SECTION IV
MAINTENANCE

4.0 GENERAL

4.1 This section contains information for the maintenance of the Model FM-10 frequency meter/signal generator. Included are in-cabinet performance checks, troubleshooting procedures and adjustments.

4.2 Test equipment. For the list of equipment required for maintenance of Model FM-10, see Table 4-1.

TABLE 4-1

LIST OF TEST EQUIPMENT REQUIRED FOR IN-CABINET PERFORMANCE TESTS, TROUBLESHOOTING AND ADJUSTMENTS

1 Spectrum Analyzer – Singer Model SA-70 or equivalent.

2 Oscilloscope – Tektronix Model 454 or equivalent.

3 RF Voltmeter – Millivac Model MV-928A or equivalent. (with 50Ω Termination).

4 Multimeter – Simpson Model 260 or equivalent.

5 FM-10 Patch Cables – PC2652 (for LH Module) and PC-2653 (for RH module).

6 Kay Amp Model 1024A or equivalent.

7 Counter – HP Model 5532A or equivalent.

8 1 MHz Frequency Standard.

9 Signal Generator – HP 608 or equivalent.

10 Plug-In modules MDM-1 or ODM-1 and AFM-1.

11 Audio Oscillator – HP 651A or equivalent.

4.3 In-Cabinet Performance Checks.

The in-cabinet performance checks verify that the Model FM-10 is operating within specifications. These checks may be used as part of incoming quality control inspection, as a periodic operational check and following repairs or adjustments.

4.3.1 Frequency synthesis and spurious response check.

a) Connect RF output jack of Model FM-10 to the input of the spectrum analyzer. Set the Model FM-10 frequency to 10.0 MHz. Center the trace on the analyzer.

b) Set the dispersion of the analyzer to 10 KHz/division; adjust the variable attenuators of the analyzer and the FM-10 to give almost full scale on the analyzer.

c) Switch the Model FM-10 10 KHz decade control from 0 through 9 and note that the frequency changes approximately 1 division for each switch position. Also note that the spurious responses are at least 35 dB down. Return the 10 KHz decade control to 0.

d) Increase the spectrum analyzer dispersion to 100 KHz/division and move up to the next frequency decade on the Model FM-10 and repeat step 4.3.1c for all the remaining decades. The spurs should be at least 35 dB down 10 MHz above and below the center frequency.

e) Set the Model FM-10 controls:

10 MHz switch	IN
VOLUME	Fully CW
Frequency Controls	010.0000
AUDIO	IN/BEAT

f) Turn the 1 KHz decade switch from the 0 position to the 9 position. The tone frequency should increase at each switch position.

4.3.2 FM Modulation Check.

a) Install Model MDM-1 or ODM-1 plug-in module. Set up FM-10 and plug-in for 15 KHz deviation as described in the plug-in module instruction manual.

b) Observe deviation reading on the MDM-1 meter or the ODM-1 screen. Is 15 KHz, if so, the FM-10 is modulating properly.

4.3.3 Amplitude Modulation Check.

a) Install in the AFM-1 plug-in module in the FM-10 mainframe.

b) Set the FM-10 frequency to 5 MHz. Set the Model H.P. 651A test oscillator to 1 KHz and connect the 50 OHM output of the Model 651A to the AM jack of the AFM-1 plug-in.

c) Connect the Tektronix Model 454 scope vertical input to the FM-10 RF output jack and the ext trig input to the test oscillator.

d) Turn the FM-10 RF output control fully CW and adjust the gain of the oscilloscope for a useable display.

e) Adjust output of the test oscillator and adjust scope to verify that approximately 30 percent modulation may be obtained.

4.4 TROUBLESHOOTING PROCEDURE.

4.4.1 To locate trouble in the Model FM-10, remove instrument covers and make visual inspection with power off. Proceed to electrical checkout as necessary. During the visual inspection look for burned or loose components, loose wire connections or any signs which suggest possibilities of trouble. Repair any faulty component or connection revealed by the initial inspection before proceeding to the steps below.

4.4.2 Power Supply Checks.

4.4.2 The three checks below (4.4.4 through 4.4.7) indicate power supply problems. If the result of any of the checks is negative, the fault should be located and rectified before continuing with other troubleshooting checks.

4.4.4 With power off, remove left hand module and reconnect connectors P10 and J10 via patch cable PC2652.

4.4.5 With power off, measure resistance to ground from junction point of red wires on A7 (see figures 4-1 and 6-6). The value should be greater than 20 ohms. If not, there is a short in the power supply.

