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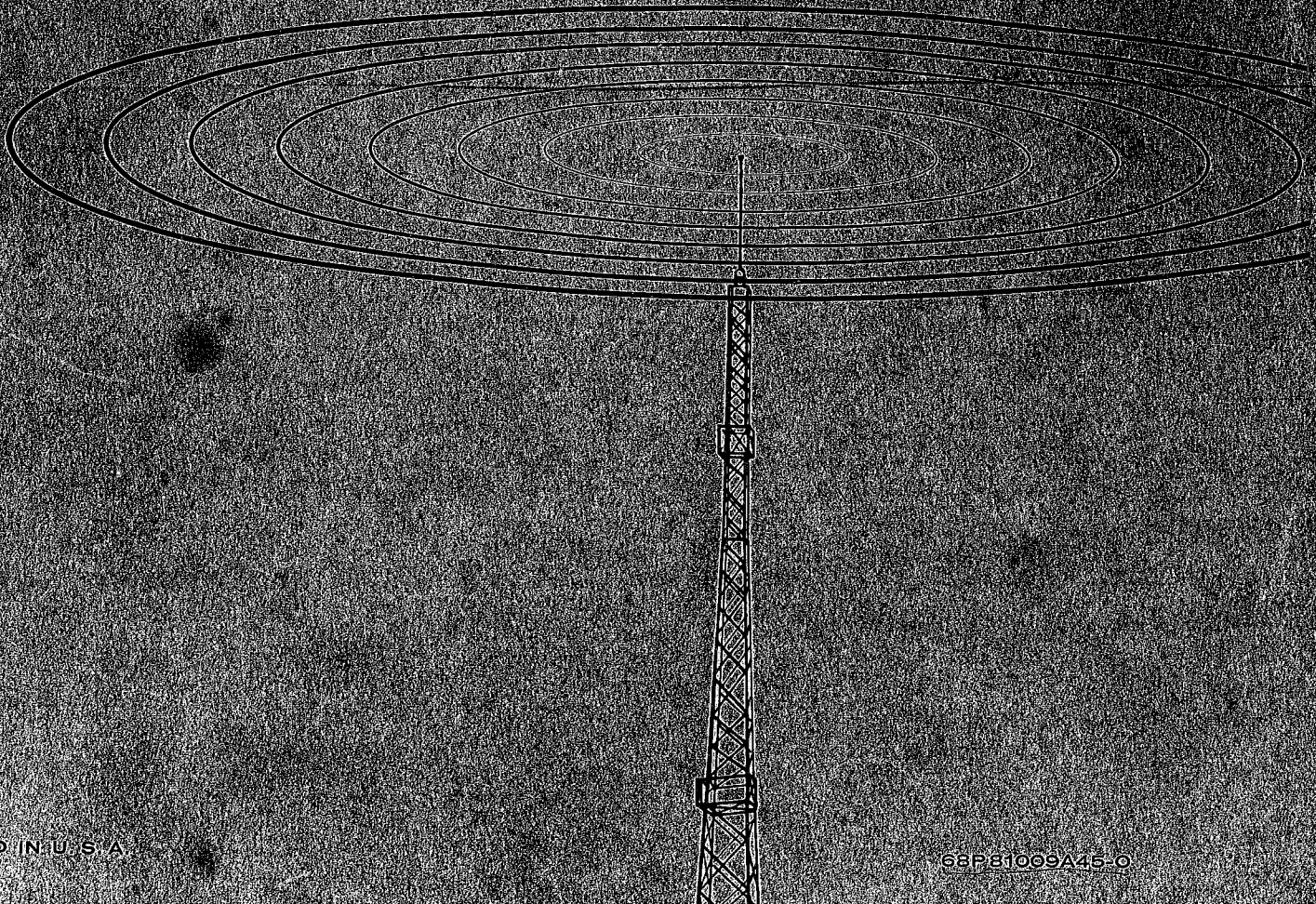
Base Station

FM Two-Way Radio

144-174 MC

250 W RF POWER

117/230 VAC



MOTOROLA

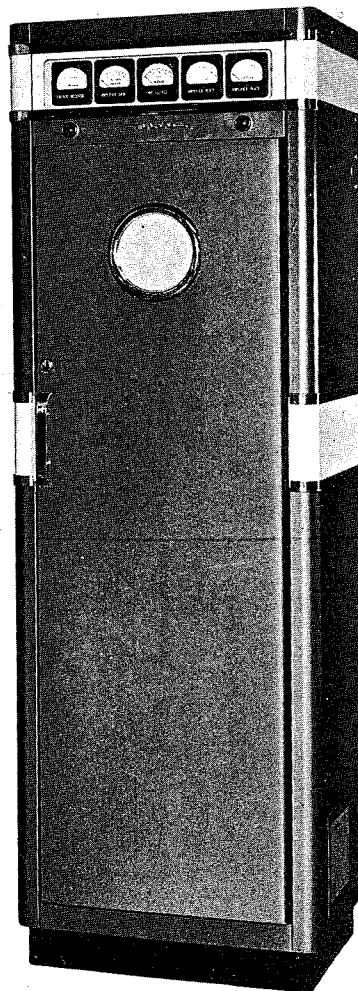
BASE STATION

FM TWO-WAY RADIO

250 W RF POWER

144-174 MC

117/230 VAC



REMOTELY CONTROLLED
ONE- OR TWO-RECEIVER MODELS



MOTOROLA INC.

Engineering Publications

4501 W. Augusta Blvd.

COMMUNICATIONS DIVISION

Chicago 51, Illinois

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Issue - O

AEFD-6899-O(MC3555)

SPECIFICATIONS

MODEL	B93AKB Series	
FREQUENCY	144-174 mc	
NOMINAL RF POWER OUTPUT	250 watts	
MODULATION	40F3: ± 15 kc for 100% at 1000 cycles or 20F3: ± 5 kc for 100% at 1000 cycles.	
20 DB QUIETING SENSITIVITY	Less than 0.60 microvolt 50-72 ohm r-f input impedance	
RECEIVER SELECTIVITY	More than -100 db at ± 30 kc	
METERING	Five (5) panel mounted meters; Resonant indication of all circuits essential to tuning and checking is accomplished with a single meter and associated rotary selector switches. Final amplifier plate voltage, plate current, grid current and line voltage are metered separately.	
NOMINAL POWER INPUT (TOTAL)	Single Receiver Models Standby: 250 watts Transmit: 1350 watts	Two Receiver Models: Standby: 290 watts Transmit: 1380 watts
PRIMARY POWER SOURCE	117 volt 60 cycle 2-wire, single-phase or 230 volt 60 cycle 3-wire, single-phase	
DIMENSIONS	68-3/8" high x 22-1/2" wide x 15" deep overall	78-3/8" high x 22-1/2" wide x 15" deep overall
WEIGHT	320 lbs installed complete	350 lbs installed complete

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FCC LICENSE DESIGNATION: CC3029

FOREWORD

PURPOSE OF THE MANUAL

This manual offers the serviceman complete installation, operation, maintenance and service information on the Motorola 2-way radio models described in it.

The manual will serve not only as a ready reference for the experienced technician, but also as a step-by-step guide for the inexperienced man.

For convenience and quick reference, the manual is divided into separate sections. Each section has complete alignment, service and maintenance information on its chassis and/or kits and includes its own diagrams, details and parts lists. For example, the receiver section contains complete information on the receiver models. Installation and operation of the complete radio set are covered in a separate section. All major section paragraph headings and diagrams are listed for the serviceman's use in the Contents.

BASE STATION NOMENCLATURE

Motorola Base Stations have specific model nomenclature assigned. Model numbers define the equipment precisely in a few letters. In any correspondence with Motorola about your equipment refer to it by model number to insure correct identification. A model number identification plate is fastened to the top of the back panel of each base station cabinet.

Motorola transmitters, receivers, power supplies and other units are also identified by model numbers. These numbers are stamped in a prominent place on each chassis. The transmitter model number of each base station is also stamped on the metal identification plate. Use the chassis model number when referring to the manual or schematic diagram and in correspondence about your equipment.

A model chart is included in the front section of this manual. This chart lists the models covered by this manual and gives a summary of the items included in each model.

PRODUCTION CHANGES

When production and engineering changes are incorporated into the equipment, a revision numeral is assigned to the chassis or kit affected, e.g.; TTD1340AA becomes TTD1340AA-1 with

the first revision. This model number complete with revision numeral is stamped on the chassis at the time of production. The revision numeral becomes an integral part of the chassis identifier.

A schematic diagram number complete with issue letter is also stamped on each chassis. This establishes direct correlation between the chassis and its schematic. The schematic issue is advanced each time a change occurs in the chassis. The applicable issue letter is stamped on the chassis.

INSTRUCTION MANUAL REVISION BULLETINS

Changes which occur after an instruction manual is printed are covered by the Instruction Manual Revision Bulletins. These bulletins give the reader complete information on the change including pertinent parts list data from which the instruction manual can be corrected.

NATIONAL SERVICE ORGANIZATION

Motorola provides a nation-wide service organization. Through its maintenance and installation program Motorola makes available the finest service to those desiring reliable continuous communications on a contract basis.



The largest service organization specializing in mobile communications is Motorola's National Service Organization. Over 800 strategically located, adequately staffed and trained, independently owned and operated stations, manned with several thousand FCC Licensed Personnel constitute the sub-contracting force.

The administrative forces of area and district service managers and district service representatives are in the direct employ of Motorola.

For your contract service requirements, please contact your local Motorola representative or write to:

National Service Manager
Motorola Communications Division
4501 W. Augusta Blvd.
Chicago 51, Illinois

REPLACEMENT PARTS ORDERING

Motorola maintains parts and service depots in Fair Lawn, New Jersey; Dallas, Texas and Burlingame, California to supplement the activities of the Parts and Service Department in Chicago. The table outlines the services provided by these facilities:

Area Served	Parts and Service	Crystals
Central Area	Chicago Parts Dept.	Factory
Eastern Area	Fair Lawn	Factory
Southern Area	Dallas	Factory
Western Area	Burlingame	Factory

Factory:
Crystal Service Department,
916 N. Kilbourn Ave.
Chicago 51, Illinois

Burlingame:
Parts and Service
1616 Rollins Road,
Burlingame, California

Chicago:
Parts and Service
4910 West Flournoy St.
Chicago 44, Illinois

Fair Lawn:
Parts and Service
15-00 Pollitt Drive
Fair Lawn, New Jersey

Dallas:
Parts and Service
7138 Envoy Court
Dallas 35, Texas

These offices are fully equipped to give this service. When ordering replacement parts, the complete number identification of the item must be used whether it be a component, kit or complete chassis. This will fix proper identification and insure receipt of the desired item. Complete number identification should also be used when requesting equipment information.

Crystal orders should specify crystal type number, crystal frequency, carrier frequency and the chassis model number in which the crystal is to be used.

CAREFUL USE OF THE INSTRUCTION MANUAL AND THE MANY SUGGESTIONS CONTAINED IN IT WILL FURTHER INSURE PROPERLY INSTALLED AND MAINTAINED RADIO EQUIPMENT.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U. S. PATENTS:

RE-24,110	2,566,759	2,699,425	2,799,001	2,883,521
RE-24,815	2,583,032	2,705,281	2,799,010	2,888,652
D-159,182	2,602,842	2,713,664	2,799,832	2,899,547
2,343,115	2,608,648	2,731,555	2,808,507	2,901,601
2,404,359	2,608,649	2,738,466	2,809,236	2,905,909
2,439,408	2,626,384	2,740,891	2,810,068	2,912,573
2,439,412	2,636,652	2,743,144	2,811,590	2,918,571
2,459,675	2,637,782	2,743,361	2,830,200	2,924,705
2,472,021	2,650,333	2,750,451	2,833,994	2,938,082
2,524,300	2,652,542	2,759,052	2,834,879	2,963,577
2,524,534	2,662,942	2,759,103	2,835,794	2,966,585
2,547,023	2,688,059	2,770,721	2,852,730	2,968,739
2,547,025	2,691,094	2,777,950	2,860,239	2,974,221
2,547,027	2,691,560	2,784,263	2,864,943	

Other U. S. Patents Pending

CONTENTS

<u>SECTION</u>	<u>NUMBER</u>
Specifications	Page ii
Model Chart	Page vii
DESCRIPTION	68P81009A46
Introduction	Page 1
Description of Units	Page 1
INSTALLATION AND OPERATION	68P81009A47
Inspection	Page 1
Antenna and Transmission Line Considerations	Page 1
Installation of Cabinet	Page 1
Pre-operational Checks	Page 4
Pre-operational System Adjustments	Page 5
Operating Procedure	Page 5
Lubrication Instructions	Page 6
Single-Receiver Cabinet Dimensional Detail	69B802279
Two-Receiver Cabinet Dimensional Detail	69B802370
P-9263 Low Pass Filter Schematic Diagram and Parts List	63B812073
Chassis Location & External Connections Diagram	63C81004A22
Single-Receiver Intercabling Diagram and Parts List	63E81004A23
Two-Receiver Intercabling Diagram and Parts List	63E81004A24
TRANSMITTER/EXCITER	68P81009A02
Description	Page 1
Control Crystal Requirements	Page 1
Circuit Operation	Page 1
Guaranteed Performance Specifications	Page 2
Adjustment of the IDC Control	Page 4
Alignment Procedure	Page 4
Transmitter Alignment Procedure Chart	EPD-6847
IDC Control Adjustment	EPD-6848
Schematic Diagram and Parts List (132-152 MC)	63E81009A43
Schematic Diagram and Parts List (144-174 MC)	63E81009A04
FINAL RF AMPLIFIER	68P81003A97
Description	Page 1
Operation	Page 1
Nominal Performance Specifications	Page 2
Alignment and Neutralizing Procedure	Page 2
Alignment Detail	69D81003A98
Alignment Procedure Chart	EPD-4974
Schematic Diagram and Parts List	63C81003A99
RECEIVER (144-174 MC)	68P856853
Description	Page 1
Guaranteed Performance Specifications	Page 2
Operation	Page 4
Alignment Procedure	Page 6
Two-Receiver Considerations	Page 6
Pre-operational Notes	Page 7
Crystal Frequency Chart	EPD-2009
Alignment Procedure Chart	EPD-2010
Schematic Diagram & Parts List 162-174 MC Single-Frequency	63E856855
Schematic Diagram & Parts List 144-162 MC Single-Frequency	63E856856

68P81009A45-0

<u>SECTION</u>	<u>NUMBER</u>
Schematic Diagram & Parts List 144-162 MC Two-Frequency	63E856857
Schematic Diagram & Parts List 162-174 MC Two-Frequency	63E856858
AC POWER SUPPLIES	
P-8434 SERIES MODELS	68P820705
Description	Page 2
Nominal Performance Specifications	Page 2
P-8434 Schematic Diagram and Parts List	63D891689
P-8434-R Schematic Diagram and Parts List	63D804314
P-8531 SERIES MODELS	54P880326
Description	Page 1
Performance Specifications	Page 2
Theory of Operation	Page 2
P-8531 Schematic Diagram and Parts List	63B880327
P-8531-A Schematic Diagram and Parts List	63B880339
P-8531-R Schematic Diagram and Parts List	63B800235
P-8531-AR Schematic Diagram and Parts List	63B804292
HV POWER SUPPLY AND RELAY CHASSIS	68P820557
Nominal Performance Specifications	Page 1
Description	Page 1
Adjustments	Page 1
Schematic Diagram and Parts List	63D820558
REMOTE CONTROL CHASSIS	54P810720
Introduction	Page 1
Model P-8066-N Remote Control Chassis	Page 1
Model P-8066-NR Remote Control Chassis	Page 2
P-8066-P Remote Control Chassis	Page 3
P-8066-PR Remote Control Chassis	Page 5
METER SWITCHING CHASSIS	
Meter Switching Chassis Model TU415	68P852807
Description	Page 1
Operation	Page 2
Schematic Diagram and Parts List	63C854779
METERING FACILITIES	
Description	Page 1
Metering Equipment	Page 1
MAINTENANCE	
General	Page 1
Routine Maintenance	Page 1
Typical Additional Checks	Page 3
Required Repairs	Page 5
Summary of Recommended Checks	Page 6

MOTOROLA

MODEL CHART

144-174 MC

250 WATT BASE STATION

CODE:

- ☒ = ONE ITEM INCLUDED IN STANDARD MODELS.
- ☐ 2 = TWO ITEMS INCLUDED IN STANDARD MODELS.
- ☒ = ONE ITEM INCLUDED. CHOICE DEPENDENT UPON FREQUENCY RANGE.
- ☒ = TWO ITEMS INCLUDED. CHOICE DEPENDENT UPON FREQUENCY RANGE.

*REPRESENTS A SERIES OF MODELS AND NOT A SPECIFIC MODEL. THE SPECIFIC MODEL, AS STAMPED ON THE CHASSIS, IS DETERMINED BY ITS APPLICATION.

ITEM	DESCRIPTION	REFERENCE DIAGRAM	MODELS	NUMBER OF TRANSMITTER FREQ.	NUMBER OF SINGLE FREQ. RECEIVERS	CHANNEL SPACING
*TRD1040AA	RECEIVER; 1-FREQUENCY	63E856855 & 56	B93AKB-1000C	1	1	60 KC
*TRD1040AB	RECEIVER; 1-FREQUENCY	63E856855 & 56	B93AKB-1020C	1	2	60 KC
TTD1340AA	TRANSMITTER/EXCITER; 1-FREQUENCY (144-174 MC)	63E81009A04	B93AKB-1030C	2	2	60 KC
TTD1340AB	TRANSMITTER/EXCITER; 2-FREQUENCY (144-174 MC)	63E81009A04	B93AKB-1100C	1	1	30 KC
P-8434	A-C POWER SUPPLY	63D891689	B93AKB-1120C	1	2	30 KC
P-8531-A	A-C POWER SUPPLY	63B880339	B93AKB-1130C	2	2	30 KC
P-8066-N	REMOTE CONTROL CHASSIS, ONE 1-FREQ. RCVR.	63C810721	B93AKB-1140C	1	2	60 KC
P-8066-P	REMOTE CONTROL CHASSIS, TWO 1-FREQ. RCVRs.	63D810722	B93AKB-1050C	2	2	60 KC
TLN6356A	OSCILLATOR SHIELD KIT		B93AKB-1150C	2	2	30 KC
TLN6357A	OSCILLATOR SHIELD KIT					
P-8415-A	ANTENNA RELAY KIT					
TLN6319A	FINAL AMPLIFIER CHASSIS, 250 WATT	63C81003A99				
P-8238C	H. V. POWER AND RELAY CHASSIS	63C820558				
P-8459	SPARE FUSE AND A-C OUTLET PANEL	63E81004A23&24				
TK577	METER PANEL	63E81004A23&24				
TKN6079A	CABLE KIT, ONE-RECEIVER MODELS	63E81004A23				
TKN6080A	CABLE KIT, TWO-RECEIVER MODELS	63E81004A24				
TK585	COAXIAL CABLE KIT	63E81004A23				
TK582	COAXIAL CABLE KIT	63E81004A24				
TK590	CABINET KIT, ONE-RECEIVER MODELS	69B802279				
TK591	CABINET KIT, TWO-RECEIVER MODELS	69B802370				
TK597	CABINET ACCESSORY KIT; ONE-RECEIVER MODELS					
TK598	CABINET ACCESSORY KIT; TWO-RECEIVER MODELS					
TK599	H. V. POWER TRANSFORMER AND BLOWER	63E81004A23&24				
K-8451-C	BLOWER KIT	63E81004A23&24				
TU415	METER SWITCHING PANEL	63C854779				
K-9322	ALIGNMENT TOOL KIT					
P-9263	LOW PASS FILTER	63A812073				
RO3	TRANSMITTER CONTROL CRYSTAL (144-174 MC)					
RM27	RECEIVER CONTROL CRYSTAL (144-162 MC)					
RM16	RECEIVER CONTROL CRYSTAL (162-174 MC)					
RM28	RECEIVER CONTROL CRYSTAL (144-162 MC)					
RM17	RECEIVER CONTROL CRYSTAL (162-174 MC)					
AO4	RECEIVER I-F CRYSTAL					
A12	RECEIVER I-F CRYSTAL					

EPD-6833-O

DESCRIPTION

1. INTRODUCTION

Each base station model consists of receiver(s) transmitter/exciter, final amplifier, power supplies and associated units. The transmitter/exciter is used to drive the final amplifier, which develops 250 watts r-f output. A separate high voltage power supply provides all final amplifier voltages except the screen grid voltage. The exciter power supply provides the screen grid voltage. The transmitter/exciter and the receiver operate from another power supply. In 2-receiver models a third power supply is included to furnish voltages for the second receiver. A remote control chassis permits control of the equipment from a distant operating point using a wire control line and a remote control console. Built-in metering facilities are provided for convenient metering of the equipment. Each model includes two blowers, one for general cabinet ventilation, the other for cooling the final amplifier. The cabinet blower is controlled by either the push-to-talk circuit or the thermostat mounted in the cabinet. The final amplifier blower is connected across the primary power input and is energized continuously.

All chassis are installed on a panel-rack mounted in an upright, steel cabinet. These models operate from a 117 volt, 60 cycle, 2-wire single phase source or a 230 volt, 60 cycle, 3-wire single phase source.

2. DESCRIPTION OF UNITS

Major units such as receiver, power supply and transmitter chassis, are described in separate sections as indicated in the CONTENTS. Units not described in separate sections are described in this paragraph.

a. Cabinet

There are two cabinet models. Single-receiver, remotely controlled base stations use the TK590 Cabinet. A typical installation including all chassis weighs 320 pounds.

The two-receiver models are mounted in the TK591 Cabinet. A complete installation weighs about 350 pounds.

The front and back of the chassis are accessible through sturdy, full-length key-locked doors. Safety interlock switches on the doors protect service personnel. The transmitter cannot be keyed with the rear door open, and the remote control console operator cannot key the transmitter with the front door open.

Chassis are mounted on standard 19" vertical racks. A 5" speaker is mounted in the front door. The high-voltage transformer is mounted on the bottom of the cabinet.

A blower is mounted in the bottom of the cabinet to circulate air throughout the cabinet. This blower is energized when the push-to-talk circuit is closed or by a thermostat mounted in the cabinet. The blower maintains the cabinet temperature below 140°F. The thermostat closes at 100°F.

b. Blower Kit

The shock-mounted blower kit supplies continuous forced-air cooling for the final amplifier. This blower is mounted above the final amplifier. The blower operates continuously when primary



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a-c power is applied to the base station. Refer to the intercabling diagrams in the INSTALLATION AND OPERATION section for intercabling details.

c. Spare Fuse & AC Outlet Panel

The spare fuse & a-c outlet panel mounts the spare fuses and has a duplex a-c convenience outlet. Refer to the instructions and applicable intercabling diagram in the INSTALLATION AND OPERATION Section of this manual for further details.

d. Cable Kits

The cable kits interconnect the base station chassis. The connections made by these cable kits are shown on the station intercabling diagram. These kits also include the interlock switches for the front and rear cabinet doors.

e. Cabinet Accessory Kits

The TK597 and TK598 Cabinet Accessory Kits are used in the 1-receiver and 2-receiver base stations respectively. Each kit includes the necessary chassis mounting brackets, meter panel glass, blank panels for unused mounting space and hardware for mounting the various chassis used in the cabinet.

f. Antenna Relay Kit

The antenna relay is the junction for the antenna, final amplifier output and receiver inputs. The antenna relay is normally in the receive po-

sition connecting the antenna to the receiver. As the transmitter is turned on, the relay is switched to the transmitter position, connecting the antenna to the output of the transmitter.

g. Harmonic Filter

The harmonic filter is a 3-section filter in a metal box 8-1/4" x 2-13/16" x 2-13/16" mounted on the back side of the final amplifier chassis. The filter unit is inserted in the circuit between the final amplifier and the antenna relay.

h. Extended Local Control Facilities

The TMN6005A Handset and Hang-Up Box or TMN6009A Desk Set is available for remotely controlled base stations. It is not included as part of the remotely controlled models and must be ordered separately. A TKN6064A (25 ft.) or TKN6065A (8 ft.) cable is required for direct connection to the base station equipment. The specific cable must be ordered separately. Refer to the instructions included with the unit for complete interconnection and schematic details.

i. Tuning Tool Kit

The K-9322 Tuning Tool Kit is included with each base station. This kit contains a Motorola Part No. 66A835721 tuning tool for aligning the transmitter and receiver.

j. Crystals

Crystals are listed in the parts lists on the back of the transmitter and receiver schematic diagrams.

INSTALLATION AND OPERATION

IMPORTANT

FCC regulations state that a radio transmitter may be tuned or adjusted only by a person holding a 1st or 2nd class commercial radiotelephone operator's license or by personnel working under his direct supervision.

FCC regulations also state that when a transmitter is initially installed, a suitable procedure shall be employed to ascertain that the carrier is on the assigned frequency. This frequency check should be made immediately before the equipment is placed in service. A Motorola T1130A Series FM Station Monitor or equivalent frequency measuring device should be used for this purpose.

REMEMBER

The efficiency of the equipment depends upon a good installation.

1. INSPECTION

Carefully unpack and inspect the equipment as soon as possible. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately.

To insure safe delivery, the high voltage rectifiers and final r-f amplifier tubes are removed from the equipment and packed in separate cartons. Remove these tubes from their shipping containers and install them in the respective chassis. Install the two 866A high voltage rectifiers in the high voltage power supply and relay

chassis near the bottom of the cabinet. Install the two r-f amplifier tubes in the final r-f amplifier chassis at the top of the cabinet. Connect the grid and plate caps on these tubes.

2. ANTENNA AND TRANSMISSION LINE CONSIDERATIONS

The antenna and transmission line kit are not included with the radio base station since each installation requires special attention. The type of antenna and transmission line should be determined by a qualified radio communications engineer. Installation of the antenna and transmission line should be made prior to the installation of the equipment. Follow the instructions included with the items.

3. INSTALLATION OF CABINET

a. Location

Location of the cabinet depends upon the accessibility of cables and other factors, as follows:

- (1) Entrance of the AC Line, Ground Lead and Control Line

There are several knockouts in the base of the cabinet for cable entrance holes. Select the knockouts to be used for proximity to a-c outlet, ground connection point, etc. When punching out knockouts it is best to use a 1/4" blunt-end punch and hold a short piece of 1-1/2" pipe against the inside of the cabinet behind the knockout. Alternately, the knockouts can be drilled out.



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(2) Entrance of the Antenna Transmission Line

The antenna lead-in is ordinarily brought in through the hole in the top of the cabinet at the corner nearest to the rear door opening edge. There is another hole in the left-hand side of the cabinet as viewed from the rear. As shipped from the factory this hole is closed with a cover plate. To use this hole for antenna cable entrance, transfer the cover plate to the hole in the top of the cabinet.

(3) Door Opening Space

Place the cabinet where there is at least 18" clearance at the back and front to allow the doors to open. The rear door is a right-hand door as shipped from the factory. It can be converted to a left-hand door by exchanging the latch handle with the plug cover on the opposite edge and moving the hinge pins to the opposite corners.

(4) Elevation

The cabinet must never be allowed to stand in water. If there is a possibility of water on the floor elevate the cabinet to prevent damage.

b. Mechanical Checks

Check all cable lugs and connectors, fuses and all bolted connections. Be sure that all tubes are firmly in place.

c. External Connections

NOTE

Refer to Chassis Location & External Connections Diagram 63C81004A22 for connection information.

(1) Antenna and Transmission Line

Refer to the instructions included with the antenna for antenna and transmission line installation details.

(2) Ground Connection

Connect a good external ground to terminal 5, bottom row, right-hand rear of the remote control chassis and to the cabinet rack.

(3) Control Line

(a) Two-Wire Control Line

Connect the two-wire 500 ohm control line from the remote control console to terminals 7 & 8 located in the bottom row of terminals on the remote control chassis as viewed from the rear of the cabinet. In the two-receiver remote control chassis, terminals 7 & 8 in the bottom row of the right-hand terminal board as viewed from the rear of the cabinet are the control line terminals. Polarity of the control line must be observed. The control line must be connected so that terminal 8 is positive with respect to terminal 7 when the push-to-talk circuit is energized from the console.

This control line should be shielded, the shield extending from where the line parallels the power and ground leads to within a short distance of the line input terminals. Ground the shield to the transmitter frame. (Terminal 5 right-hand bottom row of the remote control chassis terminal board.)

(b) Four-Wire Control Line

When a four-wire control line is used there are several special considerations to be observed, as follows:

First, some type of audio/d-c line separation device must be used at the associated remote control console. The Motorola Model P-8265 AF/DC Line Kit is used for this application. When this kit is used, connect the 500-ohm line terminals on the associated console to terminals 1 and 2 on the line kit terminal board. Then connect the d-c control line to terminals 3 and 4 and the audio line to terminals 5 and 6 on the line kit. This provides the separation of audio and d-c control functions into separate two-wire lines.

Second, refer to the JUMPER TABLE on the remote control chassis schematic diagram in the REMOTE CONTROL section of this manual for the necessary four-wire remote control jumper connections.

Third, connect the incoming four-wire control line to the remote control chassis so that the audio line goes to terminals 7 & 8, and the d-c line goes to terminals 1 & 2, bottom row, right-hand terminal board. DC control line polarity MUST BE OBSERVED. Check for polarity with the associated console push-to-talk energized. The positive and negative lines must go to terminals 2 and 1 respectively. Note that the console must be free of any EARTH GROUND. The a-f line should be shielded when running close to primary power lines or close to ground leads. The shield extending from the line

should parallel the power and ground leads to within a short distance of the line input terminals. Ground the shield to the transmitter frame. (Terminal 5, right-hand bottom row, of the remote control chassis terminal board.)

(4) Power Connection

NOTE

It is recommended that all other connections to the equipment be completed before connecting the power line to the equipment. Be sure the a-c power switch on the high voltage power supply chassis is turned OFF before connecting the a-c input.

(a) Three-Wire Service

Three, wire, 230-volt service is preferable to the usual 2-wire 117-volt service for a-c input. Where the three-wire service is available it should be used. This will improve the line voltage regulation and distribute the load between the two a-c feeder lines.

Connect the NEUTRAL wire of the three-wire service to the ground stud of the fuse block. Connect the two ungrounded a-c wires to the line terminals of the fuses.

(b) Two-Wire Service

If two-wire service is used, jumper the line terminals of the two fuses with the copper braid jumper fastened to the spare fuse panel. Then connect the NEUTRAL a-c wire to the ground stud of the fuse block. Connect the ungrounded a-c wire to the line side of either one of the two fuse terminals.

4. PRE-OPERATIONAL CHECKS

Check all cable lugs and connections, fuses and all bolted connections. Be sure all tubes are firmly in their sockets and the tube connectors secure. Place the HV POWER ON-OFF switch located on the rear of the high voltage power supply & relay chassis to the OFF position; opening this switch allows only the exciter and receiver(s) to operate. Make sure that the HIGH VOLTAGE POWER SWITCH located near the bottom of the cabinet is also in the OFF position. This switch is accessible from the front door of the cabinet. Connect the a-c power cable to the entrance fuse block or close the automatic circuit breaker if one has been installed. The green indicator lamp will light to indicate power on.

NOTE

When first installing this equipment, allow a thirty minute filament warm-up period before applying plate voltage to the high voltage rectifier tubes (placing HIGH VOLTAGE POWER switch at bottom of cabinet in ON position). This will insure that all the mercury is vaporized in the tube, thereby preventing high voltage flash back. This precaution should also be followed when making an 866-A rectifier tube replacement.

The equipment has been accurately tuned and adjusted at the factory for peak performance and maximum tube life. However, the circuit adjustments may have been disturbed in transit and it is necessary to check the essential circuits of the equipment before placing it in operation. The receiver and exciter must be checked for proper meter readings and the final amplifier must be aligned for optimum performance. The TK577 Meter Panel and the TU415 Meter Switching Panel provide the facilities for checking the required circuits in these units. The procedure is outlined in the following paragraphs.

NOTE

The front door of the equipment is left open for metering purposes. The rear door must be closed.

a. Receiver Metering

(1) Be sure that the metering cables are connected as shown on the intercabling diagram applicable to the equipment.

(2) Use the "R" positions on the rotary switch of the meter switching panel to select the various circuits to be metered.

(3) Check meter readings against the Stage Measurements chart in the RECEIVER section (first six chart entries only). If any stages need retuning, re-align the entire receiver as described in the RECEIVER section.

b. Exciter Metering

(1) Place the HI-LO switch (S1) on the front side of the exciter chassis in the LO position.

(2) Keying of the exciter can be accomplished by any one of the following methods:

(a) Use of the Transmitter ON-OFF switch on the meter panel.

(b) The key-lock switch on the front door will also close the exciter push-to-talk circuit. Turning the key clockwise completes the circuit and activates the exciter. Keep the front door open at this time for access to the meter switching panel (the rear door must be closed during all keying procedures).

NOTE

To insure safety in working with the front door open, the door interlock prevents accidental keying of the exciter from the remote control console.

(c) The exciter may also be keyed by means of a Motorola palm-type microphone connected to the MIC. receptacle on the main power supply chassis.

CAUTION

Do not key the exciter for more than a few seconds at a time before checking meter readings. The plate current may be excessive and cause damage to the tubes and other components.

(3) Use the "T" positions on the rotary switch on the meter switching panel to select the various transmitter circuits to be metered.

(4) Check meter readings against the metering chart, in the TRANSMITTER section. Proper procedure is as follows: set the switch to position 3, observe the meter, key the transmitter for a few seconds while reading the meter, re-set the switch to position 4, and so forth, until all positions are checked. The meter readings in the chart are minimum values (except PA) and may vary somewhat among units. Meter readings can be checked in any order. If the readings in position 4, 5 or 6 are below the minimum values re-align the exciter following the procedure described in the TRANSMITTER section. The PA position value is not significant at this point. This value must be properly set when the exciter is coupled into the final r-f amplifier. The procedure is fully covered in the FINAL RF AMPLIFIER section.

(5) Be sure that the exciter is de-activated after determining that the meter readings are satisfactory.

(6) FCC regulations require a frequency and deviation check before a transmitter is placed in service. A Motorola T1130A Series FM Station Monitor can be used to make these checks. See the instructions supplied with the monitor and the

exciter section of this manual for further information.

c. Final Amplifier Metering

To obtain proper operation of the final amplifier, follow the detailed alignment procedure outlined in the FINAL AMPLIFIER section.

5. PRE-OPERATIONAL SYSTEM ADJUSTMENTS

a. Single-Receiver Model Receiver Volume & Squelch Adjustments

(1) Squelch Adjustments

Place the SPEAKER switch on the meter switching panel in the "up" (SPEAKER ON) position. Turn the VOLUME control on the receiver chassis fully clockwise. With no signal being received, turn the SQUELCH control (on remote control chassis) from the full counterclockwise position (open squelch), slowly in the clockwise direction until the speaker is just quiet (noise squelched). Do not advance the control beyond the point of just squelching the noise as it will increase the minimum signal required to open the squelch circuit.

(2) Volume Adjustment

For all remotely controlled models, connect a db meter for a-c voltmeter across terminals 7 & 8 in the bottom row of the terminal board of the remote control chassis. Adjust the VOLUME control on the receiver to obtain a zero db or a reading of 1.73 volts on the a-c voltmeter with a signal being received.

b. Two-Receiver Models Receiver Volume and Squelch Adjustments

(1) Squelch Adjustments

Make the adjustment for the #1 receiver, as outlined for the single-receiver model, with the VOLUME control of the #2 receiver in the maximum counterclockwise (off) position. Similarly adjust the #2 receiver squelch with the #1 receiver VOLUME control in the maximum counterclockwise (off) position.

(2) Volume Adjustments

Make the adjustment for the #1 receiver as outlined for the single-receiver models with the VOLUME control of the #2 receiver turned completely counterclockwise (off).

Mark the setting of the VOLUME control of the adjusted receiver and return it to full counterclockwise (off) position. Similarly adjust the VOLUME control of the #2 receiver.

Reset the VOLUME control of the #1 receiver to the predetermined position.

c. Control Line Level Adjustment

The LINE INPUT LEVEL control on the remote control chassis controls the input from the remote control console to the transmitter. Refer to the REMOTE CONTROL CHASSIS section of this manual for setting the LINE INPUT control.

6. OPERATING PROCEDURE

The base stations are remotely controlled over a 2 or 4-wire control line from the remote control console. Complete operating instructions are included in the remote control console instruction manual.

a. Local Test Control

(1) Microphone

A microphone can be connected to the MIC receptacle on the transmitter power supply chassis to turn on and modulate the transmitter. If the unit is a two-frequency transmitter, the unit will operate only on channel #1. Local multi-channel selection is available on special order only.

(2) Meter Switching Panel

The XMTR ON-OFF switch on the meter switching panel can also be used to turn on the exciter or final amplifier (the rear cabinet door must be closed).

b. Local Control Operation

Local control is accomplished by connecting a Motorola microphone to the MIC receptacle on

the exciter power supply chassis. When operating locally, be sure to turn on the local speaker switch on the meter switching panel. If the unit is a two channel transmitter, the local microphone will operate on channel #1 only. Local multi-channel selection is available only on special order.

Combined extended local and remote operation is possible with limitations. Neither operator can hear the other modulate the carrier. The remote operator has no visual indication when the local operator is on the air. Operating levels depend upon line lengths. For these reasons combined operation is not recommended without first consulting the Motorola Systems Engineering Dept.

c. Emergency Low Power Operation

In the event of a failure in the final amplifier or high voltage power supply, this equipment may be operated with an r-f power output of 30 watts. Refer to the alignment procedures in the TRANSMITTER/EXCITER Section of this manual.

7. LUBRICATION INSTRUCTIONS

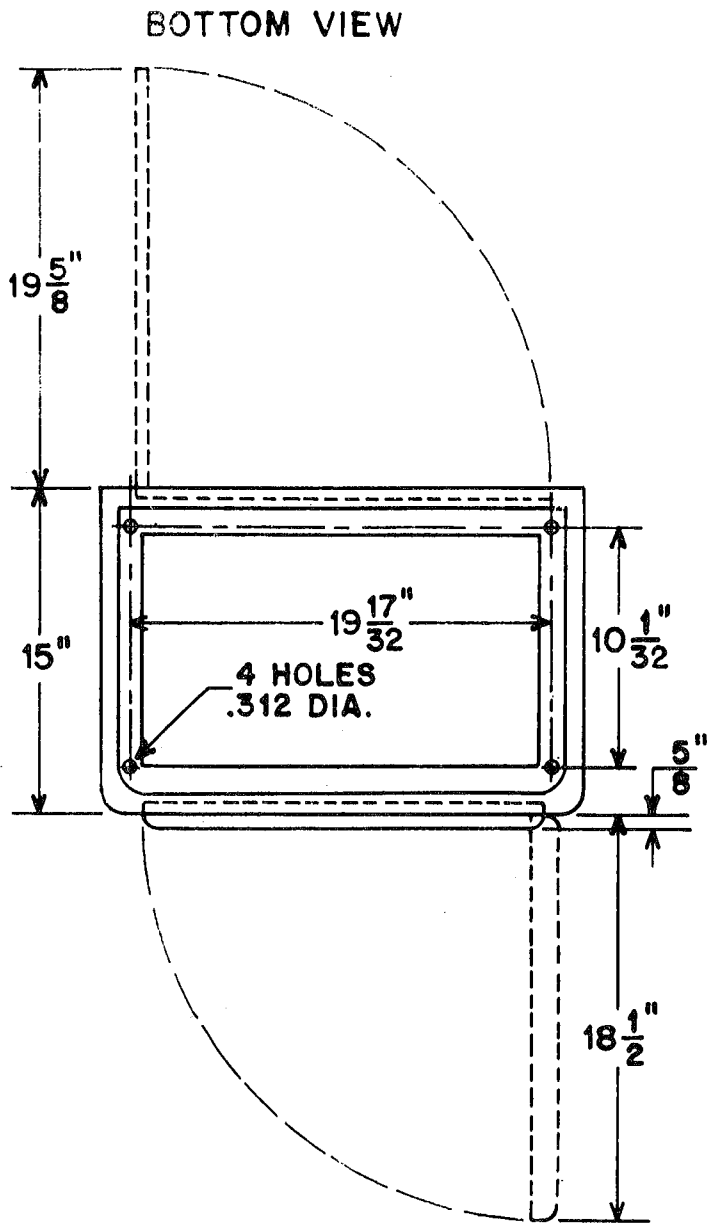
The final amplifier blower, B-2, part of the K-8451-C Shock Mounted Blower Kit, as shipped is packed with grease sufficient for a period of one to two years service depending upon use and ambient temperature. When refilling, clean out old grease before re-lubrication. If bearings are removed for washing in gasoline, replace so that the built-in grease seal is facing toward the motor interior. Use the applicable lubricant listed below:

For standard and high temperature range
(0°C ambient to 100°C total)

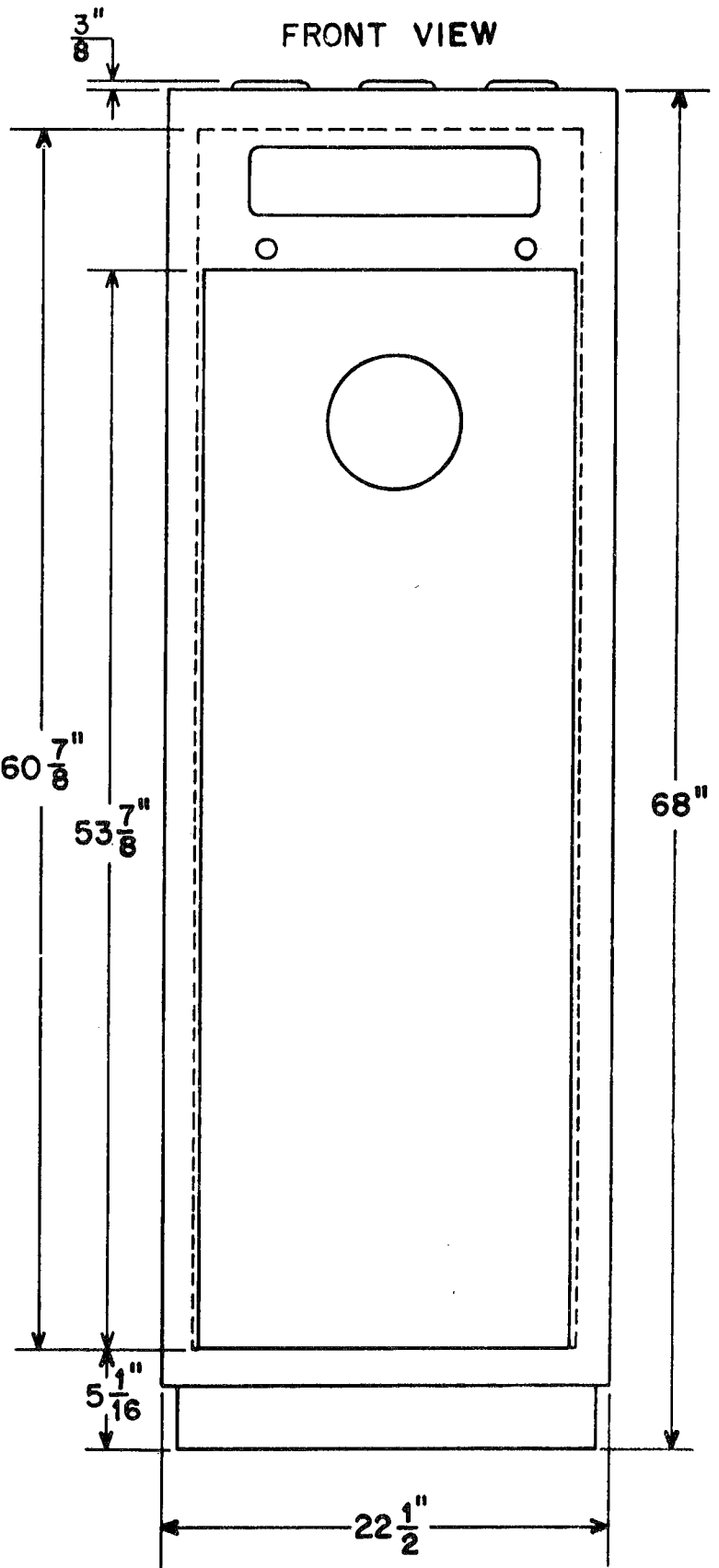
Use ANDOK C (Penola Co.) or BRB #4
(Socony Oil)

For low and wide temperature range
(-55°C ambient to 100°C total)

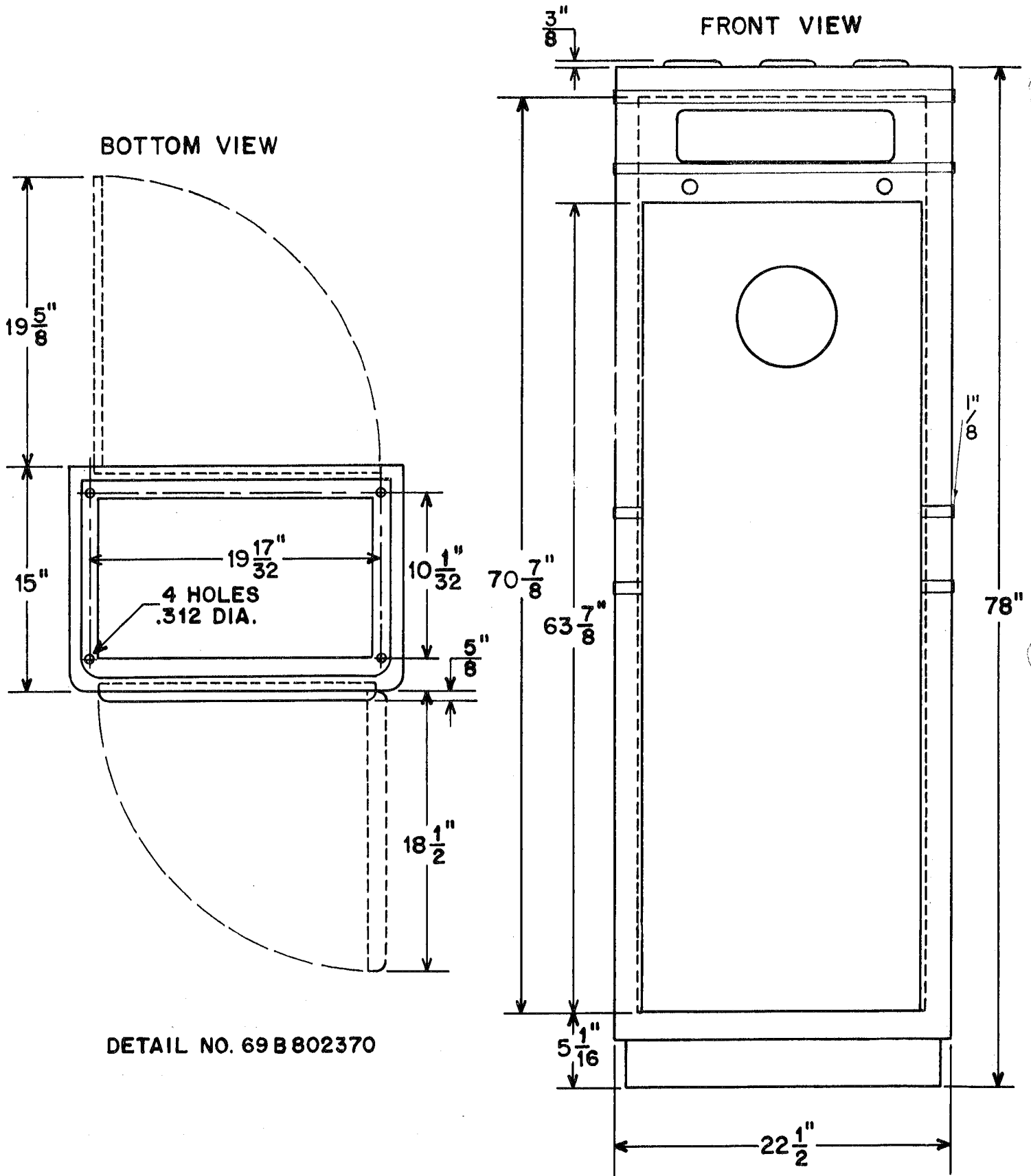
Use Beacon 325 (Penola Co. or Std. Oil
of N. J.)



