COLLINS

instruction book

Collins Radio Company | Cedar Rapids, Iowa

KWM-2 and KWM-2A
Transceivers

KWM-2

Collins Amateur Equipment Guarantee

The Collins Amateur Equipment described herein is sold under the following guarantee:

Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to workmanship or materials and which are returned to Collins at its factory or its designated Service Agency, transportation prepaid, provided:

(a) Buyer presents properly executed Warranty Verification Certificate.

(b) Notice of the claimed defect is given Collins or an authorized Service Agency, or an authorized Distributor, in writing, within 180 days from the date of purchase and goods are returned in accordance with Collins instructions.

(c) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins designs are subject to only such adjustments as Collins may obtain from the supplier thereof.

(d) Any failure due to use of equipment for purposes other than those contemplated in normal amateur operations or in violation of Collins applicable Instruction Book shall not be deemed a defect within the meaning of these provisions.

This Warranty is void with respect to equipment which is altered, modified or repaired by other than Collins or Collins Authorized Service Agencies.

Collins reserves the right to make any change in design or to make additions to, or improvements in, Collins products without imposing any obligations upon Collins to install them in previously manufactured Collins products.

No other warranties, expressed or implied, shall be applicable to said equipment, and the foregoing shall constitute the Buyer's sole right and remedy under the agreements contained in these paragraphs. In no event shall Collins have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

NOTICE: With each equipment or set of equipments purchased, the distributor should furnish a Warranty Verification Certificate. It is necessary that this certificate accompany the equipment when it is returned for warranty repairs. Be sure that you receive it from your distributor.

Warranty Repairs

On the opposite page are listed the Service Agencies authorized to perform warranty repair on Collins Amateur Equipments.

If you should wish to return material or equipment direct to Collins under the guarantee, you should notify Collins, giving full particulars including the details listed below, insofar as applicable. If the item is thought to be defective, such notice must give full information as to nature of defect and identification (including part number if possible) of part considered defective. Upon receipt of such notice, Collins will promptly advise you respecting the return. Failure to secure our advice prior to the forwarding of the goods or failure to provide full particulars may cause unnecessary delay in handling of your returned merchandise.

ADDRESS:

Collins Radio Company
Amateur Product Office
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Type number, name and serial number of equipment
(B) Date of delivery of equipment
(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known
(G) Name of distributor from whom the equipment was purchased.

Equipment returned to the Service Agency or Collins for warranty repair must be accompanied with the Warranty Verification Certificate.

Out-of-warranty Repair, Modifications, Addition of Accessories, Alignment, etc.

For information on service of this type write to the address shown below. If you wish to return your equipment for repairs, etc., without prior correspondence, be sure to include the following information attached to the equipment inside the packing carton:

(1) Complete instructions detailing work to be performed.
(2) Your return address.
(3) Method of shipment by which the equipment should be returned.
(4) Special instructions.

DIRECT YOUR CORRESPONDENCE TO:

Collins Radio Company
Product Support Division
Cedar Rapids, Iowa

HOW TO ORDER REPLACEMENT PARTS:

When ordering replacement parts, please furnish the following information insofar as applicable:

INFORMATION NEEDED:

(A) Quantity required
(B) Collins part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
(D) Collins type number, name and serial number of principal equipment
(E) Unit subassembly number (where applicable)

COLLINS RADIO COMPANY

Authorized Distributors

Amateur Radio Equipment

ALABAMA

Ack Radio Supply Company
3101 Fourth Avenue S.
Birmingham, Alabama 35233

Electronic Wholesalers, Inc.
2310 Bob Wallace Avenue S.W.
Huntsville, Alabama 35805

Specialty Distributing Company
1276 Belt Line Highway S.
Mobile, Alabama 36609

ALASKA

Yukon Radio Supply, Inc.
P.O. Box 406
645 I Street
Anchorage, Alaska 99501

ARIZONA

Elliott Electronics, Inc.
418 N. Fourth Avenue
Tucson, Arizona 85705

Henry Radio Company
6116 N. 27th Avenue
Phoenix, Arizona 85017

CALIFORNIA

Alcom Supply Co.
999 Howard Avenue
Burlingame, California 94010

Amrad Supply, Inc.
3425 Balboa Street
San Francisco, California 94121

Dymond Electronics
501 Blackstone Road
Fresno, California 93701

Elmar Electronics
140 11th Street at Madison
Oakland, California 94607

Henry Radio, Inc.
931 N. Euclid
Anaheim, California 92801

Henry Radio Company, Inc.
P.O. Box 64398
11240 W. Olympic Blvd.
Los Angeles, California 90064

Mission Ham Supplies
3316 Main Street
Riverside, California 92501

Quement Industrial Electronics
P.O. Box 527
1000 S. Bascom Avenue
San Jose, California 95128

Radio Products Sales, Inc.
1501 S. Hill Street
Los Angeles, California

Weatherbie Industrial Electronics, Inc.
1280 N. Fourth Street
San Jose, California 95112

Western Radio & TV Supply Company
P.O. Box 1728
1415 India Street
San Diego, California 92101

COLORADO

Burstein-Applebee Company
800 Lincoln Street
Denver, Colorado 80203

CONNECTICUT

Corky's Division, Hatry of Hartford
100 High Street
Hartford, Connecticut 06103

DISTRICT OF COLUMBIA

Electronics Wholesalers, Inc.
2345 Sherman Avenue N.W.
Washington, D.C. 20001

FLORIDA

Amateur Radio Center, Inc.
2805-9 N.E. Second Avenue
Miami, Florida 33137

Grice Electronics, Inc.
320 E. Gregory Street
P.O. Box 1911
Pensacola, Florida 32502

Kinkade Radio Supply
1719 Grand Central Avenue
Tampa, Florida 33606

GEORGIA

Ack Radio Supply Company
554 Deering Road N.W.
Atlanta, Georgia 30309

Southeastern Radio Parts Company
430 W. Peachtree
Atlanta, Georgia 30308

Specialty Distributing Company, Inc.
763 Juniper Street N.E.
Atlanta, Georgia 30308

HAWAII

Honolulu Electronics
819 Keeaumoku Street
Honolulu, Hawaii 96814

ILLINOIS

Amateur Electronic Supply
6450 N. Milwaukee Avenue
Chicago, Illinois 60631

Klaus Radio & Electric Company
403 E. Lake Street
Peoria, Illinois 61614

Newark Electronics Corp.
500 N. Pulaski Road
Chicago, Illinois 60624

INDIANA

Graham Electronics Supply, Inc.
122 S. Senate Avenue
Indianapolis, Indiana 46225

Radio Distributing Company, Inc.
P.O. Box 1499
1212 High Street
South Bend, Indiana 46624

IOWA

Amateur Radio Center
1210 Grand Avenue
Des Moines, Iowa 50309

World Radio Laboratories, Inc.
P.O. Box 919
3415 W. Broadway
Council Bluffs, Iowa 51501

LOUISIANA

Sterling Electronics
537 S. Claiborne Avenue
New Orleans, Louisiana 70130

Radio Parts, Inc.
1112 Magazine Street
New Orleans, Louisiana 70130

MARYLAND

Uncle George's Radio Ham Shack
11324 Fern Street
Wheaton, Maryland 20902

MASSACHUSETTS

DeMambro Radio Supply, Inc.
1095 Commonwealth Avenue
Boston, Massachusetts 02215

Graham Radio, Inc.
505 Main Street
Reading, Massachusetts 01867

MICHIGAN

Electronic Distributor, Inc.
1960 Peck Street
Muskegon, Michigan 49440

Purchase Radio Supply
327 E. Hoover Avenue
Ann Arbor, Michigan 48104

Radio Supply & Engineering
90 Selden Avenue
Detroit, Michigan 48201

Warren Radio Company
1710 S. Westnedge
Kalamazoo, Michigan 49001

COLLINS

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107 Third Avenue N.
Minneapolis, Minnesota 55401

MISSOURI

Walter Ashe Radio Company
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St. Louis, Missouri 63101

Burstein-Applebee Company
301 E. 55th St.
Kansas City, Missouri 64106

Henry Radio Company
211 North Main
Butler, Missouri 64730

Ham Radio Center
8342 Olive Boulevard
St. Louis, Missouri 63132

NEW HAMPSHIRE

Evans Radio
P.O. Box 312 Bow Junction
Route 3A
Concord, New Hampshire 03302

NEW JERSEY

Federated Purchaser, Inc.
155 U.S. Rt. 22
Springfield, New Jersey 07087

NEW YORK

Adirondack Radio Supply
P.O. Box 88
185-191 W. Main Street
Amsterdam, New York 12010

Ft. Orange Radio Distributing Company, Inc.
904-16 Broadway
Albany, New York

Harrison Radio Corporation
139-20 Hillside Avenue
Jamaica, Long Island 11435

Harrison Radio Corporation
225 Greenwich Street
New York, New York 10007

Harvey Radio, Inc.
60 Crossways Park West
Woodbury, N. Y. 11797

Steller Industries, Outercom of Ithaca
10 Graham Road West
Ithaca, New York 14850

NORTH CAROLINA

Electronic Wholesalers, Inc.
938 Burke Street
Winston-Salem, North Carolina 27102

Freck Radio & Supply Company, Inc.
38 Biltmore Avenue
Asheville, North Carolina 28807

OHIO

Custom Electronics, Inc.
1918 S. Brown Street
Dayton, Ohio 45409

Pioneer Electronic Supply Company
5403 Prospect Avenue
Cleveland, Ohio 44103

Selectronic Supplies, Inc.
3185 Bellevue Road
Toledo, Ohio 43606

Universal Service
114 N. Third Street
Columbus, Ohio 43215

OKLAHOMA

Radio, Inc.
1000 South Main
Tulsa, Oklahoma 74119

OREGON

Portland Radio Supply Company
1234 S.W. Stark Street
Portland, Oregon 97205

PENNSYLVANIA

Cameradio Company
1121 Penn Avenue
Pittsburgh, Pennsylvania 15222

Ham Buerger
424 York Road
Jenkintown, Pennsylvania 19046

Radio Electric Service Company
N.W. Corner 7th & Arch Streets
Philadelphia, Pennsylvania 19106

RHODE ISLAND

W. H. Edwards Company
116 Hartford Avenue
Providence, Rhode Island 02909

SOUTH DAKOTA

Burghardt Radio Supply
P.O. Box 746
621 Fourth Street S.E.
Watertown, South Dakota 57201

