



Rockwell  
International

instructions

# DVBFO Switchboard (638-6437-001)

Collins Telecommunications Products Division

523-0770518-001211

1 October 1980

Printed in USA

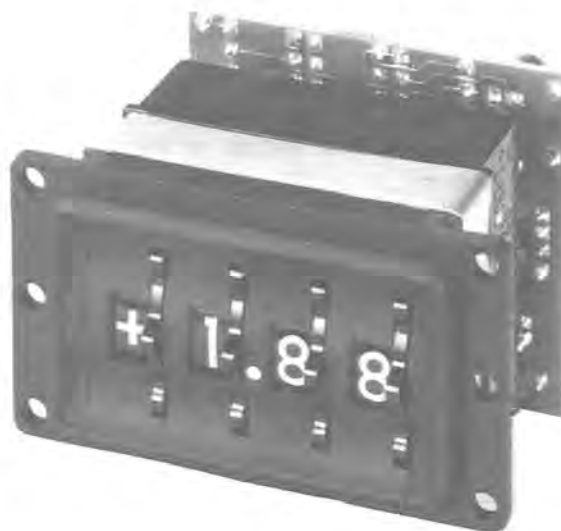
Instructions  
DVBFO Switchboard  
(638-6437-001)

## 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

523-0770518-001211

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	<p>a. Remove top cover of unit containing dvbfo switchboard to be tested.</p> <p style="text-align: center;"><b>Note</b></p> <p>Testing procedures (test 2) on dvbfo switchboard used in the controls (HF-8090/8091/8092) can be accomplished with the top cover in place.</p> <p>b. If control unit, remove parallel input card A11. Install it on an extender card and place it in the control unit.</p> <p>c. Apply power to unit.</p>		
2. Testing procedures when installed in control	<p>a. Set CONT switch to LCL, set VBFO switch to VAR.</p> <p>b. Rotate dvbfo frequency switches through their complete range.</p>	Note that dvbfo frequency display read-out 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																																																																																																																																																																																																			
<p>3. Testing and troubleshooting procedures</p>	<p>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.</p> <table border="1" data-bbox="456 913 1495 1528"> <thead> <tr> <th rowspan="2">THUMB WHEEL (kHz)</th> <th rowspan="2">BCD OUTPUT</th> <th rowspan="2">EXTENDER PIN NO</th> <th rowspan="2">A2J6 PIN NO</th> <th colspan="10">THUMB-WHEEL POSITION</th> </tr> <tr> <th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th> </tr> </thead> <tbody> <tr> <td rowspan="4">1000</td> <td>8</td> <td></td> <td>13</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td> </tr> <tr> <td>4</td> <td></td> <td>12</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>2</td> <td></td> <td>11</td> <td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>1</td> <td></td> <td>10</td> <td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td> </tr> <tr> <td rowspan="4">100</td> <td>8</td> <td></td> <td>9</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td> </tr> <tr> <td>4</td> <td></td> <td>8</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>2</td> <td></td> <td>7</td> <td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>1</td> <td></td> <td>6</td> <td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td> </tr> <tr> <td rowspan="4">10</td> <td>8</td> <td></td> <td>5</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td> </tr> <tr> <td>4</td> <td></td> <td>4</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>2</td> <td></td> <td>3</td> <td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>1</td> <td></td> <td>2</td> <td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td> </tr> </tbody> </table> <p>Logic 1 = NLT +3.0 V dc.                      Logic 0 = NMT 0.5 V dc.</p>	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	0	1	1	4		12	0	0	0	0	1	1	1	1	1	0	0	2		11	0	0	1	1	0	0	1	1	1	0	0	1		10	0	1	0	1	0	1	0	1	0	1	1	100	8		9	0	0	0	0	0	0	0	0	0	1	1	4		8	0	0	0	0	1	1	1	1	1	0	0	2		7	0	0	1	1	0	0	1	1	1	0	0	1		6	0	1	0	1	0	1	0	1	0	1	1	10	8		5	0	0	0	0	0	0	0	0	0	1	1	4		4	0	0	0	0	1	1	1	1	1	0	0	2		3	0	0	1	1	0	0	1	1	1	0	0	1		2	0	1	0	1	0	1	0	1	0	1	1	<p>Refer to chart.</p>	<p>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.</p>
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	0	1	1																																																																																																																																																																																								
	4		12	0	0	0	0	1	1	1	1	1	0	0																																																																																																																																																																																								
	2		11	0	0	1	1	0	0	1	1	1	0	0																																																																																																																																																																																								
	1		10	0	1	0	1	0	1	0	1	0	1	1																																																																																																																																																																																								
100	8		9	0	0	0	0	0	0	0	0	0	1	1																																																																																																																																																																																								
	4		8	0	0	0	0	1	1	1	1	1	0	0																																																																																																																																																																																								
	2		7	0	0	1	1	0	0	1	1	1	0	0																																																																																																																																																																																								
	1		6	0	1	0	1	0	1	0	1	0	1	1																																																																																																																																																																																								
10	8		5	0	0	0	0	0	0	0	0	0	1	1																																																																																																																																																																																								
	4		4	0	0	0	0	1	1	1	1	1	0	0																																																																																																																																																																																								
	2		3	0	0	1	1	0	0	1	1	1	0	0																																																																																																																																																																																								
	1		2	0	1	0	1	0	1	0	1	0	1	1																																																																																																																																																																																								
<p>4. Dvbfo frequency change signal</p>	<p style="text-align: center;"><b>Note</b></p> <p>Applicable only to dvbfo switchboards installed in control units.</p> <p>a. Set CONT switch to NORM.                      b. Connect dvm to A11 extender.                      c. Slowly rotate each dvbfo frequency switch through its complete range.</p>	<p>Note a logic 0 spike between each switch position.</p>	<p>Replace associated switch thumb wheel.</p>																																																																																																																																																																																																			

