

Warren Arnett

INSTRUCTION MANUAL



THE "**RESEARCH**" LINE of RADIO COMMUNICATIONS EQUIPMENT

PORTABLE TEST SETS

MODELS P-850I-A & P-850I-A-24V

Motorola
TECHNICAL INFORMATION CENTER
COMMUNICATIONS AND ELECTRONICS DIVISION
4545 W. AUGUSTA BLVD., CHICAGO 51

Motorola®

THE "RESEARCH" LINE

PORTABLE TEST SETS

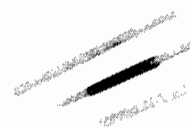
MODELS P-850]-A & P-850]-A-24V



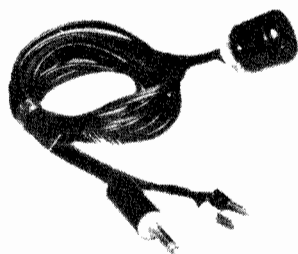
TUBE PULLER



DELUXE RECEIVER
RF INPUT CABLE



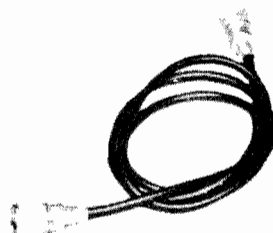
ALIGNMENT
TOOLS



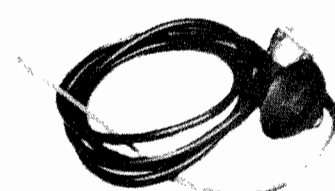
DELUXE RECEIVER
ADAPTER CABLE



DELUXE TRANSMITTER
ADAPTER CABLE



EXTENSION
CABLE



RF PROBE CABLE

Motorola

Communications and Electronics Division
4545 Augusta Blvd. • Chicago 51, Illinois

SPECIFICATIONS

MODEL	P-8501-A, P-8501-A-24V
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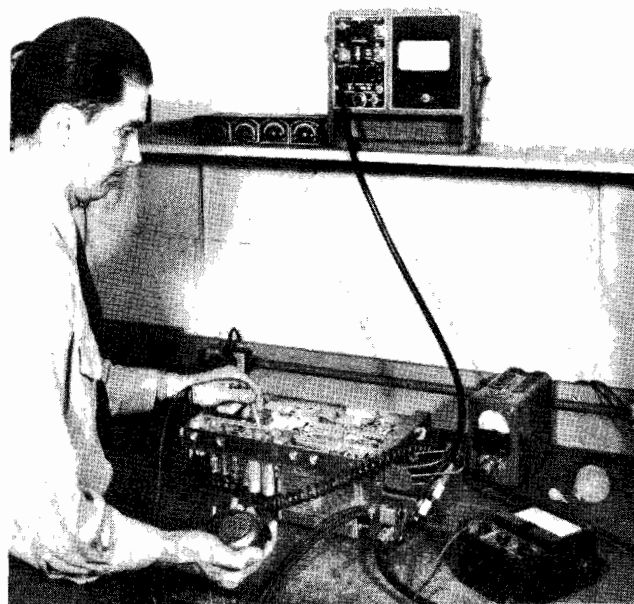
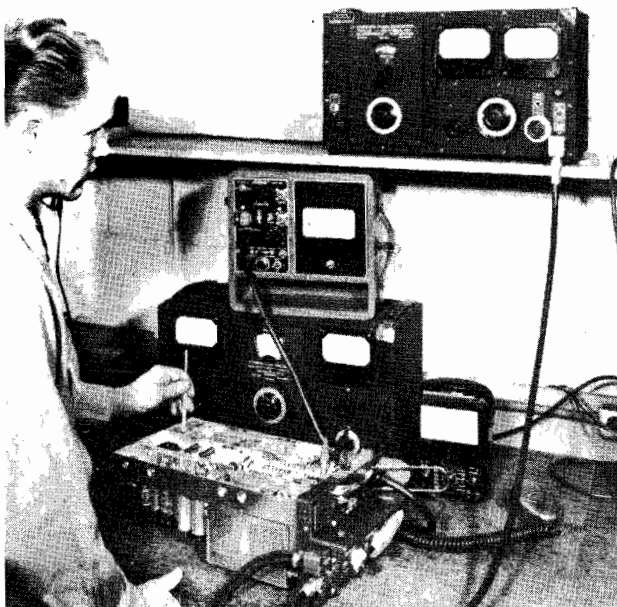
OPERATION

ALIGNMENT	Metering facilities for alignment of receiver and tune-up of transmitter are normally provided by use of a single, 11-prong plug and cable. Additional metering facilities are provided on 450-470 mc. equipment by means of a special adapter plug.
AUDIO OUTPUT	Meter indication of receiver quieting is provided. Self-contained P. M. speaker permits audio reproduction.
RF ALIGNMENT GENERATOR	Crystal controlled RF signal generator allows accurate peaking and alignment of 25-50 mc., 72-76 mc. and 152-174 mc. receivers. Motorola 4-prong oven-type or 2-prong bi-metal compensated type transmitter crystals may be used in peaking and alignment generator.
RF ALIGNMENT GENERATOR ADJUSTMENTS	Output peaking adjustment of crystal oscillator. Fine frequency adjustment of crystal circuit. Signal output adjustment of peaking generator.
CRYSTAL TESTING	Activity of 25-50 mc., 72-76 mc. and 152-174 mc. transmitter crystals may be checked.
FIELD INTENSITY METER	Relative values of the RF field intensity radiated from the transmitter antenna may be measured for 25-50 mc., 72-76 mc. and 152-174 mc. equipment.
XMTR FILAMENT OR CONTROL VOLTAGE MEASUREMENTS	P-8501-A: 6 or 12 VDC voltages P-8501-A-24V: 6, 12 or 24 VDC voltages

GENERAL

SIZE	6-3/4" high x 11-15/16" wide x 10-15/16" deep.
WEIGHT	13-1/2 lbs. complete including accessories.
METER	0-50 microamps; 2000 ohm internal resistance
TUBE COMPLEMENT AND FUNCTION	3S4 - crystal oscillator 3S4 - RF amplifier
POWER SUPPLY	1 - 67-1/2 volt battery (Eveready #467 or equivalent) 1 - 1-1/2 volt battery (Burgess type 2F or equivalent)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.