TENNESSEE

Electra Distributing Company
1914 West End Avenue
Nashville, Tennessee 37203

W & W Distributing Company
P.O. Box 436
Memphis, Tennessee 38101

TEXAS

McNicol Company, Inc.
3012 Yandell
El Paso, Texas 79903

Electronic Center, Inc.
2929 N. Haskell
Dallas, Texas 75204

Electronic Equipment &
Engineering Company
P.O. Box 3687
805 S. Staples Street
Corpus Christi, Texas 78404

Electronic Equipment &
Engineering Company
2606 Westheimer
Houston, Texas 77006

Howard Radio Company
1475 Pine Street
Abiline, Texas 79601

Radio & TV Parts
1828 N. St. Mary's
San Antonio, Texas 78212

UTAH

Manwill Supply Company
2511 S. State Street
Salt Lake City, Utah 84100

WASHINGTON

Cascade Electronic Supply
6125 202nd Street S.W.
P.O. Box 563
Lynwood, Washington 98036

C. & G. Electronic Company
2502 Jefferson Avenue
Tacoma, Washington 98402

HCJ Electronics
6904 East Sprague
Spokane, Washington 99206

WEST VIRGINIA

Chemcity Electronics
1637 Fourth Avenue
Charleston, West Virginia 25321

WISCONSIN

Amateur Electronic Supply
4828 W. Fond du Lac Avenue
Milwaukee, Wisconsin 53216

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KWM-2 and KWM-2A Transceivers

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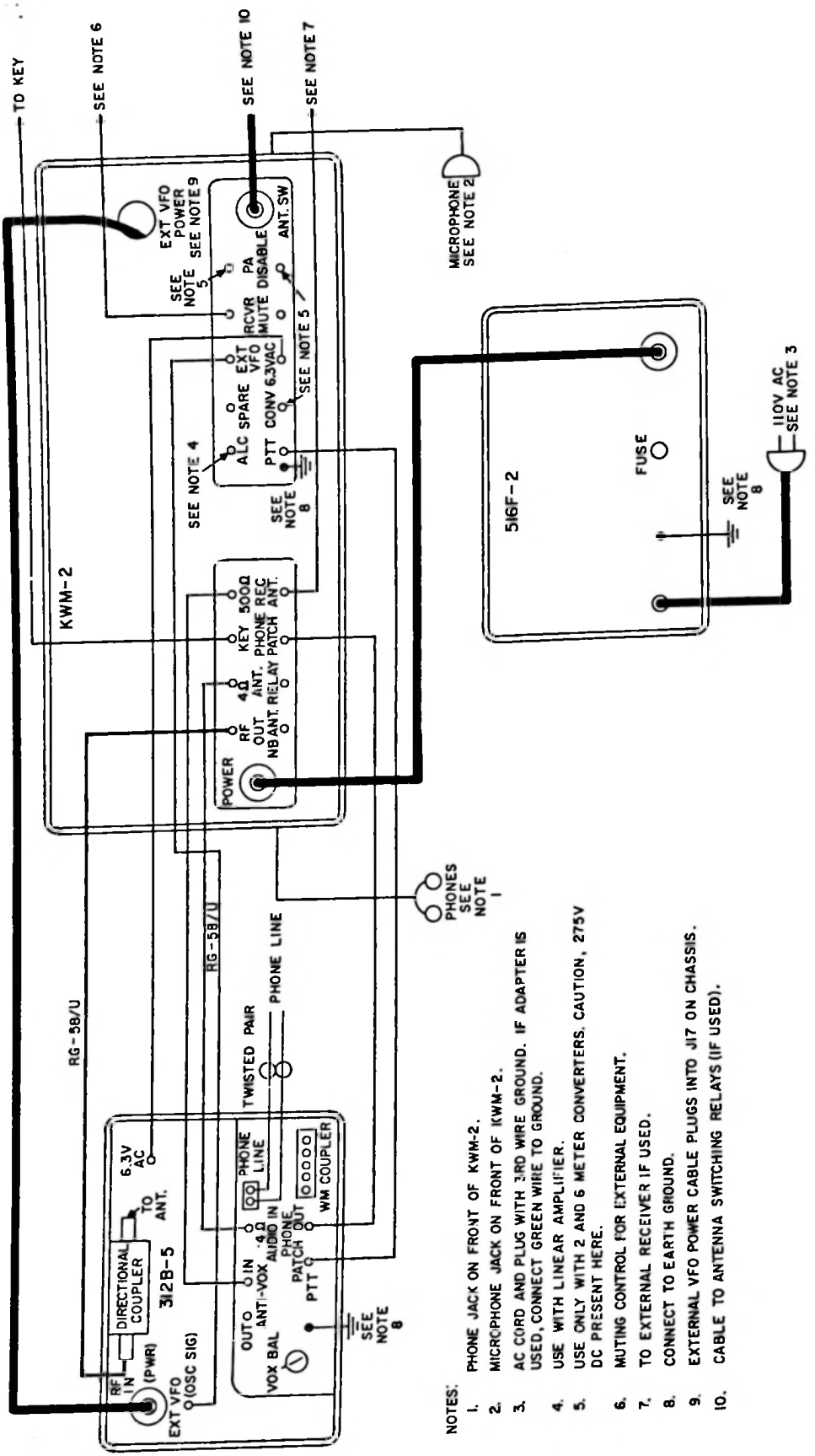


NOTES:
1. PHONE JACK ON FRONT OF KWM-2.
2. MICROPHONE JACK ON FRONT OF KWM-2.
3. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. USE WITH LINEAR AMPLIFIER.
5. USE ONLY WITH 2 AND 6 METER CONVERTERS. CAUTION, 275V DC PRESENT HERE.
6. MUTING CONTROL FOR EXTERNAL EQUIPMENT.
7. TO EXTERNAL RECEIVER IF USED.
8. CONNECT TO EARTH GROUND.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).

Figure 1-1. Fixed Station Interconnections

section 1

installation

1.1 Unpacking.

Carefully lift the transceiver out of the packing material. Examine for visible damage. If transceiver has been damaged in shipment, save box and packing material, and notify the transportation company. Fill out and mail the equipment registration card. Check that all tubes and crystals are properly seated in sockets. Check tuning controls and switches for freedom of action. Check the equipment included with the receiver against table 1-1.

1.2 Mounting and Cabling.

1.2.1 GENERAL.

For fixed station installation, refer to figure 1-1 or 1-3. For mobile installation, refer to figure 1-4. Traveling station interconnections are shown in figure 1-2.

1.2.2 FIXED STATION INSTALLATION.

1.2.2.1 EQUIPMENT INTERCONNECTION.

Connect associated equipment to the KWM-2 or KWM-2A as shown in figure 1-1 or 1-3. ANT. SW connector J25 supplies band information in the form of grounds for each 3.5-, 7-, 14-, 21-, and 28-mc operating band. This system provides a convenient method of providing band information to automatically tuned antenna systems for both mobile and fixed station use.

1.2.2.2 PHONE PATCH INSTALLATION.

The KWM-2/2A is set up for a high-impedance phone patch input (at the PHONE PATCH input, J11) such as the phone patch supplied in a Collins 312B-4 and 312B-5 Station Control. A low-impedance phone patch, such as a Collins 189A-2, may be used by making the following change in the KWM-2/2A. Disconnect the two brown-white wires from pin F on terminal board E60 (refer to figure 7-2). Using an ohmmeter, determine which of the two wires is connected to PHONE PATCH jack J11. Connect this wire to pin 7 of V1. Resolder the other brown-white wire as originally connected.

1.2.3 MOBILE INSTALLATION.

a. Select a location in the car to install the transceiver. Allow clearance on all sides to assure adequate ventilation. If vox operation is desired, leave enough space above the transceiver to allow opening the top cover for adjustment of VOX GAIN and ANTI-VOX GAIN controls, S-meter zero, etc. If a 351D-2 Mobile Mount is to be used, drill holes and fasten the adapter bracket to transmission hump with self-tapping screws. Attach the mount to the bracket. Swing the

TABLE 1-1. EQUIPMENT FURNISHED WITH KWM-2/2A

QUANTITY	DESCRIPTION	FUNCTION	PART NUMBER
1	Microphone plug	Microphone connection	361-0001-00
2	Phono plug	External connections	361-0062-00
1	Cable marker card	Cable callout	280-2946-00
1	Instruction book	Instructions	523-0176-000
1	Logbook	Station logging	523-0755-820
1	Key SCH screw #10	Alignment	024-9710-00
1	Key SCH screw #8	Alignment	024-0019-00
1	Key SCH screw #6	Alignment	024-9730-00
1	Key SCH screw #4	Alignment	024-2900-00

