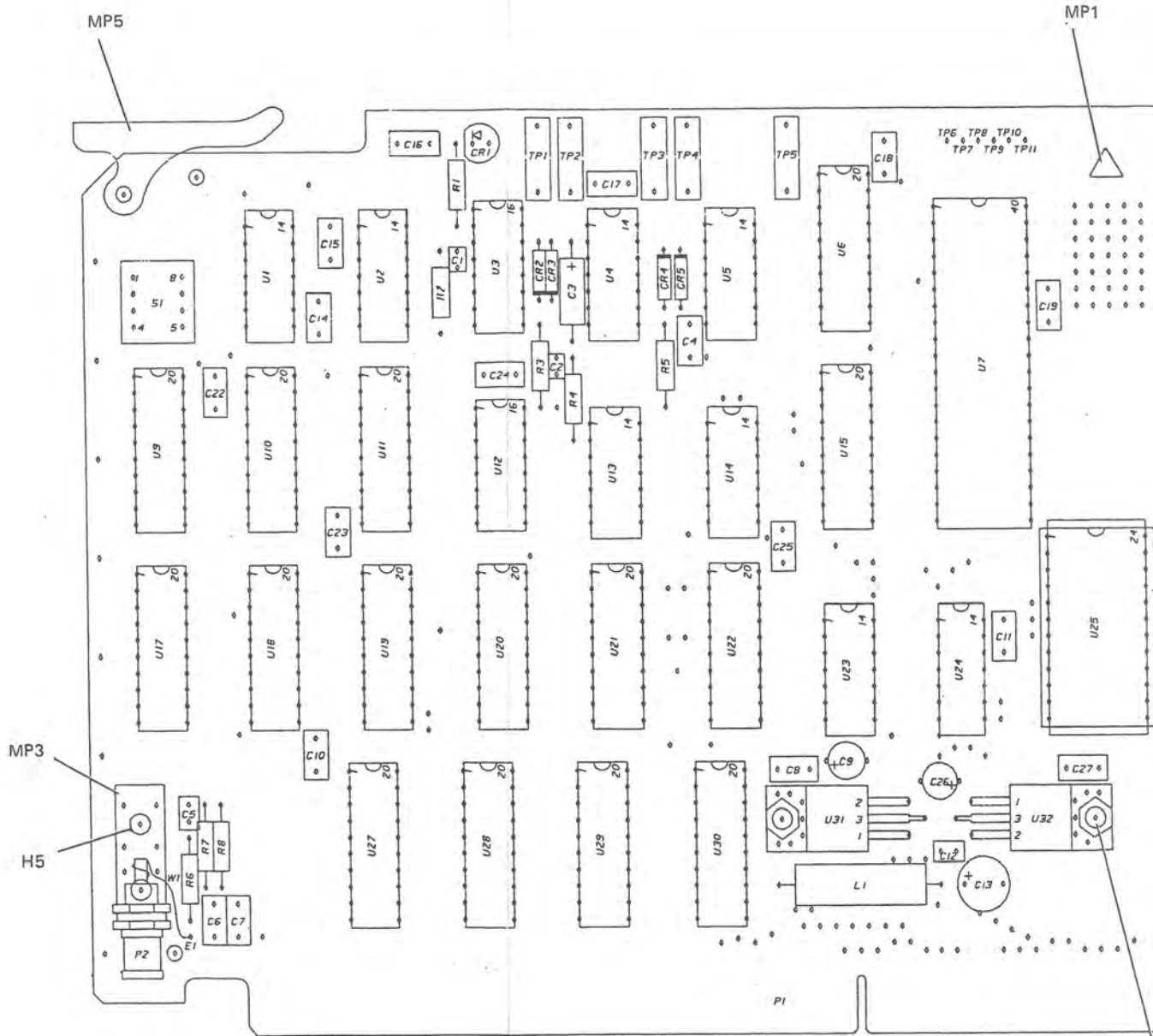
8.4 Manufacturer's Code, Name, and Address