4.4.6 Switch on power and measure voltage (B+) at junction point of red wires on A7. Value should be 9V ± 0.5%. Adjust A1A3R10 for this voltage. If the correct voltage cannot be obtained, continue investigation of power supply until fault is rectified.

4.4.7 Measure resistance to ground of the case of transistor Q1 mounted on chassis, rear of left hand module compartment (see figure 6-2). Value should be greater than 50 K ohms.

4.4.8 Only when the results of the above power supply checks are positive, proceed to following checks.

4.4.9 Broad Band Amplifier (A1A4) Check. (see figure 6-1)

4.4.10 Disconnect BND connector A1P9 and connect RF voltmeter to output of broad band amplifier (A1J9).

4.4.11 Set Frequency controls of FM-10 to 200 MHz.

4.4.12 Output voltage level of broad band amplifier should be -23 dBm ± dB.

4.4.13 Disconnect BNC connector A1A4-P5 (output of 100 KHz-500 KHz low pass filter A9FL-3) and connect to RF voltmeter. Output voltage level should be -33 dBm, ±3 dB. (use 50Ω termination on voltmeter).

4.4.14 Disconnect BNC connector P (L) from mixer Z1(600-700 MHz filter (A7FL-2) output) and connect the RF voltmeter. Output voltage level of 600-700 MHz filter should be -13 dBm minimum. (Use 50Ω termination on voltmeter).

4.4.15 Disconnect BNC connector P (R) from mixer Z1 and connect to RF voltmeter. Turn 100 MHz frequency control to "0" position. Output voltage level of diode switch should be +5 dBm or greater. Measure same voltage with 100 MHz frequency control in positions 1, 2, 3, and 4. (Use 50Ω termination on voltmeter).

4.4.16 Disconnect BNC connector P (I) from mixer Z2 and connect to RF voltmeter. Voltage level should be 0 dBm +1 dBm and for all positions of the 10 MHz decade. (Use 50 Ω termination on voltmeter).

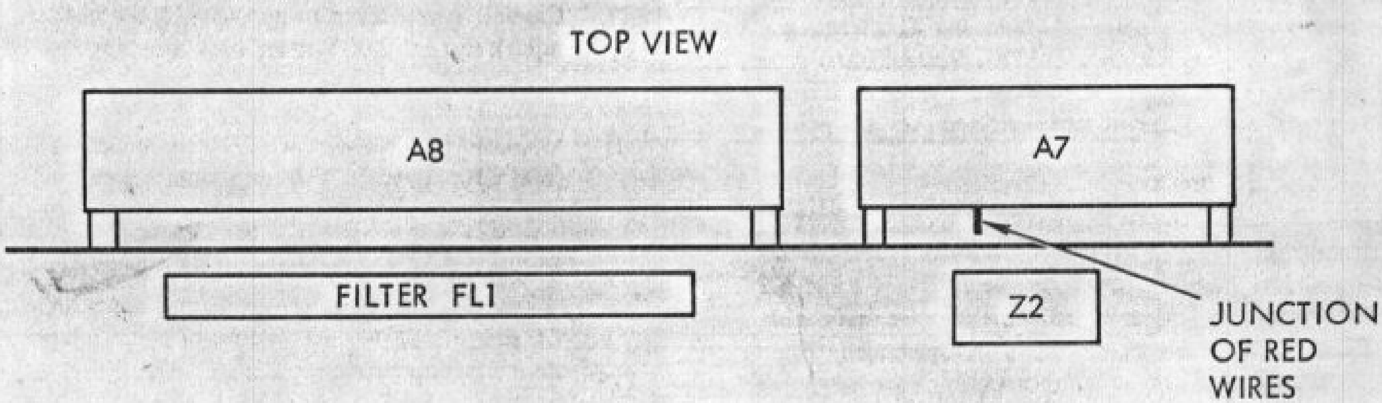

Figure 4-1. Junction Point, A7

4.4.17 Disconnect BNC connector P (R) from mixer Z2 and connect RF voltmeter. (Use 50Ω termination on voltmeter). Voltage level should be greater than +3 dBm.

4.4.18 Connect oscilloscope to output of filter A6-FL2 (50-60 MHz) (see figure 6-5). Turn 1 MHz and 100 KHz frequency controls to "0" position. Output voltage should be greater than 600 mV p-p. Turn 1 MHz frequency control from 0 to 9 position observing same voltage reading at each intermediate position. Turn 100 KHz control from 0 to 9 position observing same voltage reading at each intermediate position.

