SPRAGUE®
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IL-110

OPERATING MANUAL

FOR THE

MODEL 600A

INTERFERENCE LOCATOR

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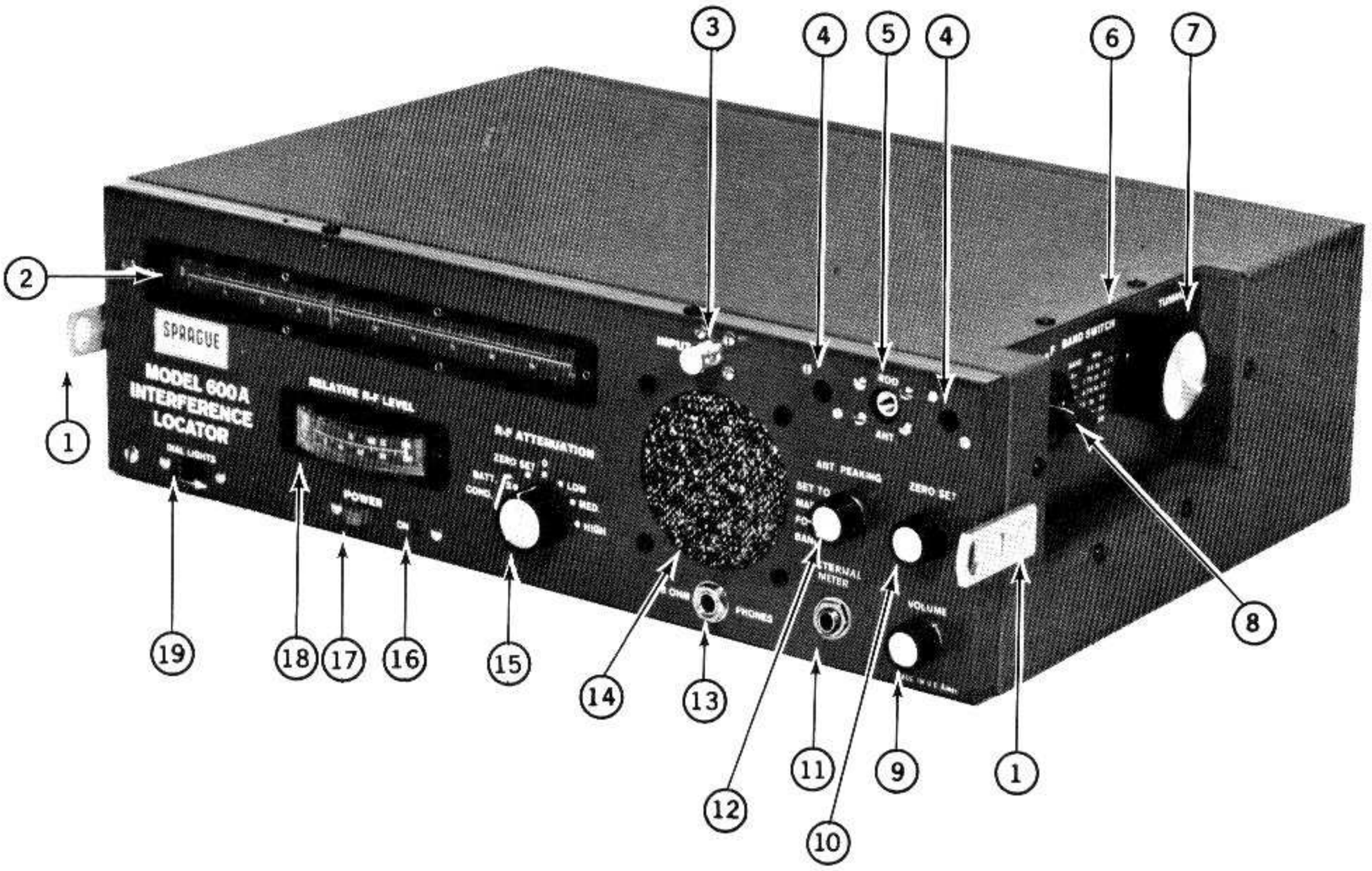
SPRAGUE ELECTRIC COMPANY
North Adams, Massachusetts



1. *Carrying strap bracket*
2. *Tuning dial*
3. *Input connector*
4. *Antenna mounting*
5. *Rod antenna connector*
6. *Band table*
7. *Tuning control*
8. *Band switch*
9. *Volume control*
10. *Zero set control*
11. *External meter jack*
12. *Antenna peaking control*
13. *Headphone jack*
14. *Speaker*
15. *Battery check/RF attenuation switch*
16. *Power indicator*
17. *Power switch*
18. *Battery check/RF level meter*
19. *Dial light switch*

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Operating Manual for the Model 600A Interference Locator

1. Introduction

1.1 General. The Sprague Model 600A Interference Locator is a rugged, wide-range, portable instrument designed especially to meet the needs of electric utilities, laboratories, industries and others concerned with the detection and location of sources of r-f transmissions and interference. Special attention has been given to the design details which contribute to the reliability and convenience of use.

1.2 Operating Frequency and Sensitivity. The Model 600A Interference Locator covers from 540 kHz to 220 MHz in six tuning ranges with a sensitivity of 2 microvolts or better at all freqúencies, for a 5% output meter deflection.

1.3 Application. The Model 600A Interference Locator is designed for the rapid detection and location of AM/FM radio and TV signal sources. Other effective uses include the following:

a. Location of communications interference sources (corona noise, power line leaks) by electric utilities.

b. Maintenance programs, both preventive and otherwise, since many faults will begin to radiate r-f noise before actual failure occurs.

c. Laboratory and other testing and investigative applications. The instrument is useful as an r-f null detector or voltmeter when so calibrated.

d. Direction finding in marine applications.

e. Detection and location of sources of r-f transmissions within the frequency range of the instrument.

1.4 Specifications. Performance specifications and other data pertaining to the Model 600A Interference Locator are found in the Appendix.

1.5 Diagrams. The block diagrams and schematic diagrams necessary for the maintenance of the instrument are contained in this manual.

2. Circuits

2.1 General. The Model 600A Interference Locator is engineered around a solid-state superheterodyne circuit which provides a high degree of stability. Special circuitry has been incorporated to provide an instrument best adapted for interference location purposes. The frequency range covers from 540 kHz to 220 MHz in six switchable bands. These frequencies include the standard broadcast band, short wave, FM and VHF television (channels 2 to 13). A general idea of the station types and services to be found within the six bands is as follows:

Band	Freq. Coverage	Station types and services
A	540 kHz – 1.75 MHz	Standard broadcasting
B	1.75 MHz – 4.7 MHz	Short wave broadcast, maritime, amateur
C	4.7 MHz – 14 MHz	Short wave braodcast, aeronautical, amateur
D	13 MHz – 28 MHz	Short wave braodcast, Citizens Band, amateur
E	28 MHz – 54 MHz	Public safety, transportation, utilities, amateur
F	54 MHz – 220 MHz	FM, VHF television, transportation, public safety, aeronautical, amateur, weather

NOTE: These allocations are subject to revision from time to time under international agreements. Specific data is obtainable from the Allocation and Treaty Division, Federal Communications Commission, Washington, D. C.

The instrument operates from a self-contained battery supply consisting of two 7.5 volt batteries, two 6 volt batteries and a single 1.5 volt dry cell. The battery life under normal usage is approximately 100 hours. When replacement is necessary, refer to Paragraphs 4.3 and 4.11 of this manual, which lists the required batteries by NEDA type number. Auxiliary power supplies are available.

2.2 Block Diagrams. The block diagrams for bands A, B and C are shown in Figure 1, bands D and E are in Figure 2 and the block diagram for Band F is shown in Figure 3. The block diagram for the complete instrument is shown in Figure 3a.

2.3 Theory of Operation. The circuitry used in the Model 600A Interference Locator is that of a superheterodyne receiver with the necessary modifications and additions to adequately cover the frequency range intended, insure stable operation under rugged conditions and long use, with a minimum of weight.

Separate r-f front ends are used for (1) the VHF television and FM bands, extending from 54 MHz to 220 MHz and (2) the broadcast and short wave bands from 540 kHz to 54 MHz. An intermediate frequency (i-f) of 455 kHz is used for the frequency range of 540 kHz to 14 MHz (Bands A, B, C) and an i-f of 10.7 MHz is used for the 14 MHz to 220 MHz range (Bands D, E, F). The same i-f stages are used for both front-ends. Each stage contains two transformers tuned to pass the two i-f frequencies.

Block diagrams of the band-switched locator circuits are shown in Figures 1, 2 and 3, and Figure 3a, below is the block diagram of the complete circuit.

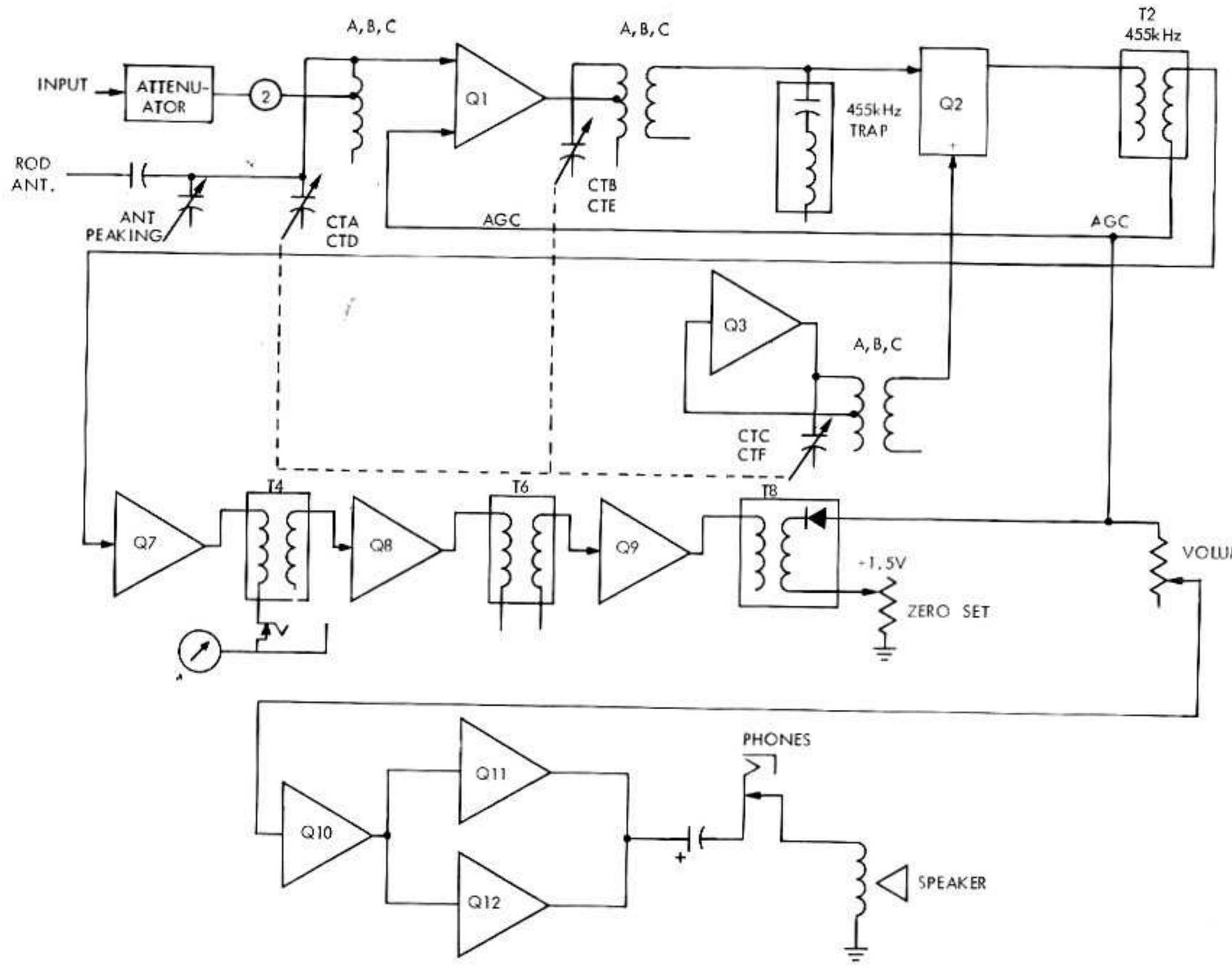


Figure 1
BANDS A, B, C.

