



## PRODUCT MODIFICATION

2710F04

**Option 04, Internal Tracking Generator Installation**

**For TEKTRONIX 2710 Spectrum Analyzer**

**B020319 - B022992**

**This kit provides parts and instructions for adding Option 04,  
Internal Tracking Generator to the 2710 Spectrum Analyzer.**

**This Option Retrofit Kit requires instrument modifications that  
can only be done by a Tektronix Service Center. If the Customer  
has received this kit, arrangements must be made with a Tektronix  
Service Center for installation to ensure Warranty coverage.**

## INSTALLATION DESCRIPTION

Retrofitting the Tracking Generator to the B02 series 2710 involves making modifications to the power supply (A15). These modifications are necessary to accommodate the additional 10 watt load from the Tracking Generator. A low pass filter must be added to the Front Panel circuitry to provide protection from the ESD path of the new Front Panel N Connector. The instrument firmware must also be updated to support the Tracking Generator. If Option 09 is installed and the serial number is below B021130, the Digital Options board (A11) will need to be modified to support the new firmware. Included with this kit is a copy of the 2710 User's Guide and a Data Sheet/Manual Insert to be sent to the customer.

### KIT PARTS LIST

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|                        |    |                                 |
|------------------------|----|---------------------------------|
| A24                    | 1  | Tracking Generator Assembly     |
| 062-9636-00            | 1  | Data Sheet / Manual Insert      |
| 070-7222-01            | 1  | 2710 User's Guide               |
| 103-0045-00            | 1  | N Male to BNC Female Adapter    |
| 120-1858-00            | 1  | Transformer                     |
| 131-1857-00            | 2  | Square Pins, J500               |
| 131-3199-00            | 1  | Jumper, P500                    |
| 131-4199-00            | 1  | 75Ω to 50Ω Adapter              |
| 136-0912-00            | 1  | IC Socket, U410                 |
| 151-5001-00            | 1  | 3904, SMD Transistor, Q512      |
| 152-0428-00            | 1  | Zener Diode, 120V               |
| 160-5427-11            | 1  | ROM, 01.15.90, U320             |
| 160-5428-11            | 1  | ROM, 01.15.90, U220             |
| 160-5429-11            | 1  | ROM, 01.15.90, U120             |
| 160-5434-11            | 1  | ROM, 01.15.90, U410             |
| 160-6852-11            | 1  | ROM, 01.15.90, U420             |
| 162-0026-00            | 3" | Clear Insulation                |
| 162-0532-00            | 3" | Heat Shrink Insulation          |
| <del>174-1238-00</del> | 1  | RF Cable, W55                   |
| 174-1818-00            | 1  | Data/Power Cable, W54           |
| 174-2077-00            | 1  | RF Cable, W51                   |
| 174-2083-00            | 1  | RF Cable, W52                   |
| 174-2084-00            | 1  | RF Cable, W53                   |
| 175-2054-05            | 1' | Strapping Wire                  |
| 211-0541-00            | 2  | Screw                           |
| 211-0658-00            | 4  | Screw                           |
| 283-0195-00            | 1  | 680pF Capacitor                 |
| 283-0212-00            | 2  | 2μF Capacitor, C512F, C522F     |
| 283-5001-00            | 1  | 100pF, SMD Capacitor, C517      |
| 308-0236-00            | 2  | 85 Ω Resistor, R352F, R452F     |
| 313-1103-00            | 1  | 10k Ω Resistor                  |
| 317-0821-00            | 1  | 820Ω Resistor                   |
| 321-5005-00            | 1  | 27.4 Ω, SMD Resistor, R225      |
| 321-5018-00            | 1  | 1k Ω, SMD Resistor, R513        |
| 321-5026-00            | 1  | 4.75k Ω, SMD Resistor, R516     |
| 321-5030-00            | 2  | 10k Ω, SMD Resistor, R514, R515 |
| 321-5050-00            | 1  | 33.2 Ω, SMD Resistor, R226      |
| 321-5051-00            | 1  | 0 Ω, SMD Resistor, W501         |
| 441-1952-00            | 1  | Chassis, Tracking Generator     |

## **(1) Power Supply Modification**

- (a) Remove the instrument cabinet (refer to Maintenance Section of Service Manual).
- (b) Remove the VR assembly (A13) and the circuit board retaining bracket on the top of the instrument.
- (c) Remove the CRT.
- (d) Remove the connectors at J103 and J104 (if option 09 is present) on the rear panel. Leave the other end of these cables connected to the boards and fold them out of the way.
- (e) If Option 15 is installed remove the semi-rigid cable connected to A17J300 on the 1st LO Buffer Amp and J101 on the inside of the rear panel from the instrument. Leave the panel mount SMA connector installed at J101.
- (f) Remove the clear plastic shield from the bottom of the power supply.
- (g) Unsolder CR420F, CR421F, and CR422F from the bottom of the power supply. With these diodes still attached to their heatsink, remove the two screws that attach the heat sink to the circuit board and remove the diodes and heatsink as an assembly. This will make transformer replacement easier.
- (h) Remove the 8 screws (4 on the back, 4 on the bottom) that attach the rear panel to the instrument chassis and power supply. Pull the rear panel away from the back of the instrument as far as the wiring will allow to gain access to the power supply board.
- (i) Remove T430F from the power supply board (refer to service manual for all parts locations) and replace it with the new transformer, 120-1858-00.
- (j) Remove C512F and C522F and replace them with the 2 $\mu$ F, 283-0212-00 capacitor.
- (k) Remove R352F and R452F and replace them with the 85 $\Omega$ , 308-0236-00 resistor. These resistors must be wrapped with the 162-0532-00 heatshrink the same way the removed parts were.
- (l) Reinstall the diode/heatsink assembly that was removed in step (g).
- (m) Reinstall the rear panel on the chassis and power supply using the screws removed in step (h).
- (n) Reinstall the cables at J103 and J104 that were removed from the rear panel in step (d).
- (o) Turn the instrument over to access the bottom of the power supply. Remove the surface mount resistors installed at R225 and R226. Install a 27.4 $\Omega$  resistor, 321-5005-00 at R225 and install a 33.2 $\Omega$  resistor, 321-5050-00 at R226.