DETAIL NO.69B802279



68P81009A47-0



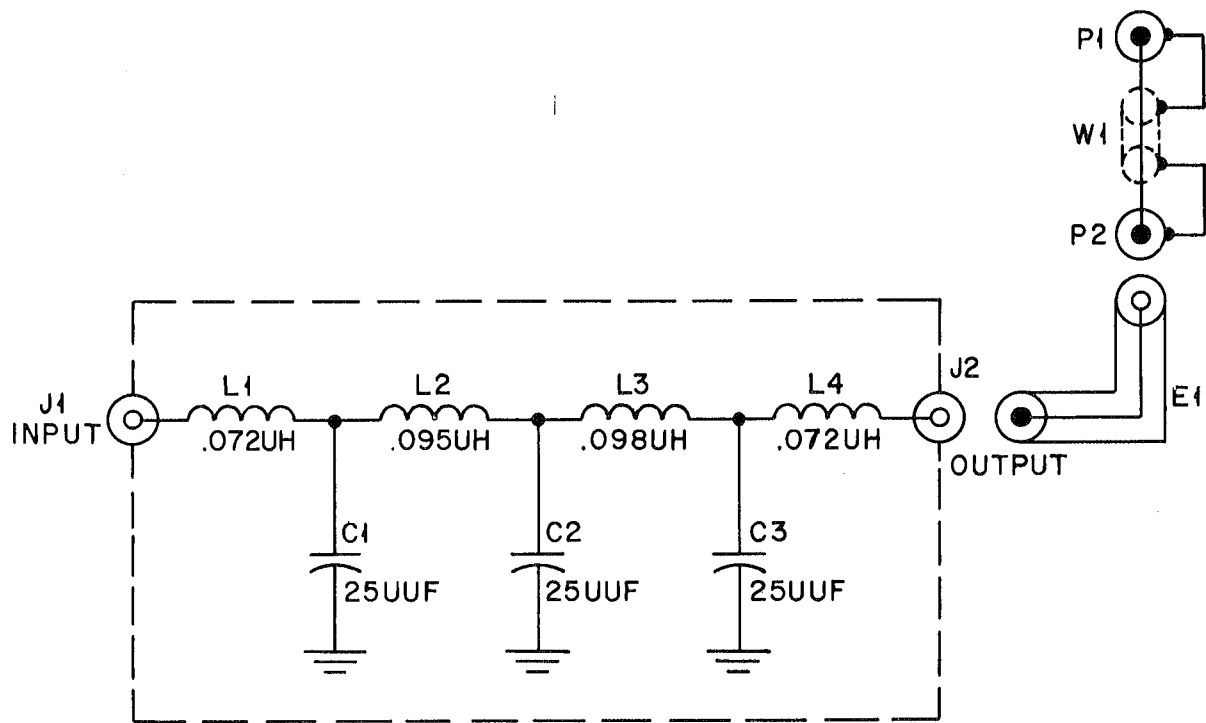


DIAGRAM NO. 63B812073

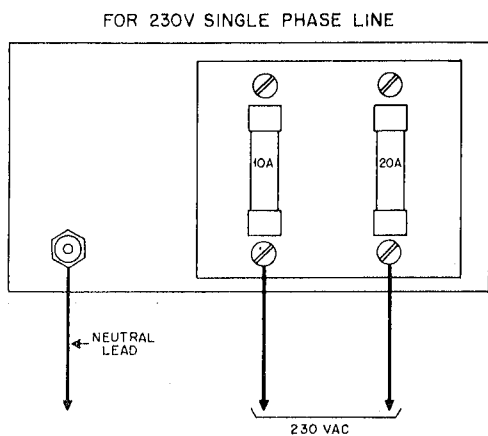
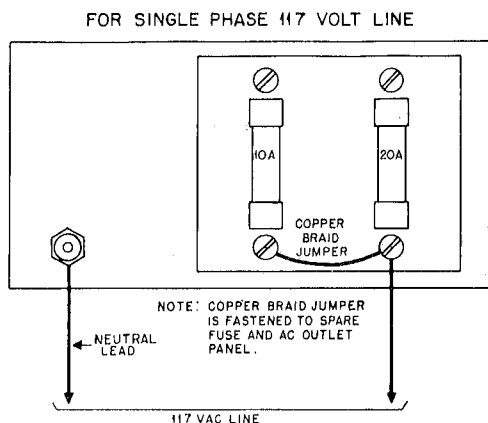
SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63B812073-A

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	21B812544	<u>CAPACITOR,</u> fixed; ceramic; 25 mmf $\pm 10\%$; 7500 vdcw; double cup; axial screw terminals
C2		same as C1
C3		same as C1
E1	28A48250	<u>ADAPTER,</u> connector; 90° angle; single male and female contact
J1	9A85615	<u>CONNECTOR,</u> receptacle: female; single contact mica filled bakelite insulator;
J2		OUTPUT same as J1 except INPUT

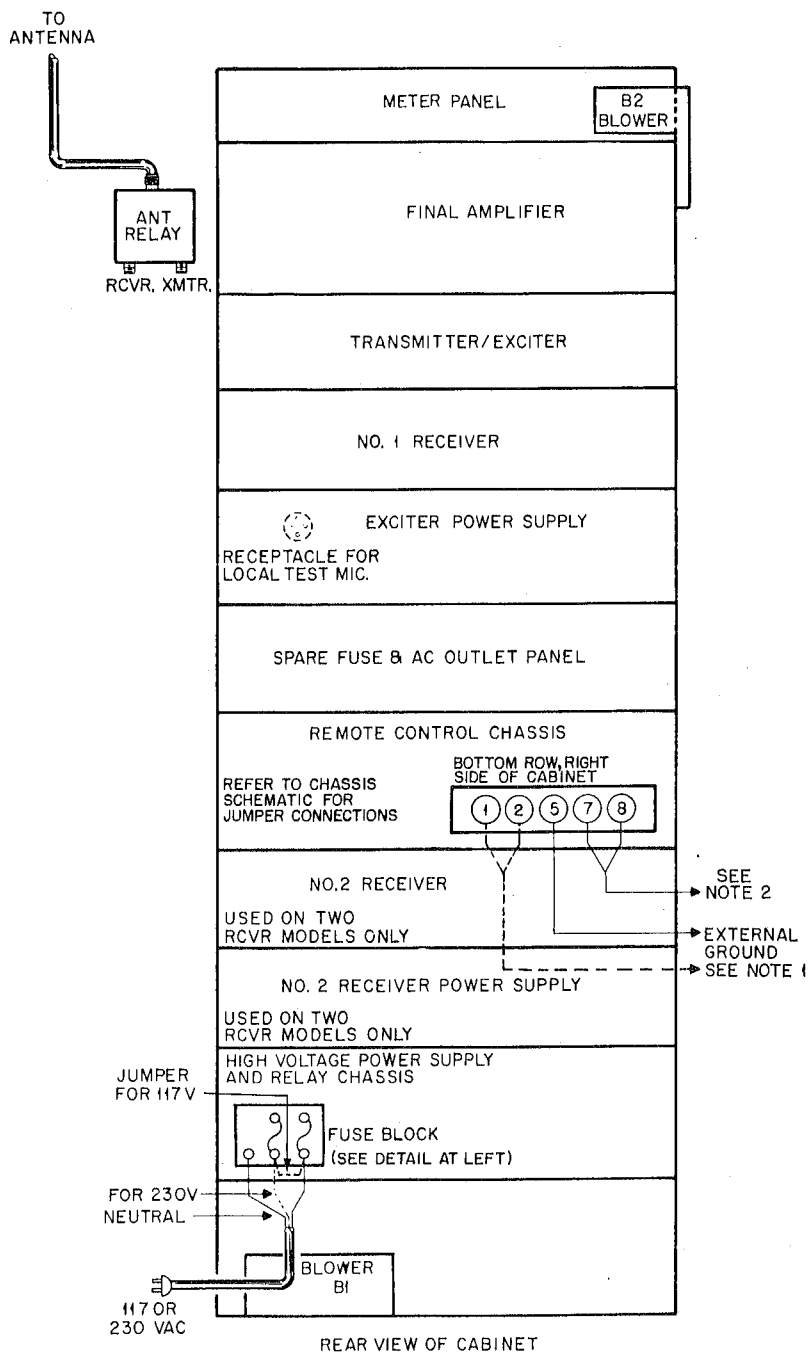
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
L1	24A812555	<u>COIL,</u> RF: harmonic filter; .072 micro- henries; 1 turn; 7/16" I. D.
L2	24A812553	
L3	24A812554	
L4		
P1	28A42310	<u>CONNECTOR,</u> plug: male; single contact; round; mica filled bakelite insulator, to ANTENNA CHANGEOVER RELAY TRANSMITTER CON- NECTOR, p/o W1
P2		
W1	1K86106	<u>LINE,</u> RF, transmission: coaxial; inter- connector; final amplifier to filter; includes: 30B82345 CABLE, RF: coaxial; RG-8/U; 12" long required Reference Parts P1 and P2

68981009A#7-0



- NOTE:
1. FOR 4-WIRE CONTROL, AUDIO CONNECTS TO 7 & 8 (BR) AND DC CONNECTS TO 1 & 2 (TERMINAL 2 IS POSITIVE IN RESPECT TO 1).
 2. TWO-WIRE CONTROL LINE CONNECTS TO TERMINALS 7 & 8. TERMINAL 8 IS POSITIVE WITH RESPECT TO TERMINAL 7.

DIAGRAM NO.63C81004A22



REFER TO INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS



PARTS LIST for Inter-cabling Diagram 63E81004A23-O

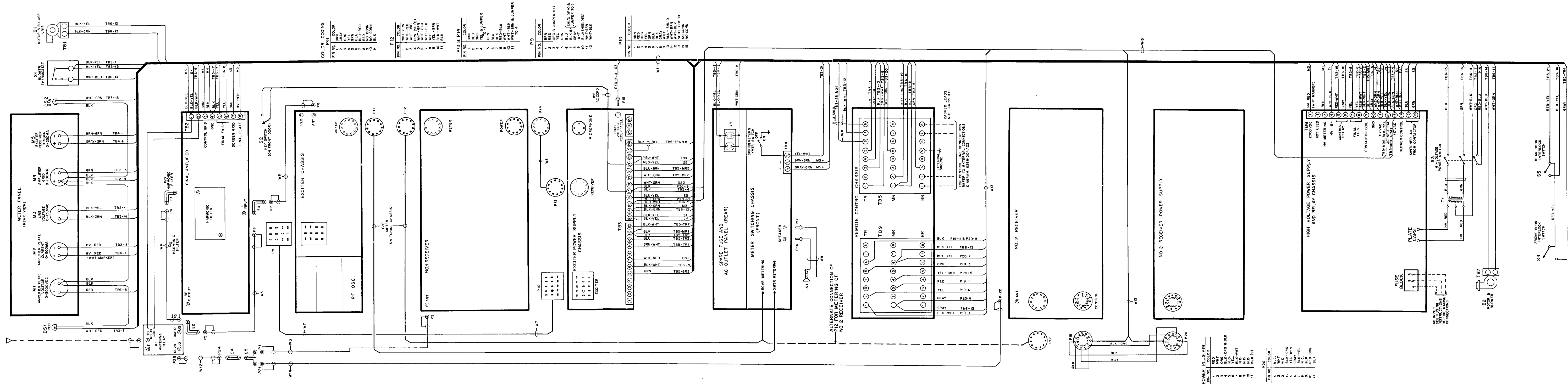
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
B1	1V821316	<u>MOTOR, AC:</u> assembly; consists of: 1V86765 MOTOR and LUGS ASSY. includes: 59B84636 MOTOR, AC: 115 v; 60 cycles; 3350 R. P. M.; 1/40 HP 29R5241 LUG, term.; 2 req'd. assembly; consists of: 59C850286 MOTOR, AC: 115 v; 60 cycles; 3350 R. P. M.; 1/40 HP 8C861633 CAPACITOR, fixed: 4 uf #20%; 330 v 42K861634 CLAMP, capacitor mounting: 2 req'd. 29B847854 LUG, slotted: for .166-.176 stud; 2 req'd. 29A859118 LUG, term.; 2 req'd. 14A859051 INSULATOR, lug: 2 req'd. 117 v; 1550 R. P. M.; 1/25-HP; 110 w; blower; 200 CFM; p/o TK599 H. V. Transformer and Blower Kit
DS1	65R12855	<u>LAMP, incandescent:</u> 6-8 v; .4 amp.; 3 watt; min. bay. base
DS2		same as DS1
E1	28A48250	<u>ADAPTOR, connector:</u> p/o Harmonic Filter right angle; whf type same as E2
E2		
E3		
E3		
J1	9A891865	<u>CONNECTOR, recept.</u> p/o K1
J2		p/o K1
J3		p/o K1
J4		female; dual a-c outlet
K1	80C851713	<u>RELAY, armature:</u> antenna; coaxial; cont. arrange- ment; 1 form "C"
LS1	50B475501	<u>SPEAKER, magnetic:</u> voice coil 3.2 ohms; 2 w; 4-1/2" dia.
M1	52B51429	<u>METER,</u> volt: 0-3000 v d-c
M2	52B50691	milliammeter: 0-500 ma.
M3	52B891586	volt: 0-150 v a-c
M4	52B80181	milliammeter: 0-100 ma.
M5	52B892096	dual scale: 0-250 ma.; 0-50 ua.
P1	28A42310	<u>CONNECTOR, plug:</u> male; single cont.; does not incl. 58K854020 ADAPTOR, con- nector; adaptor must be ordered separately
P2	28A474006	male; single cont.
P3		p/o Harmonic Filter
P4		p/o Harmonic Filter
P5		same as P1
P6	9A880725	same as P1
P7		same as P1
P8		same as P1
P9		female; 12 cont.
P10	28B891298	male; 15 cont.
P11		p/o Meter Switching Chassis
P12		p/o Meter Switching Chassis

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
P13	28B813576	<u>CONNECTOR,</u> (cont'd) male; 11 cont.; does not incl. 15K865294 SHELL, connector; shell must be ordered separately
P14	9B86864	female; 11 cont. does not incl. 15K865294 SHELL, connector; shell must be ordered separately
P15	29K5404	male; single cont.; coded RED
P16	29K5405	male; single cont.; coded BLK
P17	29K5407	male; single cont.; coded WHT
S1	80B850042	<u>SWITCH,</u> thermostatic; cont.; arrangement, 1 form "A"; close at 100°F; does not include 15A850038 COVER, thermostat; cover must be ordered separately
S2	40A86741	key lock: spst; incl. (2) 46K86743 KEYS
S3	40B800919	toggle: 3pst; H. V. POWER
S4	40A80237	interlock: spst; front door same as S4; except rear door
S5		
T1	25C821429	<u>TRANSFORMER, power:</u> c/o; primary: term. #1 and #2; 117 v, 60 cycle secondary: term. #3 and #5 tapped at term. #4; 2100 v d-c at 350 ma.
TB1	31K100799	<u>BOARD, terminal:</u> 2 screw term.
TB2		p/o FINAL AMPL.
TB3		p/o EXCITER POWER SUPPLY CHASSIS
TB4		p/o METER SWITCHING CHASSIS
TB5	31A50378	p/o REMOTE CONTROL CHASSIS
TB6		p/o H. V. POWER SUPPLY CHASSIS
TB7		2 screw term.
W1	1V80709A48	<u>CABLE ASSY., special purpose:</u> includes miscellaneous leads and ref. parts DS1, DS2, P15, S3, S4, S5, XDS1 and XDS2
W2	1V834752	includes: 30A76858 CABLE, 2-cond.; #18 ga. str. ins.; 92" length req'd. Ref. part S2
W3	1K891935	<u>LINE, RF transmission:</u> Receiver to Ant. Relay; includes: 30B475378 CABLE, RF; coaxial; RG-58A/U; 10" length req'd. Ref. parts P1 P2 and 58K854020 ADAPTOR, connector p/o Harmonic Filter
W4	1K86106	Amplifier to Harmonic Filter; includes: 30B82345 CABLE, RF; coaxial; RG-6/U; 1 ft. length req'd. Ref. parts P5, P6
W5		Exciter to Amplifier; includes: 30B475378 CABLE, RF; coaxial; RG-58A/U; 20" length req'd. Ref. parts P7, P8
W6	1K834751	
W7	1V863585	<u>CABLE ASSY., special purpose:</u> Power Supply to Exciter; incl. misc. leads and ref. parts P9, P10

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W8	1V852025	<u>CABLE ASSY.,</u> (cont'd) Power Supply to Receiver; incl. misc. leads and ref. parts P13, P14
W9	30A76858 or 30K77108	2-conductor; #18 ga. str. rubber insulated; web type; 5 ft. length req'd.
XDS1	60B82631B01	<u>LAMPHOLDER:</u> single cont.; min. bay. base; insulated mounting bracket same as XDS1
XDS2		
NON-REFERENCED ITEMS		
	P-8459 Spare Fuse and AC Outlet Panel	
	15B891864 15A891866	BOX, conduit COVER, conduit box
		<u>Spare Fuses Supplied</u>
	65K52482 65K80185 65R42092 65K892099 65K834464 65K475395 65K834466	<u>FUSE, cartridge:</u> paper; 20 amp.; 250 v; 2 supplied paper; 10 amp.; 250 v 2 amp.; 250 v slow-blow type; 3/4 amp.; 125 v slow-blow type; 4 amp.; 125 v slow-blow type; 1/2 amp.; 125 v slow-blow type; 1.25 amp.; 125 v
	TK590 Indoor Cabinet Kit (68")	
	60B80139 60K80140 64B11058 13K891855 15C892157	LENS, indicator: RED LENS, indicator: GREEN SCREEN, speaker BEZEL, speaker COVER, speaker
	TK597 Cabinet Accessory Kit	
	61C891432 64C50430 1V834419	GLASS, meter panel SCREEN, air filter KNOB and TUNING ROD ASSY. 2 supplied

68P81009A47-0

REFER TO INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS



PARTS LIST for Interconnecting Diagram 63E81004A24-A

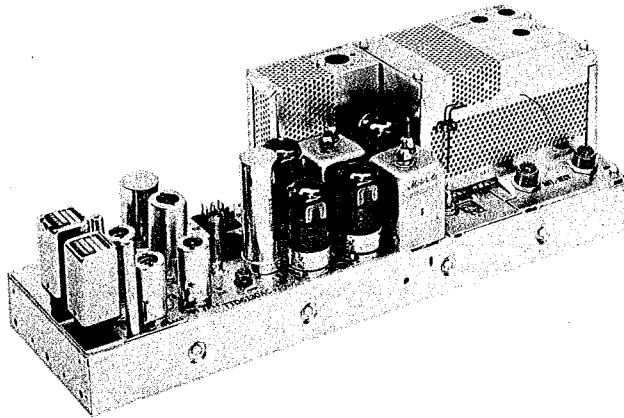
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
B1	1V821316	<u>MOTOR, AC:</u> assembly: consists of: 1V86765 MOTOR and LUGS ASSY. includes: 59B84636 MOTOR, AC: 115 v; 60 cycles; 3350 R.P.M.; 1/40 H.P. 29R5241 LUG, term.; 2 req'd
or1V852178		assembly: consists of: 59C850286 MOTOR, AC: 115 v; 60 cycles 3350 R.P.M.; 1/40 H.P. 8C861633 CAPACITOR, fixed: 4 uf ±20%; 330 v 42K861634 CLAMP, capacitor mounting: 2 req'd 29B847854 LUG, slotted: for .166-.176 stud; 2 req'd 29A859118 LUG, term.; 2 req'd 14A859051 INSULATOR, lug: 2 req'd
B2	59C51448	117 v; 1550 R.P.M.; 1/25 H.P.; 110 w; blower; 200 CFM; p/o TK599 H.V. Transformer and Blower Kit
DS1	65R12855	<u>LAMP, incandescent:</u> 6-8 v; .4 amp; 3 watt; min. bay. base
DS2		same as DS1
E1		<u>ADAPTOR, connector:</u> p/o Harmonic Filter
E2	28A48250	right angle; uhf type
E3		same as E2
E4	58A109152	feed-thru
E5	9A86150	"T" type; one male and two female contacts
J1		<u>CONNECTOR, recept.</u>
J2		p/o K1
J3		p/o K1
J4	9A891865	p/o K1 female; dual a-c outlet
K1	80C851713	<u>RELAY, armature:</u> antenna; coaxial; cont. arrange- ment, 1 form "C"
LS1	50B475501	<u>SPEAKER, magnetic:</u> voice coil 3.2 ohms; 2 w; 4-1/2" dia.
M1	52B51429	<u>METER,</u> volt: 0-3000 v d-c
M2	52B50691	milliammeter: 0-500 ma.
M3	52B891586	volt: 0-150 v a-c
M4	52B80181	milliammeter: 0-100 ma.
M5	52B892096	dual scale: 0-250 ma.; 0-50 ua
P1	28A42310	<u>CONNECTOR, plug:</u> male; single cont.; does not incl. 58K854020 ADAPTOR, connector; adaptor must be ordered separately
P2	28A474006	male; single cont.
P3		p/o Harmonic Filter
P4		p/o Harmonic Filter
P5		same as P1
P6		same as P1
P7		same as P1
P8		same as P1
P9	9A880725	female; 12 cont.
P10	28B891298	male; 15 cont.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
P11		<u>CONNECTOR, (cont'd)</u>
P12		p/o Meter Switching Chassis
P13	28B813576	p/o Meter Switching Chassis male; 11 cont.; does not incl. 15K865294 SHELL, connector; shell must be ordered separately
P14	9B86864	female; 11 cont.; does not incl. 15K865294 SHELL, connector; shell must be ordered separately
P15	29K5404	male; single cont.; coded RED
P16	29K5405	male; single cont.; coded BLK
P17	29K5407	male; single cont.; coded WHT
P18		NOT USED
P19		same as P14
P20		same as P14
P21		same as P1
P22		same as P2
P23		same as P1
P24		same as P1
S1	80B850042	<u>SWITCH,</u> thermostatic; cont. arrangement, 1 form "A"; close at 100°F; does not include 15A850038 COVER, thermostat; cover must be ordered separately
S2	40A86741	key lock: spst; incl (2)
S3	40B800919	46K86743 KEYS
S4	40A80237	toggle: 3pst; H.V. POWER interlock: spst; front door
S5		same as S4; except rear door
T1	25C821429	<u>TRANSFORMER, power:</u> c/o; primary: term. #1 and #2; 117 v, 60 cycle secondary: term. #3 and #5 tapped at term. #4; 2100 v d-c at 350 ma.
TB1	31K100799	<u>BOARD, terminal:</u> 2 screw term.
TB2		p/o FINAL AMPL.
TB3		p/o EXCITER POWER SUPPLY CHASSIS
TB4		p/o METER SWITCHING CHASSIS
TB5		p/o REMOTE CONTROL CHASSIS
TB6		p/o H.V. POWER SUPPLY CHASSIS
TB7	31A50378	2 screw term.
TB8		NOT USED
TB9		p/o REMOTE CONTROL CHASSIS
W1	1V80709A49	<u>CABLE ASSY., special purpose:</u> includes miscellaneous leads and ref. parts DS1, DS2, P15, S3, S4, S5, XDS1 and XDS2
W2	1V834752	includes: 30A76858 CABLE, 2-cond.; #18 ga. str. ins.; 92" length req'd Ref. part S2
W3	1K821983	<u>LINE, RF transmission:</u> Receiver #1 to Ant. Relay; includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 40" length req'd Ref. parts P1, P2 and 58K854020 ADAPTOR, connector p/o Harmonic Filter
W4		p/o Harmonic Filter

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
W5	1K86106	<u>LINE, RF (cont'd)</u> Amplifier to Harmonic Filter; includes: 30B82345 CABLE, RF: coaxial; RG-8/U; 1 ft. length req'd Ref. parts P5, P6
W6	1K834751	Exciter to Amplifier; includes; 30B475378 CABLE, RF: coaxial; RG-58A/U; 20" length req'd Ref. parts P7, P8
W7	1V863585	<u>CABLE ASSY., special purpose:</u> Power Supply to Exciter; incl. misc. leads and ref. parts P9, P10
W8	1V852025	Power Supply to Receiver; incl. misc. leads and ref. parts P13, P14
W9	30A76858 or30K77108	2-conductor; #18 ga. str. rubber insulated; web type; 5 ft. length req'd
W10		NOT USED
W11		NOT USED
W12		<u>LINE, RF transmission:</u> same as W6 except connects Receivers #1 and #2 to Ant. Relay; includes ref. part P23, P24
W13	1V854202	Receiver #2 to Receiver #2 Power Supply; incl. misc. leads and ref. parts P19, P20
W14		same as W3 except connects Receiver #2 to Ant. Relay; includes ref. parts P21, P22
XDS1	60B82631B01	<u>LAMPHOLDER:</u> single cont.; min. bay. base; insulated mounting bracket same as XDS1
XDS2		
NON-REFERENCED ITEMS		
	P-8459 Spare Fuse and AC Outlet Panel	
	15B891864	BOX, conduit
	15A891866	COVER, conduit box
		Spare Fuses Supplied
	65K52482	FUSE, cartridge:
	65K80185	paper; 20 amp.; 250 v; 2 supplied
	65R42092	paper; 10 amp.; 250 v
	65K892099	2 amp.; 250 v
	65K834464	slow-blow type; 3/4 amp.; 125 v
	65K475395	slow-blow type; 4 amp.; 125 v
	65K834466	slow-blow type; 1/2 amp.; 125 v
	65K834466	slow-blow type; 1.25 amp.; 125 v
	TK591 Indoor Cabinet Kit (78")	
	60B80139	LENS, indicator: RED
	60K80140	LENS, indicator: GREEN
	64B11058	SCREEN, speaker
	13K891855	BEZEL, speaker
	15C892157	COVER, speaker
	TK598 Cabinet Accessory Kit	
	61C891432	GLASS, meter panel
	64C50430	SCREEN, air filter
	1V834419	KNOB and TUNING ROD ASSY. 2 supplied

TRANSMITTER/EXCITER

MC7109



MODEL TTD1340AB

MODEL CHART

MODEL DESIGNATION	NO. OF FREQ.	FREQ. RANGE
TTD1350AA	1	132-151 mc
TTD1340AA	1	144-174 mc
TTD1340AB	2	144-174 mc

1. DESCRIPTION

The transmitters listed in the model chart are FM transmitters operating on crystal-controlled frequencies within the 132-174 mc band. A separate power supply provides the transmitter operating voltages.

The transmitter is used as an "exciter" in 250-watt base station applications.

The 1-frequency transmitter consists of a crystal-controlled oscillator, an angular phase modulator, four stages of frequency multiplication and a final amplifier stage. The fundamental crystal frequency is multiplied 24 times to provide the final r-f amplifier output frequency.

The 2-frequency transmitter is the same as the 1-frequency model except that a second crystal oscillator, with control crystal, is used. Transmissions are made on 2 specific crystal-controlled frequencies. Only 1 frequency can be transmitted at a time. An external switch is used to select frequencies by grounding the cathode of the desired oscillator.

A 2-frequency transmitter may be operated on frequencies which are separated by approximately 300 kc, without substantial degradation of the 1-frequency performance specifications. All tuned circuits following the oscillators, are normally aligned to the higher, or preferably to the more often used of the 2 carrier frequencies.

2. CONTROL CRYSTAL REQUIREMENTS

Control crystals, as listed in the MODEL CHART, in the front of the manual, are required for use with these transmitters and should be ordered separately. See the FOREWORD of the manual for ordering information.

3. CIRCUIT OPERATION

Stage-by-stage signal flow and operating frequencies are shown on the block diagram. Refer to this diagram and Schematic Diagrams 63E81009A04 and 63E81009A43, to trace the following circuit operation:

a. Audio Input and Amplifier Stage

The audio signals are fed through a coupling capacitor into the first stage of the audio amplifier. The signals then pass through the "Instantaneous Deviation Control" (IDC) circuit and are used to modulate the transmitter.



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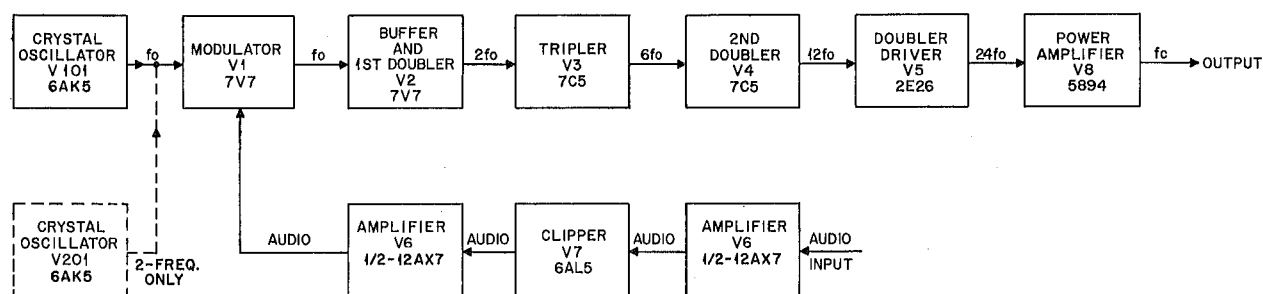
COMMUNICATIONS DIVISION

Chicago 51, Illinois

GUARANTEED PERFORMANCE SPECIFICATIONS

BASIC UNIT		TTD1350AA	TTD1340 Series	
FREQUENCY		132-151 mc	144-174 mc	
POWER APPLICATIONS		50-Watt Base	60-Watt Base	250-Watt Exciter
RF POWER OUTPUT		50 Watts	60 Watts	30 Watts
VOLTAGE REQUIREMENTS	B++ (PA PLATE)	550 v d-c at 280 ma	620 v d-c at 290 ma	420 v d-c at 200 ma
	B+	250 v d-c at 90 ma	250 v d-c at 80 ma	250 v d-c at 80 ma
CRYSTAL MULTIPLICATION		Twenty-four (24) times		
SPURIOUS AND HARMONIC EMISSION		All spurious emissions are attenuated more than 70 db below carrier level. All harmonic emissions are attenuated more than 60 db below carrier level.		
FREQUENCY STABILITY AND TEMPERATURE RANGE		Oven type crystal unit maintains carrier within $\pm .0005\%$ of assigned center frequency from -30°C to $+60^{\circ}\text{C}$ ($+25^{\circ}\text{C}$ reference).		
MODULATION		20F3: ± 5 kc deviation for 100% at 1000 cps		
AUDIO INPUT LEVEL		factory connection: 0.25 volt ± 3 db for 100% modulation at 1000 cps (approximately -17 db) optional connections: 0.18 volt ± 3 db for 100% modulation at 1000 cps (approximately -20 db)		
DIMENSIONS		16-1/2" long x 4-7/8" wide x 5-1/2" high		
WEIGHT		Approx. 6 lbs.		

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



LEGEND

f_o = OSCILLATOR FREQUENCY
 f_c = CARRIER FREQUENCY
 $f_o = \frac{f_c}{24}$
 $f_o = 24 f_o = 132 \text{ TO } 174 \text{ MEGACYCLES}$
 $f_o = 5500 \text{ TO } 7250 \text{ KILOCYCLES}$

DIAGRAM NO. 69C81009A03

BLOCK DIAGRAM

The microphone connects between ground and the shielded lead of the audio amplifier input circuit. A filtered source of approximately 4 v d-c provides operating power for the transistorized (or carbon) microphone. The microphone cartridge and pre-amplifier act like a variable voltage generator. The output voltage varies with the intensity and frequency of the sound waves which strike the diaphragm. Reasonably loud sounds produce an output of 0.25 v a-c, which provides full deviation of the r-f carrier. If increased sensitivity is desired, a tap can be changed to provide full deviation of the transmitter with a 0.18 v a-c audio signal. (See schematic diagram 63E81009A04)

b. Audio-IDC Circuit

Audio is applied to the clipper tube where the peaks are clipped; then the audio is connected to the IDC ("Instantaneous Deviation Control") circuit. This circuit limits the slope (steepness) of the audio signals which pass through it, as illustrated in Figure 1. The IDC control sets the amplitude of the signals thereby limiting the maximum wavefront slope of the signals applied to the modulator (see Figure 2). This controls transmitter deviation, since the modulator frequency shift is proportional to the slope of the audio input waveform.

The audio signal then flows through a modulation filter circuit to the modulator.

c. Modulator Stage to Power Output Stage

The modulator output frequency is doubled, tripled, then doubled two more times in succeeding stages and connected to the input of the power amplifier stage. The power amplifier output connects through a harmonic filter to the antenna relay.

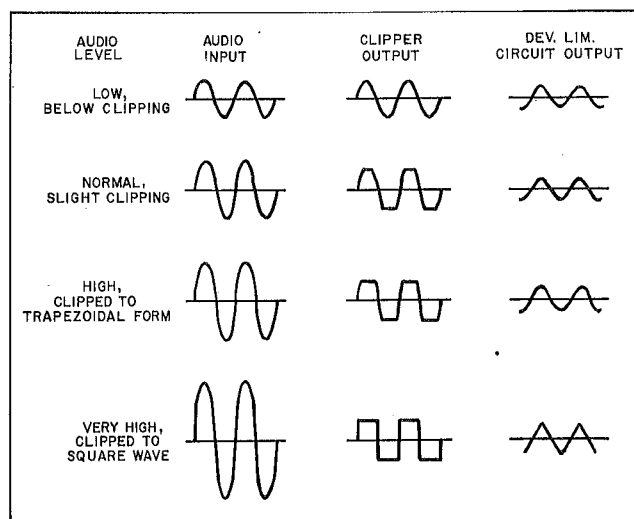


Figure 1.
Deviation Limiting Circuit Waveforms

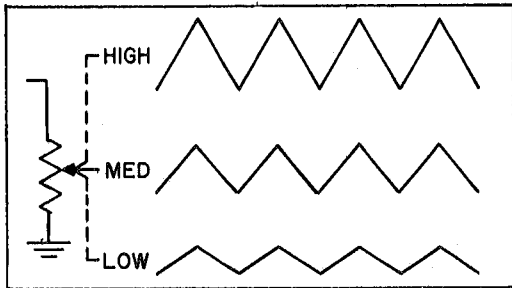


Figure 2.
How IDC Control Sets Slope
of Clipped Waveform

4. ADJUSTMENT OF THE "IDC" CONTROL

Refer to the reverse side of the transmitter alignment chart for IDC Control setting.

5. ALIGNMENT PROCEDURE

The transmitter is tuned and adjusted for its exact operating frequency prior to shipment from the factory. Other than to align the final r-f stage to the antenna, further adjustment should not be required before placing the unit in operation. A complete alignment procedure, using a Motorola test set, is provided in this section and should be used if further adjustments are required.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. For stages V2 through V5 the meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. For stage V8, connect the meter between J1, pin 8 and J1, pin 7.

EPD-713

PRE - ALIGNMENT NOTES

A. EXCERPTS FROM FCC REGULATIONS

FCC regulations state that:

- Radio transmitters may be tuned or adjusted only by persons holding a First or Second Class Radiotelephone License or by personnel working under their immediate supervision.
- The r-f power output of a transmitter shall be no more than that required for satisfactory technical operation when considering the area to be covered and local conditions.

B. TEST EQUIPMENT REQUIRED

- Motorola TU546 Series Portable Test Set or equivalent.
- Motorola T1130A Series FM Station Monitor or equivalent (for oscillator alignment).

NOTE

A special FM Station Monitor must be used for applications in the 132-151 mc range. This equipment is available on special order only. Contact your Motorola representative for further details.

- RF wattmeter or dummy antenna.
- Power supply (preferably the one designed for the transmitter).
- Motorola K-9322 Alignment Tool Kit and an insulated dial screwdriver.

C. HOW TO SET UP THE TU546 SERIES TEST SET

- Connect the 20-pin receptacle end of the metering cable to the test set and the 11-pin plug end to the transmitter METER receptacle.

NOTE

The 20-pin metering cable plug acts as the internal battery ON-OFF switch. Pins 19 and 20 on the plug are jumpered. Connecting the plug to the test set socket completes the battery circuit. To conserve battery life when not using the test set either (1) disconnect meter cable from test set, (2) set the Oscillator and Meter Reversing Switch to OFF and put Position Selector Switch to any position except 11 or 13.

- Place the RCVR-XMTR-ACCESS. switch in the XMTR position.

D. HOW TO KEY THE TRANSMITTER

- Use the XMTR-ON switch of the test set to place the unmodulated carrier on the air for meter reading and adjustment.
- Use a microphone to key the transmitter and modulate the carrier as required.

CAUTION

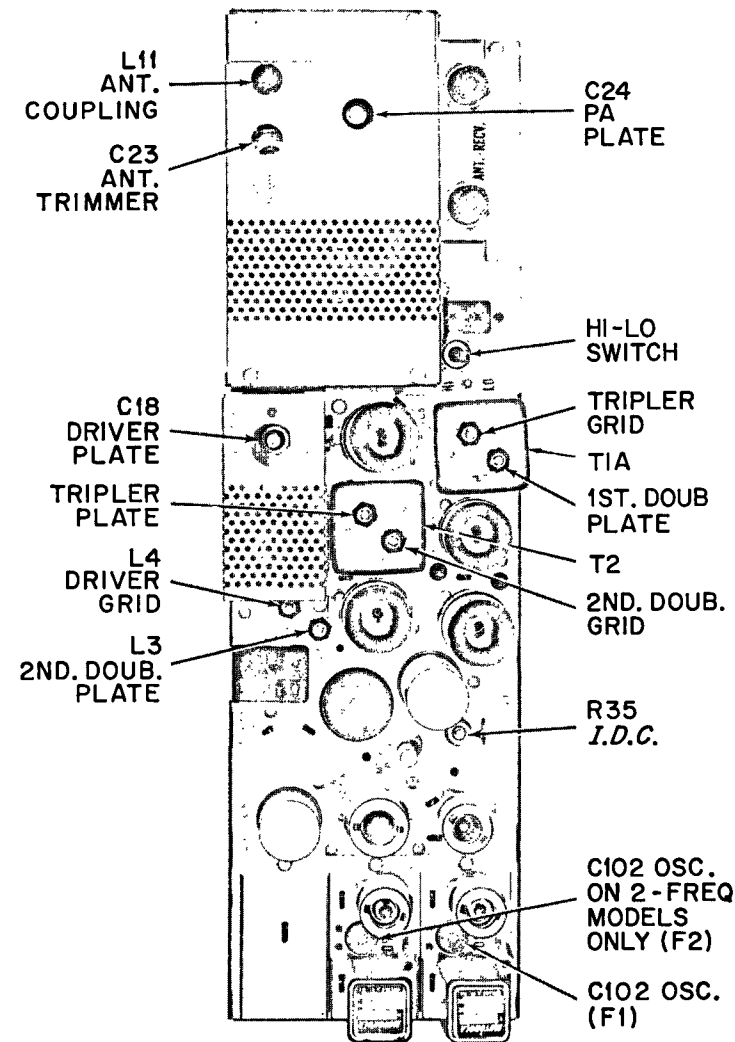
Do not key the transmitter for more than a few seconds at a time until it is properly tuned. Plate current is excessive in untuned stages and may damage the unit. Turn the transmitter on for brief periods while reading the meter and making the adjustments.

E. FREQUENCY CALCULATIONS

$$f_o = \frac{f_c}{24} \text{ where: } f_o = \text{crystal frequency, and } f_c = \text{carrier frequency}$$

F. PRELIMINARY ALIGNMENT PROCEDURE

- Connect the r-f wattmeter to the transmitter ANT. connector.
- Connect the power supply to the transmitter as shown on the radio set Inter-cabling Diagram.
- Place HI-LO switch on the transmitter in the LO position.
- Turn the equipment on and allow at least a 30 second warm-up period.
- In 2-frequency models, switch to the transmitter frequency most commonly used.



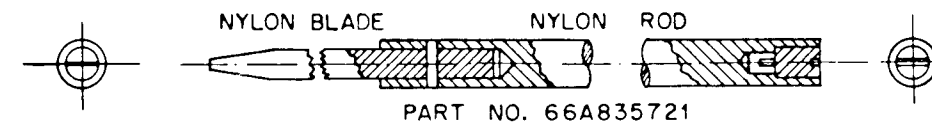
J. FINAL METER READINGS

Each time a transmitter is aligned or tested, final meter readings should be made and entered in a logbook.

All readings given in the table below are minimum except PA plate current which is maximum. DO NOT exceed the value given for the PA current. This is the maximum plate current to which the unit can be safely tuned. Multiply the scale reading by 5 to obtain the actual PA plate current in milliamperes.

Readings 3 through 6 are purely relative and do not give actual current or voltage measurement.

SWITCH POSITION	TU546 SERIES	3	4	5	6	9	7
METER READING		20	20	20	17	560 (144-174 mc xmtr.) 560 (132-151 mc xmtr.)	144-174 mc xmtr. 40 (x5 = 200-ma) max.
							132-151 mc xmtr. 44 (x5 = 220 ma) max.
CIRCUIT METERED		Tripler Grid	2nd Doubler Grid	Doubler Driver Grid	PA Grid	PA Plate Voltage	PA Plate Current



G. ALIGNMENT PROCEDURE

STEP	SWITCH POS. TU546 TEST	ADJUSTMENT	METER READING	STAGE, CONDITIONS AND PROCEDURE
1	3	T1A	Maximum	BUFFER-DOUBLER. Alternately adjust the primary slug and secondary slug. The circuit frequency is twice the crystal frequency.
2	4	T2	Maximum	TRIPLER. Alternately adjust the primary and secondary slugs. The circuit frequency is six times the crystal frequency.
3	5	L3 L4	Maximum	2ND DOUBLER. Alternately adjust L3 (primary) and L4 (secondary) slugs. The minimum meter reading is a result of fixed bias. Tune for a definite peak above this reading for proper alignment. The circuit frequency is twelve times the crystal frequency.
4	6	C18	Maximum	DOUBLER-DRIVER. Using the insulated dial screwdriver, adjust C18 for a definite peak. The minimum meter reading is the result of fixed bias and a definite peak above this reading indicates proper alignment. The circuit frequency is twenty-four times the crystal frequency.
5	7	PA PLATE (C24)	Minimum (Dip)	POWER AMPLIFIER. Using the insulated dial screwdriver, set ANT. TRIMMER, C23, for minimum plate current. Turn ANT. COUPLING adjustment, L11, fully clockwise (decoupled). Tune PA PLATE, C24, for a dip using the dial screwdriver. Place the transmitter HI-LO switch in the HI position. Retune PA PLATE for a dip.
6	7	C23	Maximum	ANTENNA INPUT. Adjust ANT. TRIMMER, C23, for maximum meter reading.
7	7	COUPLING (L11) and C23 NOTE For 250 watt stations see RF AMPLIFIER section.	Maximum RF Output NOTE DO NOT EXCEED MAXIMUM PA PLATE CURRENT GIVEN IN FINAL METER READING CHART	ANTENNA COUPLING. Remove test load and connect antenna. 1. Using field strength meter: Make adjustments with the transmitter shielded as much as possible by the housing. Place r-f probe near antenna. Adjust ANT. TRIMMER, C23, and ANT. COUPLING, L11, for maximum r-f indication on the meter. Repeat T1A, T2, L3, L4 and C18. Tighten all locknuts. 2. Using r-f wattmeter: Adjust ANT. COUPLING, L11 and ANT. TRIMMER, C23, for maximum power output. Be careful not to overcouple as a reduction in power output will occur. Remove the wattmeter and connect the antenna to the transmitter output. Recheck the PA plate current. If the reading is less than that listed in the final meter reading chart, additional coupling will be required to obtain maximum power output. If the reading is greater than that listed in the final meter reading chart, readjust L11 for a maximum as listed in the chart.
8	---	C102	Maximum On-Frequency NOTE Allow 15 minutes crystal warm-up period	OSCILLATOR(S). Adjust only when primary or secondary frequency standard is available (Motorola T1130A Series FM Station Monitor or equivalent may be used). (a) One-frequency models: Set up the monitor and adjust C102 for "on-frequency" reading. (b) Two-frequency models: (1) Set up the monitor for the primary or most used frequency and adjust C102 (on oscillator deck corresponding to position of frequency selector switch) for "on-frequency" reading. (2) Set up the monitor for secondary or least used frequency. Place frequency selector switch in secondary or least used position and adjust C102 (on oscillator deck corresponding to position of frequency selector switch) for "on-frequency" reading.

H. "IDC" ADJUSTMENT
(Transmitter Deviation)

For "IDC" ADJUSTMENT procedure see the reverse side of this chart.

"IDC" ADJUSTMENT (PREFERRED METHOD USING OSCILLOSCOPE)

1. INTRODUCTION

Accuracy of test equipment is of prime importance to any user of radio communications equipment; but of equal importance is a knowledge of the characteristics of the measuring equipment under various conditions. The Motorola T1130A Series FM Station Monitor is the leader in the field with respect to sensitivity, accuracy under conditions of variation in r-f signal level, line voltage, and environmental conditions. In common with most other meters it has the characteristic of responding differently to different wave shapes. Therefore, the use of most present-day deviation meters can lead to confusion and errors in deviation setting, if the pitfalls are unknown or disregarded.

The ideal deviation indicator would be one which would respond instantaneously to the peak value of the modulation deviation regardless of waveform. The only device which meets all these requirements is an oscilloscope. It responds instantaneously and it shows the peak value of any waveform, no matter how complex. Properly calibrated, an oscilloscope is the most accurate and reliable instrument for measuring and setting transmitter deviation.

The oscilloscope must be used in conjunction with a receiver which has a stable discriminator characteristic, since the oscilloscope displays the demodulated signal. In addition to the oscilloscope and receiver, a means to accurately calibrate the system is required. The Motorola Monitor fills these requirements, since it provides both a sensitive receiver with the proper discriminator characteristic and a reliable means of calibrating the oscilloscope. It has convenient terminals on the front panel for connection of the oscilloscope. Also, the Motorola FM Station Monitor has two modulation meter scales, 0-20 kc for wide-band systems, and 0-10 kc for split-channel systems.

Split-channel conversion kits are available for modification of older models. When converted, the older models have convenient oscilloscope terminals and can be more accurate measurement devices for such systems.

2. TEST EQUIPMENT REQUIRED

- Motorola T1130A Series FM Station Monitor (or equivalent)

NOTE

A special FM Station Monitor must be used for applications in the 132-151 mc range. This equipment is available on special order only. Contact your Motorola representative for further details.

- Motorola Model S1051B Transistorized AC Voltmeter (or equivalent)
- Motorola Model TEK-1A Transistorized Tone Generator, 1000 cps (or equivalent)
- Motorola Model T1015A Oscilloscope (or equivalent)

3. OSCILLOSCOPE CALIBRATION

The first step in the measurement of the transmitter deviation is to calibrate the oscilloscope. This can be done by using the transmitter which is to be measured.

Proceed as follows:

- Connect the oscilloscope to the monitor oscilloscope terminals, and set up the controls in accordance with the monitor instruction manual.
- Turn the "IDC" control on the transmitter chassis to the full clockwise position.
- Feed a 1000 cps test tone into the transmitter audio input terminals on base stations or mike plug on mobiles. Modulate the transmitter with this tone so adjusted that the deviation as read on the FM monitor deviation meter is 2 kc (6 kc in a wide-band system). An audio oscillator must be used for generation of this tone, since a sinusoidal waveform is very important. The Motorola TEK-1A Transistorized Tone Generator is excellent for this purpose.
- Adjust the vertical gain of the oscilloscope so that the total recovered audio pattern occupies some convenient height, e.g., four small squares. (12 squares in a wide band system). The split-channel condition is shown in figure 1.

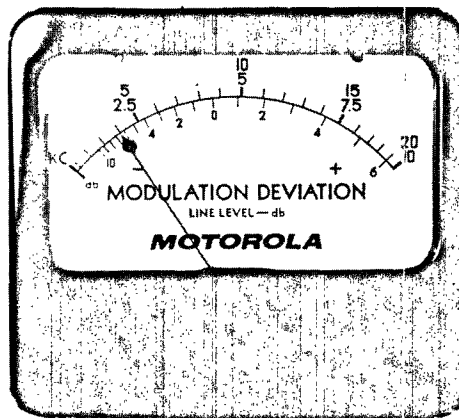


Figure 1.
Oscilloscope Calibration for
Split-Channel Transmitter

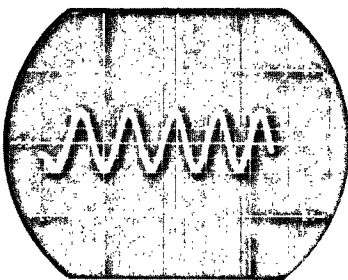
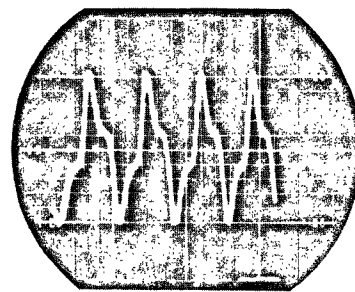


Figure 2.
5 kc Peak Deviation as seen on the Oscilloscope
(NOTE: Waveform is clipped fully)

4. MEASUREMENT AND SETTING OF TRANSMITTER DEVIATION

Once the oscilloscope has been calibrated the transmitter deviation can be properly adjusted by the following method.

- Adjust the 1000 cps input signal to 1 volt. This should drive the "IDC" circuit into full clip. See figure 2.
- With this input signal level, adjust the "IDC" control on the transmitter to provide a 10-square peak-to-peak recovered signal on the oscilloscope. This is equivalent to ± 5 kc deviation as shown in figure 2. A wide-band system should be adjusted for 30 squares (± 15 kc).



- Reduce 1000 cps input to 0.25 volt. Essentially full deviation should still be observed on the oscilloscope. Less than full deviation may indicate a weak audio tube or other lack of audio gain.

5. EMERGENCY MEASUREMENT OF DEVIATION

If an audio oscillator is not available, a loud sustained whistle of approximately 1000 cycles can be used for a rough measurement of deviation. If this rough check indicates the need for resetting deviation, do so only under controlled conditions, using a 1000 cps tone as previously indicated. The calibration of the oscilloscope should always be performed with a steady controlled signal. Do not attempt to calibrate the oscilloscope with a sustained whistle as waveform distortion will prevent an accurate calibration.

