TM 11-6625-276-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

Operator's Manual

TEST OSCILLATOR SET AN/PRM-10

(Stamford Electronics
and
Taffet Radio & TV)

HEADQUARTERS, DEPARTMENT OF THE ARMY
MAY 1962

TECHNICAL MANUAL)
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No. 11-6625-276-10)

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington 25, D. C., 21 May 1962

Operator's Manual

TEST OSCILLATOR SET

AN/PRM-10

(STAMFORD ELECTRONICS
AND
TAFFET RADIO & TV)

SECTION I

GENERAL DESCRIPTION

1-1. GENERAL.

1-2. This is the Handbook of Operation Instructions for Test Oscillator Set AN/PRM-10, manufactured by Stamford Electronics Co., Stamford, Conn. and Taffet Radio and Television Co., Woodside, N. Y.

1-3. DESCRIPTION.

1-4. Test Oscillator Set AN/PRM-10 (figure 1-1) consists of the tuning head, power supply and seven plug-in type oscillator coil assemblies. These components are housed in a waterproof combination case.

1-5. The power supply is mounted in the combination case by means of captive screws. This allows easy removal of the power supply when it is necessary to replace electron tubes. One side of the power supply is pierced with holes to act as dummy sockets that hold the plug-in oscillator coil assemblies. The power cable, and the cord to the tuning head are both permanently attached, mechanically and electrically, to the power supply.

1-6. The tuning head contains a socket-type terminal board where any one of the oscillator coil assemblies can be plugged in. The tuning head fits inside the combination case, on top of the power supply. The cord connecting it to the power supply is permanently attached mechanically and electrically. The tuning head is used as a probe. It contains a sensitive meter which accurately indicates resonant frequencies. Frequencies are read on the frequency indicator dial which is seen through a transparent plastic window in the tuning head case.

1-7. Table 1-1 shows the components of this test oscillator set. No other components are required.

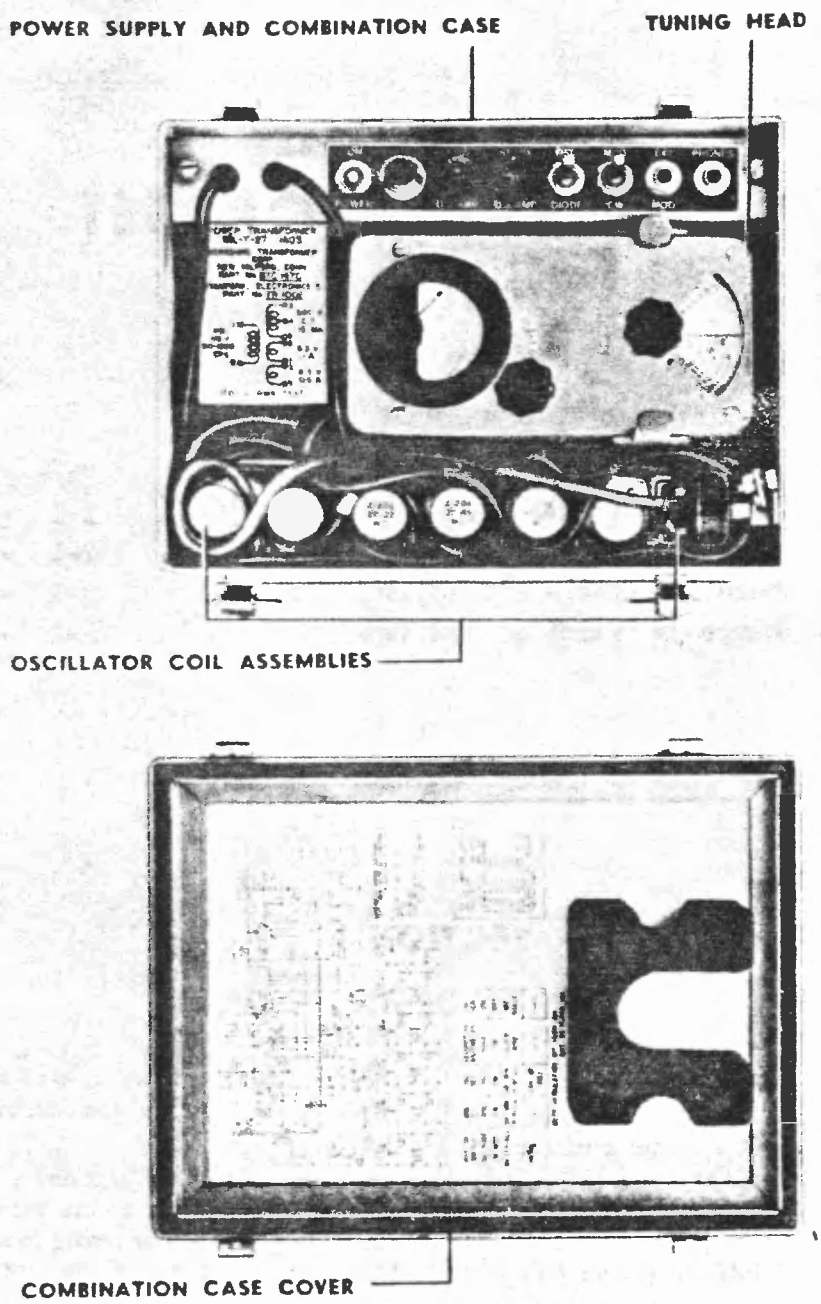


Figure 1-1. Test Oscillator Set AN/PRM-10

Table 1-1. Equipment Supplied

Quantity	*Component*
1	Tuning Head
1	Power Supply and Combination Case
1	Oscillator Coil Assy, 2 to 5 mc
1	Oscillator Coil Assy, 5 to 10 mc
1	Oscillator Coil Assy, 10 to 22 mc
1	Oscillator Coil Assy, 22 to 45 mc
1	Oscillator Coil Assy, 45 to 100 mc
1	Oscillator Coil Assy, 100 to 250 mc
1	Oscillator Coil Assy, 250 to 400 mc

1-8. PURPOSE OF EQUIPMENT. This test oscillator set is a portable test equipment designed primarily to provide means for rapidly determining resonant frequencies of tuned circuits, or the frequency of radio signals. It may also be used as a variable frequency oscillator. This provides a choice of modulated or unmodulated signals for testing, aligning and calibrating radio receivers and similar equipment.

1-9. FUNCTION. This test oscillator set may be regarded as a miniature radio receiver or transmitter. It is placed close to the equipment or circuit to be tested or calibrated. The word "coupling" is used to denote this action. The particular plug-in oscillator coil assembly plugged into tuning head acts as the receiving or transmitting antenna. Results are observed on the meter in the tuning head or heard in headphones. The "TUNING" dial scale provides definite frequency readings.

1-10. CAPABILITIES. This test oscillator set is a rugged, portable instrument primarily intended for use in organizational and field maintenance. It may be used either as a frequency meter or as a signal generator.

1-11. LIMITATIONS. When operated as a signal generator, the test oscillator set is not intended to be a frequency standard except within tolerances of plus or minus 1½ percent. Also, the test oscillator set is used entirely as a probe. It has no output cables. Coupling is always inductive through the oscillator coil assembly projecting from the top of the tuning head.

1-12. FREQUENCY RANGE. This equipment covers frequencies from 2 to 400 megacycles in seven ranges. These ranges are provided by plug-in type oscillator coil assemblies whose frequencies are stated in Table 1-1. Overlap between ranges is ten percent or more.

1-13. TYPE OF SIGNAL. Either continuous wave, or modulated continuous wave signals are produced by this test oscillator set. The instrument includes a 1000-cycle oscillator circuit. Approximately 30 percent amplitude modulation is produced by this circuit. External amplitude modulation from 50 to 10,000 cycles may be supplied from an external oscillator. Approximately one volt across 150,000 ohms is required from an external oscillator to produce 30 percent modulation.

1-14. POWER REQUIREMENTS. This test oscillator set requires 105-125 volts at 50-1000 cycles, single phase, and draws 20 watts.

CAUTION

Do not connect to direct current or 25-cycle supply.

SECTION II

OPERATING PROCEDURES

2-1. GENERAL.

2-2. The test oscillator set is a portable instrument. Ordinarily, the tuning head is held in one hand and tuned with the other. Frequency is read on the "TUNING" dial scale and points of resonance are clearly apparent in the form of sharp changes in the meter reading. The tuning head is used as a probe. It is brought close to the equipment under test so that a signal may either be inserted or picked up through the oscillator coil assembly plugged into the tuning head.

