TRANSISTOR MAINTENANCE

Transistors are inherently long-life devices and normally should not require replacement in the life of the equipment. If it becomes apparent through systematic troubleshooting that replacement is necessary, a few precautions must be observed.

PROTECTION

Transistors can be damaged by excessive heat. When removing or replacing a transistor soldered to tie points or to an etched circuit board, use a small soldering iron with a 1/8" diameter chisel tip. Use small diameter high tin content solder.

On etched circuit boards, use a toothpick inserted from the conductor side to clean out the holes before inserting the new transistor. High heat reduces conductor-to-board bonding. Pressure applied from the component side may cause the hold pad and conductor to be torn away from the board.

ORIENTATION

Transistors are packaged in various case sizes and types with various lead configurations. Before removing a transistor from an etched circuit board or tie points, make a sketch of the orientation of the transistor leads with respect to the circuit board or tie points. Forming the leads on the new transistor to conform with the leads on the one being replaced also will aid in making proper connections.

Before removing small 'plug-in' transistors, note the position of the index tab with respect to the socket. Cut the leads on the new transistor to the required length and insert into the socket properly indexed.

POWER TRANSISTORS

When replacing power transistors, be sure that —

1. The mica insulator is not damaged.
2. No grit or metal particles are lodged between the transistor and the heat sink.
3. Both sides of mica insulator are covered with silicone grease or fluid.
4. Mounting screws are tight, and
5. The protective cover is in place.

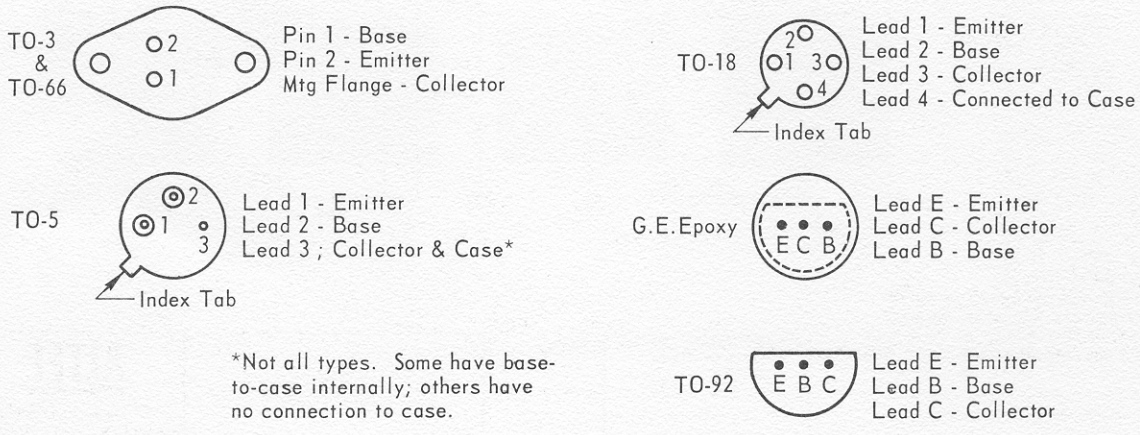
TRANSISTOR TESTING

Transistors should be checked with a transistor tester. If one is not available, an ohmmeter may be used inasmuch as most transistor failures result in a collector-to-emitter short or open circuit. Remove the suspected transistor from the circuit. Connect the ohmmeter leads to the collector and the emitter and read on the low-ohm range. If the low reading is virtually the same when the ohmmeter connections are reversed, the transistor is shorted. If the ohmmeter ten high megohm range shows no reading for both connections of the ohmmeter, the transistor is open.

SERVICING ETCHED CIRCUIT BOARDS

Before removing or replacing components on etched circuit boards, read and observe the following precautions.

1. Use a small soldering iron with a 1/8" diameter chisel tip, and use small diameter, high tin content solder.
2. Components may be removed by placing the soldering iron on the component lead on the conductor side of the board and pulling out the lead. Avoid overheating the conductor.
3. If the component is obviously faulty or damaged, clip the leads close to the component and then unsolder the leads from the board. Withdraw them from the component side.
4. Large components such as potentiometers and sockets may be removed by rotating the soldering iron from lead to lead and applying steady pressure to lift the part free. If the part is to be replaced with a new one, follow the procedure outlined in 3 above.
5. Since the conductor part of the etched circuit board is a metal-plated surface covered with solder, use care to avoid overheating and lifting the conductor from the board. A method for repair is to solder a section of good conducting wire along the damaged area.
6. Clear the solder from the circuit board holes before inserting the leads of the new component. Heat the solder in the hole, remove the iron and quickly insert a pointed non-metallic object, such as a toothpick, from the conductor side.
7. Shape the new component leads and clip them to the proper length. Insert the leads in the holes, observing the same polarity or orientation as that of the removed component. Apply heat and solder on the conductor side.