C H E C K T H E S E O U T S T A N D I N G F E A T U R E S

DESIGN

- ✓ Here is a compact unit packaged in a leatherette bound carrying case. A complete portable test meter kit for testing all MOTOROLA FM 2-way mobile transmitters and receivers and a convenient RF signal generator for alignment of 25-50 mc., 72-76 mc. and 152-174 mc. equipment.
- ✓ Crystal controlled signal generator with adjustable output from 0 to more than 800 microvolts.
- ✓ Complete testing facilities for 6 VDC, 12 VDC and 117 VAC operated units. 24 VDC operated units may be tested (P-8501-A-24V).
- ✓ Precision 2% metalized multiplier resistors in metering circuits with 4" 2000 ohm meter.
- ✓ Provides meter indication of relative radiated antenna power for 25-50 mc., 72-76 mc. and 152-174 mc. equipment.
- ✓ Microphone jack to allow local transmitter control modulation.
- ✓ Self-contained spring loaded switch for transmitter on-off control.

ACCESSORIES

- ✓ Complete set of tuning tools, adapters, cables and RF pickup probe are included as part of the model.
- ✓ P-7208 and P-7208-A RF Dummy Loads to work in conjunction with the test set for measuring transmitter RF power output are available at additional cost.
- ✓ 25-50 mc., 72-76 mc. and 152-174 mc. transmitter crystals for RF signal generator available at additional cost.
- ✓ A 455 kc. crystal unit for exact alignment of the SENSICON receiver Final IF and discriminator circuits is available at additional cost. (MOTOROLA Part No. 48B801065.)
- ✓ A 457 kc. crystal unit for exact alignment of the UNI-CHANNEL receiver Final IF and discriminator circuits is available at additional cost. (MOTOROLA Part No. 48K803674)

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Motorola

PORTABLE TEST SETS

P-8501-A & P-8501-A-24V

1. INTRODUCTION

The MOTOROLA P-8501-A and P-8501-A-24V Portable Test Sets are universal instruments for testing MOTOROLA radio transmitters and receivers. By their compact, portable design they lend themselves readily to field or bench applications. Specifically, these instruments are engineered for use with MOTOROLA "RESEARCH" Line communication equipment. With the adapter cables supplied they may be used to test and align other lines of MOTOROLA equipment as well.

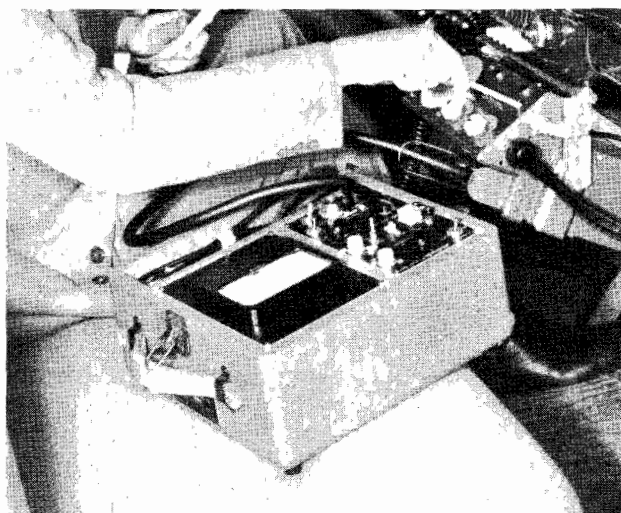
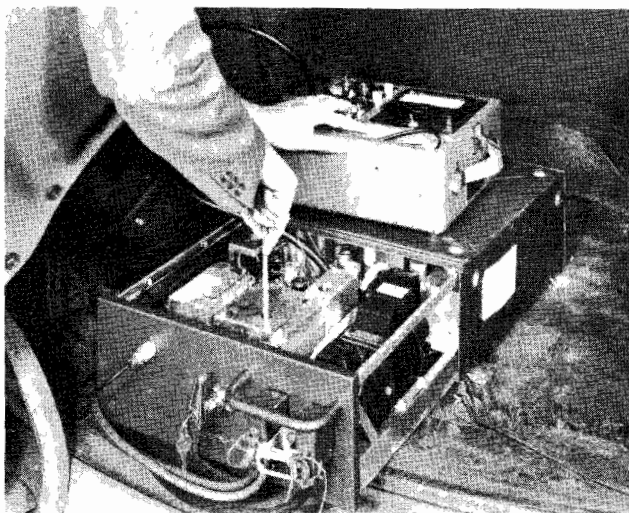
Complete testing and alignment may be accomplished for all MOTOROLA 25-50 mc., 72-76 mc. and 152-174 mc. frequency range equipment with the aid of P-8501-A Series Test Sets. For 450-470 mc. "RESEARCH" Line equipment, the P-8501-A is applicable only for metering purposes and is not to be used as a signal source for alignment.

Alignment procedures as described in the discussions to follow, will apply primarily to 25-50 mc., 72-76 mc. and 152-174 mc. equipment. For alignment of 450-470 mc. equipment refer to the comprehensive alignment procedure as outlined in the associate instruction manual for the equipment being tested.

2. DESCRIPTION

The P-8501-A Portable Test Set is designed primarily for use with MOTOROLA equipment operating from 6 VDC, 12 VDC, and 117 VAC primary power sources. The P-8501-A-24V Portable Test Set is especially suited for use in testing MOTOROLA equipment operating from 24 VDC power sources. The P-8501-A-24V and P-8501-A Test Sets differ only with respect to the value of a multiplier resistor used in the DC transmitter filament-control voltage metering circuit. This provision allows "on-scale" meter readings of 24 VDC transmitter filament voltages with the P-8501-A-24V Model. This model Test Set is identical in all other functions to the P-8501-A and may be used for complete testing of MOTOROLA equipment operating from any voltage source. However, 6 VDC and 12 VDC measurements with the P-8501-A-24V will not produce meter deflections of the magnitude attained with the P-8501-A and therefore is not to be preferred for specific 6 VDC, 12 VDC and 117 VAC MOTOROLA equipment applications.

The test set incorporates a 0-50 microampere 2000 ohm meter, which with the front panel selector switch and associated adapter plugs, provides metering for all transmitter and receiver circuits



essential to tuning and checking. Also included in the test set is a crystal oscillator and multiplier. With the aid of an associated transmitter crystal and an applicable IF crystal the test oscillator or peaking generator may be used as a source of test signal for 25-50 mc., 72-76 mc. and 152-174 mc. receiver alignment. The test set may also be used as a field strength meter for measurement of relative transmitter field strength in these frequency ranges. Other functions which may be performed with the test set are relative audio measurement, receiver quieting measurement, transmitter filament measurement and plate voltage measurement. The P-8501-A and P-8501-A-24V may be used with the P-7208 and P-7208-A RF Dummy Loads to measure RF power output. The P-7208 and P-7208-A are optional test set accessories available at extra cost.