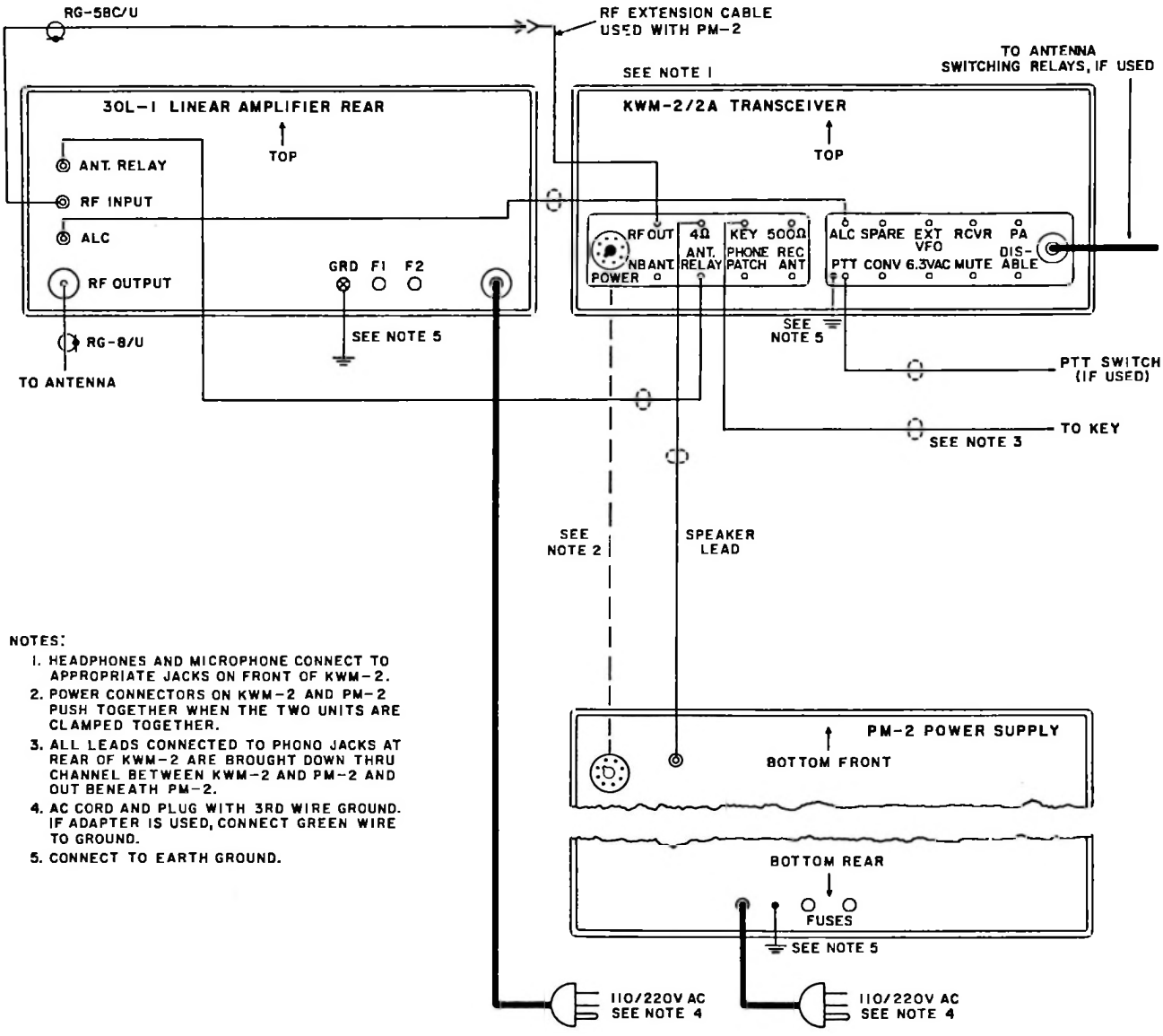


Figure 1-2. Traveling Station Interconnections with 30L-1

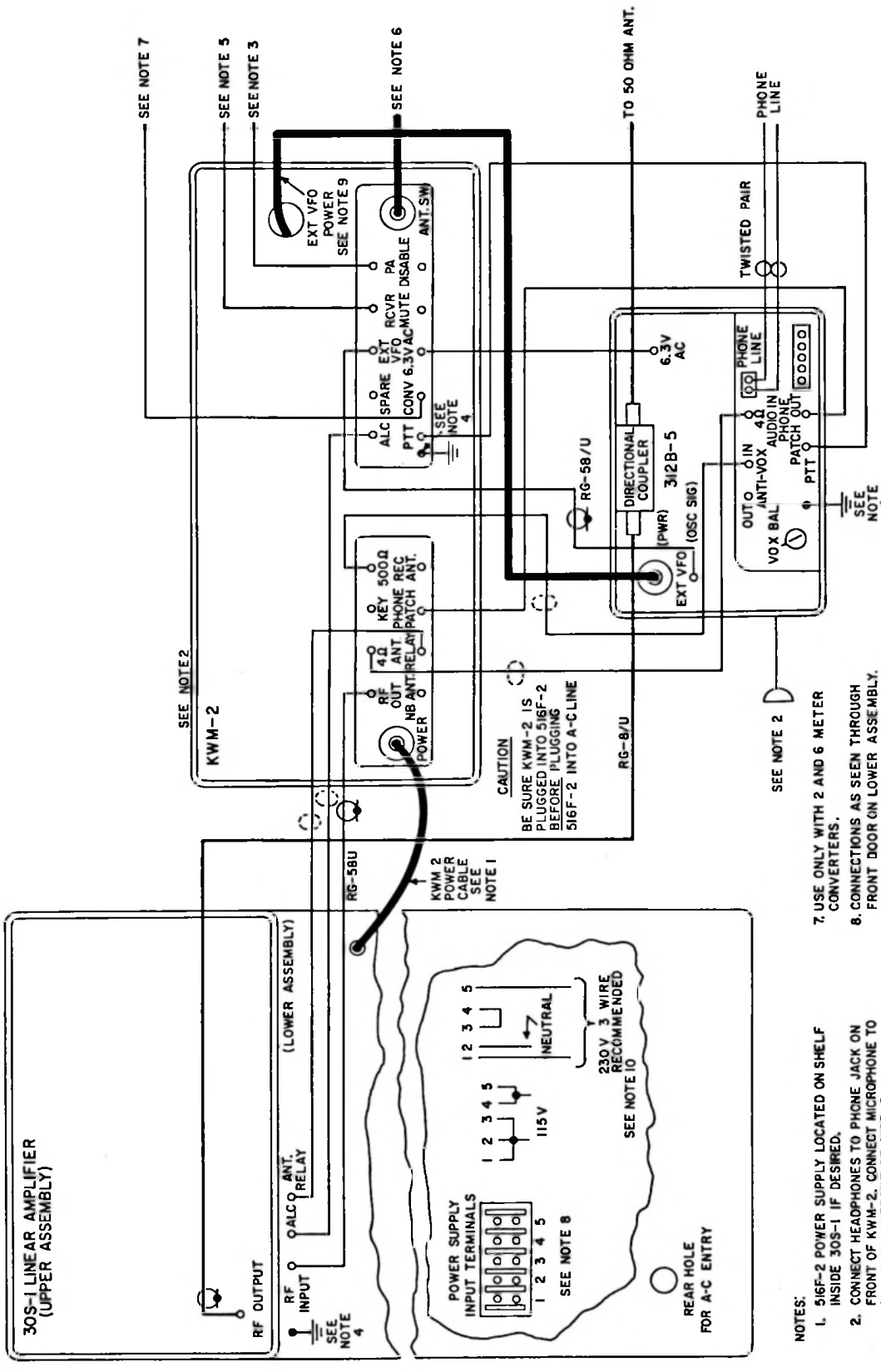
cantilever supports forward. Install the side slides in KWM-2/2A according to 351D-2 Mobile Mount Installation Instructions. Remove the plastic dust covers from the 351D-2 plugs, and store them in the recesses of the mount. Slide the transceiver onto the mount and push back until the mount plugs have entered the transceiver sockets. Tighten the wing nuts on the sides of the transceiver. See 351D-2 Instruction Sheet for mobile mount installation.

b. Select location in car for mounting MP-1 Power Supply. This location must be as clean and dry as possible. Location in luggage compartment, under seat, or on passenger side of fire wall is satisfactory. Mounting in the engine compartment is not recommended.

c. Determine necessary length of power cable (furnished with 351D-2 Mobile Mount) to connect the MP-1 to the KWM-2/2A, and cut to required length. Connect power supply, speaker, and microphone as shown in figure 1-4.

CAUTION

Before making connections to the automobile electrical system, make sure the primary circuits in the MP-1 are connected for proper ground polarity. Correct connections for either positive or negative ground systems are shown in figure 1-4.



NOTES:

1. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 IF DESIRED.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-2. CONNECT MICROPHONE TO MIC JACK ON FRONT OF 312B-5
3. USE ONLY WITH 2 AND 6 METER CONVERTERS. (CAUTION +275V DC PRESENT HERE)
4. CONNECT TO EARTH GROUND.
5. EXTERNAL RECEIVER MUTING.
6. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
7. USE ONLY WITH 2 AND 6 METER CONVERTERS.
8. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. 10 FT LENGH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END CONNECT OTHER END TO SWITCHBOX OR PLUG AS DESIRED.

Figure 1-3. High-Power Station Interconnections

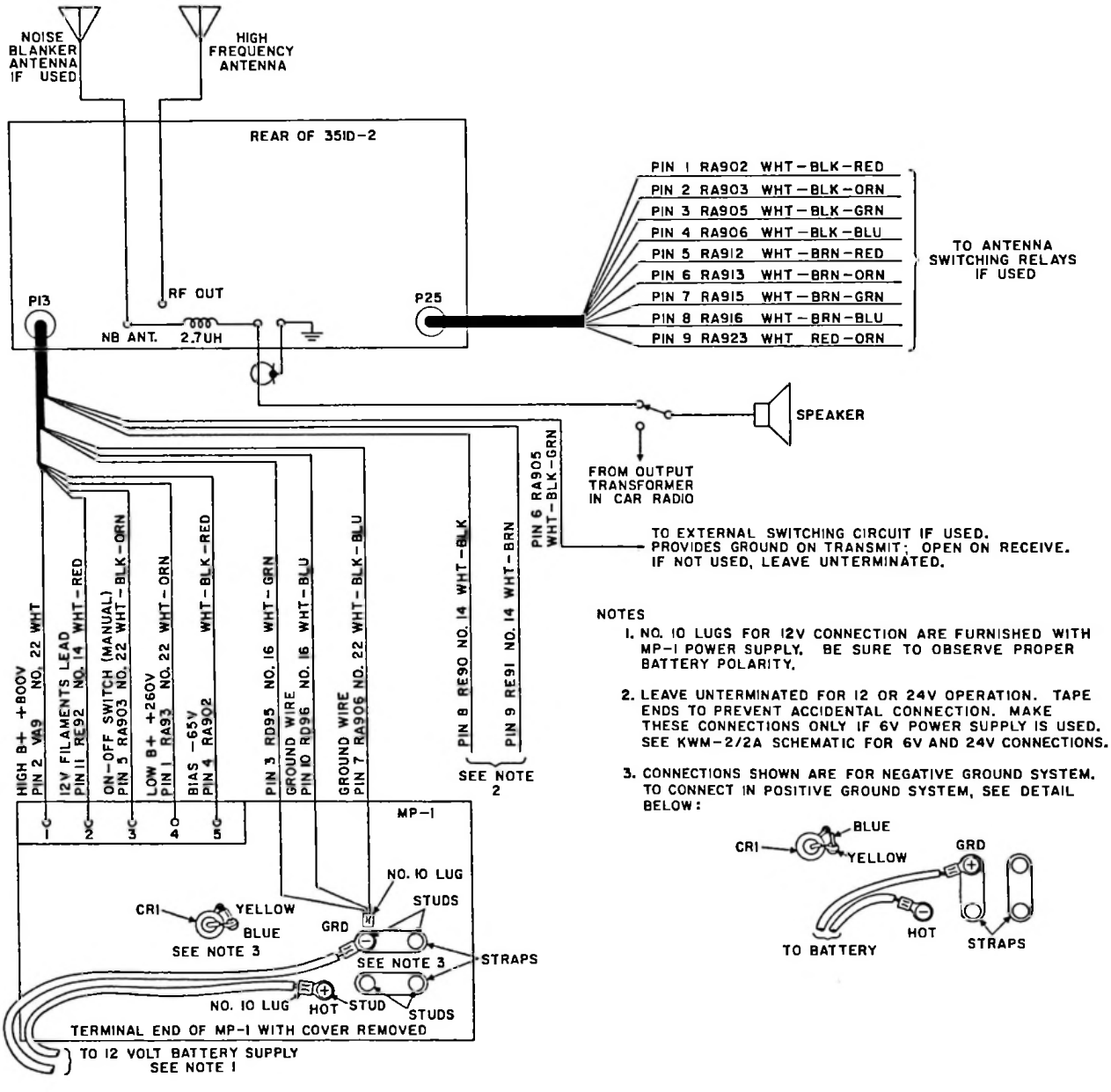


Figure 1-4. Mobile Station Interconnections

The 440E-1 Power Cable may be used to connect the power supply to the transceiver when the 351D-2 is not used. See table 5-2 for ordering information.

d. If operation is to be in boat or plane having a 115-volt, 400-cps power supply, use 516F-2 Power Supply with C1 (0.05 uf) removed from across L1 in the filter circuit. If operation is to be in a boat or plane having a 24-volt d-c power source, use a 516E-2 D-C Power Supply with a 440E-1 cable to connect it to the transceiver. The 516F-2 can also be used with the 24-volt d-c power source by using a dc-to-400-cps converter capable of handling at least a 475-watt load (C1 should be removed from across L1 in the 516F-2 when using 400-cps power for its operation).

e. No mobile speaker is supplied. If desired, the speaker leads may be connected in parallel with the car radio voice coil terminals. If the car radio has a transistor output stage, connect the terminals of the car speaker as shown in figure 1-4. Break voice coil lead, and install a switch for transfer of speaker from car radio to KWM-2/2A. If installation is in boat or plane, use any good 4-ohm speaker and mount as desired.

f. For suppression of noise encountered in mobile operation, the following suggestions may be helpful:

(1) Use resistor-type spark plugs.