Note

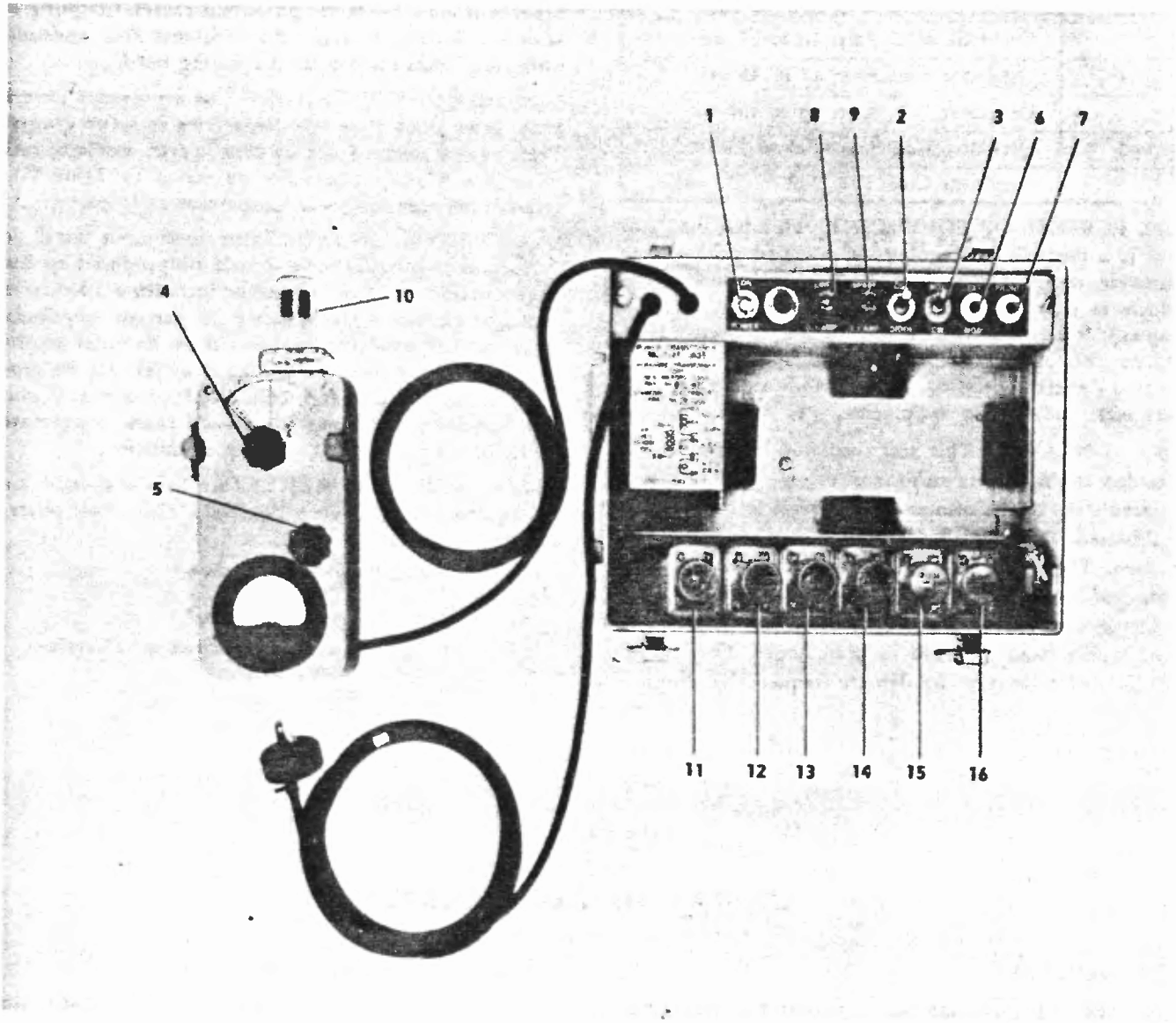
Press oscillator coil assemblies all the way into the sockets. Coils must always seat fully.

2-3. DESCRIPTION OF CONTROLS.

a. "POWER" switch (1, figure 2-1). This switch energizes the unit when the power cord is plugged into a 105-125-volt, 50-1000-cycle power source.

b. "OSC.-DIODE" switch (2). In "OSC." position the unit functions as a radio frequency oscillator. In "DIODE" position the unit functions as a diode detector or absorption wavemeter.

c. "MOD.-CW" switch (3). This switch determines the characteristics of the output signal. In "MOD." position the carrier is modulated approximately 30 percent at 1000 cycles. In "CW" position the carrier is unmodulated. This switch is useful only if "OSC.-DIODE" switch is in "OSC." position.



1. "POWER" SWITCH
2. "OSC.-DIODE" SWITCH
3. "MOD.-CW" SWITCH
4. "TUNING" KNOB
5. "METER ADJUST" KNOB
6. "EXT. MOD." JACK
7. "PHONES" JACK
8. "LINE FUSE"
9. "SPARE FUSE"
10. 2-5 MC OSCILLATOR COIL ASSY
11. 5-10 MC OSCILLATOR COIL ASSY
12. 10-22 MC OSCILLATOR COIL ASSY
13. 22-45 MC OSCILLATOR COIL ASSY
14. 45-100 MC OSCILLATOR COIL ASSY
15. 100-250 MC OSCILLATOR COIL ASSY
16. 250-400 MC OSCILLATOR COIL ASSY

Figure 2-1. Operation Controls Test Oscillator Set AN/PRM-10

d. "TUNING" knob (4). This knob tunes the oscillator circuit. Frequency is read on the dial scale which matches the frequency range of the oscillator coil assembly that is in use.

e. "METER ADJUST" knob (5). This knob, to the right of the meter, controls the sensitivity of the meter so that signals of relatively high or low strength may be read on the same scale.

f. "EXT. MOD." jack (6). This jack provides means for plugging in an external oscillator. The "MOD.-CW" switch must be in "MOD." position.

g. "PHONES" jack (7). This jack permits the insertion of headphones into the circuit for aural monitoring of all tests. Headphones should be 4000-ohm impedance or higher. Beat notes in the headphones at low frequencies, or sharp clicks in the highest frequency bands indicate resonant frequency when tuning.

h. "LINE FUSE" (8) is the fuse that carries current. It is an 0.3-amp type 3AG fuse. The "SPARE FUSE" (9) is in a holder next to the fuse that is in service.

i. Oscillator coil assemblies (10, 11, 12, 13, 14, 15 and 16) are coils which plug in on the top of the tuning head to provide frequency ranges from 2-5 mc to 250-400 mc.

2-4. OPERATION.

2-5. GRID-DIP METER OPERATION.

a. Plug power cord in on 105-125-volt, single phase, 50-1000-cycle supply.

b. Put "POWER" switch (1, figure 2-1) in "ON" position. Allow 30 seconds for electron tubes to warm up.

c. Select proper oscillator coil assembly for desired frequency range.

d. Put "OSC.-DIODE" switch (2) in "OSC." position.

e. Put "MOD.-CW" switch (3) in "CW" position.

f. Turn "METER ADJUST" knob (5) until meter pointer is about three-quarters of full scale deflection. Meter indication will vary slightly as "TUNING" knob (4) is turned, but this has no significance.

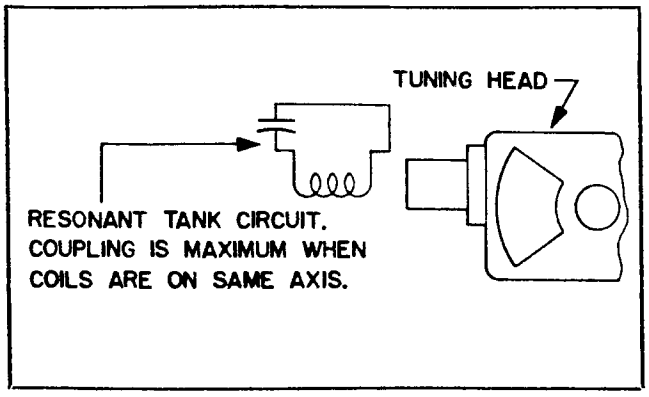


Figure 2-2. Magnetic Coupling

2-6. In grid-dip operation the test oscillator set may be used to determine the resonant frequency of unenergized tuned circuits. Using the tuning head as a probe while turning the "TUNING" knob (4, figure 2-1) bring the oscillator coil assembly close to the circuit. Magnetic coupling is maximum when the coils are on the same axis. (See figure 2-2.) Capacitive coupling may be used when a circuit is semi-shielded. Hold the oscillator coil assembly across the open end of a shielded cavity or across the end of a radio frequency output cord to secure coupling. (See figure 2-3.)

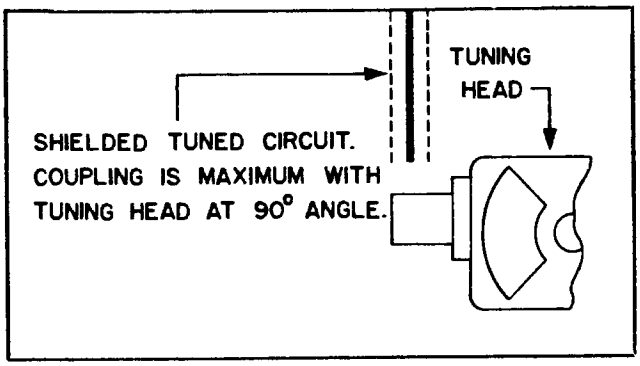


Figure 2-3. Capacitive Coupling

2-7. When tuning through resonance, the meter reading will dip suddenly. Minimum meter reading indicates exact resonance. Then read frequency on dial band corresponding to the range of the oscillator coil assembly being used.

2-8. If meter pointer dips below zero at resonance, coupling is too close. Loose coupling improves accuracy.

2-9. OSCILLATING DETECTOR OPERATION.

a. Energize equipment that is to be tested.

b. Connect test oscillator set to power. Turn "POWER" switch (1, figure 2-1) to "ON" position. Allow 30 seconds to warm up.

c. Put "OSC.-DIODE" switch (2) in "OSC." position.

d. Put "MOD.-CW" switch (3) in "CW" position.

e. Plug high impedance headset into "PHONES" jack (7).

f. Select proper frequency. Plug in oscillator coil assembly.

g. Use tuning head as probe while turning "TUNING" knob (4).

h. Arrange coupling either as shown in figure 2-2 or figure 2-3.

2-10. Beat notes in the headphones or sharp clicks at higher frequencies tell when the tuning head is tuned to the signal frequency.

2-11. Sudden dip of the meter pointer will visually indicate when the tuning head is tuned through the signal frequency.

Note

Harmonics of the signal may also be heard and cause meter pointer motion.

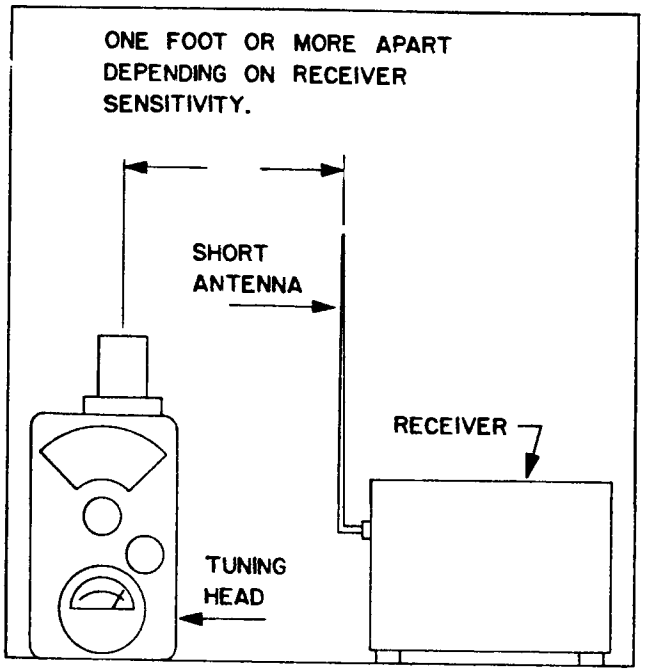


Figure 2-4. Coupling With Temporary Antenna

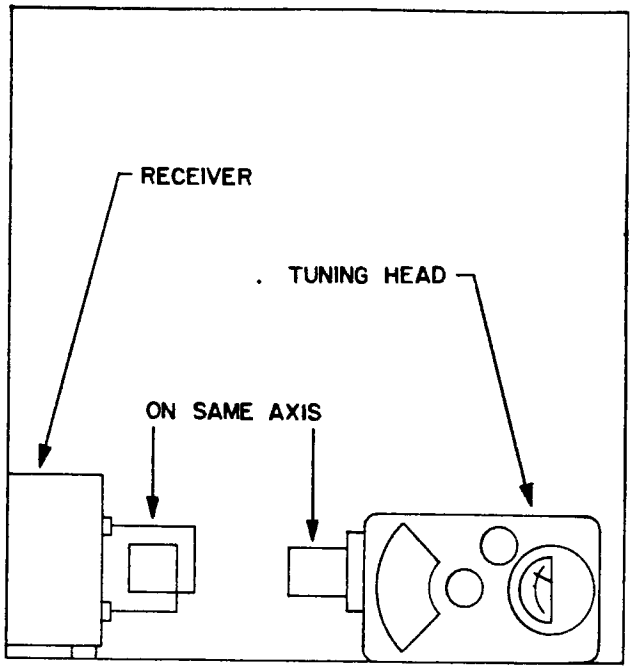


Figure 2-5. Coupling With Loop Antenna

2-12. ABSORPTION TYPE WAVEMETER OPERATION.