3. CONTROLS

The following controls are provided on the P-8501-A and P-8501-A-24V Test Sets. Their general functions are as designated. The particular circuits which can be measured with these Test Sets will depend on the equipment being tested. Refer to the associated instruction manual of this equipment for particular meter functions in a specific application.

a. GRID CURRENT-METER-FIELD STRENGTH Selector Switch

(1) GRID CURRENT position: measures grid current of internal test set oscillator.

(2) METER position: used for general metering.

(3) FIELD STRENGTH: used primarily to measure relative signal radiation of a transmitter.

b. METER POLARITY Switch

Allows reversing of meter polarity

c. XMTR ON Switch

Provides a Test Set control for keying a transmitter being tested

d. REC-XMTR-0-50 ua. Selector Switch

(1) REC position: used primarily for receiver metering

(2) XMTR position: used primarily for transmitter metering

(3) 0-50 ua.: this switch setting is used when measuring very small currents. Its chief applications are with the P-7208 Series Dummy Loads, and with DELUXE and older line MOTOROLA equipment.

e. 6-12 CRYSTAL HEATER Switch

Used to provide proper filament voltage for 6, 12 or 24 volt crystals which are to be used with the Test Set oscillator.

f. METER SELECTOR Switch, Nine Position

Provides circuit selection when metering specific equipment. The particular function of each switch position will depend upon the equipment being tested.

g. ON-OFF Switch

Controls battery power to Test Set peaking generator.

h. ADJ. Control

Allows fine frequency adjustment of Test Set crystal oscillator.

i. OSC TUNE Control

Allows peaking of crystal oscillator plate circuit to provide maximum oscillator output.

j. ATTENUATOR Control

Provides adjustment of peaking generator output from 0 to more than 800 microvolts.

4. FUNCTIONS

NOTE

The following Test Set functions which do not bear asterisk suffixes are applicable to MOTOROLA equipment of all frequency ranges. Those functions designated *- will apply only to 25-50 mc., 72-76 mc. and 152-174 mc. equipment. Designations ***- refer to 450-460 mc. equipment only.

a. Metering

(1) DISPATCHER and "RESEARCH" Line Equipment

(a) Place the REC. -XMTR.-0-50 switch in the REC. or XMTR. position, depending upon whether a transmitter or receiver is being metered.

(b) Place the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

(c) Insert the 11 pin metering plug into the METER receptacle on the chassis being metered.

(d) Refer to the MOTOROLA Instruction Manual applicable to the unit undergoing test for proper test set switch settings and meter readings.

(2) DELUXE and other MOTOROLA Equipment

(a) Place the REC.-XMTR.-0-50 switch in the 0-50 position.

(b) Place the GRID CURRENT-METER-FIELD STRENGTH meter in the METER position.

(c) Place the 9 position meter selector switch in the +4 or -4 position depending upon the direction of the needle deflection. Positions +4 and -4 act as a meter polarity reversing switch in this application.

NOTE

The meter polarity may also be reversed by the - + switch directly beneath the meter. The reversing switch is primarily used to reverse the meter polarity when measuring the battery voltage of a mobile unit in position 8 of the metering switch.

(d) Insert the 11 pin metering plug into the proper adapter receptacle.

1. When metering a transmitter - use the BLACK adapter. Plug the adapter meter connector into the transmitter METER jack.

2. When metering a receiver - use the RED adapter. Plug the adapter meter connector into the receiver METER jack and plug the two pins into the receiver SPKR receptacles.

CAUTION

DO NOT use the RED adapter to meter a transmitter. The transmitter B+ will be connected to one of the speaker pins when measuring PA plate current.

(e) Refer to the MOTOROLA Instruction Manual applicable to the unit undergoing test for proper meter readings of the various stages.

b. Receiver Relative Audio Measurement

(1) DISPATCHER and "RESEARCH" Line Receiver

(a) Place the REC.-XMTR.-0-50 switch in the REC. position.

(b) Place the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

(c) Insert the 11 pin metering plug into the METER receptacle on the receiver chassis.

(d) Place the 9 position meter selector switch in position 8.

(2) DELUXE and other MOTOROLA Receivers

(a) Place the REC.-XMTR.-0-50 switch in the REC. position.

(b) Place the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

(c) Connect the 11 pin metering plug to the RED adapter having the two pin connectors.

(d) Plug the two pin connectors into the speaker receptacles on the receiver chassis.

(e) Place the 9 position meter selector switch in position 8.

c. Relative Field Strength Measurement -*-

(1) Connect the RF probe extension cable to the PROBE connector on the test set.

(2) Connect the RF probe cable with the suction cup to the extension cable. The suction cup may be used to secure the RF probe to a car body or other fixed object.

(3) Place the GRID CURRENT-METER-FIELD STRENGTH switch in FIELD STRENGTH position.

(4) Place the REC.-XMTR.-0-50 switch in the XMTR. position.

(5) Key the transmitter by pressing the XMTR-ON momentary switch. The transmitter may also be keyed by a microphone connected to the test set.

NOTE

To key the transmitter with the test set, the 11 pin meter plug must be connected to the METER receptacle on the transmitter chassis.

(6) If the meter should read off scale; reduce the signal strength by folding the RF probe or by moving it further away from the transmitting antenna. This procedure will permit a transmitter to be adjusted for maximum radiated signal.

d. 450-470 Mc. SENSICON Receiver Multiplier Grid Current Measurements -**-

To accurately align a 450-470 mc. SENSICON receiver, the measurement of 1st and 2nd multiplier grid current is essential. Provision can be made for such measurement by application of a K-9326 adapter plug which is available as an optional accessory.

To measure the multiplier grid current in 450-470 mc. receivers proceed as follows:

(1) Plug the K-9326 adapter into the METER receptacle on the receiver.

(2) Connect the 11 pin meter plug to the adapter.

(3) Place the GRID CURRENT - METER-FIELD STRENGTH switch in the METER position.

(4) Place the REC. -XMTR. -0-50 switch in the REC. position.

(5) Place the 9 position meter selector switch in the -4 position for 1st multiplier grid current measurement.

Place the switch in the 5 position for 2nd multiplier grid current measurement.

(6) Read the grid current on the Test Set meter.

e. Transmitter Filament-Control Voltage Measurement

NOTE

For most equipment operating from a DC power source, transmitter filament voltages and control voltages are derived from the same A- supply. In these instances the following test procedure allows simultaneous measurement of both. In some cases, particularly with AC

equipment, a separate voltage source supplies power to the transmitter filament and the control circuits. In these instances the following test procedure allows control voltage measurement only.