6. OTHER MEANS FOR MEASUREMENT OF DEVIATION

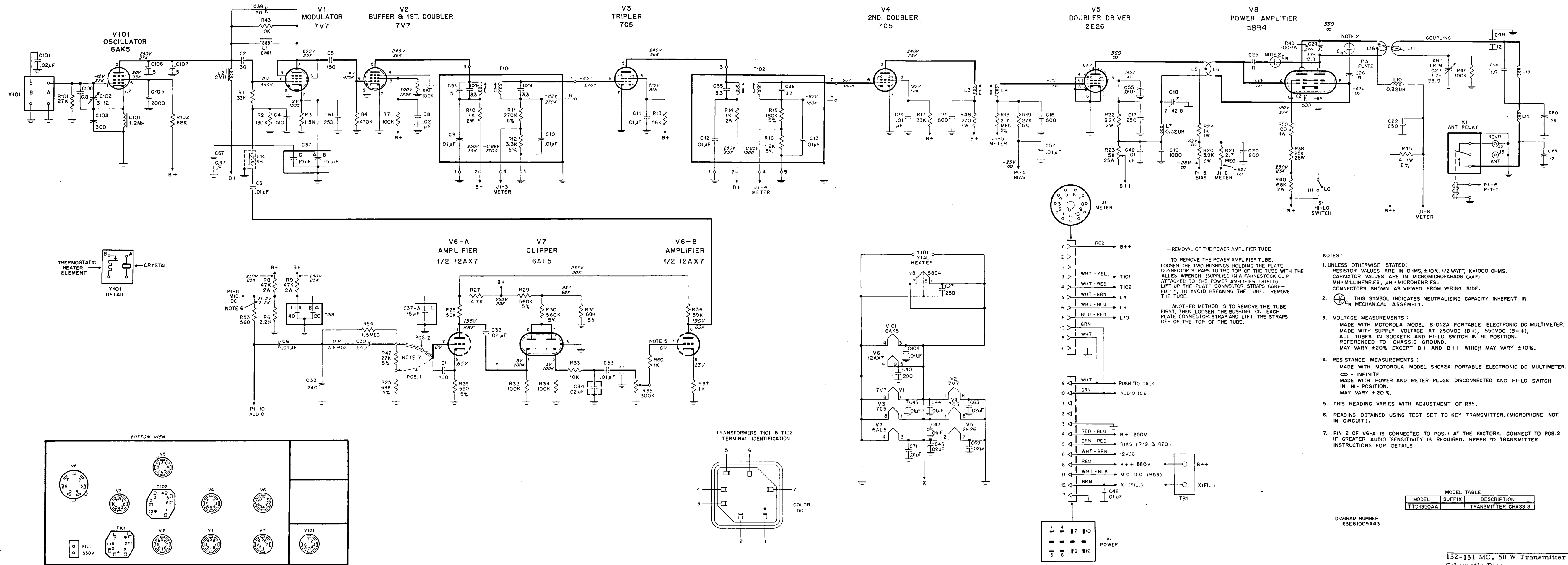
Another accurate means of measuring transmitter deviation is to use the Motorola T1020A Portable Frequency and Deviation Meter. This unit, properly used, permits the accurate measurement and setting of transmitter deviation from a peak-reading meter, which is unaffected by waveform. An oscilloscope is not required with this instrument. With this device, the transmitter deviation can be measured accurately even with voice modulation.

7. MICROPHONE AND LINE LEVELS

If the modulation level in the system still appears to be too low after setting deviation as indicated above, check the microphone or line levels as indicated in the instruction manual.

The foregoing procedure will insure that the transmitter will comply with FCC requirements for maximum deviation.

The importance of the correct deviation setting can not be overemphasized. Optimum system performance demands accurate deviation setting, both from the standpoint that overdeviation will interfere with the user on the adjacent channel, and underdeviation may reduce system range. Of equal importance is the proper setting of audio line levels so that the listener has the advantage of full deviation without the disadvantage of continual clip distortion.



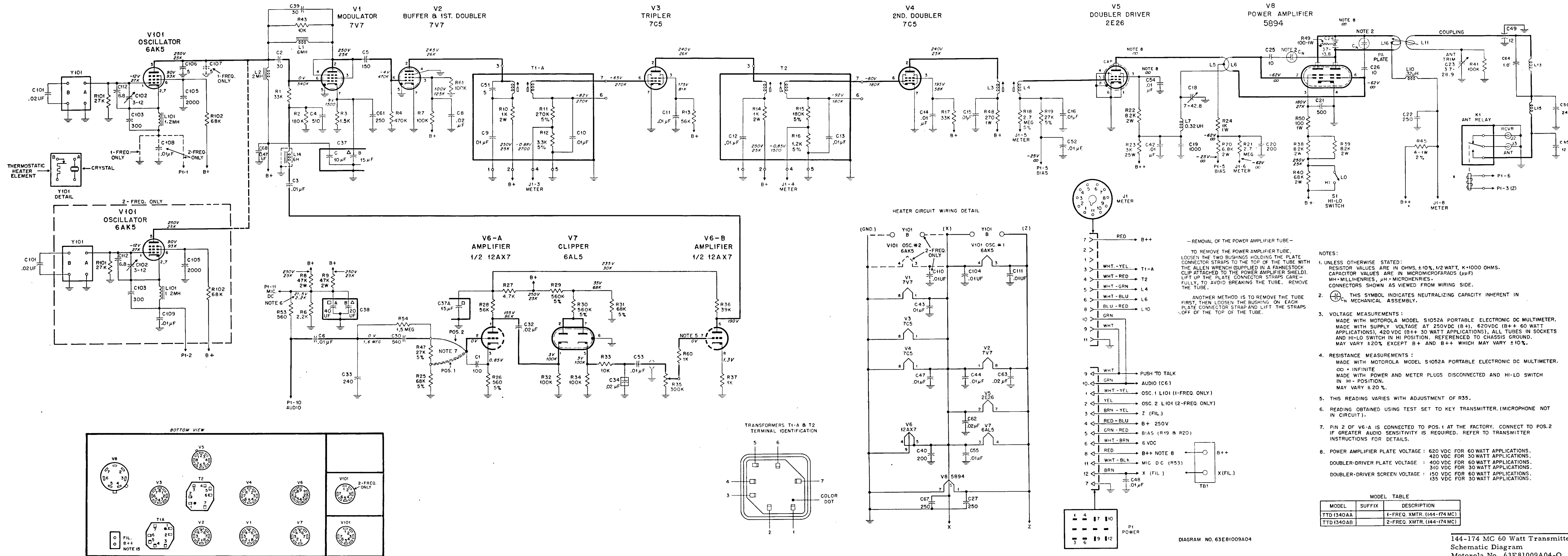
PARTS LIST for Transmitter Diagram 63E81009A43-O

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	21K840046	CAPACITOR, fixed; unless otherwise stated
C2	21K848156	dipped silver mica; 100 uuf ±10%; 500 vdcw
C3	21B801139	dipped silver mica; 30 uuf ±5%; 500 vdcw
C4	21K845214	ceramic; disc; .01 uf +80-20%; 600 vdcw
C5	21K840047	dipped silver mica; 510 uuf ±5%; 300 vdcw
C6		dipped silver mica; 150 uuf ±5%; 500 vdcw
C7		same as C3
C8	21B401029	NOT USED
C9		ceramic; disc; 02 uf +80-20%; 600 vdcw
C10		same as C3
C11		same as C3
C12		same as C3
C13		same as C3
C14		same as C3
C15	21A881306	ceramic, stand-off; 500 uuf ±10%; 500 v
C16		same as C15
C17	21K863801	molded silver mica; 250 uuf ±10%; 350 v
C18	19A475604	variable; air; 7 uuf min. to 42.8 uuf max.
C19	21B858836	standoff; 1000 uuf GMV; 500 vdcw
C20	21K840812	dipped silver mica; 200 uuf ±5%; 500 vdcw
C21	1K861204	molded silver mica; 500 uuf ±10%; 500 vdcw
C22	21A112247	molded silver mica; 250 uuf ±10%; 850 vdcw
C23	19A84648	variable; air; 3.7 uuf min. to 28.9 uuf max.
C24	19A802737	variable; air; 2 section; 3.7-13.8 uuf, each section
C25	21K847089	molded silver mica; 11 uuf ±.5 uuf; 300 v
C26		same as C25
C27	1K84708	molded silver mica; 250 uuf ±10%; 850 vdcw
C28	21K840067	ceramic; disc; 3.3 uuf ±.5 uuf; 500 v; NP0
C29		same as C28
C30	21K803505	molded silver mica; 540 uuf ±3%; 500 vdcw
C31		NOT USED
C32		same as C8
C33	21K840048	dipped silver mica; 240 uuf ±5%; 500 vdcw
C34	8K836754	oil filled; tubular; .02 uf ±10%; 400 vdcw
C35		same as C28
C36		same as C28
C37	23K838468	electrolytic; tubular; consists of: □ 15 uf +50-10%; 400 vdcw
C37A		△ 15 uf +50-10%; 400 vdcw
C37B		□ 10 uf +50-10%; 400 vdcw
C37C		△ 10 uf +50-10%; 400 vdcw
C38		electrolytic; tubular; consists of: □ 40 uf +100-10%; 150 vdcw
C38A	23K832217	△ 20 uf +100-10%; 150 vdcw
C38B		same as C2
C39		same as C2
C40		same as C20
C41		NOT USED
C42		same as C3
C43		same as C3
C44		same as C3
C45		same as C8
C46		NOT USED
C47		same as C3
C48		same as C3
C49	21K859875	ceramic; feed-thru; 12 uuf ±5%; 500 vdcw
C50	21R121875	ceramic; disc; 24 uuf ±5%; 500 vdcw
C51	21K850478	ceramic; disc; 5 uuf ±.25 uuf; 500 vdcw
C52		same as C3

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C53		CAPACITOR, (Cont'd)
C54		same as C3
C55		NOT USED
C56		same as C3
C57		NOT USED
C58		NOT USED
C59		NOT USED
C60		NOT USED
C61		same as C17
C62		NOT USED
C63		same as C8
C64	21C83959	molded phenolic; tubular; 1 uuf ±20%; 500 vdcw
C65	21K847874	molded silver mica; 12 uuf ±5%; 500 vdcw
C66		NOT USED
C67	8K859179	mylar; 0.47 uf ±20%; 400 v
C68		NOT USED
C69		same as C8
C70		same as C27
C101		same as C8
C102	20K850615	variable; 3 uuf min. to 12 uuf max.
C103	21K859944	dipped silver mica; 300 uuf ±5%; 500 vdcw
C104		same as C3
C105	21K837746	ceramic; disc; 2000 uuf ±10%; 500 vdcw
C106	21K86229	ceramic; tubular; 5 uuf ±.5 uuf; 500 vdcw
C107		same as C106
C108	21R127024	6.8 uuf ±.5 uuf; 500 v; NP0
J1	9B86864	CONNECTOR, receptacle; female; 11 contact; polarized; round; molded black plastic base; chassis mounting; does not include 42A821428 RING, connector retainer; ring must be ordered separately
J2		p/o K1
J3		p/o K1
K1	59C483605	RELAY, armature; coaxial; 6 v d-c; contact arrangement, 1 form "C"; includes reference parts J2 and J3
L1	24K483466	COIL, RF; choke; 6 uh; coded BLUE dot
L2	24A483465	choke; 2 uh; coded ORANGE dot
L3	1V800064	2nd Doubler Plate; includes 46A84787 CORE, adjustable tuning
L4	1V85835	Doubler Driver Grid; includes 46A84787 CORE, adjustable tuning
L5	24B82999C02	Doubler Driver Plate
L6	24A861654	Power Amplifier Grid
L7	24A835456	choke; .32 uh
L8		NOT USED
L9		NOT USED
L10		same as L7
L11	1V859849	Power Amplifier Antenna Coupling
L12		NOT USED
L13	24A851128	filter, harmonic; .1 uh
L14	25D850636	choke; 6 henries
L15	24A851127	RF; harmonic filter
L16	24A863417	Plate Tank
L101	24K800899	choke; 1.2 mh

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
P1	28A483376	CONNECTOR, receptacle; male; 12 contact; polarized; rectangular; molded black phenolic base; saddle mounted
R1	6R6410	RESISTOR, fixed; carbon; ±10%; 1/2 w; ins.; unless otherwise stated
R2	6R6444	33K
R3	6R6038	180K
R4	6R6377	1.5K
R5		470K
R6	6R6069	NOT USED
R7	6R6031	2.2K
R8	6R5736	100K
R9		47K; 2 w
R10	6R3922	same as R8
R11	6R2050	1K; 2 w
R12	6R2003	270K ±5%
R13	6R6378	3.3K ±5%
R14		56K
R15	6R2061	same as R10
R16	6R6166	180K ±5%
R17		1.2K ±5%
R18	6R488186	same as R1
R19	6R5786	2.7 meg ±5%
R20	6R476012	27K ±5%
R21	6R488136	3.9K; 2 w
R22	6R5762	2.7 meg
R23	17K811055	82K; 2 w
R24	6R6327	wire-wound; adjustable; 5K; 25 w
R25	6R6479	1K; 1 w
R26	6R400058	68K ±5%
R27	6R6080	560 ohm ±5%
R28	6R6378	4.7K
R29	6R5796	56K
R30		560K ±5%
R31		same as R29
R32		same as R25
R33	6R6320	same as R7
R34		10K
R35	18D82072C03	same as R7
R36	6R6487	variable; 300K ±20%; 0.2 w; incl. mtg. hdwe
R37	6R6229	39K
R38	17K842399	1K
R39		wire-wound; 25K; 25 w
R40	6R2079	NOT USED
R41		68K; 2 w
R42		same as R7
R43		NOT USED
R44		same as R33
R45	17K892469 or 17B821901	NOT USED
R46		wire-wound; 4 ohm ±2%; 1 w
R47		wire-wound; 4 ohm ±2%; 3 w
R48	6R6336	NOT USED
R49	6R6415	same as R19
R50		270 ohm; 1 w
R51		100 ohm; 1 w
R52		same as R49
R53	6R6291	NOT USED
R54	6R6460	560 ohm
R55		1.5 meg
R56		NOT USED
R57		NOT USED
R58		NOT USED
R59		NOT USED
R60		same as R37
R61		same as R7
R101	6R6434	27K
R102	6R6074	68K
S1	40A85655	SWITCH, toggle; spst

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
T101	24B857547	TRANSFORMER, RF; Buffer 1st Doubler; includes two 46A483493 CORE, adjustable tuning; coded YELLOW dot
T102	24B881294	Tripler; includes two 46K483494 CORE, adjustable tuning; coded WHITE dot
TB1	31A890581	BOARD, terminal; 2 soldering lug terminals
V1	195T228A01	TUBE, electron; type 7V7
V2		same as V1
V3	195T136A03	type 7C5
V4		same as V3
V5	197T102A01	type 2E26
V6	195T134A01	type 12AX7
V7	195T111A03	type 6AL5
V8	197T111A01	type 5894
V101	195T170A01	type 6AK5
XV1	9A83952	SOCKET, tube; female; 8 contact; molded mica filled base; saddle mounted
XV2		same as XV1
XV3		same as XV1
XV4		same as XV1
XV5	9B890001	tube; female; 8 contact; brown bakelite wafer base; saddle mounted
XV6	9K832481	tube; female; 9 contact; molded black phenolic base; saddle mounted; includes center shield and tube shield base
XV7	9B834083	tube; female; 7 contact; molded mica filled phenolic base; saddle mounted; includes center shield and tube shield base
XV8	9K859855	tube; female; 7 contact; molded steatite base chassis mounted
XV101	9K87124	tube; female; 7 contact; molded mica filled base
XY101	9B857508	crystal; female; 4 contact; square; molded black bakelite base; chassis mounted
CRYSTAL		
NOTE		
Crystals are part of the Radio Set model. When ordering a transmitter chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.		
Y101	Type R03	CRYSTAL UNIT, quartz; Transmitter Oscillator; 5.41666 - 7.25000 mc.; with 12 volt heater unit



PARTS LIST for Transmitter Diagram 63E81009A04-0

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	21K840046	CAPACITOR, fixed; unless otherwise stated
C2	21K848156	dipped silver mica; 100 uuf ±10%; 500 vdcw
C3	21B801139	dipped silver mica; 30 uuf ±5%; 500 vdcw
C4	21K845214	ceramic; disc; .01 uf +80-20%; 600 vdcw
C5	21K840047	dipped silver mica; 510 uuf ±5%; 300 vdcw
C6		dipped silver mica; 150 uuf ±5%; 500 vdcw
C7		same as C3
C8	21B401029	NOT USED
C9		ceramic; disc; .02 uf +80-20%; 600 vdcw
C10		same as C3
C11		same as C3
C12		same as C3
C13		same as C3
C14		same as C3
C15		same as C3
C16		same as C3
C17		NOT USED
C18	19A475604	variable; air; 7 uuf min. to 42.8 uuf max.
C19	21B858836	standoff; 1000 uuf GMV; 500 vdcw
C20	21K840812	dipped silver mica; 200 uuf ±5%; 500 vdcw
C21	1V861204	molded silver mica; 500 uuf ±10%; 500 vdcw
C22	21A112247	molded silver mica; 250 uuf ±10%; 850 vdcw
C23	19A84648	variable; air; 3.7 uuf min. to 28.9 uuf max.
C24	19A802737	variable; air; 2 section; 3.7-13.8 uuf, each section
C25	21K847088	dipped silver mica; 10 uuf ±2%; 300 vdcw
C26		same as C25
C27	1K84708	molded silver mica; 250 uuf ±10%; 850 vdcw
C28		NOT USED
C29		NOT USED
C30	21K803505	molded silver mica; 540 uuf ±3%; 500 vdcw
C31		NOT USED
C32		same as C8
C33	21K840048	dipped silver mica; 240 uuf ±5%; 500 vdcw
C34	8K836754	oil filled; tubular; .02 uf ±10%; 400 vdcw
C35		NOT USED
C36		NOT USED
C37	23K838468	electrolytic; tubular; consists of: □ 15 uf +50-10%; 400 vdcw
C37A		△ 15 uf +50-10%; 400 vdcw
C37B		10 uf +50-10%; 400 vdcw
C37C		electrolytic; tubular; consists of: □ 40 uf +100-10%; 150 vdcw
C38	23K832217	△ 20 uf +100-10%; 150 vdcw
C38A		same as C2
C38B		same as C20
C39		NOT USED
C40		same as C3
C41		same as C3
C42		same as C3
C43		same as C3
C44		same as C3
C45		NOT USED
C46		NOT USED
C47		same as C3
C48		same as C3
C49	21K859875	ceramic; feed-thru; 12 uuf ±5%; 500 vdcw
C50	21R121875	ceramic; disc; 24 uuf ±5%; 500 vdcw
C51	21K850478	ceramic; disc; 5 uuf ±.25 uuf; 500 vdcw
C52		same as C3

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C53		CAPACITOR, (Cont'd)
C54		same as C3
C55		same as C3
C56		same as C3
C57		NOT USED
C58		NOT USED
C59		NOT USED
C60		NOT USED
C61	21K863801	dipped silver mica; 250 uuf ±10%; 350 vdcw
C62		same as C8
C63		same as C8
C64	21C83959	molded phenolic; tubular; 1 uuf ±20%; 500 vdcw
C65	21K847874	molded silver mica; 12 uuf ±5%; 500 vdcw
C66		NOT USED
C67		same as C27
C68	8K859179	.47 uf ±20%; 400 v
C101		same as C8
C102	20K850615	variable; 3 uuf min. to 12 uuf max.
C103	21K859944	dipped silver mica; 300 uuf ±5%; 500 vdcw
C104		same as C3
C105	21K837746	ceramic; disc; 2000 uuf ±10%; 500 vdcw
C106	21K86229	ceramic; tubular; 5 uuf ±.5 uuf; 500 vdcw
C107		same as C106
C108		same as C3
C109		same as C3
C110		same as C3
C111		same as C3
C112	21R127024	6.8 uuf ±.5 uuf; 500 v; NP0
J1	9B86864	CONNECTOR, receptacle; female; 11 contact; polarized; round; molded black plastic base; chassis mounting; does not include 42A821428 RING, connector retainer; ring must be ordered separately
J2		p/o K1
J3		p/o K1
K1	59K812758	RELAY, armature; coaxial; 12 v d-c; contact arrangement, 1 form "C"; includes reference parts J2, J3; each single contact female connectors
L1	24K483466	COIL, RF; choke; 6 uh; coded BLUE dot
L2	24A483465	choke; 2 uh; coded ORANGE dot
L3	1V85835	2nd Doubler Plate; includes 46A84787 CORE, adjustable tuning
L4	1V892523	Doubler Driver Grid; includes 46A84787 CORE, adjustable tuning
L5	24B82999C01	Doubler Driver Plate
L6	24A861654	Power Amplifier Grid
L7	24A835456	choke; .32 uh
L8		NOT USED
L9		NOT USED
L10		same as L7
L11	1V859849	Power Amplifier Antenna Coupling
L12		NOT USED
L13	24A851128	filter, harmonic; .1 uh
L14	25C82697C01	choke; 6 henries
L15	24A851127	RF; harmonic filter
L16	24A861592	Plate Tank
L101	24K800899	choke; 1.2 mh

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
P1	28A483376	CONNECTOR, receptacle; male; 12 contact; polarized; rectangular; molded black phenolic base; saddle mounted
R1	6R6410	RESISTOR, fixed; carbon; ±10%; 1/2 w; ins.; unless otherwise stated
R2	6R6444	33K
R3	6R6038	180K
R4	6R6377	1.5K
R5		470K
R6	6R6069	NOT USED
R7	6R6031	2.2K
R8	6R5736	100K
R9		47K; 2 w
R10	6R3922	same as R8
R11	6R2050	1K; 2 w
R12	6R2003	270K ±5%
R13	6R6378	3.3K ±5%
R14		56K
R15	6R2061	same as R10
R16	6R6166	180K ±5%
R17		1.2K ±5%
R18	6R488186	same as R1
R19	6R5786	2.7 meg ±5%
R20	6R5690	27K ±5%
R21	6R488136	6.8K; 2 w
R22	6R5762	2.7 meg
R23	17A83436	82K; 2 w
R24	6R6327	wire-wound; 3K; 25 w
R25	6R6479	1K; 1 w
R26	6R400058	68K ±5%
R27	6R6080	560 ohm ±5%
R28	6R6378	4.7K
R29	6R5796	56K
R30		560K ±5%
R31		same as R29
R32		same as R25
R33	6R6320	same as R7
R34		10K
R35	18D82072C03	same as R7
R36	6R6487	variable; 300K ±20%; 0.2 w; incl. mtg. hdwe
R37	6R6229	39K
R38	6R5725	1K
R39		8.2K; 2 w
R40	6R2079	same as R38
R41		68K; 2 w
R42		same as R7
R43		NOT USED
R44		same as R33
R45	17K892469 or 17B821901	NOT USED
R46		wire-wound; 4 ohm ±2%; 1 w
R47		wire-wound; 4 ohm ±2%; 3 w
R48		NOT USED
R49	6R6336	same as R19
R50	6R6415	270 ohm; 1 w
R51		100 ohm; 1 w
R52		same as R49
R53	6R6291	NOT USED
R54	6R6460	NOT USED
R55		560 ohm
R56		1.5 meg
R57		NOT USED
R58		NOT USED
R59		NOT USED
R60		same as R37
R61		same as R7
R101	6R6434	27K
R102	6R6074	68K
S1	40A85655	SWITCH, toggle; spst

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
T1A	24B813173	TRANSFORMER, RF; Buffer 1st Doubler; includes two 46A483493 CORE, adjustable tuning; coded YELLOW dot
T2	24B881294	Tripler; includes two 46K483494 CORE, adjustable tuning; coded WHITE dot
TB1	31A890581	BOARD, terminal; 2 soldering lug terminals
V1	195T228A01	TUBE, electron; type 7V7
V2		same as V1
V3	195T136A03	type 7C5
V4		same as V3
V5	197T102A01	type 2E26
V6	195T134A01	type 12AX7
V7	195T111A03	type 6AL5
V8	197T111A01	type 5894
V101	195T170A01	type 6AK5
XV1	9A83952	SOCKET, tube; female; 8 contact; molded mica filled base; saddle mounted
XV2		same as XV1
XV3		same as XV1
XV4	9B890001	same as XV1
XV5		tube; female; 8 contact; brown bakelite wafer base; saddle mounted
XV6	9K832481	tube; female; 9 contact; molded black phenolic base; saddle mounted; includes center shield and tube shield base
XV7	9B834083	tube; female; 7 contact; molded mica filled phenolic base; saddle mounted; includes center shield and tube shield base
XV8	9K859855	tube; female; 7 contact; molded steatite base chassis mounted
XV101	9K87124	tube; female; 7 contact; molded mica filled base
XY101	9K857508	crystal; female; 4 contact; square; molded black bakelite base; chassis mounted

CRYSTAL

NOTE

Crystals are part of the Radio Set model. When ordering a transmitter chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
Y101	Type R03	CRYSTAL UNIT, quartz; Transmitter Oscillator; 5.41666 - 7.25000 mc.; with 12 volt heater unit

FINAL RF AMPLIFIER

1. DESCRIPTION

The TLN6319A Final RF Amplifier is designed to develop 250 watts of r-f output power in the 144-174 mc range.

The input circuit is driven by a 30 watt transmitter, in the same frequency range, and is matched to either a 50 or a 70 ohm input impedance, using a coaxial cable with standard uhf connectors.

Two 4D21(4-125A) (OR 6155) tetrode amplifier tubes in a push-pull circuit develop the final r-f output. The output circuit is also matched for either a 50 or a 70 ohm transmission line, using standard uhf connectors.

The chassis is attached to a standard 19" rack mount panel for mounting. The r-f deck is completely shielded to reduce stray r-f radiation.

Proper operation and maintenance of the equipment will insure long dependable service in any system in which it is installed.

2. OPERATION

WARNING

Operation of this equipment involves the use of high voltages which are hazardous to personal safety. Operating personnel must, at all times observe safety regulations. Do not change tubes or make adjustments inside the cabinet with the high voltage turned on. Under no circumstances should any access door or safety interlock be removed, short circuited, or tampered with in any way.

IMPORTANT

FCC regulations state that a radio transmitter may be tuned or adjusted only by a person holding a 1st or 2nd class commercial radiotelephone operator's license or by personnel working under direct supervision of the same.

FCC regulations state that when a transmitter is initially installed, a suitable procedure shall be employed to ascertain that the carrier is on the assigned frequency. This frequency check is recommended to be made immediately before the equipment is placed in service. A Motorola T1130A Series Frequency Monitor or equivalent frequency measuring device should be used for this purpose.

a. Controls

All power controls for the final amplifier are located on the P-8238-C High Voltage Power Supply Chassis or its associated components.

A key type local control switch is located on the front door of the cabinet. This switch permits the exciter to be locally controlled when checking or aligning the equipment. Turning the key to its clockwise position turns the transmitter "on"; to turn the transmitter "off", turn the key to its counterclockwise position. To remotely control the transmitter, the key must be in the counterclockwise position.

Safety interlock switches are provided on both the front and rear cabinet access doors. To turn "on" the exciter chassis only, the rear cabinet door must be closed but the front door may



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COMMUNICATIONS DIVISION

Chicago 51, Illinois

NOMINAL PERFORMANCE SPECIFICATIONS

BASIC UNIT	TLN6319A
FREQUENCY	144-174 mc
RF POWER OUTPUT	250 watts
POWER SUPPLY RATING	330 ma at 2000 v d-c 12 amps at 5.0 v a-c
RF POWER INPUT	16-18 watts
TUBE COMPLEMENT	Two 4D21 (4-125A) Tetrode RF Amplifier OR Two-6155
DIMENSIONS	19" wide x 10-1/2" high x 8-1/4" deep
MOUNTING	Standard 19" vertical rack
WEIGHT	Approximately 12 lbs
METERING	Associated Panel Mounted Meters: 0-100 ma d-c, Grid Current 0-500 ma d-c, Plate Current 0-3000 v d-c, Plate Voltage

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

be open. To turn the final amplifier "on", both the front and rear cabinet doors must be closed. The interlock on the rear door completely disables the equipment. The interlock on the front door prevents the exciter from being turned "on" from the remote control position while the equipment is being inspected or serviced.

b. Local Modulation Test

To voice modulate the exciter while testing, connect a Motorola microphone to the MIC receptacle on the exciter-receiver power supply chassis.

c. Multiple Frequency Operation

If an exciter with more than one operating frequency is used, the #1 frequency only is turned "on" when locally controlling the exciter. If it is desirable to locally select frequencies when more than one exciter frequency is available, it is necessary to connect a selector switch

to open or ground the proper oscillator cathode on the exciter chassis.

d. Adjustments

The final amplifier grid tuning, plate tuning and the neutralizing capacitors are accessible from the front of the cabinet through access holes in the cabinet door. The output coupling loop may be adjusted through an access hole in the front cover plate of the final amplifier chassis with the front door open.

3. ALIGNMENT AND NEUTRALIZING PROCEDURE

A complete alignment and neutralization procedure is provided, in chart form, at the end of this section.

Alignment tools for both the transmitter/exciter and final amplifier may be found inside the front door of the cabinet.

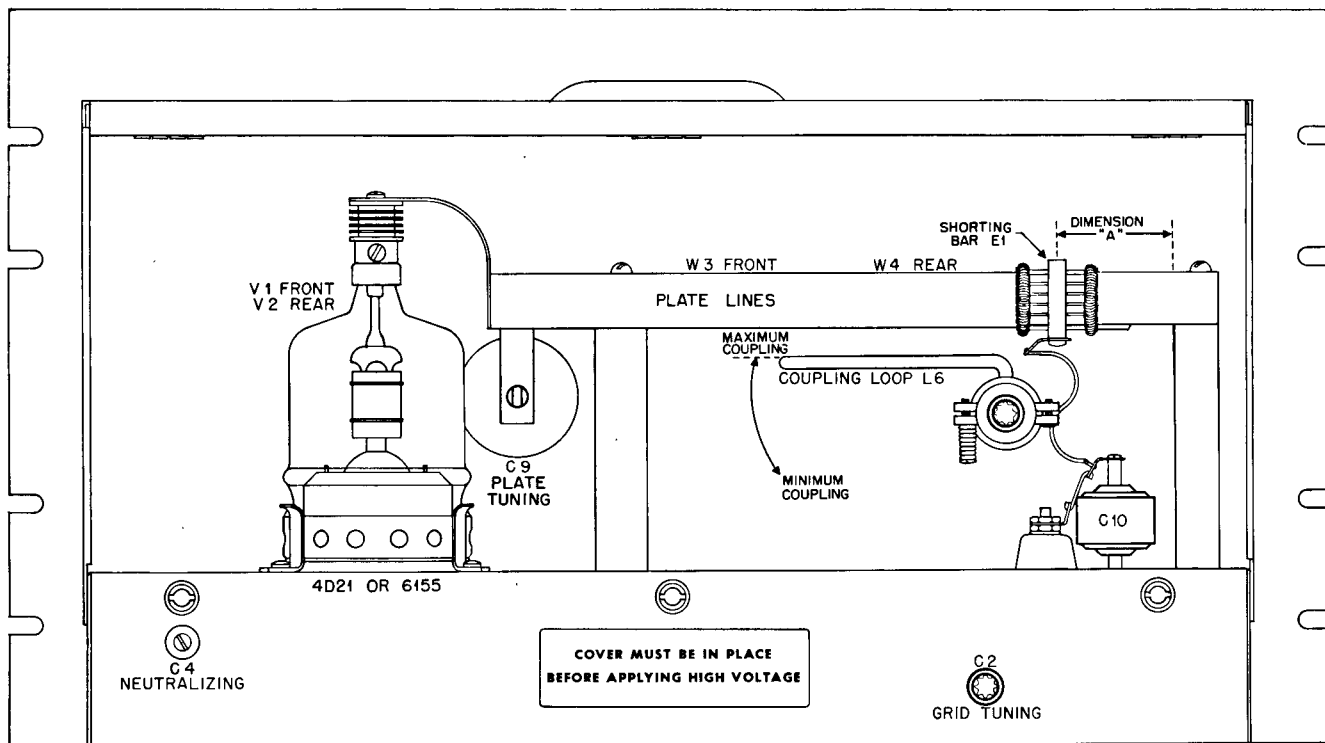
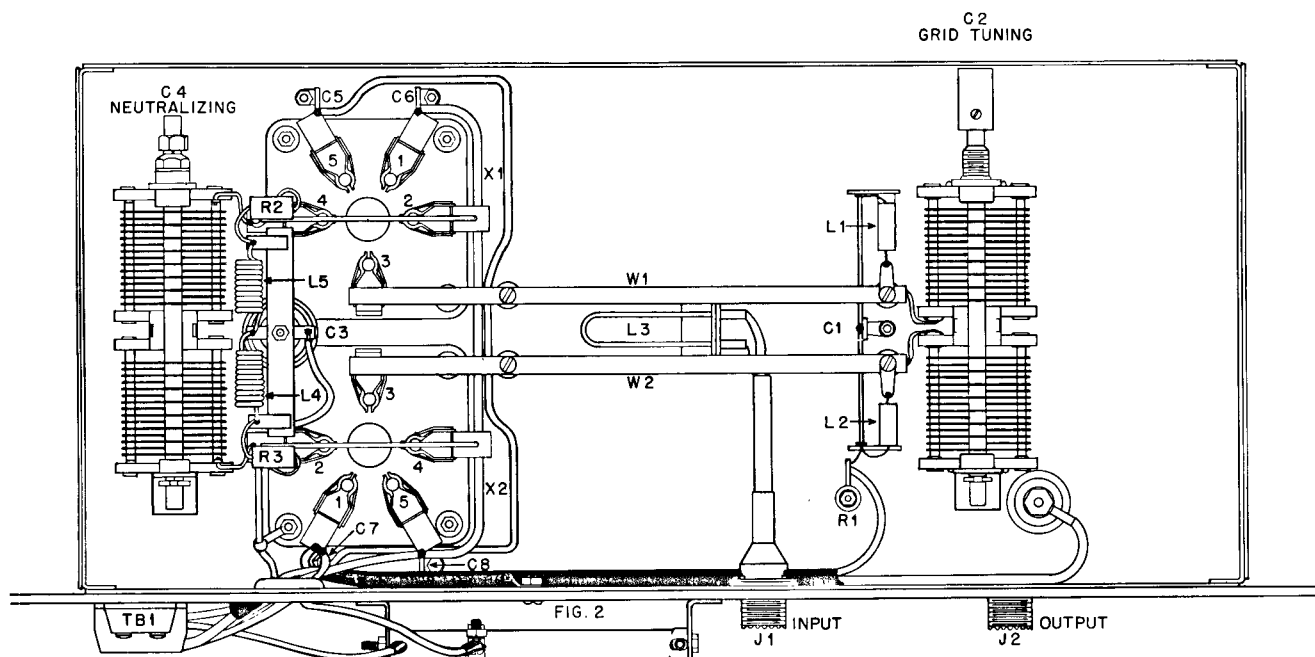


FIG. 1



TUBE	PIN NUMBERS				
	1	2	3	4	5
V1 & V2	NOTE 2	200-300	-60 10-70	200-300	NOTE 2

VOLTAGE NOTES:

1. ALL READINGS TAKEN FROM PIN TERMINALS TO GROUND EXCEPT PINS 1 & 5.
2. 5.7 V MEASURED FROM PIN 1 TO PIN 5.
3. MEASUREMENTS TO BE MADE WITH A MOTOROLA MODEL SIO52A DC MULTIMETER.
4. READINGS TAKEN WITH EQUIPMENT IN FULL NORMAL OPERATION.

TUBE	PIN NUMBERS				
	1	2	3	4	5
V1 & V2	150	15 K	1 K	15 K	150

RESISTANCE NOTES:

1. ALL READINGS TAKEN FROM PIN TERMINALS TO GROUND.
2. READINGS TAKEN WITH EQUIPMENT TURNED "OFF."

BEFORE ALIGNING FINAL AMPLIFIER

Read entire alignment procedure and know switch locations and tuning adjustments. Basic requirements of the alignment are as follows:

- 1. Couple the exciter to the final amplifier.
- 2. Neutralize the final amplifier.
- 3. Load the final amplifier to the antenna.

WARNING

HIGH VOLTAGE IS USED IN THE OPERATION OF THIS EQUIPMENT. DEATH ON CONTACT MAY RESULT IF PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS.

Before working on the equipment, after the power has been turned off, always short out high voltage circuits making sure one side of shorting tool is grounded before touching high voltage circuit.

NOTE

The meter readings and values outlined in these instructions are based on a nominal 117 v a-c line voltage.

PRE-ALIGNMENT PROCEDURE

STEP	PROCEDURE
1	Open the front door and locate the HI-VOLTAGE POWER ON-OFF switch near the base of the cabinet at the front (red switch plate). Set switch to OFF.
2	Check exciter meter readings in positions T3, T4, T5 and T6 of metering selector switch. Refer to exciter alignment procedure. Realign exciter if necessary.
3	Connect the antenna which will be used in regular service, or a dummy antenna load. Make sure exciter output is coupled to final amplifier input.
	CAUTION NEVER TURN ON TRANSMITTER WITHOUT A LOAD.
4	Locate H. V. POWER HIGH-LOW switch at left hand side of cabinet in front. Set this switch to LOW position.
5	Set rotary selector switch on meter switching panel to PA position.
6	Decouple the coupling loop L6 on final amplifier by inserting the tuning tool through the access hole on the cover plate, and push downward.
7	Open rear door and locate H. V. POWER ON-OFF switch on left hand side next to the main fuse block. Set this switch to ON position.
8	Close and lock the rear door.
9	The plate tuning lines are adjusted to the assigned carrier frequency of the base station, at the factory and should not need adjustment. The plate tuning lines are adjusted by setting the shorting bar to the correct distance from the mounting insulator. Distances are measured from the center of the shorting block to the closest edge of the insulator (see Figure 1, dimension A.). Depending upon the carrier frequency, the dimensions will be approximately: 3/4" for 148-155 mc, 1-1/16" for 155-160 mc, 1-3/8" for 160-165 mc, 1-11/16" for 165-170 mc, 2" for 170-174 mc.

EXCITER COUPLING PROCEDURE

STEP	SWITCH POSITION	ADJUSTMENT	METER READING	PROCEDURE
1	PA	Exciter Ant. Trimmer, C23	Minimum	Key exciter briefly while making adjustment and reading meter. Use key lock switch on front door. Front door can be left open. Tune C23 for minimum reading on EXCITER-RECEIVER meter.
2	---	Exciter Output Coupling Loop L11	---	Set L11 for minimum coupling (turn shaft to full clockwise position).
3	PA	Exciter PA Tuning, C24	Minimum	Key exciter and adjust C24 for "dip" on EXCITER-RECEIVER meter.
4	PA	Exciter Output Coupling Loop L11 & Final RF Amplifier GRID TUNING C2	Maximum	Turn L11 two turns counterclockwise to increase coupling. Adjust C2 for maximum reading on AMPLIFIER GRID meter.
5	PA	Exciter Ant. Trimmer C23	Maximum	Tune C23 for peak reading on EXCITER-RECEIVER meter.
6	---	Final RF Amplifier GRID TUNING C2	Maximum	Tune C2 on final amplifier for maximum reading on AMPLIFIER GRID meter. Reading should be above 50 ma. NOTE: If meter reads "off-scale" at this time, neutralization is required. Follow NEUTRALIZATION PROCEDURE to bring meter reading "on-scale". It is recommended that the NEUTRALIZATION PROCEDURE be followed regardless of the meter reading.

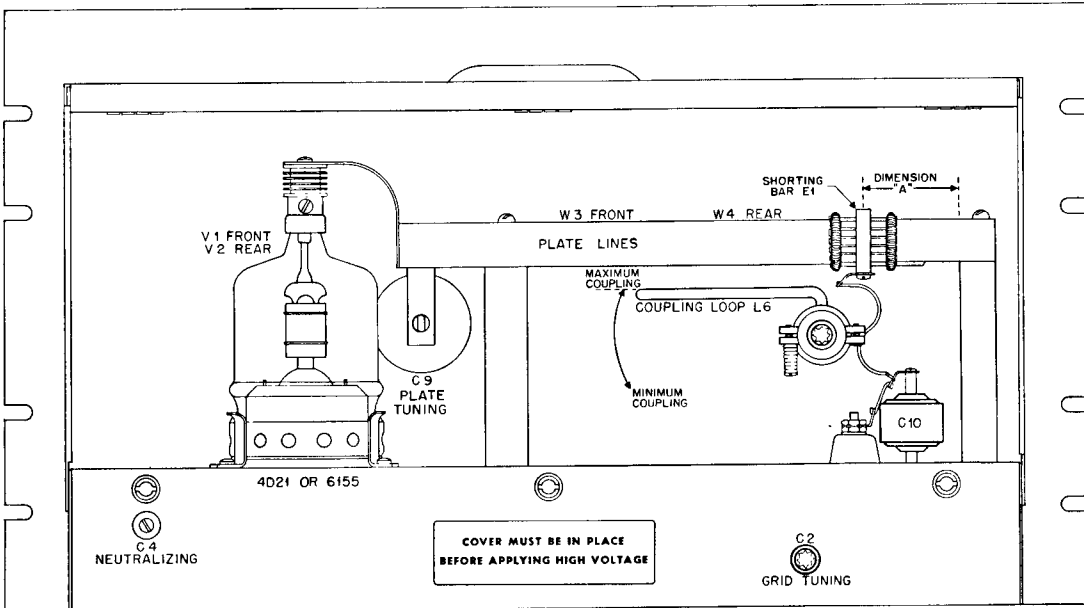


FIGURE 1.

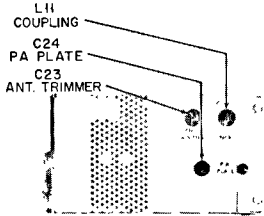


FIGURE 2.

NEUTRALIZATION PROCEDURE

METHOD NO.	NEUTRALIZATION CHECK	STEP	ADJUSTMENT	AMPLIFIER GRID METER READING	NEUTRALIZATION ADJUSTMENTS
	CAUTION BE SURE HI-VOLTAGE SWITCH IS OFF. Use an insulated tuning tool for all adjustments. Do not touch any circuit components when exciter is on. Turn exciter on with door key switch or switch on metering chassis. Make all neutralization checks with final amplifier front cover plate installed and coupling loop L6 pressed downward, (away from the plate lines).				NOTE Turn plate tuning control C9 back and forth through resonance to check for neutralization. Resonance is indicated by a dip in AMPLIFIER GRID meter reading. The dip decreases as adjustment approaches proper neutralization. Locknut on NEUTRALIZING control C4 must be loosened before it can be adjusted. C4 is adjusted from a half-meshed position in the direction which decreases its capacity in the following adjustments.
1	LAMP METHOD. (preferred method) Make a one-turn loop of insulated wire, 1" in diameter, and solder it across the two terminals of No. 48 or a No. 49 pilot lamp (2-volt, 60 ma). Fasten this assembly to the end of an insulated rod at least 12" long. Remove the front cover plate of the amplifier. Insert the lamp bulb test rod through the 1/2" hole in the cover plate. Replace the cover plate with the lamp bulb inside the housing. Turn the exciter on and slowly bring the test loop and bulb close to the plate lines. Turn plate tuning control, C9, slowly through a short range while observing lamp. A very faint glow or no glow at all indicates proper neutralization. Proceed to FINAL AMPLIFIER ALIGNMENT if proper neutralization is obtained. A glowing lamp indicates that neutralization is required. Neutralize the amplifier as outlined in NEUTRALIZATION ADJUSTMENTS. NOTE: Bulb will glow only at resonance. TUNE SLOWLY while observing lamp. A "dip" in AMPLIFIER GRID meter reading indicates resonance.	A	GRID TUNING C2	Maximum	Adjust C2 for maximum meter reading.
		B	Plate Tuning C9		Adjust C9 for maximum bulb brightness, decouple when necessary, to prevent burning out the bulb.
		C	NEUTRALIZING C4		Adjust C4 from the half-meshed position, decreasing capacity, until there is no glow in the lamp, while keeping C9 at resonance as in step B, above.
		D			Repeat steps B and C until there is a faint or no glow in lamp when lamp coupling loop is close to the plate lines. This indicates proper neutralization. Tighten locknut on C4 when finished.
2	METER METHOD NO. 1. Disconnect the exciter r-f coaxial output cable from the input of the final amplifier. Disconnect the final amplifier r-f output cable from the harmonic filter. Connect the exciter r-f output cable to the final amplifier output r-f cable via a PL-258 (Amphenol 83-1J) junction or PL-274 (Amphenol 83-1F) feed-thru connector. This connects the exciter r-f output to the final amplifier plate circuit. Move the final amplifier coupling loop L6 to approximately a 20 degree angle with the plate lines. Turn the exciter on and adjust the plate tuning control C9 for a maximum (resonant) reading on the AMPLIFIER GRID meter. An indication on this meter in excess of 1 ma denotes improper neutralization.	A	GRID TUNING C2	Maximum	Adjust C2 for maximum meter reading.
		B	Plate Tuning C9	Maximum	Adjust C9 for maximum meter reading.
		C	NEUTRALIZING C4	Minimum	Adjust C4 for the half-meshed position, decreasing capacity, for a minimum meter reading.
		D	Plate Tuning C9 & GRID TUNING C2	Maximum	Readjust C9 & C2 for maximum meter reading.
		E	NEUTRALIZING C4	Minimum	Readjust C4 for minimum meter reading.
		F		1 ma or less	Repeat steps D and E until a reading of no more than approximately 1 ma is obtained when both C9 & C2 are at maximum. This indicates proper neutralization. Tighten locknuts on C4 when finished.
3	METER METHOD NO. 2. Return the "off-scale" reading as noted in step 6 of EXCITER COUPLING PROCEDURE to an "on-scale" reading by de-tuning the exciter ANT TRIMMER, C23. Vary the plate tuning control C9 slowly through a short range while observing the AMPLIFIER GRID meter. Very slight deflection or no deflection indicates proper neutralization. If properly neutralized, re-tune the ANT TRIMMER C23 (step 5 of EXCITER COUPLING PROCEDURE) and refer to FINAL AMPLIFIER ALIGNMENT. If a meter variation is obtained, refer to NEUTRALIZATION ADJUSTMENTS.	A	GRID TUNING C2	Maximum	Adjust C2 for maximum meter reading.
		B	Plate Tuning C9	Minimum	Adjust C9 for minimum meter reading or a dip when C9 is tuned through resonance.
		C	NEUTRALIZING C4	Maximum	Adjust C4 for maximum meter reading.
		D			Repeat steps A and C until there is little or no meter deflection, as C9 is rotated through resonance. This indicates proper neutralization.

FINAL AMPLIFIER ALIGNMENT

STEP	CONTROL	METER READING	PROCEDURE
1	Coupling Loop L6	---	Move L6 to about 30 degree angle with plate lines.
2	Plate Tuning C9	Minimum	Make sure HIGH-LOW switch is in LOW position. Turn on HI-VOLTAGE POWER ON-OFF switch at base of cabinet (red plate). Turn transmitter on with key switch. Tune C9 for minimum reading (resonance) on AMPLIFIER PLATE CURRENT meter.
3	GRID TUNING C2 (on final amplifier) ANT TRIMMER C23 (on exciter)	Maximum	Tune C2 for maximum reading on AMPLIFIER GRID meter. If at least 40 ma is not obtained, adjust C23 on the exciter for 40 ma.
4	Plate Tuning C9	Minimum	Turn transmitter off with key switch. If dummy load or r-f watt-meter is used, disconnect load and connect antenna to be used in regular operation. Set HIGH-LOW switch to HIGH position. Turn transmitter on and tune C9 for minimum reading on AMPLIFIER PLATE CURRENT meter. Note meter reading.
5	Coupling Loop L6	260-280 ma	If meter reading is less than 260 ma, turn transmitter off, move L6 slightly toward plate lines. Key transmitter and check reading. Repeat as necessary for 260-280 ma reading. After each change in L6 readjust C9 to maintain resonance.
6	GRID TUNING C2 (on final amplifier) ANT TRIMMER C23 (on exciter)	28-32 ma	Readjust C2 for maximum reading on AMPLIFIER GRID meter. Reading should be 28-32 ma. Readjust ANT TRIMMER C23 on exciter to obtain 28-32 ma if necessary.
7	Plate Tuning C9	Minimum	To compensate for capacitive effect of final amplifier tubes, adjust C9 as follows: With filament "on" and plate voltage "off", allow station to stand for 5 minutes or longer. Make adjustments 30-60 seconds after turning transmitter "on"--Tune C9 for minimum (resonance) on the AMPLIFIER PLATE CURRENT meter and then turn to clockwise direction for 10 ma increase in meter reading over the resonant condition.

CONCLUDING ADJUSTMENTS

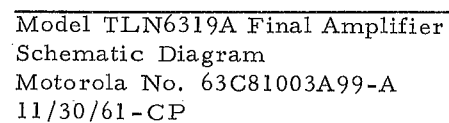
- 1. Interaction between grid and plate circuits may require slight compensating adjustments of plate tuning control C9 as GRID TUNING control C2 is varied. Increasing the grid current decreases the plate current; decreasing the grid current will increase the plate current. When finally adjusted, the plate current should be 260-280 ma.
- 2. If grid current is less than 28 ma on the AMPLIFIER GRID meter, increase the r-f drive from the exciter by adjusting exciter ANT TRIMMER C23 and exciter COUPLING loop L11 for increased AMPLIFIER GRID meter reading. Readjust final amplifier GRID TUNING control C2 for maximum meter reading. Then readjust final amplifier PLATE TUNING control C9 and exciter COUPLING loop L11 to maintain 260-280 ma AMPLIFIER PLATE current meter reading.
- 3. If grid current is more than 32 ma on the AMPLIFIER GRID meter, decrease the r-f drive from the exciter by adjusting exciter ANT TRIMMER C23 and exciter COUPLING loop L11 for decreased AMPLIFIER GRID meter reading. Readjust final amplifier GRID TUNING control C2 for maximum meter reading. Then readjust final amplifier PLATE TUNING control C9 and exciter COUPLING loop L11 to maintain 260-280 ma AMPLIFIER PLATE current meter reading.
- 4. It is recommended that neutralization be checked with the station "on-the-air". To do this, adjust PLATE TUNING C9 on the final amplifier through resonance while watching the AMPLIFIER GRID and AMPLIFIER PLATE CURRENT meters. The AMPLIFIER PLATE CURRENT meter should "dip" at the same time that the AMPLIFIER GRID meter "peaks" for proper neutralization of the final amplifier. If these conditions are not achieved repeat NEUTRALIZATION PROCEDURE. In either case, readjust C9 as described in Step 7, FINAL AMPLIFIER ALIGNMENT.