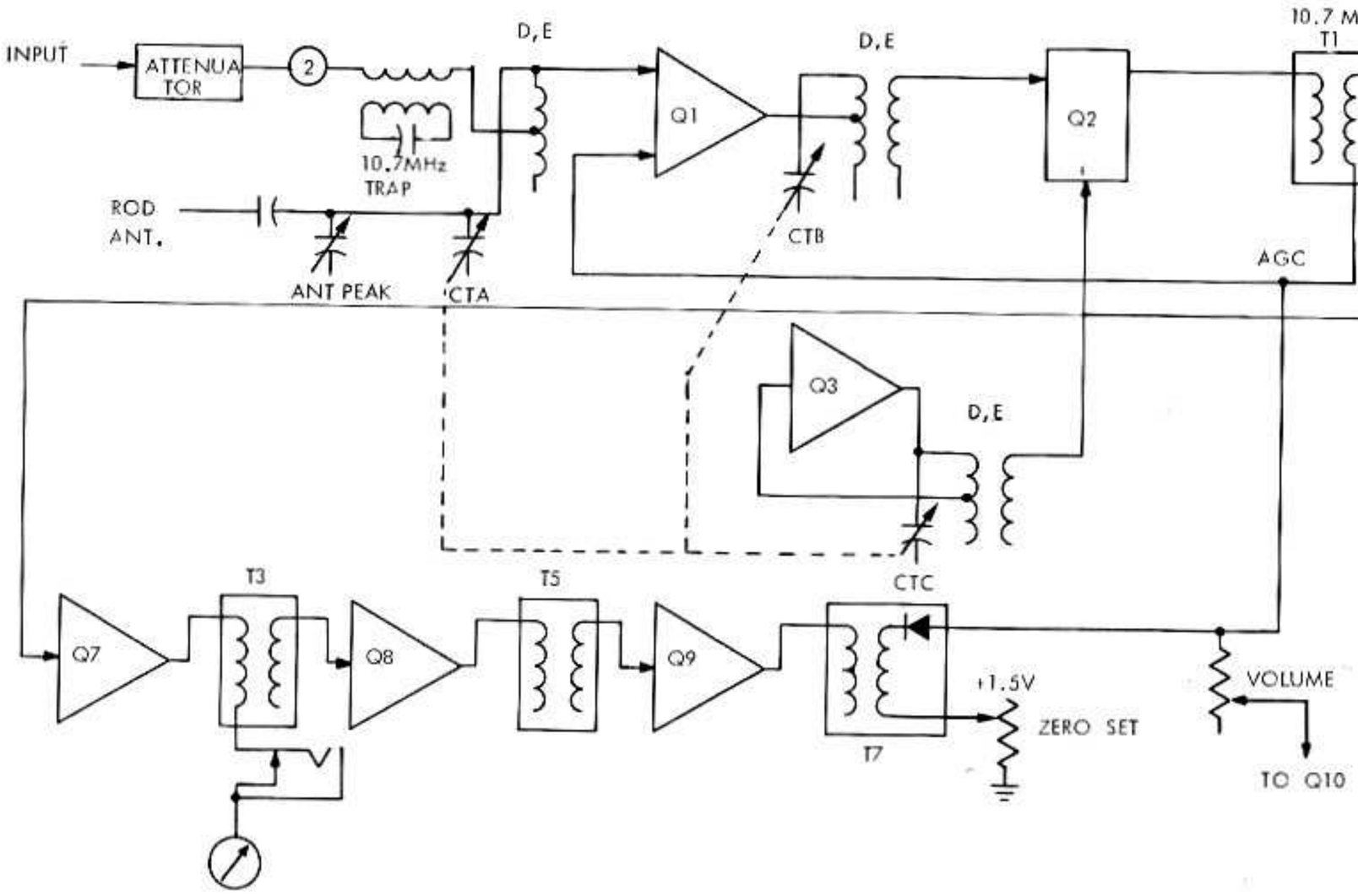


Figure 2
BANDS D, E.