To measure "RESEARCH" Line and DISPATCHER transmitter filament-control voltage:

(1) Insert the 11 pin meter plug into the METER receptacle on the transmitter chassis.

(2) Place the GRID CURRENT - METER-FIELD STRENGTH switch in the METER position.

(3) Place the REC. -XMTR. -0-50 switch in the XMTR. position.

(4) Place the - + switch beneath the meter in the (+) position if the positive terminal of the mobile unit's battery is grounded or place it in the (-) position if the negative terminal of the battery is grounded.

(5) Place the 9 position meter selector switch in position 8.

(6) The meter will read filament-control voltage when the transmitter is in the "standby" condition as follows:

(a) On the P-8501-A Test Set multiply the meter reading in microamperes by 0.3 to obtain the filament voltage in volts.

(b) On the P-8501-A-24V Test Set the meter reading reads directly 0-50 volts.

f. Transmitter Plate Voltage Measurement

To measure "RESEARCH" Line and DISPATCHER transmitter plate voltage:

(1) Insert the 11 pin meter plug into the METER receptacle on the transmitter chassis.

(2) Place the GRID CURRENT - METER-FIELD STRENGTH switch in the METER position.

(3) Place the REC. -XMTR. -0-50 switch in the XMTR. position.

(4) Place the 9 position meter selector switch in position 7. The meter will read zero when the transmitter is in the "standby" condition. Multiply the meter reading in microamperes obtained in the "transmit" condition by a factor of 20 to determine the plate voltage in volts.

CAUTION

DO NOT use K-9326 adapter plug when metering a 450-470 mc. transmitter. Use of this adapter may result in serious damage to the test set meter.

g. Receiver Quieting Measurement

DISPATCHER and "RESEARCH" Line Receivers

Quieting signal is that input signal necessary to reduce the output noise, at the speaker, 20 db. This measurement is to be made in a well shielded location in the absence of extraneous noises.

This measurement is important, in that it indicates in one measurement that the signal-to-noise ratio of the receiver RF stage is satisfactory and that there is sufficient gain, i.e. that amplifier tubes are working normally.

The actual measurement is made by observing the noise voltage at the speaker without any carrier at the antenna. Then sufficient carrier is introduced at the antenna to reduce the noise output voltage to 1/10 its former value.

To measure the quieting signal accurately on 25-50 mc., 72-76 mc. and 152-174 mc. receivers a Model 80 Signal Generator or equivalent and a MOTOROLA P-8501-A Portable Test Set are required.

To measure the quieting signal on 450-470 mc. receivers, a Model M360 Measurement Corp. Signal Generator or an equivalent and a MOTOROLA P-8501-A Portable Test Set are required.

The proper procedure is as follows:

(1) Turn the signal generator "on" and allow the signal to stabilize by a "warm-up" period of 1-1/2 to 2 hours.

(2) Connect the 11 pin meter plug from the test set to the METER receptacle on the receiver chassis.

(3) Place the REC. -XMTR. -0-50 switch in the REC. position.

(4) Place the GRID CURRENT - METER - FIELD STRENGTH switch in the METER position.

(5) Connect the signal generator, adjusted to the desired carrier frequency, to the receiver antenna input connector using a coaxial lead and

6 db. pad. The exact carrier frequency will be indicated by a zero reading on the test set meter with the 9 position meter selector switch in position 4. (The AFC switch should be placed in the "OFF" position on receivers employing this control.)

(6) Place the 9 position meter selector switch in position 8.

(7) Turn the receiver SQUELCH control fully counterclockwise (OFF).

(8) With no signal input to the receiver (signal generator attenuator control set for zero output), adjust the VOLUME control for a reading of 8.0 on the test set meter.

(9) Adjust the output level of the signal generator until the receiver audio is decreased to a reading of 0.8 on the test set meter.

(10) Note the setting of the signal generator output control. This value (microvolts) is the 20 db. quieting sensitivity of the receiver.

(11) Disconnect the Test Set and Signal Generator.

h. Peaking Generator Operation -*-

The peaking generator provides a crystal controlled source of RF signal for aligning most MOTOROLA receivers. The peaking generator is designed to use the transmitter crystal for operation in the 25-50, 72-76 and 152-174 megacycle bands. The stages are broadly tuned and therefore the output will be at all harmonics of the crystal frequency.

(1) Place the transmitter crystal for the associated carrier frequency or its equivalent into the appropriate crystal socket on the test set.

IMPORTANT

When aligning a receiver in the 25-50 mc. range with an FMT-5 transmitter crystal, place the #1X891072 adapter in the crystal socket on the test meter. This adapter is an optional accessory not normally supplied with the test set. The item however will be furnished by MOTOROLA at no extra cost per customer request. Place the FMT-5 crystal in the adapter. The adapter places a capacitor in series which permits the oscillator to be tuned to the correct frequency.

The Test Sets contain a 6-12 switch which places a dropping resistor in series with the crystal heater when in position 12. The use of this switch on the test set depends upon the power source of the receiver being aligned and the voltage rating of the crystal heater. The proper setting for this switch is indicated below.

(a) Position 6, when aligning a 6 VDC or 117 VAC receiver using a crystal with a 6 volt heater.

(b) Position 12, when aligning a 12 VDC receiver using a crystal with a 6 volt heater.

(c) Position 6, when aligning a 12 VDC receiver using a crystal with a 12 volt heater.

(d) Position 6, when aligning a 24 VDC receiver using a crystal with a 24 volt heater.

NOTE

When aligning a 24 VDC receiver the transmitter crystal must have a 24 volt heater.

(2) Transmit a carrier signal of the frequency of the receiver being tested from an associated transmitter. It is recommended that the test transmitter be located sufficient distance from the receiver so that the received signal will be relatively weak.

(3) Adjust the discriminator coil for zero meter indication for all receivers within the specified frequency ranges except the SENSICON and UNI-CHANNEL receivers. When aligning these receivers, adjust the first local oscillator coil for zero discriminator indication.

(4) Connect the output of the peaking generator, RF OUT, to the ANT connector of the antenna relay on the transmitter chassis using the cable supplied with the test set. A ground connection must be made between the test set and the receiver being aligned to permit operation of the test sets crystal heater. The shield of the RF cable is used for this purpose.

(5) Turn "on" the peaking generator with the ON-OFF switch on the test set.