*Not all types. Some have base-to-case internally; others have no connection to case.

Figure 17 Typical Transistor Package Configurations

PARTS LIST

Reference Designator	Name and Description
C1 thru 5	Capacitor, 1 mfd, 3V (Centralab UK-105)
C6,8,9	Capacitor, 0.1 mfd ±10%, 200V (John Fast #F313C104K)
C10	Capacitor, 0.015 mfd ±10%, 100V (CD WMF 1S15)
C11,13 thru 16,24	Capacitor, 10 mfd, 25V, with plastic sleeve (Ducati #12.32.31)
C12	Capacitor, 0.1 mfd ±10%, 200V (John Fast #F313C104K
C17,18	Capacitor, 0.005 mfd ±20%, Ceramic Disc, (Erie Type 801)
C19	Capacitor, 1 mfd ±10%, 100V (CD WMF 1W1)
C20 thru 23	Capacitor, 5000 mfd, 25V, with Vinyl cover (Mallory Type F.P. or equivalent)
C26	Capacitor, 0.047 mfd ±10%, 200V (John Fast #F313C473K)
C27	Capacitor, 0.01 mfd ±20%, 600V, Ceramic Disc, (Erie Type 811)
CB1	Circuit Breaker, 1 Amp (Sylvania MB 315)
CB2	Circuit Breaker, 5 Amp (Sylvania MB 650)
CR1,2	Rectifier, 1N3492R (Delco)
CR3	Diode, zener (Diodes, Inc. #ZD12B)
P1 thru 6	Control, 750 Ω (Altec 13600-1)
P7,8	Control, 50K Ω (Altec 14573-1)
P9	Potentiometer, 5000 Ω (Melrain)
P10	Potentiometer, 50 Ω (Melrain)
P11	Control, 750 Ω (Altec 14574-4)
PL1,2	Lamp, pilot (GE #1815)
Q2 thru 6	Transistor, AL2712
Q7,8	Transistor (RCA #35554, pin length 0.44" min.)
Q9,12	Transistor, 2N2288 (Bendix B1272)
Q13	Transistor (RCA 2N3053)
R1 thru 5	Resistor, 820 Ω ±10%, 1/2W
R6,9	Resistor, 1000 Ω ±10%, 1/2W
R12	Resistor, 820K Ω ±10%, 1/2W
R13	Resistor, 12K Ω ±10%, 1/2W
R14	Resistor, 1 MΩ ±10%, 1/2W
R15	Resistor, 15K Ω ±10%, 1/2W
R16,18,19,41	Resistor, 1K Ω ±10%, 1/2W
R17	Resistor, 330K Ω ±10%, 1/2W
R20	Resistor, 8.2K Ω ±10%, 1/2W
R21,22	Resistor, 4.7K Ω ±10%, 1/2W
R23	Resistor, 1.5K Ω ±10%, 1/2W
R24,25	Resistor, 47 Ω ±10%, 1/2W
R26,27	Resistor, 470 Ω ±10%, 1/2W
R28,29	Resistor, 33 Ω ±10%, 1/2W
R30,31	Resistor, 12 Ω ±10%, 1/2W
R32 thru 35	Resistor, 0.1 Ω ±10%, 3W (Clarostat VC3D)
R36	Resistor, 7.5 Ω ±5%, 5W (Clarostat VC5E)
R37	Resistor, 100 Ω ±10%, 1/2W
R38	Resistor, 330 Ω ±10%, 1/2W
R39	Resistor, 33 Ω ±10%, 1/2W
R40	Resistor, 10K Ω ±10%, 1/2W
R42	Resistor, 15K Ω ±10%, 1/2W
RT1	Thermistor (Fenwal JZ35J1)
S1 thru 6	Switch, slide (Stackpole SS-50, black trigger)
S7	Switch, power, 125V, 3 Amp; 20V, 5 Amp, (CTS Type SWF; 3/8" long; shaft length 11/16" from mounting surface)
T1	Transformer (Altec 17489)
T2	Transformer (Altec 16658)
T3	Transformer (Altec 6897)
TS1	Terminal strip, barrier (Kulka 600C-YSY-6)
TS2	Terminal strip, barrier (Kulka 599-3/4 St-2)
Input 1 thru 5	Connector (Cannon XLR-3-13)
ACC1 thru 6 Booster	Socket, octal (Cinch 9829)
Compressor Out	Socket (Amphenol 78-S6S)
Recdr Out 1,2 & VU Out	Jack, pin (National Tel-Tronics #326)
Speaker Plug	Plug (Jones P 302-CCT)
Monitor Volume	Jack, phone (National Tel-Tronic 336)
	AC cord (Altec 12934-4)
	Driver Amplifier (Altec 14677)