FINAL METER READINGS

EXCITER-RECEIVER	AMPLIFIER GRID	LINE VOLTAGE	AMPLIFIER PLATE (ma)	AMPLIFIER PLATE (V DC)
150 ma (max.)	28 ma (min.) 32 ma (max.)	117 volts	260 ma (min.) 280 ma (max.)	1950 v d-c

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN6319A-1	C3	WAS 500 UUF	V2
		R4	WAS 3500 OHMS	
		C11	ADDED 1000 UUF	
		W5	ADDED 1V80718A27 CIRCUIT WAS A5 SHOWN BELOW	

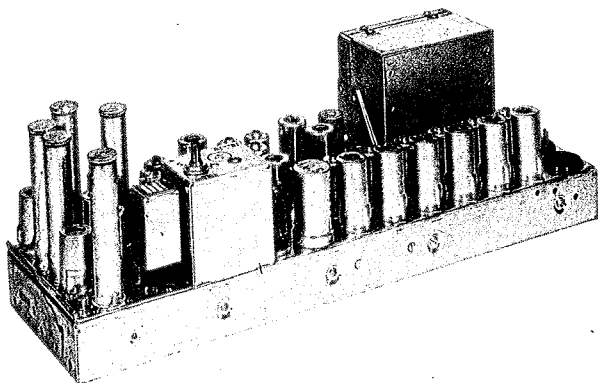
The diagram shows a circuit for V2. It includes a coil L5 labeled .86μH. A capacitor C3 labeled 500 is connected to a ground symbol. A resistor R3 labeled 100 2W is connected to the bottom of L5. A variable capacitor C4B labeled 7-48 is connected to the top of C3. A resistor R4 labeled 3500 50W is connected to the bottom of C4B. A potentiometer labeled SCREEN ADJUST is connected to the bottom of R4. The bottom of the potentiometer is connected to a line labeled ORG.



PARTS LIST for Schematic Diagram 63C81003A99-A

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	1V86722	<u>CAPACITOR ASSEMBLY,</u> fixed; molded silver mica; 250 uuf $\pm 10\%$; 500 v
C2	19B834146	<u>CAPACITOR,</u> variable; air; dual section; c/o; 7 uuf min. to 48 uuf max. section
C2A		7 uuf min. to 48 uuf max. section
C2B		fixed; silver mica; 1000 uuf $\pm 20\%$; 2000 v
C3	21K2727	same as C2
C4		same as C1
C5		same as C1
C6		same as C1
C7		same as C1
C8		same as C1
C9	51A84622	plate, includes threaded adjusting screw; two required for capacitance; one plate p/o W3, one plate p/o W4
C10	21B834201	fixed; ceramic; tubular; 500 uuf $\pm 50-20\%$; 20,000 vdcw; 2 threaded terminations; same as C3
C11		
E1	1B82815B01	<u>BAR,</u> shorting
J1	9A85615	<u>CONNECTOR, receptacle;</u> female; single contact; round mica filled insulator; square mounting base; does not include 15A483599 SHELL, connector, which must be ordered separately; p/o L3
J2		p/o L6; consists of: 47A834169 TUBE; antenna coupling loop 39A834388 CONNECTOR; terminal: female; single contact
L1	24B834310	<u>COIL, RF;</u> choke; 2.69 microhenries
L2		same as L1
L3	1V834368	grid link coupling; assy; incl: 1V834369 Assembly, Bracket and Insulator 24A834175 COIL, RF 30B475378 CABLE, RF; coax; RG-58A/U; 4-1/2" lgth req'd
L4	24A834176	Reference part J1 choke; parasitic suppressor; .86 microhenries
L5		same as L4
L6	1V834376	output coupling loop; assy; c/o: 24C834377 COIL, RF 4A84599 WASHER, spacer 14A84628 INSULATOR, bead 43A84600 BUSHING, insulator 42A84605 CLAMP, lower 41A834173 SPRING, compression 3S1838 SCREW, machine: 6-32 x 7/8 3S1234 SCREW, machine: 6-32 x 3/8 58A84526 COUPLING, shaft 4A84599 WASHER, spacer 4A849485 WASHER, spacer 43A847530 BUSHING, spacer 43A834460 COLLAR, stop 3S9705 SCREW, set: 8-32 x 1/4 47K112980 PIN, drive-lock Reference part J2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R1	17K50661	<u>RESISTOR, fixed;</u> wire-wound; 1000 ohm $\pm 10\%$; 10 w; ins.
R2	6R3963	carbon; 100 ohm $\pm 10\%$; 2 w; ins.
R3		same as R2
R4	17C82567B02	wire-wound; 7.5K $\pm 10\%$; 50 w
TB1	31K51723	<u>BOARD, terminal;</u> 8 dual screw terminals; does not include 13A893005 MARKER, identification; marker must be ordered separately
V1	197T105A01 or 197T115A01	<u>TUBE, electron;</u> 4-125A/4D21 6155 same as V1
V2		
W1	47A834154	<u>LINE, RF;</u> transmission same as W1
W2		transmission: assy; front; c/o: 47B82817B01 TUBE, tank line 51A84622 PLATE, capacitor: 1/2 of reference part C9 2A83024 NUT, adjustment lock
W3	1V834372	transmission: assy; rear; c/o: 47B82817B01 TUBE, tank line 51A84622 PLATE, capacitor: 1/2 of reference part C9 43A82820B01 INSERT, nylon 41A82821B01 SPRING, compression 15A82819B01 CAP, insulator 3S7129 SCREW, set: 10-32 x 3/16"
W4	1V80710A51	
W5	1V80718A27	<u>CABLE, coaxial;</u> assy; includes: 30B475378 CABLE, coaxial: RG-58A/U; 1 ft. req'd. 29R5294 LUG, solder
XV1	9B834177	<u>SOCKET, tube;</u> female; 5 contact; giant square ceramic base; four tube grounding retainer clips included same as XV1
XV2		
NON-REFERENCED ITEMS		
	67A51736	INSULATOR, feed-thru
	14A84617	INSULATOR, stand-off; 6-32; 4 req'd
	14A84616	INSULATOR, stand-off; 10-32; 2 req'd
	14A86397	INSULATOR, stand-off; dual
	42A834178	STRAP, plate line; 2 req'd
	58A84629	CONNECTOR, plate; 2 req'd
	58A84526	COUPLING, shaft & bushing
	2A806522	NUT, lock
	43A806680	BUSHING, locknut
	30A790948	CABLE, high voltage: 12" lgth req'd
	66A82818B01	TOOL, tuning



TRD1030AA SERIES RECEIVER

MODEL CHART

MODEL NUMBER	NO. OF FREQ.	FREQ-RANGE IN MC	CHAN. SPAC.
TRD1031AA	1	144-162	60 KC
TRD1031AB	1	144-162	30 KC
TRD1031AC	2	144-162	60 KC
TRD1031AD	2	144-162	30 KC
TRD1032AA	1	162-174	60 KC
TRD1032AB	1	162-174	30 KC
TRD1032AC	2	162-174	60 KC
TRD1032AD	2	162-174	30 KC
TRD1041AA	1	144-162	60 KC
TRD1041AB	1	144-162	30 KC
TRD1041AC	2	144-162	60 KC
TRD1041AD	2	144-162	30 KC
TRD1042AA	1	162-174	60 KC
TRD1042AB	1	162-174	30 KC
TRD1042AC	2	162-174	60 KC
TRD1042AD	2	162-174	30 KC
TRD1051AA	1	144-162	60 KC
TRD1051AB	1	144-162	30 KC
TRD1052AA	1	162-174	60 KC
TRD1052AB	1	162-174	30 KC

RECEIVER

144-174 MC

1. DESCRIPTION

a. Application

The receivers listed in the model chart receive FM signals on one (or two) fixed, crystal-controlled frequencies in the 144-174 mc band. Operating voltages are obtained from the radio set power supply.

b. Design

These receivers incorporate a dual conversion superheterodyne circuit. The 12 pre-tuned and sealed circuits of the i-f filter determine the signal reception bandwidth. On models designed for 30 kc channel spacing operation the signals are attenuated -100 db at ± 15 kc. On 60 kc models the signals are attenuated -100 db at ± 30 kc.

c. Basic Receiver Circuitry

The basic receiver circuit consists of the following stages: two r-f amplifiers, a first oscillator-multiplier, a mixer, a first i-f amplifier, a second oscillator, a second mixer, four second i-f stages, two limiter stages, a discriminator and two stages of audio amplification.

d. Two-Frequency Models

All models with nomenclature ending in C or D are 2-frequency versions of the basic single-frequency receiver.

The 2-frequency receiver is the same as the single-frequency receiver except for the


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Engineering Publications

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COMMUNICATIONS DIVISION

Chicago 51, Illinois

GUARANTEED PERFORMANCE SPECIFICATIONS

MODEL NUMBER	TRD1031AA, AB, AC, AD; TRD1041AA, AB, AC, AD; TRD1051AA, AB TRD1032AA, AB, AC, AD; TRD1042AA, AB, AC, AD; TRD1052AA, AB	
FREQUENCY	144-162 mc; 162-174 mc	
SENSITIVITY	0.6 microvolt or less for 20 db quieting 50 ohms r-f input impedance	
SELECTIVITY	-100 db or more at ± 30 kc; -100 db at ± 15 kc	
MODULATION ACCEPTANCE	± 15 kc; ± 5 kc	
SPURIOUS RESPONSE	All spurious and image responses are attenuated at least 100 db	
TEMPERATURE RANGE AND FREQUENCY STABILITY	Oven type crystal maintains oscillator stability within $\pm 0.0005\%$ from -30°C to $+60^{\circ}\text{C}$ ambient ($+25^{\circ}\text{C}$ reference)	
SQUELCH	Noise compensated type, adjustable sensitivity. Threshold sensitivity of 0.2 microvolt.	
AUDIO OUTPUT	1.0 watt to a 3.2 ohm load	
TUBE COMPLEMENT AND FUNCTION	6AK5 - 1st R-F 6AK5 - 2nd R-F (1) 6BC5 - Oscillator & Multiplier or (2) 6BC5 - Oscillator & Multiplier* 6AK5 - 1st Mixer 6BH6 - 1st I-F (1) 6BH6 - 2nd Oscillator 6BH6 - 2nd Mixer 6BH6 - 2nd I-F (1) 6BH6 - 2nd I-F (2) 6BH6 - 2nd I-F (3) 6BH6 - 2nd I-F (4) 6BH6 - 1st Limiter 6BJ6 - 2nd Limiter 6AL5 - Discriminator 6BH6 - Noise Amplifier 6AL5 - Noise Rectifier 12AX7 - 1st Audio & Squelch 6AQ5 - Audio Power Amplifier	
NUMBER OF TUNED CIRCUITS	Total of 31: 5 rigid coaxial tuned lines in the antenna, r-f amplifier and and oscillator multiplier stages. 26 permeability tuned circuits in the oscillator and i-f amplifier stages including 12 plastic-cast circuits in the "Permakay" i-f filter.	
FILTER TYPE	TFN6007AW "Permakay" (for 60 kc channel spacing); TFN6007AS "Permakay" (for 30 kc channel spacing)	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

*Used in two-frequency receivers only.

addition of another first oscillator and control crystal. Two-frequency models receive signals on two specific, crystal-controlled frequencies in the band. Only one frequency can be received at a time. The 2-frequency receivers are designed for operation with a frequency separation between channels as great as 180 kc without any change in performance specifications. An external switch is used to select frequencies. The switch is connected into the cathode circuits of the two first local oscillator stages. In the F1 position the switch grounds the cathode of the #1 oscillator, permitting that stage to operate normally. At the same time it opens the cathode of the #2 oscillator to disable the #2 stage. In the

F2 position the switch reverses the connections and selects the #2 local oscillator.

e. Chassis Complement

Each receiver consists of a basic chassis and a number of other items depending upon the frequency range, number of operating frequencies and channel spacing operation. The receivers are factory assembled from the sub-assemblies to form a compact single unit. The items included in each receiver are summarized in the following chart.

MODEL	FREQ.		BASIC CHASSIS								COIL KIT	FILTER		*XTAL.					RF DECK				SQL KIT	TWO FREQ. KIT
X = 1 USED	1 FREQ.	2 FREQ.	TU281WL	TU281WH	TU281SL	TU281SH	TU281WQL	TU281WQH	TU281SQL	TU281SQH	K-8414	TFN6007AW	TFN6007AS	RM16	RM27	ZM16	ZM27	A04	TU282BL	TU282BH	TU282BL-R2	TU282BH-R2	K-9144	K-9141
TRD1031AA	X		X								X	X			X			X	X					
TRD1031AB	X			X							X		X		X			X	X					
TRD1031AC		X	X								X	X				X	X			X				X
TRD1031AD		X		X							X		X			X	X			X				X
TRD1032AA	X			X							X	X		X				X		X				
TRD1032AB	X				X						X		X	X				X		X				
TRD1032AC		X	X								X	X			X	X					X			X
TRD1032AD		X			X						X		X		X	X					X			X
TRD1041AA	X					X					X	X			X			X	X					
TRD1041AB	X							X			X		X		X			X	X					
TRD1041AC		X				X					X	X				X	X			X				X
TRD1041AD		X						X			X		X			X	X			X				X
TRD1042AA	X						X				X	X		X				X		X				
TRD1042AB	X								X		X		X	X				X		X				
TRD1042AC		X					X				X	X			X	X					X			X
TRD1042AD		X							X		X		X			X	X				X			X
TRD1051AA	X					X					X	X			X			X	X				X	
TRD1051AB	X							X			X		X		X			X	X				X	
TRD1052AA	X						X				X	X		X				X		X			X	
TRD1052AB	X								X		X		X	X				X		X			X	

*ZM16 & ZM27 Crystal Assemblies for 2-frequency receivers, contain two channel crystals.

2. OPERATION

a. Stage Analysis

This receiver operates in accordance with basic FM receiver operation theory. The stage analysis given in these instructions is but a brief summary of the pertinent points. To follow the discussion refer to the block diagram. This diagram shows stage-by-stage signal flow and operating frequencies.

b. RF Amplifier

Signals received at the antenna are coupled to the grid of the first r-f amplifier by the impedance-matching network in the input circuit. The first r-f stage provides some amplification, however its main purpose is to improve sensitivity and selectivity. In the output of this stage, two coaxial tuned lines couple the signal into the second r-f amplifier and the signal from the second r-f amplifier is coupled, through another coaxial tuned line, into the first mixer. The second r-f amplifier provides some increase in gain and improves the r-f selectivity by isolating the tuned circuits. The gain of both r-f stages provides the optimum signal to noise ratio in the signals sent to the first mixer.

c. First Oscillator and Mixer

The first oscillator output is coupled to the multiplier where the output is five times the oscillator frequency. The first mixer heterodynes the signal from the r-f amplifier with the signal from the multiplier to produce the first intermediate frequency (1st i-f) of 5.5 mc.

These frequency relationships can be expressed as follows:

$$\begin{array}{l} f_1 = f_c - 5f_{01} \\ f_{01} = \frac{f_c - f_1}{5} \end{array} \left[\begin{array}{l} -162-174 \text{ mc} \\ \end{array} \right. \quad \begin{array}{l} f_1 = 5f_{01} - f_c \\ f_{01} = \frac{f_c + f_1}{5} \end{array} \left[\begin{array}{l} -144-162 \text{ mc} \\ \end{array} \right. \\ f_2 = f_{02} - f_1$$

f_c = carrier frequency

f_{01} = 1st oscillator crystal frequency
(dependent on f_c)

f_1 = 1st intermediate frequency
(fixed) = 5.5 mc

f_2 = 2nd intermediate frequency
(fixed) = 455 kc

f_{02} = 2nd oscillator crystal frequency
(fixed) = 5955 kc

The multiplied oscillator frequency and the r-f carrier are used as the input to the first mixer. The output from the first mixer is called the first intermediate frequency (first i-f).

d. First IF and Second Mixer

The signals are amplified in the first i-f amplifier and applied to the second mixer along with an injection frequency generated in the second local oscillator. The second local oscillator frequency is controlled by the i-f crystal. This frequency is 5955 kc, the same for all receivers regardless of r-f carrier frequency. The difference between the second local oscillator frequency and the first i-f is the second mixer output. This output is a 455 kc signal which carries the audio modulation. The frequency relationships of these three stages are as follows:

Second local oscillator

freq.	5955 kc
First intermediate freq. . .	5500 kc
Difference freq.	
(second i-f)	455 kc

e. Second IF

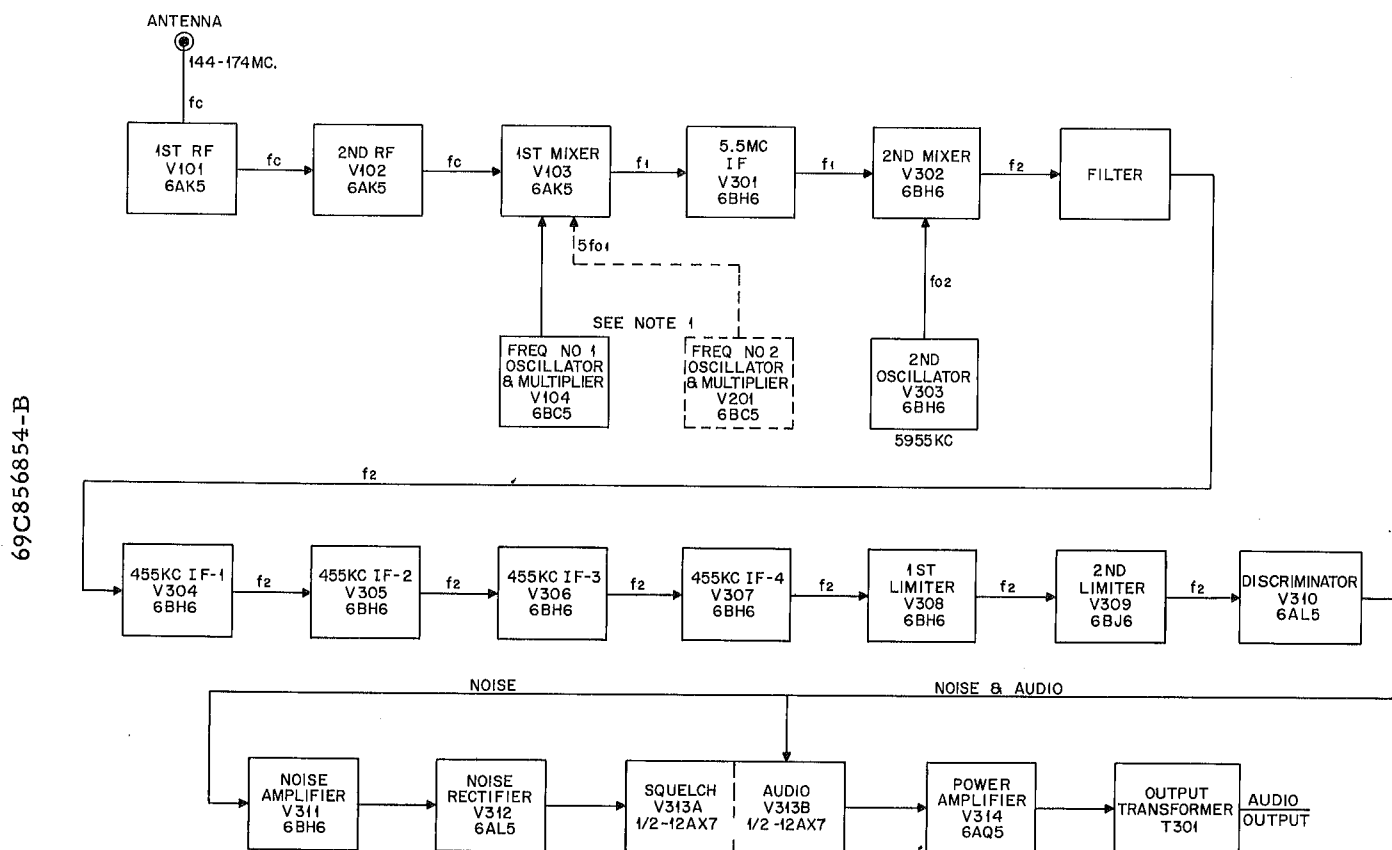
A "Permakay" i-f filter is used in the second i-f before the amplification stages. This filter is permanently sealed in polyesterstyrene and is unconditionally guaranteed for the life of the receiver provided the seal is unbroken and the housing is not tampered with. This filter is the major factor in determining the bandwidth of the receiver. It greatly attenuates the signal outside the pre-determined pass-band. Signals leaving the filter are amplified by four stages of second i-f amplification and applied to the limiter stages.

f. Limiters Discriminator and Audio Stages

The two limiter stages clip the tops and bottoms of the incoming signals, thereby virtually eliminating the noise which characteristically "rides" signals in the form of amplitude modulation. These stages are largely responsible for the "quieting" effect inherent in the FM communications receiver when it picks up an on-frequency signal. The limiter output is sent to the discriminator which translates frequency deviations into corresponding amplitude variations, thereby detecting the audio modulation. The audio amplification stage provides a 1.0 watt audio output to a three ohm load.

g. Noise-Actuated Squelch Circuit

The noise-actuated squelch circuit consists of a noise amplifier, a noise rectifier, a d-c amplifier and associated circuit components, as shown on the schematic diagram. The discriminator output is applied to the input of the noise amplifier. The input r-c network greatly attenuates the low-frequency components but passes frequencies above 3000 cps. These random frequencies are amplified in the noise amplifier. The variable SQUELCH control, in the cathode of the noise amplifier, varies the gain of the tube by adjusting its bias.



NOTES:

1. V201 IS USED FOR TWO FREQUENCY OPERATION. ONLY ONE FREQUENCY MAY BE IN USE AT ONE TIME.

DIAGRAM NO. 69C856854

The output of the noise amplifier drives the noise rectifier. The rectified noise signal appears as positive voltage across the load resistor. This positive voltage is added to a steady negative bias taken from the second limiter stage. The resultant of these two voltages is applied to the grid of the d-c amplifier tube. In the no-signal condition, i. e., noise alone, the resultant voltage is zero or somewhat positive. The d-c amplifier conducts and cuts off the audio amplifier tube. This keeps the speaker silent when signals are not being received. When signals are received the noise is greatly reduced and the rectified noise output is not enough to overcome the steady negative bias on the grid of the d-c amplifier. In this condition, the d-c amplifier is cut off and the audio amplifier operates, passing on the received audio signals.

h. Squelch Control

The SQUELCH control limits the gain of the noise amplifier tube. In practice, this control is adjusted for a "threshold" setting. This is the point where the rectified noise voltage will bias the grid of the d-c amplifier so that the audio amplifier is just barely cut-off. Then, when a weak signal is received a slight reduction in noise will cut off the d-c amplifier and allow the audio amplifier to conduct.

i. Audio Level

The audio level control on the receiver chassis is used to set the maximum audio level available at the VOLUME control on the control unit. This permits future adjustments to compensate for variations in tube characteristics, resistor and capacitor tolerances and transmitter deviation.

3. ALIGNMENT PROCEDURE

A complete receiver alignment procedure, in chart form, is included in this section. Test set-up information, using a Motorola portable test set, is also included with the alignment procedure.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. The meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. Refer to the applicable schematic diagram for specific metering pin receptacle information.

a. IF Gain Control Alignment

With an "on" frequency carrier signal of 0.5 microvolts input to the receiver and the squelch control open (unsquelched), adjust the control R304 for the best noise quieting. R304 is located on the side of the second mixer and oscillator shield and is accessible only from the bottom of the chassis.

b. Audio Frequency Response Modifications

Although the TRD1040A & TRD1050A Series Receivers are used primarily in base stations, they can also be used for mobile purposes. However, when a TRD1040A & TRD1050A Series Receiver is to be used as a mobile receiver WITHOUT MOTOROLA "QUIK-CALL" Selective Signalling, it is recommended that the audio frequency response be modified as shown in Figure 1. This modification improves the readability of weak signals in the presence of ignition noise. The modification simply consists of adding R392 and, reconnecting R384 and C384 as shown.

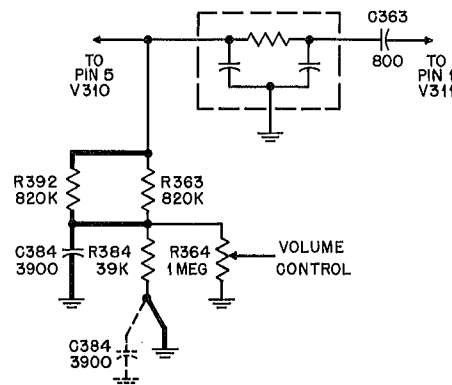


FIGURE 1.

4. TWO-RECEIVER CONSIDERATIONS

In two-receiver stations where the two receivers are intended to receive carrier frequencies separated less than 500 kc apart or separated 5.0 to 6.0 mc apart, special consideration must be given to the selection of control and i-f crystal frequencies. The data required for calculating the proper frequencies is shown on the CRYSTAL FREQUENCY CHART. The particular formula to be applied will depend upon carrier frequency separation and the operating frequencies to which the receivers are aligned.

Alignment of two-receiver equipment is identical to the standard single-receiver alignment procedure outlined in this section except for the differences in first i-f, control crystal and i-f crystal frequencies. When aligning the receivers, replacing a receiver, replacing a crystal or changing the carrier frequency in this application, refer to the above mentioned chart for crystal and i-f frequency data.

IMPORTANT

When ordering replacement crystals, be sure to specify all frequencies involved and crystal type numbers.

5. PRE-OPERATIONAL NOTES

The receiver is aligned to its exact operating frequency before it is shipped from the factory. However, it should be checked for proper operation before it is placed in service. Make the frequency check described in step 10 of the alignment chart in this section. Also take meter readings for the last six entries in the stage measurement chart. If the readings are beyond the allowable limits, realign the receiver according to the alignment chart.

a. Sensitivity Measurement (20 db Quieting)

The receiver sensitivity check should be made in a well shielded location in the absence of extraneous electrical noise. The sensitivity, or quieting signal, is that input signal necessary to reduce the output noise at the speaker by 20 db.

The following equipment is required to accurately measure the quieting signal:

FM Signal Generator (Motorola Model T1034B, or equivalent).

Motorola Portable Test Set (Model TU546 or TU546P).

(1) Warm up the signal generator for 1-1/2 to 2 hours.

(2) Plug the test set metering cable into the test set and the 11-pin receiver metering socket on the radio set.

(3) Place the test set function selector switch in the RCVR position.

(4) Set the signal generator to the carrier frequency and connect the signal generator, using the coaxial cable and 6 db pad, to the antenna connector on the radio set. The exact carrier frequency will be indicated by a "0" reading on the "0" center scale of the test set with the position selector switch in position 4.

(5) Turn the SQUELCH control on the control head fully counterclockwise (open).

(6) Place the position selector switch on the test set in position 11 AUDIO.

(7) If the radio set has a speaker connected to it, place the test set SPKR switch in the OPEN position. If the speaker is not connected, place the switch in the LOAD position. This is necessary to present the proper load to the audio amplifier.

(8) Set the VOLUME control to provide a convenient reading (preferably mid-scale for ease in reading) on the 0-2 VAC scale of the test set meter with the switch in the 2 VAC position. Record this reading.

(9) Advance the attenuator control on the signal generator until the test set meter indicates approximately 0.2 v a-c.

(10) Place the test set multiplier switch in the 0.2 VAC position and hold it there. In this position, the meter sensitivity is increased 20 db.

(11) Continue to increase the output of the signal generator until the meter reads exactly the same as it did in step (8).

(12) Note the microvolt output of the signal generator (indicated on the calibrated attenuator control). This is the 20 db quieting sensitivity and should be 0.5 microvolts or less for maximum efficiency.

b. Alternate Method -- 20 db Quieting Measurement

Equipment required:

Motorola S1051B Transistorized AC Voltmeter or equivalent.

Signal Generator (Motorola Model T1034B, or equivalent).

(1) Connect the a-c voltmeter across the voice coil terminals (pin #9 and #10 on the metering plug).

(2) With noise only, turn the VOLUME control to a normal listening level and turn the SQUELCH control fully counterclockwise (open).

(3) Note the reading on the meter. This is a reference level to be used later.

(4) Set the signal generator to the carrier frequency and connect the signal generator, using the coaxial cable and 6 db pad, to the antenna connector on the radio set.

(5) Inject a signal until the noise is reduced 1/10 the value as noted in step (3). For example, if step (3) was 1.0 volt, then step (5) should be 0.1 volt. The noise has been reduced 20 db. The receiver sensitivity in microvolts can now be read on the signal generator.

c. Average Stage Measurements

APPROXIMATE MICROVOLT INPUT		INPUT TO	FREQUENCY IN MC.	METER POSITION	METER READING OR DB METER	
RECEIVER WITH FILTER					RECEIVER WITH FILTER	
TFN6007AW	TFN6007AS				TFN6007AW	TFN6007AS
130000	130000	Pin 1 V308	.455	3	-10	-10
13000	13000	Pin 1 V307	.455	3	-25	-25
96000	96000	Pin 1 V306	.455	1	-5	-5
0.60 or less 1.0 to 1.2	0.60 or less 4.0	Antenna	F _o	*DB Meter 1	20 db (quieting) -30	20 db (quieting) -30
1.5 to 2.0 3.0 to 4.5	1.6 13.0	Pin 1 V101	F _o	*DB Meter 1	20 db (quieting) -15	20 db (quieting) -15
12 to 16 45 to 55	14 160	Pin 1 V102	F _o	*DB Meter 1	20 db (quieting) -15	20 db (quieting) -15
7 to 9 20 to 25	7 80	Pin 1 V103	5.5	*DB Meter 1	20 db (quieting) -15	20 db (quieting) -15
4.5 to 6.0 65 to 75	15 240	Pin 1 V301	5.5	*DB Meter 1	20 db (quieting) -15	20 db (quieting) -15
35 to 50 900 to 1100	200 2800	Filter Input Jack thru 6800 ohm matching resistor	.455	*DB Meter 1	20 db (quieting) -15	20 db (quieting) -15
6.3 150	6.3 150	Pin 1 V304	.455	*DB Meter 1	20 db (quieting) -15	20 db (quieting) -15
2200	2200	Pin 1 V305	.455	1	-5	-5
Noise	Noise	Antenna	No Signal	1	0 to -8	0 to -5
Noise	Noise	Antenna	No Signal	2	-11 to -25	-11 to -25
Noise	Noise	Antenna	No Signal	3	-32 to -45	-32 to -45
Noise	Noise	Antenna	No Signal	4	**0	***0
Noise	Noise	Antenna	No Signal	5	-17 to -32	-17 to -32
Noise	Noise	Antenna	No Signal	6	-13 to -28	-13 to -28

* Refer to Sensitivity Measurement procedure on page 7 when making this measurement.

** A meter reading of up to ± 1 ua of zero is allowable without any degradation.

*** A meter reading of up to ± 2.0 ua of zero is allowable without any degradation.

68P856853-1

CARRIER SEPARATION	RECEIVER FREQUENCY RELATIONSHIP	RECEIVER	CRYSTAL	ONE RECEIVER OPERATING IN THE 144-162 MC BAND AND ONE RECEIVER OPERATING IN THE 162-174 MC BAND	BOTH RECEIVERS OPERATING IN THE 162-174 MC BAND	BOTH RECEIVERS OPERATING IN THE 144-162 MC BAND
CARRIER FREQUENCY SEPARATION LESS THAN 500 KC	No. 1 Rcvr. Operating Higher Than No. 2 Rcvr.	No. 1	Control	Type RM16 $f_{x1} = \frac{f_1 - 5.5 \text{ MC}}{5}$	Type RM16 $f_{x1} = \frac{f_1 - 5.5 \text{ MC}}{5}$	Type RM27 $f_{x1} = \frac{f_1 + 5.5 \text{ MC}}{5}$
			IF	Type AO4 5955 KC	Type AO4 5955 KC	Type AO4 5955 KC
		No. 2	Control	Type RM28 $f_{x2} = \frac{f_2 + 5.5 \text{ MC} - f_d}{5}$	Type RM17 $f_{x2} = f_{x1}$	Type RM28 $f_{x2} = f_{x1}$
			IF	Type A12 5955 KC - f_d	Type A12 5955 KC - f_d	Type A12 5955 KC + f_d
	No. 1 Rcvr. Operating Lower Than No. 2 Rcvr.	No. 1	Control	Type RM28 $f_{x1} = \frac{f_1 + 5.5 \text{ MC} - f_d}{5}$	Type RM16 $f_{x1} = \frac{f_1 - 5.5 \text{ MC}}{5}$	Type RM27 $f_{x1} = \frac{f_1 + 5.5 \text{ MC}}{5}$
			IF	Type A12 5955 KC - f_d	Type AO4 5955 KC	Type AO4 5955 KC
		No. 2	Control	Type RM16 $f_{x2} = \frac{f_2 - 5.5 \text{ MC}}{5}$	Type RM17 $f_{x2} = f_{x1}$	Type RM28 $f_{x2} = f_{x1}$
			IF	Type AO4 5955 KC	Type A12 5955 KC + f_d	Type A12 5955 KC - f_d
CARRIER FREQUENCY SEPARATION 5.0 - 5.499 MC	No. 1 Rcvr. Operating Higher Than No. 2 Rcvr.	No. 1	Control	Type RM17 $f_{x1} = \frac{f_1 - 6.0 \text{ MC}}{5}$	Type RM17 $f_{x1} = \frac{f_1 - 6.0 \text{ MC}}{5}$	Type RM27 $f_{x1} = \frac{f_1 + 5.5 \text{ MC}}{5}$
			IF	Type A12 6455 KC	Type A12 6455 KC	Type AO4 5955 KC
		No. 2	Control	Type RM28 $f_{x2} = \frac{f_2 + 6.0 \text{ MC}}{5}$	Type RM16 $f_{x2} = \frac{f_2 - 5.5 \text{ MC}}{5}$	Type RM28 $f_{x2} = \frac{f_2 + 6.0 \text{ MC}}{5}$
			IF	Type A12 6455 KC	Type AO4 5955 KC	Type A12 6455 KC
	No. 1 Rcvr. Operating Lower Than No. 2 Rcvr.	No. 1	Control	Type RM28 $f_{x1} = \frac{f_1 + 6.0 \text{ MC}}{5}$	Type RM16 $f_{x1} = \frac{f_1 - 5.5 \text{ MC}}{5}$	Type RM28 $f_{x1} = \frac{f_1 + 6.0 \text{ MC}}{5}$
			IF	Type A12 6455 KC	Type AO4 5955 KC	Type A12 6455 KC
		No. 2	Control	Type RM17 $f_{x2} = \frac{f_2 - 6.0 \text{ MC}}{5}$	Type RM17 $f_{x2} = \frac{f_2 - 6.0 \text{ MC}}{5}$	Type RM27 $f_{x2} = \frac{f_2 + 5.5 \text{ MC}}{5}$
			IF	Type A12 6455 KC	Type A12 6455 KC	Type AO4 5955 KC
CARRIER FREQUENCY SEPARATION 5.5 - 6.0 MC	No. 1 Rcvr. Operating Higher Than No. 2 Rcvr.	No. 1	Control	Type RM17 $f_{x1} = \frac{f_1 - 5.0 \text{ MC}}{5}$	Type RM17 $f_{x1} = \frac{f_1 - 5.0 \text{ MC}}{5}$	Type RM27 $f_{x1} = \frac{f_1 + 5.5 \text{ MC}}{5}$
			IF	Type A12 5455 KC	Type A12 5455 KC	Type AO4 5955 KC
		No. 2	Control	Type RM28 $f_{x2} = \frac{f_2 + 5.0 \text{ MC}}{5}$	Type RM16 $f_{x2} = \frac{f_2 - 5.5 \text{ MC}}{5}$	Type RM28 $f_{x2} = \frac{f_2 + 5.0 \text{ MC}}{5}$
			IF	Type A12 5455 KC	Type AO4 5955 KC	Type A12 5455 KC
	No. 1 Rcvr. Operating Lower Than No. 2 Rcvr.	No. 1	Control	Type RM28 $f_{x1} = \frac{f_1 + 5.0 \text{ MC}}{5}$	Type RM16 $f_{x1} = \frac{f_1 - 5.5 \text{ MC}}{5}$	Type RM28 $f_{x1} = \frac{f_1 + 5.0 \text{ MC}}{5}$
			IF	Type A12 5455 KC	Type AO4 5955 KC	Type A12 5455 KC
		No. 2	Control	Type RM17 $f_{x2} = \frac{f_2 - 5.0 \text{ MC}}{5}$	Type RM17 $f_{x2} = \frac{f_2 - 5.0 \text{ MC}}{5}$	Type RM27 $f_{x2} = \frac{f_2 + 5.5 \text{ MC}}{5}$
			IF	Type A12 5455 KC	Type A12 5455 KC	Type AO4 5955 KC

LEGEND

f_1 = No. 1 Rcvr. Carrier Freq. f_{x2} = Xtal Freq. No. 2 Rcvr.
 f_2 = No. 2 Rcvr. Carrier Freq. f_d = Kilocycle Difference
Between f_1 & f_2
 f_{x1} = Xtal Freq. No. 1 Rcvr.

NOTE

Except for cases shown, receivers in the 144-162 mc range use control xtal type RM27 $f_{x1} = \frac{f_{\text{carrier}} + 5.5 \text{ mc}}{5}$ and i-f xtal AO4, 5955 kc. Receivers in the 162-174 mc range use control xtal type RM16 $f_{x1} = \frac{f_{\text{carrier}} - 5.5 \text{ mc}}{5}$ and i-f xtal AO4, 5955 kc.

TEST EQUIPMENT REQUIRED

1. Motorola TU546 Series Portable Test Set or equivalent.
2. Motorola Signal Generator Model T1034B or equivalent.
3. Motorola K-9322 Alignment Tool Kit.
4. Transmitter which this receiver is intended to receive (for frequency adjustment).
5. Power Supply (preferably one designed for the receiver under test).

**HOW TO SET UP THE TU546 SERIES TEST SETS
FOR DISCRIMINATOR AND 455 KC ALIGNMENT**

1. Set the function selector switch to the RCVR position.
2. Connect the 20-pin metering cable into the receptacle on the test set. Plug the other end (11-pin) into the metering socket on the receiver. When not using the test set disconnect the 20-pin metering cable to conserve battery life.
3. Connect one end of the test set r-f extension cable to the r-f connector on the test set. Connect the other end of the extension cable to the r-f probe cable.
4. Place the oscillator and meter reversing switch to the 455 kc position.

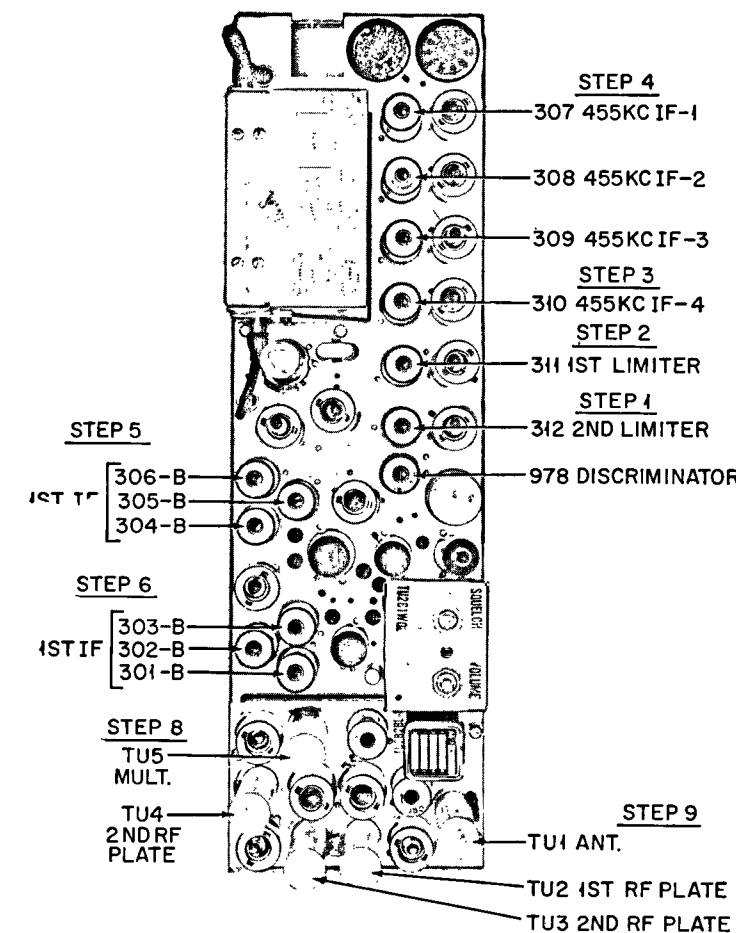
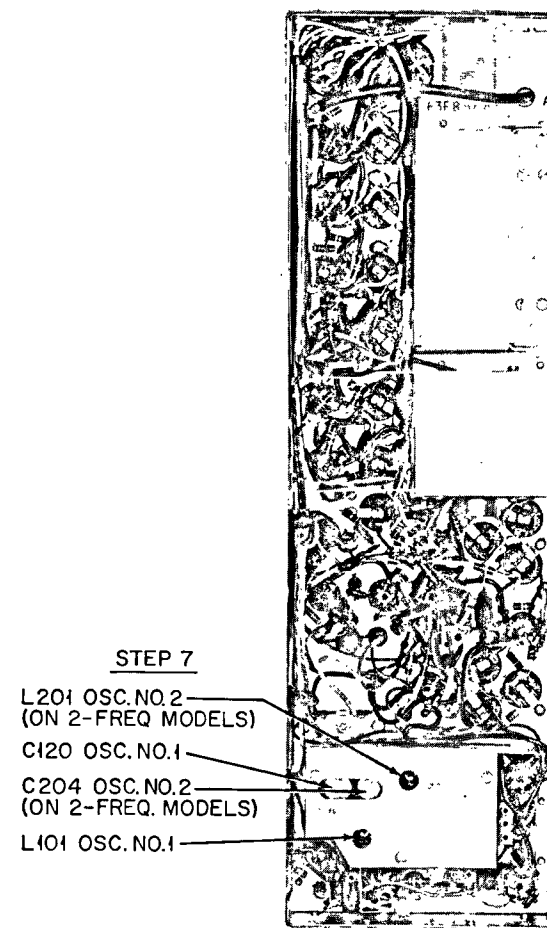
TEST SET SELECTOR SWITCH POSITIONS

TU546 SERIES TEST SETS	1	2	3	4	5	6
CIRCUIT METERED	2nd I-F #3 Grid	1st Lim. Grid	2nd Lim. Grid	Discr. Output	Discr. Input	1st Osc. Grid

**HOW TO SET UP THE SIGNAL GENERATOR*
FOR 5.5 MC IF ALIGNMENT**

1. Set the signal generator frequency for approximately 5.5 mc.
2. Couple the signal generator output loosely to the grid (pin 1) of V302. Couple just enough input to give a small increase in meter reading with the selector switch in position 1 or 2.
3. Set the test set selector switch to position 4.
4. Locate the exact 5.5 mc point by rotating the generator dial back and forth around the 5.5 mc setting until you obtain a meter reading of exactly zero (position 4). The meter reading should go above and below zero as the dial is rotated. Leave the generator set for zero meter reading. Make sure the signal remains constant throughout the alignment (generator may drift).

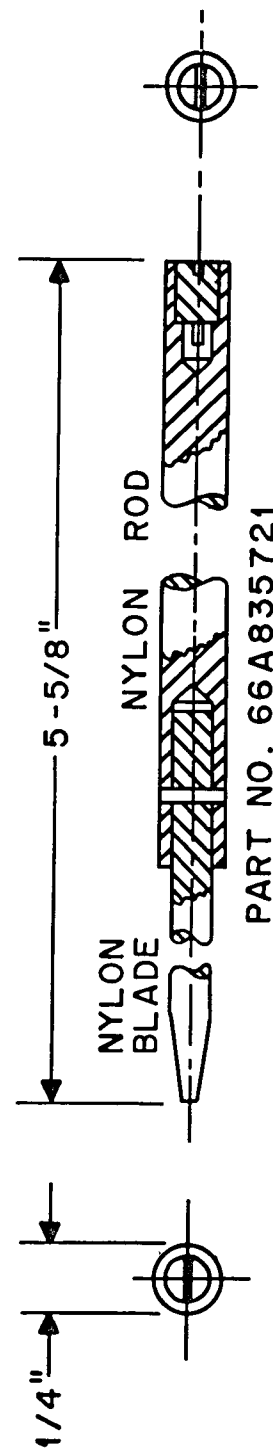
*Use Motorola Model T1034B, or equivalent.



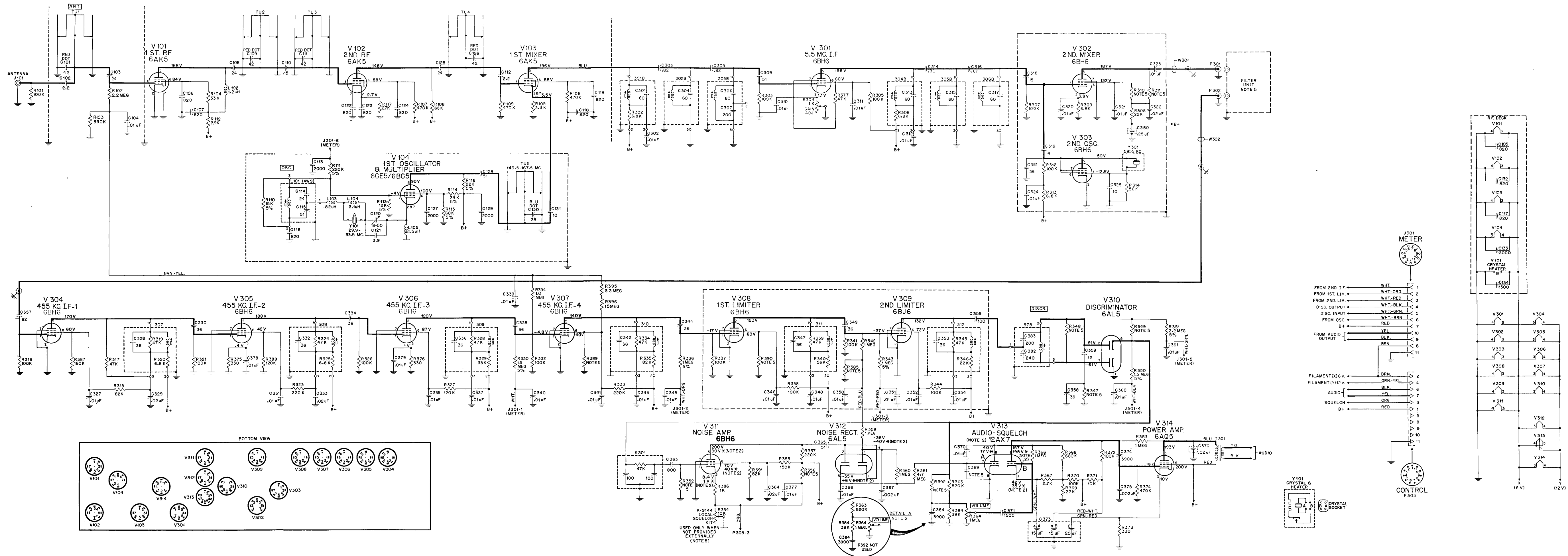
STEP	STAGE, TEST CONDITIONS AND PROCEDURE	ALIGNMENT FREQUENCY	ADJUSTMENT	TU546 TEST SET SWITCH POSITION	METER READING
1	DISCRIMINATOR -- Set up the Portable Test Set as described at the left. Place r-f probe under chassis near pin 1, V304, set meter selector switch to position 5. Turn the test set on. Adjust coil 978 (secondary) to a maximum counterclockwise position as viewed from the bottom of the chassis. Adjust coil 312 (primary) for maximum reading. Set the meter switch to position 4 and adjust coil 978 (secondary) for zero reading. Set the meter switch to position 5 and readjust coil 312 (primary) for maximum reading. Re-check for zero meter reading in position 4.	455 kc, sharp tuning	312, 978	5, 4	Maximum Zero
2	SECOND LIMITER COIL 311 -- Set meter selector switch to position 3. With r-f probe in same position as preceding step, tune coil 311 for maximum.	455 kc, sharp tuning	311	3	Maximum
3	FIRST LIMITER COIL 310 -- Set meter selector switch to position 2. With r-f probe same as before, tune coil 310 for maximum.	455 kc, sharp tuning	310	2	Maximum
4	455 KC I-F COILS 309, 308, 307 -- Set meter selector switch to position 1. With r-f probe same as before, tune coils 309, 308, 307 in order for maximum meter reading. After peaking coils, turn test set OFF and remove r-f probe.	455 kc, sharp tuning	309, 308, 307	1	Maximum
5	5.5 MC I-F COILS 306B, 305B, 304B -- Set up the signal generator as described at left for 5.5 mc i-f alignment. Set meter selector switch to position 1 or 2. Connect generator to grid (pin 1) of first i-f amplifier, V301. Adjust 306B, 305B, 304B in order for maximum reading.	5.5 mc, sharp tuning	306B, 305B, 304B	1 or 2	Maximum
6	5.5 MC I-F COILS 303B, 302B, 301B -- Connect generator to grid (pin 1) of first mixer, V103. With generator set as in step 5, adjust 303B, 302B, 301B in order for maximum reading. Disconnect generator.	5.5 mc, sharp tuning	303B, 302B, 301B	1 or 2	Maximum
7	FIRST OSCILLATOR COIL L101 -- Position the ceramic trimmer, C120, so that the screwdriver adjustment slot is parallel with the length of the receiver chassis. Adjust coil L101 for a maximum meter reading with the selector switch in position 6. If 2-frequency, set F1-F2 switch (on receiver) to F1 position while adjusting L101. Then place switch in F2 position while adjusting trimmer C204 and coil L201 in a similar manner.	Receiver cry- stal frequency	C120, L101 (C204, L201)	6	Maximum
8	R-F CIRCUIT -- Connect the output of the signal generator, adjusted to the desired carrier frequency by a zero meter reading in position 4, to the grid (pin 1) of V102, second r-f stage, using a 6 db, 50 ohm, attenuation pad. Adjust r-f tuning pipes TU5 and TU4 for a maximum reading with meter switch in position 2. (SEE NOTE.)	Carrier fre- quency, sharp tuning	TU5, TU4	2	Maximum
9	ANTENNA CIRCUIT -- Connect the output of the signal generator to the antenna connector (J101) on the receiver. Adjust r-f coaxial tuning pipes TU3, TU2 and TU1 for maximum meter reading with meter switch in position 1 or 2. Repeak TU5, TU4, TU3, TU2 and TU1.	Carrier fre- quency, sharp tuning	TU3, TU2, TU1	1 or 2	Maximum
10	FREQUENCY CHECK -- Transmit a carrier from the transmitter which this receiver is normally intended to receive. Listen for quieting at test set speaker. If necessary, couple antenna or length of wire to receiver antenna connector to bring in signal. Place meter selector switch in position 4 (+ or -). With transmitter carrier on, check meter reading. A zero reading indicates that receiver is "on frequency". Adjust trimmer C120 for frequency 1 or C204 for frequency 2).	Carrier fre- quency, sharp tuning	C120 (C204)	4	Zero

NOTE

When adjusting r-f coaxial tuning pipe TU5, two definite peaks may be observed on the test set meter. The correct tuning will be to the larger peak (lower frequency on 162-174 mc receivers, higher frequency on 144-162 mc receivers). The r-f circuits of the two-frequency receivers can be peaked to the frequency most often used or to the frequency equi-distant from the two operating frequencies for the best performance on both channels.