(6) Insert the 11 pin meter connector into the DISPATCHER or "RESEARCH" Line receiver METER receptacle or use the adapter for DELUXE and other MOTOROLA receivers having no 11 pin meter receptacle. Allow a short "warm-up" period sufficient for crystal heating.

(7) Place the GRID CURRENT -METER-FIELD STRENGTH switch in the GRID CURRENT position and set the ATTENUATOR in the maximum output position. Check the meter for test set oscillator grid current - - with crystals of normal activity the meter will read above 10 microamperes.

(8) Return the meter switch to the METER position and place the selector switch in position 2. Tune the output of the peaking generator for a maximum meter reading by adjusting the control marked OSC TUNE as follows:

(a) Set the ATTENUATOR control to maximum. Tune the OSC TUNE control for a maximum meter reading. BE SURE THE OSCILLATOR IS ON A TRUE PEAK. It is possible under certain circumstances to have the crystal lose control of the oscillator. Self-oscillation of the peaking generator can be readily detected by switching the test meter to position 4. Rapid fluctuations of the meter as a hand is placed on the crystal indicates self-oscillation. The OSC TUNE control should be carefully adjusted until RF output is obtained which provides a stable meter reading. Screw the slug all the way out. The large peaks that are wrong will be unstable.

(b) After obtaining a maximum reading, reduce the ATTENUATOR level and repeak the meter with OSC TUNE control. Repeat this procedure a few times, but do not set the ATTENUATOR level so low that the oscillations stop as indicated by a zero meter reading when the GRID CURRENT-METER-FIELD STRENGTH switch is placed in the GRID CURRENT position.

(9) Place the selector switch in position 4. Adjust the test set crystal frequency for zero discriminator meter reading with the control capacitor marked ADJ on the test set.

(10) Place the selector switch in position 1 or 2 (position 2 is more sensitive but saturates for lower signal levels). Keep the oscillator output as low as possible.

CAUTION

Care should be taken when reducing the output of the peaking generator as the ATTENUATOR is not linear; however, it will provide good control at low output levels and will attenuate to zero output.

(11) Align the receiver as outlined in the applicable MOTOROLA Instruction Manual.

i. SENSICON and UNI-CHANNEL Receiver 2nd IF Stage Alignment

The P-8501-A may be used to align the final IF of SENSICON and UNI-CHANNEL Receivers in all frequency ranges if an additional 455 kc. or 457 kc. is purchased for use with the peaking generator.

If a SENSICON receiver is to be aligned a 455 kc. crystal should be used - MOTOROLA Part No. 48B801065. If a UNI-CHANNEL receiver is to be aligned a 457 kc. crystal should be used - MOTOROLA Part No. 48K803674. These crystals should be ordered from MOTOROLA INC., 1327 West Washington Boulevard, Chicago 7, Illinois.

The following procedure should be used when aligning the 2nd IF of SENSICON and UNI-CHANNEL receivers.

(1) Plug the 455 kc. or 457 kc. crystal into the two pin crystal socket on the test set.

(2) Place the GRID CURRENT - METER-FIELD STRENGTH meter in the GRID CURRENT position.

(3) Place the ON-OFF switch in the ON position.

(4) Set the ATTENUATOR control for maximum output.

(5) Adjust the frequency ADJ control for a maximum meter reading.

(6) Connect the RF probe cable to the RF OUT receptacle. The extension cable may be used if desired.

(7) Lay the RF probe under the receiver chassis near the 2nd IF-1 tube.

(8) Align the receiver as outlined in the applicable SENSICON or UNI-CHANNEL receiver section of your MOTOROLA Instruction Manual.

j. P-7208 and P-7208-A Dummy Loads -*-

NOTE

The P-7208 and P-7208-A RF Dummy loads are optional items not supplied with this Test Set. They must be ordered separately if desired.

The P-7208 RF Dummy Load is a radio frequency resistive load unit which is used in conjunction with the P-8501-A Test Set to measure transmitter RF power output. The unit has a standing wave ratio of less than 1.2 over a frequency range of 25 mc. to 174 mc. and has a nominal load impedance of 50 ohms. The RF power capability of the dummy load is 25 watts for continuous operation and 60 watts for intermittent operation.

The P-7208-A RF Dummy Load is the same as the P-7208 except that the maximum power rating is 2 watts. The P-7208-A is designed for use with the MOTOROLA Portable equipments.

To measure transmitter RF power output:

(1) Place the GRID CURRENT - METER-FIELD STRENGTH switch in the METER position.

(2) Place the REC. -XMTR. -0-50 switch in the 0-50 position.

(3) Place the 9 position meter switch to the +4 position.

(4) Insert the 11 pin metering plug into the BLACK transmitter adapter receptacle.

(5) Plug the adapter connector into the jack on the RF Dummy Load.

(6) Connect the transmitter ANT. connector to the coaxial connector on the RF Dummy Load using the extension cable supplied with the test set.

(7) Turn on the transmitter power switch and allow a one minute warm-up period.

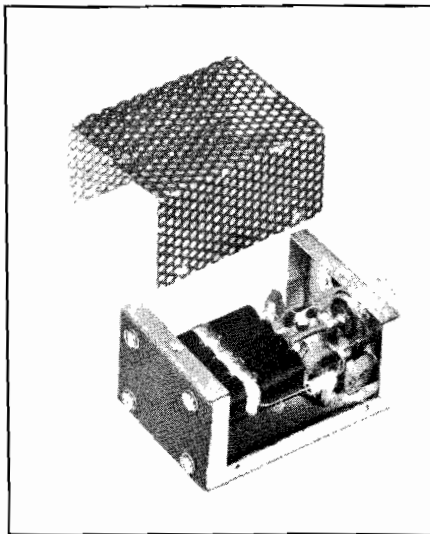
(8) Key the transmitter with the press-to-talk switch on the microphone (in AC models a test microphone may be connected on the power supply chassis).

(9) Note the reading on the test set meter. Refer to the applicable calibration curve shipped with the RF Dummy Load to convert the indicated microamperes to output watts.

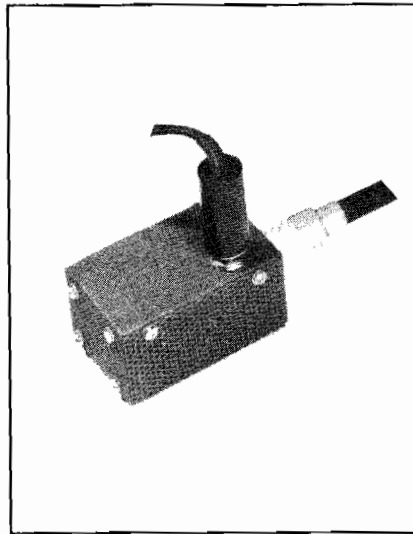
NOTE

If the meter reads off scale, reverse the meter polarity with the - + switch beneath the meter.