a. Energize equipment to be tested.

b. Connect to power source and turn "POWER" switch (1, figure 2-1) to "ON" position. Allow 30 seconds for electron tubes to warm up.

c. Put "OSC.-DIODE" switch (2) in "DIODE" position.

d. Turn "METER ADJUST" knob (5) fully clockwise.

e. Select proper frequency. Plug in oscillator coil assembly.

f. Arrange coupling either as shown in figure 2-2 or figure 2-3.

2-13. Meter reading will be low while tuning. At the incoming signal's frequency, the tuning meter rises to a peak reading. Loose coupling with low peak readings is most accurate.

CAUTION

Use a coupling distance of several feet from transmitter circuits to prevent harm to the instrument.

2-14. When it is impossible to tell what frequency to expect in the circuit under test, it is necessary to take and record a number of readings over a wide frequency range. The frequency separating meter peaks or sound in the headphones is the fundamental frequency.

2-15. R-F SIGNAL GENERATOR OPERATION.

2-16. The test oscillator set may be used as a signal generator for the alignment and adjustment of r-f and i-f circuits operating between 2 and 400 mc. Turn "POWER" switch (1, figure 2-1) to "ON" position. Turn "MOD.-CW" switch (3) to the desired position and "OSC.-DIODE" switch (2) to "OSC." position.

2-17. Coupling is secured by means of a short antenna added to the equipment under test. (See figure 2-4.) When a radio receiver has a loop antenna, align the axis of the tuning head with the axis of the loop. (See figure 2-5.) In general it is desirable to keep the test oscillator set some distance from the equipment to avoid overloading circuits.

2-18. The test oscillator set provides signals for the adjustment of resonant antennas. The antenna may be fed at the center or end. Use the oscillator coil assembly of proper frequency and turn the "TUNING" knob (4, figure 2-1) to the exact frequency desired. Arrange switches as directed in paragraph 2-16. Use a second test oscillator set or a field strength meter to read signal strength as the antenna is adjusted.

SPECIAL NOTICE

To stop equipment in an emergency, turn off the "POWER" switch. Pull the plug of the power cord out of the connector at the power source.

SECTION III
OPERATING CHECKS AND ADJUSTMENTS

3-1. PRELIMINARY CHECK.

3-2. Before using the test oscillator set, test it for meter deflection.

a. Connect 105-125-volt, 50-1000-cycle supply.

b. Turn "POWER" switch (1, figure 2-1) to "ON" position.

c. Allow 30 seconds for tubes to warm up.

d. Insert the 2-5 mc oscillator coil assembly.

e. Set "METER ADJUST" knob (5) fully clockwise for maximum sensitivity.

f. Set "OSC.-DIODE" switch (2) to "OSC." position.

3-3. Tune through the full range of the dial. A normal instrument should provide full scale deflection of the meter pointer.

3-4. CHECK DURING OPERATION.

3-5. If meter reading drops below zero during grid-dip meter operation, as stated in paragraphs 2-5 through 2-8 the tuning head is held too close to the unenergized tuned circuit and too much power is absorbed. Move the instrument back to get looser coupling.

3-6. When a tuned circuit is energized during absorption meter type operation as described in paragraphs 2-12 and 2-13, the readings will be zero or very low until the instrument is tuned to resonance. Then the meter pointer should rise to a peak reading.

SECTION IV
EMERGENCY OPERATION AND REPAIR

4-1. EMERGENCY OPERATION.

4-2. Emergency operation of the test oscillator set is not recommended. It is a test instrument which is used in keeping other equipment in proper condition. Therefore, it should not be used if it shows any damage, or fails to indicate full scale deflection of the meter pointer when tuned as directed in paragraphs 3-1 through 3-5.

4-3. REPLACEMENT OF TUNING HEAD ELECTRON TUBE.

4-4. If there is less than full scale deflection of the meter pointer during the preliminary check described in paragraphs 3-1 through 3-3, replace the electron tube V-201. (See figure 4-1.)

a. Remove four screws holding top case assembly.

b. Remove the "TUNING" knob and felt washer by loosening the setscrews with the Allen wrench provided in the power supply. Then lift off the top case assembly.

c. Using long nose pliers slide off the coil clip from the middle terminal of electron tube V-201.

d. Twist electron tube V-201 counterclockwise until the pins slip out of the four lock lugs that form the socket.

CAUTION

Do not pull out on the electron tube—it must be twisted out of the lugs.

e. Twist a new electron tube V-201 into place.

f. Replace coil clip.

g. Carefully put the top case assembly back into place. Be careful to line up the grounding contact springs so they interlock smoothly without crumpling or bending.

h. Check operation as instructed in paragraphs 3-2 and 3-3.

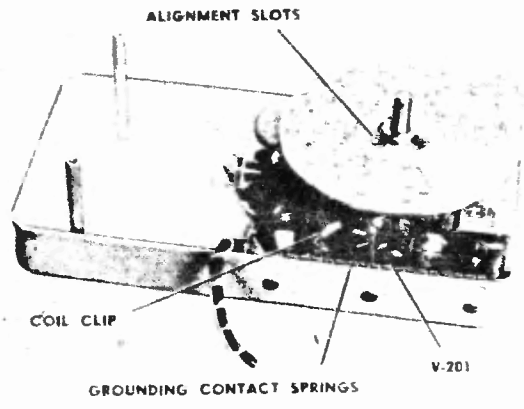


Figure 4-1. Location of Electron Tube in Tuning Head

4-5. REPLACEMENT OF POWER SUPPLY ELECTRON TUBES. Remove the tuning head and oscillator coil assemblies. Loosen the four captive screws that hold the power supply in the combination case. Lift out the power supply chassis, turn it over and take the following steps. (See figure 4-2.)

a. Remove electron tube shields by pressing down, twisting counter-clockwise and then withdrawing.

b. Remove electron tubes by pulling out.

c. Replace electron tubes by turning until the pins enter the individual sockets and then pressing down.

d. Replace electron tube shields.

e. Replace power supply in combination case and tighten the captive screws.

4-6. REPLACEMENT OF FUSE. When necessary, the fuse (8, figure 2-1) is removed from the power supply by turning the knob under "LINE FUSE" and withdrawing. Insert the spare fuse and discard the old one. If the new fuse burns out, disconnect power from the instrument and investigate cause of the short circuit.

4-7. REPLACEMENT OF PILOT LIGHT. The pilot light in the power supply can be removed and replaced from the front. Unscrew the red jewel cover. Then push down on the lamp and turn counter-clockwise to withdraw.