- (p) Add a 10k $\Omega$  resistor, 313-1103-00 in series with the common cathode of CR421. This will require cutting the two runs connected to the cathodes and installing a strap using the 175-2054-05 wire. See Figure 1.
- (q) Install a 120V, zener diode, 152-0428-00 across C323. See Figure 1. Use the clear insulation, 162-0026-00 on the diode leads to prevent shorts.
- (r) Reinstall the clear plastic shield removed in step (f) on the bottom of the power supply.
- (s) Install a strap from the positive side of C530F to Pin 3 of J4 on the bottom of the power supply using the 175-2504-05 wire. See Figure 2.

## **(2) Tracking Generator Installation**

- (a) Remove the left side instrument chassis. Refer to Figure 4 for screw locations.
- (b) Install the Data/Power ribbon cable, W54, 174-1818-00 at J4 on the power supply board. See Figure 3. Route the wire coming the connector at J4 to the bottom of the power supply and solder it to Pin 1 of connector J7. See Figures 2 and 3.
- (c) Remove the bracket from the old left side chassis and install it on the Tracking Generator chassis, 441-1952-00. See Figure 5.
- (d) Install the Tracking Generator chassis onto the 2710 chassis. See Figure 5. Be sure to use the 2 flat-head screws, 211-0541-00 in the location indicated in Figure 5.
- (e) Install the Tracking Generator module (A24) into the new left side chassis. See Figure 6.
- (f) Connect W54, 174-1818-00 to connector A24J300 on the Tracking Generator. See Figure 7.
- (g) Remove the Phaselock CFC module (A12) and the 300Hz Filter board (A22). This will allow access to A17J300 on the 1st LO Buffer Amp (A17).
- (h) Using Figure 7, route cable W53, 174-2084-00 through the round hole located at the bottom of the rear card cage bracket. The cable can be bent to aid installation, but care must be taken to ensure the semi-rigid cable is not kinked or broken.
- (i) Connect W53 to A17J300 on the 1st LO Buffer Amp (A17) and A24J100 on the Tracking Generator (A24). See Figure 7.
- (j) Remove the front panel access cover shown in figure 4.
- (k) Remove the gray plastic plug from the front panel generator connector hole.
- (l) Unplug the 20 pin ribbon cable from J640 on the back of the Front Panel.
- (m) Remove the nut and washer from the RF Input connector on the front of the 2710.

- (n) Remove the four nuts that secure the Front Panel to the instrument chassis and remove the Front Panel from the 2710.
- (o) Using Figure 10, install the 680pF capacitor, 283-0195-00 and the 820 $\Omega$  resistor, 317-0821-00 on the back of the Front Panel board. Solder the cap to the feedthru holes connected to pins 12 and 13 of U553. Solder the resistor to the leg of the cap connected to pin 12 and to the side of C560 that is connected to pin 16. Parts must be flat to the board.
- (p) Reinstall the Front Panel by reversing steps (l) through (n).
- (q) Install cable W52, 174-2083-00 as shown in Figure 7. The N connector may be removed from the cable and installed in the front panel first. Care must be taken that the center conductor is not damaged when the cable is reinserted into the N connector and that the cable is fully tightened into the N connector. Connect the other end of W52 to A24J600 on the Tracking Generator module.
- (r) Reinstall the front panel access cover removed in step (j).
- (s) Install cable W55, 174-~~1238~~<sup>1811</sup>-00 as shown in Figures 6 and 7. Connect the end without the ferrite bead to A10J185 on the microprocessor board. Connect the end with the ferrite bead to connector A24J500 on the Tracking Generator.
- (t) If the instrument has Option 15 (1405 Interface) install cable W51, 174-2077-00 as shown in Figure 7. Connect one end to A24J110 on the Tracking Generator and the other end to the rear panel connector J101.
- (u) If the instrument does not have Option 15, install the 50 $\Omega$  terminator, removed from A17J300 when cable W53 was installed in step (i), at A24J110 on the Tracking Generator.
- (v) Reinstall the CRT.
- (w) Reinstall the VR assembly.
- (x) Reinstall the Phaselock CFC assembly and 300Hz filter board.

### **(3) Firmware Installation**

- (a) Remove the Digital Options board (if installed) and the Microprocessor board. See figure 7.
- (b) Install the following ROM's on the Microprocessor board. See Figure 8.

160-5427-11 at U320  
 160-5428-11 at U220  
 160-5429-11 at U120  
 160-6852-11 at U420

- (c) Install ROM 160-5434-11 at U410 on the Digital Options Board. If the serial number of the instrument is below B021130 the Digital Options board will not have the necessary components to support the ROM. Use Figure 9 to install the components provided with this kit.
- (d) Reinstall the Digital Options and Microprocessor boards.
- (e) Reinstall the circuit board retaining bracket across the top of the instrument.
- (f) Power up the instrument and press Util Menu/#4/#9. Check that **TRACKING GEN** is listed on the Installed Options Display.