PART NO. 66A835721



REVISIONS				
DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
O1	TRD1031AA TRD1031AB TRD1041AA TRD1041AB TRD1051AA TRD1051AB	TU1, L101, R364	ANT, OSC & VOLUME FUNCTIONS ADDED	TU1, L101, R364
A	TRD1031AA-1 TRD1031AB-1 TRD1041AA-1 TRD1041AB-1 TRD1051AA-1 TRD1051AB-1	W301	PART NO. WAS 1V891171 TFN6007AW FILTER WAS K-9436-A TFN6007AS FILTER WAS K-9436-A MOTOROLA MODEL S1052A PORTABLE ELECTRONIC DC MULTIMETER WAS VTVM	PARTS LIST TABLE IN NOTE 5 TABLE IN NOTE 5
A1	TRD1031AA-1 TRD1031AB-1 TRD1041AA-1 TRD1041AB-1 TRD1051AA-1 TRD1051AB-1			

- NOTES:
- UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS $\pm 10\%$, 1/2 WATT. K=1000 OHMS.
ALL CAPACITOR VALUES ARE IN MICROMICROFARADS.
 - * RECEIVER SQUELCHED.
 - ALL VOLTAGE READINGS MEASURED WITH A MOTOROLA MODEL S1052A PORTABLE ELECTRONIC DC MULTIMETER.
 - ALL VOLTAGE READINGS MAY VARY $\pm 20\%$ EXCEPT B+ WHICH MAY VARY $\pm 10\%$.
 - COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.

COMP.	TRD1031AA	TRD1031AB	TRD1041AA	TRD1041AB	TRD1051AA	TRD1051AB
FILTER	TFN6007AA	TFN6007AS				
R310	390K	6.8K				
R311	6.8K	120K				
R389	68K	NOT USED				
R390	68K	NOT USED				
R395	5.9 MEG	1.2 MEG				
R347	470K	220K				
R348	39K	NOT USED				
R349	220K	150K				
R352	47K	100K				
R356	220K	68K				
C369	.01UF	.02UF				
R392	820K	820K	NOT USED	NOT USED	NOT USED	NOT USED

6. THESE MODELS HAVE A MODIFIED AUDIO RESPONSE FOR BASE STATION AND "QUICK-CALL" APPLICATIONS.

MODEL	SUFFIX	DESCRIPTION
TRD1031AA	1	1-FREQ. 60KC CHAN. SPACING
TRD1031AB	1	1-FREQ. 30KC CHAN. SPACING
TRD1041AA	1	1-FREQ. 60KC CHAN. SPACING (NOTE 6)
TRD1041AB	1	1-FREQ. 30KC CHAN. SPACING (NOTE 6)
TRD1051AA	1	SAME AS TRD1041AA W/LOCAL SQ.
TRD1051AB	1	SAME AS TRD1041AB W/LOCAL SQ.

DIAGRAM NO. 63E856855

PARTS LIST for Schematic Diagram 63E856855-A1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C101	51K891350	<u>CAPACITOR, fixed:</u> unless otherwise stated ceramic; disc; 42 uuf ±1 uuf; coded RED dot; includes ferrule, center wire and eyelet
C102	21K842427	molded phenolic; tubular; 2.2 uuf ±10%; 500 vdcw
C103	21K840365	ceramic; disc; 24 uuf ±5%; 500 vdcw
C104	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C105	21B837745	ceramic; disc; 820 uuf ±10%; 500 vdcw
C106		same as C105
C107		same as C105
C108		same as C103
C109		same as C101
C110	21A881064	molded phenolic; tubular; .15 uuf ±5%; 500 vdcw
C111		same as C101
C112		same as C102
C113	21K837746	ceramic; disc; 2000 uuf ±10%; 500 vdcw
C114	21K840845	ceramic; disc; 24 uuf ±5%; 500 vdcw
C115	21K840711	dipped silver mica; 51 uuf ±5%; 500 vdcw
C116		same as C105
C117		same as C105
C118		same as C105
C119		same as C105
C120	20B840719	variable; air; 8 uuf min. to 50 uuf max.
C121	21K838284	ceramic; disc; 3.9 uuf ±.25 uuf, 250 vdcw
C122		same as C105
C123		same as C105
C124		same as C105
C125		same as C103
C126		same as C101
C127		same as C113
C128		same as C115
C129		same as C113
C130	51B890641	ceramic; disc; 38 uuf ±1uuf; coded BLUE dot; includes ferrule, center wire and eyelet
C131	21R410063	ceramic; disc; 10 uuf ±5%; 500 vdcw
C132		same as C105
C133		same as C113
C134	21B800801	ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw
C301	21R400448	ceramic; tubular; 60 uuf ±10%; 500 vdcw
C302		same as C104
C303	21K475679	molded phenolic; tubular; .82 uuf ±10%; 500 vdcw
C304		same as C301
C305		same as C303
C306	21K847091	dipped silver mica; 80 uuf ±10%; 300 vdcw
C307	21K840812	dipped silver mica; 200 uuf ±5%; 500 vdcw
C308		NOT USED
C309		same as C115
C310		same as C104
C311		same as C104
C312		same as C104
C313		same as C301
C314		same as C301
C315		same as C301

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C316		<u>CAPACITOR, (cont'd)</u>
C317		same as C301
C318	21K840846	ceramic; disc; 15 uuf ±5%; 500 vdcw
C319	21K840850	ceramic; disc; 4 uuf ±.5 uuf; 500 vdcw
C320		same as C104
C321		same as C104
C322	21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw
C323		same as C104
C324		same as C104
C325		same as C131
C326		NOT USED
C327		same as C104
C328	21K834092	ceramic; tubular; 36 uuf ±5%; 500 vdcw
C329		same as C322
C330	21R121627	ceramic; disc; 36 uuf ±5%; 500 vdcw
C331		same as C104
C332		same as C328
C333		same as C322
C334		same as C330
C335		same as C104
C336		same as C328
C337		same as C104
C338		same as C104
C339		same as C104
C340		same as C104
C341		same as C104
C342		same as C328
C343		same as C104
C344		same as C330
C345		same as C104
C346		same as C104
C347		same as C328
C348		same as C104
C349		same as C330
C350		same as C104
C351		same as C104
C352		same as C104
C353		same as C328
C354		same as C104
C355	21K840069	ceramic; disc; 100 uuf ±5%; 500 vdcw
C356		NOT USED
C357	21K840045	molded silver mica; 62 uuf ±10%; 500 vdcw
C358	21R121962	ceramic; disc; 39 uuf ±5%; 500 vdcw
C359	21K855348	ceramic; disc; 12 uuf ±10%; 500 vdcw
C360		same as C104
C361		same as C104
C362		NOT USED
C363	21K840049	dipped silver mica; 800 uuf ±5%; 300 vdcw
C364		same as C322
C365		same as C115
C366		same as C104
C367		same as C113
C368		NOT USED
C369	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw; used only in TRD1031AA, TRD1041AA, TRD1051AA
	or 21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw; used only in TRD1031AB, TRD1041AB, TRD1051AB
C370		same as C104
C371		same as C134

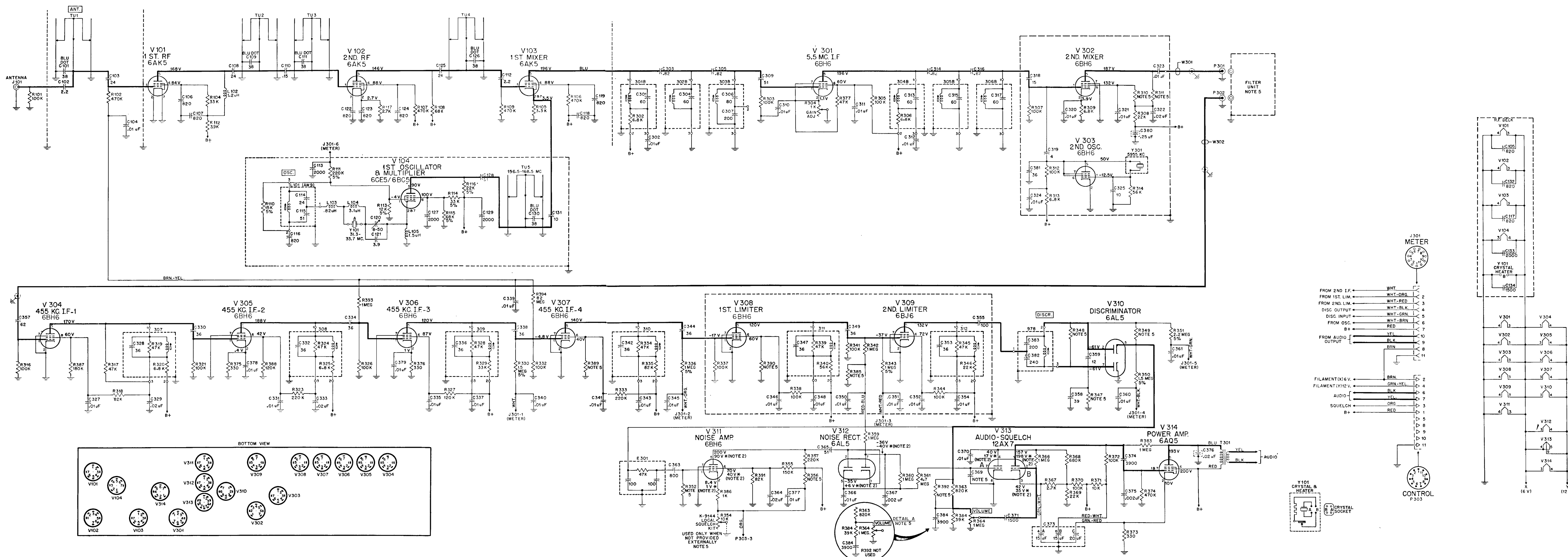
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C372		<u>CAPACITOR, (cont'd)</u>
C373	23K81256	NOT USED
C373A		electrolytic; tubular; 3 section; consisting of: Δ 15 uf +50-10%; 250 vdcw; section □ 15 uf +50-10%; 250 vdcw; section 20 uf +100-10%; 25 vdcw; section
C373B		ceramic; disc; 3900 uuf ±10%; 500 vdcw
C373C		same as C113
C374	21K837996	oil filled; tubular; .02 uf ±20%; 400 vdcw
C375		same as C113
C376	8K85984	oil filled; tubular; .02 uf ±20%; 400 vdcw
C377		same as C104
C378		same as C104
C379		same as C104
C380	8A892986	oil filled; tubular; .25 uf ±20%; 400 vdcw
C381		same as C330
C382	21K811932	molded silver mica; 240 uuf ±3%; 500 vdcw
C383	21K811933	molded silver mica; 200 uuf ±3%; 500 vdcw
C384		same as C374
E301	21K842354	<u>CAPACITOR-RESISTOR ASSEMBLY:</u> printed circuit; tubular; consisting of: dual capacitor; silver paint on ceramic form; 100 uuf each section and 47K carbon resistor
J101	9A87120	<u>CONNECTOR, receptacle:</u> female; single contact; round molded mica filled phenolic insulator; chassis mounted
J301	9B86864	female; 11 contact; polarized; round molded black phenolic base; chassis mounted; does not include 42A821428 RING connector retainer; which must be ordered separately
L101	24B845421	<u>COIL,</u> R-F: 1st Oscillator; base stamped AW9; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot and reference parts C114, C115
L102	24A891309	R-F: choke; 1.2 uh
L103	24B840512	R-F: choke; .82 uh; coded BLK-YEL
L104	24A85541	R-F: choke; 3.1 uh
L105	24K848119	R-F: choke; 1.5 uh; coded BRN-GRN dot
301B	24K811628	I-F: 1st Mixer Plate; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C301, R102
302B	24K811629	I-F: 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference part C304
303B	24K811627	I-F: Grid; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C306, C307
304B		same as 301B except I-F: Plate; 5.5 mc and includes reference parts C313, R306

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
305B		<u>COIL, (cont'd)</u>
306B		same as 302B except I-F: 2nd Mixer Grid; 5.5 mc and includes reference part C317
307	24B890723	I-F: 2nd I-F-1; 455 k-c includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C328, R319, R320
308		same as 307 except I-F: 2nd I-F-2; 455 k-c and includes reference parts C332, R324, R325
309	24B891317	I-F: 2nd I-F-3; Plate; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C336, R328, R329
310	24B890722	I-F: 2nd I-F-4; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C342, R334, R335
311	24B890721	I-F: 1st Limiter; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C317, R339, R340
312	24B804673	I-F: Discriminator Primary; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C353, R345, R346
978	24B811978	I-F: Discriminator Secondary; includes 46K86893 CORE, adjustable tuning; coded WHITE dot and reference parts C382, C383
P301	28A474006	<u>CONNECTOR, plug:</u> male; single contact; round bake-lite wafer insulator; cable mounting
P302		same as P301
P303	28B813576	male; 11 contact; polarized; round molded black phenolic base; cable mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately
R101	6R6031	<u>RESISTOR, fixed:</u> carbon; unless otherwise stated
R102	6R6433	100K ±10%; 1/2 w; ins.
R103	6R5646	2.2 meg. ±10%; 1/2 w; ins.
R104	6R6410	390K ±10%; 1/2 w; ins.
R105	6R5581	33K ±10%; 1/2 w; ins.
R106		same as R102
R107		same as R102
R108	6R6074	68K ±10%; 1/2 w; ins.
R109		same as R102
R110	6R5726	15K ±5%; 1/2 w; ins.
R111	6R400066	220K ±5%; 1/2 w; ins.
R112	6R5659	3.9K ±10%; 1/2 w; ins.
R113	6R2075	12K ±5%; 1/2 w; ins.
R114	6R2068	33K ±5%; 1/2 w; ins.
R115	6R6479	68K ±5%; 1/2 w; ins.
R116	6R6480	22K ±5%; 1/2 w; ins.
R117	6R5577	2.7K ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R301		<u>RESISTOR, fixed:</u> (cont'd)
R302	6R6428	NOT USED
R303		6.8K ±10%; 1/2 w; ins.
R304	18K849437	same as R101
R305		variable; wire-wound; 1K ±20%; 1 w
R306		same as R101
R307		same as R302
R308	6R6397	22K ±10%; 1/2 w; ins.
R309		same as R302
R310	6R5646	390K ±10%; 1/2 w; ins; used only in TRD1031AA, TRD1041AA, TRD1051AA
or 6R6428		6.8K ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R311	6R6428	6.8K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AA
or 6R5631		120K ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R312		same as R101
R313		same as R302
R314	6R6378	56K ±10%; 1/2 w; ins.
R315		NOT USED
R316		same as R101
R317	6R6048	47K ±10%; 1/2 w; ins.
R318	6R5644	82K ±10%; 1/2 w; ins.
R319	6R6048	47K ±10%; 1/2 w; ins.
R320		same as R302
R321		same as R101
R322		NOT USED
R323	6R6407	220K ±10%; 1/2 w; ins.
R324		same as R319
R325		same as R302
R326		same as R101
R327		120K ±10%; 1/2 w; ins.
R328	6R5631	same as R319
R329		NOT USED
R330	6R400228	1.5 megohm ±5%; 1/2 w; ins.
R331		NOT USED
R332		same as R101
R333		same as R323
R334		same as R330
R335		same as R101
R336		same as R318
R337		same as R330
R338		same as R101
R339		same as R101
R340		same as R314
R341		same as R101
R342	6R6046	1 megohm ±10%; 1/2 w; ins.
R343		same as R330
R344		same as R101
R345		same as R319
R346		same as R108
R347	6R6377	470K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AB
or 6R6407		220K ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R348	6R6487	39K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AA
R349	6R6407	220K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AA
or 6R6398		150K ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R350		same as R330
R351	6R2073	2.2 megohm ±5%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R352	6R6048	<u>RESISTOR, fixed:</u> (cont'd)
or 6R6031		47K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AA
R353		100K ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R354	18K824757	NOT USED
R355		variable; wire-wound; 10K ±10%; 2 w; p/o K-9144 Local Squeal Kit; used only when not provided externally
R356	6R6398	150K ±10%; 1/2 w; ins.
6R6407		220K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1051AA
or 6R6236		68K ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R357		same as R323
R358		NOT USED
R359		same as R342
R360		same as R342
R361	6R6446	4.7 megohm ±10%; 1/2 w; ins.
R362		NOT USED
R363	6R6429	820K ±10%; 1/2 w; ins.
R364	18K891109	variable; carbon; 1 megohm ±30% NOT USED
R365		same as R342
R366		same as R117
R367		680K ±10%; 1/2 w; ins.
R368	6R6475	same as R308
R369		same as R101
R370		10K ±10%; 1/2 w; ins.
R371	6R6320	same as R101
R372		330 ohm ±10%; 1/2 w; ins.
R373	6R6022	same as R102
R374		same as R373
R375		same as R373
R376		same as R373
R377		same as R319
R378		NOT USED
R379		NOT USED
R380		NOT USED
R381		NOT USED
R382		NOT USED
R383		same as R342
R384	6R6487	39K ±10%; 1/2 w; ins.
R385	6R490110	3.9 megohm ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AA
or 6R5653		1.2 megohm ±10%; 1/2 w; ins.; used only in TRD1031AB, TRD1041AB, TRD1051AB
R386	6R6229	1K ±10%; 1/2 w; ins.
R387	6R6444	180K ±10%; 1/2 w; ins.
R388		same as R327
R389	6R6074	68K ±10%; 1/2 w; ins.; used only in TRD1031AA, TRD1041AA, TRD1051AA
R390		same as R389
R391		same as R318
R392		same as R389 except used only in TRD1031AA, TRD1041AA, TRD1051AA
R393		NOT USED
R394	6R5585	same as 342
R395	6R6497	3.3 meg. ±10%; 1/2 w; ins.
R396	6R476065	15 meg. ±10%; 1/2 w; ins.
TU1		<u>CAVITY, tuned:</u> Field replacement not recommended
TU2		Field replacement not recommended
TU3		Field replacement not recommended
TU4		Field replacement not recommended

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
TU5		<u>CAVITY, tuned:</u> (cont'd)
T301	25K837004	Field replacement not recommended
V101	195T170A01	<u>TUBE, electron:</u>
V102		type 6AK5
V103		same as V101
V104	195T225A01	same as V101
V301	195T175A01	type 6BH6
V302		same as V301
V303		same as V301
V304		same as V301
V305		same as V301
V306		same as V301
V307		same as V301
V308		same as V301
V309	195T176A01	type 6BJ6
V310	195T111A03	type 6AL5
V311		same as V301
V312		same as V310
V313	195T134A01	type 12AX7
or 195T113A01		type 12AT7
V314	195T101A01	type 6AQ5
W301	1V80709A47	<u>LINE, RF transmission:</u> filter input; includes 30B475378 CABLE, RF; coaxial; RG-58A/U; 6" length req'd
W302	1V891172	Reference part P301 assembly; includes: 30B475378 CABLE, RF; coaxial; RG-58A/U; 9-1/2" length required
XV101	9B834083	Reference part P302
XV102		<u>SOCKET, tube: female;</u> 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV103		same as XV101
XV104		same as XV101
XV301		same as XV101
XV302		same as XV101
XV303		same as XV101
XV304		same as XV101
XV305		same as XV101
XV306		same as XV101
XV307		same as XV101
XV308		same as XV101
XV309		same as XV101
XV310		same as XV101
XV311	9B87123	tube; female; 7 contact; miniature molded black phenolic base; saddle mounting; includes center shield
XV312		same as XV311
XV313	9B86868	tube; female; 9 contact; miniature molded black phenolic base; saddle mounting; includes center shield
XV314		same as XV311



REVISIONS				
DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF SYMBOL	CHANGE	LOCATION
O1	TRD1032AA TRD1032AB TRD1042AA TRD1042AB TRD1052AA TRD1052AB	TU1, L101, R364	ANT, OSC & VOLUME FUNCTIONS ADDED	TU1, L101, R364
A	TRD1032AA-1 TRD1032AB-1 TRD1042AA-1 TRD1042AB-1 TRD1052AA-1 TRD1052AB-1	W301	PART NO. WAS 1V891171 TFN6007AW FILTER WAS K-8436-A FILTER	PARTS LIST TABLE IN NOTE 5
A1	TRD1032AA-1 TRD1032AB-1 TRD1042AA-1 TRD1042AB-1 TRD1052AA-1 TRD1052AB-1		TFN6007AS FILTER WAS T1049 FILTER MOTOROLA MODEL S1052A PORTABLE ELECTRONIC DC MULTIMETER WAS VTVM	TABLE IN NOTE 5

- NOTES:
- UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS $\pm 10\%$, 1/2 WATT, K=1000 OHMS.
ALL CAPACITOR VALUES ARE IN MICROMICROFARADS.
 - * RECEIVER SQUELCHED.
 - ALL VOLTAGE READINGS MEASURED WITH A MOTOROLA MODEL S1052A PORTABLE ELECTRONIC DC MULTIMETER.
 - ALL VOLTAGE READINGS MAY VARY $\pm 20\%$ EXCEPT B+ WHICH MAY VARY $\pm 10\%$.
 - COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.

COMP.	MODEL				
	TRD1032AA	TRD1032AB	TRD1042AA	TRD1042AB	TRD1052AA
FILTER	TFN6007AW	TFN6007AS			
R310	390K	6.8K			
R311	6.8K	120K			
R389	68K	NOT USED			
R390	68K	NOT USED			
R385	3.9 MEG	1.2 MEG			
R347	470K	220K			
R348	39K	NOT USED			
R349	220K	150K			
R352	47K	100K			
R355	220K	68K			
C369	0.01uF	0.02uF			
R392	820K	820K	NOT USED	NOT USED	NOT USED

6. THESE MODELS HAVE A MODIFIED AUDIO RESPONSE FOR BASE STATION AND "QUICK-CALL" APPLICATIONS.

MODEL TABLE		
MODEL	SUFFIX	DESCRIPTION
TRD1032AA	1	1-FREQ. 60KC CHAN. SPACING
TRD1032AB	1	1-FREQ. 30KC CHAN. SPACING
TRD1042AA	1	1-FREQ. 60KC CHAN. SPACING (NOTE 6)
TRD1042AB	1	1-FREQ. 30KC CHAN. SPACING (NOTE 6)
TRD1052AA	1	SAME AS TRD1042AA W/LOCAL SQ.
TRD1052AB	1	SAME AS TRD1042AB W/LOCAL SQ.

DIAGRAM NO. 63E856-6

PARTS LIST for Schematic Diagram 63E856856-A1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C101	51B890641	CAPACITOR, fixed; unless otherwise stated ceramic; disc; 38 uuf ±1 uuf; coded BLUE dot; includes ferrule, center wire and eyelet
C102	21K842427	molded phenolic; tubular; 2.2 uuf ±10%; 500 vdcw
C103	21K840365	ceramic; disc; 24 uuf ±5%; 500 vdcw
C104	21B801139	ceramic; disc; .01 uuf +80-20%; 600 vdcw
C105	21B837745	ceramic; disc; 820 uuf ±10%; 500 vdcw
C106	same as C105	
C107	same as C105	
C108	same as C103	
C109	same as C101	
C110	21A881064	molded phenolic; tubular; .15 uuf ±5%; 500 vdcw
C111	same as C101	
C112	same as C102	
C113	21K837746	ceramic; disc; 2000 uuf ±10%; 500 vdcw
C114	21K840845	ceramic; disc; 24 uuf ±5%; 500 vdcw
C115	21K840711	dipped silver mica; 51 uuf ±5%; 500 vdcw
C116	same as C105	
C117	same as C105	
C118	same as C105	
C119	same as C105	
C120	20B840719	variable; air; 8 uuf min. to 50 uuf max.
C121	21K838284	ceramic; disc; 3.9 uuf ±.25 uuf, 250 vdcw
C122	same as C105	
C123	same as C105	
C124	same as C105	
C125	same as C103	
C126	same as C101	
C127	same as C113	
C128	same as C115	
C129	same as C113	
C130	same as C113	
C131	21R410063	ceramic; disc; 10 uuf ±5%; 500 vdcw
C132	same as C105	
C133	same as C113	
C134	21B800801	ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw
C301	21R400448	ceramic; tubular; 60 uuf ±10%; 500 vdcw
C302	same as C104	
C303	21K475679	molded phenolic; tubular; .82 uuf ±10%; 500 vdcw
C304	same as C301	
C305	same as C303	
C306	21K847091	dipped silver mica; 80 uuf ±10%; 300 vdcw
C307	21K840812	dipped silver mica; 200 uuf ±5%; 500 vdcw
C308	NOT USED	
C309	same as C115	
C310	same as C104	
C311	same as C104	
C312	same as C301	
C313	same as C303	
C314	same as C301	
C315	same as C301	

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C316		CAPACITOR, (cont'd)
C317		same as C303
C318	21K840846	same as C301 ceramic; disc; 15 uuf ±5%; 500 vdcw
C319	21K840850	ceramic; disc; 4 uuf ±.5 uuf; 500 vdcw
C320		same as C104
C321		same as C104
C322	21B401029	ceramic; disc; .02 uuf +80-20%; 600 vdcw
C323		same as C104
C324		same as C104
C325		same as C131
C326		NOT USED
C327		same as C104
C328	21K834092	ceramic; tubular; 36 uuf ±5%; 500 vdcw
C329		same as C322
C330	21R121627	ceramic; disc; 36 uuf ±5%; 500 vdcw
C331		same as C104
C332		same as C328
C333		same as C322
C334		same as C330
C335		same as C104
C336		same as C328
C337		same as C104
C338		same as C330
C339		same as C104
C340		same as C104
C341		same as C328
C342		same as C104
C343		same as C330
C344		same as C104
C345		same as C104
C346		same as C104
C347		same as C328
C348		same as C104
C349		same as C330
C350		same as C104
C351		same as C104
C352		same as C104
C353		same as C328
C354		same as C104
C355	21K840069	ceramic; disc; 100 uuf ±5%; 500 vdcw
C356		NOT USED
C357	21K840045	molded silver mica; 62 uuf ±10%; 500 vdcw
C358	21R121962	ceramic; disc; 39 uuf ±5%; 500 vdcw
C359	21K855348	ceramic; disc; 12 uuf ±10%; 500 vdcw
C360		same as C104
C361		same as C104
C362		NOT USED
C363	21K840049	dipped silver mica; 800 uuf ±5%; 300 vdcw
C364		same as C322
C365		same as C115
C366		same as C104
C367		same as C113
C368		NOT USED
C369	21B801139	ceramic; disc; .01 uuf +80-20%; 600 vdcw; used only in TRD1032AA, TRD1042AA, TRD1052AA
	or 21B401029	ceramic; disc; .02 uuf +80-20%; 600 vdcw; used only in TRD1032AB, TRD1042AB, TRD1052AB
C370		same as C104
C371		same as C134

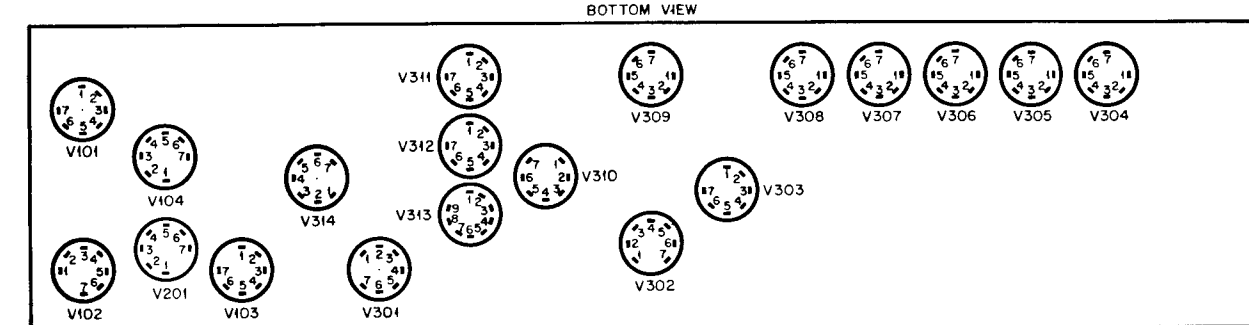
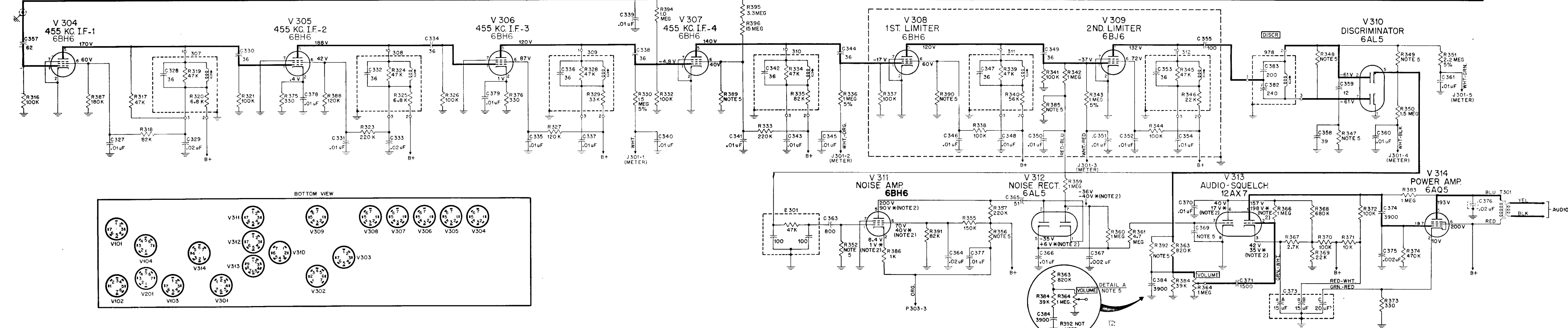
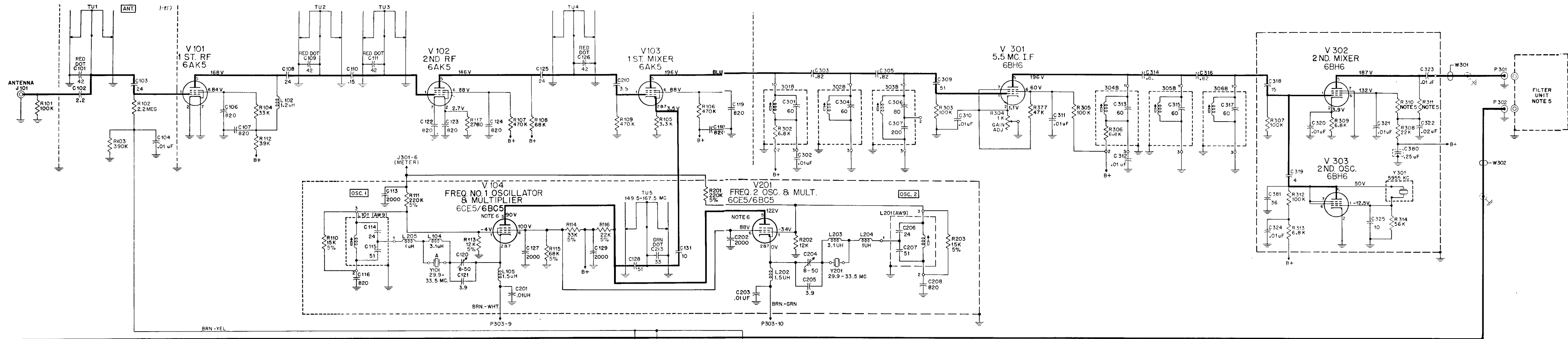
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C372		CAPACITOR, (cont'd)
C373	23K81256	NOT USED
C373A		electrolytic; tubular; 3 section; consisting of: Δ 15 uuf +50-10%; 250 vdcw; section
C373B		□ 15 uuf +50-10%; 250 vdcw; section
C373C		20 uuf +100-10%; 25 vdcw; section
C374	21K837996	ceramic; disc; 3900 uuf ±10%; 500 vdcw
C375		same as C113
C376	8K85984	oil filled; tubular; .02 uuf ±20%; 400 vdcw
C377		same as C104
C378		same as C104
C379		same as C104
C380	8A892986	oil filled; tubular; .25 uuf ±20%; 400 vdcw
C381		same as C330
C382	21K811932	molded silver mica; 240 uuf ±3%; 500 vdcw
C383	21K811933	molded silver mica; 200 uuf ±3%; 500 vdcw
C384		same as C374
E301	21K842354	CAPACITOR-RESISTOR ASSEMBLY; printed circuit; tubular; consisting of: dual capacitor; silver paint on ceramic form; 100 uuf each section and 47K carbon resistor
J101	9A87120	CONNECTOR, receptacle: female; single contact; round molded mica filled phenolic insulator; chassis mounted
J301	9B86864	female; 11 contact; polarized; round molded black phenolic base; chassis mounted; does not include 42A821428 RING connector retainer; which must be ordered separately
L101	24B845421	COIL, R-F; 1st Oscillator; base stamped AW9; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot and reference parts C114, C115
L102	24A891309	R-F; choke; 1.2 uh
L103	24B840512	R-F; choke; .82 uh; coded BLK-YEL
L104	24A85541	R-F; choke; 3.1 uh
L105	24K848119	R-F; choke; 1.5 uh; coded BRN-GRN dot
301B	24K811628	1-F; 1st Mixer Plate; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C301, R302
302B	24K811629	1-F; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference part C304
303B	24K811627	1-F; Grid; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C306, C307
304B		same as 301B except 1-F; Plate; 5.5 mc and includes reference parts C313, R306

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
305B		COIL, (cont'd)
R302		same as 302B except 1-F; 5.5 mc and includes reference part C315
306B		same as 302B except 1-F; 2nd Mixer Grid; 5.5 mc and includes reference part C317
307	24B890723	1-F; 2nd 1-F-1; 455 k-c includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C328, R319, R320
308		same as 307 except 1-F; 2nd 1-F-2; 455 k-c and includes reference parts C332, R324, R325
309	24B891317	1-F; 2nd 1-F-3; Plate; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C336, R328, R329
310	24B890722	1-F; 2nd 1-F-4; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C342, R334, R335
311	24B890721	1-F; 1st Limiter; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C317, R339, R340
312	24B804673	1-F; Discriminator Primary; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C353, R345, R346
978	24B811978	1-F; Discriminator Secondary; includes 46K86893 CORE, adjustable tuning; coded WHITE dot and reference parts C382, C383
P301	28A474006	CONNECTOR, plug: male; single contact; round bakelite wafer insulator; cable mounting
P302		same as P301
P303	28B813576	male; 11 contact; polarized; round molded black phenolic base; cable mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately
R101	6R6031	RESISTOR, fixed; carbon; unless otherwise stated
R102	6R6377	100K ±10%; 1/2 w; ins.
R103		470K ±10%; 1/2 w; ins.
R104	6R6410	33K ±10%; 1/2 w; ins.
R105	6R5581	3.3K ±10%; 1/2 w; ins.
R106		same as R102
R107		same as R102
R108	6R6074	68K ±10%; 1/2 w; ins.
R109		same as R102
R110	6R5726	15K ±5%; 1/2 w; ins.
R111	6R400066	220K ±5%; 1/2 w; ins.
R112	6R5659	3.9K ±10%; 1/2 w; ins.
R113	6R2075	12K ±5%; 1/2 w; ins.
R114	6R2068	33K ±5%; 1/2 w; ins.
R115	6R6479	68K ±5%; 1/2 w; ins.
R116	6R6480	22K ±5%; 1/2 w; ins.
R117	6R5577	2.7K ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R301		RESISTOR, fixed; (cont'd)
R302		NOT USED
R303	6R6428	6.8K ±10%; 1/2 w; ins.
R304	18K849437	same as R101 variable; wire-wound; 1K ±20%; 1 w
R305		same as R101
R306		same as R302
R307		same as R101
R308	6R6397	22K ±10%; 1/2 w; ins.
R309		same as R302
R310	6R5646	390K ±10%; 1/2 w; ins; used only in TRD1032AA, TRD1042AA, TRD1052AA
	or 6R6428	6.8K ±10%; 1/2 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R311	6R6428	6.8K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
	or 6R5631	120K ±10%; 1/2 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R312		same as R101
R313		same as R302
R314	6R6378	56K ±10%; 1/2 w; ins.
R315		NOT USED
R316		same as R101
R317	6R6048	47K ±10%; 1/2 w; ins.
R318	6R5644	82K ±10%; 1/2 w; ins.
R319	6R6048	47K ±10%; 1/2 w; ins.
R320		same as R302
R321		same as R101
R322	6R6407	NOT USED
R323		220K ±10%; 1/2 w; ins.
R324		same as R319
R325		same as R302
R326		same as R101
R327	6R5631	120K ±10%; 1/2 w; ins.
R328		same as R319
R329		same as R104
R330	6R400228	1.5 megohm ±5%; 1/2 w; ins.
R331		NOT USED
R332		same as R101
R333		same as R323
R334		same as R319
R335		same as R318
R336		same as R330
R337		same as R101
R338		same as R101
R339		same as R319
R340		same as R314
R341		same as R101
R342	6R6046	1 megohm ±10%; 1/2 w; ins.
R343		same as R330
R344		same as R101
R345		same as R319
R346		same as R308
R347	6R6377	470K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AB, TRD1052AA
	or 6R6407	220K ±10%; 1/2 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R348	6R6487	39K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
R349	6R6407	220K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
	or 6R6398	150K ±10%; 1/2 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R350		same as R330
R351	6R2073	2.2 megohm ±5%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R352	6R6048	RESISTOR, fixed; (cont'd)
	or 6R6031	47K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
R353		100K ±10%; 1/2 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R354	18K824757	NOT USED
		variable; wire-wound; 10K ±10%; 2 w; p/o K-9144 Local Squelch Kit; used only when not provided externally
R355	6R6398	150K ±10%; 1/2 w; ins.
R356	6R6407	220K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
	or 6R6236	68K ±10%; 1 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R357		same as R323
R358		NOT USED
R359		same as R342
R360		same as R342
R361	6R6446	4.7 megohm ±10%; 1/2 w; ins.
R362		NOT USED
R363	6R6429	820K ±10%; 1/2 w; ins.
R364	18K891109	variable; carbon; 1 megohm ±30%
R365		NOT USED
R366		same as R342
R367		same as R117
R368	6R6475	680K ±10%; 1/2 w; ins.
R369		same as R308
R370		same as R101
R371	6R6320	10K ±10%; 1/2 w; ins.
R372		same as R101
R373	6R6022	330 ohm ±10%; 1/2 w; ins.
R374		same as R102
R375		same as R373
R376		same as R373
R377		same as R319
R378		NOT USED
R379		NOT USED
R380		NOT USED
R381		NOT USED
R382		NOT USED
R383		same as R342
R384	6R6487	39K ±10%; 1/2 w; ins.
R385	6R490110	3.9 megohm ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
	or 6R5653	1.2 megohm ±10%; 1/2 w; ins.; used only in TRD1032AB, TRD1042AB, TRD1052AB
R386	6R6229	1K ±10%; 1/2 w; ins.
R387		180K ±10%; 1/2 w; ins.
R388		same as R327
R389	6R6074	68K ±10%; 1/2 w; ins.; used only in TRD1032AA, TRD1042AA, TRD1052AA
		same as R389
R390		same as R318
R391		same as R363 except used only in TRD1032AA, TRD1032AB, same as R342
R392		8.2 megohm ±10%; 1/2 w; ins.
R393		
R394	6R5585	
		CAVITY, tuned: Field replacement not recommended
TU1		Field replacement not recommended
TU2		Field replacement not recommended
TU3		Field replacement not recommended
TU4		Field replacement not recommended

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
TU5		<u>CAVITY, tuned; (cont'd)</u> Field replacement not recommended
T301	25K837004	<u>TRANSFORMER, A-F:</u> output; 5000 ohm to 3.2 ohm at 55 m-a d-c
V101	195T170A01	<u>TUBE, electron:</u> type 6AK5
V102		same as V101
V103		same as V101
V104	195T225A01	type 6CE5/6BC5
V301	195T175A01	type 6BH6
V302		same as V301
V303		same as V301
V304		same as V301
V305		same as V301
V306		same as V301
V307		same as V301
V308		same as V301
V309	195T176A01	type 6BJ6
V310	195T111A03	type 6AL5
V311		same as V301
V312		same as V310
V313	195T134A01	type 12AX7
or 195T113A01		type 12AT7
V314	195T101A01	type 6AQ5
W301	1V80709A47	<u>LINE, RF transmission:</u> filter input; includes 30B475378 CABLE RF: coaxial; RG-58A/U; 6" length req'd
W302	1V891172	Reference part P301 assembly; includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 9-1/2" length required Reference part P302
XV101	9B834083	<u>SOCKET, tube; female:</u> 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV102		same as XV101
XV103		same as XV101
XV104		same as XV101
XV301		same as XV101
XV302		same as XV101
XV303		same as XV101
XV304		same as XV101
XV305		same as XV101
XV306		same as XV101
XV307		same as XV101
XV308		same as XV101
XV309		same as XV101
XV310		same as XV101
XV311	9B87123	tube; female; 7 contact; miniature molded black phenolic base; saddle mounting; includes center shield
XV312		same as XV311
XV313	9B86868	tube; female; 9 contact; miniature molded black phenolic base; saddle mounting; includes center shield
XV314		same as XV311
XY101	9K857508	crystal; female; 4 contact; square molded black bakelite base; chassis mounted



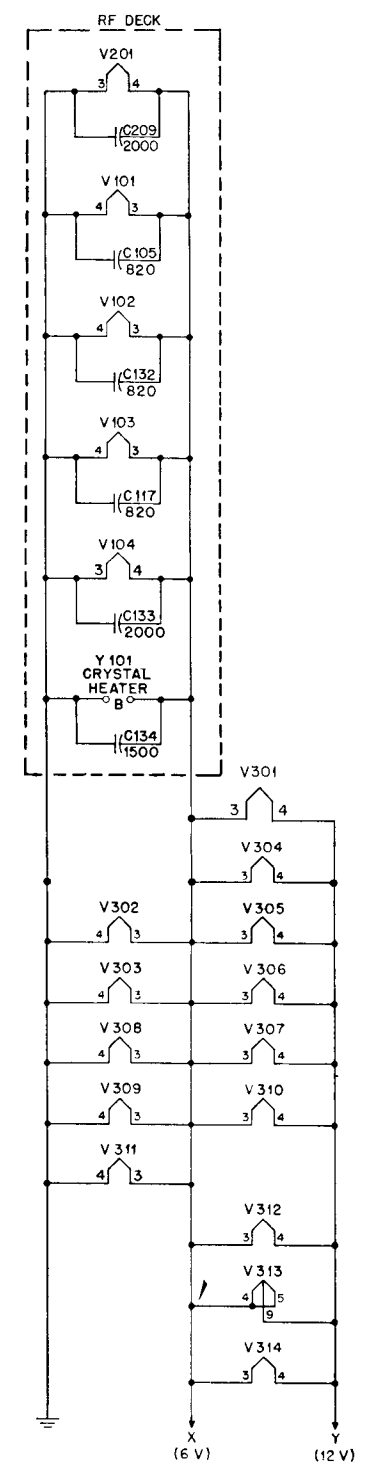
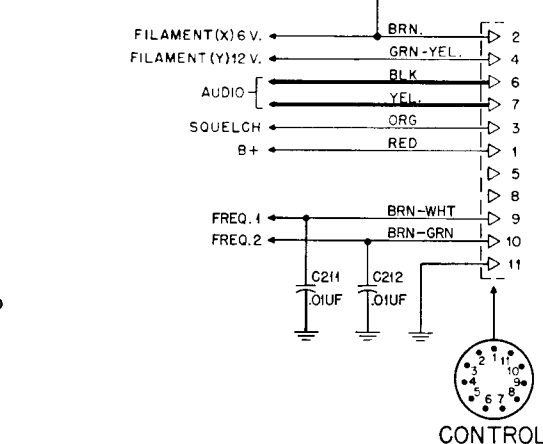
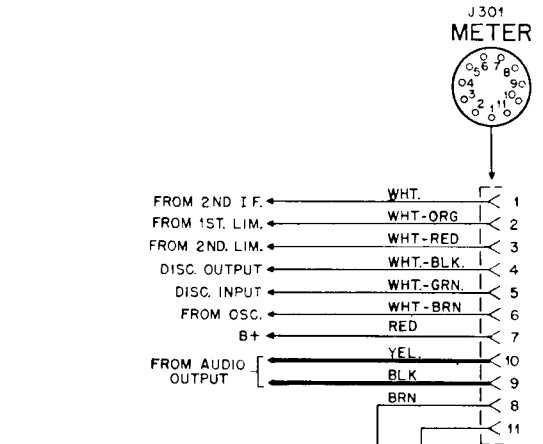
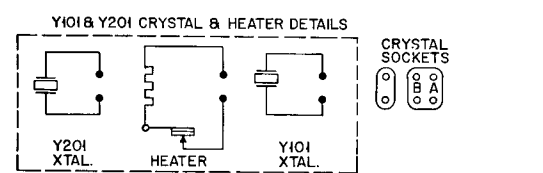
REVISIONS				
DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A1	TRD1031AC TRD1031AD TRD1041AC TRD1041AD	TU101, L101, L201, R364	ANT, OSC #1, OSC #2 & VOLUME FUNCTIONS ADDED	TU101, L101, L201, R364
B	TRD1031AC-1 TRD1031AD-1 TRD1041AC-1 TRD1041AD-1	W301	PART NO. WAS 1V891171	PARTS LIST
B1			MOTOROLA DC MULTIMETER WAS VTVM	NOTE 3

- NOTES:
- UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS $\pm 10\%$, 1/2 WATT. K=1000 OHMS.
ALL CAPACITOR VALUES ARE IN MICROMICROFARADS.
 - * RECEIVER SQUELCHED.
 - ALL VOLTAGE READINGS MEASURED WITH A MODEL S1052A DC MULTIMETER.
 - ALL VOLTAGE READINGS MAY VARY $\pm 20\%$ EXCEPT B+ WHICH MAY VARY $\pm 10\%$.
 - COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS
FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING
TABLE FOR SPECIFIC IDENTIFICATION.

COMP.	TRD1031AC	TRD1031AD	TRD1041AC	TRD1041AD
FILTER	TN6507AW	TN6507AS		
R310	390K	6.8K		
R311	6.8K	120K		
R389	68K	NOT USED		
R390	68K	NOT USED		
R385	3.9 MEG	1.2 MEG		
R347	470K	220K		
R348	39K	NOT USED		
R349	220K	150K		
R352	47K	100K		
R356	68K	220K		
R359	.01UF	.02UF		
R392	820K	820K	NOT USED	NOT USED

- 6 READINGS TAKEN WITH FREQUENCY SELECTOR SWITCH
IN CORRESPONDING FREQUENCY POSITION.
- 7 THIS MODEL HAS A MODIFIED AUDIO RESPONSE FOR
BASE STATION AND "QUICK-CALL" APPLICATIONS.