<u>MFR CODE</u>	<u>MANUFACTURER'S NAME AND ADDRESS</u>	<u>MFR CODE</u>	<u>MANUFACTURER'S NAME AND ADDRESS</u>
00779	AMP INC P O BOX 3608 HARRISBURG PA 17105	31019	SOLID STATE SCIENTIFIC INC 3900 WELSH RD WILLOW GROVE PA 19090
01121	ALLEN-BRADLEY CO 1201 SOUTH 2ND ST MILWAUKEE WI 53204	31433	UNION CARBIDE CORP ELECTRONICS DIV HWY 276 SE P O BOX 5928 GREENVILLE SC 29606
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP 13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49 DALLAS TX 75265	34335	ADVANCED MICRO DEVICES 901 THOMPSON PL SUNNYVALE CA 94086
02735	RCA CORP SOLID STATE DIVISION ROUTE 202 SOMERVILLE NJ 08876	56289	SPRAGUE ELECTRIC CO 87 MARSHALL ST NORTH ADAMS MA 01247
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR 5005 E MCDOWELL RD PHOENIX AZ 85008	72982	MURATA ERIE NORTH AMERICA INC ERIE OPERATIONS 645 W 11TH ST ERIE PA 16512
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV SUB OF SCHLUMBERGER LTD NORTH AMERICAN SALES MAIL STOP 14-1053 401 ELLIS ST P O DRAWER 7284 MOUNTAIN VIEW CA 94042	81073	GRAYHILL INC 561 HILLGROVE AVE P O BOX 373 LA GRANGE IL 60525
12998	QUALITY NAME PLATE INC MILL ROAD EAST GLASTONBURY CT 06025	81349	MILITARY SPECIFICATIONS
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS DIV 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498	93958	REPUBLIC ELECTRONICS CORP 176 E 7TH ST PATERSON NJ 07524
14936	GENERAL INSTRUMENT CORP DISCRETE SEMI CONDUCTOR DIV 600 W JOHN ST HICKSVILLE NY 11802	96906	MILITARY STANDARDS
27014	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051	98291	SEAELECTRO CORP 225 HOYT MAMARONECK NY 10544
		99800	AMERICAN PRECISION INDUSTRIES INC DELEVAN DIV 270 QUAKER RD EAST AURORA NY 14052