#### **(4) Calibration and Performance Verification**

Included in the price of this kit is a full instrument calibration. The 2710 should be fully calibrated before running a performance check on the Tracking Generator. After the 2710 has been calibrated, use the Performance Check in the Data Sheet/Manual Insert, 062-9636-00 to verify Tracking Generator operation. If Tracking Generator calibration is required, use the cal procedure in the Data Sheet/Manual Insert.

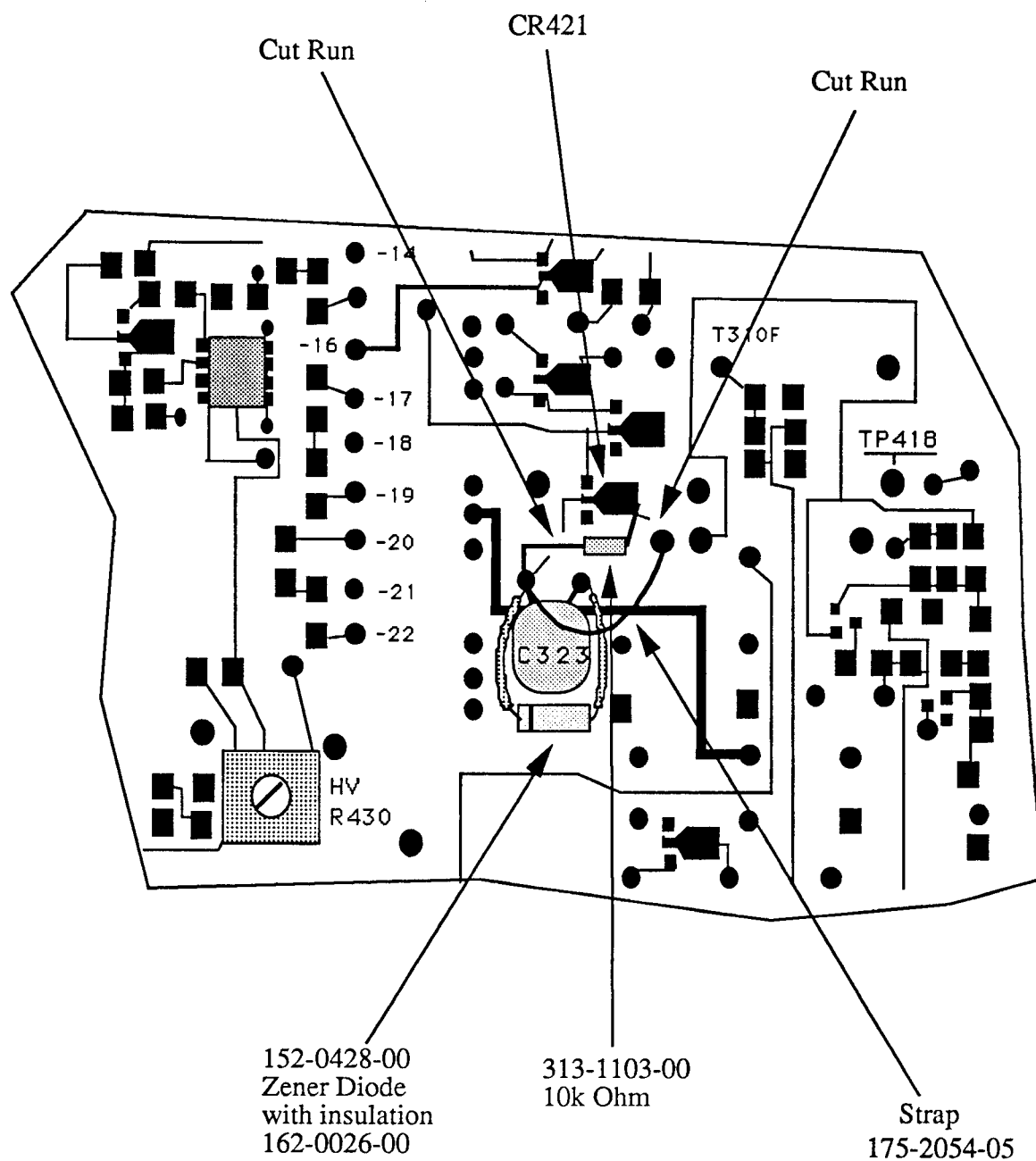


Figure 1.