Table 2. DVBFO Switchboard, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Local/remote operation	<p style="text-align: center;"><b>Note</b></p> <p>Applicable only to dvbfo frequency switchboards installed in local units.</p> <p>a. Set CONT switch to REM.</p> <p>b. Rotate all dvbfo frequency switches through their complete range.</p>	<p>Note the voltage at the associated A2J6 pins for each setting of each switch.</p> <p>0 V on all pins.</p>	<p>Unit malfunction.</p>

#### 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.

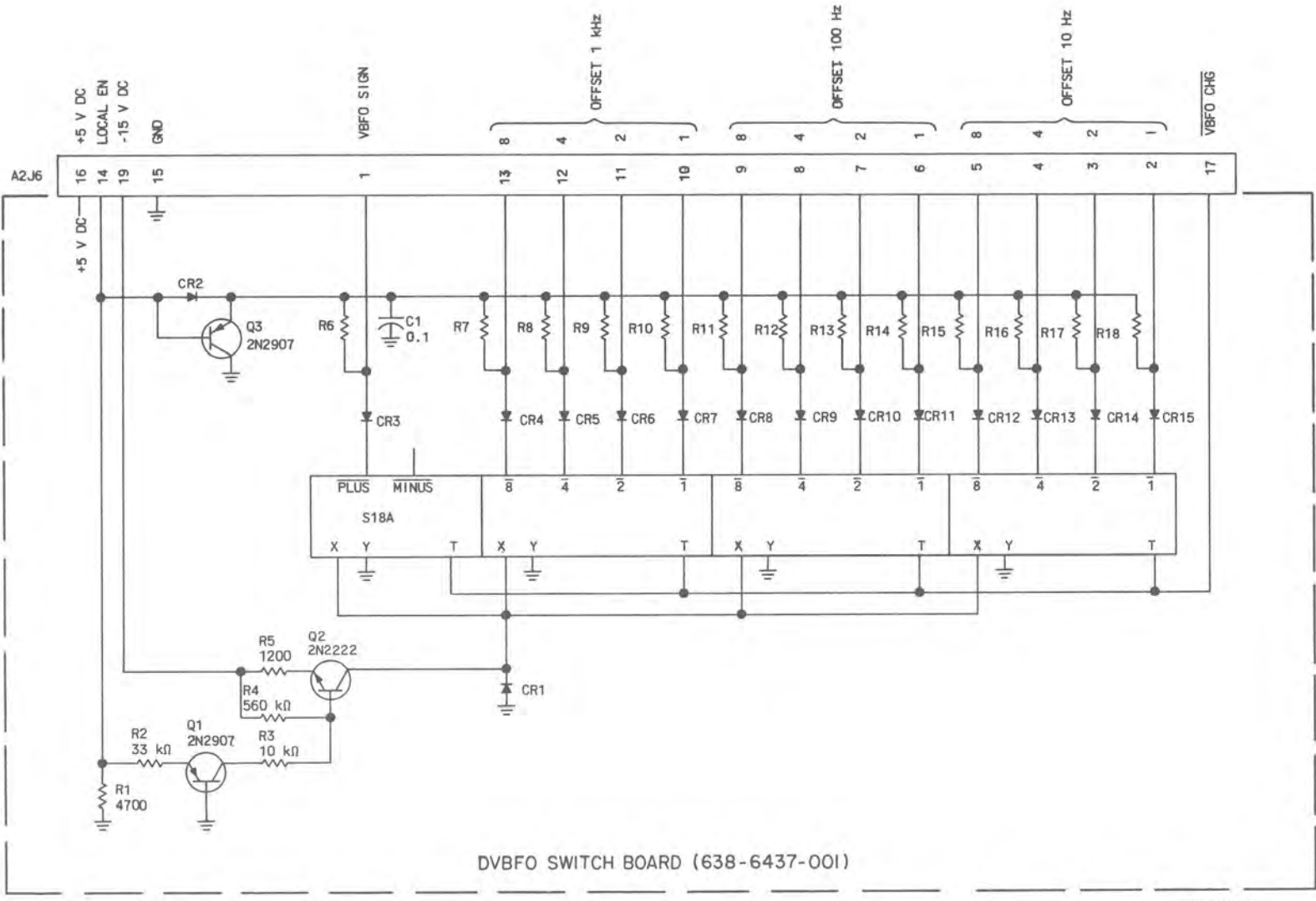
Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