(2) Install coaxial bypass capacitors at ignition coil, generator, and voltage-regulator leads. Use bracket-mounted coaxial capacitors in the battery and generator leads to the voltage regulator and a 0.005-uf (or smaller) disc ceramic or mica capacitor from the field lead to ground. DO NOT use larger than 0.005-uf capacitor here unless a 4-ohm resistor is placed in series with it.

(3) If capacitor bypasses are not satisfactory, remove them, and use chokes in series with the leads from field and armature terminals of generator. Place these chokes as close to the voltage regulator as possible.

(4) For the field lead choke, wind 12 turns of no. 18 wire on a 1/4-inch diameter powdered-iron core. For the armature lead, wind 12 turns of no. 14 or larger wire on 1/4-inch diameter powdered-iron core.

(5) Ground the rear end of the exhaust pipe to the car body with copper braid, using a radiator hose clamp to secure the braid to the tailpipe. General information concerning noise suppression is available in current handbooks.

1.3 Initial Checks. (Refer to figure 2-1.)

Set MIC GAIN control (4) full counterclockwise until the switch clicks. Set OFF-ON-NB-CAL switch (1) to ON. Set meter switch (8) to PLATE, and EMISSION switch (2) to LOCK. The transceiver is in receive condition during warmup, so the meter will read full scale until filaments have come to temperature. This is normal S-meter action. When the S-meter falls back to zero, the circuits will have switched to transmit condition, and the meter will indicate PA plate current. Read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust BIAS ADJUST potentiometer on the power supply to set plate current to 40 ma. If the transceiver is to be used with a linear amplifier, set bias to produce 50-ma idling plate current.

section 2

operation

2.1 Receiver Tuning.

a. Refer to figure 2-1. Set function switch (1) to ON. This is the swtich labeled OFF-ON-NB-CAL. See table 2-1.

b. Set EMISSION switch (2) to desired sideband (USB or LSB position). Set BAND switch (3) to desired band. If KWM-2A, set crystal board selector (12) so desired set of bands appears in window.

c. Set the MIC GAIN control (4) full counterclockwise. Set R.F. GAIN control (10) full clockwise.

d. Set VOX GAIN control (under top cover) full counterclockwise.

e. Set ANTI-VOX GAIN control (under top cover) full counterclockwise.

f. Adjust the A.F. GAIN control (5) until some receiver noise is heard in speaker.

g. Adjust the EXCITER TUNING control (6) to white portion of scale indicating the desired band. Rock this control slightly to peak the receiver noise output. The transceiver is now ready to receive and the selected 200-kc band may be tuned with the tuning control. Dial frequency can be determined by adding the dial reading to the BAND switch setting.

h. Turn function switch to CAL position. Tune dial to nearest 100-kc point (0, 100, or 200), and decrease R.F. GAIN control as necessary for comfortable listening level. Adjust tuning until the calibrate signal is zero beat. When the calibrate signal is zero beat in the receiver, set the hairline on the 100-kc mark with the zero set knob. Set function switch to ON and tune dial to the desired portion of the 200-kc band selected. If checking calibrate circuit against WWV is desired, see paragraph 4.5.2.3.

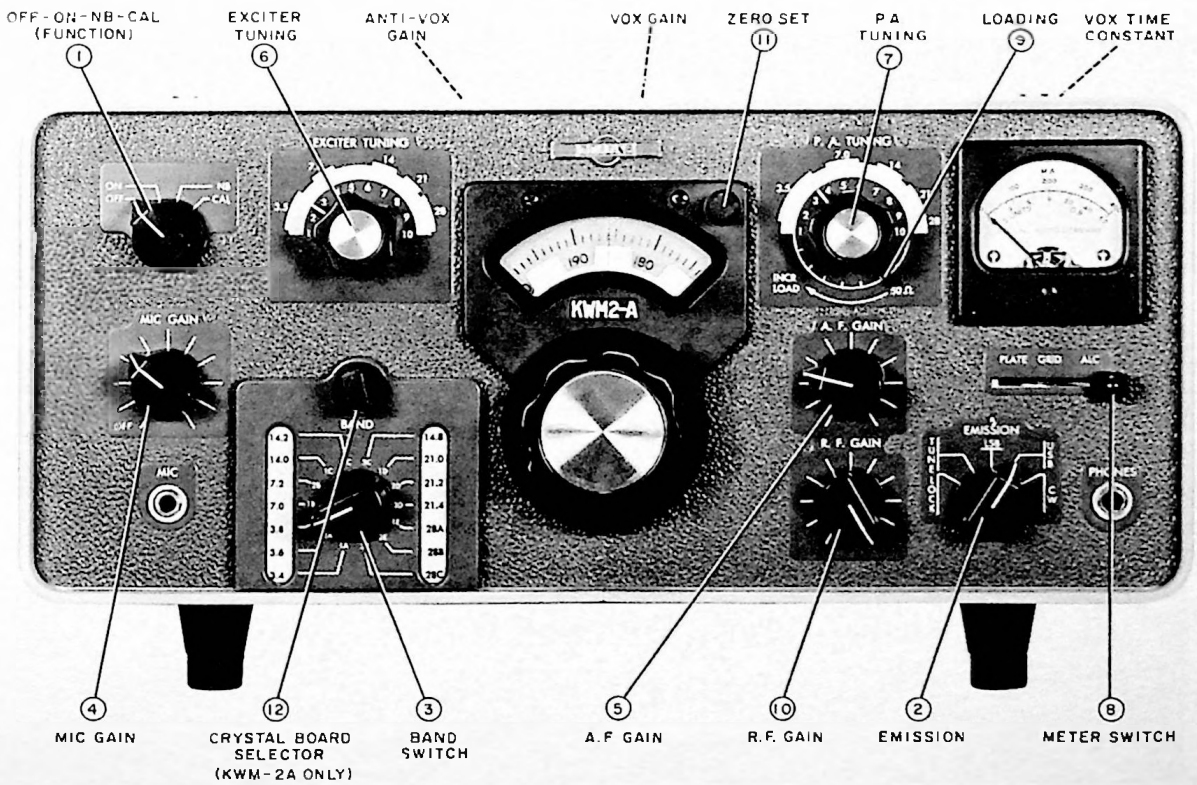


Figure 2-1. Operating Controls

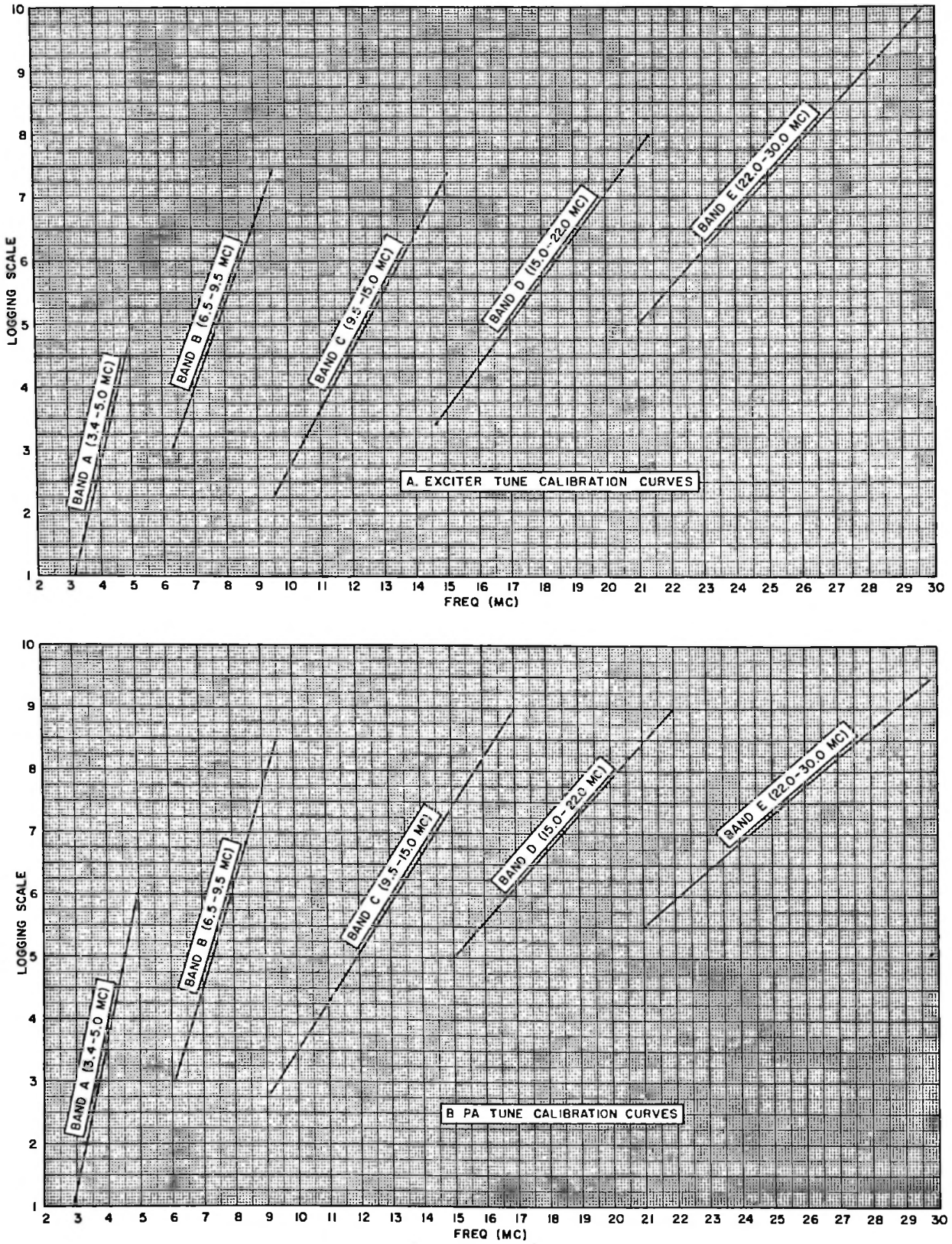


Figure 2-2. Logging Scale Calibration Curves

WARNING

During amateur operation, DO NOT operate transmit circuits while the transceiver is tuned to receive outside the amateur band in use. The transmit frequency is always locked to the receive frequency. Return tuning to within the band before transmitting.