4.4.19 Connect R voltmeter to terminal I on mixer A6A2. Voltage level should be -10 dBm ±1 dB.

4.4.20 Connect oscilloscope to test point TP3 on board A5 (see figure 6-4). Turn 100 KHz, 10 KHz and 1 KHz frequency controls to "0" positions. Voltage should be 2V p-p. Turn 100 KHz control from 0 through 9 positions observing same voltage at all intermediate positions. Repeat this procedure with the 10 KHz and 1 KHz controls.

4.4.21 Connect oscilloscope to pin A2-5 (5-6 MHz output) on board A2 (see figure 6-3). Turn 0-1 KHz frequency control to "0" position (not OUT). Voltage should be approximately 5-6V p-p. Turn 0-1 KHz control from 0 through 10 and observe same voltage at all points.

4.5 ADJUSTMENTS

4.5.1 All circuit boards may be removed from their mountings by sliding them out sideways (see figures 4-2 and 6-2 for board locations). Most adjustments may be made with each board only half way out of its compartment. When re-inserting boards, dress all wires carefully. Note that some boards cannot be re-inserted unless wires are fully dressed towards the appropriate ends of their compartments.

All internal adjustments described in paragraphs 4.5.2 through 4.5.30 should be made in the sequence given, starting with board A2. The calibration of the TCXO (paragraph 4.6) and the adjustment of the 0-1 KHz control (paragraph 4.7) may be carried out separately.

4.5.2 A2 Board Adjustment (Figure 6-3)

a) Set FM-10 frequency controls to "0" (zero) positions and the 0-1 KHz control to OUT.

b) Lift A2 board and connect the oscilloscope to pin A2-3 (1 MHz input) and ground. The voltage should be approximately 3V p-p.

c) Connect the oscilloscope to pin A2-8 (2 MHz input) and ground. The voltage should be approximately 3.5V p-p.

d) Connect the oscilloscope to pin A2-7 (9 MHz output) and ground. Adjust L1, L2, and L3 on board A2 for maximum output of approximately 600 mV p-p.

e) Connect the oscilloscope to pin A2-9 (6 MHz output) and ground. Adjust A2L4 for maximum output of approximately 4.5V p-p.

4.5.3 A3 Board Adjustment (Figure 6-4)

a) Lift board A3 and connect the oscilloscope to pin A3-3 (6 MHz input) and ground. The voltage should be approximately 5V p-p.

b) Connect oscilloscope to A3-6 (9 MHz input) and ground. The voltage should be approximately 600 mV p-p.

c) Connect oscilloscope to pin A3-8 (3.6-4.5 MHz input) and ground. Voltage should be approximately 600 mV p-p.

d) Measure the voltage at TP1 on board A3 (600 KHz output). Voltage should be approximately 265 mV p-p.

e) Measure voltage at A3-TP2 (9.6 MHz output) and adjust A3R8 for purest waveform. Adjust A3 L1 and A3 L2 for maximum voltage. Voltage should be approximately 235 mV p-p.

f) Measure voltage at A3-TP3 (5-6 MHz output) and adjust A3R23 for maximum output. Switch 1 KHz control from 0 through 9. The voltage should not fall below 2V p-p.

g) Turn the 1 KHz control to 0 and re-install board A3.

4.5.4 A4 Board Adjustment (Figure 6-4)

a) Lift board A4 and connect oscilloscope to pin A4-3 and ground. Voltage should be 2V p-p at 6 MHz.

b) Connect oscilloscope to pin A4-6 (9 MHz input) and ground. Voltage should be 600 mV p-p.