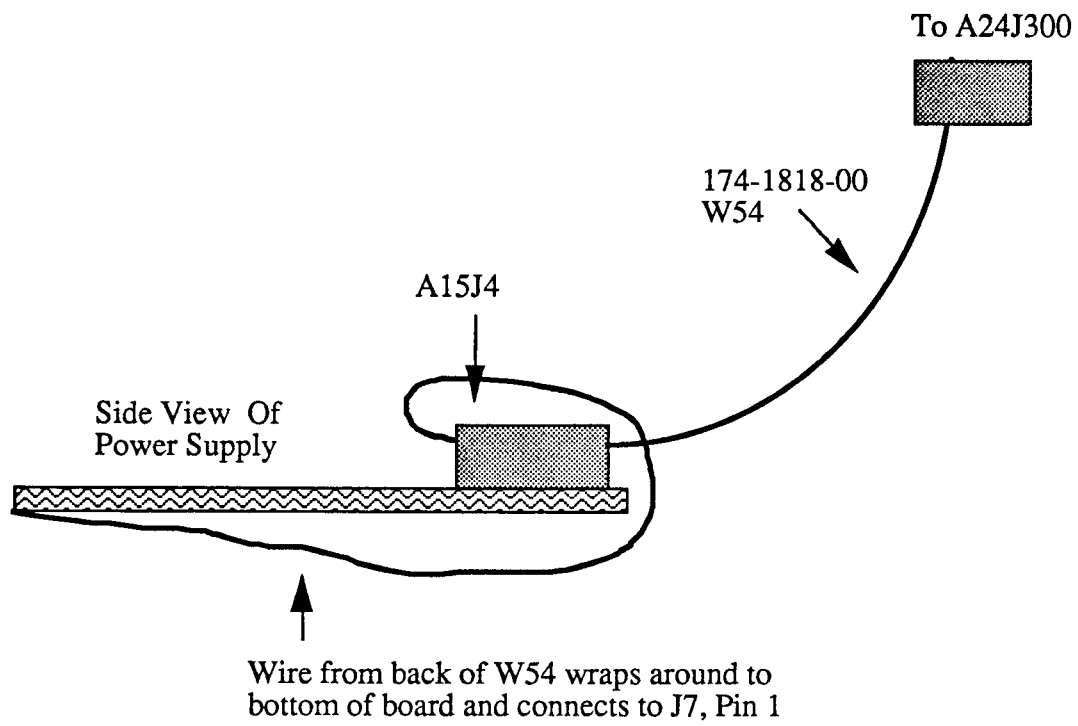


Figure 3.

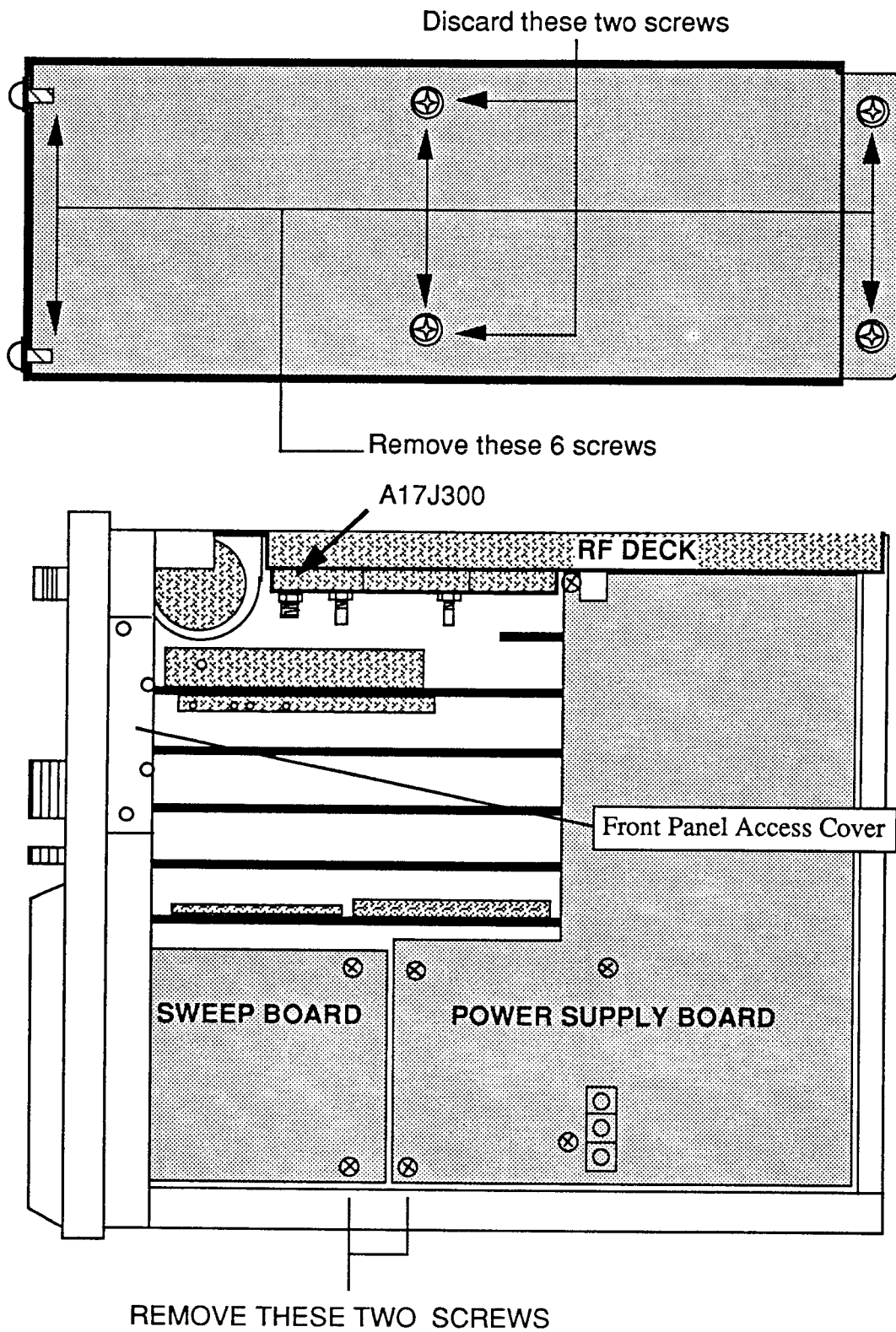


Figure 4.