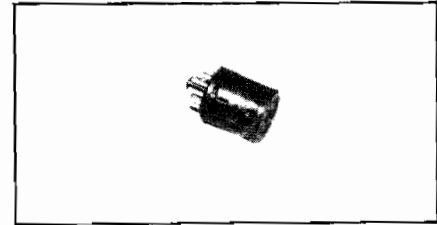
5. OPTIONAL ACCESSORIES



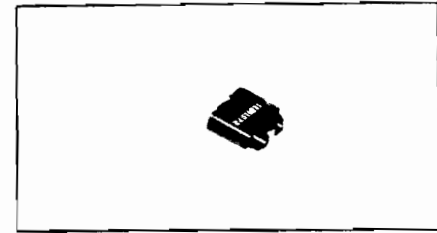
COVER REMOVED



WITH CONNECTIONS



K-9326 ADAPTER KIT



FMT-5 CRYSTAL ADAPTER

P-7208 SERIES DUMMY LOADS

6. SCHEMATIC DIAGRAM PARTS LIST

DELUXE TEST SET

Model: P-8501-A, P-8501-A-24V

Reference:
Schematic Diagram
63D891692-E

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
BT 1	48X480415	BATTERY, dry: "A"; 1-1/2 volt
BT 2	48X24983	BATTERY, dry: "B"; 67-1/2 volt
C 1	21K87133	CAPACITOR, fixed: ceramic; tubular; 1500 mmf GMV; 500 vdcw
C 2	19K29854	CAPACITOR, variable: air; 3-35 mmf; ADJ.
C 3		Same as C 1
C 4	21R474573	CAPACITOR, fixed: ceramic; tubular; 50 mmf $\pm 5\%$; 500 vdcw
C 5	21B87134	CAPACITOR, fixed: ceramic; tubular; 500 mmf min.; 500 vdcw
C 6	21R6605	CAPACITOR, fixed: mica; 5600 mmf $\pm 20\%$; 500 vdcw
C 7	21K474609	CAPACITOR, fixed: ceramic; tubular; 4 mmf $\pm .5$ mmf
	or 21K474952	CAPACITOR, fixed: ceramic; tubular; 4 mmf $\pm .5$ mmf; 500 vdcw
C 8	21R31493	CAPACITOR, fixed: ceramic; tubular; 24 mmf $\pm 5\%$; 500 vdcw; p/o L 1
C 9	21K474009	CAPACITOR, fixed: ceramic; tubular; 100 mmf $\pm 20\%$; 500 vdcw
C 10		Same as C 1
C 11		Same as C 5
C 12	21R87127	CAPACITOR, fixed: ceramic; tubular; 36 mmf $\pm 5\%$; 500 vdcw; p/o L 4
C 13	21B83959	CAPACITOR, fixed: molded; tubular; 1 mmf $\pm .2$ mmf; 500 vdcw; p/o L 4
C 14		Same as C 5
C 15	21K801139	CAPACITOR, fixed: ceramic; disc; .01 mf $\pm 80-20\%$; 450 vdcw
C 16		Same as C 15

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
CR 1 CR 2	48A90173	CRYSTAL UNIT, rectifying: germanium Same as CR 1
E 1	31A892459	HOLDER, fuse: single fuse mounting; for 1-1/4" long x 1/4" diameter fuse
F 1	65A42869	FUSE, cartridge: one time; glass; 1/200 ampere; 250 volt; 1" long x 1/4" diameter
J 1	9A85615	CONNECTOR, receptacle; female; single contact; round; mica filled bakelite insulator; square mounting base; FIELD STRENGTH PROBE
J 2	9B16345	CONNECTOR, receptacle; female; 4 contact; round; phenolic insulator; MICROPHONE
J 3		Same as J 1 except RF OUT
L 1	24B823247	COIL, RF: OSCILLATOR PLATE
L 2	24A77336	COIL, RF: choke; 4.3 millihenries
L 3	24A470505	COIL, RF: choke; 285 microhenries
L 4	24B475533	COIL, RF: MULTIPLIER PLATE
L 5		Same as L 2
L 6	24A85541	COIL, RF: choke; 3.1 microhenries
L 7		Same as L 6
LS 1	50B478023	SPEAKER, magnetic: 3.2 ohm voice coil; 3-1/2"
M 1	52B474497	METER, ammeter: 0 to 50 microampere; 2000 ohm DC; 4" black bakelite case; METER
	or 52B880281	METER, ammeter: 0 to 50 microampere; 2000 ohm; DC; 4" black bakelite case; METER
P 1	28B813576	CONNECTOR, plug: male; 11 contact; polarized; round; black phenolic base; does not include 1V483723 Connector Shield and Handle Assembly or 41A483715 Connector Shield Spring; which must be ordered separately; p/o W 1
R 1	6R6326	RESISTOR, fixed: carbon; 100 ohm $\pm 10\%$; 1/2 w; ins.
R 2	6R6373	RESISTOR, fixed: carbon; 150 ohm $\pm 10\%$; 1/2 w; ins.
R 3	17K892454	RESISTOR, fixed: carbon film; 280,000 ohm $\pm 2\%$; 1/2 w; ins.; used only on P-8501-A
	or 17K811974	RESISTOR, fixed: carbon film; 980,000 ohm 1/2 w; ins.; $\pm 2\%$; ins.; used only on P-8501-A-24V
R 4	17K892453	RESISTOR, fixed: carbon film; 17,500 ohm $\pm 2\%$; 1/2 w; ins.
R 5	17K892455	RESISTOR, fixed: carbon film; 20 megohm $\pm 2\%$; 2 w; ins.
R 6	17K86037	RESISTOR, fixed: wire wound; 7 ohm $\pm 5\%$; 10 w; ins.
R 7	6R6048	RESISTOR, fixed: carbon; 47,000 ohm $\pm 10\%$; 1/2 w; ins.
R 8		Same as R 2
R 9	18A80865	RESISTOR, variable: wire wound; 50,000 ohm $\pm 20\%$; ATTENUATOR
R 10		Same as R 7
S 1	40B892458	SWITCH, lever action: three position; two pole
S 2	40B892457	SWITCH, rotary: 2 section; 9 position; consisting of:
S 2A		1 section, 9 position; front section
S 2B		1 section, 9 position; rear section
S 3	40A475597	SWITCH, toggle: D.P.S.T.; XMTR ON
	or 40K811760	SWITCH, toggle: D.P.S.T.; XMTR ON
S 4	40B892456	SWITCH, rotary: 2 section; 3 position; consisting of:
S 4A		1 section, 3 position; front section
S 4B		1 section, 3 position; rear section
S 5	40A482097	SWITCH, toggle: S.P.S.T.; 6 volt and 24 volt closed - 12 volt open
	or 40A811825	SWITCH, toggle: S.P.S.T.; 6 volt and 24 volt closed - 12 volt open