2.2 Transmitter Tuning.

2.2.1 GENERAL.

a. Set up for receive function as in paragraph 2.1.
b. Set EMISSION switch to TUNE position.
c. Set P.A. TUNING control to white portion of dial indicating the desired band (for amateur operation). If the transceiver is being operated outside amateur bands, ignore the amateur band markings on the dial scale, and set the control according to the logging scale charts of figure 2-2.
d. Set meter switch (8) to PLATE position.
e. Advance the MIC GAIN control full clockwise, and rock the EXCITER TUNING control until maximum plate current is obtained.
f. IMMEDIATELY dip the plate current with the P.A. TUNING control.
g. Return the MIC GAIN control to full counterclockwise position.
h. Set meter switch to GRID position.
i. Advance MIC GAIN control until grid current is obtained.
j. Rock the EXCITER TUNING control to obtain a peak in grid current indication.
k. Turn MIC GAIN to OFF.
l. Set EMISSION switch to LOCK position.
m. Advance MIC GAIN to provide a grid current reading of approximately 1/3 scale.
n. Set meter switch to PLATE position.
o. Alternately dip plate current with P.A. TUNING control, and adjust loading with INCR LOAD control until plate current is 230 ma at the dip. When operating the transceiver with a linear amplifier, load to only 200 ma.
p. Set EMISSION switch to desired operating position.

CAUTION

If transceiver frequency is changed by any great amount, be sure to redip the power amplifier plate current and check the loading. This will be most important on the 80- and 40-meter bands. Some operating experience will indicate the amount of frequency excursion possible without readjustment.

2.2.2 SINGLE-SIDEBAND OPERATION.

a. Set up receiver operation and transmitter operation completely as in paragraphs 2.1 and 2.2.1.
b. Close-talk into the microphone, increasing VOX GAIN control setting until vox relay just operates. For vox operation, it is desirable to close-talk the microphone to prevent background noises from tripping the KWM-2/2A into transmit function.
c. Set meter switch to ALC position. Increase setting of MIC GAIN control to obtain S6 average reading on voice.
d. Leave MIC GAIN control as set in step c above. Leave microphone in normal operating position. Set function switch to CAL position, tune in calibrate signal, and adjust A.F. GAIN control for comfortable listening level.
e. Adjust the tuning control for approximately 1000-cps beat note. If the vox relay trips, increase ANTI-VOX GAIN setting to minimum point necessary to prevent speaker output from tripping vox. It may be necessary to increase VOX GAIN setting slightly after this antivox gain adjustment in order to compensate for the antivox gain.

NOTE

Do not use more vox gain or more antivox gain than necessary to control vox operation. If vox circuits transfer between words, increase the release time constant by turning VOX TIME CONSTANT control (under top cover) clockwise. If less release time is desired, turn the control counterclockwise.

f. Set function switch to ON position. The KWM-2/2A is now ready for transmit operation in SSB service. Speaking into the microphone transfers from receive function to transmit function through the vox circuit action. If the receiver is tuned to a different frequency, the transmitter is tuned to the new receiver frequency.
g. After changing frequency on the lower bands (below 10 mc), set EMISSION switch to LOCK position, and make the following checks:

(1) Set meter switch to GRID position.
(2) Rock EXCITER TUNING control slightly to check that PA grid drive is peaked.
(3) Set meter switch to PLATE, and check dip in PA plate current with P.A. TUNING control.
(4) Set EMISSION switch back to the desired operating position.

2.2.3 CW OPERATION.

a. Set the function switch to ON.
b. Set up receiver and transmitter operation completely as in paragraphs 2.1 and 2.2.1.
c. Depress key and adjust A.F. GAIN control for comfortable monitoring level.
d. Hold key down, and increase VOX GAIN control setting until the vox relay operates. If it is desired to

change the release time constant, adjust the VOX TIME CONSTANT potentiometer, R43. Clockwise rotation of this control increases the release time. This control is located on a bracket under the top cover, behind the meter.

e. Set meter switch to ALC position. While sending a series of dots, adjust MIC GAIN control for S2 meter indication of alc.

f. When receiving, leave the A.F. GAIN control set for comfortable monitoring level, and adjust the receive level with the R.F. GAIN control. When the KWM-2/2A is receiving, the received signal is indicated in S-units. The S-meter will read correctly with the R.F. GAIN at less than maximum setting, provided the received signal level is high enough to actuate the S-meter. For example, if the R.F. GAIN control is set for no-signal reading of S8 and reads S9 with signal, the received signal is S9.

NOTE

The CW output signal frequency is 1500 cps higher than the dial reading.

2.2.4 MOBILE OPERATION.

Vox and antivox circuits will operate in mobile operation, but push-to-talk operation is recommended, since high-level background noises will produce undesirable vox switchover. Set VOX GAIN and ANTI-VOX GAIN controls full counterclockwise before installation. If vox operation is desired, leave clearance in installation so top cover can be opened. For mobile operation, load the power amplifier to 230-ma plate current.

2.3 Operation Outside Amateur Bands.

2.3.1 SELECTION OF CRYSTALS.

The crystals supplied provide for complete coverage of all amateur bands except the 10-meter band for which only one crystal is furnished (for 28.5 to 28.7 mc). Two extra sockets are provided for additional crystals in the 10-meter band. Figure 2-3 shows crystal socket locations. Select these crystals as follows:

a. If the lower edge of the desired 200-kc band is 11.8 mc or less, the required frequency is equal to the lower edge of the desired band plus 3.155 mc. As an example, if the desired band is 4.0 to 4.2 mc, 4.0 mc plus 3.155 mc equals 7.155 mc.

b. If lower edge of desired 200-kc band is 12.00 mc or higher, the required crystal frequency is half the sum of the lower edge of desired band plus 3.155 mc. As an example, if the desired band is 14.4 to 14.6 mc:

$$\frac{14.4 + 3.155}{2} = 8.7775 \text{ mc.}$$

The plate circuit of the oscillator is tuned to twice the crystal frequency when required injection frequencies are this high.

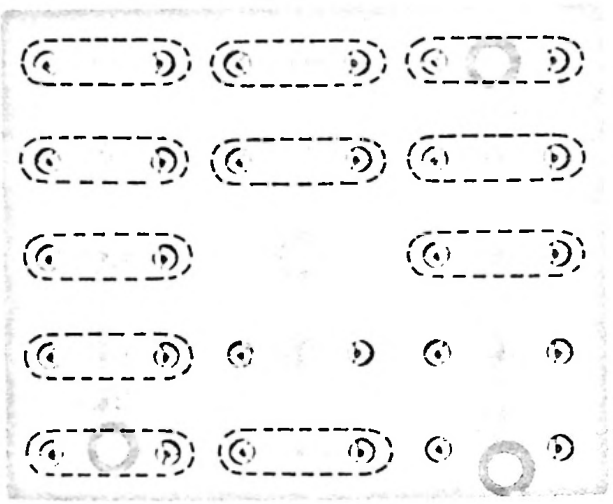


Figure 2-3. Crystal Socket Locations

CAUTION

Avoid transmitter operation between 5.0 and 6.5 mc. In this range, the second harmonic of the vfo and the variable i-f frequency is nearly the same as the desired frequency. In transmit function, some of this energy will pass through the tuned circuits and become spurious emission.

c. Plug substitute or extra crystals into the appropriate socket on the mounting board according to bandswitch position and total coverage columns in table 2-2. The example cited in step b above calls for placement of the crystal in one of the sockets marked C. If two additional 10-meter crystals are used, they must be plugged into the sockets marked E. Table 2-2 lists crystal socket designations, switch positions (BAND), crystal frequencies furnished, and frequency range limitations. For extra coverage crystals available, see section 6, Parts List.

The KWM-2A is equipped with an extra crystal mounting board and a front-panel switch to allow selection of either board. The crystal mounting board for extra-band operation is located on the top of the chassis. If amateur band operation is not needed, extra-band crystals may be substituted in the crystal mounting board under the chassis. BE SURE the crystals are plugged into appropriate sockets according to information of table 2-2 and figure 2-3. The transmitter can be operated at other frequencies outside the specified amateur bands or at other 10-meter frequencies by plugging the proper crystals into the mounting boards.

TABLE 2-1. KWM-2/2A OPERATING CONTROL FUNCTIONS

CONTROL	FUNCTION
Function (S11)	
OFF	Removes a-c power from power supply.
ON	Connects a-c power to power supply.
NB	Turns on accessory noise blanker when used.
CAL	Turns on 100-kc crystal calibrator.
MIC GAIN (R8, S10)	Controls audio amplifier gain for SSB operation, and controls tone level for CW operation.
EXCITER TUNING	Controls all ganged slug-tuned circuits in receiver and exciter portions of transceiver.
Crystal board selector (S15) (in KWM-2A only)	Selects second bank of crystals for additional coverage, and changes scale on BAND switch.
BAND (S2 through S8, S13)	Selects capacitors and crystals needed to tune transceiver to desired 200-kc band. S13 grounds a different pin on J25 for each band for remote antenna selection.
P.A. TUNING (C150)	Resonates PA plate circuit to operating frequency.
A.F. GAIN (R92)	Controls receiving audio amplifier gain.
R.F. GAIN (R84)	Controls gain of receiver-transmitter r-f amplifier and receiving i-f amplifiers during receiving.
Meter switch (S12)	
PLATE	Measures PA plate current by measuring PA cathode voltage changes.
GRID	Measures PA grid current.
ALC	Shows alc action by measuring cathode voltage changes at transmitter i-f amplifier V4A.
EMISSION (S9)	
LOCK	Grounds key line for continuous output in CW mode at full power. Used for tuning.
TUNE	Reduces PA screen voltage with series resistor, and produces CW carrier for tuneup.
LSB	Selects LSB bfo crystal, and raises vfo frequency for LSB operation.
USB	Selects USB bfo crystal, and lowers vfo frequency for USB operation.
CW	Selects USB bfo crystal, raises vfo frequency, and turns on tone oscillator. Keyed tone is applied to balanced modulator instead of voice signal.
*ANTI-VOX GAIN (R45)	Controls level of anti-vox signal fed to vox circuit.
*VOX GAIN (R39)	Controls gain of vox amplifier for voice-controlled operation.
*VOX TIME CONSTANT (R43)	Controls hold-in time of vox circuit.