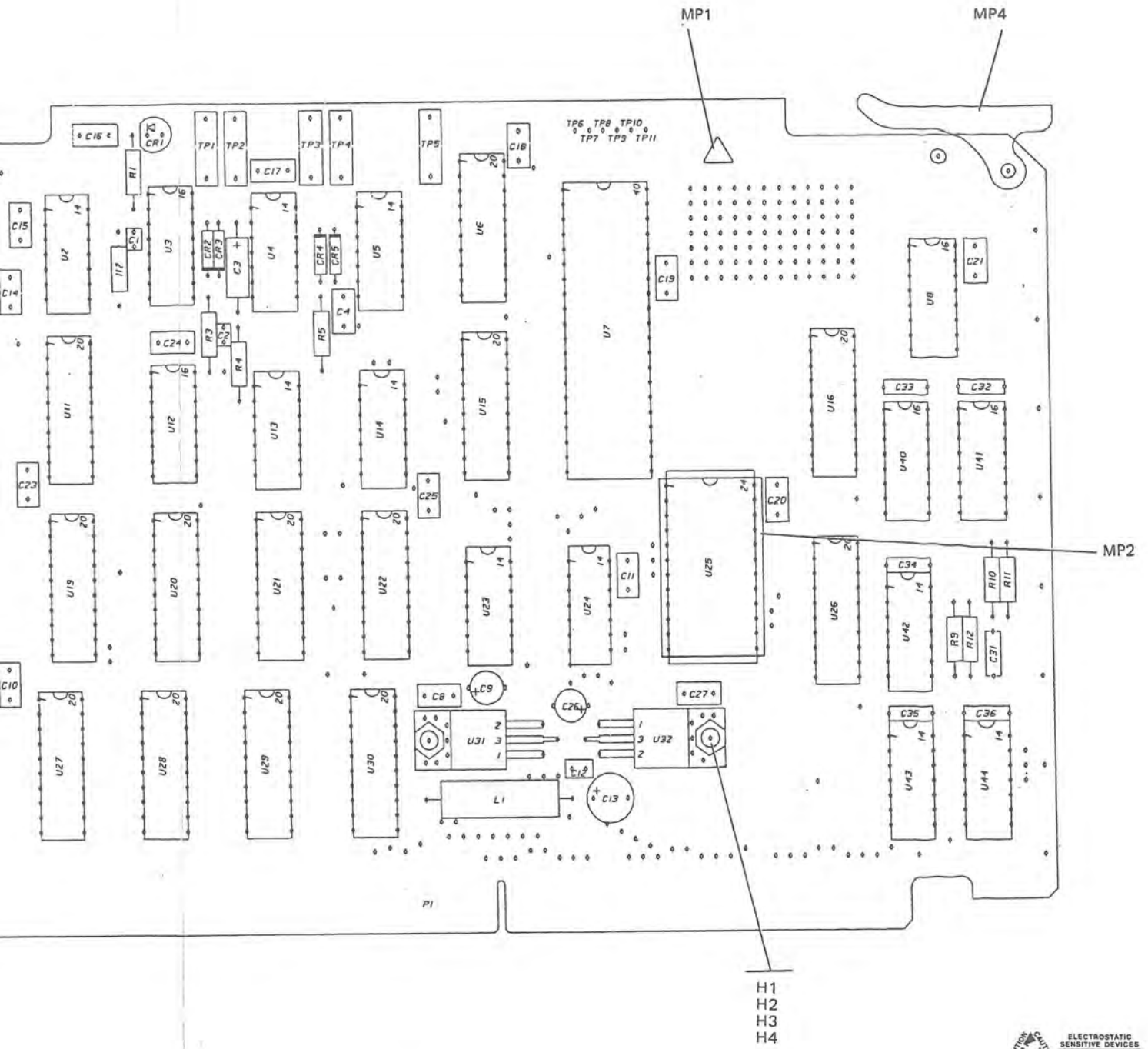
8.5 Equipment Covered

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

<u>CARD/SUBASSEMBLY</u>	<u>PART NUMBER</u>	<u>LATEST EFFECTIVITY</u>
DDS Control Interface	646-5905-003	G



H
H
H
H



DDS Control Interface,
Parts Location Diagram
Figure 5 (Sheet 1 of 2)