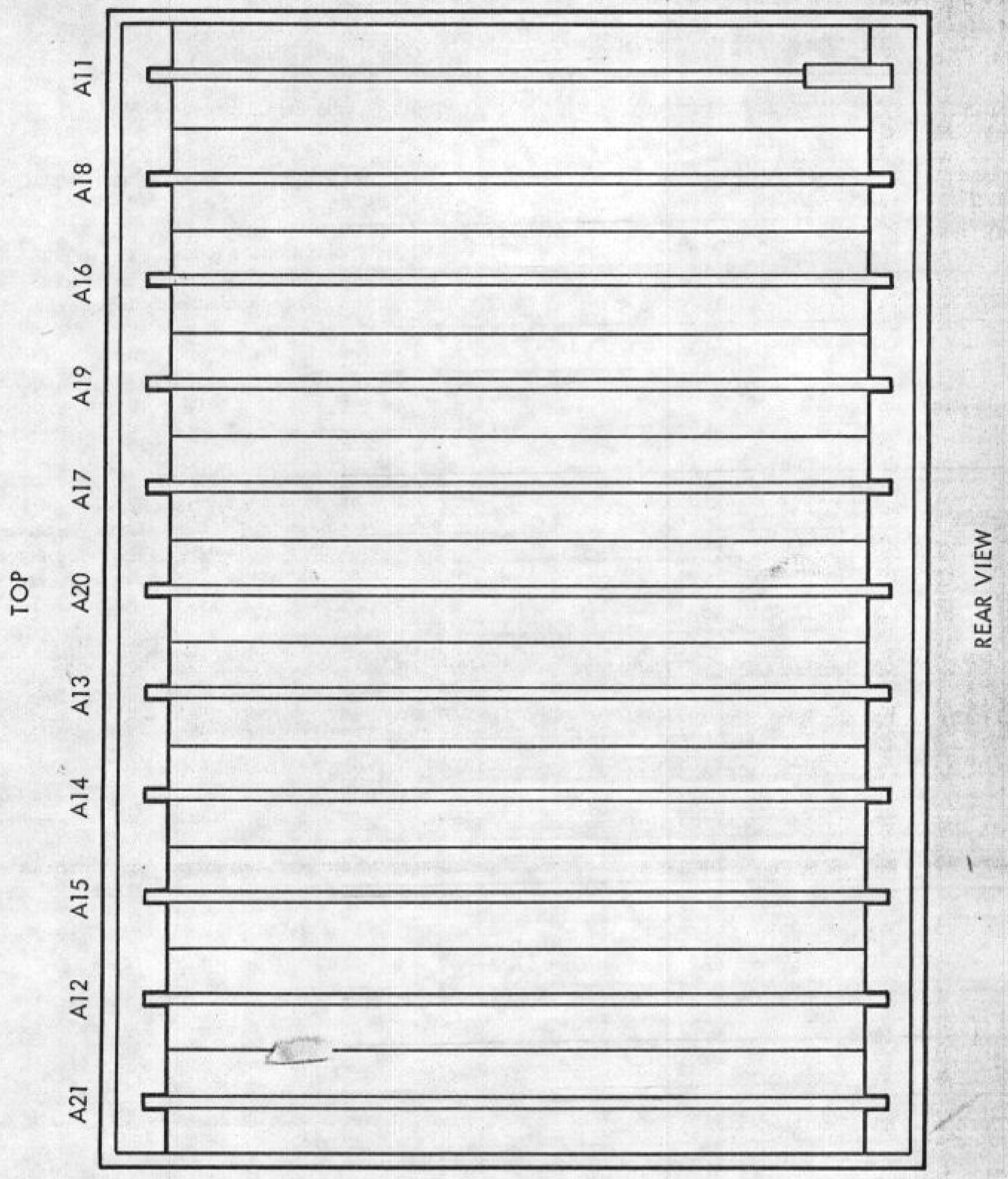

Figure 4-2. Board Locations, A11-A21

c) Connect oscilloscope to pin A4-8 (3.6-4.5 MHz input) and ground. Voltage should be 600 mV p-p.

d) Measure voltage at A4-TP1 (600 MHz output). Voltage should be approximately 265 mV p-p.

e) Measure voltage at A4-TP2 (9.6 MHz output). Adjust A4R8, A4L1 and A4L2 for maximum voltage of approximately 235 mV p-p.

f) Measure voltage at A4-TP3 (5-6 MHz output). Adjust A4R23 for maximum voltage. Turn 10 KHz frequency control from 0 through 9. Voltage should not fall below 2V p-p.

g) Turn 10 KHz to 0 and re-install board A4.

4.5.5 A5 Board Adjustment (Figure 6-4)

a) Lift A5 and connect oscilloscope to pin A5-3 and ground. Voltage should be approximately 2V p-p at 6 MHz.

b) Measure voltage across pin A5-6 and ground (9 MHz input). Voltage should be approximately 600 mV p-p.

c) Measure voltage across pin A5-8 (3.6-4.5 MHz input) and ground. Voltage should be approximately 600 mV p-p.

d) Measure voltage at A5-TP1 (600 KHz output). Voltage should be approximately 265 mV p-p.

e) Measure voltage at A5-TP2 (9.6 MHz output). Adjust A5R8, A5L1 and A5L2, for maximum voltage of approximately 235 mV p-p.

f) Measure voltage at A5-TP3 (5-6 MHz output). Adjust A5R23 for maximum voltage. Switch 100 KHz frequency control from 0 through 9. Voltage should not fall below 2V p-p;

g) Turn 100 KHz control to 0 and re-install board A5.