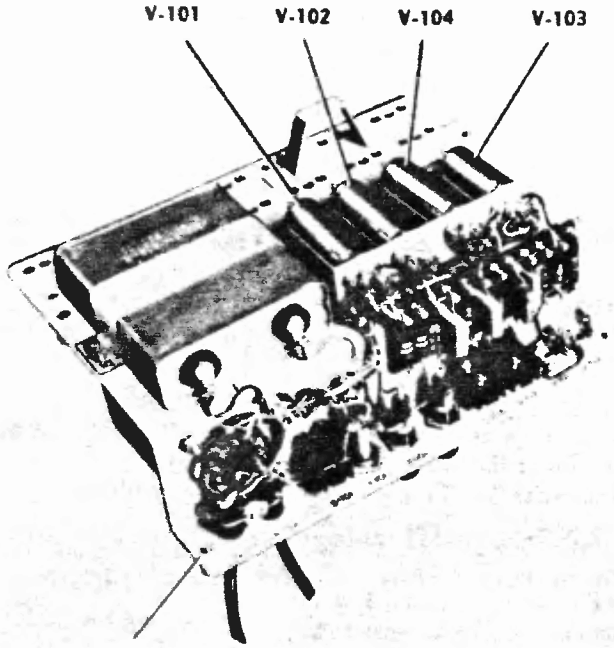


Figure 4-2. Location of Electron Tubes in Power Supply

TM 11-6625-276-24

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LIST OF ILLUSTRATIONS

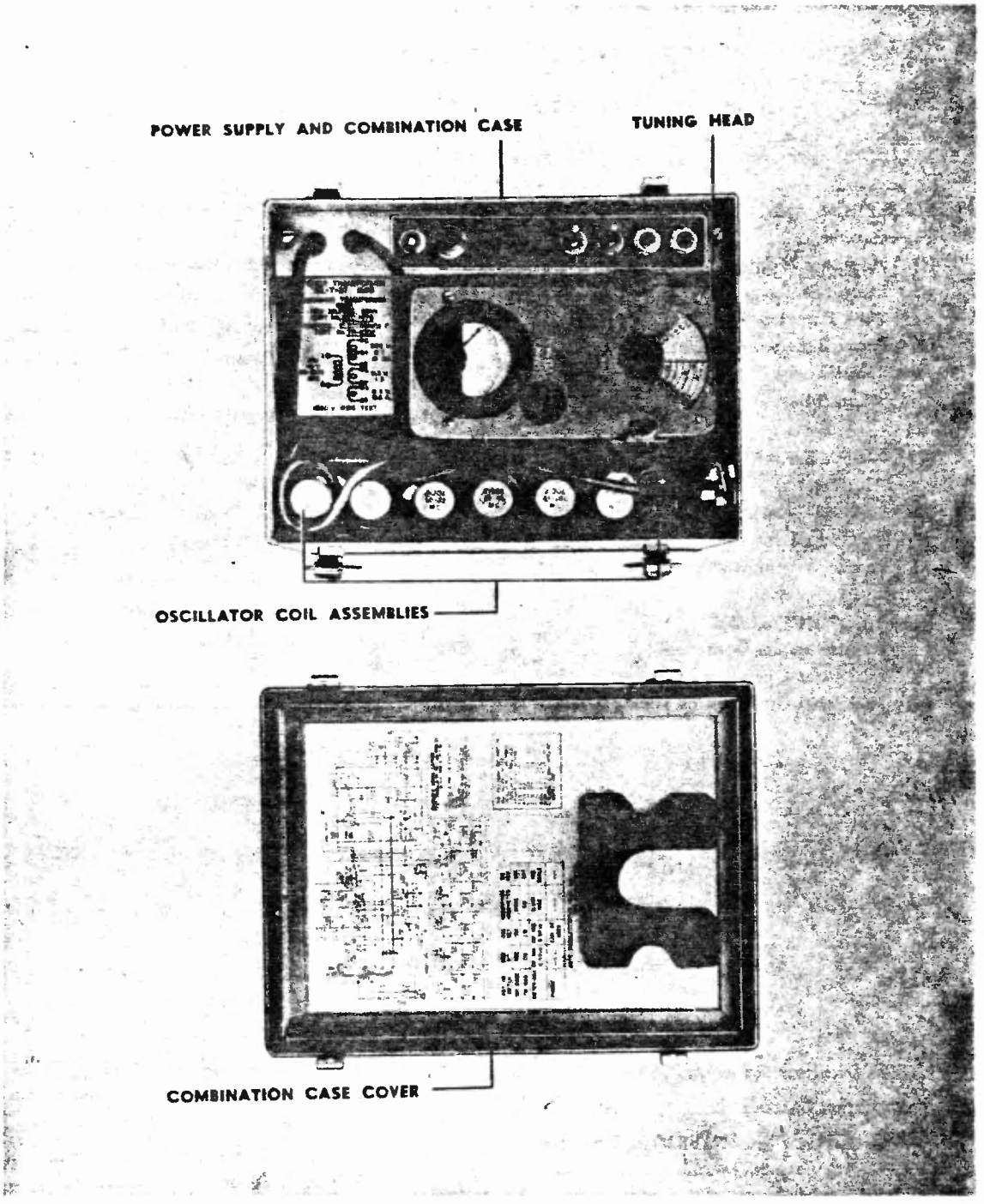


Figure 1-1. Test Oscillator Set AN/PRM-10

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. GENERAL.

1-2. This publication comprises service instructions for Test Oscillator Set AN/PRM-10 (figure 1-1), manufactured by Stamford Electronics Co., Stamford, Conn. and Taffet Radio & Television Co., Woodside, N. Y. The government designation for this equipment is Test Oscillator Set AN/PRM-10. The manufacturer's designation is Test Oscillator Set AN/PRM-10. The equipment consists of a power supply chassis assembly mounted in a combination case, a tuning head which is used as a probe, and seven oscillator coil assemblies which plug into the tuning head. The tuning head is permanently connected by an electrical cord to the power supply chassis.

1-3. PURPOSE OF EQUIPMENT.

1-4. The test oscillator set is portable test equipment designed primarily to provide means for rapidly determining resonant frequencies of tuned circuits, or the frequency of radio signals. It may also be used as a radio frequency signal generator for testing, aligning and calibrating radio receivers and similar equipment. Readings are indicated in the tuning head by a frequency scale dial and a microammeter. High impedance headphones may be used to give aural indication of the resonant frequency.

1-5. FREQUENCY RANGE. The test oscillator set covers frequencies from 2 to 400 megacycles in seven steps. These steps are provided by seven plug-in type oscillator coils whose frequencies are listed in Table 1-1.

Table 1-1. Components of Test Oscillator Set

Quantity	*Component*
1	Tuning Head
1	Power Supply and Combination Case
1	Oscillator Coil Assy., 2-5 mc
1	Oscillator Coil Assy., 5-10 mc
1	Oscillator Coil Assy., 10-22 mc
1	Oscillator Coil Assy., 22-45 mc
1	Oscillator Coil Assy., 45-100 mc
1	Oscillator Coil Assy., 100-250 mc
1	Oscillator Coil Assy., 250-400 mc

1-6. TUBE COMPLEMENT. This equipment contains five electron tubes; four in the power supply chassis assembly and one in the tuning head, as shown in Table 1-2.

1-7. FUSE. A cartridge type, 3AG fuse is used. A spare fuse is mounted next to the live fuse. Fuses are rated at 0.3 amp.

Table 1-2. Tube Complement

Tube	*Quantity*	*Type*	*Function*
		POWER SUPPLY	
V-101	1	JAN 6X4W	Rectifier
V-102	1	JAN OA2	Voltage regulator
V-103	1	JAN 6AV6	Modulation amplifier
V-104	1	JAN 6005	Oscillator, modulator, voltage regulator
		TUNING HEAD	
V-104	1	JAN 955	Oscillator, detector

1-8. POWER REQUIREMENTS. This test oscillator set requires 105-125 volts at 50 to 1000 cycles and draws 20 watts.

CAUTION

Do not connect to direct current or 25 cycle supply.

1-9. LOCATION AND FUNCTION OF OPERATING CONTROLS.

a. "POWER" switch (1, figure 1-2). This switch energizes the unit when the power cord is plugged into a 105-125 50-1000 cycle power source.

b. "OSC.-DIODE" switch (2). In "OSC." position the unit functions as a radio frequency oscillator. In "DIODE" position the unit functions as a diode detector or absorption wavemeter.

c. "MOD.-CW" switch (3). This switch determines the characterstics of the output signal. In "MOD." position the carrier is modulated approximately 30 percent at 1000 cycles. In "CW" position the carrier is unmodulated. This switch is effective only if "OSC.-DIODE" switch is in "OSC." position.

d. "TUNING" knob (4). This knob tunes the oscillator circuit. Frequency is read on the dial scale which matches the frequency range of the oscillator coil assembly that is in use.

e. "METER ADJUST" knob (5). This knob, to the right of the meter, controls the sensitivity of the meter

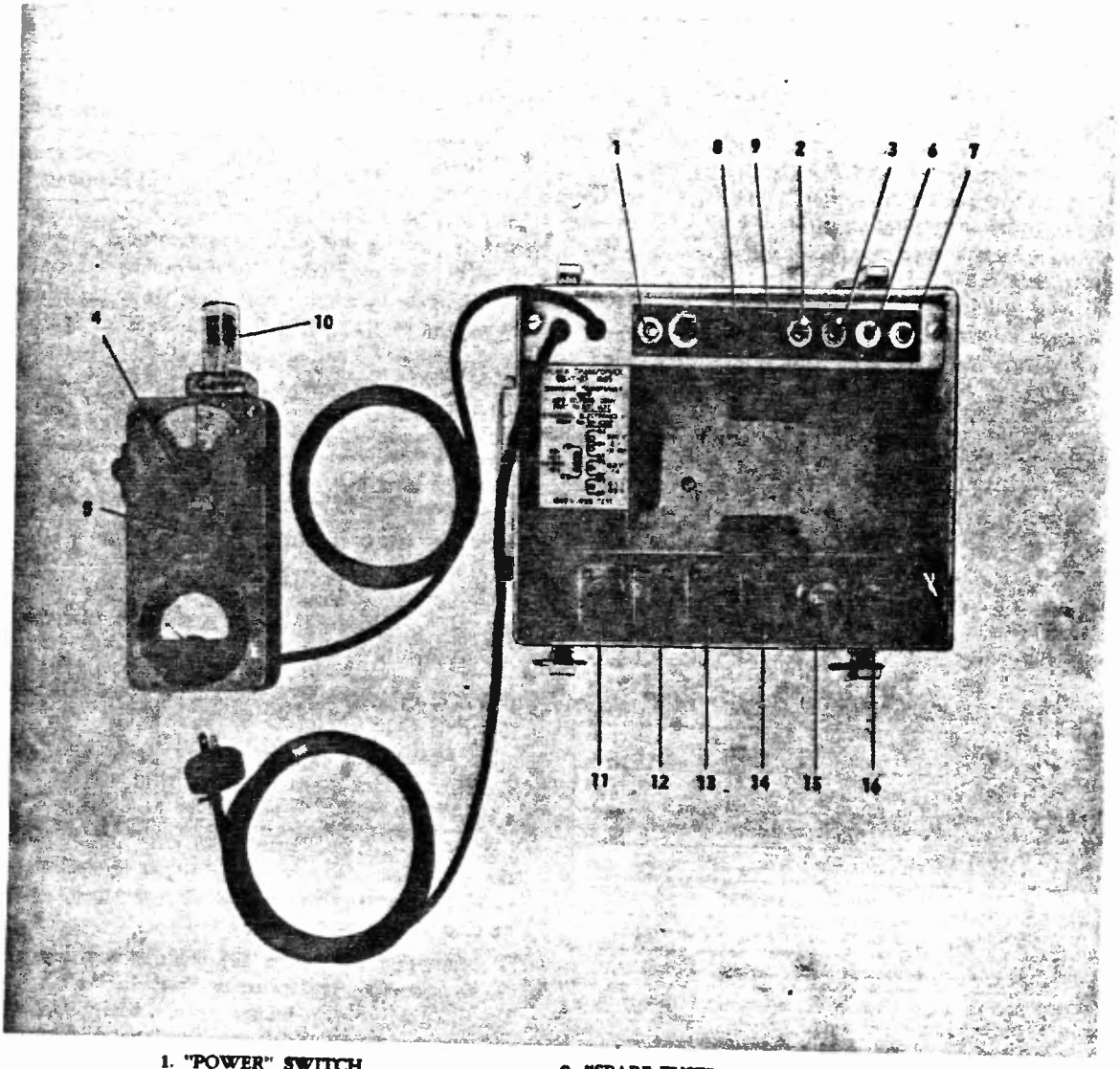
so that signals of relatively high or low strength may be read on the same scale.

f. "EXT. MOD." jack (6). This jack provides means for plugging in an external oscillator. the "MOD.-CW" switch must be in "MOD." position.

g. "PHONES" jack (7). This jack permits the insertion of headphones into the circuit for aural monitoring of tests. Headphones should be high impedance, preferably 4000 ohms or more. Beat notes in the headphones at low frequencies, or sharp clicks in the highest frequency bands indicate resonant frequency when tuning.

h. "FUSE-LINE" (8) is the fuse that carries current. It is a 0.3 amp type 3AG fuse. The "SPARE FUSE" (9) is in a holder next to the fuse that is in service.

i. Oscillator coil assemblies (10, 11, 12, 13, 14, 15 and 16) are coils which plug in on the top of the tuning head to provide frequency ranges from 2-5 mc to 250-400 mc.