MODEL	SUFFIX	DESCRIPTION
TRD1031AC	1	2-FREQ. 60KC CHAN. SPACING
TRD1031AD	1	2-FREQ. 30KC CHAN. SPACING
TRD1041AC	1	2-FREQ. 60KC CHAN. SPACING (NOTE 7)
TRD1041AD	1	2-FREQ. 30KC CHAN. SPACING (NOTE 7)



NOTE
COMPONENTS REFERENCED IN 200 SERIES ARE
ON THE LAST PANEL OF THIS PARTS LIST.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C101	51K891350	CAPACITOR, fixed; unless otherwise stated ceramic; disc; 42 uuf ±1 uuf; coded RED dot; includes ferrule, center wire and eyelet
C102	21K842427	molded phenolic; tubular; 2.2 uuf ±10%; 500 vdcw
C103	21K840365	ceramic; disc; 24 uuf ±5%; 500 vdcw
C104	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C105	21B837745	ceramic; disc; 820 uuf ±10%; 500 vdcw
C106		same as C105
C107		same as C105
C108		same as C103
C109		same as C101
C110	21A881064	molded phenolic; tubular; .15 uuf ±5%; 500 vdcw
C111		same as C101
C112		NOT USED
C113	21K837746	ceramic; disc; 2000 uuf ±10%; 500 vdcw
C114	21K840845	ceramic; disc; 24 uuf ±5%; 500 vdcw
C115	21K840711	dipped silver mica; 51 uuf ±5%; 500 vdcw
C116		same as C105
C117		same as C105
C118		same as C105
C119		same as C105
C120	20B840719	variable; air; 8 uuf min. to 50 uuf max.
C121	21K838284	ceramic; disc; 3.9 uuf ±.25 uuf, 250 vdcw
C122		same as C105
C123		same as C105
C124		same as C105
C125		same as C103
C126		same as C101
C127		same as C113
C128		same as C115
C129		same as C113
C130		NOT USED
C131	21R410063	cer.; disc; 10 uuf ±5%; 500 vdcw
C132		same as C105
C133		same as C113
C134	21B800801	ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw
C301	21R400448	ceramic; tubular; 60 uuf ±10%; 500 vdcw
C302		same as C104
C303	21K475679	molded phenolic; tubular; .82 uuf ±10%; 500 vdcw
C304		same as C301
C305		same as C303
C306	21K847091	dipped silver mica; 80 uuf ±10%; 300 vdcw
C307	21K840812	dipped silver mica; 200 uuf ±5%; 500 vdcw
C308		NOT USED
C309		same as C115
C310		same as C104
C311		same as C104
C312		same as C104
C313		same as C301
C314		same as C303
C315		same as C301

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C316		CAPACITOR, (cont'd)
C317		same as C303
C318	21K840846	same as C301
C319	21K840850	ceramic; disc; 15 uuf ±5%; 500 vdcw
C320		ceramic; disc; 4 uuf ±.5 uuf; 500 vdcw
C321		same as C104
C322	21B401029	same as C104
C323		ceramic; disc; .02 uf +80-20%; 600 vdcw
C324		same as C104
C325		same as C104
C326		same as C104
C327		NOT USED
C328		same as C104
C329	21K834092	ceramic; tubular; 36 uuf ±5%; 500 vdcw
C330	21R121627	ceramic; disc; 36 uuf ±5%; 500 vdcw
C331		same as C104
C332		same as C328
C333		same as C322
C334		same as C330
C335		same as C104
C336		same as C328
C337		same as C104
C338		same as C330
C339		same as C104
C340		same as C104
C341		same as C104
C342		same as C328
C343		same as C104
C344		same as C330
C345		same as C104
C346		same as C104
C347		same as C328
C348		same as C104
C349		same as C330
C350		same as C104
C351		same as C105
C352		same as C104
C353		same as C328
C354		same as C104
C355	21K840069	ceramic; disc; 100 uuf ±5%; 500 vdcw
C356		NOT USED
C357	21K840045	molded silver mica; 62 uuf ±10%; 500 vdcw
C358	21R121962	ceramic; disc; 39 uuf ±5%; 500 vdcw
C359	21K855348	ceramic; disc; 12 uuf ±10%; 500 vdcw
C360		same as C104
C361		same as C104
C362		NOT USED
C363	21K840049	dipped silver mica; 800 uuf ±5%; 300 vdcw
C364		same as C322
C365		same as C115
C366		same as C104
C367		same as C113
C368		NOT USED
C369	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw; used only in TRD1031AC, TRD1041AC
	or 21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw; used only in TRD1031AD, TRD1041AD
C370		same as C104
C371		same as C134

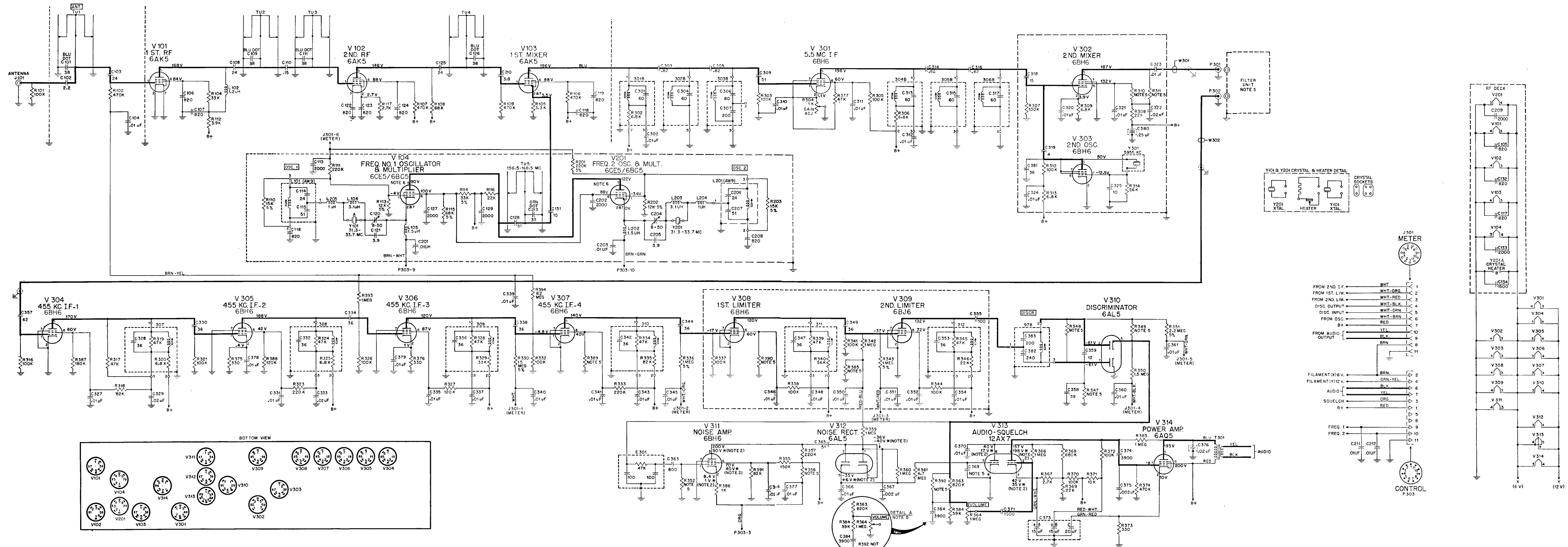
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C372		CAPACITOR, (cont'd)
C373	23K81256	NOT USED
C373A		electrolytic; tubular; 3 section; consisting of: Δ 15 uf +50-10%; 250 vdcw; section □ 15 uf +50-10%; 250 vdcw; section 20 uf +100-10%; 25 vdcw; section
C373B		ceramic; disc; 3900 uuf ±10%; 500 vdcw
C374	21K837996	same as C113
C375		oil filled; tubular; .02 uf ±20%; 400 vdcw
C376	8K85984	same as C104
C377		same as C104
C378		same as C104
C379		same as C104
C380	8A892986	oil filled; tubular; .25 uf ±20%; 400 vdcw
C381		same as C330
C382	21K811932	molded silver mica; 240 uuf ±3%; 500 vdcw
C383	21K811933	molded silver mica; 200 uuf ±3%; 500 vdcw
C384		same as C374
E301	21K842354	CAPACITOR-RESISTOR ASSEMBLY; printed circuit; tubular; consisting of: dual capacitor; silver paint on ceramic form; 100 uuf each section and 47K carbon resistor
J101	9A87120	CONNECTOR, receptacle; female; single contact; round molded mica filled phenolic insulator; chassis mounted
J301	9B86864	female; 11 contact; polarized; round molded black phenolic base; chassis mounted; does not include 42A821428 RING connector retainer; which must be ordered separately
L101	24B845421	COIL, R-F; 1st Oscillator; base stamped AW9; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot and reference parts C114, C115
L102	24A891309	R-F; choke; 1.2 uh
L103	24B840512	R-F; choke; .82 uh; coded BLK-YEL
L104	24A85541	R-F; choke; 3.1 uh
L105	24K848119	R-F; choke; 1.5 uh; coded BRN-GRN dot
301B	24K811628	1-F; 1st Mixer Plate; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C301, R302
302B	24K811629	1-F; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference part C304
303B	24K811627	1-F; Grid; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C306, C307
304B		same as 301B except 1-F; Plate; 5.5 mc and includes reference parts C313, R306

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
305B		COIL, (cont'd)
306B		same as 302B except 1-F: 2nd Mixer Grid; 5.5 mc and includes reference part C317
307	24B890723	1-F; 2nd 1-F-1; 455 k-c includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C328, R319, R320
308		same as 307 except 1-F: 2nd 1-F-2; 455 k-c and includes reference parts C332, R324, R325
309	24B891317	1-F; 2nd 1-F-3; Plate; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C336, R328, R329
310	24B890722	1-F; 2nd 1-F-4; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C342, R334, R335
311	24B890721	1-F; 1st Limiter; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C317, R339, R340
312	24B804673	1-F; Discriminator Primary; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C353, R345, R346
978	24B811978	1-F; Discriminator Secondary; includes 46K86893 CORE, adjustable tuning; coded WHITE dot and reference parts C382, C383
P301	28A474006	CONNECTOR, plug; male; single contact; round bakelite wafer insulator; cable mounting
P302		same as P301
P303	28B813576	male; 11 contact; polarized; round molded black phenolic base; cable mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately
R101	6R6031	RESISTOR, fixed; carbon; unless otherwise stated
R102	6R6433	100K ±10%; 1/2 w; ins.
R103	6R5646	2.2 megohm ±10%; 1/2 w; ins.
R104	6R6410	390K ±10%; 1/2 w; ins.
R105	6R5581	33K ±10%; 1/2 w; ins.
R106	6R6377	3.3K ±10%; 1/2 w; ins.
R107		470K ±10%; 1/2 w; ins.
R108	6R6074	same as R106
R109		68K ±10%; 1/2 w; ins.
R110	6R5726	15K ±5%; 1/2 w; ins.
R111	6R400066	220K ±5%; 1/2 w; ins.
R112	6R5659	3.9K ±10%; 1/2 w; ins.
R113	6R2075	12K ±5%; 1/2 w; ins.
R114	6R2068	33K ±5%; 1/2 w; ins.
R115	6R6479	68K ±5%; 1/2 w; ins.
R116	6R6480	22K ±5%; 1/2 w; ins.
R117	6R5577	2.7K ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R301		RESISTOR, fixed; (cont'd)
R302	6R6428	NOT USED
R303		47K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
R304	18K849437	same as R302
R305		variable; wire-wound; 1K ±20%; 1 w
R306		same as R101
R307		same as R302
R308	6R6397	same as R101
R309		variable; wire-wound; 10K ±10%; 2 w; p/o K-9144 Local Squelch Kit; used only when not provided externally
R310	6R5646	22K ±10%; 1/2 w; ins.
		390K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
	or 6R6428	6.8K ±10%; 1/2 w; ins.; used only in TRD1031AD, TRD1041AD
R311	6R6428	6.8K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
	or 6R5631	120K ±10%; 1/2 w; ins.; used only in TRD1031AD, TRD1041AD
R312		same as R101
R313		same as R302
R314	6R6378	same as R342
R315		4.7 megohm ±10%; 1/2 w; ins.
R316		NOT USED
R317		same as R101
R318	6R6048	same as R342
R319	6R5644	47K ±10%; 1/2 w; ins.
R320	6R6048	same as R302
R321		same as R101
R322	6R6407	NOT USED
R323		220K ±10%; 1/2 w; ins.
R324		same as R319
R325		same as R302
R326		same as R101
R327	6R5631	120K ±10%; 1/2 w; ins.
R328		same as R319
R329		same as R104
R330	6R400228	1.5 megohm ±5%; 1/2 w; ins.
R331		NOT USED
R332		NOT USED
R333		same as R101
R334		same as R323
R335		same as R319
R336	6R5587	same as R318
R337		1 megohm ±5%; 1/2 w; ins.
R338		same as R101
R339		same as R101
R340		same as R314
R341		same as R101
R342	6R6046	1 megohm ±10%; 1/2 w; ins.
R343		same as R336
R344		same as R101
R345		same as R319
R346		same as R308
R347	6R6377	470K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
	or 6R6407	220K ±10%; 1/2 w; ins.; used only in TRD1031AD, TRD1041AD
R348	6R6487	39K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
R349	6R6407	220K ±10%; 1/2 w; ins.; used on only in TRD1031AC, TRD1041AC
	or 6R6398	150K ±10%; 1/2 w; ins.; used only in TRD1031AD, TRD1041AD
R350		same as R330
R351	6R2073	2.2 megohm ±5%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R352	6R6048	RESISTOR, fixed; (cont'd)
	or 6R6031	47K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
R353	18K824757	100K ±10%; 1/2 w; ins.; used only in TRD1031AD, TRD1041AD
R354		NOT USED
R355	6R6398	variable; wire-wound; 10K ±10%; 2 w; p/o K-9144 Local Squelch Kit; used only when not provided externally
R356	6R6407	150K ±10%; 1/2 w; ins.
		220K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
R357		same as R323
R358		NOT USED
R359		same as R342
R360		same as R342
R361	6R6446	4.7 megohm ±10%; 1/2 w; ins.
R362	6R6429	NOT USED
R363	18K891109	820K ±10%; 1/2 w; ins.
R364		variable; carbon; 1 megohm ±30%
R365		NOT USED
R366		same as R342
R367	6R6475	same as R117
R368		680K ±10%; 1/2 w; ins.
R369		same as R308
R370	6R6320	same as R101
R371	6R6022	10K ±10%; 1/2 w; ins.
R372		same as R101
R373		330 ohm ±10%; 1/2 w; ins.
R374		same as R106
R375		same as R373
R376		same as R373
R377		same as R317
R378		NOT USED
R379		NOT USED
R380		NOT USED
R381		NOT USED
R382		NOT USED
R383		same as R342
R384	6R6487	39K ±10%; 1/2 w; ins.
R385	6R490110	3.9 megohm ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
	or 6R5653	1.2 megohm ±10%; 1/2 w; ins.; used only in TRD1031AD, TRD1041AD
R386	6R6229	1K ±10%; 1/2 w; ins.
R387	6R6444	180K ±10%; 1/2 w; ins.
R388		same as R327
R389	6R6074	68K ±10%; 1/2 w; ins.; used only in TRD1031AC, TRD1041AC
R390		same as R389
R391		same as R318
R392		same as R363 except used only in TRD1031AC, TRD1031AD
		NOT USED
R393		same as R342
R394		same as R318
R395	6R6497	3.3 megohms ±10%; 1/2 w; ins.
R396	6R476065	15 megohms ±10%; 1/2 w; ins.
TU1		CAVITY, tuned; Field replacement not recommended
TU2		Field replacement not recommended
TU3		Field replacement not recommended
TU4		Field replacement not recommended

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
TU5		CAVITY, tuned; (cont'd)
		Field replacement not recommended
T301	25K837004	TRANSFORMER, A-F; output; 5000 ohm to 3.2 ohm at 55 m-a d-c
V101	195T170A01	TUBE, electron; type 6AR5
V102		same as V101
V103		same as V101
V104	195T225A01	type 6CE5/6BC5
V301	195T175A01	type 6BH6
V302		same as V301
V303		same as V301
V304		same as V301
V305		same as V301
V306		same as V301
V307		same as V301
V308		same as V301
V309	195T176A01	type 6BJ6
V310	195T111A03	type 6AL5
V311		same as V301
V312		same as V310
V313	195T134A01	type 12AX7
	or 195T113A01	type 12AT7
V314	195T101A01	type 6AQ5
W301	1V80709A47	LINE, RF transmission; filter input; includes 30B475378 CABLE, RF; coaxial; RG-58A/U; 6" length req'd
W302	1V891172	Reference part P301 assembly; includes: 30B475378 CABLE, RF; coaxial; RG-58A/U; 9-1/2" length required
		Reference part P302
XV101	9B834083	SOCKET, tube; female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV102		same as XV101
XV103		same as XV101
XV104		same as XV101
XV301		same as XV101
XV302		same as XV101
XV303		same as XV101
XV304		same as XV101
XV305		same as XV101
XV306		same as XV101
XV307		same as XV101
XV308		same as XV101
XV309		same as XV101
XV310		same as XV101
XV311	9B87123	same as XV101
		tube; female; 7 contact; miniature molded black phenolic base; saddle mounting; includes center shield
XV312		same as XV311
XV313	9B86868	tube; female; 9 contact; miniature molded black phenolic base; saddle mounting; includes center shield
XV314		same as XV311
XY101	9K857508	crystal; female; 4 contact; square molded black bakelite base; chassis mounted



REVISIONS				
DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A1	TRD1032AC TRD1032AD TRD1042AC TRD1042AD	TU101, L101, L201, R364	ANT. OSC #1, OSC #2 & VOLUME FUNCTIONS ADDED	TU101, L101, L201, R364
B	TRD1032AC-1 TRD1032AD-1 TRD1042AC-1 TRD1042AD-1	W301	PART NO. WAS 1V891171	PARTS LIST
B1			MOTOROLA DC MULTIMETER WAS VTVM	NOTE 3

- NOTES:
1. UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS $\pm 10\%$, 1/2 WATT. K=1000 OHMS.
ALL CAPACITOR VALUES ARE IN MICROMICROFARADS.
 2. * RECEIVER SQUELCHED.
 3. ALL VOLTAGE READINGS MEASURED WITH A MODEL 5002A DC MULTIMETER.
 4. ALL VOLTAGE READINGS MAY VARY $\pm 20\%$ EXCEPT B+ WHICH MAY VARY $\pm 10\%$.
 5. COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS
FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING
TABLE FOR SPECIFIC IDENTIFICATION.

COMP.	MODEL	TRD1032AC	TRD1032AD	TRD1042AC	TRD1042AD
FILTER	TFN6007AW	TFN6007AS			
R310	390K	6.8K	6.8K	120K	
R311	6.8K	120K			
R389	68K	NOT USED			
R390	68K	NOT USED			
R395	3.9 MEG	1.2 MEG			
R347	470K	220K			
R348	39K	NOT USED			
R349	220K	150K			
R352	47K	100K			
R356	220K	68K			
R369	0.01F	0.02F			
R392	820K	820K	NOT USED	NOT USED	

6. READINGS TAKEN WITH FREQUENCY SELECTOR SWITCH IN
CORRESPONDING FREQUENCY POSITION.
7. THIS MODEL HAS A MODIFIED AUDIO RESPONSE FOR BASE
STATIONS AND "QUICK-CALL" APPLICATIONS.

MODEL	SUFFIX	DESCRIPTION
TRD1032AC	1	2-FREQ. 60KC CHAN. SPACING
TRD1032AD	1	2-FREQ. 30KC CHAN. SPACING
TRD1042AC	1	2-FREQ. 60KC CHAN. SPACING (NOTE 7)
TRD1042AD	1	2-FREQ. 30KC CHAN. SPACING (NOTE 7)

DIAGRAM NO. 63E85658

NOTE

COMPONENTS REFERENCED IN 200 SERIES
ARE ON THE LAST PANEL OF THIS PARTS LIST.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C101	51B890641	CAPACITOR, fixed; unless otherwise stated ceramic; disc; 38 uuf ±1 uuf; coded BLUE dot; includes ferrule, center wire and eyelet
C102	21K842427	molded phenolic; tubular; 2.2 uuf ±10%; 500 vdcw
C103	21K840365	ceramic; disc; 24 uuf ±5%; 500 vdcw
C104	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C105	21B837745	ceramic; disc; 820 uuf ±10%; 500 vdcw
C106		same as C105
C107		same as C105
C108		same as C103
C109		same as C101
C110	21A881064	molded phenolic; tubular; .15 uuf ±5%; 500 vdcw
C111		same as C101
C112	21K837746	NOT USED
C113	21K837746	ceramic; disc; 2000 uuf ±10%; 500 vdcw
C114	21K840845	ceramic; disc; 24 uuf ±5%; 500 vdcw
C115	21K840711	dipped silver mica; 51 uuf ±5%; 500 vdcw
C116		same as C105
C117		same as C105
C118		same as C105
C119		same as C105
C120	20B840719	variable; air; 8 uuf min. to 50 uuf max.
C121	21K838284	ceramic; disc; 3.9 uuf ±.25 uuf, 250 vdcw
C122		same as C105
C123		same as C105
C124		same as C105
C125		same as C103
C126		same as C101
C127		same as C113
C128		same as C115
C129		same as C113
C130		NOT USED
C131	21R410063	ceramic; disc; 10 uuf ±5%; 500 vdcw
C132		same as C105
C133		same as C113
C134	21B800801	ceramic; disc; 1500 uuf GMV ±100% max.; 500 vdcw
C301	21R400448	ceramic; tubular; 60 uuf ±10%; 500 vdcw
C302		same as C104
C303	21K475679	molded phenolic; tubular; .82 uuf ±10%; 500 vdcw
C304		same as C301
C305		same as C303
C306	21K847091	dipped silver mica; 80 uuf ±10%; 300 vdcw
C307	21K840812	dipped silver mica; 200 uuf ±5%; 500 vdcw
C308		NOT USED
C309		same as C115
C310		same as C104
C311		same as C104
C312		same as C104
C313		same as C301
C314		same as C303
C315		same as C301

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C316		CAPACITOR, (cont'd)
C317		same as C303
C318	21K840846	electrolytic; tubular; 3 section; ceramic; disc; 15 uuf ±5%; 500 vdcw
C319	21K840850	ceramic; disc; 4 uuf ±.5 uuf; 500 vdcw
C320		same as C104
C321		same as C104
C322	21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw
C323		same as C104
C324		same as C104
C325		same as C131
C326		NOT USED
C327		same as C104
C328	21K834092	ceramic; tubular; 36 uuf ±5%; 500 vdcw
C329		same as C322
C330	21R121627	ceramic; disc; 36 uuf ±5%; 500 vdcw
C331		same as C104
C332		same as C328
C333		same as C322
C334		same as C330
C335		same as C104
C336		same as C328
C337		same as C330
C338		same as C104
C339		same as C104
C340		same as C104
C341		same as C104
C342		same as C328
C343		same as C104
C344		same as C330
C345		same as C104
C346		same as C104
C347		same as C328
C348		same as C104
C349		same as C104
C350		same as C104
C351		same as C104
C352		same as C104
C353		same as C328
C354		same as C104
C355	21K840069	ceramic; disc; 100 uuf ±5%; 500 vdcw
C356		NOT USED
C357	21K840045	molded silver mica; 62 uuf ±10%; 500 vdcw
C358	21R121962	ceramic; disc; 39 uuf ±5%; 500 vdcw
C359	21K855348	ceramic; disc; 12 uuf ±10%; 500 vdcw
C360		same as C104
C361		same as C104
C362		NOT USED
C363	21K840049	dipped silver mica; 800 uuf ±5%; 300 vdcw
C364		same as C322
C365		same as C115
C366		same as C104
C367		same as C113
C368		NOT USED
C369	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw; used only in TRD1032AC, TRD1042AC
	or 21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw; used only in TRD1032AD, TRD1042AD
C370		same as C104
C371		same as C134

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C372		CAPACITOR, (cont'd)
C373	23K81256	NOT USED
C373A		electrolytic; tubular; 3 section; consisting of: Δ 15 uf +50-10%; 250 vdcw; section □ 15 uf +50-10%; 250 vdcw; section
C373B		15 uf +50-10%; 250 vdcw; section
C373C		20 uf +100-10%; 25 vdcw; section
C374	21K837996	ceramic; disc; 3900 uuf ±10%; 500 vdcw
C375		same as C113
C376	8K85984	oil filled; tubular; .02 uf ±20%; 400 vdcw
C377		same as C104
C378		same as C104
C379		same as C104
C380	8A892986	oil filled; tubular; .25 uf ±20%; 400 vdcw
C381		same as C330
C382	21K811932	molded silver mica; 240 uuf ±3%; 500 vdcw
C383	21K811933	molded silver mica; 200 uuf ±3%; 500 vdcw
C384		same as C374
E301	21K842354	CAPACITOR-RESISTOR ASSEMBLY; printed circuit; tubular; consisting of: dual capacitor; silver paint on ceramic form; 100 uuf each section and 47K carbon resistor
J101	9A87120	CONNECTOR, receptacle; female; single contact; round molded mica filled phenolic insulator; chassis mounted
J301	9B86864	female; 11 contact; polarized; round molded black phenolic base; chassis mounted; does not include 42A821428 RING connector retainer; which must be ordered separately
L101	24B845421	COIL, R-F; 1st Oscillator; base stamped AW9; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot and reference parts C114, C115
L102	24A891309	R-F; choke; 1.2 uh
L103	24B840512	R-F; choke; .82 uh; coded BLK-YEL
L104	24A85541	R-F; choke; 3.1 uh
L105	24K848119	R-F; choke; 1.5 uh; coded BRN-GRN dot
301B	24K811628	1-F; 1st Mixer Plate; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C301, R302
302B	24K811629	1-F; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference part C304
303B	24K811627	1-F; Grid; 5.5 mc; includes 46K891111 CORE, adjustable tuning; coded LAVENDER dot and reference parts C306, C307
304B		same as 301B except 1-F; Plate; 5.5 mc and includes reference parts C313, R306

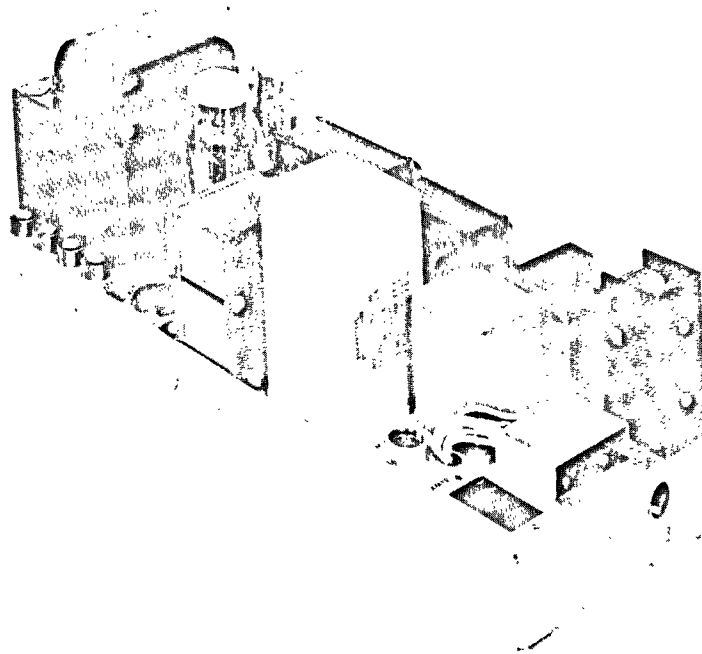
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
305B		COIL, (cont'd)
R302		same as 302B except 1-F; 5.5 mc and includes reference part C315
R303		same as R101
R304	18K849437	same as 302B except 1-F; 2nd Mixer Grid; 5.5 mc and includes reference part C317
307	24B890723	1-F; 2nd 1-F-1; 455 k-c includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C328, R319, R320
308		same as 307 except 1-F; 2nd 1-F-2; 455 k-c and includes reference parts C332, R324, R325
309	24B891317	1-F; 2nd 1-F-3; Plate; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and includes reference parts C336, R328, R329
310	24B890722	1-F; 2nd 1-F-4; 455 k-c; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C342, R334, R335
311	24B890721	1-F; 1st Limiter; includes 46K891110 CORE, adjustable tuning; coded GREEN dot and reference parts C317, R339, R340
312	24B804673	1-F; Discriminator Primary; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C353, R345, R346
978	24B811978	1-F; Discriminator Secondary; includes 46K86893 CORE, adjustable tuning; coded WHITE dot and reference parts C382, C383
P301	28A474006	CONNECTOR, plug; male; single contact; round bakelite wafer insulator; cable mounting
P302		same as P301
P303	28B813576	male; 11 contact; polarized; round molded black phenolic base; cable mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately
R101	6R6031	RESISTOR, fixed; carbon; unless otherwise stated
R102	6R6377	100K ±10%; 1/2 w; ins.
R103		470K ±10%; 1/2 w; ins. NOT USED
R104	6R6410	33K ±10%; 1/2 w; ins.
R105	6R5581	3.3K ±10%; 1/2 w; ins.
R106	6R6377	470K ±10%; 1/2 w; ins.
R107		same as R106
R108	6R6074	68K ±10%; 1/2 w; ins.
R109		same as R106
R110	6R5726	15K ±5%; 1/2 w; ins.
R111	6R400066	220K ±5%; 1/2 w; ins.
R112	6R5659	3.9K ±10%; 1/2 w; ins.
R113	6R2075	12K ±5%; 1/2 w; ins.
R114	6R2068	33K ±5%; 1/2 w; ins.
R115	6R6479	68K ±5%; 1/2 w; ins.
R116	6R6480	22K ±5%; 1/2 w; ins.
R117	6R5577	2.7K ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R301	6R6428	RESISTOR, fixed; (cont'd)
R302		NOT USED
R303		47K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
R304	18K849437	100K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R305		same as R101
R306		same as R302
R307		same as R101
R308	6R6397	22K ±10%; 1/2 w; ins.
R309		same as R302
R310	6R5646	390K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
or 6R6428		6.8K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R311	6R6428	6.8K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AD
or 6R5631		120K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AC
R312		same as R101
R313		same as R302
R314	6R6378	56K ±10%; 1/2 w; ins.
R315		NOT USED
R316		same as R101
R317	6R6048	47K ±10%; 1/2 w; ins.
R318	6R5644	82K ±10%; 1/2 w; ins.
R319	6R6048	47K ±10%; 1/2 w; ins.
R320		same as R302
R321		same as R101
R322	6R6407	220K ±10%; 1/2 w; ins.
R323		same as R319
R324		same as R302
R325		same as R101
R326		same as R101
R327	6R5631	120K ±10%; 1/2 w; ins.
R328		same as R319
R329		same as R104
R330	6R400228	1.5 megohm ±5%; 1/2 w; ins.
R331		NOT USED
R332		same as R101
R333		same as R323
R334		same as R319
R335		same as R318
R336	6R5587	1 megohm ±5%; 1/2 w; ins.
R337		same as R101
R338		same as R101
R339		same as R319
R340		same as R314
R341		same as R101
R342	6R6046	1 megohm ±10%; 1/2 w; ins.
R343		same as R336
R344		same as R101
R345		same as R319
R346		same as R308
R347	6R6377	470K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
or 6R6407		220K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R348	6R6487	39K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
R349	6R6407	220K ±10%; 1/2 w; ins.; used on only in TRD1032AC, TRD1042AC
or 6R6398		150K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R350		same as R330
R351	6R2073	2.2 megohm ±5%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R352	6R6048	RESISTOR, fixed; (cont'd)
or 6R6031		47K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
R353		100K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R354	18K824757	NOT USED
		variable; wire-wound; 10K ±10%; 2 w; p/o K-9144 Local Squelch Kit; used only when not provided externally
R355	6R6398	150K ±10%; 1/2 w; ins.
R356	6R6407	220K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
or 6R6236		68K ±10%; 1 w; ins.; used only in TRD1032AD, TRD1042AD
R357		same as R323
R358		NOT USED
R359		same as R342
R360		same as R342
R361	6R6446	4.7 megohm ±10%; 1/2 w; ins.
R362		NOT USED
R363	6R6429	820K ±10%; 1/2 w; ins.
R364	18K891109	variable; carbon; 1 megohm ±30% NOT USED
R365		same as R342
R366		same as R117
R367	6R6475	680K ±10%; 1/2 w; ins.
R368		same as R308
R369		same as R101
R370	6R6320	10K ±10%; 1/2 w; ins.
R371		same as R101
R372	6R6022	330 ohm ±10%; 1/2 w; ins.
R373		same as R106
R374		same as R373
R375		same as R373
R376		same as R317
R377		NOT USED
R378		NOT USED
R379		NOT USED
R380		NOT USED
R381		NOT USED
R382		NOT USED
R383		same as R342
R384	6R6487	39K ±10%; 1/2 w; ins.
R385	6R490110	3.9 megohm ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
or 6R5653		1.2 megohm ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R386	6R6229	1K ±10%; 1/2 w; ins.
R387	6R6444	180K ±10%; 1/2 w; ins.
R388		same as R327
R389	6R6074	68K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
6R6377		470K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
or 6R6407		220K ±10%; 1/2 w; ins.; used only in TRD1032AD, TRD1042AD
R393		39K ±10%; 1/2 w; ins.; used only in TRD1032AC, TRD1042AC
R394	6R5585	8.2 megohm ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
TU5		CAVITY, tuned; (cont'd)
		Field replacement not recommended
T301	25K837004	TRANSFORMER, A-F; output; 5000 ohm to 3.2 ohm at 55 m-a d-c
V101	195T170A01	TUBE, electron; type 6AK5
V102		same as V101
V103		same as V101
V104	195T225A01	type 6CE5/6BC5
V301	195T175A01	type 6BH6
V302		same as V301
V303		same as V301
V304		same as V301
V305		same as V301
V306		same as V301
V307		same as V301
V308		same as V301
V309	195T176A01	type 6BJ6
V310	195T111A03	type 6AL5
V311		same as V301
V312		same as V310
V313	195T134A01	type 12AX7
or 195T113A01		type 12AT7
V314	195T101A01	type 6AQ5
W301	1V80709A47	LINE, RF transmission; filter input; includes 30B475378 CABLE, RF; coaxial; RG-58A/U; 6" length req'd
W302	1V891172	Reference part P301 assembly; includes: 30B475378 CABLE, RF; coaxial; RG-58A/U; 9-1/2" length required
		Reference part P302
XV101	9B834083	SOCKET, tube; female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV102		same as XV101
XV103		same as XV101
XV104		same as XV101
XV301		same as XV101
XV302		same as XV101
XV303		same as XV101
XV304		same as XV101
XV305		same as XV101
XV306		same as XV101
XV307		same as XV101
XV308		same as XV101
XV309		same as XV101
XV310		same as XV101
XV311	9B87123	tube; female; 7 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV312		same as XV311
XV313	9B86868	tube; female; 9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV314		same as XV311
XY101	9K857508	crystal; female; 4 contact; square molded black bakelite base

POWER SUPPLY



P-8434 SERIES
POWER SUPPLY

MODEL	APPLICATION
P-8434	30 Watt Transmitter/Exciter and One Receiver
P-8434-R	Special Applications



MOTOROLA INC.

Engineering Publications

4501 W. Augusta Blvd.

COMMUNICATIONS DIVISION

Chicago 51, Illinois

DESCRIPTION

The Motorola a-c operated power supply chassis described herein provide all of the voltages necessary for operation of a complete transmitter/exciter, single receiver installation.

Adequate primary overload protection of the transmitter/exciter, receiver and relay power circuits is provided by five (5) cartridge type replaceable fuses. A pair of type 5R4GY vacuum tube diodes are connected for full wave rectification in the high voltage circuit. Selenium full

wave rectifiers are employed in the receiver and relay circuits.

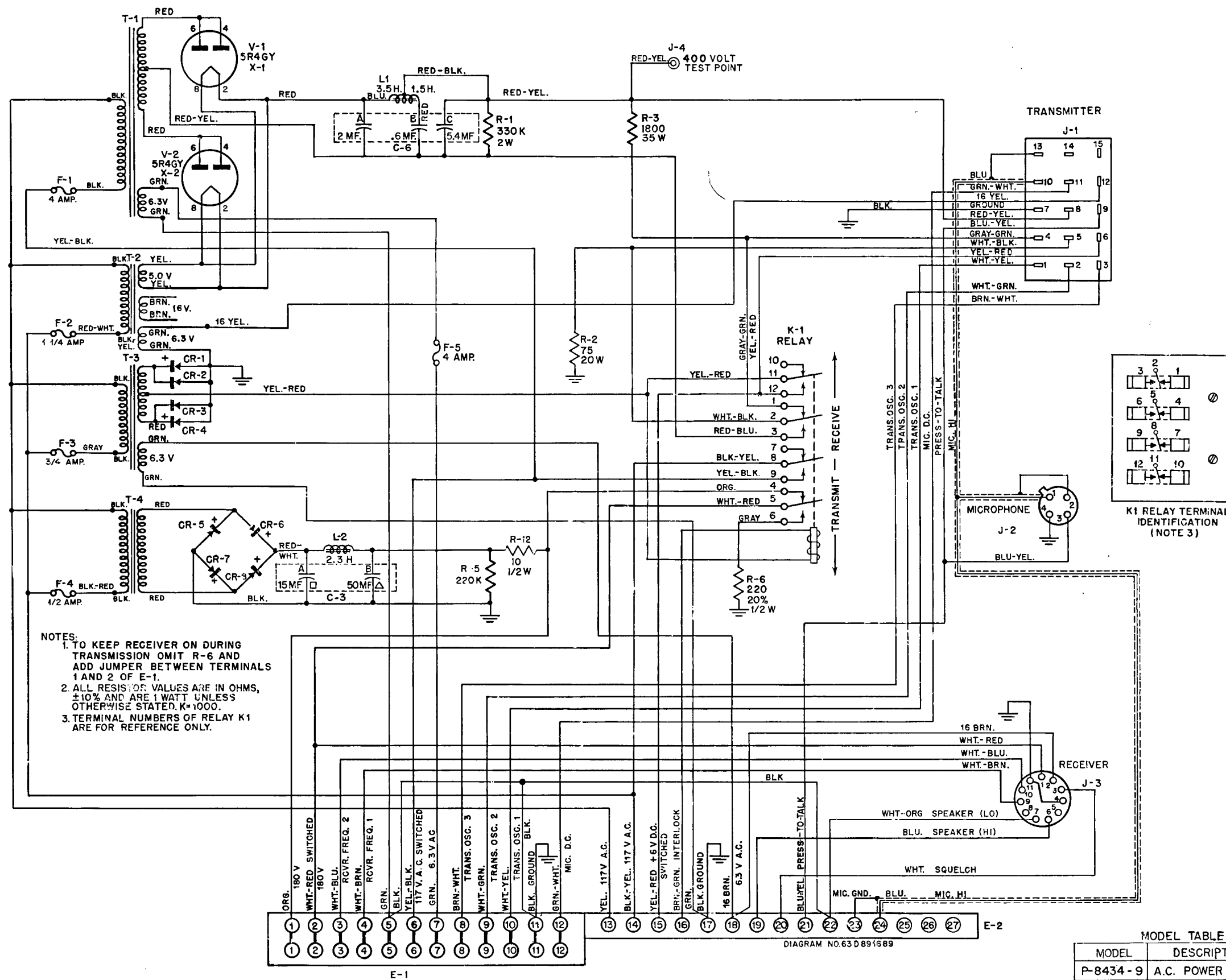
In addition to the rectifier circuits, the power supply chassis contains a microphone connector for local transmitter operation and a transmit-receive relay which provides the necessary receiver B+ muting facilities.

The P-8434-R Power Supply is a modified version of the standard P-8434. The modification permits the receiver to remain "on" during the transmission period of the associated transmitter for repeater or duplex operation.

NOMINAL PERFORMANCE SPECIFICATIONS

BASIC UNIT	P-8434 P-8434-R
DESIGNED FOR:	30 Watt Transmitter/Exciter, single Receiver Base Station
PRIMARY POWER SOURCE	117 volts, 60 cycle, single phase, 2-wire
TUBE COMPLEMENT	Two 5R4GY Rectifiers
OUTPUT RATINGS	Transmitter Section 420 v d-c at 200 ma. 250 v d-c at 80 ma. Receiver Section 175 v d-c at 60 ma. Low Voltage Section 6.3 v a-c for heater circuits 6.3 v d-c for relay circuits
DIMENSIONS	19" long x 6-1/4" wide x 6-1/4" high
WEIGHT	31 lbs.
MOUNTING	Standard 19" rack installation

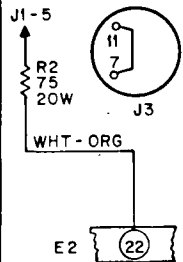
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.



PREVIOUS REVISIONS
LISTED ON BACK
OF THIS DIAGRAM →

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
S	P-8434-6	L2	WAS 2.45 h	OUTPUT OF BRIDGE RECTIFIER CIRCUIT
		T4	WAS 25B813404	INPUT OF BRIDGE RECTIFIER CIRCUIT
T	P-8434-7		JUMPER LEAD RELOCATED. CIRCUIT WAS AS SHOWN BELOW	J3
			WHT-ORG LEAD RELOCATED. CIRCUIT WAS AS SHOWN BELOW	E2
U	P-8434-8	C6C	WAS 6 uf	J1-8
V	P-8434-9	F4	WAS 65K834465	T4 PRIMARY
W	P-8434-9		JUMPER ADDED BETWEEN E1-11 AND E2-22.	E1 & E2
W1		E3, E4, E5, E6	WERE 9B820279	PARTS LIST
W2		XF1	WAS E3	PARTS LIST
		XF2	WAS E4	
		XF3	WAS E5	
		XF4	WAS E6	
		XF5	WAS E7	



SCHEMATIC DIAGRAM PARTS LIST

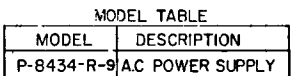
P-8434 AC Power Supply, 30 Watt

Reference:
Schematic Diagram
63D891689-W2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	23K890493	<u>CAPACITOR,</u> NOT USED
C2		NOT USED
C3		fixed: electrolytic; 2 section; consisting of: □ 15 mf +50-10%; 350 vdcw; section
C3A		△ 50 mf +50-10%; 300 vdcw; section
C3B		NOT USED
C4	8K854319	NOT USED
C5		NOT USED
C6		fixed: oil filled; 3 section; consisting of: 2 mf +20-10%; 1000 vdcw; section
C6A		.6 mf ±10%; 1000 vdcw; section
C6B		6 mf +20-10%; 800 vdcw; section
C6C		
CR1	48B890348	<u>RECTIFIER,</u> metallic: selenium; 1 plate
CR2		same as CR1
CR3		same as CR1
CR4		same as CR1
CR5		metallic: selenium; 6 plate
CR6	48K842141	same as CR5
CR7		same as CR5
CR8		same as CR5
E1	31B880805	<u>BOARD,</u> terminal: 12 double screw terminals
E2	31B892834	terminal: 15 single screw terminals
XF1	9C82083C01	<u>FUSEHOLDER</u> extractor post type; includes mounting hardware
XF2		same as XF1
XF3		same as XF1
XF4		same as XF1
XF5		31A824974 single fuse; clip type; for 1-1/4" long x 1/4" diameter fuse
F1	65K834464	<u>FUSE, cartridge: one time; glass; slow blow type</u> 4 ampere; 125 volt; 1-1/4" x 1/4"
F2		1.25 ampere; 125 volt; 1-1/4" x 1/4"
F3		3/4 ampere; 125 volt; 1-1/4" x 1/4"
F4		1/2 ampere; 125 volt; 1-1/4" x 1/4"
F5		same as F1
J1	9A891537	<u>CONNECTOR,</u> receptacle: female; 15 contacts; polarized; rectangular; black bakelite base; TRANSMITTER
J2	9B16345	receptacle: female; 4 contacts; polarized; round; phenolic insulator; MICROPHONE

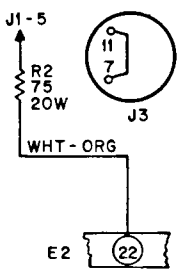
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
J3	9B86864	<u>CONNECTOR,</u> receptacle: female; 11 contacts; round; black plastic base; does not include 42A821428 RING, connector retainer; which must be ordered separately;
J4	9K81685	<u>RECEIVER</u> receptacle: female; 1 contact; coded, BLACK
K1	59B890907	<u>RELAY,</u> armature: contact arrangement; 4 form "C"; does not include 15A891538 COVER, relay; which must be ordered separately; TRANSMIT- RECEIVE
L1	25C892463	<u>REACTOR,</u> filter; tapped at 1.5 henries and 3.5 henries
L2	25B825358	filter; 2.3 henries
R1	6R490002	<u>RESISTOR,</u> fixed: carbon; 330,000 ohms ±10%; 2 w; ins.
R2	17K475245	fixed: wire wound; 75 ohms ±10% 20 w; ins.
R3	17B892965	fixed: wire wound; 1800 ohm ±10%; 35 w
R4	6R5574	NOT USED
R5		fixed: carbon; 220,000 ohm ±10%; 1 w; ins.
R6		fixed: carbon; 220 ohm ±10%; 1/2 w; ins.
R7	6R3933	NOT USED
R8		NOT USED
R9		NOT USED
R10		NOT USED
R11		NOT USED
R12	6R5621	fixed: carbon; 10 ohm ±10%; 1/2 w; ins.
T1	25B84881	<u>TRANSFORMER,</u> power: primary; 117 volts, 50-60 cycles; secondary, 420 volts at 290 ma. each side of center tap; secondary, 6.3 volts at 1 ampere
		or 25C821424 power: filament; primary; 117 volts; 50-60 cycles; secondary, 420 volts at 290 ma. each side of center tap; secondary, 6.3 volt at 1 ampere
T2	25B483001	power: filament; primary; 117 volts; 50-60 cycles; secondary, 16 volts at .75 ampere; secondary, 6.3 volts at 5 ampere; secondary, 5 volts at 6 ampere
	or 25C812731	power: filament; primary, 117 volts; 50-60 cycles; secondary, 16 volts at .75 ampere; secondary, 6.3 volts at 5 ampere; secondary, 5 volts at 6 ampere
T3	25C891531	power: relay supply; primary, 117 volts; 50-60 cycles; secondary, 8.5 volts at 1 ampere each side of center tap; secondary, 6.3 volts at 4.5 ampere
T4	25C861389	power: plate; primary, 117 volt; resistance 28.6 ohms 50-60 cycles; secondary, 200 volts at 90 ma; resistance 61.3 ohm

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
V1	195T211A01	<u>TUBE, electron:</u> type 5R4GY same as V1
V2		
X1	9B6763	<u>SOCKET,</u> tube: female; 8 contact; black molded bakelite base; saddle mounting
X2		same as X1



P-8434-R Power Supply
Schematic Diagram
Motorola No. 63D804314-N2
11/30/61-CP

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
J	P-8434-R-6	L2	WAS 2.45 h	OUTPUT OF BRIDGE RECTIFIER CIRCUIT
		T4	WAS 25B813404	INPUT OF BRIDGE RECTIFIER CIRCUIT
K	P-8434-R-7		JUMPER LEAD RELOCATED. CIRCUIT WAS AS SHOWN BELOW	J3
			WHT-ORG LEAD RELOCATED. CIRCUIT WAS AS SHOWN BELOW	E2
				
L	P-8434-R-8	C6C	WAS 6 uf	J1-8
M	P-8434-R-9	F4	WAS 65K834465	T4 PRIMARY
N	P-8434-R-9		JUMPER ADDED BETWEEN E1-11 AND E2-22	E1 & E2
N1		E3, E4, E5, E6	WERE 9B820279	PARTS LIST
N2		XF1	WAS E3	PARTS LIST
		XF2	WAS E4	
		XF3	WAS E5	
		XF4	WAS E6	
		XF5	WAS E7	

SCHEMATIC DIAGRAM PARTS LIST
P-8434-R AC Power Supply, 30 Watt

Reference:
Schematic Diagram
63D804314-N2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C 1	23K890493	CAPACITOR
C 2		NOT USED
C 3		Fixed: electrolytic; 2 section; consisting of: □ 15 mf +50-10%; 350 vdcw; section
C 3A	8C867267	△ 50 mf +50-10%; 300 vdcw; section
C 3B		NOT USED
C 4		NOT USED
C 5		NOT USED
C 6		Fixed: oil filled; 3 section; consisting of:
C 6A		2 mf +20-10%; 1000 vdcw; section
C 6B		.6 mf ±10%; 1000 vdcw; section
C 6C		5.4 mf +20-10%; 1000 vdcw; section
CR 1	48B890348	RECTIFIER
CR 2	48K842141	Metallic: selenium; 1 plate
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5		Metallic: selenium; 6 plate
CR 6		Same as CR 5
CR 7		Same as CR 5
CR 8		Same as CR 5
E 1	31B880805	BOARD
E 2	31B892834	Terminal: 12 double screw terminals
		Terminal: 15 single screw terminals
XF1	9C82083C01	FUSEHOLDER
XF2	31A824974	extractor post type; includes mounting hardware
XF3		same as XF1
XF4		same as XF1
XF5		same as XF1
		single fuse; clip type; for 1-1/4" long x 1/4" diameter fuse
F1	65K834464	FUSE, cartridge: one time; glass; slow blow type
F2	65K834466	4 ampere; 125 volt; 1-1/4" x 1/4"
F3	65K892099	1.25 ampere; 125 volt; 1-1/4" x 1/4"
F4	65K475395	3/4 ampere; 125 volt; 1-1/4" x 1/4"
F5		1/2 ampere; 125 volt; 1/4" x 1/4"
		same as F1
J 1	9A891537	CONNECTOR
J 2	9B16345	Receptacle: female; 15 contacts; polarized; rectangular; black bakelite base; TRANSMITTER
J 3	9B86864	Receptacle: female; 4 contacts; polarized; round; phenolic insulator; MICROPHONE
		Receptacle: female; 11 contacts; round; black plastic base; does not include 42A821428 RING, connector retainer; which must be ordered separately;
J 4	9K81685	RECEIVER
		Receptacle: female; 1 contact; coded; BLACK

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
JU 1	1V801456	LEAD, Electrical: jumper; BLACK; 2-1/2 inch long; used only on P-8434-R
K 1	59B890907	RELAY, Armature: contact arrangement; 4 form "C"; does not include 15A891538 COVER, relay; which must be ordered separately TRANSMIT-RECEIVE
L 1	25C892463	REACTOR Filter; tapped at 1.5 henries and 3.5 henries
L 2	25B825358	Filter; 2.3 henries
R 1	6R490002	RESISTOR Fixed; carbon; 330,000 ohms ±10%; 2 w; ins.
R 2	17K475245	Fixed; wire wound; 75 ohms ±10%; 20 w; ins.
R 3	17B892965	Fixed; wire wound; 1800 ohm ±10%; 35 w
R 4	6R5574	NOT USED
R 5		Fixed; carbon; 220,000 ohm ±10%; 1 w; ins.
R 6		NOT USED
R 7	6R5621	NOT USED
R 8		NOT USED
R 9		NOT USED
R 10		NOT USED
R 11		NOT USED
R 12		Fixed; carbon; 10 ohm ±10%; 1/2 w; ins.
T 1	25B84881	TRANSFORMER Power: primary; 117 volts; 50-60 cycles; secondary; 420 volts at 290 ma.; each side of center tap; secondary, 6.3 volts at 1 ampere
	or 25C821424	Power: primary; 117 volts; 50-60 cycles; secondary, 420 volts at 290 ma. each side of center tap; secondary, 6.3 volts at 1 ampere
T 2	25B483001	Power: filament; primary; 117 volts; 50-60 cycles; secondary, 16 volts at .75 ampere; secondary 6.3 volts at 5 ampere; secondary 5 volts at 6 ampere
	or 25C812731	Power: filament; primary, 117 volts; 50-60 cycles; secondary 16 volts at .75 ampere; secondary 6.3 volts at 5 ampere; secondary 5 volts at 6 ampere
T 3	25C891531	Power: relay supply; primary, 117 volts; 50-60 cycles; secondary; 8.5 volts at 1 ampere each side of center tap; secondary, 6.3 volts at 4.5 ampere
T 4	25C861389	Power: plate; primary, 117 volt; resistance 28.6 ohms 50-60 cycles; secondary, 200 volts 90 ma; resistance 61.3 ohm
V 1	195T211A01	TUBE, electron: type 5R4GY
V 2		Same as V 1
X 1	9B6763	SOCKET Tube: female; 8 contact; black molded bakelite base; saddle mounting
X 2		Same as X 1

POWER SUPPLY CHASSIS

P-8531 SERIES

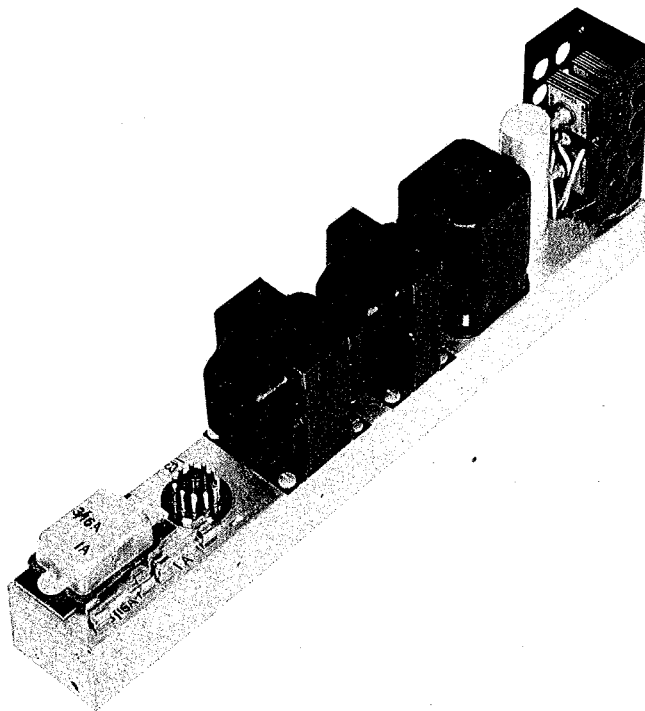
1. DESCRIPTION

The P-8531 Power Supply described in this section provides all of the voltages required for the operation of a Motorola fixed frequency communications receiver, "Sensicon" or equivalent. The power supply operates from a 117 v a-c primary power source. Selenium rectifiers connected for full wave rectification provide the receiver B+ voltage. Two replaceable, cartridge type fuses provide adequate overload protection of the power circuits.