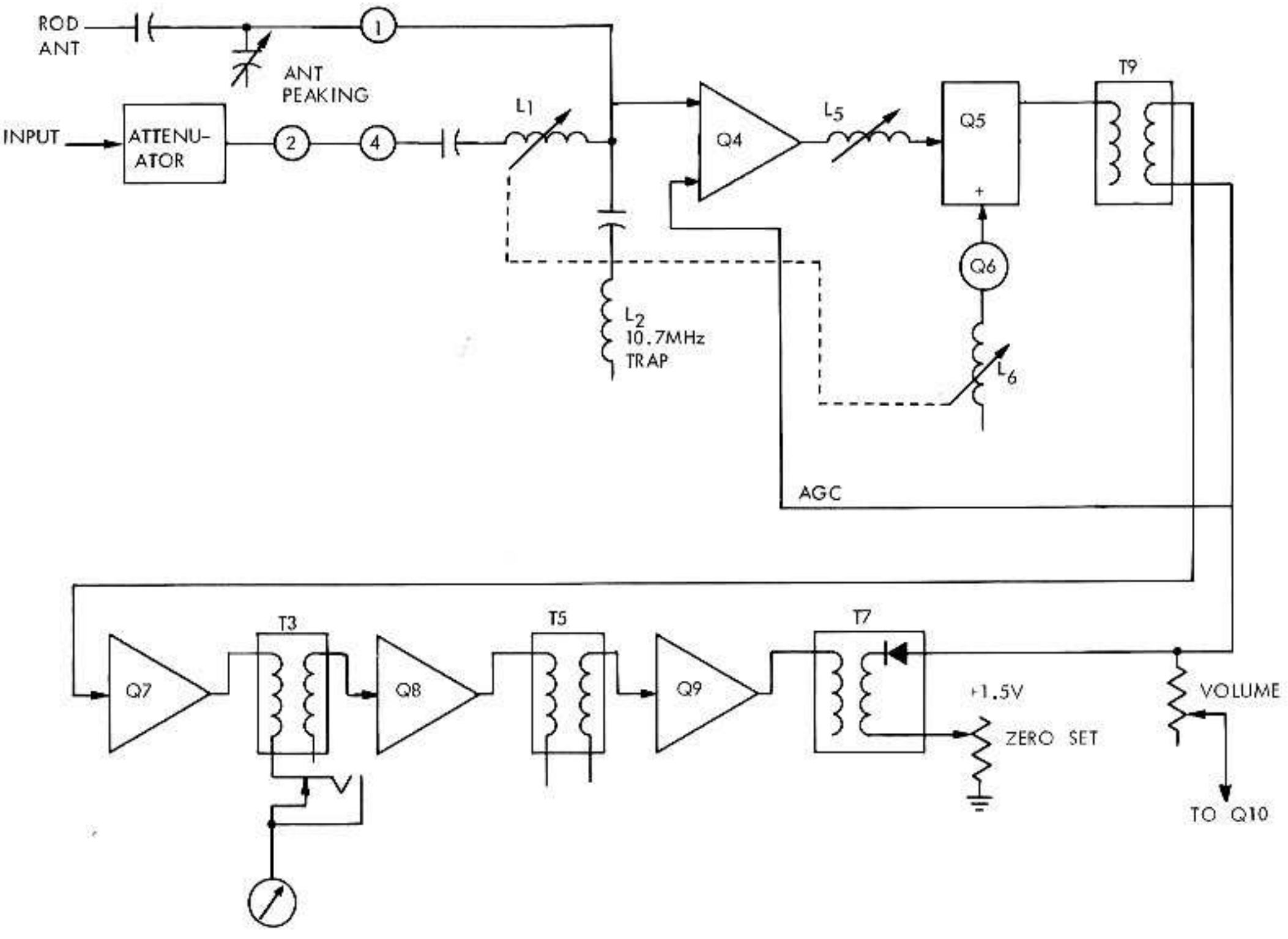


Figure 3

BAND F

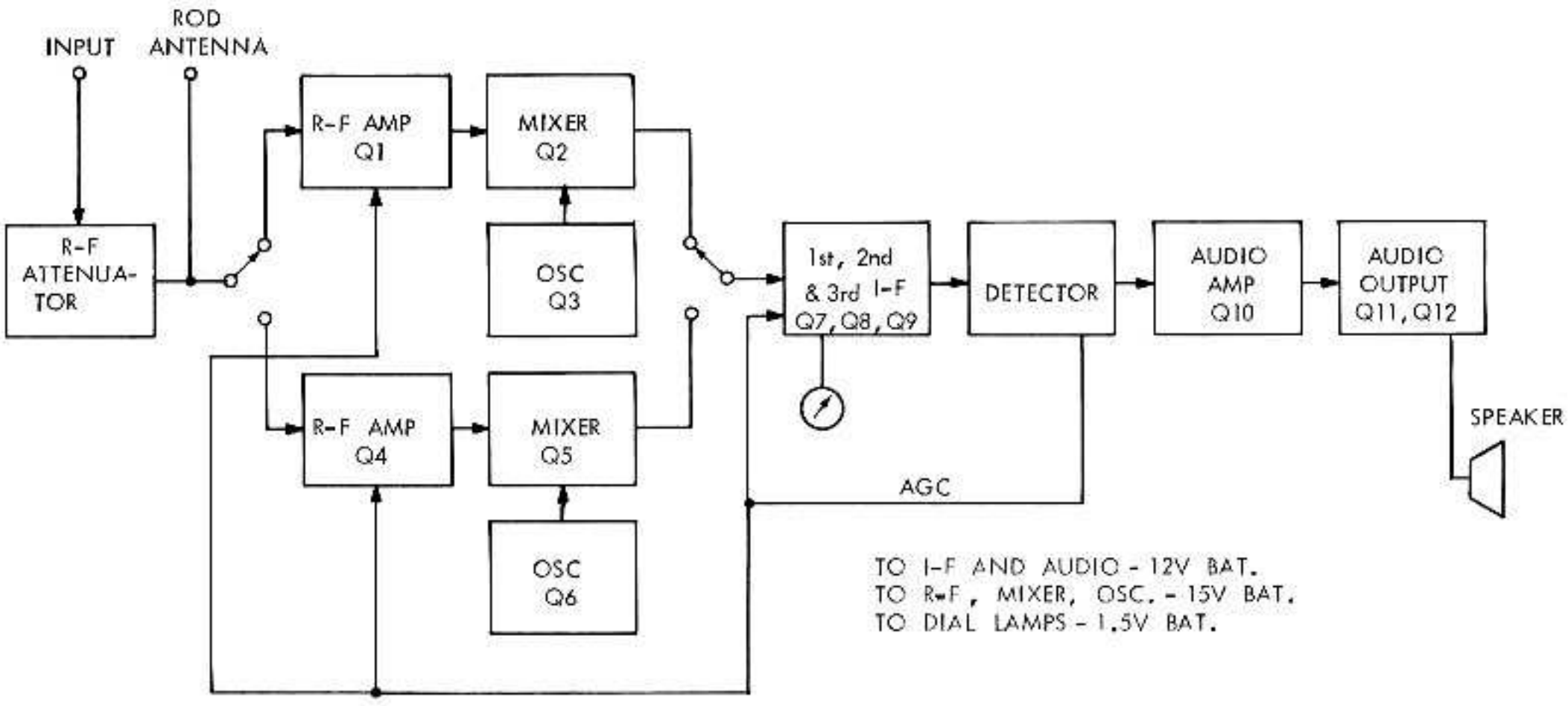


Figure 3A

2.4 VHF Operation. (54 MHz-220 MHz) From the antenna connector, the signal passes through the attenuator to Q4 r-f amplifier. The output of this amplifier is mixed with the signal from the local oscillator Q6 in mixer stage Q5. This produces a 10.7 MHz i-f signal. This signal is then amplified in Q7 first i-f stage and Q8 second i-f amplifier stage. The third i-f stage is Q9 whose output is applied to a single-tuned output transformer through diode D1, where detection takes place. The resultant audio signal then passes to the audio gain control, and the rectified current from diode D1 is injected into the a-g-c filter, then to the first i-f stage and the r-f amplifier. The Q7 collector current is monitored by a meter which shows an approximate logarithmic function of the r-f input signal.

The audio gain control applies signal to Q10 audio amplifier-driver which is applied to Q11, Q12 complementary pair, whose output is applied either to the speaker or the 8 ohm headphone jack.

2.5 Broadcast and Shortwave Band Operation. Bands A, B, C, D and E operate in a similar fashion except for the different r-f front end used at these frequencies, and the use of 455 kHz i-f transformers on Bands A, B and C. The attenuator output is applied to the tuned r-f stage Q1 which supplies mixer Q2. The oscillator is Q3.

2.6 Batteries. A 12-volt battery supplies power to the i-f amplifier, audio driver and audio output transistors.

A 15-volt battery powers the tuners (front ends). Only the tuner in use receives power. A switch section on the band switch removes power to the tuner not being used. The 15-volt battery also provides a 1.5 volt bias to the first i-f amplifier Q7. The zero-set control varies the amount of bias current being supplied.

A separate 1.5 volt D-cell powers the two lamps which illuminate the tuning dial scale and the meter scale.

3. Antenna Systems

3.1 General. Three antennas are furnished with the Model 600A Interference Locator. These include a VHF dipole, an all-wave rod antenna and a directional loop antenna. One optional antenna and two optional antenna accessories are available. Connections for the three antennas furnished are described below.

3.2 VHF Dipole Antenna. This antenna is collapsible and adjustable and is provided with a mounting base which fastens directly to the top panel connectors on either side of the ROD ANT connector by means of two quick-action fasteners. The coaxial antenna lead connects to the INPUT coaxial socket.

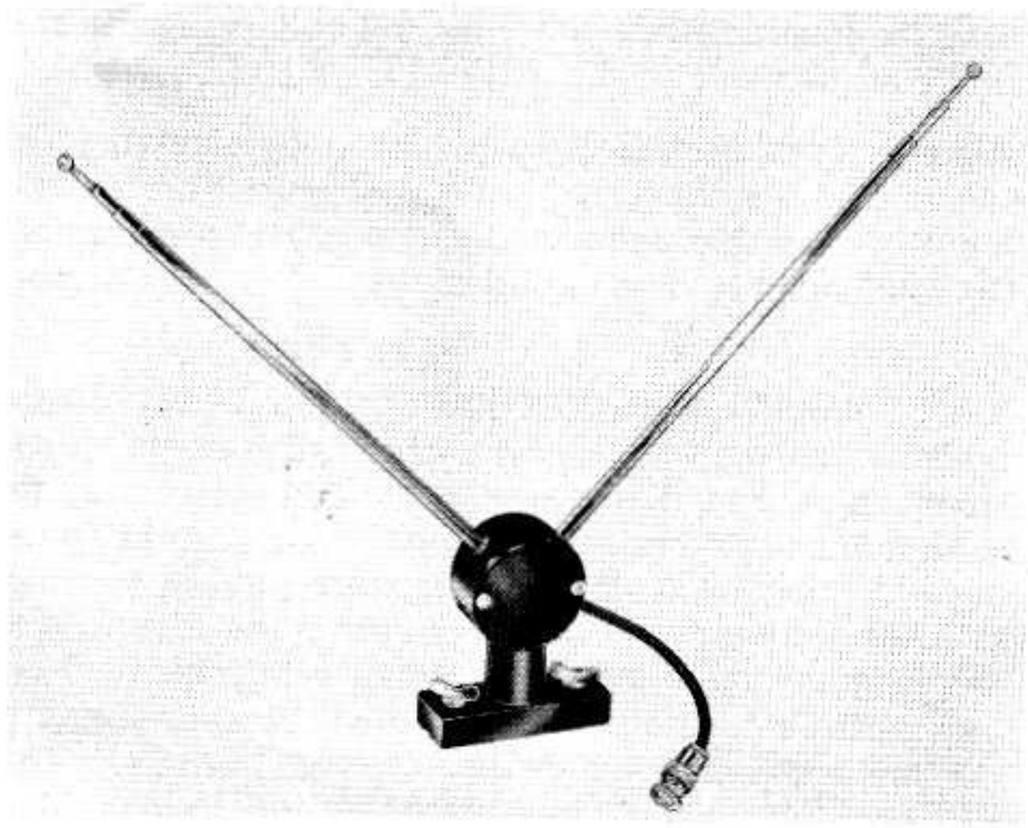


Figure 4

3.2.1 Applications. Antenna choice depends on the particular application as described in this paragraph. The dipole antenna (Figure 4) should be used where horizontally-polarized signals are to be traced. This antenna is directional and may be used to determine the direction from which the interference or r-f transmission is radiating.

When the antenna is turned toward the direction of *maximum* signal strength, the source of that signal is in a direction at right angles to the plane of the antenna. The length of the antenna may be adjusted for maximum signal strength at any one frequency.

3.3 All-Wave Rod Antenna. A single telescoping rod may be unscrewed from the antenna base and threaded directly into the ROD ANT connector for use as an all-wave adjustable vertical antenna.

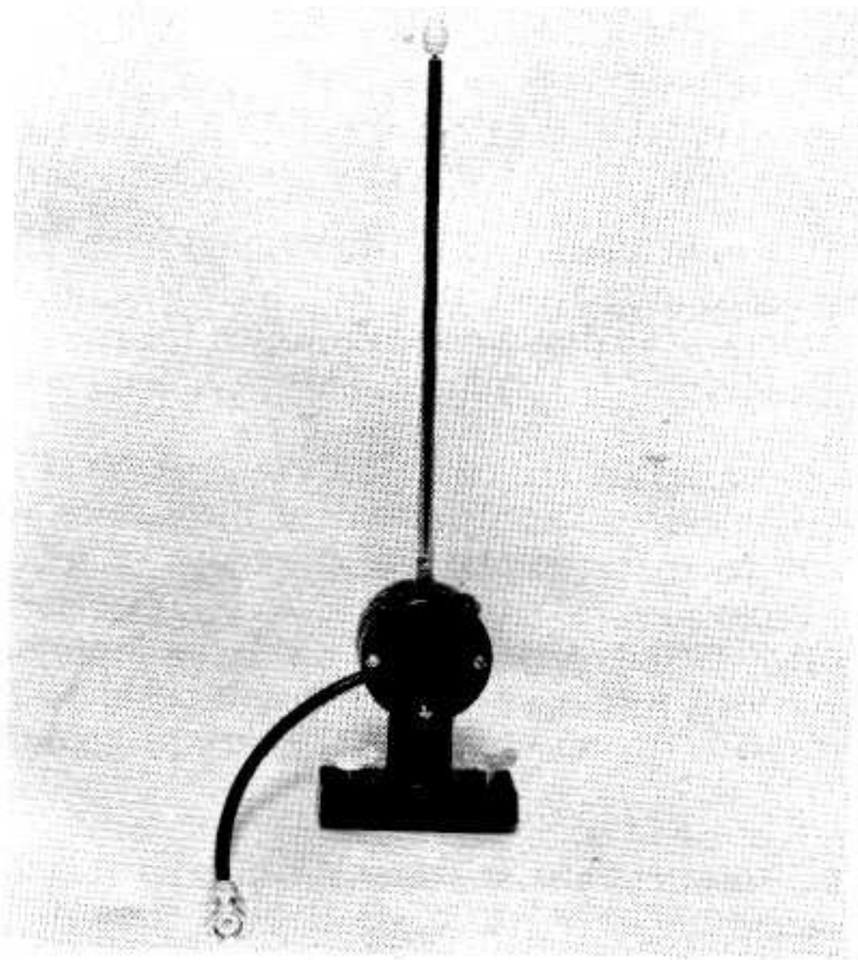


Figure 5

When the rod antenna is used in this manner, the R-F ATTENUATOR does not function. R-F attenuation may be accomplished however, by collapsing the rod or by adjustment of the ANT. PEAKING control.

Remote operation may be achieved by screwing the center rod into the antenna base, (Figure 5) removing the other rod and connecting the coaxial antenna lead (through an extension cable) to the INPUT connector.

3.3.1 Applications. The rod antenna provides maximum sensitivity to signals, especially at the lower frequencies, but it is non-directional. However, the source of interference or r-f transmission can be found by using the triangulation procedure (taking readings at several compass points and noting the direction of increasing signal strength). When using this method, the controls on the instrument must be maintained in the same position once they are set initially. This will avoid confusing signal strength indications.

3.4 Directional Loop Antenna. This direction-finding antenna can be mounted on the instrument top panel in the same manner as the dipole antenna (See section 3.2).