1. "POWER" SWITCH
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16. 250-400 MC OSCILLATOR COIL ASSY

Figure 1-2. Operation Controls

SECTION II
TEST EQUIPMENT AND SPECIAL TOOLS

2-1. No special test equipment, special tools or cables are required for the servicng of this equipment. One Allen wrench is supplied for the setscrews in the control knobs and gears.

SECTION III
PREPARATION FOR USE AND RESHIPMENT

3-1. PREPARATION FOR USE. This equipment is self-contained in its own waterproof combination case. It is ready for use when the cover is removed. Cables are permanently connected to the equipment. No additonal cables are required.

3-2. PREPARATION FOR RESHIPMENT. Stow cables carefully before locking cover onto the case. First wind power cable in big loops around the oscillator coils. (See figure 1-1.) Lock the power plug in the slotted retainer by pushing the Allen wrench through the holes drilled in the plug blades. Clip the chain to the Allen wrench. Fit the interconnecting cable in a zigzag pattern between the oscillator coils. Put the cover on and pull down the catches.

SECTION IV
THEORY OF OPERATION

4-1. GENERAL SYSTEM OPERATION.

4-2. The power supply provides well-regulated voltage to the tuning head. The tuning head is used as a probe in checking the resonant frequency of a signal. The tuning head is given seven different frequency ranges from 2 to 400 mc by successively plugging in the seven different oscillator coil assemblies. These oscillator coils project so that they may be placed close to the equipment which is being tested. When the tuning head is tuned to the frequency of an unenergized tuned circuit, the meter reading drops quickly to a lower value. When the tuning head is tuned to the frequency of an energized circuit or signal, the meter reading rises quickly to maximum. Frequency is read on the calibrated dial above the "TUNING" knob.

4-3. FUNCTIONAL OPERATION OF POWER SUPPLY. Electron tube (V-101, figure 4-1) rectifies the alternating current plate supply provided through transformer (T-101). The 8 microfarad filter capacitor (C-101) is tied to the cathode of electron tube (V-101). Electron tube (V-102) is a voltage regulator. Electron tubes (V-103) and (V-104) vary in their function in accordance with the position of "OSC.-DIODE" switch (S-103), and "MOD.-CW" switch (S-102).

a. In "OSC." position of switch (S-103) and "MOD." position of switch (S-102) the network consisting of capacitors (C-103, C-104 and C-105) and resistors (R-103, R-104, R-105 and R-106) produce a feedback voltage modulated at 1000 cycles. The feedback voltage is applied at the grid, pin 1 of electron tube (V-103). The amplified output goes to the grid, pin 7, of electron tube (V-104). This modulates at 1000 cycles the current passed by electron tube (V-104). The cathode, pin 2 of electron tube (V-104) is the plate voltage supply connection for the main oscillator electron tube (V-201). Under the conditions just explained electron tube (V-103) acts as an oscillator and electron tube (V-104) acts as a voltage regulator.

b. Modulation can be applied by an external oscillator by plugging it in at the "EXT.-MOD." jack (J-101), while switch (S-102) is in "MOD." position and (S-103) is in "OSC." position. The amplitude of the external oscillator signal should be about 1 volt.

c. When switch (S-102) is put in "CW" position, the grid, pin 1 of electron tube (V-103) is grounded, rendering this electron tube inactive. Electron tube (V-104) remains a voltage regulator. Because the cathode, pin 2, rides at about 155-volt positive potential, it is tied to one side of the 6.3-volt heater supply to prevent breakdown between the heater and cathode inside the tube.

d. In "MOD." position of switch (S-102) a 1000-cycle note can be heard in headphones and the tone is loudest when the test oscillator is tuned to the frequency of the circuit being tested. In "CW" position of switch (S-102) nothing can be heard in the headphones until the frequency of the circuit under test is reached while

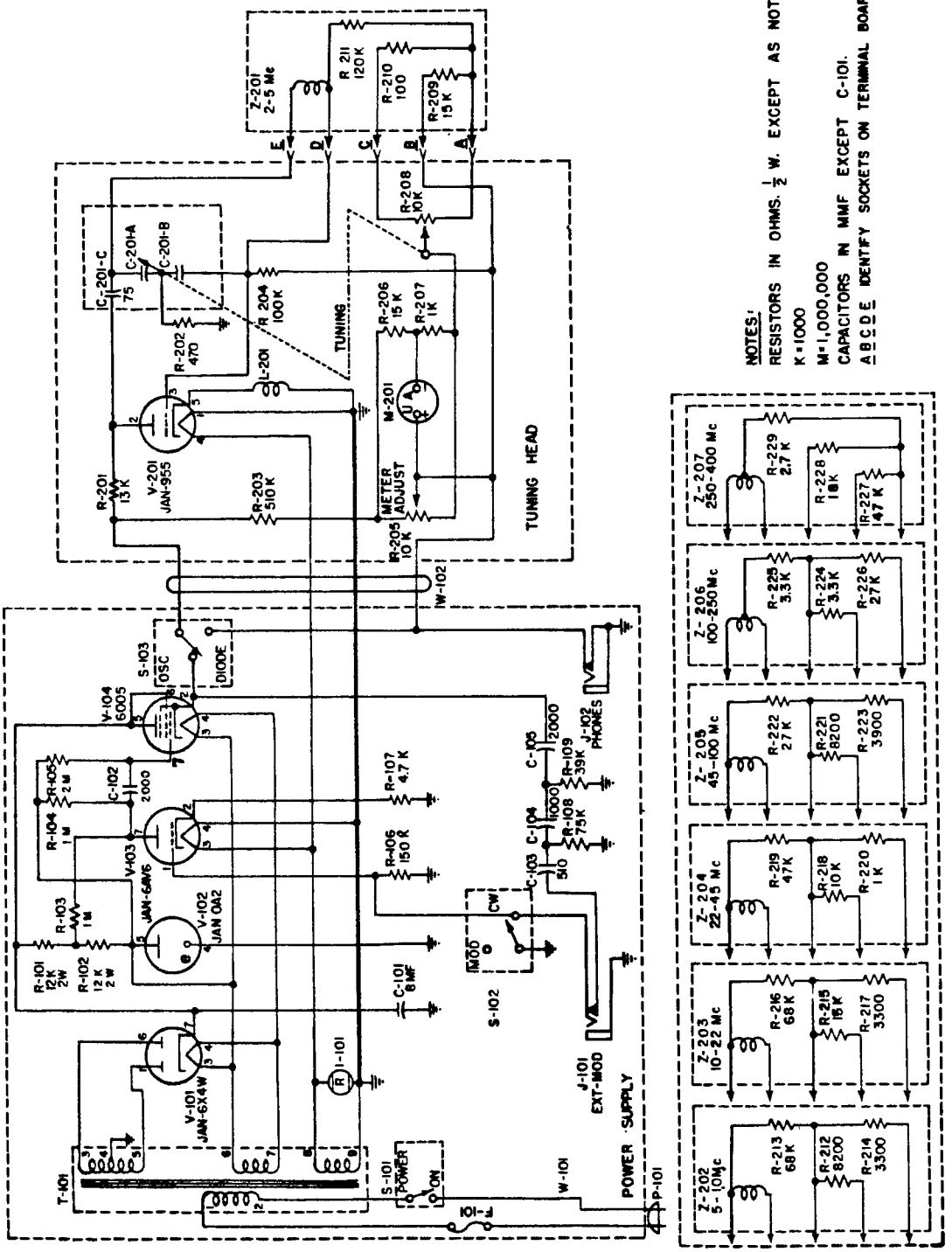


Figure 4-1. Test Oscillator Set AN/PRM-10, Schematic Wiring Diagram

tuning the test oscillator. Then a click or buzzing note will be heard.

4-4. FUNCTIONAL OPERATION OF TUNING HEAD. Oscillator coils (Z-201 through Z-207, figure 4-1) are plugged into the top of this unit to vary its frequency range from 2-5 to 250-400 mc. Turning the "TUNING" knob brings the unit to the same frequency as the circuit under test. If headphones are used, there will be a beat note, or click when the frequency is reached. This point in tuning is called resonance or the resonant frequency.

a. In "DIODE" position of switch (S-103) the unit functions as a diode detector or absorption type wavemeter. Maximum reading of the meter, or sound in the headphones indicates the resonant frequency. In "OSC." position of switch (S-103) the unit serves as a frequency meter or signal generator.

b. Electron tube (V-201) is the main oscillator tube. When the instrument exhibits lack of sensitivity, this tube should be the first to be replaced. Choke coil assembly (L-201) is a combination coil and 220-ohm resistor which improves the stability of high frequency operation. The coil has a friction tube contact which slides on the cathode pin of electron tube (V-201). This pin is in the open. The other four pins of the electron tube fit into socket lugs.

c. Variable resistor (R-208) is geared to rotate with capacitor (C-201ABC). This provides smooth meter indication during tuning. Variable resistor (R-205) is operated by the "METER ADJUST" knob. This controls meter sensitivity by applying a positive potential to the negative terminal of meter (M-201). This bucking action governs the amount of current flowing through the meter and enables it to handle a wider range of signal amplitudes. Variable resistor (R-205) does not control the energy output of the test oscillator. The output is constant for all control positions.

SECTION V

OPERATIONAL AND ORGANIZATIONAL MAINTENANCE

5-1. MINIMUM PERFORMANCE STANDARDS.

5-2. A normal instrument provides at least 40 percent deflection of meter (M-201, figure 4-1) during a full turn of the "TUNING" knob. First plug the 2-5 mc oscillator coil into the tuning head. Turn the power "ON" and turn the "METER ADJUST" knob fully clockwise. The desired 40 percent deflection indicates that the instrument has proper sensitivity for use in testing other equipment.