The P-8531-A Power Supply is a modified version of the P-8531. This chassis is designed to provide the power and control facilities required by the #2 receiver in a two receiver remotely controlled indoor upright, weatherproof or locally controlled desk top base station installation. A relay is included to furnish the receiver B+ muting function.

The P-8531-R Power Supply is another modified version of the P-8531. This chassis is designed to provide the a-c and d-c voltages required for operation of a control receiver or repeater balanced control circuits. The B+ circuit is isolated from ground and an adjustable resistor provided to allow d-c output voltage settings of 0 to 175 volts.

The P-8531-AR Power Supply is a modification of the P-8531-A Power Supply which has the receiver B+ muting function eliminated to keep the #2 receiver operating at all times.



P-8531
POWER SUPPLY

MODELS	APPLICATION
P-8531	Receiver Only Models
P-8531-A	Power for #2 Receiver in 2 Receiver Base Station Models
P-8531-AR	Special Applications
P-8531-R	Special Applications



MOTOROLA INC.

Engineering Publications

COMMUNICATIONS DIVISION

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PERFORMANCE SPECIFICATIONS

BASIC UNIT	P-8531 and P-8531-A P-8531-AR	P-8531-R
PRIMARY POWER SOURCE	117 volts, 60 cycle, single phase, 2-wire	
OUTPUT RATING	200 v d-c at 60 ma 6.3 v a-c at 3.5 amps	200 v d-c at 60 ma or 0-175 v d-c at 50 ma. max.
DIMENSIONS	19" long x 2-1/8" wide x 5-1/4" high	
WEIGHT	Approximately 6 lbs.	
MOUNTING	Standard 19" Rack	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

2. THEORY OF OPERATION

a. Model P-8531

The 117v a-c is applied to this power supply chassis via intercabling and the fuse & junction box which is associated with this radio installation. Leads on pins #6 and #7 of the power supply connector apply the 117v a-c to the primary windings of transformers T1 and T2. The secondary winding of transformer T1 with its rectifier circuit supplies the dc voltages required for the operation of an associated receiver unit in the base station installation. The secondary winding of transformer T2 provides a 6.3 volt a-c source for filament requirements in the receiver unit.

b. Model P-8531-A

The operation of this model is essentially the same as that described for the Model P-8531 above, except that a relay has been added. Incoming dc from another power source in the equipment will actuate this relay whenever the base station push-to-talk circuit is energized. This relay, K1, in the energized position will interrupt the receiver

No. 2 B+ circuit thereby disabling it, and ground any possible residual charge in the associated receiver plate circuit capacitors. Upon completion of the base station transmission, relay K1 de-energizes and places the No. 2 receiver back in operation.

c. Model P-8531-R

117v a-c is applied thru pins #6 and #7 of the power supply connector to the primary of transformer T1. The secondary of this transformer in conjunction with its rectifier circuit supply the voltages required for operation of remote control relays, etc. The d-c output voltage of this chassis is adjustable from 0-175v d-c. Note that the B-circuit is isolated from ground.

d. Model P-8531-AR

The operation of this model is the same as the Model P-8531-A except the relay function is omitted; thus, the No. 2 receiver which this power supply normally supplies will operate at all times. Note that one lead to the relay coil is omitted, thereby disabling it.

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
P	P-8531-6	L1	WAS 2.45 h	OUTPUT OF BRIDGE RECTIFIER CIRCUIT
		T1	WAS 25B813404	INPUT OF BRIDGE RECTIFIER CIRCUIT
R	P-8531-7	F2	WAS 4/10 AMP.	T1 PRIMARY
R1	P-8531-7	XF1, XF2	ADDED	PARTS LIST
R2		E1	9B820279 REMOVED	PARTS LIST

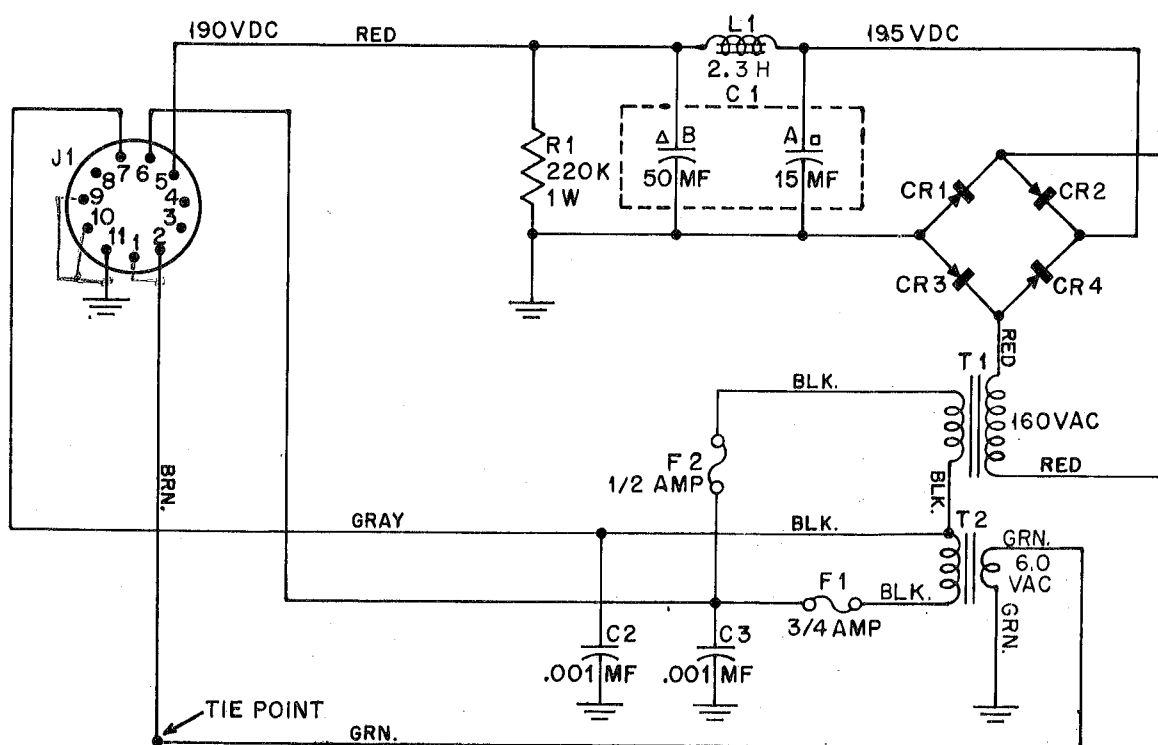


DIAGRAM NO.63B880327

MODEL	DESCRIPTION
P-8531-7	A.C. POWER SUPPLY

SCHEMATIC DIAGRAM PARTS LIST

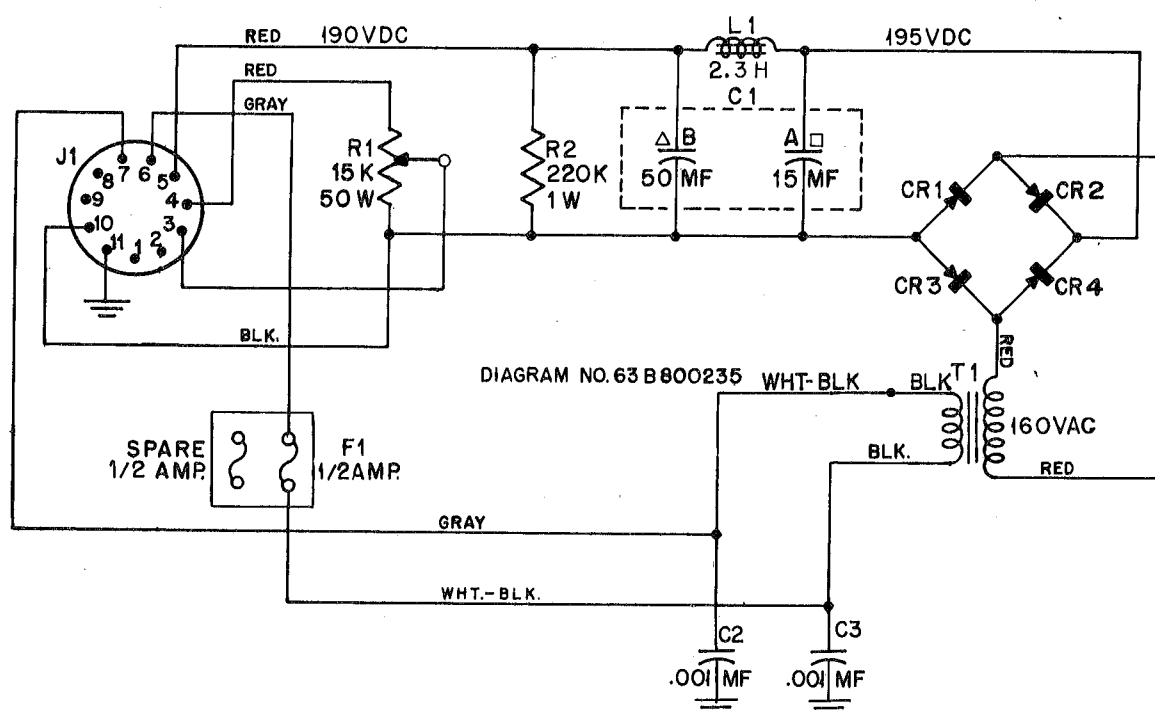
P-8531 AC Power Supply

Reference:
Schematic Diagram
63B880327-R2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1 C1A C1B C2 C3	23K890493 21R6663	<u>CAPACITOR, fixed:</u> electrolytic; two sections □ 15 uf +50-10%; 350 vdcw △ 50 uf +50-10%; 300 vdcw mica; 1000 uuf ±10%; 500 vdcw same as C2
CR1 CR2 CR3 CR4	48K824141	<u>RECTIFIER, metallic:</u> selenium; 6 plate same as CR1 same as CR1 same as CR1
F1 F2	65K892099 65K475395	<u>FUSE, cartridge:</u> slow blow type; glass; 3/4 ampere 125 volt; 1-1/4" long x 1/4" dia. slow blow type; glass; 1/2 ampere 125 volt; 1-1/4" long x 1/4" dia.
L1	25B825358	<u>COIL, AF:</u> filter; 2.3 henries
J1	28B813576	<u>CONNECTOR, receptacle:</u> male; 11 contact; does not include 42A821428 RING, connector retainer; which must be ordered separately
R1	6R5574	<u>RESISTOR, fixed:</u> carbon; 220K ±10%; 1 w; ins.
T1 T2	25C861389 25B880299	<u>TRANSFORMER, power:</u> plate; primary; 117 volt; 50-60 cps secondary, 200 volts at 90 ma. filament; primary; 117 volt; 60 cps secondary 6.3 volt at 4 ampere
XF1 XF2	9C82083C01	<u>FUSEHOLDER:</u> extractor post type; includes mounting hardware same as XF1.

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
N	P-8531-R-7	L1	WAS 2.45 h	OUTPUT OF BRIDGE RECTIFIER CIRCUIT
		T1	WAS 25B813404	INPUT OF BRIDGE RECTIFIER CIRCUIT
P	P-8531-R-8	F1	WAS 4/10 AMP.	T1 PRIMARY
P1	P-8531-R-8	XF1	ADDED	PARTS LIST
P2		E1	9B820279 REMOVED	PARTS LIST



MODEL TABLE

MODEL	DESCRIPTION
P-8531-R-8	A.C. POWER SUPPLY

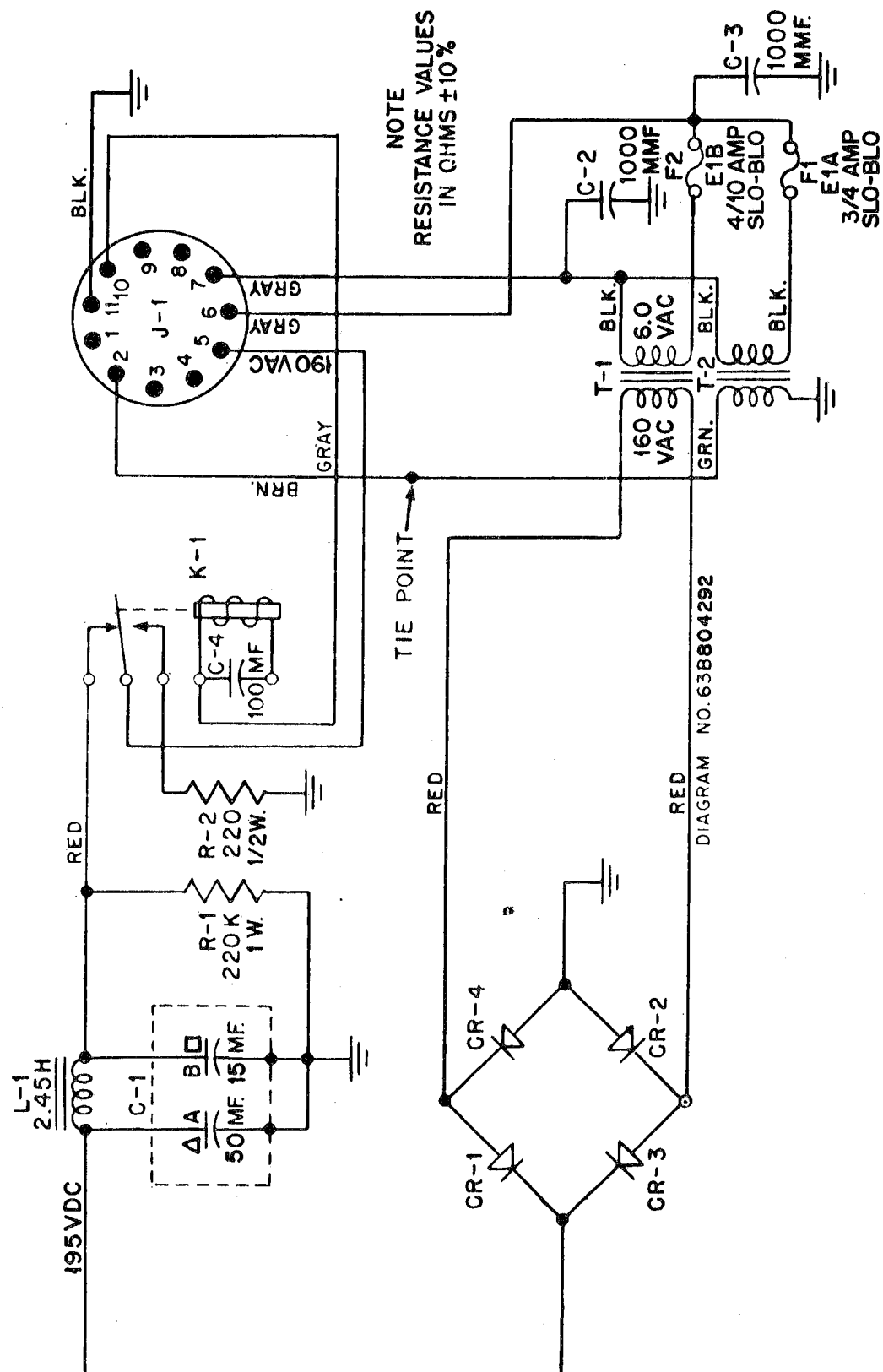
SCHEMATIC DIAGRAM PARTS LIST

P-8531-R AC Power Supplies

Reference:
Schematic Diagram
63B800235-P2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1 C1A C1B C2 C3	23K890493 21R6663	<u>CAPACITOR, fixed:</u> electrolytic: two sections □ 15 uf +50-10%; 350 vdcw Δ 50 uf +50-10%; 300 vdcw mica; 1000 uuf ±10%; 500 vdcw same as C2
CR1 CR2 CR3 CR4	48K842141	<u>RECTIFIER, metallic:</u> selenium; 6 plate same as CR1 same as CR1 same as CR1
F1	65K475395	<u>FUSE, cartridge:</u> slow blow type; glass; 1/2 ampere 125 volt; 1-1/4" long x 1/4" diameter
L1	25B825358	<u>COIL, AF:</u> filter; 2.3 henries
J1	28B813576	<u>CONNECTOR, receptacle:</u> male; 11 contact; does not include 42A821428 RING, connector retainer; which must be ordered separately
R1 R2	17B51774 6R5574	<u>RESISTOR, adjustable: unless stated</u> wirewound; 15K ±10%; 50 w; ins. fixed; carbon; 220K ±10%; 1 w; ins.
T1	25C861389	<u>TRANSFORMER, power:</u> plate; primary; 117 volt; 50-60 cps secondary; 200 volts at 90 ma
XF1	9C82083C01	<u>FUSEHOLDER:</u> extractor post type; includes mounting hardware

MODEL	DESCRIPTION
P-8531-AR-5	A.C. POWER SUPPLY



Model P-8531-AR Power Supply
Schematic Diagram
Motorola No. 63B804292-H
11/22/61-RCS

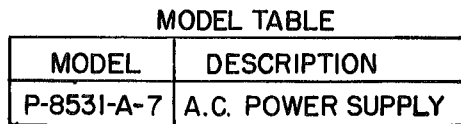
SCHEMATIC DIAGRAM PARTS LIST

P-8531-AR AC Power Supplies

Reference:
Schematic Diagram
63B804292

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1 C1A C1B C2 C3 C4	23K890493 21R6663 23B892549	<u>CAPACITOR, fixed:</u> electrolytic; two sections □ 15 uf +50-10%; 350 vdcw △ 50 uf +50-10%; 300 vdcw mica; 1000 uuf ±10%; 500 vdcw same as C2 electrolytic; 100 uuf +100-15%; 25 vdcw
CR1 CR2 CR3 CR4	48K842141	<u>RECTIFIER, metallic:</u> selenium; 6 plate same as CR1 same as CR1 same as CR1
E1	31A480477	<u>HOLDER, fuse:</u> dual fuse mounting; for 1-1/4" long x 1/4" diameter fuses
F1 F2	65K892099 65K834465	<u>FUSE, cartridge:</u> one time; slo-blo; glass; 3/4 amp. 125 volt; 1-1/4" long x 1/4" dia. one time; slo-blo; glass; 4/10 amp. 125 volt; 1-1/4" long x 1/4" dia.
K1	59B800031	<u>RELAY, armature:</u> contact arrangement; 1 form "C"
L1	25K87302	<u>COIL, AF:</u> filter; 2.45 henries
P1	28B813576	<u>CONNECTOR, receptacle:</u> male; 11 contact; does not include 42A821428 RING, connector retainer; which must be or- dered separately
R1 R2	6R5574 6R6270	<u>RESISTOR, fixed; carbon:</u> 220K ±10%; 1 w; ins. 220 ±10%; 1/2 w; ins.
T1 T2	25B813404 25B880299	<u>TRANSFORMER, power:</u> plate; primary; 117 volt; 50-60 cps secondary, 190 volts at 55 ma. filament; primary; 117 volt; 60 cps secondary; 6.3 volt at 4 amp.

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
P	P-8531-A-6	L1	WAS 2.45 h	OUTPUT OF BRIDGE RECTIFIER CIRCUIT
		T1	WAS 25B813404	INPUT OF BRIDGE RECTIFIER CIRCUIT
R	P-8531-A-7	F2	WAS 4/10 AMP.	T1 PRIMARY
R1	P-8531-A-7	XF1, XF2	ADDED	PARTS LIST
R2		E1	9B820279 REMOVED	PARTS LIST



P-8531-A AC Power Supply
Schematic Diagram
Motorola No. 63B880339-R2
11/22/61-RCS

SCHEMATIC DIAGRAM PARTS LIST

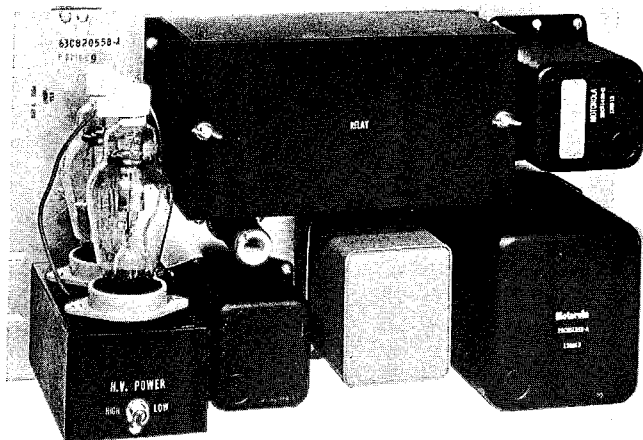
P-8531-A AC Power Supplies

Reference:
Schematic Diagram
63B880339-R2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1 C1A C1B C2 C3 C4	23K890493 21R6663 23B892549	<u>CAPACITOR, fixed:</u> electrolytic; two sections □ 15 uf +50-10%; 350 vdcw △ 50 uf +50-10%; 300 vdcw mica; 1000 uuf ±10%; 500 vdcw same as C2 electrolytic; 100 uuf +100-15%; 25 vdcw
CR1 CR2 CR3 CR4	48K842141	<u>RECTIFIER, metallic:</u> selenium; 6 plate same as CR1 same as CR1 same as CR1
F1 F2	65K892099 65K475395	<u>FUSE, cartridge:</u> slow blow type; glass; 3/4 ampere 125 volt; 1-1/4" long x 1/4" diameter slow blow type; glass; 1/2 ampere 125 volt; 1-1/4" long x 1/4" diameter
K1	59B800031	<u>RELAY, armature:</u> contact arrangement; 1 form "C"
L1	25B825358	<u>COIL, AF:</u> filter; 2.3 henries
J1	28B813576	<u>CONNECTOR, receptacle:</u> male; 11 contact; does not include 42A821428 RING, connector retainer; which must be ordered separately
R1 R2 R3	6R5574 6R6270 6R488022	<u>RESISTOR, fixed:</u> carbon; 220K ±10%; 1 w; ins. carbon; 220 ±10%; 1/2 w; ins. 10 ohm ±10%; 1 w; ins.
T1 T2	25C861389 25B880299	<u>TRANSFORMER, power:</u> plate; primary; 117 volt; 50-60 cps secondary; 200 volts at 90 ma. filament; primary; 117 volt; 60 cps secondary; 6.3 volt at 4 amp.
XF1 XF2	9C82083C01	<u>FUSEHOLDER:</u> extractor post type; includes mounting hardware same as XF1

HV POWER SUPPLY & RELAY CHASSIS

MC5553



MODEL P-8238-C

1. NOMINAL PERFORMANCE SPECIFICATIONS

INPUT	117 volt 60 cycle, 2-wire single phase 230 volt 60 cycle, 3-wire single phase
OUTPUT	350 ma at 2000 volts 12.6 amp at 5 volts
TUBE COM- PLEMENT	2-866A Mercury Vapor Rectifiers
MOUNTING	19" rack mounting
WEIGHT	Chassis Unit: 47 lbs Plate Transformer: 48 lbs

2. DESCRIPTION

The P-8238-C High Voltage Power Supply and Relay Chassis provides the plate, grid cathode bias and filament voltages necessary for the operation of the r-f final amplifier. This

chassis also includes the switches and relays necessary to control the equipment. The r-f amplifier plate voltage is supplied by the high voltage plate transformer mounted in the base of the cabinet. The transformer is actually part of the cabinet kit.

The various controls, switches and relays incorporated in this chassis and their functions are on the following page.

3. ADJUSTMENTS

WARNING

Potentials up to 2000 volts are present in this equipment. Use extreme caution whenever a cabinet door must be opened to make an adjustment. These adjustment procedures incorporate maximum safety precautions.

a. Overload Adjustment

An overload relay circuit is used in this chassis to protect the final r-f amplifier against excessive plate current flow. Whenever the transmitter is turned on the overload relay stands ready to turn it off in case of an overload. Releasing the push-to-talk button on the microphone restores the overload relay to normal. If the push-to-talk button is pressed again before the overload condition is corrected the overload relay will act again to turn the transmitter off.

The overload relay should operate when the reading on the AMPLIFIER PLATE current meter reaches 340-350 ma (normal reading--250 to 280 ma). Resistor R5, the OVERLOAD ADJUST control, is used to set the overload relay operating



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CONTROLS	FUNCTION
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Located on Top of Chassis

HV POWER HIGH-LOW Switch (S2)	Reduces plate voltage to p-a approx. 1/2 for tuning purposes.
Overload adjust control (R5) (located under RELAY cover)	Overload relay current adjustment for proper operating value.
Control Relay (K3)	Transmitter on-off control
Overload Relay (K2)	De-energizes plate contactor relay (K3) in the event of an overload.
Plate contact relay (K4)	Controls primary a-c input to high voltage plate transformer.
30 sec. time delay relay (K1)	Provides protective time delay for high voltage rectifier warm-up period.

Located on Wiring Side

High voltage meter adjustment, resistor, slide type (R3)	0-3000 volt meter calibrating resistor.
Bias adjustment resistor, slider type (R4)	Adjustment of protective bias voltage to final amplifier tubes.
HV POWER ON-OFF Switch (S1)	High voltage rectifier & final amplifier filaments and control circuit on-off switch.

Located on Bottom of Cabinet

HI-VOLTAGE POWER ON-OFF Switch	High voltage transformer a-c input control.
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The fuse block on the rear of the chassis provides for the primary power line termination and fusing. The sixteen contact terminal board provides facilities for all other terminations.

point. This control is set at the factory for proper operation and normally should not need re-adjustment. It can, however, be checked for proper operation and reset, if necessary, by the maintenance technician.

To check for overload relay operation turn the transmitter on and de-tune the PLATE TUNING control slowly (on the final amplifier chassis) while watching the AMPLIFIER PLATE current meter. De-tuning the plate circuit causes the plate current to rise, producing the same effect as an overload. If the overload relay operates when the reading reaches 340-350 ma the

OVERLOAD ADJUST setting is correct. Then, all that remains is to restore the proper resonance setting of the PLATE TUNING control so that the equipment operates normally. If any difficulty is encountered refer to the FINAL AMPLIFIER section of this manual, which gives a complete tuning procedure for the final amplifier.

If the overload relay operates at less than 340-350 ma turn the transmitter off, turn the OVERLOAD ADJUST control slightly further in the clockwise direction. This raises the over-

load relay operating point. Turn the transmitter on and detune further while watching the meter. Repeat these steps as necessary to obtain the proper overload setting of 340-350 ma. Then restore the proper resonant setting of the plate tuning control.

If the overload relay does not operate when the meter reading reaches 340-350 ma turn the transmitter off and adjust the OVERLOAD ADJUST control slightly counterclockwise. Turn the transmitter on again and repeat as necessary until the overload relay operates at a meter reading of 340-350 ma. Then restore the resonance setting of the PLATE TUNING control so that the equipment operates normally. Refer to the alignment procedure in the FINAL R-F AMPLIFIER section if necessary.

b. Meter and Bias Adjustment

NOTE

The following adjustments should not be made unless accurate meters are available.

CAUTION

Potentials up to 2000 volts are present in this equipment. Before making any meter or bias adjustment turn OFF the HI-VOLTAGE POWER switch at the base of cabinet inside the front door. Turn

the switch back on when checking the reading. If further adjustments are required always have the HI-VOLTAGE POWER switch off when the rear door is opened.

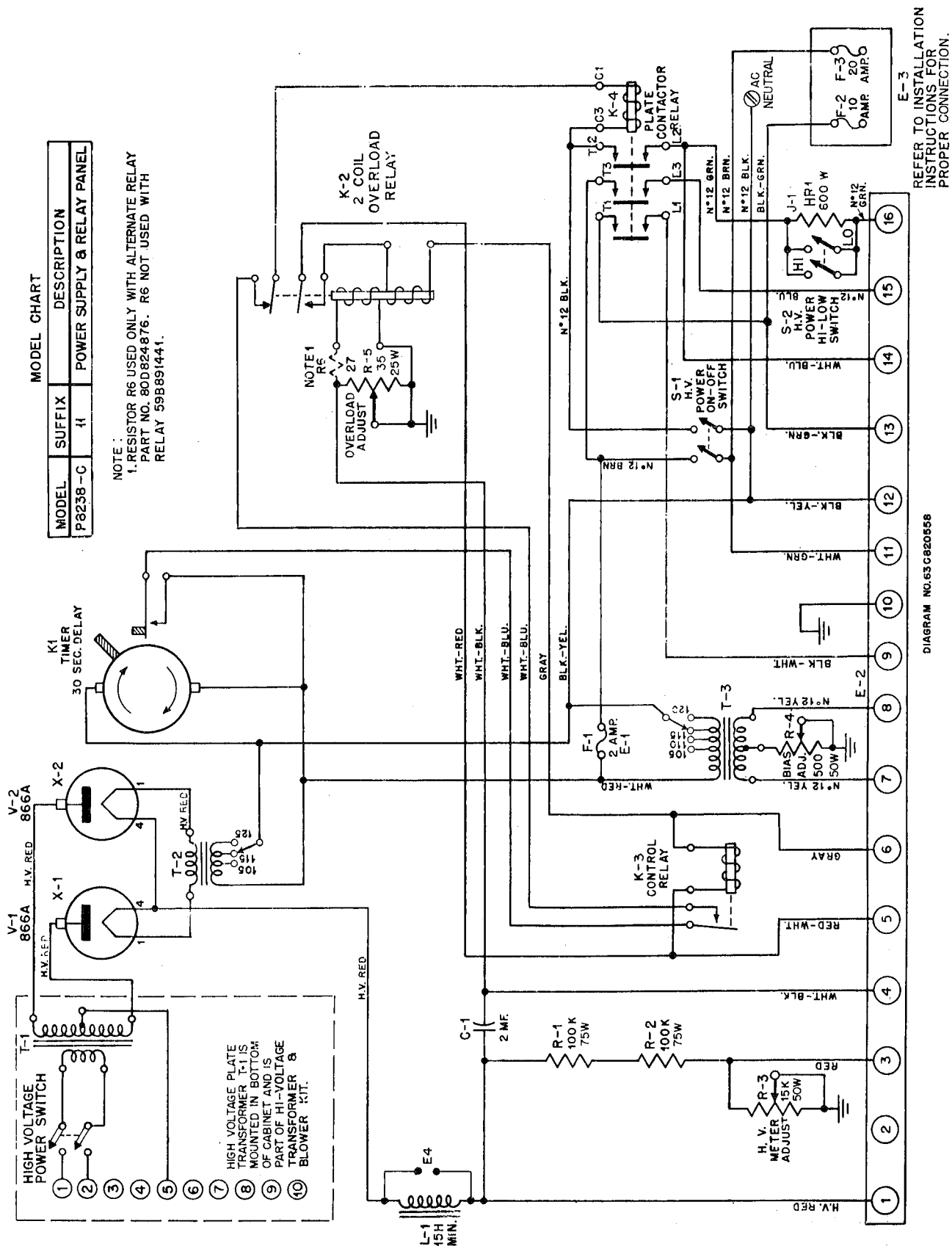
(1) High Voltage Meter Adjustment

The HI-VOLTAGE METER ADJ. resistor, R3, is an adjustable wire wound resistor. With the transmitter "on", the AMPLIFIER PLATE voltmeter should read between 1900 and 2000 volts. If this meter reading is not indicated, connect an accurate d-c kilovoltmeter, capable of reading 2500 volts or more, from terminal 1 (top of the terminal strip at the right rear of the power supply and relay chassis) to ground and adjust the slider loop of the adjustable resistor R3 so that the AMPLIFIER PLATE voltmeter reading corresponds to the test meter reading.

(2) Bias Voltage Adjustment

The BIAS ADJ. adjustable wire wound resistor R4, controls the positive d-c voltage applied to the cathode of the final amplifier tubes. Effectively, this regulates the negative potential of the grids with respect to the cathodes and hence controls the bias on the tubes. The proper voltage reading for this adjustment, measured from the center tap of the secondary winding of filament transformer T3 to ground should be between +70 and +80 volts d-c.

68P820557-F



P-8238-C-4 High Voltage Power Supply & Relay Chassis Schematic Diagram
Motorola No. 63C820558-L
11/30/61-RS

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
K	P-8238-C-10		HARDWARE	
L	P-8238-C-11	K3	WAS 59B890004 OR 80B834387	PARTS LIST

REFER TO INSTALLATION INSTRUCTIONS FOR PROPER CONNECTION.

DIAGRAM NO. 63C820558

SCHEMATIC DIAGRAM PARTS LIST

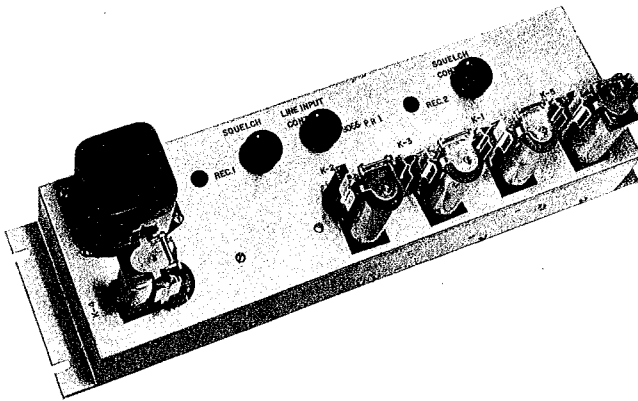
P-8238-C Power and Relay Panel Chassis

Reference:
Schematic Diagram
63C820558-L

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	8A51768	<u>CAPACITOR, fixed:</u> oil filled; rectangular; 2 uf +20-10%; 3000 vdcw
E1	31A880519	<u>FUSEHOLDER:</u> single fuse; for mounting 1-1/4" long x 1/4" diameter fuse
E2	31B51777	<u>BOARD, terminal</u> 16 dual screw terminals
E3	67B80179	<u>FUSEHOLDER:</u> dual fuse mounting; for 2" lg x 9/16" diameter fuse
E4		<u>ARRESTOR,</u> electrical surge: consists of two 4A838973 WASHER, eccentric (Spark Gap Pole pieces)
F1	65K42092	<u>FUSE, cartridge:</u> one time; glass; 2 ampere; 250 volt; 1-1/4" long x 1/4" dia.
F2	65K80185	one time; paper; 10 ampere; 250 volt; 2" long x 9/16" dia.
F3	65K52482	one time; paper; 20 ampere; 250 volt; 2" long x 9/16" dia.
HR1	17B51806	<u>HEATING ELEMENT:</u> 600 watt; single contact medium screw base
J1	9B51772	<u>LAMPHOLDER:</u> female; single contact; medium screw base
K1	59B880516 or 80B82220A01	<u>RELAY,</u> time delay: 30 second delay at 117 VAC;
K2	1V824893 or 1V824894	<u>RELAY AND MOUNTING BRACKET:</u> Assembly; includes: 59B891441 RELAY, armature: contact arrangement; 1 form "A", 1 form "B" 7A891477 BRACKET, relay mounting Assembly; includes: 80B824876 RELAY, armature: contact arrangement; 1 form "A", 1 form "B" 7A824874 BRACKET, relay mounting Reference part R6
K3	80C82858B01	<u>RELAY, armature:</u> 2 form "A", shorting bar type;
K4	80C847700	<u>CONTROL</u> 3 pole, single throw; double break; PLATE CON- TACTOR
L1	25C851359	<u>REACTOR:</u> filter; 15 henries

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
R1	17C51773	<u>RESISTOR,</u> fixed: wire wound; 100K ±10%; 75 w; ins.
R2		same as R1
R3	17B51774	adjustable: wire wound; 15K ±10%; 50 w; ins.; one slider tap; H. V. METER ADJUST
R4	17K51776	adjustable: wire wound; 500 ohm ±10% 50 w; ins.; one slider tap; BIAS ADJUST
R5	18A891458	variable: wire wound; 35 ohm ±10%; 25 w; OVERLOAD ADJUST
R6	6R5676	fixed: carbon; 27 ohm ±10%; 1 w; ins.; used only with 1V824894 Relay Assembly
S1	40A50316	<u>SWITCH, toggle:</u> dpst; H. V. POWER
S2	40A811748 or 40A50316	dpst; POWER HI-LO dpst; POWER HI-LO
T1	25C821429	<u>TRANSFORMER, power:</u> plate; pri; 117 volt 60 cycle; sec; 2100 volt DC at 350 ma. out of filter; center tapped (for reference only, p/o CABINET KIT)
T2	25C849213	filament; pri; tapped at 110; 120 and 130 volt; 60 cycle; secondary 5 volt at 5 amperes
T3	25C51435	filament; pri; tapped at 105, 110, 115 and 120 volt; 60 cycles; secondary 5.2 volt at 13 amperes
V1	197T108A01	<u>TUBE, electron:</u> type 866A same as V1
V2		
X1	9C849317	<u>SOCKET, tube:</u> female; 4 contacts; porcelain base; bayonet locking
X2		same as X1
MISCELLANEOUS PARTS LIST		
	32A475252	GASKET, fuseholder: for E3
	14A880526	INSULATOR, fuseholder: for E1
	13B891426	MARKER, identification: for E2

CE2074



Model P-8066-PR Remote Control Chassis

REMOTE CONTROL CHASSIS

1. INTRODUCTION

Motorola remote control chassis provide termination and/or control functions for FM two-way radio equipment. Four remote control chassis models are available for specific applications as outlined below and described in succeeding paragraphs.

2. MODEL P-8066-N REMOTE CONTROL CHASSIS (Refer to attached schematic diagram no. 63D810721.)

a. Description

The Model P-8066-N Remote Control Chassis provides a 24-terminal board, a line transformer, a LINE INPUT control, a receiver SQUELCH control and a CONTROL relay. The use or omission of four jumpers (in combination) adapt this chassis for dual squelch or carrier squelch operation, or for two or four-wire base station control. Refer to the jumper table on the schematic diagram for this unit.

b. Operation

A two-wire base station audio and control line is connected to terminals 7 and 8, bottom row, of TB1. In four-wire remote console control applications, the transmit-receive audio

MODEL	STANDARD APPLICATIONS
P-8066-N	Used in a single-frequency base station, base station (RA) or repeater (RA) station. SEE PARAGRAPH 2.
P-8066-NR	Used in a single-frequency repeater (RT) station. SEE PARAGRAPH 3.
P-8066-P	Used in a two-frequency* base station. SEE PARAGRAPH 4.
P-8066-PR	Used in a two-frequency* base station (RA) or repeater (RT) station. SEE PARAGRAPH 5.

* One single-frequency transmitter with two single-frequency receivers; or, one two-frequency transmitter with one or two single-frequency receivers.


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pair is connected to terminals 7 and 8, bottom row, and the d-c control pair is connected to terminals 1 and 2, bottom row, of TB1. Refer to the base station (RA) and repeater (RA) station instructions for interconnections pertinent to this type of operation.

Receiver audio is placed on the line via the 3-ohm winding of the line transformer. The CONTROL relay, which is energized by a 10 ma d-c voltage on the control line, switches the audio (transmit-receive) and keys the station transmitter. Audio for the transmitter is coupled through the 600/500 ohm winding of the line transformer and the LINE INPUT control to terminal 6, top row, of TB1.

Refer to the appropriate intercabling diagram to trace the audio and control circuitry for the station.

c. Level Adjustments

(1) SQUELCH Control

Place the speaker on-off switch for the cabinet in the "on" position, or use a test set speaker. With no signal being received (a rushing noise at the speaker) and the "Private-Line" function disabled in dual squelch installations, turn the SQUELCH control slowly clockwise from the fully counterclockwise position. Turn the control until the rushing noise just cuts out. Do not advance the SQUELCH control beyond this point, since further clockwise rotation will increase the amount of signal necessary to open the squelch circuit.

(2) Volume Adjustment
(On Receiver Chassis)

Connect a db meter, or a line level meter, across terminals 7 and 8, bottom row, of TB1. Adjust the volume control on the receiver chassis for a reading of zero db, or 1.73 volts peak, with a normal signal being received. Do not use unsquelched receiver noise.

(3) LINE INPUT Control

The LINE INPUT control is used to adjust the audio input level to the transmitter. Connect a Motorola Model S1050B or S1051B Transistorized AC Voltmeter (or equivalent) across terminals 6 and 8, top row, of TB1. Connect the ground side to terminal 8. Energize the CONTROL relay, K1, and feed a 1000 cps tone at +8 vu into the audio line at its source. Adjust the LINE INPUT control for a reading of 0.25 volt.

3. **MODEL P-8066-NR REMOTE CONTROL CHASSIS** (Refer to attached schematic diagram no. 63D810721)

a. Description

The Model P-8066-NR Remote Control Chassis provides a 24-terminal board, a line transformer, a LINE INPUT control, a receiver SQUELCH control, a CONTROL relay, and a filter network. This filter network is used to reduce arcing across squelch relay contacts during repeater (RT) operation.

b. Operation as a Standard Repeater (RT) Station

Receiver audio appears at terminals 1 and 2, middle row, of TB1 and is coupled through the 3-ohm winding to the 600/500 ohm winding of the line transformer. From there the audio is routed to the transmitter input via the LINE INPUT control and terminals 6 and 8, top row, of TB1. The transmitter has been turned on by a switched ground from the repeater (RT) station receiver squelch relay.

NOTE

Relay K1 does not energize during standard repeater (RT) operation.

Refer to the appropriate intercabling diagram to trace the audio and control circuitry for the repeater (RT) station cabinet.

c. Operation of Repeater (RT) Station as a Remotely Controlled Base Station

A two-wire audio and control line is connected to terminals 7 and 8, bottom row, of TB1. This will permit a repeater (RT) station to be operated from a remote control console as follows:

Receiver audio is placed on the line via the 3-ohm winding of the line transformer. The CONTROL relay, which is energized by a 10 ma. d-c voltage on the control line, switches the audio (transmit-receive) and keys the station transmitter. Audio for the transmitter is coupled through the 600/500 ohm winding of the line transformer and the LINE INPUT control to terminals 6 and 8, top row, of TB1.

Refer to the appropriate intercabling diagram to trace the audio and control circuitry for the station.

d. Level Adjustments

(1) SQUELCH Control

Place the speaker on-off switch for the cabinet in the "on" position, or use a test set speaker. With no signal being received (a rushing noise at the speaker), turn the SQUELCH control slowly clockwise from the fully counter-clockwise position. Turn the control until the rushing noise just cuts out. Do not advance the control beyond this point, since further clockwise rotation will increase the amount of signal necessary to open the squelch circuit.

(2) Volume Adjustment
(On Receiver Chassis)

Connect a db meter, or a line level meter, across terminals 7 and 8, bottom row, of TB1. Adjust the volume control on the receiver chassis for a reading of zero db, or 1.73 volts peak, with a normal signal being received. Do not use unsquelched receiver noise.

(3) LINE INPUT Control

The LINE INPUT control is used to adjust the audio input level to the transmitter. Connect a Motorola Model S1050B or S1051B Transistorized AC Voltmeter (or equivalent) across terminals 6 and 8, top row, of TB1. Connect the ground side to terminal 8. With a normal signal being received, adjust the LINE INPUT control for a reading of 0.25 volt.

NOTE

If the repeater (RT) station is also to be operated from a remote control console, do not readjust the LINE INPUT control setting once it has been properly set for repeater (RT) operation. If audio coming from the remote console is insufficient to modulate the transmitter properly, consult a Motorola field representative.

4. MODEL P-8066-P REMOTE CONTROL CHASSIS (Refer to attached schematic diagram no. 63E810722)

a. Description

The Model P-8066-P Remote Control Chassis provides two 24-terminal boards, a line transformer, a LINE INPUT control, two receiver SQUELCH controls, a transmit-receive control relay, a transmit control relay, a fre-

quency no. 2 control relay, and a receiver muting relay. The use or omission of four jumpers (in combination) adapt this chassis for two or four-wire base station control. Refer to the jumper table on the schematic diagram for this unit.

b. Operation

A two-wire audio and control line may be connected to terminals 7 and 8, bottom row, of TB1. Refer to the remote control console instruction manual to determine proper polarity for these connections.

In four-wire control applications, the audio pair is connected to terminals 7 and 8, bottom row, of TB1; and the d-c control pair is connected to terminals 1 and 2, bottom row, of TB1. Refer to the remote control console instruction manual to determine the proper polarity for these connections.

Receiver audio will appear at the 3-ohm winding of the line transformer. Audio for the transmitter is coupled through the 600/500 ohm winding of the line transformer, through the LINE INPUT control to terminal 6, top row, of TB1.

DC control currents of specific values and polarities govern the operation of relays K1, K2, or K3. Relay K4 is operated by a switched 117 v a-c from relay K3. DC control current appears at terminals 1 and 2, bottom row, of TB1. Terminal 2 is positive with respect to terminal 1 with the push-to-talk function on the control line. Terminal 2 would be negative with respect to terminal 1 if the receiver no. 2 muting switch were actuated at the console.

When the current placed on terminal 2 is -5 ma., relay K1 will energize. Since relay K1, in the de-energized condition, maintains the B+ circuit for receiver no. 2, energizing relay K1 will break this circuit and mute the second receiver.

Relay K1 will remain energized as long as relay K2 remains de-energized, because a positive voltage is routed through contacts 2 and 3 of K1, through contacts 5 and 4 of K2, to the coil of K1. Energizing relay K2 will break contacts 5 and 4 of that relay, and thereby open the voltage circuit to the coil of K1. K1 will then de-energize and un-mute receiver no. 2. (NOTE: To energize K2 momentarily key transmitter with 2 freq. switch in F2 position.)

When the current appearing at terminal 2, bottom row, of TB1 is +5 ma., relay K3 will energize. Energizing this relay will cause relay K4 to energize, which will perform the following functions:

- (1) Mute receiver no. 2 by breaking the B+ circuit,
- (2) Mute receiver no. 1 by breaking the audio circuit,
- (3) Turn "on" the transmitter, and
- (4) Complete the audio input circuit to the transmitter.

Relay K3 and relay K4 will remain energized as long as the push-to-talk circuit remains operated.