4.5.6 A6 Board Adjustment (Figure 6-5)

a) Lift A6 board and connect oscilloscope to pin A6-6 (5-6 MHz input) and ground. Voltage should be approximately 2-3V p-p.

b) Measure voltage across pin A6-14 (36-45 MHz input) and ground. Voltage should be approximately 200 mV p-p.

c) Measure input voltage to mixer A6A1 Terminal L and adjust A6L1 for maximum amplitude of approximately 1.2V p-p at 90 MHz.

d) Measure output voltage of A6FL-1 and adjust A6L3 and A6L4 for maximum amplitude of approximately 1.2V p-p.

e) Unsolder wire on pin A6-8. Connect the center conductor of a 50 ohm coaxial test cable to pin A6-8 and connect outer conductor to pin A6-9.

f) Connect other end of test cable to RF voltmeter and measure voltage level. Level should be 0 dBm ±3 dB. (Use 50 ohm termination on voltmeter.)

g) Disconnect test cable from RF voltmeter and connect to spectrum analyzer. Set dispersion for 100 KHz with 60 MHz center frequency. Set amplitude to log scale and adjust gain for a dynamic range of at least 40 dB. Proceed with steps 4.5.7 through 4.5.16.

4.5.7 A21 Board Adjustment (Figure 6-10)

a) With 100 KHz and 1 MHz switches in "0" position, pull A21 board out.

b) Connect scope to junction of Y2* and C6*. Tune L1* for maximum amplitude, approximately 100 mV p-p.

c) Observe 60 MHz output on spectrum analyzer and tune C5* for minimum 100 KHz sidebands approximately 40 dB down or greater.

d) While observing spectrum analyzer, tune L3*, L4*, and L5* for maximum output.

e) If output level is other than "0" dBm ±1 dB, select R38*.

*Partial reference designator. Add board assembly number for full designator.

f) Dress all wires above the center of the board toward the top of the chassis and all wires below the center of the board toward the bottom of the chassis, re-install board.

4.5.8 A20 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number "1" position, pull out A20 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.9 A19 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to "2" position. Pull out A19 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.10 A18 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to "3" position. Pull A18 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.11 A17 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number 4 position. Pull out A17 board, re-center on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.12 A16 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number 5 position. Pull out A16 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.13 A15 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number 6 position. Pull out A15 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.14 A14 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number 7 position. Pull out A14 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.15 A13 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number 8 position. Pull out A13 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

4.5.16 A12 Board Adjustment (Figure 6-10)

a) Set 100 KHz and 1 MHz switches to number 9 position. Pull out A12 board, re-center trace on the spectrum analyzer and repeat steps 4.5.7b through 4.5.7f.

b) Set frequency dispersion of spectrum analyzer to 1 MHz. Switch 1 MHz decade from 9 through 0 and note that the frequency change on the spectrum analyzer is linear, 1 div per switch position.

c) Disconnect test coax on A6 and re-install original wires. Push A6 down into its compartment.

d) Disconnect BNC on "I" port (center connector) of Z2 and connect the BNC to the Millivac. (use 50 ohm termination on voltmeter.) With the 100 and 10 MHz switches in "0" position the output should be "0" dBm ±1 dB.

4.5.17 A21 Board Adjustment (Figure 6-10)

a) Pull A21 board half way out and adjust C24* and C36* for maximum output on Millivac.

b) If the output is too high or low, remove the cover and re-tune C24* and C36*.

c) If the output is too high, un-solder and move the tap on L7* down toward ground until the output is "0" dBm, re-peak C36* after soldering the tap back on the coil.

d) If the output is too low, un-solder and move the tap on L7* up until the output is "0" dBm, re-peak C36* after soldering the tap back on the coil.

e) Re-install the cover and re-peak C24* and C36*, push the board back into the compartment.

*Partial reference designator. Add board assembly number for full designator.

4.5.18 A20 Board Adjustment (Figure 6-10)

a) Switch the 10 MHz decade to "1" position, pull A20 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac. The output should be "0" dBm ±1 dB.

b) If the output is too high or low remove the cover and re-tune C24*, C36*, and C43* for maximum output.

c) If the output is too high, un-solder and move the tap on L6* down toward ground until the output is "0" dBm ±1 dB, re-peak C24* after soldering the tap back on the coil.

d) If the output is too low, un-solder and move the tap on L8* up until the output is "0" dBm ±1 dB, re-peak C43* after soldering the tap back on the coil.