<u>MFR CODE</u>	<u>MANUFACTURER'S NAME AND ADDRESS</u>
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*

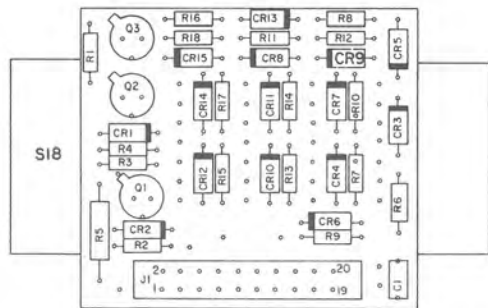
Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

<u>CIRCUIT CARD/ SUBASSEMBLY</u>	<u>COLLINS PART NUMBER</u>	<u>LATEST EFFECTIVITY</u>
Dvbfo switchboard	638-6437-001	REV A

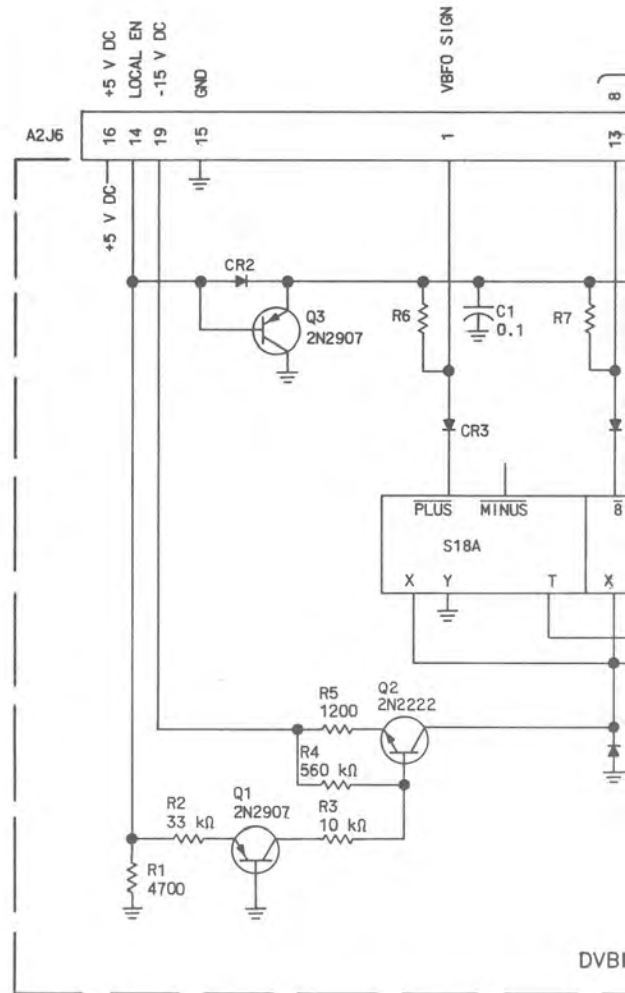


- NOTES:
- ① UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND DIODES ARE IN4454.
  - ② R6-R18 ARE 33 kΩ.

DVBFO Switchboard, Schematic Diagram  
Figure 2 (Sheet 1 of 2)



TPA-2430-011



NOTES:

- ① UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND DIODES ARE 1N4454.
- 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 DIEI, 0.1UF, FORM10%, 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