TPA-8071-019

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR	
				CODE	PART NUMBER
	DDS CONTROL INTERFACE (ESDS)	646-5905-003			646-5905-003
CR1	SEMICOND DEVICE	353-0293-040		14936	MV5053
CR2-CR5	SEMICOND DEVICE	353-3644-010		31433	1N4454-1
C1,C2	CAPACITOR, FIXED CER DIE, 2200PF, 20%, 50V	913-3279-060		72982	8111P050Z5U222M
C3	CAPACITOR, FIXED ELCTLT, 1UF, 10%, 50V	184-9087-430		81349	M39003/01-2356
C4	CAPACITOR, FIXED CER DIE, 0.1UF, 10%, 100VDC	913-5019-440		81349	CK06DX104K
C5	CAPACITOR, FIXED CER DIE, 150PF, 5%, 100VDC	913-3117-050		93950	DR20CB151J
C6-C8	CAPACITOR, FIXED CER DIE, 0.1UF, 20%, 50V	913-3279-200		72982	8131M050Z5U104M
C9	CAPACITOR, FIXED TMTLM ELCTLT, 10UF, 20%, 20V	184-9102-610		31433	T362B106M020AS
C10,C11	CAPACITOR, FIXED CER DIE, 0.1UF, 20%, 50V	913-3279-100		72982	8131M050Z5U104M
C12	CAPACITOR, FIXED CER DIE, 0.01UF, 20%, 50V	913-3279-110		72982	8121M050Z5U103M
C13	CAPACITOR, FIXED TMTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56269	194D239A
C14-C25	CAPACITOR, FIXED CER DIE, 0.1UF, 20%, 50V	913-3279-200		72982	8131M050Z5U104M
C26	CAPACITOR, FIXED TMTLM ELCTLT, 10UF, 20%, 20V	184-9102-610		31433	T362D106M020AS
C27	CAPACITOR, FIXED CER DIE, 0.1UF, 20%, 50V	913-3279-200		72982	8131M050Z5U104M
C28-C30	NOT USED				
C31	CAPACITOR, FIXED CER DIE, 1000PF, 10%, 100VDC	913-3325-310		56289	923CX7R102K100B
C32-C36	CAPACITOR, FIXED CER DIE, 0.1UF, 10%, 50VDC	913-3325-470		56289	923CX7R104K050B
H1	NUT, PLAIN, HEX SST, 4-40 (QTY 2)	313-0043-000		96906	M535649-244
H2	WASHER, LOCK SST, 0.115 ID X 0.209 OD (QTY 2)	310-0279-000		96906	M53538-135
H3	WASHER, FLAT CRES, 0.125ID X 0.250 OD (QTY 2)	310-0779-030		96906	M51795-803
H4	SCREW, MACH SST, 4-40 X 5/16 (QTY 2)	343-0134-000		96906	M51957-14
H5	RIVET, TUBULAR BR5, 0.123 DIA X 0.156 (QTY 2)	305-1788-000			305-1788-000
L1	COIL, RF 10UH	240-0884-020		99800	BP-2267-2
MP1	LABEL, WARNING (QTY 1)	280-2745-040		12998	280-2745-040
MP2	SOCKET, IC (QTY 1)	220-0075-050		00779	641266-1
MP3	BRACKET (QTY 1)	651-4498-001			
MP4	EXTRACTOR (QTY 1)	652-7924-001			
MP5	EXTRACTOR (QTY 1)	652-7919-001			
P1	NOT USED				
P2	CONNECTOR, RCPT ELEC	357-7207-100		98291	52-046-0000
R1	RESISTOR, FIXED CHPSN, 47 OHMS, 10%, 1/4W	745-0701-000		81349	RCR07G470KS
R2	RESISTOR, FIXED CHPSN, 1.5HEGO, 10%, 1/4W	745-0863-000		81349	RCR07G15SKS
R3	RESISTOR, FIXED CHPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G10SKS
R4	RESISTOR, FIXED CHPSN, 0.47HEGO, 10%, 1/4W	745-0845-000		81349	RCR07G474KS
R5	RESISTOR, FIXED CHPSN, 2.2HEGO, 10%, 1/4W	745-0069-000		81349	RCR07G22SKS
R6	RESISTOR, FIXED CHPSN, 47 OHMS, 10%, 1/4W	745-0701-000		81349	RCR07G470KS
R7,R8	RESISTOR, FIXED CHPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R9-R11	RESISTOR, FIXED CHPSN, 5.6K, 10%, 1/4W	745-0776-000		81349	RCR07G562KS
R12	RESISTOR, FIXED CHPSN, 2K, 5%, 1/4W	745-0759-000		81349	RCR07G202JS
S1	SWITCH, DUAL PKG	266-0243-010		81073	765804S
TP1	JACK, TIP BRN	360-0162-000		81349	M39024-11-04
TP2	JACK, TIP RED	360-0160-000		81349	M39024-11-02
TP3	JACK, TIP ORN	360-0164-000		81349	M39024-11-06
TP4	JACK, TIP YEL	360-0166-000		81349	M39024-11-08
TP5	JACK, TIP GRN	360-0163-000		81349	M39024-11-05
U1	INTEGRATED CIRCUIT LOGIC GATE (ESDS)	351-1523-090		04713	SN74LS04N
U2	INTEGRATED CIRCUIT FLIP FLOP (ESDS)	351-1525-040		04713	SN74LS74AN
U3	INTEGRATED CIRCUIT DIGITAL MOS (ESDS)	351-8159-210		31019	SCL4049UBE
U4	INTEGRATED CIRCUIT (ESDS)	351-8342-010		02735	CD4093BE
U5	RESISTOR NETWORK DUAL-IN-LINE, 10K, 2%, 125V	350-4027-120		01121	314A103
U6	INTEGRATED CIRCUIT BUFFER/LINE DRIVER	351-1841-030		01295	SN74LS244N
U7	INTEGRATED CIRCUIT MICROPROCESSOR (ESDS)	351-8873-012		07263	F6802DMQB
U8	INTEGRATED CIRCUIT DIGITAL MOS (ESDS)	351-8159-090		31019	SCL4020BE
U9,U10	INTEGRATED CIRCUIT BUFFER/LINE DRIVER	351-1841-030		01295	SN74LS244N
U11	INTEGRATED CIRCUIT FLIP FLOP (ESDS)	351-8610-020		27014	HM74C374N
U12	INTEGRATED CIRCUIT DECODER (ESDS)	351-1526-030		04713	SN74LS138N
U13,U14	INTEGRATED CIRCUIT LOGIC GATE (ESDS)	351-1523-110		04713	SN74LS00N
U15-U18	INTEGRATED CIRCUIT BUFFER/LINE DRIVER	351-1841-030		01295	SN74LS244N
U19-U21	INTEGRATED CIRCUIT FLIP FLOP (ESDS)	351-8610-020		27014	HM74C374N
U22	INTEGRATED CIRCUIT TRANSCIEVER, OCTAL BUS (ESDS)	351-1849-020		01295	SN74LS245N
U23,U24	INTEGRATED CIRCUIT LOGIC GATE (ESDS)	351-1523-130		04713	SN74LS20N
U25	INTEGRATED CIRCUIT 2732	659-0884-001			659-0884-001
U26	INTEGRATED CIRCUIT COMPARATOR (ESDS)	351-1947-010		34335	AM25LS2521DH
U27-U30	INTEGRATED CIRCUIT FLIP FLOP (ESDS)	351-8610-020		27014	HM74C374N
U31,U32	INTEGRATED CIRCUIT REGULATOR	351-1120-010		07263	UA7805UC
U33-U39	NOT USED				
U40	INTEGRATED CIRCUIT COUNTER (ESDS)	351-1527-030		07263	74LS191PC
U41	INTEGRATED CIRCUIT DIGITAL MOS (ESDS)	351-8159-240		02735	CD4040SE
U42	INTEGRATED CIRCUIT DIGITAL MOS (ESDS)	351-8159-110		31019	SCL4013SE
U43	INTEGRATED CIRCUIT LOGIC GATE (ESDS)	351-1523-260		04713	SN74LS32N
U44	INTEGRATED CIRCUIT LOGIC GATE (ESDS)	351-1523-110		04713	SN74LS00N