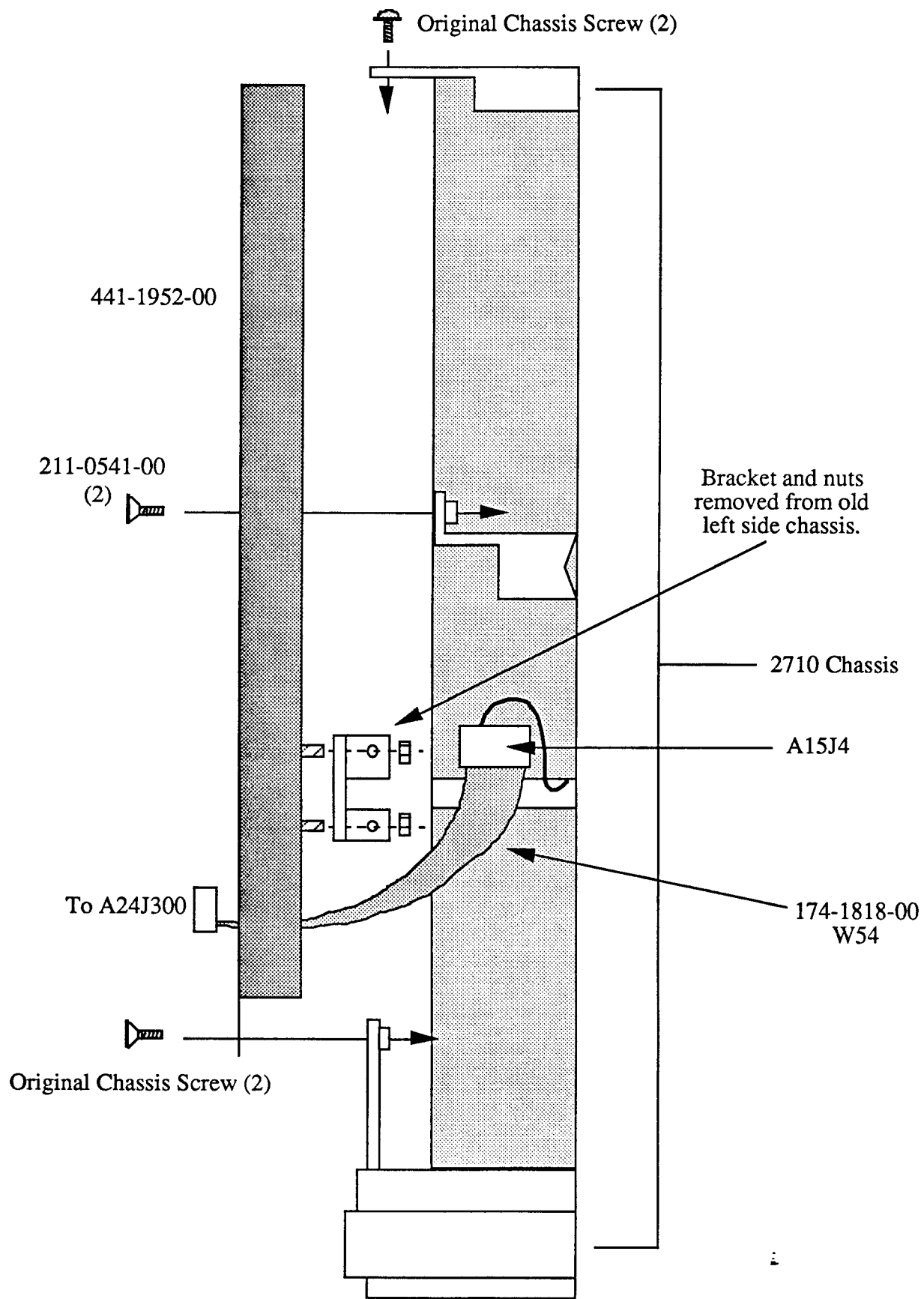


Figure 5.