5-3. SYSTEM TROUBLE ANALYSIS. If the meter reading is below 40 percent when following the instructions given in paragraph 5-2, it indicates that the overall sensitivity of the test oscillator set is below the required minimum standard. The most likely cause is weakening of electron tube (V-201, figure 5-1) in the tuning head.

5-4. REPLACING ELECTRON TUBE V-201.

a. Remove the "TUNING" knob. Remove the four screws holding top case assembly and lift it from the tuning head.

b. Slide off the contact of choke coil assembly (L-201, figure 5-1) from the open pin of electron tube (V-201).

c. Twist electron tube (V-201) counterclockwise and then replace with a new one.

d. Slide the tube contact back on the open pin of electron tube (V-201).

5-5. CHECKING TUNING HEAD. While the top case assembly is open, check all wiring connections. Check that the setscrews of the gears are tight so that

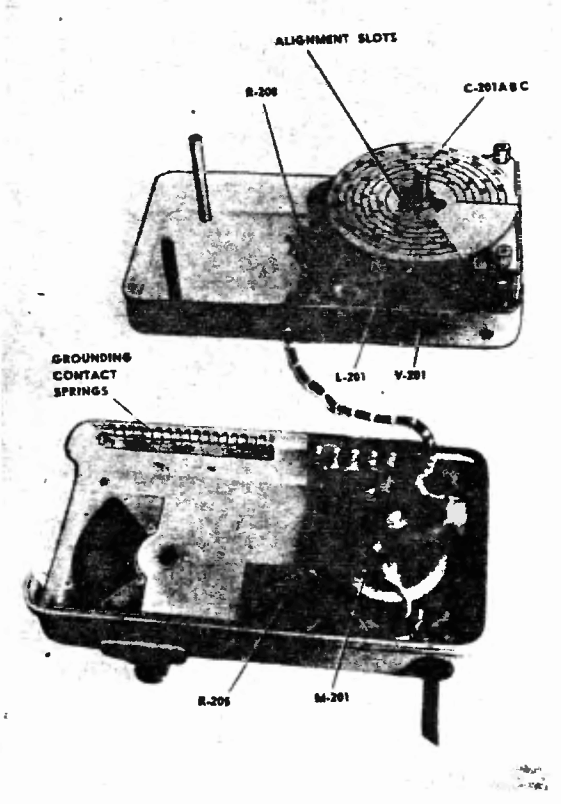


Figure 5-1. Internal View of Tuning Head

the shaft of variable resistor (R-208, figure 5-1) turns when variable capacitor (C-201ABC) is tuned. Check the insulation between variable resistor (R-205) and tuning head case. The variable resistor case may have worn through the insulation due to vibration.

5-6. Check meter (M-201, figure 5-1) by connecting a 750,000-ohm resistor to the "+" terminal. Connect the positive side of the 28-volt d-c supply to the resistor. Touch the other side of the 28-volt d-c supply to the other meter terminal. A deflection of about 40 percent should result. An exact reading is not expected because of normal variation in resistors and supply voltage.

5-7. Replace top cover assembly carefully. Fit the grounding contact springs on the inner sides of the case together accurately so that the delicate spring leaves do not jam and crumple.

5-8. CHECKING POWER SUPPLY. If the pilot light does not glow when the "POWER" switch is put in "ON" position, check the power source to verify that the 115-volt, 50-1000-cycle line is alive. Remove the line fuse and replace it with the spare fuse. Remove the pilot light by unscrewing the front of the indicator. Check the lamp and replace it if the filament is broken or burned out.

5-9. When the test oscillator set fails to operate after it is certain that power reaches the power supply, check the four electron tubes in the power supply, using a tube checker. Release the four captive screws in the corners of the power supply chassis assembly. Lift the power supply chassis assembly out of the combination case. Grasp the raised rail when lifting.

5-10. The electron tubes are in a row on the under side of the power supply chassis assembly. (See figure 5-2.) Remove the metal tube shields by pushing them down slightly, twisting counterclockwise and then pulling out. Lack of heat or glow of the heater should show which electron tube has failed. Remove the electron tubes by pulling straight out. Replace the faulty electron tube with a new one of the same type. After replacing electron tubes, check all the wiring for loose connections. Check all parts for firmness of attachment.

5-11. If the actions specified in paragraphs 5-8 through 5-10 do not make the power supply operate, perform full checking of the circuit as instructed in paragraphs 6-4 through 6-8.

5-12. LUBRICATION. The test oscillator set does not require lubrication.

5-13. INSPECTION. Look for any dirt or foreign matter that may be in the gear teeth. Check the structural condition of the power supply and the tuning head. Examine the power cable (W-101, figure 7-1), and the interconnecting cable (W-102), to be sure that there are no bare wires due to worn insulation. See that all resistors and capacitors are firmly mounted and show no signs of dripping melted wax or brown spots caused by overheating.

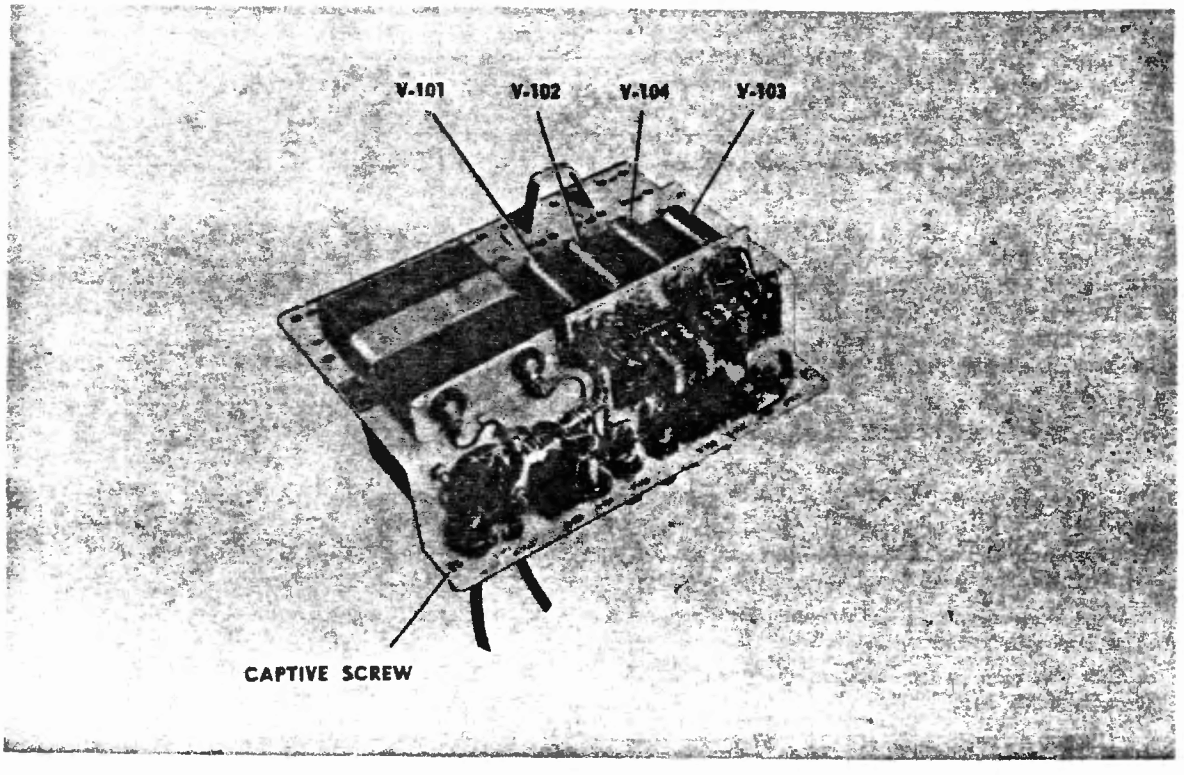


Figure 5-2. Internal View of Power Supply

SECTION VI
FIELD AND FASRON MAINTENANCE

6-1. MINIMUM PERFORMANCE STANDARDS.

6-2. Check proper performance of the test oscillator set in all seven frequency ranges.

a. Plug the power cable in on 115-volt, 50-1000-cycle supply.

b. Put switch (S-101, figure 7-1) in "ON" position. Put switch (S-102) in "MOD." position. Put switch (S-103) in "OSC." position. This arranges the test oscillator set as a signal generator.

c. Use a second test oscillator set with headphones inserted and switches in "ON" and "DIODE" positions, and with "METER ADJUST" knob fully clockwise to receive the generated signals.

d. Insert oscillator coils (Z-201 through Z-207, figure 7-1) into each tuning head, a pair of the same frequency range at a time. Couple the tuning heads end to end so that the oscillator coils are about one foot apart.

e. Tune the second test oscillator set through the frequency shown by test oscillator set which is being serviced. A beat note or click will be heard in the headphones, and a flicker of the pointer of meter (M-201, figure 7-1) will occur when the incoming signal is received. Tune slowly so as not to pass the resonant point without noticing it.

f. If a signal is received with any of the oscillator coils it proves that the tuning head and power supply are operating properly, but coils that do not oscillate should be replaced.

g. Before replacing oscillator coils make certain that their contact pins are clean and make genuine electrical contact when plugged into the tuning head. Always plug coils in fully or frequency accuracy may be upset.

6-3. SYSTEMS TROUBLE ANALYSIS.

6-4. REMOVAL. Remove the "TUNING" knob and the four screws in the corners of the top case assembly. Lift it off of the tuning head. Loosen the four captive screws in the corners of the power supply chassis and then lift it out of the combination case.

6-5. VOLTAGE AND CONTINUITY CHECKS.

CAUTION

Internal voltages of test voltmeters are sufficient to damage meter M-201. Put a 100,000-ohm resistor in series with one test lead. This assumes 6 volts as the test meter voltage and provides a possible 60 percent deflection of meter M-201.

6-6. When the test oscillator does not operate after new electron tubes have been put in and the meter checked, make the voltage and continuity checks outlined in Table 6-1. Test points mentioned in Table 6-1 appear on figure 7-1. Figure 7-2 is the practical wiring diagram which guides the finding of test point locations in the equipment.