*These operating controls are inside the cabinet.

Mark the desired lower band edge information on the white card in the band-switch windows. Make sure this information is marked in the appropriate switch positions.

2.3.2 ADJUSTMENT OF TUNED CIRCUITS.

For operation outside amateur bands, disregard amateur band markings on EXCITER TUNING and P.A. TUNING scales, and use logging scales. Figure 2-2 shows logging scale calibration curves. Operation at frequencies outside the amateur bands will result in slightly decreased receiver sensitivity and transmitter PA grid drive unless the tuned circuits of the transceiver are retuned to peak their responses in the desired portions of the high-frequency spectrum. For moderate excursions from the amateur bands, the decrease in performance is minor, and realignment of the r-f circuits is usually not necessary unless optimum performance is desired. Adjustment of the trimmer capacitors only will normally be sufficient to peak the response outside the amateur bands. Figure 4-1 shows the location of these adjustments. The letter portions of the capacitor designations correspond to the frequency ranges listed in the total coverage column of table 2-2. For example, the E trimmers are normally peaked on 10 meters, but may be reset to favor another portion of band E which covers 22.0 to 30.0 mc.

At the extremities of some bands the PA loading may be either too heavy or too light. This condition can be corrected by the following procedure:

a. Remove the top cover from the PA compartment.

WARNING

Be sure that all power is disconnected before working in this compartment. Dangerous voltages are present with power on.

b. Temporarily disconnect the existing wire from the rear stator terminal of the 2-gang loading capacitor.

c. Connect a jumper wire between front and rear stator terminals, and replace the compartment cover.

NOTE

The 50 Ω mark on the loading control will no longer be correct after this modification is made.

TABLE 2-2. CRYSTAL FREQUENCIES AND OPERATING BANDS

BAND-SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1A - 3.4	3.4 - 3.6 mc	6.555 mc	1A	
2A - 3.6	3.6 - 3.8 mc	6.755 mc	2A	A 3.4 - 5.0 mc
3A - 3.8	3.8 - 4.0 mc	6.955 mc	3A	
1B - 7.0	7.0 - 7.2 mc	10.155 mc	1B	B 6.5 - 9.5 mc
2B - 7.2	7.2 - 7.4 mc	10.355 mc	2B	
1C - 14.0	14.0 - 14.2 mc	8.5775 mc	1C	
2C - 14.2	14.2 - 14.4 mc	8.6775 mc	2C	C 9.5 - 15.0 mc
3C - 14.8	14.8 - 15.0 mc	8.9775 mc	3C	
1D - 21.0	21.0 - 21.2 mc	12.0775 mc	1D	
2D - 21.2	21.2 - 21.4 mc	12.1775 mc	2D	D 15.0 - 22.0 mc
3D - 21.4	21.4 - 21.6 mc	12.2775 mc	3D	
1E - 28A	28.5 - 28.7 mc	15.8275 mc	1E	
2E - 28B	As selected	Not furnished	2E	E 22.0 - 30.0 mc
3E - 28C	As selected	Not furnished	3E	

section 3

principles of operation

3.1 Block Diagram.

Refer to figure 3-1. The KWM-2/2A is an SSB or CW transceiver operating in the range between 3.4 and 30.0 mc. It consists of a double-conversion receiver and a double-conversion exciter-transmitter. The transmitter and receiver circuits use common oscillators, and a common mechanical filter, as well as a common r-f amplifier. The transmitter low-frequency i-f and the receiver low-frequency i-f is 455 kc. The high-frequency i-f for both is 2.955 to 3.155 mc. This is a band-pass i-f which accommodates the full 200-kc bandwidth. Figure 7-1 is a schematic diagram of the KWM-2/2A.

3.2 Transmitter Circuits.

3.2.1 A-F CIRCUITS.

Microphone or phone-patch input is connected to the grid of the first audio amplifier, V1A, amplified, and coupled to the grid of the second audio amplifier V11B. Output from V11B is coupled to the grid of cathode follower V3A through the MIC GAIN control, R8. Output from the cathode follower is fed to the resistive balance point of the balanced modulator. In TUNE, LOCK, and CW positions of the EMISSION switch, output from the tone oscillator, V2B, is fed to the grid of the second audio amplifier. The amplified tone oscillator signal is taken from the plate of V11B and coupled to the grid of the vox amplifier V14B to activate the vox circuits in CW operation. This signal is also fed to the grid of the first receiver a-f amplifier, V16A, for CW monitoring.

3.2.2 BALANCED MODULATOR AND LOW-FREQUENCY I-F CIRCUITS.

Audio output from the cathode of V3A and the bfo voltage are fed to a diode quad balanced modulator (CR1, CR2, CR3, and CR4). Both upper and lower sideband outputs from the balanced modulator are coupled through i-f transformer T1 to the grid of the i-f amplifier, V4A. Output from the i-f amplifier is fed to the mechanical filter, FL1. The passband of FL1 is centered at 455 kc. This passes either upper or lower sideband, depending upon the sideband selected when the EMISSION switch connects bfo crystal Y16 or Y17. The single-sideband output of FL1 is connected to the grids of the first transmitter mixer in push-pull.

3.2.3 BALANCED MIXERS.

The 455-kc single-sideband signal is fed to the first balanced mixer grids in push-pull. The plates of the mixer are connected in push-pull, and vfo signal is fed to the two grids in parallel. The mixer cancels the vfo signal energy and translates the 455-kc single-sideband signal from the balanced modulator to a 2.955- to 3.155-mc single-sideband signal. The T2-L4 combination between the first and second mixer provides broadband response to the 200-kc variable i-f output (2.955 to 3.155 mc) from the first transmit mixer V5. The band-pass i-f signal is fed to one of the grids of the second balanced mixer, and the high-frequency injection signal energy from crystal oscillator V13A is fed to the cathode and the other grid. This arrangement cancels the high-frequency injection signal energy within the mixer and translates the band-pass i-f signal to desired operating band.

3.2.4 R-F AND ALC CIRCUITS.

The slug-tuned circuits coupling V6 to V7, V7 to V8, and V8 to the power amplifier are ganged to the EXCITER TUNING control. The signal is amplified by the r-f amplifier, V7, and the driver, V8, to drive the power amplifier, V9 and V10. Output from the parallel power amplifiers is tuned by a pi-network and fed to the antenna through contacts of transmit-receive relay K3. Negative r-f feedback from the PA plate circuit to the driver cathode circuit reduces distortion in the output signal. Both the driver and PA stages are neutralized to ensure stability. When r-f driving voltage to the PA becomes great enough that positive peaks drive the PA grids positive, the grids begin to draw current and the signal is detected. This produces an audio envelope. The audio is rectified by the alc rectifier, V17A, which is connected to produce a negative d-c voltage. The voltage is filtered by C159, C160, R118, and R119 (which also determine the alc time constants), and used to control the gain of V4A and V7. This system allows a high average level of modulation without driving the PA tubes well into the grid current region, which would result in increased distortion.

3.3 Receiver Circuits.

3.3.1 R-F CIRCUITS.

Signal input from the antenna is connected through relay contacts to the tuned input circuit, T3. The

signal is applied from T3 to the grid of the receiver-transmitter r-f amplifier, V7. Amplified signal from V7 is applied from the tuned circuit, consisting of L10 and band switch selected capacitors, to the grid of the receiver first mixer, V13B.

3.3.2 RECEIVER MIXERS.

The input r-f signal is fed to the grid of V13B, and the high-frequency oscillator injection signal is fed to the cathode of V13B. The difference product of the first mixer is applied from the plate of the tube to variable i-f transformer T2. Output of T2 in the range of 2.955 to 3.155 megacycles is applied to the grid of the second receiver mixer, V17B, across parallel-tuned trap circuit Z5. This trap circuit minimizes a spurious response which would otherwise result from harmonics of the high-frequency crystal oscillator. When signal input is applied to the grid of V17B and vfo injection signal is applied to the cathode of V17B, the 455-kc difference product is fed from V17B plate to mechanical filter FL1.

3.3.3 I-F CIRCUITS.

The output from FL1 is applied to the grid of the first i-f amplifier, V1B. The i-f signal is amplified by V1B and V3B and applied through T5 to avc rectifier V15A and to the grid of product detector V15B. Beat-frequency oscillator signal is applied to the cathode of V15B, and the product of mixing is the detected audio signal. Output of the avc rectifier circuit is applied to the two receiver i-f amplifiers and through contacts of relay K4 to the receiver-transmitter r-f amplifier. This avc voltage controls the gain of the receiver and prevents overloading.

3.3.4 A-F CIRCUITS.

Output from the product detector is applied through the A.F. GAIN control, R92, to the grid of the first a-f amplifier, V16A. Amplified audio output of V16A is coupled to the grid of the a-f output amplifier, V16B, which produces the power to operate a speaker, headphones, or phone patch.

3.4 Oscillators.

The transceiver contains the tone oscillator, the beat-frequency oscillator, the variable-frequency oscillator, the high-frequency crystal oscillator, and the crystal calibrator.

3.4.1 TONE OSCILLATOR.

The tone oscillator operates when the EMISSION switch is in LOCK, TUNE, or CW position. It is a phase-shift oscillator operating at approximately 1500 cps. Its output is fed to the transmitter audio circuits for CW operation. Some of the output from the tone oscillator is applied to the receiver audio circuits for sidetone monitoring in CW operation. Due to the 1500-cps tone applied to the balanced modulator during CW operation, the actual transmitted CW signal will be 1500 cps above the KWM-2/2A dial reading.

3.4.2 BEAT-FREQUENCY OSCILLATOR.

The bfo is crystal controlled at either 453.650 or 456.350 kilocycles, depending upon whether Y16 or Y17 is selected by EMISSION switch section S9H. The unused crystal is shorted out by this switch section. These crystal frequencies are matched to the passband of the mechanical filter, FL1, so that the carrier frequency is placed approximately 20 db down on the skirts of the filter response. This 20-db carrier attenuation is in addition to the 30-db suppression provided by the balanced modulator.