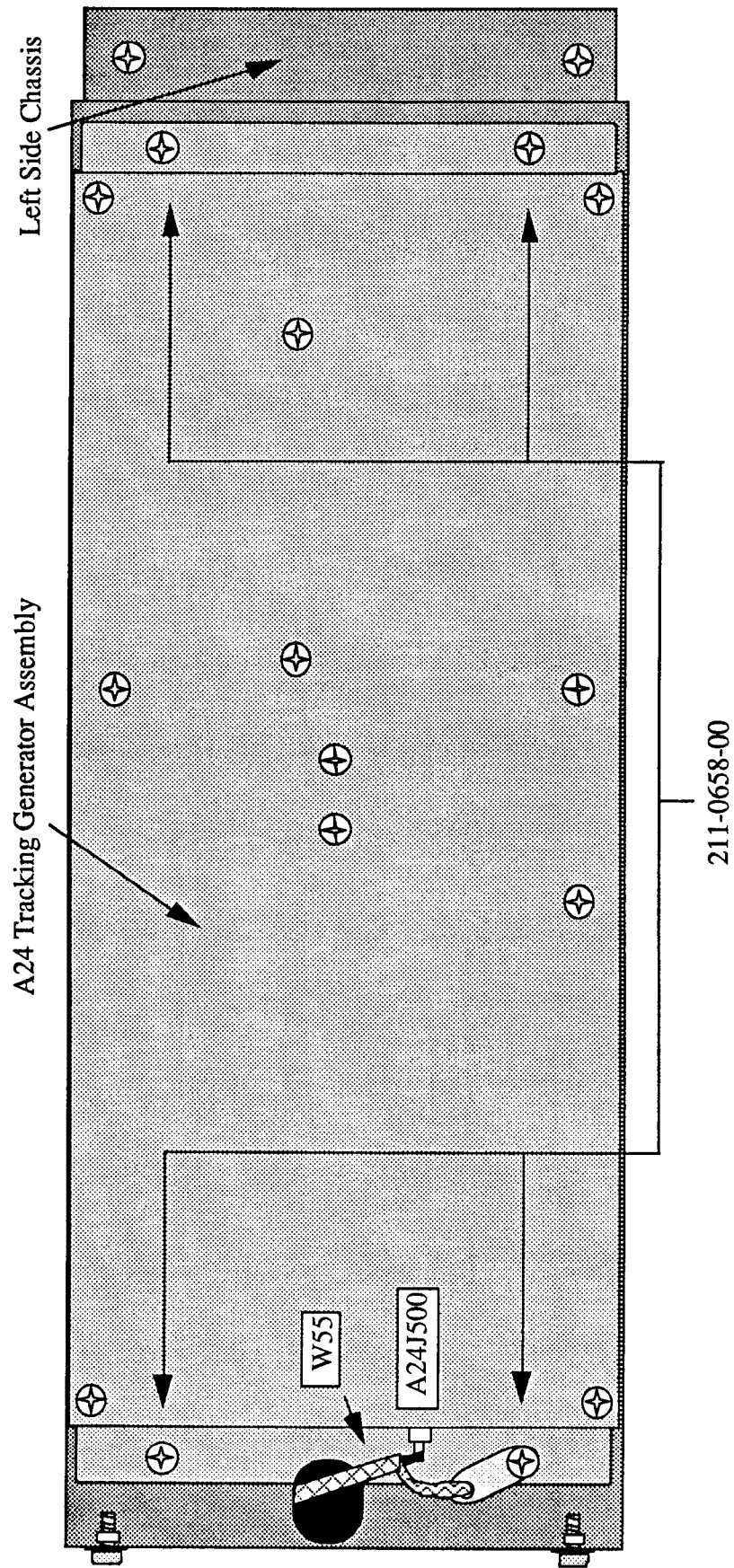


Figure 6.

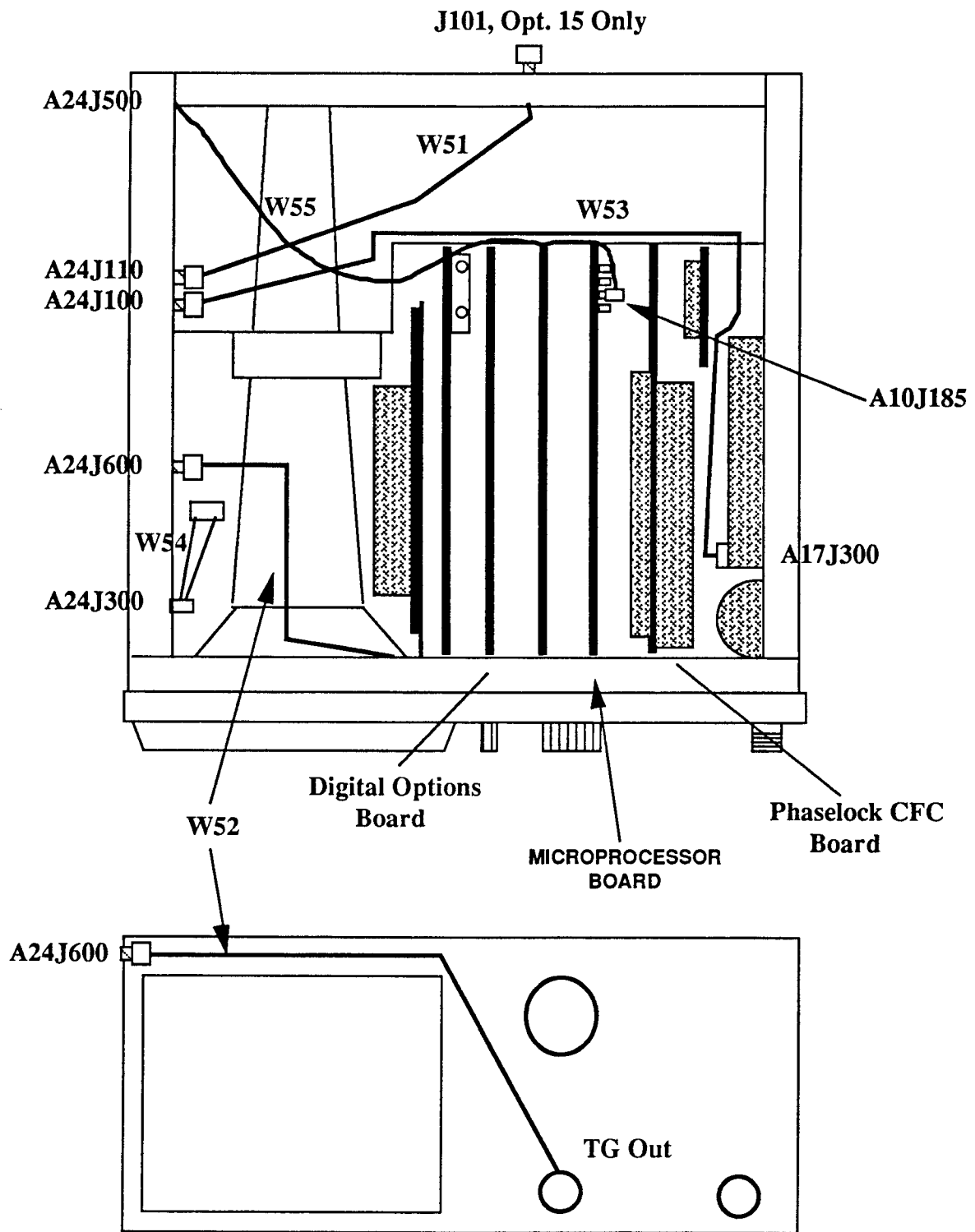


Figure 7.