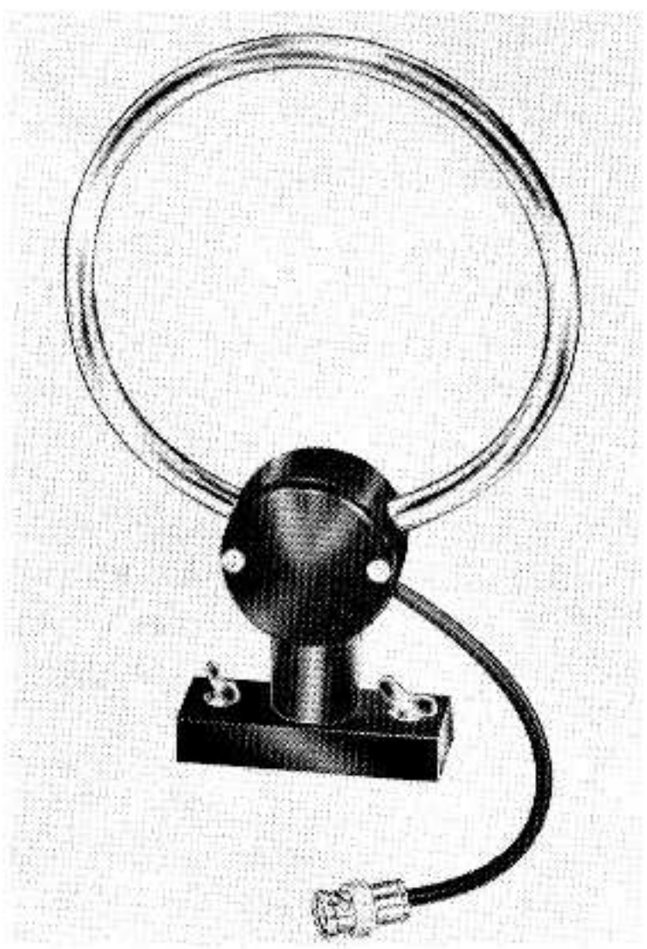


Figure 6

3.4.1 Applications. The directional loop antenna is responsive up to and including 50 MHz. It is used to determine the direction from which the interference or r-f radiation is coming. This is accomplished by rotating the entire instrument in the direction of the *weakest* signal as indicated on the RELATIVE R-F LEVEL meter. The direction of the source will be perpendicular to the plane of the loop.

3.5 R-F Probe Antenna. This is an optional accessory used with a coaxial extension cable connected to the INPUT connector. The cable is also an option.

3.5.1 Applications. When an interference source has been localized to a small area, the r-f probe antenna is useful for pinpointing purposes. By inserting the probe into and around electrical installations, machinery, wiring and appliances, the source can be located with great accuracy. This antenna is used after the interference source has been localized by using either the loop or dipole antennas.

The probe is connected to one end of the 25-foot coaxial cable and the other end of the cable is connected to the locator INPUT connector.

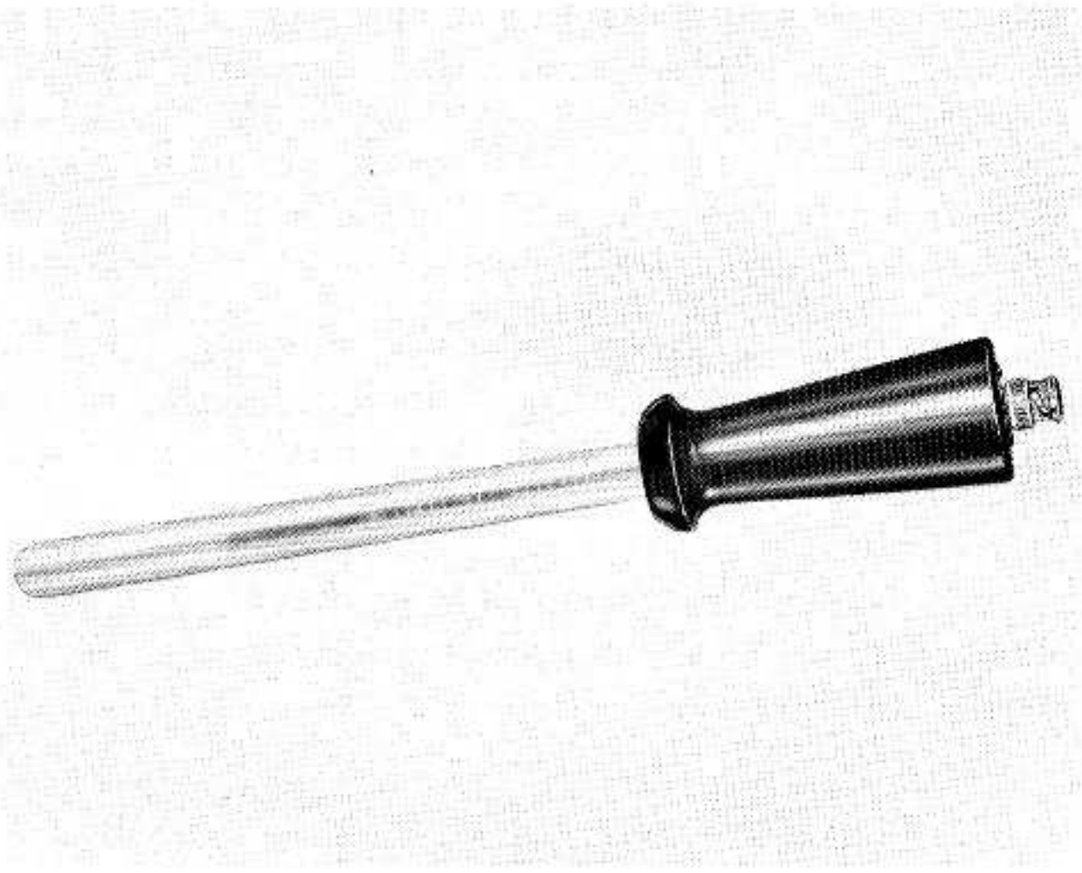


Figure 7

SAFETY PRECAUTIONS

For maximum protection to users, the r-f probe antenna is tested to withstand 35,000 volts, 60 Hz. However, the probe should never be used in direct contact with the circuit under examination, whether it is "live" or not. The Model 600A Interference Locator should always be placed on the ground or floor when probing near energized equipment. Use extreme caution when using the probe in the vicinity of moving machinery.

3.6 Antenna Mounting. This is an adjustable web strap-suction cup mounting for (1) the VHF dipole antenna, (2) the all-wave rod antenna and (3) the directional loop antenna. Intended for vehicular mounting, it is best installed on a flat roof, held in place with the suction cups and strapped securely to the rain gutters. This mount eliminates the need for a permanent installation and does not require holes to be drilled into the vehicle.

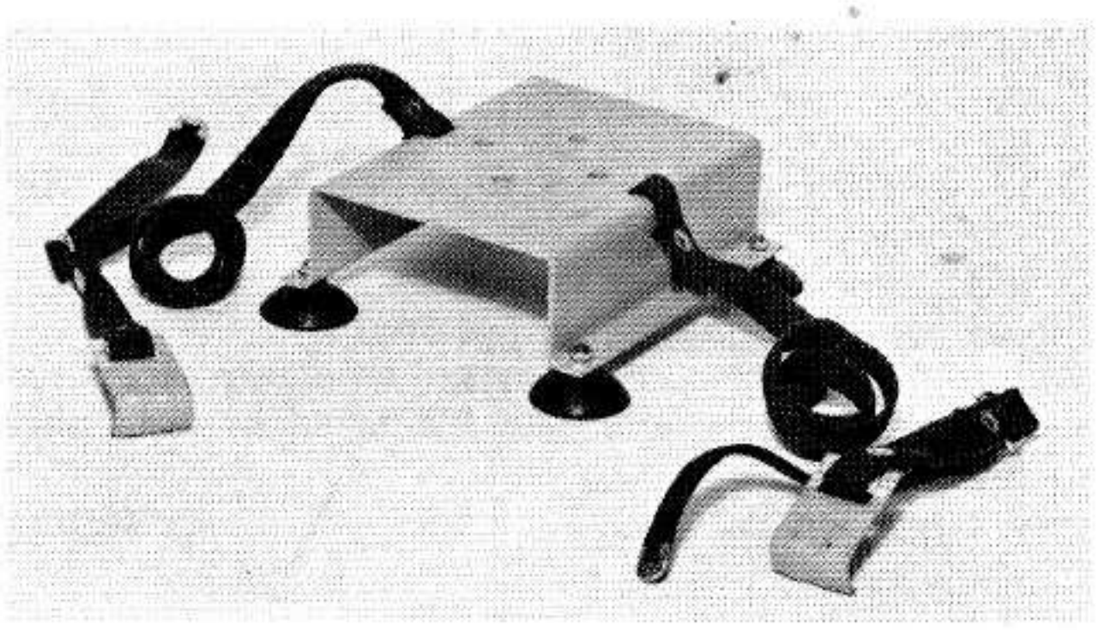


Figure 8

3.7 Short Coaxial Cable. This 8-foot cable (Figure 9) with mating connectors for the INPUT connector

on the instrument is used for adapting the Model 600A to standard vehicle radio antenna/s or external test equipment (for null-detection or voltmeter use). The impedance of this cable is 50 ohms.

Figure 9

3.8 Long Coaxial Cable. This 25-foot cable with mating connector for the INPUT connector on the instrument is used for connecting remote antennas (such as the r-f probe antenna) to the Model 600A Locator. The impedance of this cable is 50 ohms.

Figure 10

4. Operation

4.1 General. The operating controls and procedures for using the Model 600A Interference Locator have been designed for ease of operation and to minimize operator error. When difficulty is encountered in using the instrument, read through the pertinent instruction paragraphs.

4.2 Attaching the Antenna. Select the antenna best suited to the individual application and attach it, with necessary cable if required, as outlined in Section 3.

4.3 Applying Power. Turn the power on by sliding the POWER switch to the ON position. Run through the check list below:

a. The red window to the right of the POWER switch indicates that power is applied.

b. Insure that all batteries are in good condition by rotating the R-F ATTENUATION switch to BATT. COND. 1 and BATT. COND. 2 and observing the RELATIVE R-F LEVEL meter for the following:

(1) If the meter indicates GOOD (green) in both switch positions, the batteries are alright.

(2) If the meter indicates REPLACE (red) in BATT. COND. 1 switch position, replace both 6 volt batteries (NEDA 6).

(3) If the meter indicates REPLACE (red) in BATT. COND. 2 switch position, replace both 7.5 volt batteries (NEDA 713).

On rare occasions, the single cell providing the 1.5 volt bias to pin 3 of the battery socket (J5) may be defective with the remainder of the 15 volt battery indicating GOOD in the BATT. COND. 2 position. In this case the meter will not zero with the ZERO SET control. Replace the defective 7.5 volt battery (NEDA 713).

(To gain access to the battery compartment, remove the four quick-action fasteners on the rear of the instrument case)

If the check out is satisfactory, the Interference Locator is ready for immediate use.

4.3.1 Auxiliary Power Supplies. To replace the battery power supply with either the Model 524 12 volt d-c or Model 525 115 volt a-c auxiliary power supplies, loosen the four quick-action fasteners on the rear of the instrument case and unplug the power connector. Reverse the procedure to connect the auxiliary power supply.

Both auxiliary power supplies are internally fuse-protected against instrument overload and vehicle regulator failure or power line surges.

4.4 Tuning Range Selection. Select the desired tuning range by rotating the BAND SWITCH on the side of the cabinet. The frequency ranges are listed for each band position on the BAND MHz table between the BAND SWITCH and the TUNING knob on the side of the cabinet.