NOTE

If the output cannot be obtained by moving the tap on L8*, un-solder and move the tap up on L7* or L6*. Do not move the tap up more than on half turn on L7* or L6*.

e) Disconnect the BNC on the "R" port of Z1* and connect it to the spectrum analyzer input.

f) Set the dispersion to 10 MHz with 700 MHz center frequency.

g) Peak C13 of A11 board (see figure 6-9) for maximum output with minimum sidebands on analyzer.

h) Tune C2, C5, C8, and C11 of A10 board (see figures 4-3 and 6-8) for maximum amplitude with minimum sidebands approximately 40 dB down or greater.

i) Disconnect the input to the analyzer and connect it to the Millivac. The output level should be between +4 dBm and +10 dBm.

j) While observing output level of the Millivac switch the 100 MHz decade up or down 1 position the output level should not change more than ±1 dB. Disconnect Millivac and connect spectrum analyzer as before.

k) Re-install the cover on board and re-peak C24*, C36*, and C43*. Push the board back into the compartment.

4.5.19 A19 Board Adjustment (Figure 6-10)

a) Switch the 100 MHz decade to number 1 position and the 10 MHz decade to number 2 position. Pull A19 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac output of approximately "0" dBm ±1 dB at connector to "I" port of Z2 (Use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through 4.5.18d if required.

c) Set the center frequency of the spectrum analyzer to 800 MHz. Peak C21 of A11 (figure 6-9) for maximum output with minimum sidebands on the analyzer.

d) Tune C15, C18, C22, and C25 of A10 board (figures 4-3 and 6-8) for maximum amplitude with minimum sidebands approximately 40 dB down or greater.

e) Repeat steps 4.5.18i through 4.5.18k.

4.5.20 A18 Board Adjustment (Figure 6-10)

a) Switch the 100 MHz decade to number 2 position and the 10 MHz decade to number 3 position, pull A18 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac of approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through 4.5.18d if required.

c) Set the center frequency of the spectrum analyzer to 900 MHz peak C28 of A11 for maximum output with minimum sidebands on the analyzer.

d) Tune C28, C32, C36, and C39 of A10 board (figures 4-3 and 6-8) for maximum amplitude with minimum sidebands approximately 40 dB down or greater.

e) Repeat steps 4.5.18i through 4.5.18k.

*Partial reference designator. Add board assembly number for full designator.