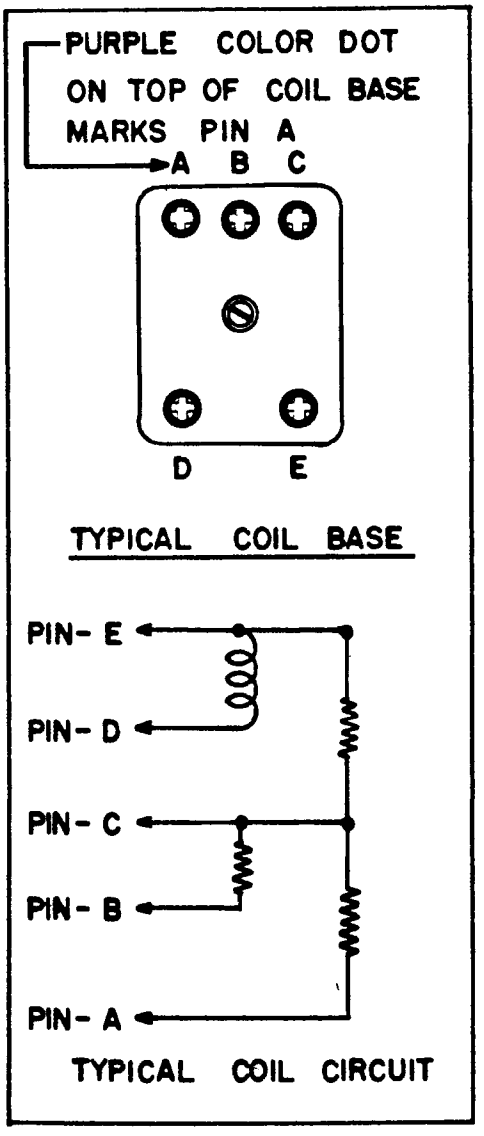


Figure 6-1. Identification of Oscillator Coil Contact Pins

6-7. Check electron tube socket terminal voltages in accordance with figure 7-3. Check electron tube socket resistance values in accordance with figure 7-4. With both voltage and resistance, variation of plus or minus 10 percent is permissible. But, any reading that is sharply different requires that the associated circuit be checked.

6-8. OSCILLATOR COIL CHECK. Refer to the oscillator coils (Z-201 through Z-207, figure 7-1) when any oscillator coil is suspected of not working. Figure 6-1 identifies the contact pins in the bases of the coils. Check for the continuity and resistance values shown by figure 7-1.

6-9. ALIGNMENT. After repairing a test oscillator set, check its accuracy by comparing its frequency dial indications with another test oscillator set. Follow the instructions given in paragraph 6-2. Tune slowly and observe frequency dial readings accurately. When frequency dial readings do not agree, adjust the repaired unit's frequency dial position. Loosen the three screws in the slotted holes in the frequency dial and shift the dial on the shaft. When either capacitor (C-201ABC, Figure 5-1) or variable resistor (R-208) are replaced, turn both their shafts fully counter-clockwise. Then turn the shaft of variable resistor (R-208) clockwise, the distance of one gear tooth. Then tighten gear set screws.

6-10. MAINTENANCE AND INSPECTION. Each time the test oscillator set is used check the sensitivity as directed in paragraph 5-2. The minimum meter reading of 40 percent is requred.

6-11. OVERHAUL SCHEDULE. Replace electron tube V-201 after the test oscillator set has operated for 300 hours. No further routine overhaul is scheduled because there is practically no mechanical wear and electrical loadings are low.

Table 6-1. Systems Trouble Analysis Chart (Sheet 1 of 3)

Step	*Test Points*	*Test Equipment Control Position*	*AN/PRM-10 Control Position*	*Normal Indication*	*Possible Cause of Abnormal Indication*
1	(1) Pin 5 of electron tube V-102 to ground.	20,000-ohm per volt voltmeter. Use 250-volt d-c scale.	Power connected. Turn "POWER" switch "ON." Plug in 2-5 mc oscillator coil. Turn "METER ADJUST" knob until meter reads 100. "OSC.-DIODE" switch in "OSC." "MOD.-CW" switch in "CW" "TUNING" knob at 3.5 mc.	150 volts d-c	Transformer T-101, Electron tubes V-101, V-102, capacitor C-101, resistors R-101, R-102.
2	(2) Pin 7 of electron tube V-103 to ground.	Same as Step 1.	Same as step 1.	60 volts d-c	Resistor R-103, R-104, capacitor C-102, electron tube V-103 and associated parts.
3	(3) Pin 5 of electron tube V-104 to ground.	Same as step 1, but 1000-volt d-c scale.	Same as step 1.	310 volts	Electron tube V-104 and associated parts.
4	(4) Pin 2 of electron tube V-104 to ground.	Same as step 1, use 250-volt d-c scale.	Same as step 1.	155 volts d-c	Electron tube V-104, capacitors C-103, C-104, C-105, resistors R-108, R-109.
5	(5) Pin 2 of electron tube V-201 to ground.	Same as step 4.	Same as step 1.	105 volts d-c	Resistor R-201, electron tube V-201, Cord W-102.

Table 6-1. System Trouble Analysis Chart—(Cont.) (Sheet 2 of 3)

Step	Test Points	Test Equipment Control Position	AN/PRM-10 Control Position	Normal Indication	Possible Cause of Abnormal Indication
6	(5) Pin 2 of electron tube V-201 to ground.	High resistance scale. Put a 100,000-ohm resistor in series with one voltmeter lead to protect meter M-201 in tuning head.	Disconnect power. Remove oscillator coil. Vary "METER ADJUST" knob.	Continuity.	Resistors R-201, R-203, R-205.
7	(A) Green lead on switch S-103 to (A_1) negative terminal of meter M-201	Same as step 6.	Same as step 6.	Continuity.	Meter M-201 green wire in cord W-102.
8	(A) Negative terminal of meter M-201 to (A_3) terminal of resistor R-206.	Same as step 6.	Same as step 6.	Continuity.	Resistor R-206.
9	(A_3) Negative terminal of meter M-201 to (A_4) terminal of resistor R-207.	Same as step 6.	Same as step 6.	Continuity.	Resistor R-207.
10	(A_4) Terminal of resistor R-207 to (A_1) terminal of terminal board TB-202.	Same as step 6 but remove 100,000-ohm resistor.	Turn "TUNING" knob through full rotation.	0 to 10,000 ohms as knob is turned.	Resistor R-208, winding or contact arm.
11	(A_5) Terminal of terminal board TB-202 to (A_5) terminal of terminal board TB-202.	Same as step 10.	No adjustment required.	10,000 ohms.	Resistor R-208 and associated wiring.
12	(B) Terminal of terminal board TB-202 to (B_1) terminal of Resistor R-202.	Same as step 10.	Same as step 10.	No continuity.	Capacitor C-201ABC.
13	(B_1) Terminal of resistor R-202 to ground.	Same as step 10.	Same as step 10.	470 ohms.	Resistor R-202.

Table 6-1. System Trouble Analysis Chart—(Cont.) (Sheet 3 of 3)

Step	*Test Points*	*Test Equipment Control Position*	*AN/PRM-10 Control Position*	*Normal Indication*	*Possible Cause of Abnormal Indication*
14	(B) Terminal of terminal board TB-202 to ground.	Same as step 10.	Same as step 10.	100,000 ohms.	Resistor R-204.
15	(5) Pin 2 of electron tube V-201 to ground.	Same as step 10.	Same as step 10.	530,000 ohms, varies slightly with movement of "TUNING" knob.	Resistors R-201, R-203 and R-205.
16	(C) Pin 5 of electron tube V-201 to ground.	Same as step 10.	Same as step 10.	Continuity to 50 ohms.	R-f choke assembly L-201.
17	(D) Pin 1 of electron tube V-103 to ground.	Same as step 10.	Same as step 10 but change switch S-102 to "MOD." position.	150,000 ohms.	Resistor R-106.
18	(E) Pin 2 of electron tube V-103 to ground.	Same as step 10.	No adjustment required.	4,700 ohms.	Resistor R-107.

SECTION VII

DIAGRAMS

7-1. GENERAL.

7-2. This section contains four figures, the schematic wiring diagram (figure 7-1), and the practical wiring diagram (figure 7-2), the electron tube terminal voltage diagram (figure 7-3), and the electron tube terminal resistance diagram (figure 7-4).

7-3. Both the schematic wiring diagram (figure 7-1), and the practical wiring diagram (figure 7-2), contain the same reference symbol numbers. Power supply parts are covered within the "100" block of reference symbol numbers. Tuning head parts are covered by the "200" block of reference symbol numbers. Identical reference symbol numbers are also stamped in black ink either on, or next to the actual electrical parts.

7-4. The schematic wiring diagram (figure 7-1), shows the entire circuit of the test oscillator set and shows the location of all test point identification symbols. The practical wiring diagram (figure 7-2), gives the location of each part and shows the tolnr coding of each wire.

7-5. Figures 7-3 and 7-4 illustrate the location of the contact pins in the electron tube sockets and list the voltages and resistances associated with these pins. Take readings tabulated in these two figures with the electron tubes in the sockets.