4.5 Antenna Peaking. For maximum sensitivity, the individual antenna system in use must be matched for the frequency in use. For all bands, set the ANT. PEAKING control on the top panel for maximum deflection on the RELATIVE R-F LEVEL meter.

4.6 R-F Attenuation. Rotation of the R-F ATTENUATION switch to the O position provides maximum sensitivity, while the LOW, MED. and HIGH positions provide for increasing degrees of input signal attenuation.

4.7 Zero Set. The ZERO SET control is used to adjust the pointer to the zero point on the meter scale, while the R-F ATTENUATION is in the ZERO SET position. The zero point on the meter should be checked occasionally during operation and again when changing bands.

Since the ZERO SET control greatly affects the Model 600A sensitivity, misadjustment can cause the instrument to appear to be defective. Maximum instrument sensitivity will occur with the control fully clockwise.

4.8 Volume. Clockwise rotation of the VOLUME control increases the audio output level to either the internal speaker or external ear phones. Set this control to a comfortable listening level.

4.9 Tuning. Tune the instrument for the frequency desired by rotating the TUNING control located on the side panel. The frequency of the signals heard are read directly on the main tuning dial on the top panel. A convenient linear logging scale is also provided on each band.

Select that R-F ATTENUATION switch position (LOW-MED.-HIGH) which provides maximum meter deflection, but with the meter reading on the lower half of the scale. The VOLUME control should then be adjusted to provide a comfortable volume level.

4.10 Meter. The reading on the meter is directly proportional to the quasi-peak of the received r-f signal and is independent of modulation. Meter indications are also independent of the setting of the VOLUME control. The meter has an upper scale with an approximately logarithmic distribution. (The higher the meter reading, the greater the r-f input signal level). The logarithmic meter characteristic plus the R-F ATTENUATION switch position used to attenuate the r-f input signal allows the locator to be used over a wide range of input signal levels. For operator convenience, the lower scale is linear (0-100). This is helpful in duplicating readings, and as a general reference and logging scale. See also paragraph 4.13 below.

4.11 Dial Lights. These can be turned on by sliding the spring-return DIAL LIGHTS switch to the right. If the lights are weak or inoperative, replace the 1.5 volt cell (NEDA 13).

4.12 Audio Output. The panel-mounted speaker provides audio output unless headphones are used. Plugging 4 ohm to 16 ohm impedance headphones into the 8 OHM PHONES jack disconnects the internal speaker. This is helpful in noisy areas, for greater sensitivity to weak signals and for reasons of security.

4.13 External Meter. A jack is provided to enable the user to have a remote meter (such as mounted above a vehicle instrument panel) which gives the same type of indication as the internal RELATIVE R-F LEVEL meter. Note that when using the external meter, the BATT. COND. positions of the R-F ATTENUATOR switch will normally indicate low.

5. Location Procedures

5.1 General. There are three methods of monitoring and interpreting an r-f signal (noise or interference). You can:

(1) listen to the audio output from the built-in speaker.

(2) use the headphones plugged into the 8 OHM PHONES jack.

(3) observe the deflection of the meter indicator. Use of the meter is preferred because the human ear is sensitive to only relatively large changes in audio level. In cases where rotating the directional antenna produces only a small change in audio output, the meter readings must be relied upon in determining the direction from which the signal is coming.

5.2 Initial Readings. Initial attempts to locate the source of a signal will probably start quite far from the source. A signal from a radio or television station may be considerably stronger than the interfering signal. This will produce a maximum meter reading when the antenna is directed toward the radio or TV station, rather than toward the interference source. Figure 11 illustrates the start of an interference hunt, well away from the homes affected.

However, noise signals are generally very broad and can be heard above or below the frequency of the desired signal. By slight detuning, the signal from the station will be eliminated leaving just the interfering signal on the meter. It should now be possible to determine the direction of maximum interference by rotating the directional antenna and noting the changes in meter readings as shown in Figure 13. In this case, the investigation was carried out by a mobile unit.

NOTE: If the signal strength increases as the power line is patrolled, the direction heading is correct. If the signal decreases in strength, the opposite heading must be used. Additionally, there may be peaks and nulls in the signal as the investigator proceeds along the line. Each succeeding peak will be stronger as the source is approached. If each succeeding peak grows weaker, the direction of travel must be reversed. Figure 12 shows a Model 600A in use near a high tension line.