## ROM Locations

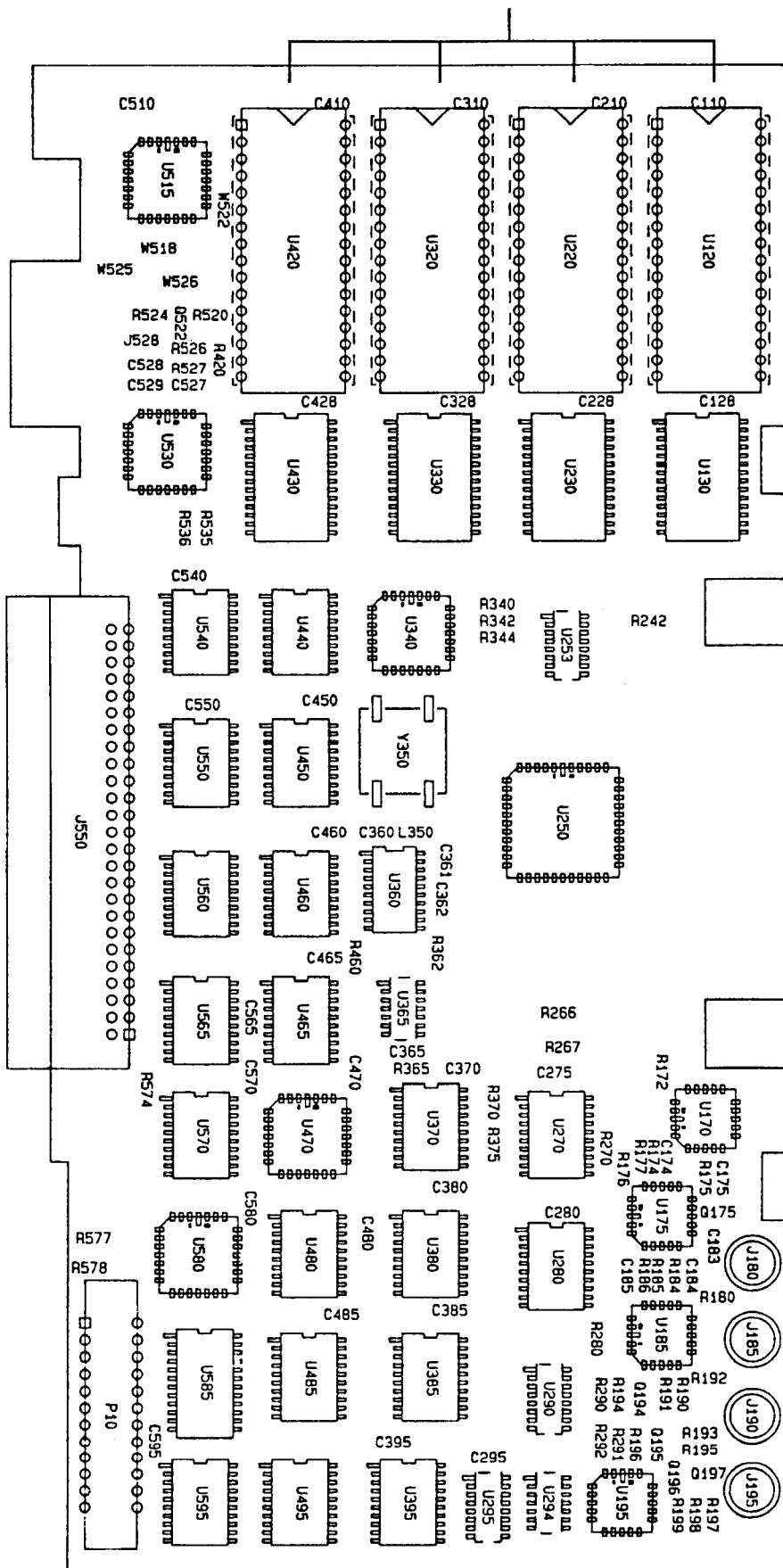


Figure 8.

