

Model 17A
WIDE BAND SIGNAL GENERATOR
SERVICE MANUAL

<<WARNING>>
This service manual is for use by qualified
personnel only. To avoid electrical shock,
do not perform any service in this manual
unless qualified to do so.

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1. SPECIFICATIONS

Frequency Range	: 100kHz to 150MHz (up to 450MHz on harmonics)
Band	: A 100 to 300kHz B 300 to 1000kHz C 1.00 to 3.5MHz D 3.0 to 12MHz E 10 to 40MHz F 33 to 150MHz (100 to 450MHz, calibrated harmonics)
Frequency Accuracy	: $\pm 3\%$
RF Output	: 100mVrms, approx., up to 35MHz. (open circuit)
Output Control	: HIGH-LOW switch and fine adjuster.
Modulation	: Int.: approx. 1 kHz 30% Ext.: 50Hz to 20kHz, at less than .15Vrms (30%) input.
Audio Output	: 1 kHz; 1 Vrms or more (fixed).
Crystal Oscillator	: For 1 to 15MHz crystal in Type FT-243 holder. (not included).
Power Supply	: 100, 115 to 120, 220 to 240V, 50/60Hz; approx. 3VA.
Size and Weight	: 238(W) \times 150(H) \times 130(D) mm; 2.5kg.

2. TEST EQUIPMENT REQUIRED

The following test equipment is required for calibration and servicing of the Model 17A. The suggested specifications are the minimum necessary for proper calibration of this instrument.

<u>Test Equipment</u>	<u>Minimum Specifications</u>
- Multimeter	Accuracy: $\leq 1\%$ *LEADER Model LDM-853A
- Oscilloscope	Sensitivity: 10mV/div Bandwidth: 20MHz *LEADER Model 1020 Low capacitance Probe *LEADER Model LP-16BX
- Frequency Counter	Bandwidth: 150MHz *LEADER Model LDC-822A

3. CALIBRATION PROCEDURE

3.1 General

Calibration should be performed after a 30 minute warm-up period. It should also be confirmed that the unit is connected to the rated power line voltage.

All adjustment should be completed in the given order, because some adjustments interact with others.

During the adjustment procedure, remove the case only when necessary and replace immediately after making an adjustment. This will maintain all circuit at constant operating temperature.

*** WARNING ***

Electrical shock hazards exist inside this instrument when covers are removed.

3.2 Initial Settings

The initial control settings to be used for each check and adjustment are listed below. Any variations from these settings are stated in the applicable procedure.

FREQUENCY RANGE	F
Dial	33MHz
Mode	EXT MOD
HIGH-LOW	HIGH
FINE	Fully clockwise

3.3 Power Supply

- Connect the DC voltmeter between test point and chassis.
- Check the supply voltage according to Table 3-1.

<u>Test point</u>	<u>Voltage</u>
Q301, collector	+18.5V
Q301, emitter	+12V

Table 3-1

3.4 Frequency Adjustment

NOTE This step mentions a RF frequency adjustment, however, it is very critical. Therefore, if problem is not evident, do not attempt for the following adjustments. It may be necessary to compromise for the best calibration accuracy.

- Connect the frequency counter to OUTPUT terminal.

(1) F Band

- Set: FREQUENCY RANGE F

- The frequency reading should be within $\pm 3\%$ on entire range. If not, adjust shape and space of the F band coil and two bars, between variable capacitor and RANGE switch, for a best calibration accuracy.

(2) E Band

- Set: FREQUENCY RANGE E

- The frequency reading should be within $\pm 3\%$ on entire range. If not, adjust E band coil for a best calibration accuracy.

(3) D to A Band

- Apply the same procedure for the D to A band by adjusting the each coil.

3.5 Modulation Check

- Set: FREQUENCY RANGE B
 Dial 500kHz
 Mode INT MOD

- Connect the oscilloscope to OUTPUT terminal.

- Check that the AM signal comes out.

4. TROUBLESHOOTING PROCEDURE

4.1 General

Confirm that the any equipment used with the Model 17A is operating correctly.

Check all control settings, because an incorrect setting can make a good unit appear defective. If there is any question about the function, refer to the Instruction manual for a correct operation.

Check all circuits for visual defects such as broken component, loose connection, open wire, poor soldering etc.

Some troubles can be solved with proper adjustment.

Check the voltage and waveform as shown in the Schematic diagram to locate the defective circuit. Start with the power supply.

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4.2 Theory of Operation

The Model 17A is divided into following three sections; 1) a RF oscillator, 2) an AF oscillator and 3) a modulator. Refer to "7. Block Diagram".

The RF oscillator is used colpitts circuit which consists of active device, transistor, and feedback loop containing coils and variable capacitor. The frequency range is from 100kHz to 150MHz in fundamental.

The AF section is used a phase-shift oscillator which consists of an amplifier and resistance-capacitance network connecting between output and input of the amplifier. The network having a phase shift of 180° at the oscillation frequency, 1kHz.

The modulator receives the RF and AF signals, then generates AM signal.

4.3 Troubleshooting Aid

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- (1) Overall operation is not satisfactory or no signal comes out.
- a. Check the following points to locate the defective circuit.
- Line fuse in the compartment on the left side of the instrument.
Use 0.2A normal blow fuse for 100V to 240V operation.
CAUTION Use specified Fuse only. Refer to "10. Parts List".
 - Secondary voltage of power transformer.
- b. Power supply
Check power supply voltage according to Table 4-1.

<u>Test point</u>	<u>Voltage</u>
Q301, collector	+18.5V
Q301, emitter	+12V

Table 4-1

Yes: Proceed to step "(2)".

No: Troubleshoot power supply

+18.5V: D101-102(T-2269, power supply board) and associated circuit.

+12V: +18.5V line, Q301, D301(T-4540, AF oscillator board) and associated circuit.

(2) RF Oscillator

Check that the RF signal present at gate of Q403(T-4541, RF oscillator board) for approximately 0.5Vp-p in lower frequency range.

Yes: Troubleshoot buffer amplifier, attenuator and associated circuit. Check HIGH-LOW switch for wrong contact.

No: Troubleshoot RF oscillator and associated circuit. Check RANGE switch for wrong contact.

(3) Modulation

No AM signal comes out.

Check that the 1kHz sine wave present at collector of Q302(T-4540, AF oscillator board) for 8Vp-p.

Yes: Troubleshoot AF oscillator and associated circuit.

No: Troubleshoot modulator and associated circuit. Check mode switch for wrong contact.

8. SCHEMATIC DIAGRAM