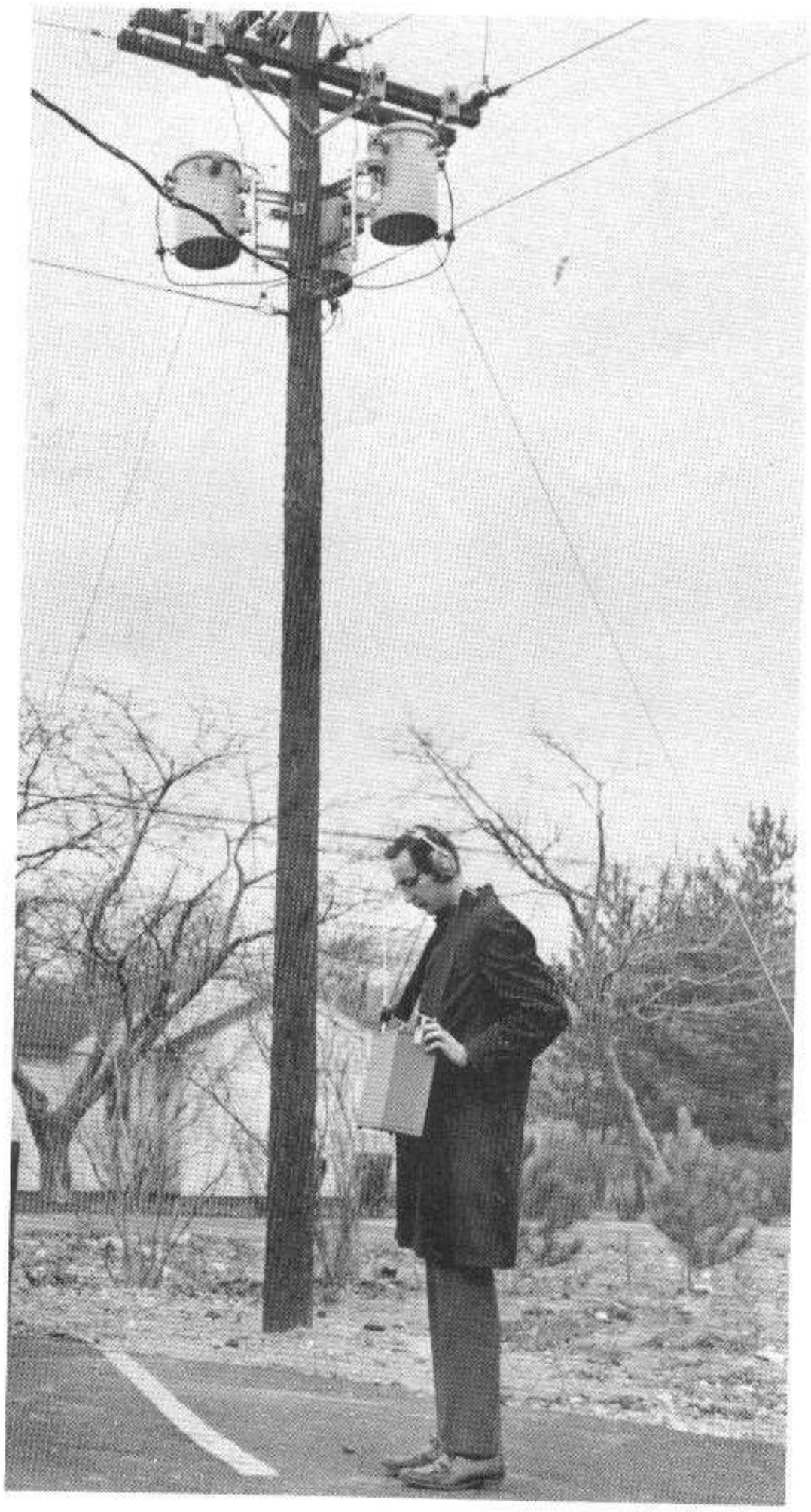


Figure 11

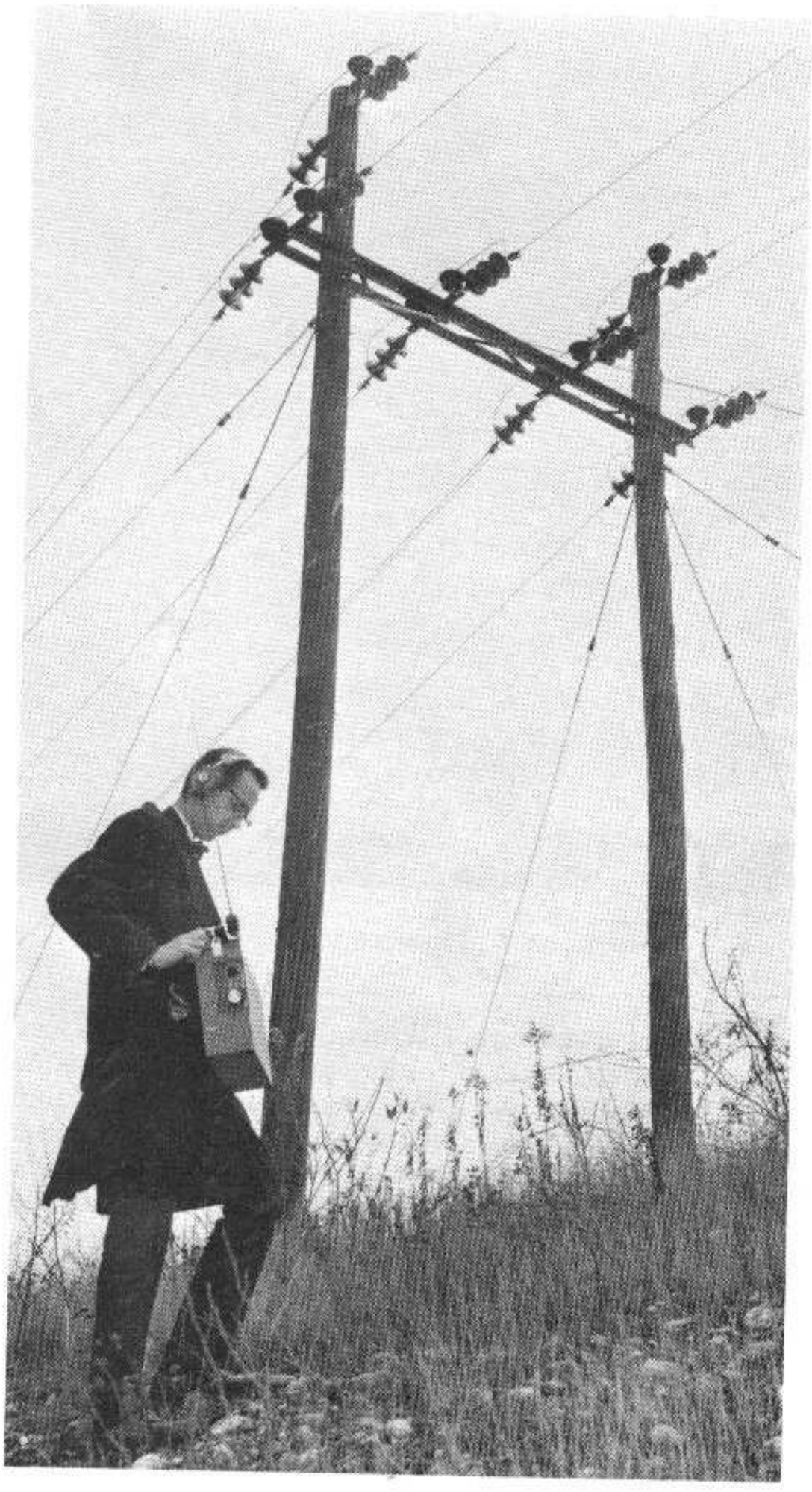


Figure 12

Figure 13

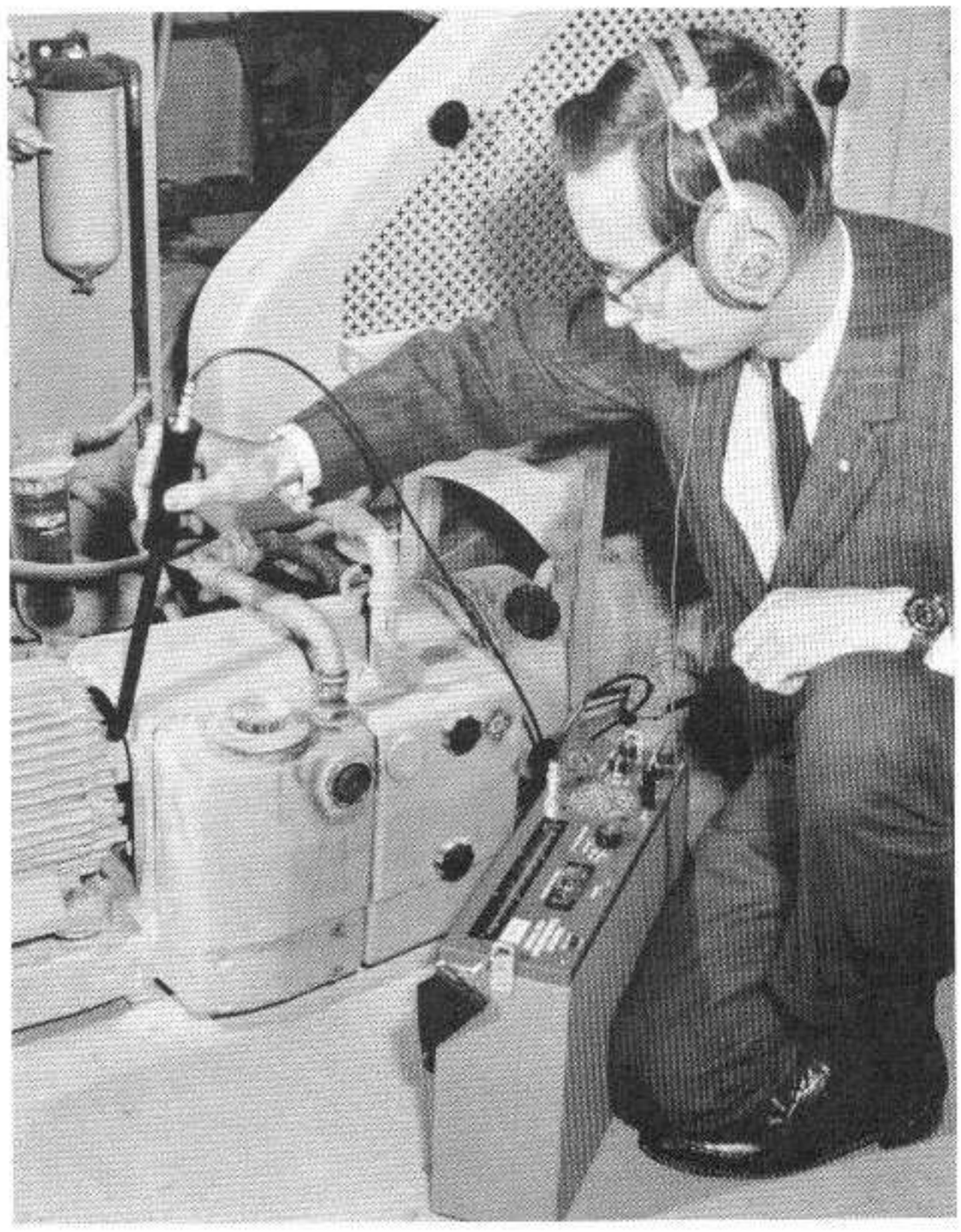


Figure 14

5.3 Final Readings. When the investigator is very close to the source of interference, the directional antenna will lose its effectiveness due to the strength of the signal from all directions. For precise location of the source, the r-f probe antenna should be used as shown in Figure 14. Here, the offending unit was found to be a badly arcing motor commutator.

6. Service and Maintenance

6.1 General. The Model 600A Interference Locator is designed and constructed to give long, trouble-free service but an occasional malfunction may occur. Most difficulties can be corrected by a qualified electronic equipment repairman referring to the block diagrams, schematic diagram, parts list and alignment instructions. The accepted trouble-shooting procedures apply when servicing the Model 600A. These include looking for simple and obvious difficulties (loose antenna cable connections, run-down batteries, error in selecting proper frequency band, etc.), to the more detailed examinations such as internal visual and instrument checks (loose components, voltage and current checks, obviously damaged parts, etc.).

Instructions for returning the instrument to the factory are contained in the Warranty Terms found on the inside back cover of this Manual.

6.2 Alignment. The Model 600A Interference Locator should not be aligned by inexperienced personnel. Certain adjustments, particularly in the high-frequency circuits, are very critical and require familiarity with such equipment.

The signal generator used for alignment should contain an attenuator capable of reducing the generator output to 5 microvolts at all frequencies between 455 kHz and 220 MHz.

The accuracy of the dial calibration after realignment will be determined by the calibration accuracy of the signal generator used.

The input impedance of the Model 600A Interference Locator is approximately 50 ohms, therefore a generator with a 50 ohm output impedance must be used. Since the meter on the Interference Locator will be used as the tuning indicator, the signal generator may have either a modulated output or a continuous-wave (CW) output. Modulation will aid in identification of the signal generator's signal, particularly if the Model 600A is badly out of alignment.

Because the meter is in the automatic gain control (AGC) circuit, the generator output level must be kept low so the meter reading will not exceed 10 on the linear scale.

All adjustments should be made to produce maximum deflection of the tuning meter.

Before starting the alignment procedure, the meter zero adjustment must be made. The R-F ATTENUATION must be returned to the 0 position and left there for the duration of the alignment steps.

The position of the VOLUME control has no effect if a CW signal is used. If the signal generator is modulated, (approximately 30%) the control should be adjusted for a comfortable listening level.

6.2.1 Alignment Procedure. The following adjustments must be made before proceeding with the alignment of this instrument. All tuning should be for maximum signal on the RELATIVE R-F LEVEL meter, except as noted for the traps. Adjust the signal generator for approximately 20% meter reading during the alignment.

Set the R-F ATTENUATION control to 0. Remove transistor Q3 and Q6 while aligning the i-f stages and traps. Repeat each alignment step on bands A through E before proceeding to the next band.

BAND	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	SWITCH POSITION	DIAL SETTING	ADJUSTMENTS
455 kHz I-F	0.01μF	Term 4 – T10	455 kHz	A	—	T8; T6, T4, T2 top and bottom
455 kHz Trap	—	ANT	455 kHz	A	—	T10 for minimum signal
10.7 MHz I-F	0.01μF	Term 4 – T10	10.7 MHz	D	—	T7; T5, T3, T1 top and bottom
10.7 Mhz I-F and trap	—	INPUT	10.7 MHz	F	—	T9 top and bottom; L2 for minimum signal (trap)
10.7 MHz trap	—	INPUT	10.7 MHz	D	—	L9 for minimum signal (trap)
A	200 ohm non-inductive	INPUT	540 kHz 1.7 MHz	A	540 kHz 1.7 MHz	Osc A*, R-F Amp**, Mixer A slugs, C14A, C5A
B	200 ohm non-inductive	INPUT	1.8 MHz 4.6 MHz	B	1.8 MHz 4.6 MHz	Osc B*, R-F Amp**, Mixer B slugs, C14B, C5B
C	200 ohm non-inductive	INPUT	4.7 MHz 13 MHz	C	4.7 MHz 13 MHz	Osc C*, R-F AMP**, Mixer C slugs, C14C*, C5C
D	200 ohm non-inductive	INPUT	13 MHz 28 MHz	D	13 MHz 28 MHz	Osc D* R-F Amp**, Mixer D slugs, C14D*, C5D
E	200 ohm non-inductive	INPUT	28 MHz 54 MHz	E	28 MHz 54 MHz	Osc E* R-F Amp**, Mixer E slugs, E14E*, C5E
F	—	INPUT	54 MHz 120 MHz	F	54 MHz 120 MHz	L8* C52*, C74

* Indicates calibration adjustments.

** Adjust R-F amplifier slugs, bands A through E, so that rotation of ANT PEAKING control produces two peaks in receiver sensitivity at the high and low ends of the bands.

Internal slider adjustments for the 220 MHz oscillator and mixer are factory pre-set.

6.3 Voltage Chart. The measurements shown below must be made with a d-c vacuum tube or solid-state voltmeter with an input resistance of at least 11 megohms, otherwise the circuit under test will be loaded down and the reading will be in error. The Model 600A Interference Locator must be operated on fresh batteries for these measurements.

The voltages shown in the table were measured with a Hewlett Packard Model HP-410B vacuum tube voltmeter. The Model 600A meter was set to zero, with no signal input. All voltages are positive with respect to the chassis except as noted. Voltages may vary as much as 20% with different transistors.