When the current appearing at terminal 2, bottom row, of TB1 is +10 ma., both relay K2 and relay K3 will operate. Energizing relay K3 will accomplish the functions described in the preceding paragraph. Energizing relay K2 will switch the ground circuit for the transmitter oscillator from oscillator no. 1 to oscillator no. 2, thereby permitting transmission on transmitter frequency no. 2 (if used). Also, as mentioned above, energizing relay K2 will permit relay K1 to de-energize and un-mute receiver no. 2.

c. Level Adjustments

(1) SQUELCH Controls

Place the speaker on-off switch for the cabinet in the "on" position, or use a test set speaker. Turn one SQUELCH control fully clockwise, and the other SQUELCH control fully counterclockwise. With no signal being received (a rushing noise at the speaker), turn the SQUELCH control for that receiver slowly clockwise from the fully counterclockwise position

until the rushing noise just cuts out. Do not advance the control beyond this point, since further clockwise rotation will increase the amount of signal necessary to open the squelch circuit.

With the first receiver quieted, turn the SQUELCH control for the other receiver fully counterclockwise. Advance this control slowly clockwise until the speaker rushing noise just cuts out again. When both receivers are just quieted with no signal being received, the controls are adjusted properly for "threshold" squelch operation.

(2) Volume Adjustments (On Receiver Chassis)

Connect a db meter, or a line level meter, across terminals 7 and 8, bottom row, of TB1. With a normal signal being received by one receiver, adjust the volume control on that receiver chassis for a reading of zero db, or 1.73 volts peak. Then, with a normal signal being received by the other receiver, make the same adjustment with that receiver volume control. Do not use unsquelched receiver noise, nor attempt to adjust one receiver while a signal is coming in on the other receiver.

(3) LINE INPUT Control

The LINE INPUT Control is used to adjust the audio input level to the transmitter. Connect a Motorola Model S1050B or S1051B Transistorized AC Voltmeter (or equivalent) across terminals 6 and 8, top row, of TB1. Connect the ground side to terminal 8. Energize relay K3 (and thereby relay K4) and feed a 1000 cps tone at +8 vu into the audio line at its source. Adjust the LINE INPUT control for a reading of 0.25 volt.

d. Summary of Relay Operation

RELAY	WHEN DE-ENERGIZED:	ENERGIZED BY:	WHEN ENERGIZED:
K3	Keeps relay K4 de-energized. (Receive)	+5 ma.	Energizes relay K4. (Transmit)
K4	Unmutes receivers and keeps transmitter "off".	117 v a-c from relay 3	Mutes receivers, turns "on" transmitter and completes audio path to transmitter.
K1	Connects B+ to receiver no. 2	-5 ma.	Disconnects B+ from receiver no. 2.
K2	Connects ground to transmitter oscillator no. 1, and holds in relay K1 (if energized).	+10 ma.	Connects ground to transmitter oscillator no. 2, and drops out K1 (if energized).

5. MODEL P-8066-PR REMOTE CONTROL CHASSIS (Refer to attached schematic diagram no. 63E835201)

a. Description

The Model P-8066-PR Remote Control Chassis provides two 24-terminal boards, a line transformer, a LINE INPUT control, two receiver SQUELCH controls, a transmit-receive control relay, a transmit control relay, a frequency no. 2 control relay, a receiver muting relay, and a priority relay. The use or omission of five jumpers (in combination) adapt this chassis for two or four-wire base station control, and for operation in a repeater (RT) station or a base station (RA). Refer to the jumper table on the schematic diagram for this unit.

b. Operation

The operation of this model remote control chassis varies slightly with its applications; i. e., repeater (RT) station, base station (RA), or console-controlled base station. Refer to the appropriate instruction manual for an explanation of the particular application. Generally speaking, however, the operation of the Model P-8066-PR Remote Control Chassis is similar to that of the Model P-8066-P, which is described in the preceding paragraph 4.

The priority relay, K5, is operated by a switched 117 v a-c from the receiver no. 1, squelch relay. Whenever a signal is detected by the no. 1 receiver, during repeater operation; relay K5 will operate and remove B+ from receiver no. 2, and complete the transmitter turn-on circuit from the receiver no. 1 squelch relay.

c. Level Adjustments

(1) SQUELCH Controls

Place the speaker on-off switch for the cabinet in the "on" position, or use a test set speaker. Turn one SQUELCH control fully clockwise, and the other SQUELCH control fully counterclockwise. With no signal being received, (a rushing noise at the speaker), turn the SQUELCH control for that receiver slowly clockwise from the fully counterclockwise position until the

rushing noise just cuts out. Do not advance the control beyond this point, since further clockwise rotation will increase the amount of signal necessary to open the squelch circuit.

With the first receiver quieted, turn the SQUELCH control for the other receiver fully counterclockwise. Advance this control slowly clockwise until the speaker rushing noise just cuts out again. When both receivers are just quieted with no signal being received, the controls are adjusted for "threshold" squelch operation.

(2) Volume Adjustment
(On Receiver Chassis)

Connect a db meter, or a line level meter, across terminals 7 and 8, bottom row, of TB1. With a normal signal being received by one receiver, adjust the volume control on that receiver chassis for a reading of zero db, or 1.73 volts peak. Then, with a normal signal being received by the other receiver, make the same adjustment with that receiver volume control. Do not use unsquelched receiver noise, nor attempt to adjust one receiver while a signal is coming in on the other receiver.

(3) LINE INPUT Control

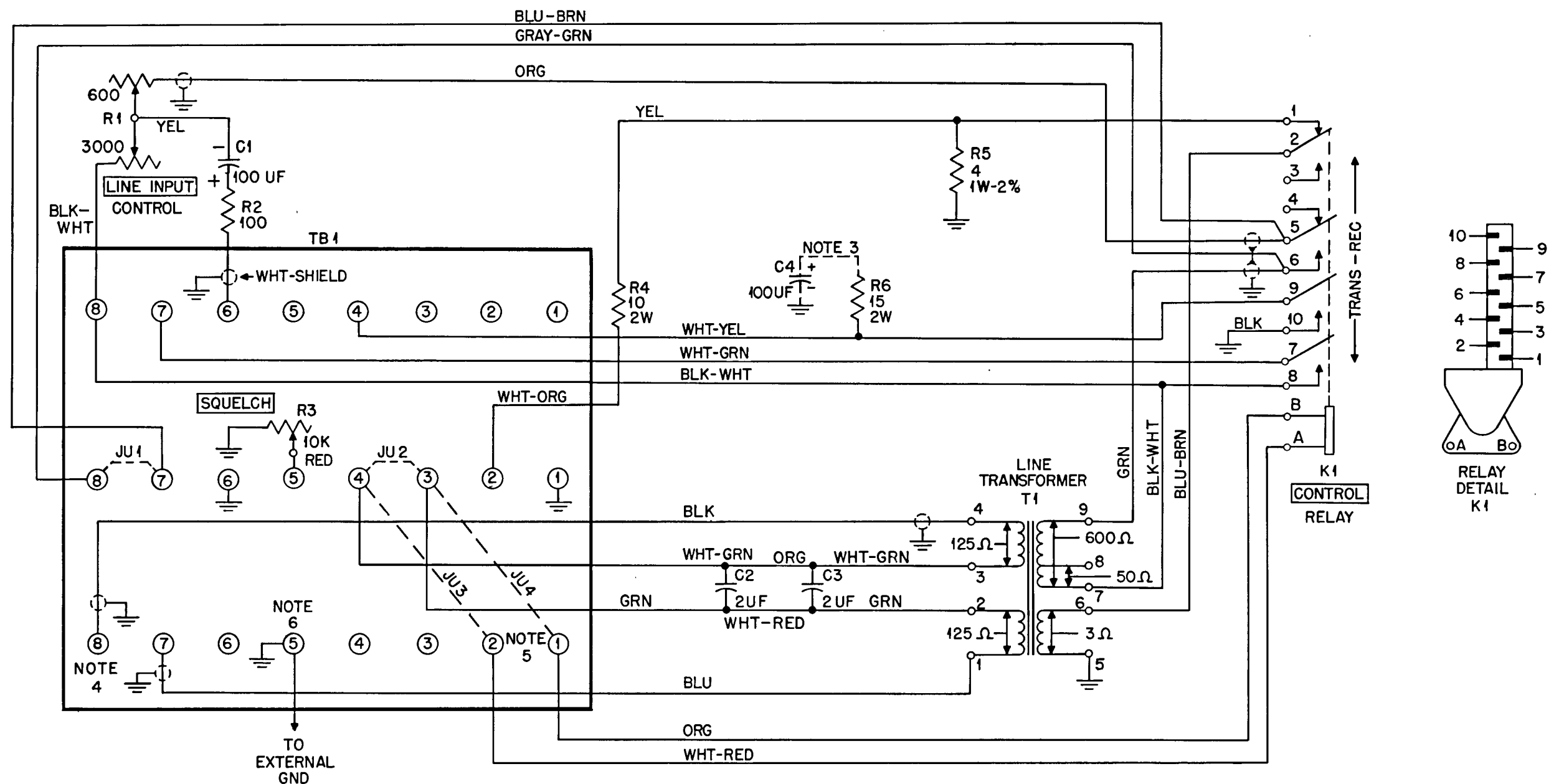
The LINE INPUT control is used to adjust the audio input level to the transmitter. Connect a Motorola Model S1050B or S1051B Transistorized AC Voltmeter (or equivalent) across terminals 6 and 8, top row, of TB1. Connect the ground lead to terminal 8. With a normal signal being received on the no. 1 receiver only, adjust the LINE INPUT control for a reading of 0.25 volt.

NOTE

If the repeater station is also to be operated from a remote control console, do not readjust the LINE INPUT Control setting once it has been set properly for repeater operation. If audio coming from the remote control console is insufficient to modulate the transmitter properly, consult a Motorola field representative.

d. Summary of Relay Operation

RELAY	WHEN DE-ENERGIZED:	ENERGIZED BY:	WHEN ENERGIZED:
K3	Keeps relay K4 de-energized	+5 ma.	Energizes relay K4
K4	Unmutes receivers and keeps transmitter "off".	117 v a-c from K3	Mutes receivers, turns "on" transmitter and completes audio path to transmitter
K1	Connects B+ to receiver no.2	-5 ma.	Disconnects B+ from receiver no. 2
K2	Connects ground to transmitter oscillator no. 1, and holds in relay K1 (if energized)	+10 ma.	Connects ground to transmitter oscillator no. 2, and drops out K1 (if energized)
K5	Connects B+ to receiver no.2	117 v a-c from rcvr. no. 1 squelch relay	Opens B+ line to receiver no.2 and terminates B+ with 220 ohm resistor to ground, and completes transmitter turn-on circuit from receiver no.1 squelch relay.



P-8066-N JUMPER TABLE

APPLICATION	TYPE OF SQUELCH	CONSOLE CONTROL	JU1	JU2	JU3	JU4
BASE STATION	CARRIER	2-WIRE	OMIT	OMIT	USED	USED
BASE STATION	DUAL	2-WIRE	OMIT	OMIT	USED	OMIT
BASE STATION	CARRIER	4-WIRE	OMIT	USED	OMIT	OMIT
BASE STATION	DUAL	4-WIRE	OMIT	USED	USED	OMIT
BASE STATION (RA)	CARRIER	4-WIRE	OMIT	USED	OMIT	OMIT
REPEATER (RA) STATION	CARRIER	4-WIRE	OMIT	USED	OMIT	OMIT

P-8066-NR JUMPER TABLE

APPLICATION	CONSOLE CONTROL	JU1	JU2	JU3	JU4
REPEATER (RT) STATION	2-WIRE	USED	OMIT	USED	USED

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS $\pm 10\%$, 1/2 WATT UNLESS OTHERWISE SPECIFIED. K=1000.
2. K-1 IS SHOWN IN RECEIVE POSITION.
3. R6, C4 & ASSOCIATED DOTTED LEADS USED ON P-8066-NR ONLY.
4. TWO-WIRE AUDIO & CONTROL LINE CONNECTS TO TERMINALS 7 & 8 (BR). AUDIO PAIR CONNECTS TO TERMINALS 7 & 8 (BR) IN FOUR-WIRE CONTROL APPLICATIONS.
5. D-C CONTROL PAIR CONNECTS TO TERMINALS 1 & 2 (BR) IN FOUR-WIRE CONTROL APPLICATIONS.
6. ALL GROUND SYMBOLS REFERENCED TO TERMINAL 5 (BR).

MODEL TABLE

MODEL	SUFFIX	APPLICATION
P-8066-N	2	BASE, BASE (RA) AND REPEATER (RA)
P-8066-NR	2	REPEATER (RT)

DIAGRAM NO. 63D810721

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

REVISIONS				
DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
D2	P-8066-N-1 P-8066-NR-1	R1	SCREENING ADDED	LINE INPUT CONTROL
		R3	SCREENING ADDED	SQUELCH CONTROL
		K1	SCREENING ADDED	CONTROL RFLAY
		TB1	WAS REFERENCED E1	TB1
			JUMPER TABLE REVISED	JUMPER TABLE
			NOTES 4, 5 & 6 ADDED	NOTES
D3	P-8066-N-1 P-8066-NR-1	TB1	GROUND SYMBOL ADDED	TERMINAL 5 BOTTOM ROW
E	P-8066-N-2 P-8066-NR-2	R1	WAS 18A811698	PARTS LIST

PARTS LIST for Schematic Diagram 63D810721-E

P-8066-N and P-8066-NR Remote Control Chassis

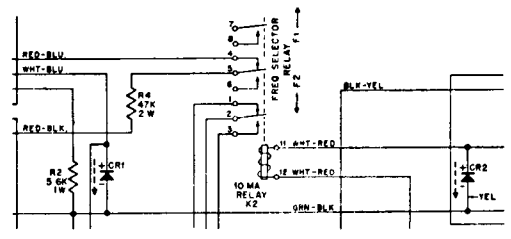
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1 C2 C3 C4	23B892549 8A81769	<u>CAPACITOR, fixed:</u> 100 uf +100-15%; 25 vdcw 2 uf; 200 vdcw same as C2 same as C1 except used only on P-8066-NR
K1	59B81303	<u>RELAY, armature:</u> contact arrangement, 2 form "C", 2 form "A" 4-8 ma; coil resistance 6500 ohm does not include 15B80676 COVER, relay or 7K483186 BRACKET, relay mount- ing; cover or bracket must be ordered separately
R1	18A82053D01	<u>ATTENUATOR,</u> variable "L" pad; wire-wound; 600 to 3000 ohm; 4 w
R2 R3 R4 R5 R6	6R6326 18K898247 6R488033 17K892469 or 17B821901 6R476059	<u>RESISTOR, fixed:</u> 100 ±10%; 1/2 w variable: 10K; 4 w 10; 2 w wire-wound; 4; ±2%; 1 w; wire-wound; 4; ±2%; 3 w; 15; 2 w; used only on P-8066-NR
T1	25B811697	<u>TRANSFORMER, AF:</u> line type: primary, two 125 ohm windings to match 500 ohm line secondary #1, 600 ohm tapped at 50 ohm secondary #2, 3 ohm
TB1	31B81754	<u>BOARD, terminal:</u> 24 screw terminals

DIAG. ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
F	P-8066-P-2	C4	ADDED (30 uf)	RELAYS, K1, K2, K3
		C5	ADDED (20 uf)	
		CR3, CR4	ADDED (1N1221)	
		R1	WAS (5.6K)	
		R3	WAS (47K)	
		R10	ADDED (1.2K-1W)	
		R11	ADDED (3.9K-1W)	
		R12	ADDED (22K-1W)	
		CR2	RELOCATED CIRCUIT WAS AS SHOWN BELOW	
F1	P-8066-P-2		TIE POINT ADDED BETWEEN CR2 & CR4 AT JUNCTION OF K3-8 & CR1	K3
F2	P-8066-P-2	TB1	WAS REFERENCED E2	TB1
		TB2	WAS REFERENCED E1	TB2
			BOXES ADDED TO CHASSIS SCREENING	
			JUMPER TABLE REVISED	JUMPER TABLE
			NOTES 2, 3, 4, & 5 ADDED	NOTES
F3	P-8066-P-2		GROUND SYMBOLS ADDED	TB2 TERM. 1 TOP ROW AND TB1 TERM. 5 BOTTOM ROW
G	P-8066-P-3	R9	WAS 18A811698	PARTS LIST

P-8066-P Remote Control Chassis

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
C1	8A81769	<u>CAPACITOR, fixed:</u> 2 mf; 200 v
C2		same as C1
C3	23B892549	100 mf +100-15%; 25 v
C4	23K837743	electrolytic; 30 uf +100-10%; 350 vdcw
C5	23K483459	electrolytic; 20 uf $\pm$ 30%; 350 vdcw
CR1	48D842140	<u>RECTIFIER,</u> metallic; selenium; DC output 100 ma
CR2		same as CR1
CR3	48K859725	silicon; type 1N1221
CR4		same as CR3
TB1		<u>BOARD, terminal:</u>
TB2	31B81754	25 screw term. same as E1
K1	59K801503	<u>RELAY, armature;</u> contact arrangement; 2 form "A"; 2 form "C" 4-8 ma; coil resistance 6500 ohm; does not include 15B80676 COVER, relay or 7K483186 BRACK- ET, relay mounting; cover or brack- et must be ordered separately
K2	59A82985	contact arrangement; 2 form "A" 2 form "C" 5-10 ma; coil resistance 1400 ohm; does not include 15B80676 COVER, relay or 7K483186 BRACK- ET, relay mounting; cover or brack- et must be ordered separately
K3		same as K1
K4	59A86269	dual stack; contact arrangement; 1st stack, 1 form "B" 1 form "C"; 1 form "A"; 2nd stack, 1 form "B"; 1 form "C"; 1 form "A"; does not include 15B80676 COVER or 7K483186 BRACKET, relay mounting; cover or bracket must be ordered separately
R1	6R5691	<u>RESISTOR, fixed; unless stated;</u> 6.8K $\pm$ 10%; 1 w; ins.
R2	6R6327	1K $\pm$ 10%; 1 w; ins.
R3	6R5768	33K $\pm$ 10%; 2 w; ins.
R4	18K898247	variable; 10K 4 w
R5	6R488033	10 ohm $\pm$ 10%; 2 w; ins.
R6	17K892469	4 ohm $\pm$ 2%; 1 w; ins.
	or 17B821901	4 ohm $\pm$ 2%; 3 w; ins.
R7		same as R4
R8	6R6326	100 ohm $\pm$ 10%; 1/2 w; ins.
R10	6R5770	1.2K $\pm$ 10%; 1 w; ins.
R11	6R5618	3.9K $\pm$ 10%; 1 w; ins.
R12	6R6341	22K $\pm$ 10%; 1 w; ins.
R9	18A82053D01	<u>ATTENUATOR,</u> variable; wire wound; 600 to 3000 ohm; 4 w
T1	25B811697	<u>TRANSFORMER, AF:</u> line type; 500 ohm split primary; 600 ohm secondary impedance; tap- ped at 50 ohm; secondary impedance 3 ohm

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION	REFER TO CIRCUIT BOARD
B	P-8066-PR-1	C6	ADDED (30 uf)	RELAYS K1, K2, K3	NONE
		C7	ADDED (20 uf)		
		CR3, CR4	ADDED (1N1221)		
		R2	WAS (5.6K)		
		R4	WAS (47K)		
		R12	ADDED (1.2K-1W)		
		R13	ADDED (3.9K-1W)		
		R14	ADDED (22K-1W)		
		CR2	RELOCATED		
			CIRCUIT WAS AS SHOWN BELOW		
					
B1			TIE POINT ADDED BETWEEN JUNCTION OF CR2, CR4 AND TERMINAL 8 OF RELAY K3	K3	NONE
B2		K4	RELAY CONTACTS RE-REFERENCED. GENERAL NOTES ADDED.	K4	NONE
C	P-8066-PR-2	AT1	WAS 18A811698	PARTS LIST	NONE

PARTS LIST for Schematic Diagram 63E835201-C

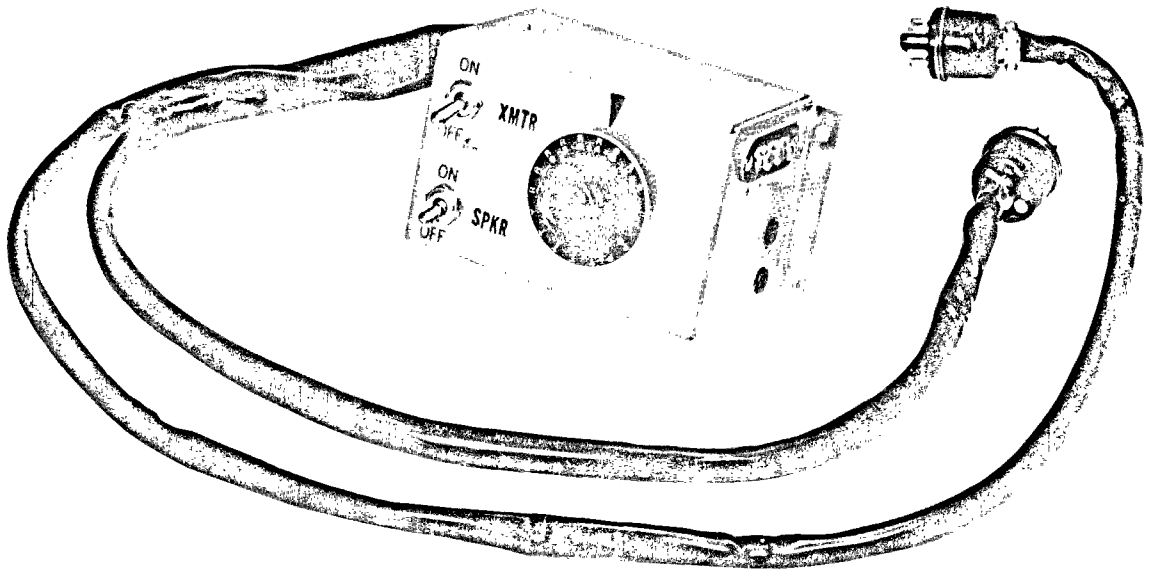
Model: P-8066-PR Remote Control Chassis

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
AT1	18A82053D01	<u>ATTENUATOR, variable:</u> wire-wound; 600 ohm extreme counter clock-wise; 3000 ohm extreme clock-wise; "L" pad
C1	8K801685	<u>CAPACITOR, fixed:</u> oil filled; square; 2 uf ±10%; 400 vdcw
C2	8A81769	paper; square; 2 uf 200 vdcw same as C2
C3	23B892549	electrolytic; tubular; 100 uf +100-15%; 25 vdcw
C5	23K837743	same as C4
C6		electrolytic; tubular; 30 uf +100-10%; 350 vdcw
C7	23K483459	electrolytic; tubular; 20 uf ±30%; 350 vdcw
CR1	48D842140	<u>RECTIFIER, metallic:</u> selenium; 6 plate
CR2		same as CR1
CR3	48D82383B04	silicon; 300 v
CR4		same as CR3
K1	59K801503	<u>RELAY, armature:</u> contact arrangement; 2 form "C" and 2 form "A"; 4-8 ma; coil res. 6500 ohms; does not incl.; 15B80676 COVER, relay or 7K483186 BRACKET, relay mounting; cover or bracket must be ordered separately
K2	59K82985	contact arrangement; 2 form "C" and 2 form "A"; 10 ma; does not include 15B80676 COVER, relay or 7K483186 BRACKET, relay mounting; cover or bracket must be ordered separately
K3		same as K1
K4	59D86269	dual stack; contact arrangement; 1st stack, 1 form "C", 1 form "A" and 1 form "B"; 2nd stack 1 form "A", 1 form "B" and 1 form "C"; 117 VAC; does not include 15B80676 COVER, relay or 7K483186 BRACKET, relay mounting; cover or bracket must be ordered separately
K5		same as K4
R1	6R5583	<u>RESISTOR, fixed: carbon; unless otherwise stated</u> 47 ohm ±10%; 1 w; ins.
R2	6R5691	6.8K ±10%; 1 w; ins.
R3	6R6327	1K ±10%; 1 w; ins.
R4	6R5768	33K ±10%; 2 w; ins.
R5	6R6270	220 ohm ±10%; 1/2 w; ins.
R6	18K898247	variable; wire-wound; 10K; 4 w
R7	6R488033	10 ohm ±10%; 2 w; ins.
R8	17K892469	wire-wound; 4 ohm ±2%; 1 w; ins.
	or 17B821901	wire-wound; 4 ohm ±2%; 3 w; ins.
R9		same as R6
R10	6R6326	100 ohm ±10%; 1/2 w; ins.
R11	6R118227	15 ohm ±10%; 1 w; ins.
R12	6R5770	1.2K ±10%; 1 w; ins.
R13	6R5618	3.9K ±10%; 1 w; ins.
R14	6R6341	22K ±10%; 1 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
T1	25B811697	<u>TRANSFORMER, AF; line;</u> consists of the following windings: primary #1; terminals #1, 2; 125 ohm primary #2; terminals #3, 4; 125 ohm secondary #1; terminals #5, 6; 3 ohm secondary #2; terminals 7, 9; 600 ohm, tapped at terminal #8; 50 ohm
TB1 TB2	31B81754	<u>BOARD, terminal:</u> 24 screw terminals same as TB1

METER SWITCHING CHASSIS

EPD-6379-O (MC3726)



Model TU415

1. DESCRIPTION

The Model TU415 Meter Switching Chassis includes a metering selector switch, transmitter and receiver metering cables and connectors, speaker and transmitter ON-OFF switches, and a speaker receptacle. The Model TU415 Metering Chassis is designed for use with indoor cabinet installations.

The kit consists of a rotary circuit selector switch and cables for connection to the transmitter and receiver chassis. The 0-50 microampere meter on the meter panel in the cabinet is connected to the three-screw terminal board on the TU415 Meter Switching Chassis. The TU415 Meter Switching Chassis also includes a speaker ON-OFF

toggle switch mounted on the lower left corner, a meter connection terminal board mounted on the upper side of the right end, and a speaker receptacle mounted on the lower side of the right end. A spring-return transmitter ON-OFF switch is incorporated on this metering panel to turn on the transmitter for testing purposes. All components are mounted or terminated on a 5" x 3-1/4" x 3" chassis. The chassis mounts on a small panel. The circuit selector switch is a 2-pole 18-position rotary switch which selects the desired circuit to be metered in the transmitter or receiver. The switch is marked for positions R1 through R8, T2 through T6, PA, and PO. The "R" symbol denotes receiver circuits, the "T" denotes transmitter circuits, the "PA" denotes power amplifier plate current and "PO" indicates relative power output to the antenna system.



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2. OPERATION

a. Transmitter ON-OFF Switch

The spring-return transmitter ON-OFF switch is wired in parallel with the microphone push-to-talk circuit and is, therefore, in series with the rear door interlock switch. This spring-return switch prevents the transmitter from being inadvertently left in the ON position. The transmitter can be operated when the front door of the cabinet is open, but the rear door must be closed.

b. Speaker Facilities

A two-pin SPEAKER jack, J1, is included for connecting an external 3-ohm speaker. A SPEAKER ON-OFF switch and 3-ohm matching resistor are wired into the circuit for control and impedance matching purposes. In the OFF position the 3-ohm resistor matches the load for constant impedance when the speaker load is disconnected.

c. Metering Two-Receiver Models

In two-receiver base station models the receiver metering cable is normally connected to the METER receptacle of the No. 1 receiver. To meter No. 2 receiver disconnect this cable from the No. 1 receiver and connect it to the METER receptacle of the No. 2 receiver.

d. Meter Selector Switch

The following table indicates meter switch positions and corresponding transmitter and receiver circuits of the equipment.

<u>METER POSITION</u>	<u>CIRCUIT MEASURED</u>
R1	Receiver 2nd IF-4 Grid
R2	Receiver 1st Limiter Grid
R3	Receiver 2nd Limiter Grid
R4+	Receiver Discriminator Balance (positive)
R4-	Receiver Discriminator Balance (negative)
R5	Receiver Discriminator Input
R6	Receiver 1st Oscillator Grid
R7	Receiver B+
R8	"G" Receiver - no connection "A" Receiver - "X" filaments (6 volts)
T2	No Connection
T3	Transmitter 2nd Doubler Grid (25-54 Mc. Models) Transmitter Tripler Grid (144-174 Mc Models)
T4	Transmitter 3rd Doubler Grid (25-54 Mc. Models) Transmitter 2nd Doubler Grid (144-174 Mc. Models)
T5	Transmitter Doubler-Driver Grid
T6	Transmitter Power Amplifier Grid
PA	Transmitter Power Amplifier Plate (plate current reading)
PO	No Connection

For further circuit details refer to attached schematic diagram

REVISIONS

DIAG. ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION	CIRCUIT BOARD AFFECTED
A	TU415-1	S3	WAS 40A482097	XMTR. ON-OFF	NONE

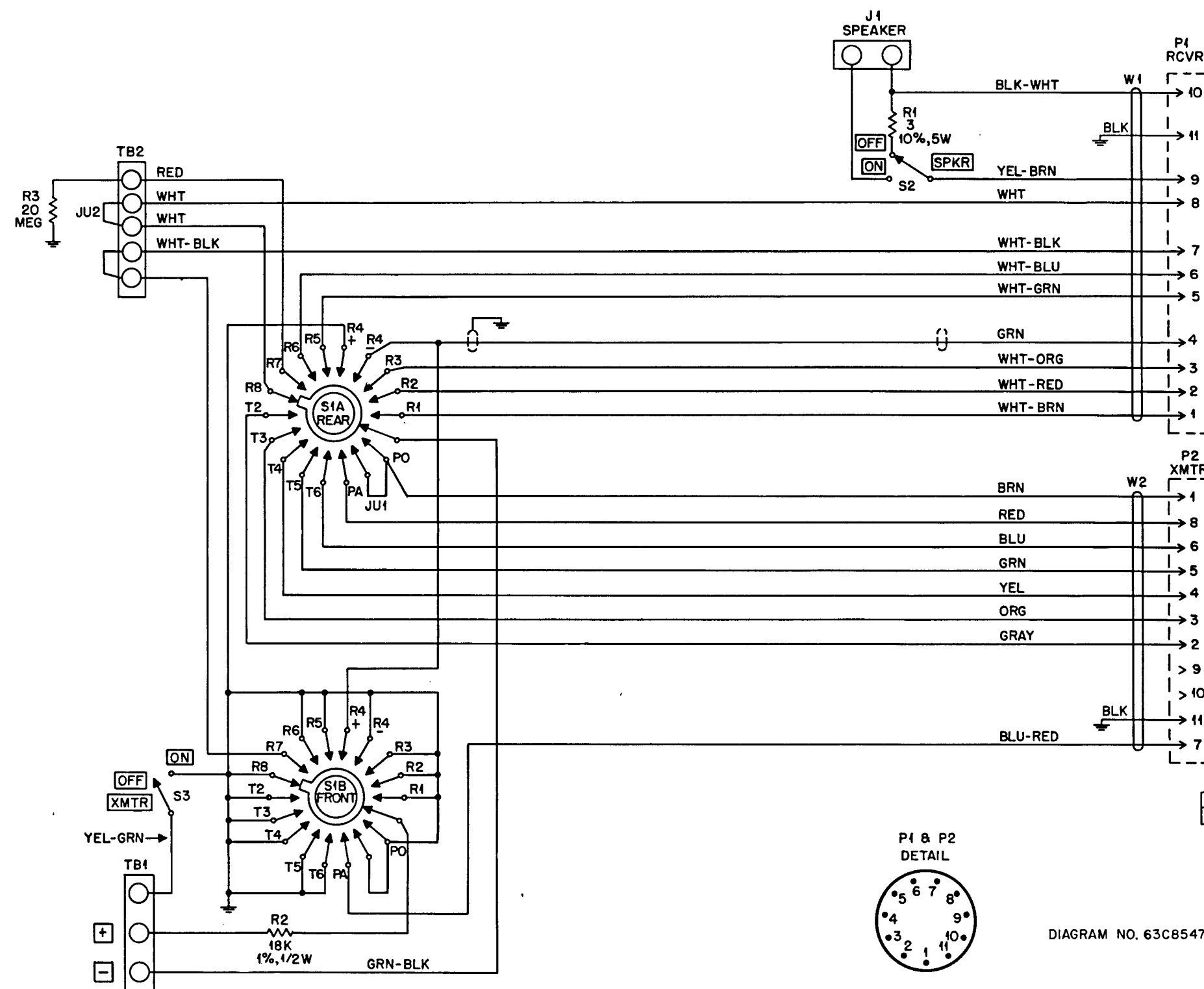


DIAGRAM NO. 63C854779

MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
TU415	1	METERING CHASSIS

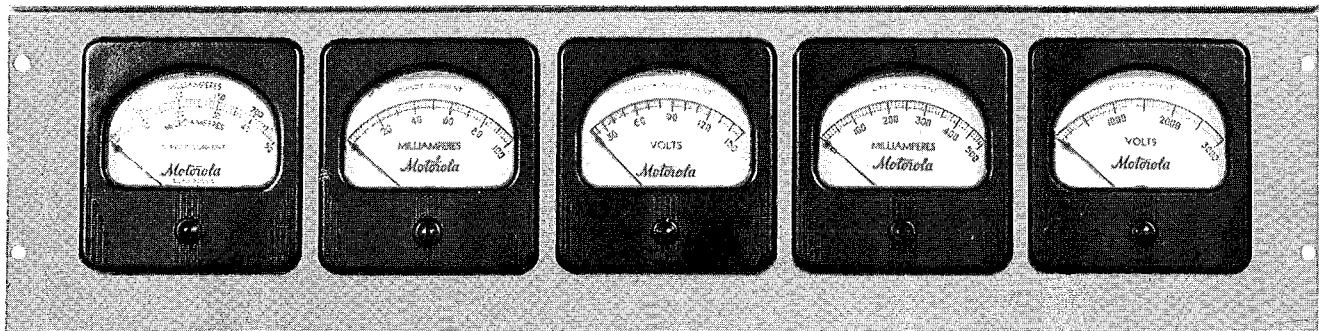
SCHEMATIC DIAGRAM PARTS LIST

TU415 Meter Switching Panel

Reference:
Schematic Diagram
63C854779-A

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
J1	9K82810	<u>CONNECTOR, receptacle:</u> female; 2 contact; rectangular; molded black phenolic base; SPEAKER CONNECTOR
P1	28B813576	<u>CONNECTOR, plug:</u> male; 11 contact; polarized; molded black phenolic base; does not include 15A483149 SHELL, connector or 41A483715 SPRING, connector shell; which must be ordered separately; p/o W1; connects to Receiver Meter Connector same as P1 except p/o W2 and connects to Transmitter Meter Connector
P2		
R1	17K82839	<u>RESISTOR, fixed:</u> wire wound; 3 ohm $\pm 10\%$; 5 w; ins.
R2	6K892470	carbofilm; 18K $\pm 1\%$; 1/2 w; ins.
R3	6K892455	carbofilm; 20 meg. $\pm 2\%$; 2 w; ins.
S1	40B822398	<u>SWITCH,</u> rotary: 2 pole; 18 position; METERING consists of: 1 pole; 18 position; rear sec.
S1A		1 pole; 18 position; front sec.
S1B		
S2	40A80248	toggle: S. P. D. T. SPEAKER ON-OFF
S3	40B844445	toggle: S. P. S. T. XMTR ON-OFF
TB1	31A844836	<u>BOARD, terminal:</u> 3 screw terminals
TB2	31A891286	1 ground and 5 solder lug terminals
W1	1V832006	<u>CABLE ASSEMBLY, special purpose</u> connects to Receiver Meter Con- nector; includes: Reference part P1 and miscellaneous wire leads; covered with black tubing
W2	1V832005	connects to Transmitter Meter Connector; includes: Reference part P2 and miscellaneous wire leads; covered with black tubing

METERING FACILITIES



AEFD-4646-O(6858-3)

1. DESCRIPTION

The 250 and 300 watt base stations incorporate metering facilities which allow easy measurement of all transmitter and receiver circuits essential to tuning and checking. Metering of the receiver and the exciter circuits is accomplished with a dual scale 0-50 microampere meter and rotary selector switches with associated cabling. A 0-250 ma scale is included on the meter face to permit direct reading of the exciter final amplifier plate current. Also included on the meter panel are additional meters to measure primary line voltage and p-a plate voltage, p-a grid current, and p-a plate current of the final amplifier chassis.

2. METERING EQUIPMENT

The TK577 Meter Panel consists of a metal mounting plate, a terminal board, and five meters.

The five meters and their function are as follows:

- (1) 0-150 v a-c voltmeter, primary power source line voltage.
- (2) 0-3000 v d-c voltmeter, final amplifier plate voltage.
- (3) 0-500 milliampere meter, final amplifier plate current.
- (4) 0-100 milliampere meter, final amplifier grid current.
- (5) 0-50 microampere, 0-250 milliampere meter, exciter and receiver chassis circuits.

The meter panel is installed at the top of the cabinet and is visible with the cabinet doors closed. The meter panel also includes two pilot lamps to indicate main power "on" and transmitter "on"



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MAINTENANCE

1. GENERAL

This section outlines the specific duties and responsibilities of maintenance personnel. Experience has shown that there is a particular way of maintaining two-way communications equipment that is far superior to any other in achieving maximum operating efficiency and reliability. This procedure is known as "System Maintenance", which simply means that the inspection and maintenance of all units constituting the communication system is conducted in an established and orderly fashion. It is recommended that the procedure should be conducted at regular intervals.

All communications systems include integrated assemblies. A failure in any one of these would constitute a failure of communications. There are three major factors which require attention:

- a. The primary power source.
- b. The basic radio units.
- c. The antenna system.

Any successful maintenance program must include the entire system. It would be of little consequence to maintain the basic radio units at top efficiency and ignore the primary power or the antenna system. A failure in either one results directly in a failure of radio communications. Therefore, to be successful in maintenance, a program should be developed and closely followed on a basis of all-inclusive system maintenance. Such a program should include a periodic check on all the factors constituting the FM two-way radio communication system.

This section recommends specific duties and responsibilities of maintenance personnel. The

two phases of maintenance are the preventive maintenance measures and the repair of the equipment when it breaks down. Preventive maintenance is performed on equipment to insure good working condition so that break down and needless interruptions in service will be kept to minimum. Preventive measures include visual inspection of electrical and mechanical parts, periodic cleaning, and lubrication. These techniques can be performed with a minimum of equipment and effort. Potential failures can often be spotted and corrected before they have a chance to develop. Systematic recording of meter readings and studying of performance characteristics also aid in the prevention of failures. Comparison of data, taken on a particular equipment at regular intervals, reveals slow progressive drifts that may be too small to show up significantly in one test. Any marked variations in the regularly obtained data should be regarded as a sign of an approaching failure and investigated promptly.

NOTE

Due to the particularity of some equipment chassis, special maintenance considerations are included in the respective instruction sections for these units. Refer to these instruction sections for further information.

2. ROUTINE MAINTENANCE

The following chart is part of the regular preventive maintenance procedure. These procedures should be performed at least as often as recommended. Under adverse conditions, such procedures as cleaning and inspecting for signs of deterioration of exposed components should be performed more often depending upon the conditions encountered. The purpose of routine maintenance is to prevent certain troubles from occurring.

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ROUTINE MAINTENANCE CHECK CHART

What to Check	How to Check	Explanation
	<u>WEEKLY</u>	
1. Cleaning	Clean dirt and moisture from exterior of equipment.	Remove loose dust and dirt with a soft brush or blower; remove dirt and grease which adheres to the chassis and parts with a brush or cloth moistened with a cleaning solution. Wipe gently with a clean soft cloth such as cheese cloth.
2. Inspecting	Inspect parts and wiring for rust corrosion, loose connections, frayed and burned insulation, loose screws, and burned and charred resistors and coils.	Use #0000 sandpaper to remove rust and corrosion. Do not use steel wool or emery cloth as minute particles frequently enter the equipment and cause harmful internal shorting or grounding of circuits. Use paint which is authorized and consistent with existing regulations to touch up bared surfaces.
3. Controls	Inspect for binding scraping, excessive looseness, misalignment, and positive action. Tighten knobs or controls, if necessary.	Replace if necessary.
4. Plug-in items	Inspect the seating of readily accessible plug-in items such as tubes, lamps, crystals, fuses, and plug-in type transformer.	Replace if necessary.
5. Cables	Inspect cables for cuts, breaks, fraying deterioration, kinks, and strains.	Repair or replace if necessary.
6. Connectors	Inspect for loose connections and bent or broken contacts.	Straighten all bent contacts. Replace if contacts are broken.
7. Pilot light Assemblies	Inspect for looseness, broken lenses, and burned out bulbs.	Replace if necessary.
8. Dust Covers	Check to see that all protective dust covers are in place.	
9. Meters	Inspect meters for damaged glass and broken cases.	Replace if necessary.
10. Antenna Tower guy wires (if used)	Check for proper tension.	Tighten all guy wires for equal tension on each corner.

ROUTINE MAINTENANCE CHECK CHART (Cont'd.)

What to Check	How to Check	Explanation
11. Mountings and connections 12. Power Supply Voltages	<u>WEEKLY</u> Clean and tighten exterior of components and cases, rack mounts, antenna mounts, shock mounts, coaxial cables, and cable connections. Check for proper power supply voltages by observing indications on the appropriate meters.	Tighten screws, bolts and nuts carefully. Fittings tightened beyond the pressure for which they are designed will be damaged or broken. Each voltage on each transmitter and receiver must be checked to determine that the power supply voltages are correct.
	<u>MONTHLY</u> 1. Tubes Inspect for loose envelopes, cracked sockets, insufficient spring tension. Check emission of receiver type tubes. 2. Terminal Boards Inspect for loose connections, cracks, and breaks. 3. Transformers, Chokes, Potentiometers Inspect for signs of overheating. 4. Electrical Connections If necessary, tighten all electrical connections, terminal strips, etc. 5. Capacitors Inspect fixed capacitors for leaks, bulges, and discoloration. Inspect variable capacitors for dirt, moisture, misalignment of plates, and loose mounting. 6. Resistors Inspect for cracks, chipping, blistering, discoloration and moisture. 7. Switches Clean and tighten switches, terminal blocks, and interior of chassis.	Replace all defective tubes. Replace if necessary. Replace if necessary. Do not tighten beyond the pressure for which they are designed. Replace if defective. Replace if defective.

3. TYPICAL ADDITIONAL CHECKS

NOTE

Due to the particularity of some equipment chassis, special maintenance considerations are included in the respective instruction sections for these units. Refer to these instruction sections for further information.

a. Fuses

Fuses, sometimes even when new, may have too much resistance. Check and replace if voltage drop exceeds .1 volt.

b. Fuse Holders

Fuse holders also lose their temper because of heat resulting from poor contact. Acid causes

corrosion. Accumulation of oil and dirt increases contact resistance and the remedial action is to clean contacts, tighten or replace.

c. Primary Power Source

Primary voltages are always suspected in a-c circuits as they can often be too high as well as too low. In some cases application of voltage regulators may be necessary. Loose connections on fuses occur even in a-c circuits. Check for hot fuses and connections.

Primary power sources should be the first check points in preventive maintenance procedures and should be checked periodically.

d. Unit Assemblages

These include the transmitter, receiver, power supply, and associated units. Very few adjustments need to be made regularly in the transmitter and receiver. To catch a maximum number of incipient troubles, the technician must use his eyes, his ears, his sense of touch, and meter measurements, as well as his good judgment and past experience.

Basically four types of observations are required:

(1) Listening Tests

An experienced technician can often detect warnings of impending trouble by noting the audio quality, the noise background and the squelch operation in relation to the settings of the volume and squelch controls. He will come to know the normal signal level he should obtain at given locations with selected stations in a particular system. Degradation of performance will be immediately apparent to the technician who checks the set periodically, whereas the steady operator may become accustomed to a gradually degraded performance.

(2) Visual Inspections

Check for loose bolts, screws and clamps, worn microphone cords, burned out pilot lights, arcing conditions at any point in the equipment, loose or broken components, burned resistors, or loose connections. A good visual inspection not only means quick locating of the trouble source, but may prevent more serious trouble from developing later.

(3) Touch Tests

WARNING

When making touch tests on the equipment the technician should be extremely careful, as HIGH VOLTAGES ARE PRESENT AT ALL TIMES. Extreme caution should be observed to avoid hazardous electrical shocks. Even after the a-c power is disconnected from the equipment, short out the high voltage components to chassis ground by means of a screwdriver with insulated handle.

The fingers are good detectors of improper temperature conditions. Fuses, fuse holders, crystal ovens, transformers and relay coils which are too hot indicate possible trouble sources. Also, cold crystal ovens (except for non-heated crystals), tubes or resistors that should normally be warm are probably in trouble. Such tests are quick and should be used often.

(4) Meter Measurements

Actual quantitative measurements of voltages, grid and plate currents, power output, frequency and deviation have no substitute; their meaning is definite. Experience will indicate to what degree variations can be tolerated.

e. Antenna Systems

Visual checks of antennas, line and tower lights, antenna mounting devices, cables, and connectors should be made periodically, as well as meter checks to find any open or shorted lines or high standing wave ratios. Remember that the antenna must efficiently radiate the power developed in the transmitter and also transfer to the receiver the minute voltages picked up from the distant transmitter to produce a good audible signal. Failure of the antenna or antenna line is a failure of the communications systems.

f. Netting

Netting of receivers and transmitters in any system is more important than usually realized. The term "netting" means that all receivers and transmitters in a given system are aligned on the same frequency. With modern selectivity requirements, it is more than ever necessary to tune every receiver exactly to the station it must receive. Careful "netting" of all units in an integrated system to the correct frequency is a first order requirement of any communication

system and will eliminate a prime cause of poor system performance.

g. Frequency Checks

Frequency checks of transmitter deviation will also improve poor system operation. The technician should be sure that transmitters are swinging through the entire deviation range as under-deviation does not develop the full advantages of frequency modulation.

A good rule to follow is to check performance frequently and make adjustments only when actual tests and measurements prove improper operation. Do not make any unit adjustments without meter and signals to indicate actual conditions.

h. Lubrication

The equipment has been properly lubricated at the factory. On base stations which use the TK599 High Voltage Transformer and Blower Kit, the blower motor requires lubrication approximately every three months. Apply SAE #20 oil through the slits in the two rubber caps on this blower motor. All other blower motors are self-oiling. The bearings of exhaust fans are of the "greased-for-life" ball bearing type. These units require no additional lubrication. A minimum amount of grease should be applied to surfaces obviously requiring grease, such as shaft bushings. In each case apply grease sparingly and wipe excess away. Take particular care that no oil or grease comes in contact with the electrical parts of the equipment.

i. Filter Cleaning

The cabinet blower motor uses an air filter which is located between the blower intake and the cabinet wall. It is recommended that the air filter and the cabinet intake screen be cleaned approximately every three to four months. To remove the air filter unit, pull upward on the filter holder. Cleaning of the removed filter may be in the form of a sharp "rap" against a hard surface to remove any accumulated dust and dirt. If necessary, the use of kerosene or similar fluid may be used; however, once a cleaning fluid is used, subsequent similar cleaning will become necessary. Cleaning of the cabinet intake screen is accomplished by simply removing any dust, dirt or grease from the screen with a brush or cloth, moistened with a cleaning fluid if necessary.

j. Rustproofing and Painting

When the finish on the components has been badly scarred or damaged, rust and corrosion can be prevented by touching up the bared surfaces. Use #0000 sandpaper to clean the surface down to the bare metal; obtain a bright smooth finish.

CAUTION

Do not use steel wool or emery cloth. Minute particles frequently enter the equipment and cause harmful internal shorting or grounding of circuits.

4. REQUIRED REPAIRS

a. Tagging Leads

Tagging of leads is essential to assure that correct re-wiring will be made when a part is replaced. Before unsoldering any leads, tie together the leads that are attached to each part. Use small tags or short pieces of adhesive tape to identify all wires in accordance with their actual connections. Identify every lead that is to be removed.

b. Parts and Substitutions

When damaged parts must be replaced, identical parts should be used. If the identical replacement component is not available, check the parts list of the respective chassis for proper Motorola part number and order the components from the nearest Motorola replacement parts depot as listed in the Foreword of this instruction manual. If for any reason, substitutions must be made immediately, it is recommended to replace the substitutions as soon as the proper replacement part is available. Even the substituted part must have identical electrical properties and must be of equal or higher voltage and current ratings.

c. Location

Relocation of a substituted part may develop hum or other interference and is not recommended.

d. Mounting

Mount the new or repaired part in the same mounting as that formerly used by the damaged part. Fasten all mountings securely.

e. Soldering

Before soldering any connections, carefully scrape all parts that will be touched by the solder until all traces of rust, corrosion, paint or varnish are removed. Dust the scraped parts with a small clean brush. Tin all surfaces to be soldered. Wrap the wire around the lug to be soldered to obtain sufficient mechanical support. Solder the connection, using a minimum amount of solder with sufficient heat to make the solder flow evenly around the tinned surface.

5. SUMMARY OF RECOMMENDED CHECKS

A good preventive maintenance program would require a complete system check at least every three months preferably monthly or weekly. In a general way the following items should be part of any preventive maintenance routine.

- a. Clean and dust thoroughly.
- b. Check primary voltage circuits.
- c. Measure all required B+ voltages.
- d. Measure power output of transmitters.
- e. Measure sensitivity of receivers.
- f. Check meter reading at the metering positions of transmitters and receivers.
- g. Check audio output of receivers and audio input to transmitters.
- h. Check d-c control voltages at control panels.
- i. Check operation of all relays and clean relay contacts.
- j. Measure frequency and deviation of transmitters.
- k. Check and adjust frequency netting of the entire system.
- l. Check all accessories; such as cables, microphones, pilot lights, etc.
- m. Check the antenna system and clean antenna of any dirt or corrosion.
- n. Check telephone lines, a-c line, and antenna coaxial lines.
- o. Check and adjust remote control levels.
- p. Check power supply output voltages.
- q. Actually make an operational listening test of transmission and reception.
- r. Keep individual records of each unit.