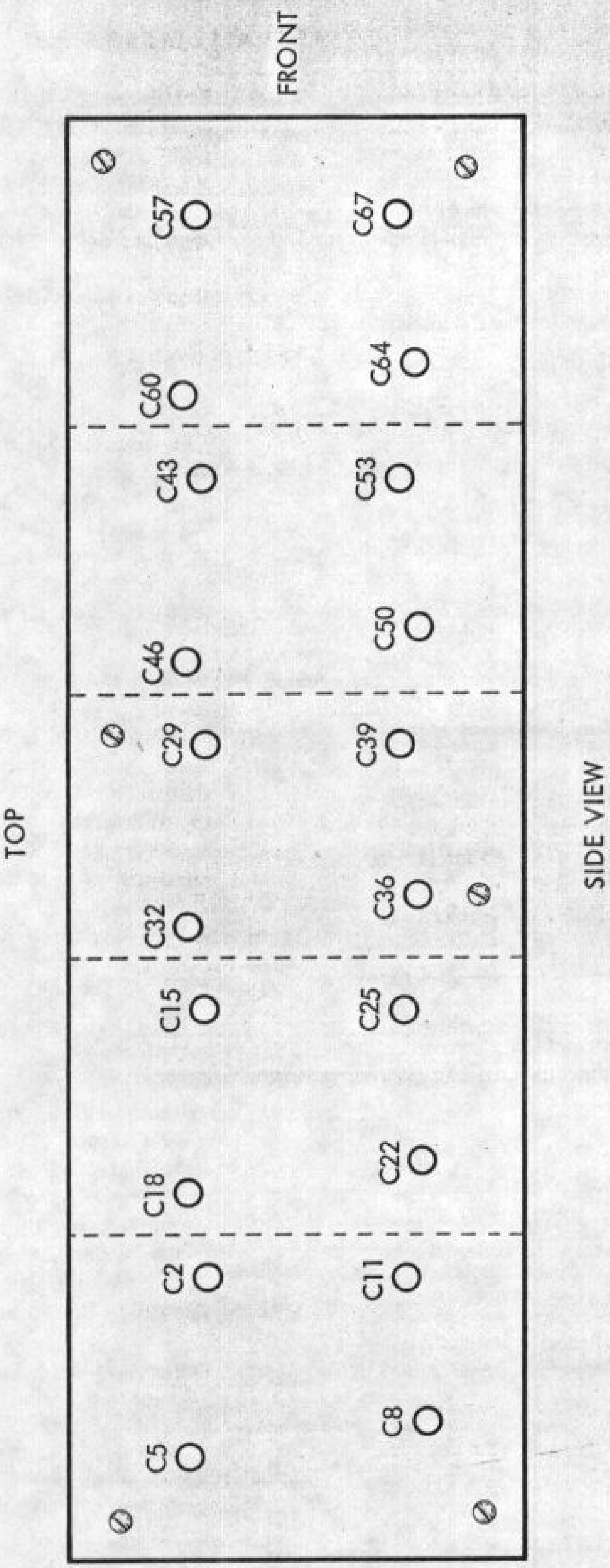

Figure 4-3. Access Hole Identifications, A10

4.5.21 A17 Board Adjustment

a) Switch the 100 MHz decade to number 3 position and the 10 MHz decade to number 4 position, pull A17 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac of approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through 4.5.18d if required.

c) Set the center frequency of the spectrum analyzer to 1 GHz. Peak C34 of A11 (figure 6-9) for maximum output with minimum sidebands on the analyzer.

d) Tune C43, C46, C50, and C53 of A10 board for maximum amplitude with minimum sidebands, approximately 40 dB down or greater.

e) Repeat steps 4.5.18i through 4.5.18k.

4.5.22 A16 Board Adjustment

a) Switch the 100 MHz decade to number 4 position and the 10 MHz decade to number 5 position. Pull A16 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac of approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through 4.5.18d.

c) Set the center frequency of the spectrum analyzer to 1.1 GHz peak C40 of A11 for maximum output with minimum sidebands on the analyzer.

d) Tune C57, C60, C64, and C67 of A10 board (figures 4-3 and 6-8) for maximum amplitude with minimum sidebands approximately 40 dB down or greater.

e) Repeat steps 4.5.18i through 4.5.18k.

f) Disconnect the input to the spectrum analyzer and re-connect the BNC to the "R" port of Z1*.

4.5.23 A15 Board Adjustment

a) Switch the 10 MHz decade to number 6 position, pull A15 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through d and 4.5.18k.

4.5.24 A14 Board Adjustment

a) Switch the 10 MHz decade to number 7 position, pull A14 board half way out and adjust C24*, C36*, and C43* (figure 6-10) for maximum output on the Millivac approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through d and 4.5.18k.

4.5.25 A13 Board Adjustment

a) Switch the 10 MHz decade to number 8 position, pull A13 board half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac of approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through 4.5.18k if required.

c) Disconnect the Millivac and re-connect the BNC to the "I" port of Z2.

4.5.26 A12 Board Adjustment

a) Switch the 10 MHz decade to number 9 position. Pull board A12 half way out and adjust C24*, C36*, and C43* for maximum output on the Millivac of approximately "0" dBm ±1 dB at connector to "I" port of Z2 (use 50 ohm termination on voltmeter).

b) Repeat steps 4.5.18b through 4.5.18k.

c) Disconnect Millivac and re-connect the BNC to the "I" port of Z2.

*Partial reference designator. Add board assembly number for full designator.

4.5.27 A8 Board Adjustment

a) Disconnect the BNC on the "R" port of Z2 and connect it to the Millivac, the output level should be approximately +3 dBm or greater. (Use 50 ohm termination on voltmeter.)

b) While observing the output on the Millivac, peak C13 of A11 board for maximum output.

c) Un-screw and lift out A8 assembly, peak C3*, C6*, C9*, and C12* for maximum output on the Millivac.

d) Switch the 100 KHz and 1 MHz decades to number 4 position and peak C21*, C18*, and C15* for maximum output on the Millivac.

e) Switch the 100 KHz and 1 MHz decades from 0 through 9, and output should not fall below +3 dBm.

f) Disconnect the Millivac and re-connect the BNC to the "R" port of Z2.

4.5.28 A7 Board Adjustment

a) Disconnect the BNC on the "L" port of Z1 and connect it to the Millivac.

b) Switch the 100 KHz and 1 MHz decades from 0 through 9, the output should not fall below −13 dBm.

c) Disconnect the Millivac and re-connect the BNC to the "L" port of Z1.

4.5.29 A1A2 Adjustment

a) Turn FM-10 off and pull left hand module half way out. Install patch cable PC2652 and turn unit on.

b) Disconnect the BNC on the input to the variable attenuator and connect the Millivac to the BNC mounted on the chassis.

c) Set the synthesizer frequency to 250 MHz adjust R31* for an output of -23 dBm on the Millivac.

d) Switch the 100, 10 and 1 MHz decades throughout their ranges, the output should not vary more than ±1 dB. Re-adjust R31* if necessary.

e) Disconnect the Millivac and re-connect the input to the variable attenuator. Remove patch cable and install left hand module.