3.4.3 VARIABLE-FREQUENCY OSCILLATOR.

The vfo uses fixed capacitance and variable inductance to tune the range of 2.5 to 2.7 mc. The series combination of capacitor C308 and diode CR301 is connected in parallel with capacitor C303. The diode switches C308 into or out of the circuit, depending upon the polarity of a bias voltage impressed across the diode junction. When USB emission is selected, the bias is positive and C308 is switched into the circuit. The capacitor then is adjusted to shift the vfo frequency by an amount equal to the frequency separation of bfo crystals Y16 and Y17. This allows the selection of either sideband without upsetting tuning or dial calibration.

3.4.4 HIGH-FREQUENCY CRYSTAL OSCILLATOR.

The high-frequency crystal oscillator, V13A, is crystal controlled by 1 of 14 crystals selected by BAND switch S2. Output from the high-frequency crystal oscillator is fed to the transmitter second mixer and to the crystal oscillator cathode follower. The cathode follower provides isolation and impedance match between the crystal oscillator and the receiver first mixer cathode. The output frequency of this oscillator is always 3.155 mc higher than the lower edge of the desired band. This high-frequency injection signal is the crystal fundamental frequency for all desired signals below 12 megacycles. For operating frequencies higher than 12 mc, the crystal frequency is doubled in the plate circuit of the oscillator. Instructions for calculating crystal frequencies for the desired bands are given in section 2.

3.4.5 CRYSTAL CALIBRATOR.

The 100-kc crystal calibrator, V12A, is the pentode section of a type 6U8A tube. Its output is coupled to the antenna coil, T3. The calibrator may be trimmed to zero beat with WWV by adjustment of capacitor C76.

3.5 Vox and Antivox Circuits.

Audio output voltage from the second microphone amplifier, V11B, is coupled to the VOX GAIN control R39. A portion of this voltage is amplified by vox amplifier V14B and fed to the vox rectifier, which is one of the diodes of V14. The positive d-c output of the vox rectifier is applied to the grid of vox relay amplifier V4B, causing it to conduct current and

actuate the vox relay, K2. Contacts of K2 switch the receiver antenna lead, the other relay coils, and bias voltage. Relays K3 and K4 switch the metering circuits from receive to transmit, the low plate voltages from receive to transmit tubes, and the avc and alc leads.

The antivox circuit provides a threshold voltage to prevent loudspeaker output (picked up by the microphone circuits) from tripping the KWM-2/2A into transmit function. Some of the receiver output audio voltage is connected through C235 to the ANTI-VOX GAIN control, R45. Signal from the slider of this potentiometer is rectified by the antivox rectifier, which is the other diode of V14. Negative d-c output voltage from the antivox rectifier, connected to the grid of V4B, provides the necessary antivox threshold. ANTI-VOX GAIN control R45 adjusts the value of the antivox voltage threshold so that loudspeaker output will not produce enough positive d-c output from the vox rectifier to exceed the negative d-c output from the antivox rectifier and cause V4B to actuate K2. However, speech energy into the microphone will cause the positive vox voltage to overcome the negative antivox voltage and produce the desired action of K2.

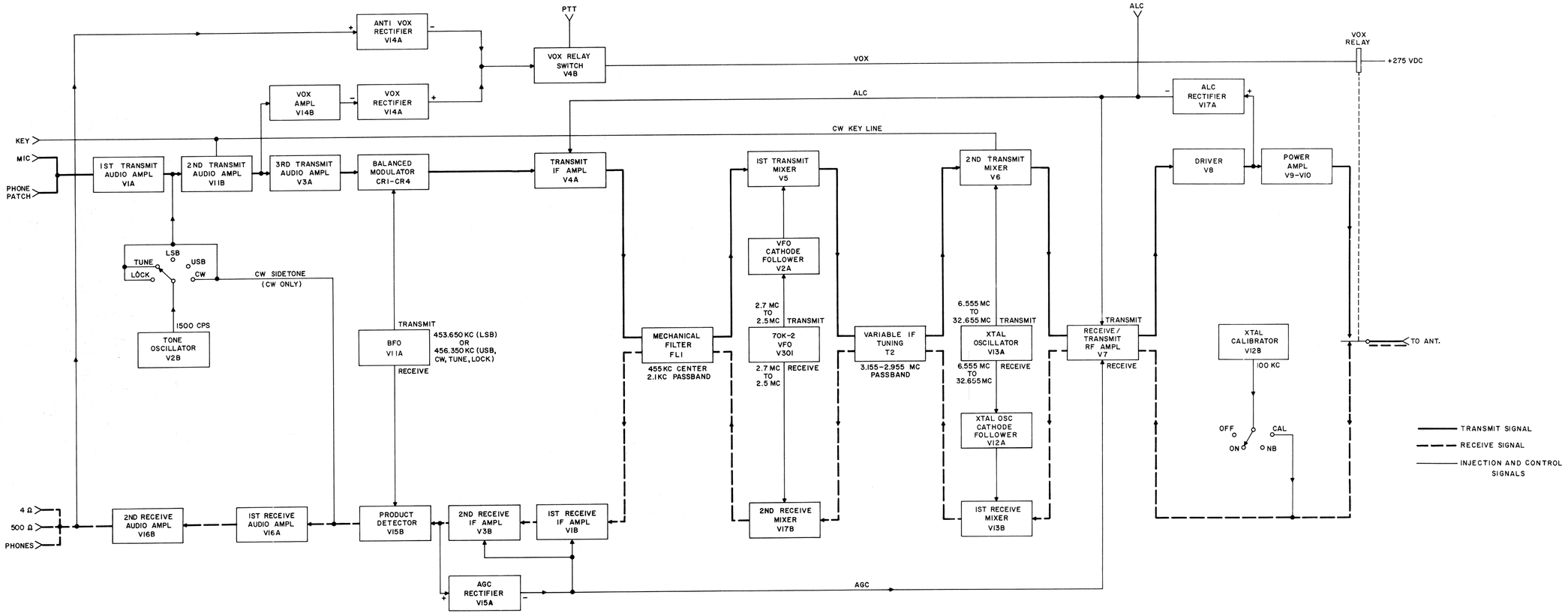


Figure 3-1. KWM-2 and KWM-2A, Block Diagram

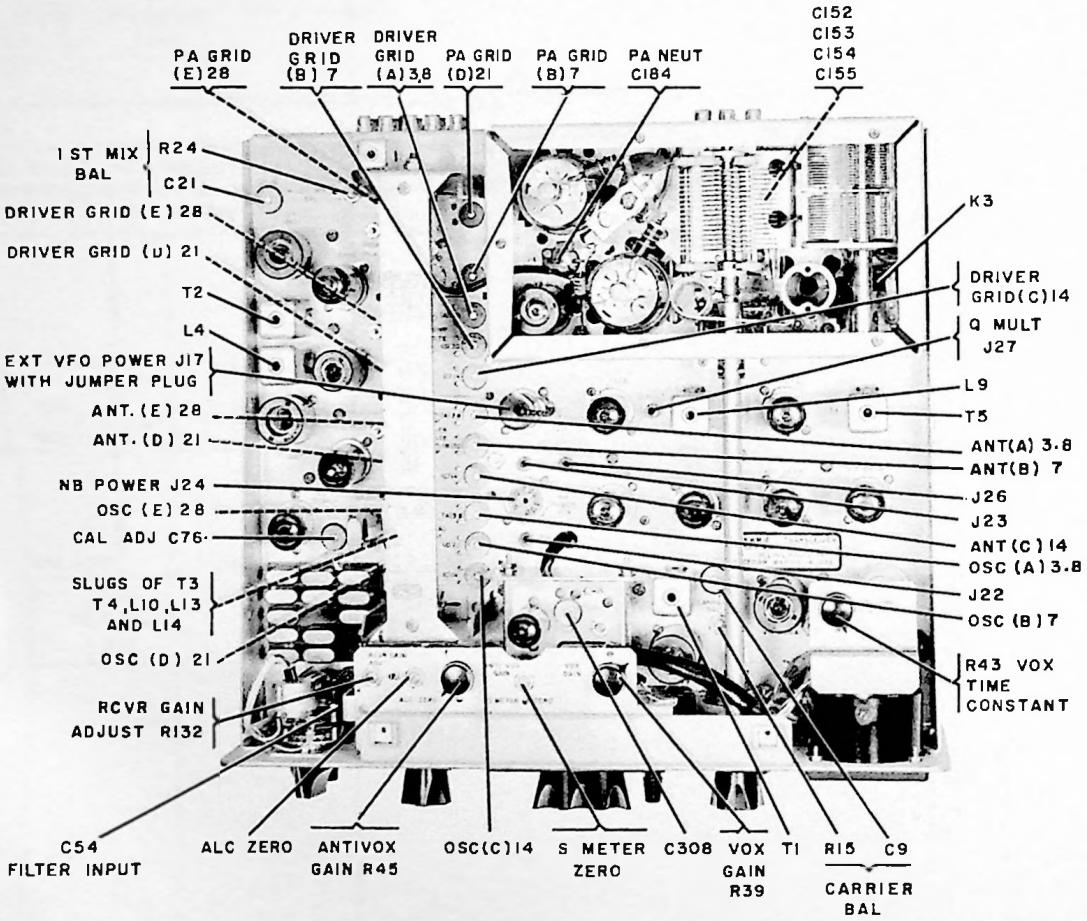


Figure 4-1. Location of Adjustments

section 4

service instructions

4.1 General.

Included in this section are signal tracing procedures, alignment and neutralization procedures, and voltage and resistance measurements. If any soldered parts are removed or replaced at terminals to which semiconductor diodes are connected, be sure to attach an alligator clip to the diode lead. This acts as a heat sink to protect the diode.

To remove the transceiver chassis from the cabinet, lift the lid, and remove the two Phillips-head screws located between the lid fasteners. Remove the four feet and the screw located midway between the rear feet. From the rear, push the chassis forward until the front panel protrudes from the cabinet about an inch. Grasp the front panel at the edges, and carefully slide the chassis out of the cabinet.