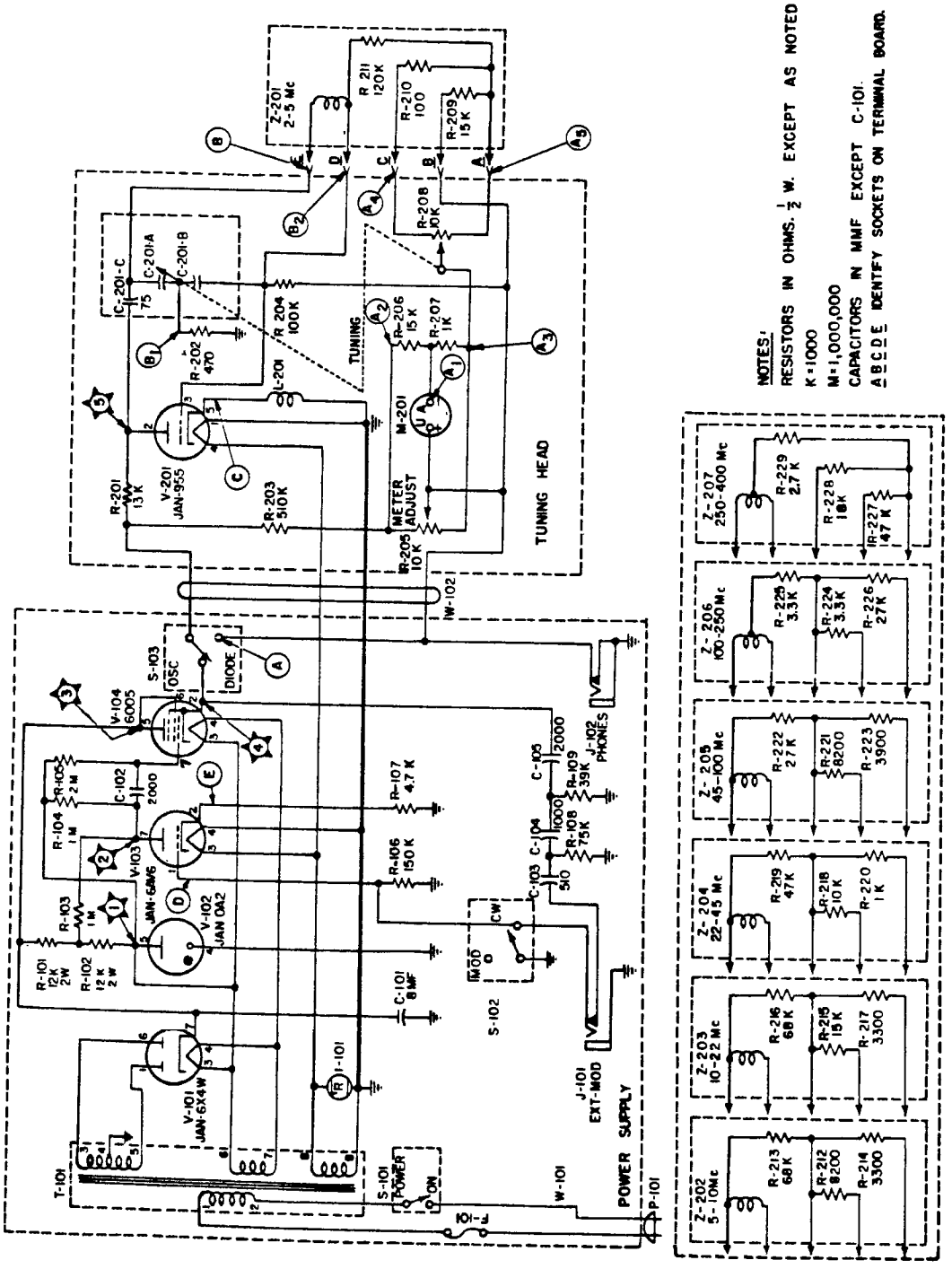


Figure 7-1. Test Oscillator Set AN/PRM-10, Schematic Wiring Diagram with Test Points Identified

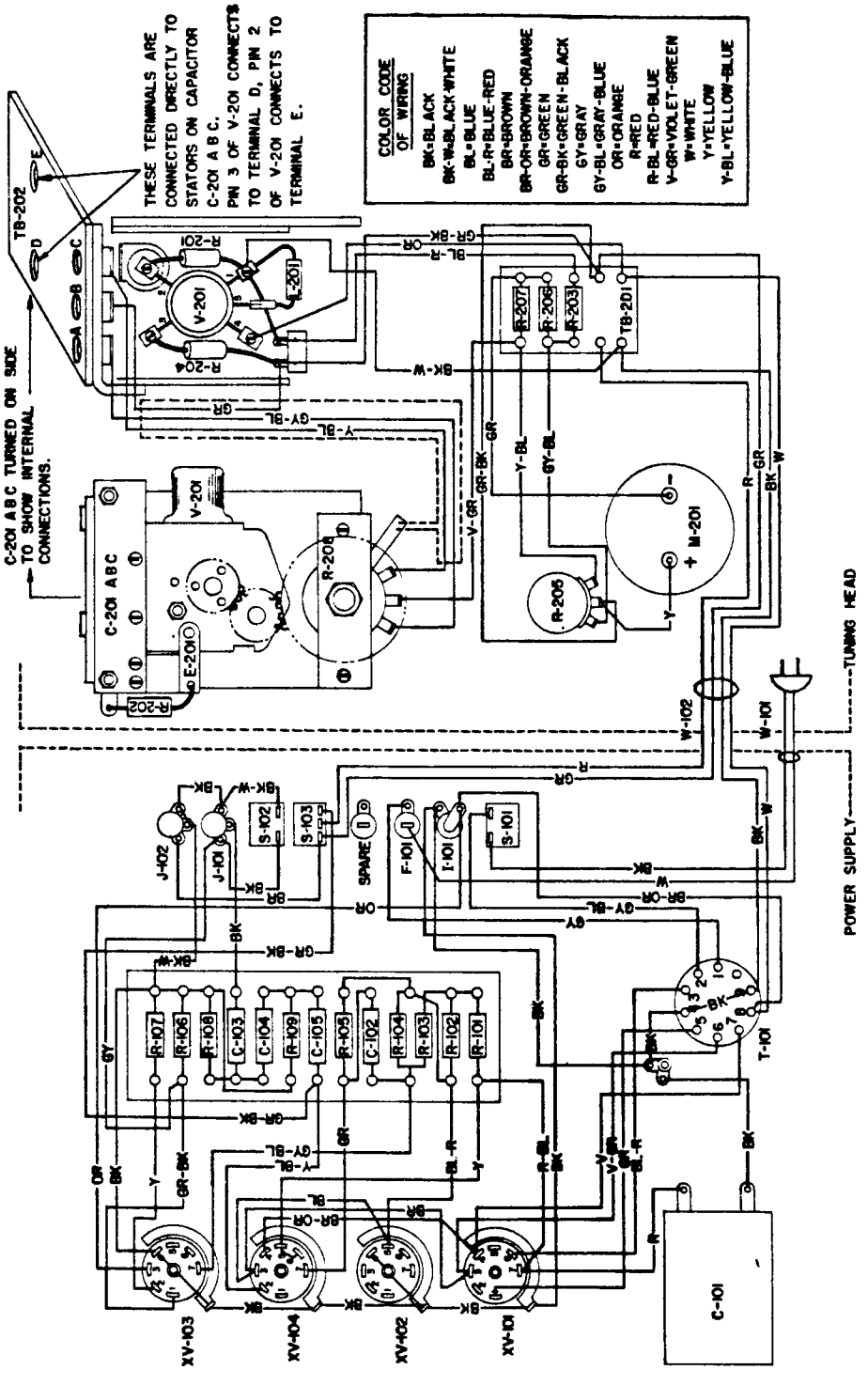
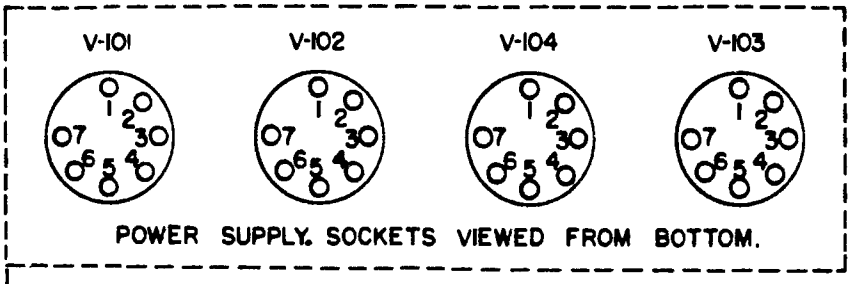
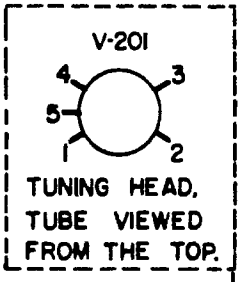


Figure 7-2. Test Oscillator Set AN/PRM-10, Practical Wiring Diagram



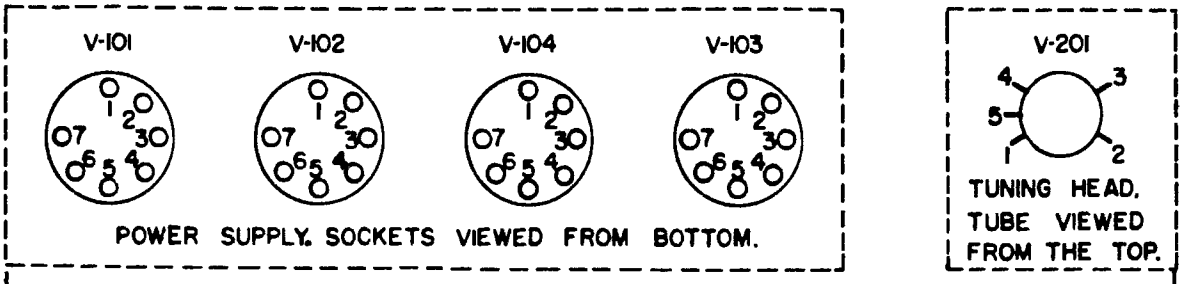


Voltages							
Tube	Terminal						
	1	2	3	4	5	6	7
V-101	260 a-c	0.0 d-c	145 d-c	145 d-c	0.0 a-c	260 a-c	308 d-c
V-102	145 d-c	— —	— —	— —	145 d-c	— —	— —
V-103	— —	1.05 d-c	6.3 a-c	— —	— —	— —	80 d-c
V-104	100 d-c	160 d-c	145 d-c	145 d-c	300 d-c	300 d-c	100 d-c
V-201	— —	112 d-c	−10 a-c	6.3 a-c	0.2 d-c	— —	— —

Notes

Measurements made between terminals and power supply chassis ground lug. 2-5 mc oscillator coil plugged into tuning head and frequency set to 4 mc. "OSC.-DIODE" switch in "OSC." position. Use 20,000 ohm per volt voltmeter for d-c readings. Use 1000 ohm per volt voltmeter for a-c readings. Employ scale nearest to indicated value.

Figure 7-3. Electron Tube Socket Terminal Voltage Diagram



Tube	Resistance in Ohms — Terminal						
	1	2	3	4	5	6	7
V-101	900	0.0	0.0	0.0		900	0
V-102	Infinity	0.0	Infinity	0.0	24K*	Infinity	0
V-103	150K	4.7K	0.3	0.0	Infinity	Infinity	Infinity
V-104	Infinity	500K	Infinity	Infinity	Infinity	Infinity	Infinity
V-201	0.7	500K	100K	0.3	42		

Notes

Measurements made between socket terminals and power supply chassis ground lug. 2-5 mc oscillator coil plugged into tuning head and frequency set to 4 mc. "OSC.-DIODE" switch in "OSC." position. "MOD.-CW" switch in "MOD." position. Use meter scale giving maximum readable deflection. K = 1000, M = 1,000,000

* Resistance increases as Capacitor C-101 charges.

Figure 7-4. Electron Tube Socket Terminal Resistance Diagram

GPO 811-943-2