Transistor No.	Pin 1 (Emitter or Drain)	Pin 2 (Base or (Gate 2)	Pin 3 (Collector or Gate 1)	Pin 4 (Case or Source)
Q1	13.20	0.92	0.00	0.48
Q2	1.60	1.90	13	0.00
Q3	0.24	−0.10	14	0.00
Q4	8.00	0.80	0.00	0.80
Q5	1.50	1.90	13	0.00
Q6	0.50	0.92	10	0.00
Q7	0.06	0.64	9.7	0.00
Q8	1.00	1.45	9.5	0.00
Q9	1.03	1.40	9.4	0.00
Q10	0.45	0.54	5.2	0.00
Q11	5.00	5.20	12	0.00
Q12	5.00	5.20	0.00	0.00

6.4 Dial Cable Re-stringing. On rare occasions, the dial cable will require tightening or replacement. The diagram below (Figure 15) will aid in correcting troubles in this area. If the cord is replaced, use dial cord with an 0.030 diameter and follow the diagram below:

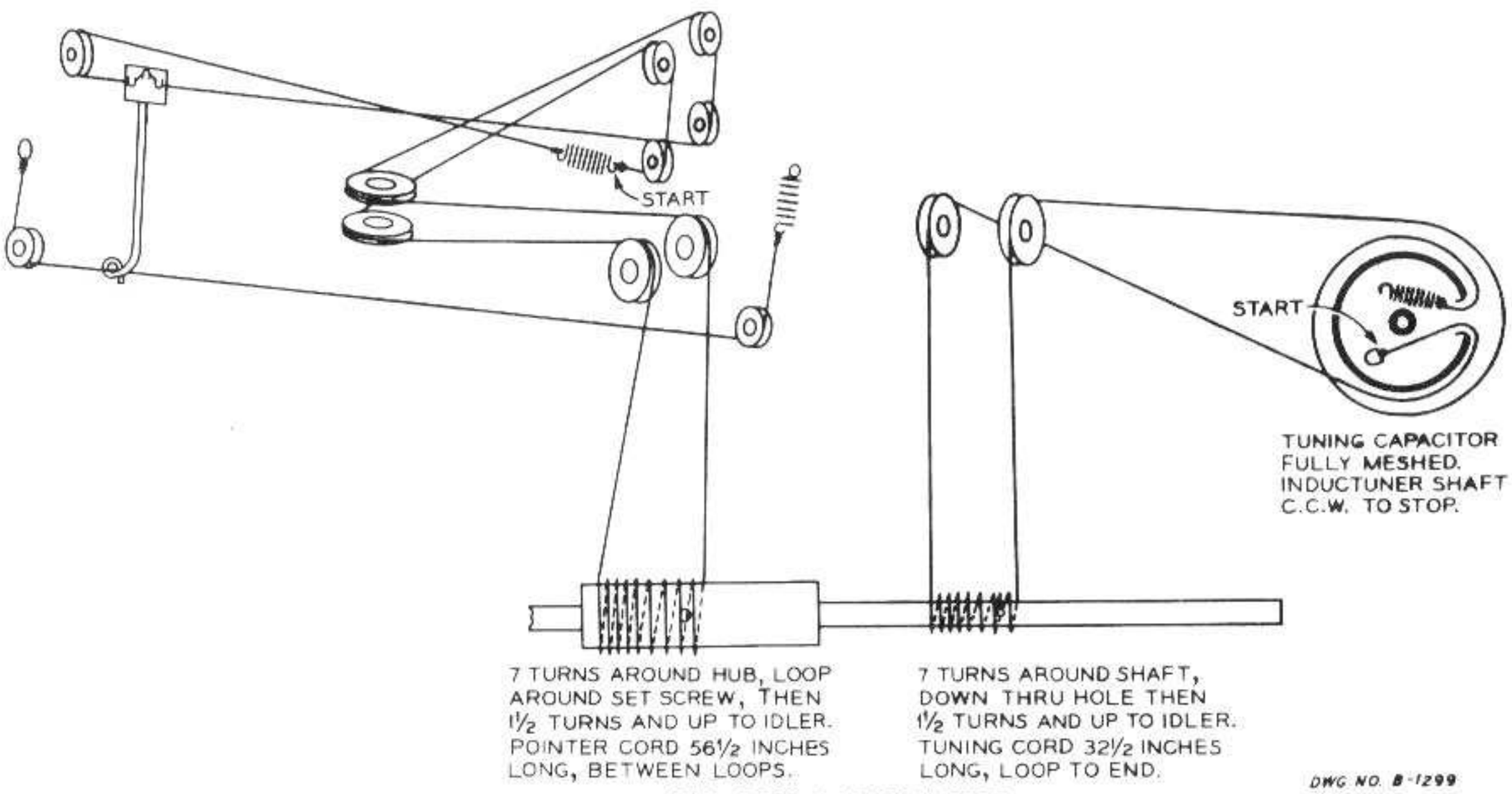


Figure 15

APPENDIX
Specifications and Performance Characteristics

1. Size.

1.1 The Model 600A is 4 5/8 in. high x 16 3/4 in. wide x 12 1/4 in. deep, including controls and under-cabinet feet.

2. Net Weight.

2.1 17.5 pounds including batteries.

3. Mounting.

3.1 The instrument is mounted in a sturdy, compact, light-weight, grey-finished metal case with carrying strap.

4. Accessories Supplied.

4.1. Complete complement of dry-cell type batteries.

4.2. Combination collapsible/adjustable rod/dipole antenna.

4.3 Directional loop antenna.

4.5. Carrying strap.

4.6. Operating/Servicing Manual.

5. Optional Accessories

5.1. Adjustable suction cup-mounted fitting for attaching loop or dipole antennas on flat surfaces such as car roof tops (order Model 516).

5.2. R-F Antenna probe (order Model 511).

5.3. Eight-foot 50-ohm coaxial cable for connecting the instrument to a standard vehicle antenna or external test equipment (order Model 513).

5.4. Twenty-five-foot 50-ohm coaxial cable extension for connecting the instrument to remote antennas (order Model 512).

5.5. Headphones for use in high-noise level areas or for security reasons (order Model 514).

5.6 External meter for remote indication during mobile or other use (order Model 526).

5.7 12 volt d-c mobile auxiliary power supply for operation of Locator from vehicle cigarette lighter (order Model 524).

5.8 115 volt a-c auxiliary power supply for operation of Locator from commercial power lines (order Model 525).

5.9 Fibre case for transporting or storing Locator and accessories (order Model 523).

6. Tuning Range. 540 kHz to 220 MHz in 6 bands.

7. Sensitivity.

7.1. 2 microvolts or better at all frequencies for a 5% output meter deflection.

8. Battery Power Supply.

8.1. 15 volts (2 ea. NEDA Type 713)

8.2. 12 volts (2 ea. NEDA Type 6)

8.3. 1.5 volt (1 ea. NEDA Type 13)

9. Battery Life.

9.1. One hundred hours of operation may be expected under continuous operating conditions. This is a variable and is extended under intermittent operating conditions.

10. Circuitry.

10.1. The Model 600A Interference Locator employs a high-gain, all solid-state AM superheterodyne circuit using slope detection for frequency-modulated signals.

LIST OF MAINTENANCE PARTS

Circuit Symbol	Replacement Part No.	Description
B1, B2		Bulb, incandescent, type 123
C1, C3, C6, C8, C10, C12, C20, C34, C35, C36, C44, C88, C94, C96, C103, C107, C110, C114, C121	1-940	Capacitor, disc ceramic, 0.03 μF, 100 Vdc
C2, C4, C7, C9, C11, C15, C16, C22, C40, C41, C42, C46, C47, C58, C67, C71, C77, C82, C83, C93, C106, C109, C118, C138	1-936	Capacitor, disc ceramic, 0.001 μF, 1000 Vdc
C5A, C5B, C5C, C5D, C5E, C14A, C14B, C14C, C14D, C14E	1-1046	Capacitor, ceramic trimmer, screw adjustable, 2-12 pF.
C43, C48, C49, C50, C51, C54, C55, C59, C60, C68, C69, C75, C76, C78, C79	1-885	Capacitor, button ceramic, self-tapping screw, 0.001 μF, 200 Vdc.
C17	1-894	Capacitor, silvered mica, 300 pF, $\pm 5\%$, 500 Vdc.
C18, C37, C65	1-909	Capacitor, silvered mica, 100 pF, $\pm 5\%$, 500 Vdc.
C19	1-934	Capacitor, silvered mica, 60 pF, $\pm 5\%$, 500 Vdc.
C21, C87, C89, C92, C95, C101, C102, C105, C108, C115	1-935	Capacitor disc ceramic, 0.01 μF, 500 Vdc.
C24	1-937	Capacitor, silvered mica, 430 pF, $\pm 5\%$, 500 Vdc.
C25	1-938	Capacitor, silvered mica, 2000 pF, $\pm 5\%$, 500 Vdc.
C26	1-939	Capacitor, silvered mica, 2200 pF, $\pm 5\%$, 500 Vdc.
C27	1-893	Capacitor, silvered mica, 200 pF, $\pm 5\%$, 500 Vdc.
C28	1-894	Capacitor, silvered mica, 300 pF, $\pm 5\%$, 500 Vdc.
C31, C86, C99	1-940	Capacitor, polystyrene film, 0.0022 μF, $\pm 5\%$, 200 Vdc.
C33, C91, C104	1-941	Capacitor, polystyrene film, 0.01 μF, $\pm 5\%$, 200 Vdc.
C45	1-942	Capacitor, silvered mica, 120 pF, $\pm 5\%$, 500 Vdc.
C52, C74	1-1024	Capacitor, ceramic trimmer, screw adjustable, 1-6 pF.
C53	1-949	Capacitor, silvered mica, 10 pF, $\pm 5\%$, 500 Vdc.
C56	1-944	Capacitor, ceramic pigtail, 18 pF, $\pm 10\%$.
C57	1-945	Capacitor, air trimmer, 5-100 pF.
C61, C62	1-946	Capacitor, silvered mica, 430 pF, $\pm 5\%$, 500 Vdc.
C63, C70	1-947	Capacitor, silvered mica, 30 pF, $\pm 5\%$, 500 Vdc.
C73	1-948	Capacitor, ceramic pigtail, 2.2 pF, $\pm 10\%$, 500 Vdc.
C64, C66, C72	1-943	Capacitor, silvered mica, 5 pF, $\pm 5\%$, 500 Vdc.
C113, C127	1-682	Capacitor, tubular electrolytic, 50 μF, 3 Vdc.
C116	1-950	Capacitor, polystyrene film, 0.0033 μF, $\pm 5\%$, 200 Vdc.
C123, C126	1-951	Capacitor, tubular electrolytic, 2 μF, 12 Vdc.
C128	1-952	Capacitor, tubular electrolytic, 1000 μF, 16 Vdc.
C129	1-953	Capacitor, tubular electrolytic, 100 μF, 25 Vdc.
C130	1-954	Capacitor, tubular electrolytic, 500 μF, 25 Vdc.
C131	1-955	Capacitor, tubular electrolytic, 4μF, 6 Vdc
C132	1-956	Capacitor, tubular ceramic, 1 pF, $\pm 10\%$, 500 Vdc
C133	1-957	Capacitor, polyester-film, 0.047μF, $\pm 10\%$, 200 Vdc
CTA, CTB, CTC, CTD, CTE	1-958	Capacitor tuning, bands A thru E, inclusive
D3	5-60	Diode, variable, capacity T1V306
L1, L5, L6	1-1021	Inductuner®, Band F, (Var)
L2	3-354	Trap, r-f amplifier, 10.7 MHz