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
S 6	40A474034 or 40K811752	SWITCH, toggle: D.P.S.T.; ON-OFF SWITCH, toggle: D.P.S.T.; ON-OFF; consisting of: p/o S 6
S 6A		p/o S 6
S 6B		
S 7	40A80246 or 40K811751	SWITCH, toggle: D.P.D.T. SWITCH, toggle: D.P.D.T.
V 1	3S4	TUBE, electron
V 2		Same as V 1
W 1	1V475527	CABLE ASSEMBLY, special purpose: METERING; includes: 30A474498 CABLE, special purpose; 11 conductor; rubber covered; 3-1/2 ft. long required Reference part P 1
X 1	9K82810	SOCKET, crystal: female; 2 contact; rectangular; black bakelite base
X 2	9A30451	SOCKET, crystal: female; 4 contact; square; mica filled bakelite base
X 3	9K87124	SOCKET, tube: female; 7 contact; miniature; round; mica filled phenolic base; includes center shield; saddle mounting
X 4		Same as X 3
MISCELLANEOUS NON-REFERENCED PARTS		
	36X80912	KNOB: bar; for reference part R 9
	30A76858	CABLE, special purpose: 2 conductor; rubber covered; one 12" long and one 17" long lengths required
	26A890034	SHIELD, tube: for reference part V 1, V 2; 2 required
	1V892448	CABLE ASSEMBLY, special purpose; BATTERY: includes: 31K892422 CONNECTOR: 1 single male and 1 single female contact; snap type; mounted on a rectangular phenolic strip 28K12249 CONNECTOR, plug: male; 2 contact; pin type: round bakelite insulator 10M50 WIRE, electrical: #24 ga.; stranded; coded, BLACK; 12-1/2" long required 10M52 WIRE, electrical: #24 ga.; stranded; coded, RED; 14-1/2" long required
ACCESSORY PARTS (SUPPLIED)		
	1V475530	LINE, RF transmission: RF PROBE; assembly; includes: 62" 30K475278 CABLE, RF: coaxial; RG-58A/U 1 9A85615 CONNECTOR, plug: female; single contact 1 15A483599 SHELL, connector: for 9A85615 CONNECTOR plug 1 37A475539 CUP, suction
	1V475531	LINE, RF transmission: assembly; EXTENSION; includes: 42" 30K475378 CABLE, RF: coaxial; RG-58A/U 2 28A85558 CONNECTOR, plug: male; single contact
	1V475525	LINE, RF transmission: assembly; DELUXE RECEIVER RF INPUT: includes: 39" 30K475378 CABLE, RF: coaxial; RG-58A/U 1 28A85558 CONNECTOR, plug: male; single contact; UHF type 1 28A80810 CONNECTOR, plug: male; single contact
	1V892541	CABLE ASSEMBLY, special purpose: DELUXE RECEIVER ADAPTER; includes: 104" 30A76858 CABLE, 2 conductor: rubber covered 1 28A19484 PLUG, telephone: 2 contact 1 9K892736 CONNECTOR, plug: female; 11 contact

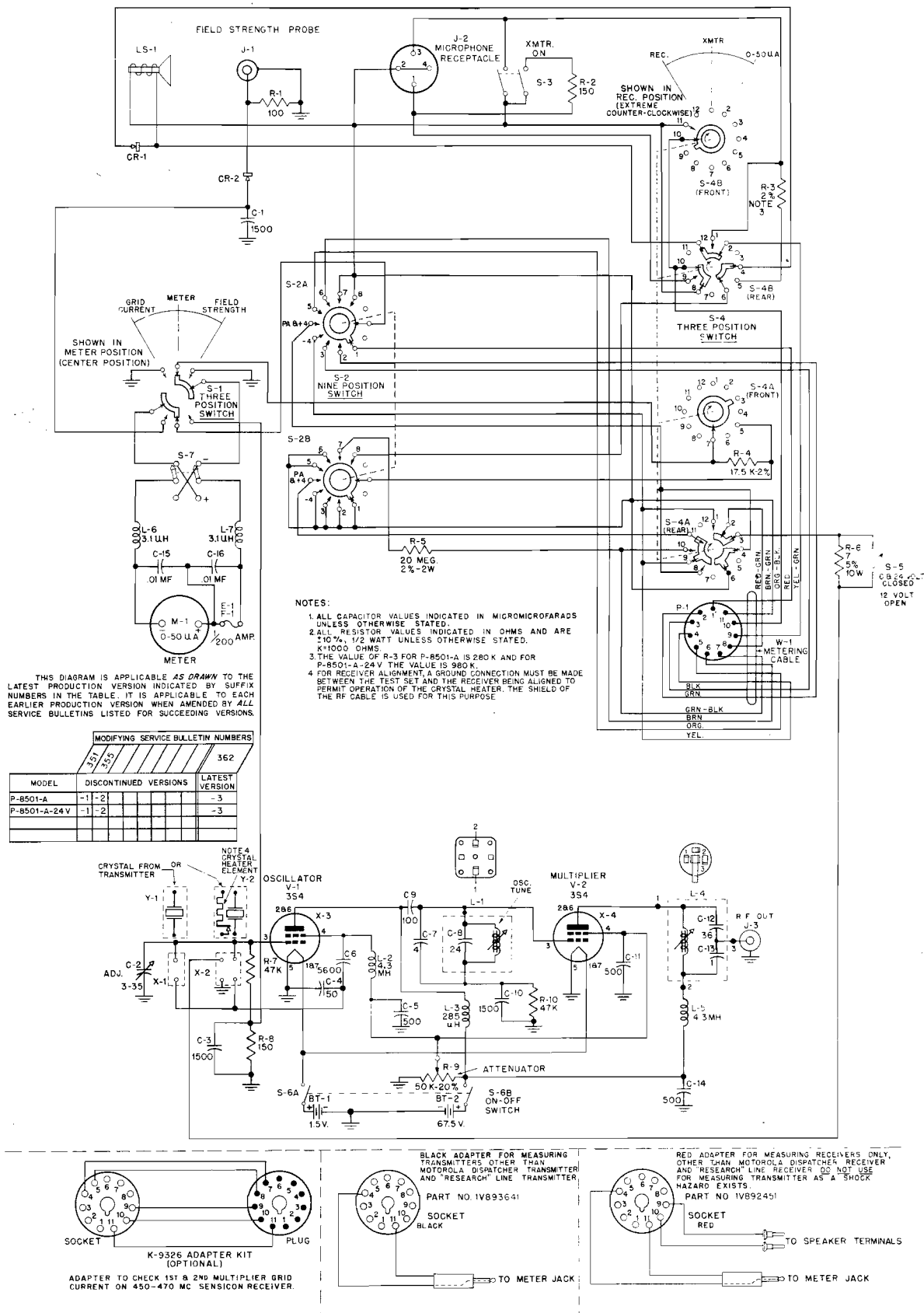
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1V893641	1 15K893642 SHELL, connector: for 9K892736 CONNECTOR, plug 1 29K5405 CONNECTOR, plug: male; single contact; pin type; coded; black 1 29K5407 CONNECTOR, plug: male; single contact; pin type; coded; white CABLE ASSEMBLY, special purpose: DELUXE TRANSMITTER ADAPTER; includes: 36" 30A76858 CABLE, special purpose; 2 conductor; rubber covered 1 28A19484 PLUG, telephone: 2 contact 1 9K892736 CONNECTOR, plug: female; 11 contact 1 15A483149 SHELL, connector: for 9K892736 CONNECTOR, plug
	66A891568	TOOL, alignment: double ended screwdriver; 6" long
	66A474489	TOOL, alignment: double ended; slotted plug; recessed blade; 5-1/2" long
	66A481953	TOOL, alignment: double ended; recessed blade; projected blade; 7-5/16" long
	66K475051	TOOL, tube puller