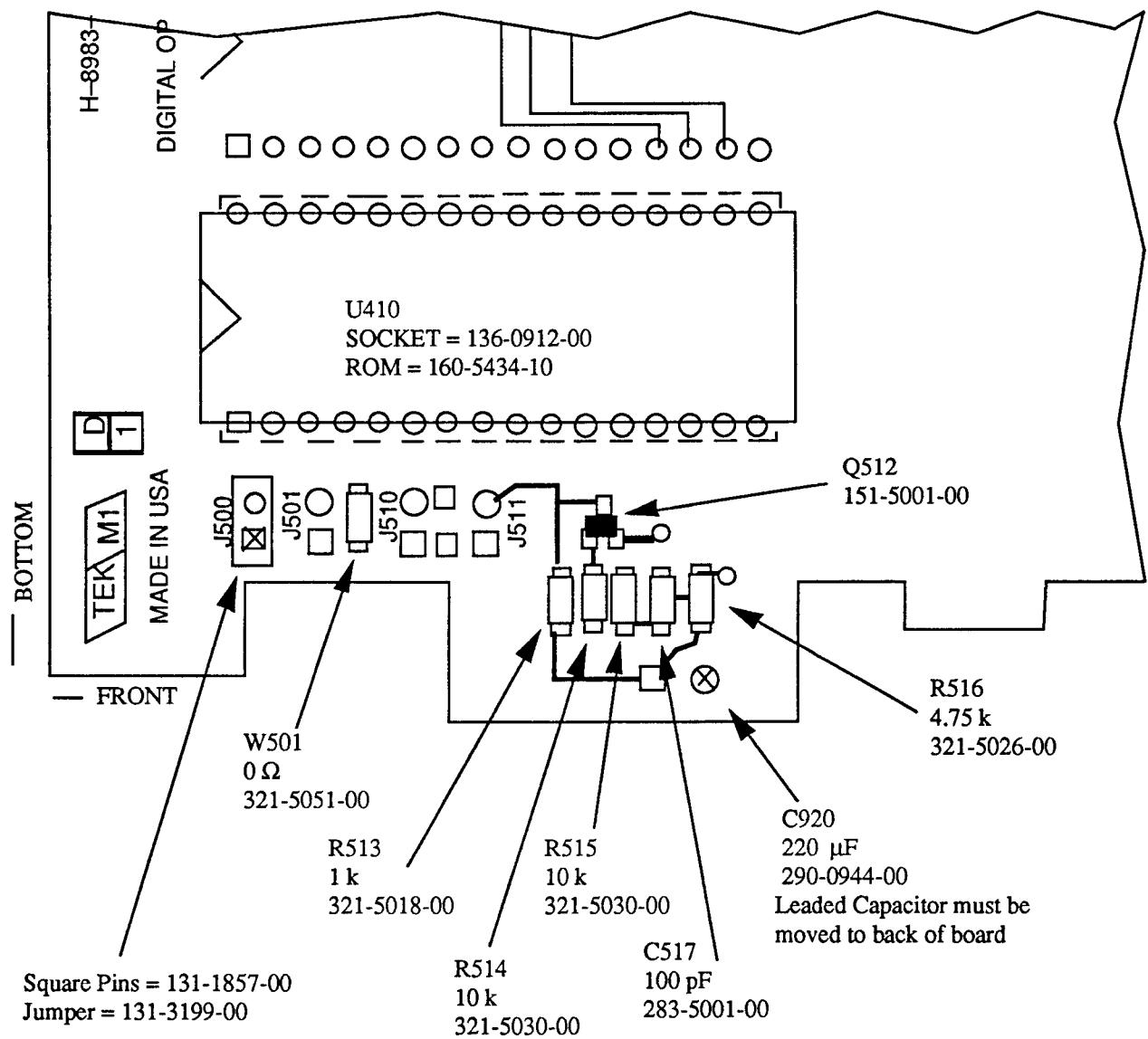
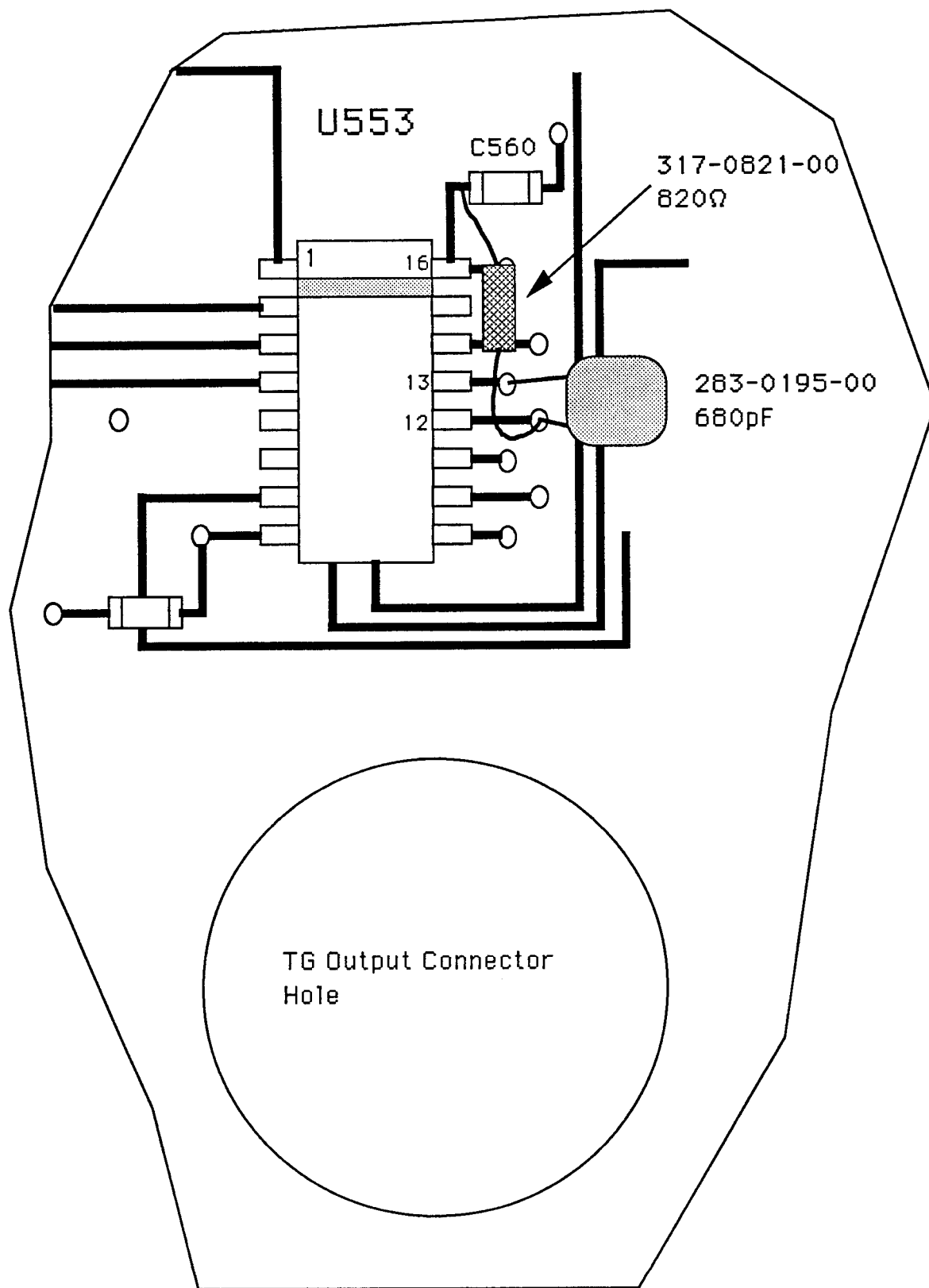


Figure 9.



Back Of 2710 Front Panel

Figure 10.