LIST OF MAINTENANCE PARTS

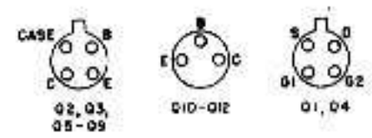
Circuit Symbol	Replacement Part No.	Description
L4	3-356	Trimmer, HF, Mixer, band F
L7	3-357	Trimmer, HF, Osc, Band F
L8	3-358	Trimmer, LF, Osc. Band F
L9	3-359	Trap, Band D, antenna, 10.7 MHz
M1	7-30	Meter, indicator, 2MA, special scale
Q1, Q4	5-60	Transistor, r-f amplifier
Q2	5-51	Transistor, LF mixer
Q3	5-52	Transistor, LF Oscillator
Q5	5-53	Transistor, HF mixer
Q6	5-54	Transistor, HF Oscillator
Q7	5-55	Transistor, 1st IF amplifier
Q8, Q9	5-56	Transistor, 2nd and 3rd IF amplifier
Q10	5-57	Transistor, audio driver
Q11	5-58	Transistor, NPN, audio output
Q12	5-59	Transistor, PNP, audio output
R1, R9, R11, R15, R23, R26, R27, R28, R29, R38, R39, R40, R42, R45, R46, R50, R58, R59, R64, R66, R67, R72, R75, R81, R87, R88, R89, R90, R91	2-36	Resistor, composition, 100Ω, 1/2 watt, ±10%
R2	2-1219	Resistor, deposited carbon, 110Ω, 1/2 watt, ±1%
R3, R5, R7	2-1203	Resistor, deposited carbon, 900Ω, 1/2 watt, ±1%
R4, R6, R8	2-1202	Resistor, deposited carbon, 90Ω, 1/2 watt, ±1%
R12, R18, R19, R33, R25	2-7	Resistor, composition, 18Ω, 1/2 watt, ±10%
R13, R20, R21, R23, R24, R73, R80, R88	2-65	Resistor, composition, 4.7KΩ, 1/2 watt, ±10%
R14	2-81	Resistor, composition, 22KΩ, 1/2 watt, ±10%
R16, R35, R51, R52, R62	2-49	Resistor, composition, 10KΩ, 1/2 watt, ±10%
R17, R105	2-38	Resistor, composition, 380Ω, 1/2 watt, ±10%
R22, R63, R79, R85	2-41	Resistor, composition, 470Ω, 1/2 watt, ±10%
R31	2-57	Resistor, composition, 120 KΩ, 1/2 watt, ±10%
R32	2-97	Resistor, composition, 100K ohms, 1/2 watt, ±10%
R36	2-43	Resistor, composition, 560 ohms, 1/2 watt, ±10%
R37, R54, R55, R60	2-49	Resistor, composition, 1K ohms, 1/2 watt, ±10%
R41, R130	2-170	Resistor, composition, 470 ohms, 1/4 watt, ±10%
R43	2-169	Resistor, composition, 390 ohms, 1/4 watt, ±10%
R44, R69, R71, R77, R83	2-168	Resistor, composition, 220 ohms, 1/4 watt, ±10%
R47	2-109	Resistor, composition, 330K ohms, 1/2 watt, ±10%
R48	2-75	Resistor, deposited carbon, 12K ohms, 1/2 watt, ±5%
R53	2-37	Resistor, composition, 330 ohms, 1/2 watt, ±10%
R56	2-1	Resistor, composition, 10 ohms, 1/2 watt, ±10%
R57, R65	2-29	Resistor, composition, 150 ohms, 1/2 watt, ±10%
R61	2-172	Resistor, composition, 33K ohms, 1/4 watt, ±10%
R68	2-1204A	Resistor, deposited carbon, 9K ohms, 1/2 watt, ±5%
R70, R104	2-15	Resistor, composition, 39 ohms, 1/2 watt, ±10%
R74, R86, R99	2-79	Resistor, composition, 18 K ohms, 1/2 watt, ±10%
R76, R78, R82, R84	2-9	Resistor, composition, 22 ohms, 1/2 watt, ±10%
R96	2-85	Resistor, composition, 33 K ohms, 1/2 watt, ±10%

LIST OF MAINTENANCE PARTS

Circuit Symbol	Replacement Part No.	Description
R100	2-1072	Resistor, continuously adjustable, composition, linear taper, 5K ohms, 1/2 watt
R101	2-1081	Resistor, continuously adjustable, composition, audio taper, 25K ohms, 1/2 watt
R102	2-91	Resistor, composition, 56K ohms, 1/2 watt, ±10%
R103	2-45	Resistor, composition, 680 ohms, 1/2 watt, ±10%
R106, R107	2-1	Resistor, composition, 1.5 ohms, 1/2 watt, ±10%
R108	2-71	Resistor, composition, 8.2K ohms, 1/2 watt, ±10%
R109	2-23	Resistor, composition, 82 ohms, 1/2 watt, ±10%
SW1	11-603	Switch, attenuator
SW2 (part 1)	11-601	Switch, band, sections 1-10 incl.
SW2 (part 2)	11-602	Switch, band, sections 11-13 incl.
SW3	11-805	Switch, momentary, dial/meter illumination
SW4	11-600	Switch, power
T1, T3, T5, T9	3-351	Transformer, 10.7 MHz, IF interstage
T2, T4, T6	3-349	Transformer, 455 kHz, IF interstage
T7	3-352	Transformer, 10.7 MHz, IF output
T8	3-350	Transformer, 455 kHz, IF output
T10	3-353	Trap, mixer, 455 kHz
T11	3-360	Transformer, ant., Band A
T12	3-361	Transformer, ant., Band B
T13	3-362	Transformer, ant., Band C
T14	3-363	Transformer, ant., Band D
T15	3-364	Transformer, ant., Band E
T16	3-365	Transformer, mixer, Band A
T17	3-366	Transformer, mixer, Band B
T18	3-367	Transformer, mixer, Band C
T19	3-368	Transformer, mixer, Band D
T20	3-369	Transformer, mixer, Band E
T21	3-370	Transformer, oscillator, Band A
T22	3-371	Transformer, oscillator, Band B
T23	3-372	Transformer, oscillator, Band C
T24	3-373	Transformer, oscillator, Band D
T25	3-374	Transformer, oscillator, Band E

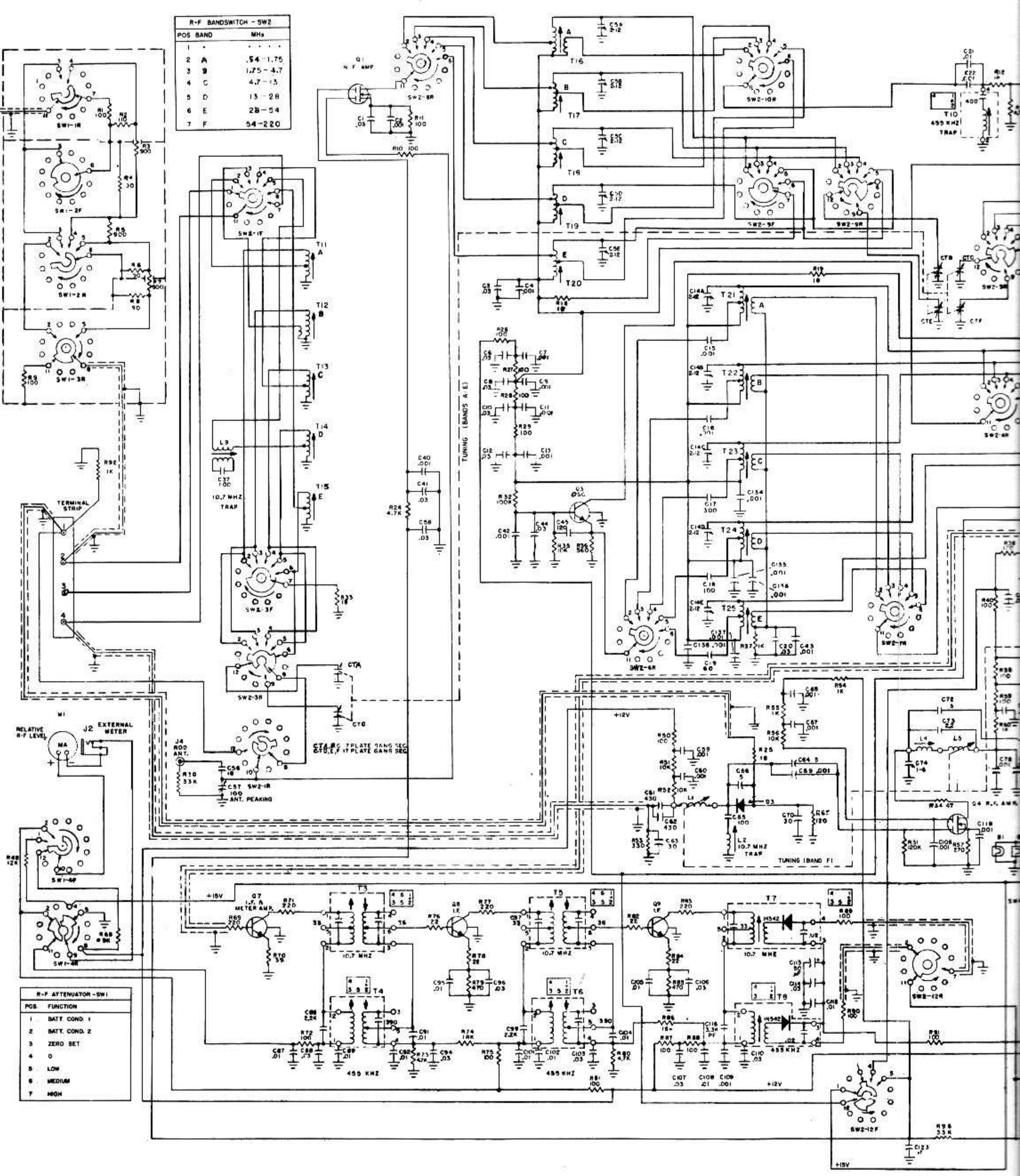
ALL RESISTORS ±10%, 1/2W, UNLESS OTHERWISE SPECIFIED.
ALL RESISTANCE VALUES ARE IN OHMS. K = 1000
ALL CAPACITANCE VALUES OF LESS THAN 1.0 ARE IN MICROFARADS, 1.0 OR GREATER ARE IN PICOFARADS, UNLESS OTHERWISE SPECIFIED.

TRANSISTOR BASING



NOTE:
Q11 & Q12 ARE UNITS OF A COMPLEMENTARY MATCHED PAIR AVAILABLE AS 2N4107.

SPRAGUE ELECTRIC CO.
MODEL 600A LOCATOR


R-F BANDSWITCH - SW2
POS BAND MHz
1 .
2 A .54 - 1.75
3 B 1.75 - 4.7
4 C 4.7 - 13
5 D 13 - 28
6 E 28 - 54
7 F 54 - 220
R-F ATTENUATOR - SW1
POS. FUNCTION
1 BATT. COND. 1
2 BATT. COND. 2
3 ZERO SET
4 0
5 LOW
6 MEDIUM
7 HIGH
J3 INPUT
SW1-1R
SW1-2F
SW1-2R
SW1-3R
SW1-4F
SW1-4R
SW2-1F
SW2-3F
SW2-3R
SW2-8R
SW2-10R
SW2-9F
SW2-9R
SW2-7R
SW2-6R
SW2-12R
SW2-12F
Q1 R.F. AMP
Q2 R.F. AMP
Q3 OSC.
Q4 R.F. AMP
Q7 I.F. & METER AMP.
Q8 I.F.
Q9 I.F.
T10 455 KHZ TRAP
L3 10.7 MHZ TRAP
L2 10.7 MHZ TRAP
TERMINAL STRIP
J4 ROD ANT.
M1 RELATIVE R-F LEVEL
J2 EXTERNAL METER
ANT. PEAKING
CT4 RC 7 PLATE GANG SEC
CT5 E.F 11 PLATE GANG SEC
TUNING (BAND'S A-E)
TUNING (BAND F)
10.7 MHZ
455 KHZ
+12V
+15V