

SERVICING PRECAUTIONS

1. General Servicing Precautions

(1) Always disconnect the power source before:

- 1) Removing or reinstalling any component, circuit board, module or any other instrument assembly.
- 2) Disconnecting or reconnecting any instrument electrical plug or other electrical connection.
- 3) Connecting a test substitute in parallel with an electrolytic capacitor in the instrument.

Caution: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

(2) Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.

(3) Do not apply power to this instrument and or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.

(4) Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

- 1) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.
- 2) The Components used in the unit have a specified conflammability and dielectric strength. When replacing any components, use components which have the same ratings. Components marked  in the circuit diagram are important for safety or for the characteristics of the unit. Always replace with the exact components.
- 3) An insulation tube or tape is sometimes used and some components are raised above the printed writing board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install them as they were.
- 4) After servicing always check that the removed screws, components and wiring have been installed correctly and that the portion around the service part has not been damaged. Further check the insulation between the blades of attachment plug and accessible conductive parts.

ESD PRECAUTIONS

1. Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive Devices (ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

- (1) Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
- (2) After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
- (3) Use only a grounded-tip soldering iron to solder or unsolder ESD devices.
- (4) Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESD devices.
- (5) Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.
- (6) Do not remove a replacement ESD device from its protective package until immediately before you are ready to install it. (Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
- (7) Immediately before removing the protective material from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

- (8) Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).