7. CRYSTAL UNIT

NOTE

CRYSTAL UNITS are not part of the P-8501-A or P-8501-A-24V TEST SET and must be ordered as a separate item.

Y 1 or Y 2	48B801065 or 48K803674 or	CRYSTAL UNIT, quartz: IF Alignment; 455 kc.; MOTOROLA Type TX 1 CRYSTAL UNIT, quartz: IF Alignment; 457 kc.; MOTOROLA Type TX 2 Applicable Transmitter Crystal Applicable Transmitter Crystal
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ADDENDUM

MANUAL AFFECTED:

<u>TITLE</u>	<u>PART NUMBER & ISSUE</u>
PORTABLE TEST SETS MODELS P-8501-A & P-8501-A-24V	54P891690-C

ADDENDUM #1

SECTION AFFECTED:

<u>TITLE</u>	<u>PART NUMBER & ISSUE</u>
SCHEMATIC DIAGRAM	63D891692-F

CHANGES:

The (+) and (-) terminals of the 0-50 ua. meter (M-1) are shown on the diagram with the left terminal marked (-) and the right terminal marked (+). This is directly opposite to the markings on the actual meter. Change the diagram to show the left terminal marked (+) and the right terminal marked (-).

REASON FOR CHANGES:

To have the diagram agree with the markings on the actual meter.

ATTACHMENTS:

None

Motorola

Communications and Electronics Division
4545 Augusta Blvd. Chicago 51, Illinois

ADD. #1
DATE 12/53

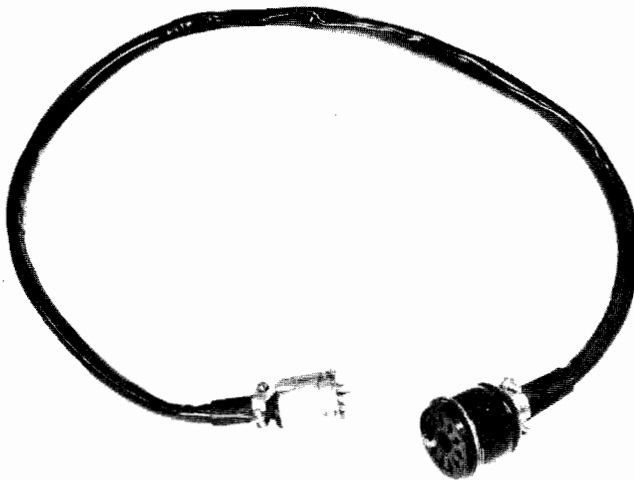
MOTOROLA

TEST ADAPTER CABLE

MODEL TKN6025A

PARTS LIST for Schematic Diagram 63B862694-A

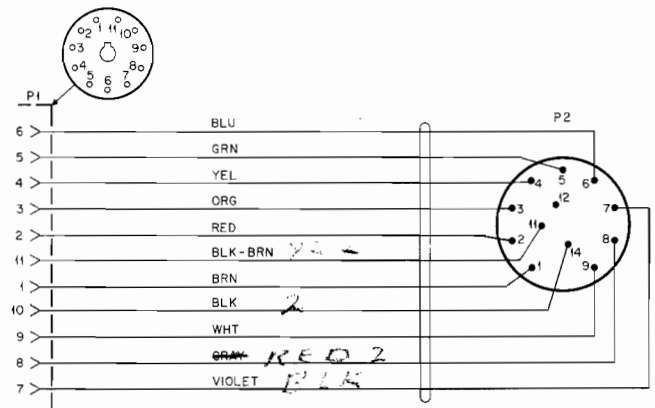
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P1	9C86864	CONNECTOR, plug; female: 11 contact; does not incl. 15A483149 SHIELD, plug
P2	1V80754A26	assy: c/o: 28B864669 PLUG, male; 12 contacts 15A864670 SHELL, plug 37K103664 GROM-MET 42A82740 CLAMP, cable; 2 req'd 3S7287 SCREW, machine (4-36-3/8)



REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TKN6025A	P2	WAS 28B864669 CONNECTOR, PLUG	PARTS LIST

When using a Motorola Partable test set to meter a "Motrac"®, "Business Dispatcher", or "Mocom · 30"® Mobile FM Two-Way Radio, or Alert Monitor receiver the Model TKN6025A Adapter Cable must be used. The adapter cable has an 11-pin female receptacle on one end and a 12-pin male plug on the other end. Connect the 11-pin receptacle to the test set metering cable and the 12-pin plug to the metering socket of the transmitter or receiver of the radio set.



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