4.6 Calibration of TCXO

4.6.1 Either of two methods may be used to calibrate the TCXO. One uses a frequency counter and the other uses the Lissajous figure technique in conjunction with an oscilloscope.

4.6.2 Calibration using counter.

4.6.3 Connect the FM-10 RF output jack to the input jack of the Kay amplifier. Connect the output jack of the Kay amplifier to the counter.

4.6.4 Rotate the hinged cover plate away from the access hole in left side panel of FM-10.

4.6.5 Remove protective cap screw directly behind the cover plate with holding driver. (Cap screw may be either slot-head or hex-head).

4.6.6 Observe small slot-head frequency adjustment trimmer behind the cap screw, and carefully turn to adjust frequency.

WARNING

Check that the protective cap screw is in position by reference to Figure 1. If it is accidentally missing, you may wrongly assume that the trimmer is the cap screw.

4.6.7 Set the FM-10 to 1 MHz and adjust the TCXO and board A11 for exactly 1 MHz

4.6.8 Calibration using Lissajous Figure.

4.6.9 Connect FM-10, 1 MHz frequency standard into a Lissajous figure test set-up. Set the FM-10 for 1 MHz operation. For 1×10^{-7} accuracy, adjust TCXO Crystal so that Lissajous pattern executes two reversals in 10 seconds.

*Partial reference designator. Add board assembly number for full designator.

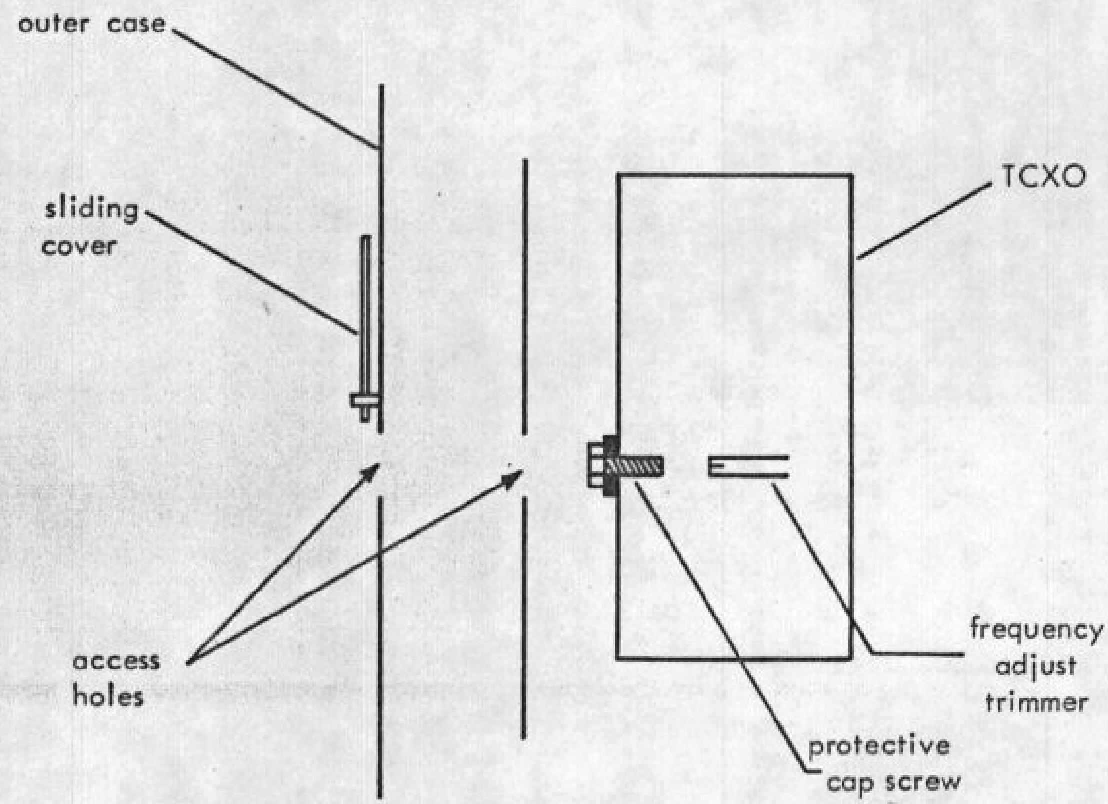

Figure 4-4. Access to TCXO