4.2 Transmitter Signal Tracing.

Table 4-1 lists appropriate signal generator connection points and normal signal levels. Figure 4-1 shows location of adjustments. Before making measurements, set EMISSION switch to USB, disable the power amplifier by disconnecting the jumper between J5 and J6, and remove the high-voltage rectifier tube from its socket. Set meter switch to GRID. Peak EXCITER TUNING, and turn VOX GAIN control full counterclockwise. Short PTT jack J16 to ground to key the KWM-2/2A to transmit. Connect signal generator output to points indicated in table 4-1, and adjust signal generator output attenuator until PA grid current just begins to show on the meter. Attenuator reading is signal voltage necessary at that point. Voltages given in the table are nominal and may vary

TABLE 4-1. TRANSMITTER SIGNAL LEVELS

SIGNAL GENERATOR CONNECTION POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL GENERATOR OUTPUT VOLTAGE
V8-2 (grid)	3.8	3.9 mc	0.5 volt
	7.2	7.3 mc	0.41 volt
	14.2	14.3 mc	0.5 volt
	21.4	21.5 mc	0.2 volt
	28A	28.6 mc	0.75 volt
V7-1 (grid)	3.8	3.9 mc	40,000 microvolts
	7.2	7.3 mc	22,000 microvolts
	14.2	14.3 mc	43,000 microvolts
	21.4	21.5 mc	30,000 microvolts
	28A	28.6 mc	32,000 microvolts
	28B, 28C	According to crystal used	
V6-2 (grid)	14.2	3.055 mc	32,000 microvolts
V5-2 (grid)	14.2	3.055 mc	62,000 microvolts
V4A-6 (grid)	14.2	455 kc	12,000 microvolts
For following, disconnect signal generator, remove J16 short, set EMISSION switch to TUNE, and adjust MIC GAIN for grid current threshold. Measure with a-c vtvm or calibrated oscilloscope.			
V3A-7 (cathode)	Any	*1500 cps	0.014 volt
V3A-9 (grid)	Any	*1500 cps	0.06 volt
V11B-9 (grid)	Any	*1500 cps	2.8 volts
For following, turn EMISSION switch to USB, and connect audio oscillator to J11 through a 40-db pad. Set MIC GAIN fully clockwise, and adjust audio oscillator output for PA grid current threshold. Measure input at oscillator output with a-c vtvm.			
V1A-9 (grid) or J11 PHONE PATCH	Any	1500 cps	35 millivolts through a 40-db pad

TABLE 4-1. TRANSMITTER SIGNAL LEVELS (Cont)

SIGNAL GENERATOR CONNECTION POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL GENERATOR OUTPUT VOLTAGE
For following, short J16 to ground, peak EXCITER TUNING for each band, and measure at test point with vtvm.			
V6-3	3.6		1.0 to 1.8 volts
	7.0		1.0 to 1.4 volts
	14.0		1.0 to 1.4 volts
	21.2		1.0 to 1.4 volts
	28.5		1.0 to 1.4 volts
V5-2 or 7	Vfo set at 100		1.0 to 1.4 volts
Wiper of R15	Any		1.0 to 1.4 volts
*Frequency of internal tone oscillator.			

±20 percent. Each time, be careful to set signal generator to frequency shown in the table. Oscillator output voltage may be measured with a vacuum-tube voltmeter.

4.3 Receiver Signal Tracing.

Table 4-2 lists significant test points and normal signal levels. Figure 4-1 shows location of test points and adjustments. All r-f and i-f measurements were made by connecting a vacuum-tube voltmeter to the avc bus and increasing signal generator output until the avc threshold is reached. The avc threshold voltage is the point at which the d-c vtvm indication just changes with increased signal level. The receiver was tuned to 14.1 mc for these measurements, and a test signal injected at indicated test points. Signal voltage values are taken from signal generator output attenuator. All values are nominal and may vary ±20 percent without degrading performance.

4.4 Voltage and Resistance Measurements.

Table 4-3 lists voltage and resistance of all tube sockets of the KWM-2/2A except that of the vfo tube, V301. DO NOT OPEN the oscillator can. Refer to figure 7-2 for location of tube sockets. Measurements were made under the following conditions:

a. All measurements made with a vtvm and with all tubes in sockets. Unless otherwise noted in table, all measurements made with R.F. GAIN at maximum, A.F. GAIN at minimum, EMISSION switch in USB position, BAND switch in 14.2 position, vfo dial at 100, OFF-ON-NB-CAL switch in ON position. All voltages on transmitter tubes are taken with PTT jack J16 shorted to ground and MIC GAIN control full counterclockwise, but not far enough to close S14.

b. Resistances of less than 0.9 ohm listed as zero.

c. Resistance measurements made with power supply plug removed from J13.

TABLE 4-2. RECEIVER SIGNAL LEVELS

TEST POINT	FREQUENCY	VOLTAGE	TEST POINT	FREQUENCY	VOLTAGE
V15B-8	455 kc	1.1 volts	V13B-8	High-frequency oscillator injection signal (17.155 mc)	*1.8 to 3.0 volts
V15B-9	455 kc	*1.4 volts			
V3B-6	455 kc	8000 microvolts			
V1B-6	455 kc	220 microvolts	V13B-9	14.1 mc	55 microvolts
V17B-9	2.5-2.7 mc	*0.6 volt	V7-1	14.1 mc	6.5 microvolts
V17B-8	3.055 mc	180 microvolts	J2 (RCVR ANT) or J1 (RF OUT)	14.1 mc	2.3 microvolts
*Oscillator injection voltage, measured with r-f vacuum-tube voltmeter.					

TABLE 4-3. VOLTAGE AND RESISTANCE MEASUREMENTS

TUBE		PIN NUMBER									PLATE CAP
		1	2	3	4	5	6	7	8	9	
V1	D-C V A-C V Ohms	290/1.5 9K	200/1.4 34K	4.2 10 to 1K	- 6.3 0	0 0 0	-1.4/-18 3.5 meg	0.45 180	44/42 80K	-0.3/-0.35 1 meg	
V2	D-C V A-C V Ohms	270/245 9K	0 6.5** 650K	130** 110K	- 6.3 0	0 0 0	140** 58K	4.2** ∞	125/105 6.5K	125/105 52K	
V3	D-C V A-C V Ohms	230/1.5 14K	145/1.4 45K	0.5/0 47	- 6.3 0	0 0 0	-1.4/-18 3.9 meg	5.8/7.4* 1K	0/190 20K	0 0 to 250K	
V4	D-C V A-C V Ohms	0/260 26K	0/95 23K	0.1/.66 120	- 6.3 0	0 0 0	-1.0/-1.0 1.5 meg	18/0 2K	290/90 21K	-0.1/-0.1 ∞	
V5	D-C V A-C V Ohms	290/250 9K	-64/-0.05 480K	0/2.1 240	0 0 0	0 0 0	285/245 9K	-64/-0.05 480K	0/2.2 240	- 6.3 0	
V6	D-C V A-C V Ohms	0.3/220 28K	-2.0/0 98K	0/1.9 225	0 6.3 0	0 6.3 0	-0.3/220 28K	-1.9/0 98K	0/1.9 220	0 0 0.	
V7	D-C V A-C V Ohms	-1.5/-1.5 2.5 meg	0 0	0 6.3 0	0 0 0	230/215 10K	95/90 27K	0 0			
V8	D-C V A-C V Ohms	0/4 150	-64/0 30K	.28/155 50K	0 0 0	0 6.3 0	290/260 8.3K	0 0	.3/155 50K	-64 30K	
V9	D-C V A-C V Ohms	0/0.1 2	0 0 0	0/240 11K	0 2	-64 40K	0/0.1 2	0 6.3 0	0 0		∞
V10	D-C V A-C V Ohms	0/0.1 2	0 0	0/240 11K	0 2	-64 40K	0/0.1 2	0 6.3 0	0 0		∞
V11	D-C V A-C V Ohms	96/86 600K	-11.2/-10.5 1 meg	86/82 230K	0 6.3 0	0 0 0	195/185 17K	0 0	2/1.8 1K	0 480K	
V12	D-C V A-C V Ohms	260/1.5 6K	0/0 1 meg	280/1.5 120K	0 6.3 0	0 0 0	280/1.5 240K	15/0.1 1 meg	122/0.4 6.8K	120/1.6 55K	
V13	D-C V A-C V Ohms	155/1.5 15K	-12/-10.5 1 meg	190/185 51K	0 6.3 0	0 0 0	285/260 7K	0 0	1.8/0 150	0 100K	
V14	D-C V A-C V Ohms	-0.5 ∞	0 0 to 500K	1.2/1.2 ∞	0 6.3 0	0 0 0	-0.1 270K	96/88 120K	0 0 to 250K	0.65/0.6 330	
V15	D-C V A-C V Ohms	-1.8/-19 2.2 meg	2.8/2.5 5.6K	2.8/2.5 5.6K	0 6.3 0	0 0 0	-1.8/-19 2.2 meg	130/180 43K	0/-64 1 meg	1.5/0 820	
V16	D-C V A-C V Ohms	3/2.8 5.6K	1.8/1.5 2.3 meg	78/82 270K	0 6.3 0	0 0 0	2.2/2.0 68	0 470K	130/120 22K	182/196 8K	
V17	D-C V A-C V Ohms	0 ∞	1.7/1.5 1500	0 ∞	0 0 0	0 6.3 0	-1.3 2.3 meg	280/1.5 8.5K	0/-64 100K	3.8/0.2 1K	

*Selected in final test.
**EMISSION switch in TUNE position.

d. All measurements made from tube socket pins to ground.

e. When two voltages are given for same tube pin, the first is for receive condition and the second for transmit condition.

WARNING

800 volts d-c is present on rear power connector J13 (pin 2) and inside PA compartment.

4.5 Field Alignment Procedures.

4.5.1 FIELD ALIGNMENT.

Field alignment consists of a few simple adjustments and is intended as a means of restoring peak performance of a working KWM-2/2A. No alignment procedure should ever be performed just for the sake of alignment. Adjustments should be made only when there is reason to suspect that performance is not up to standard. All field alignment adjustment points can be reached by raising the cabinet lid, and the KWM-2/2A does not have to be removed from its cabinet. See figure 4-1 for adjustment locations.

4.5.2 TEST EQUIPMENT REQUIRED.

Test equipments required for field alignment of the KWM-2/2A are a 50-ohm, 100-watt dummy load and a receiver with a 100-kc crystal calibrator and an S-meter.

4.5.3 R-F CIRCUITS PEAKING.

a. Connect dummy load to KWM-2/2A output jack J1. Set KWM-2/2A controls as follows: OFF-ON-NB-CAL to ON, BAND to 28A, EMISSION to LSB, MIC GAIN to OFF, INCREASE LOADING to 50 Ω, and tuning dial to 100.

b. After 5-minute warmup period, set EMISSION switch to TUNE and meter switch to GRID. Adjust MIC GAIN and EXCITER TUNING to produce midscale indication on meter. Set meter switch to PLATE, and dip plate current with P.A. TUNING. Reset meter switch to GRID. Peak the four (E)28 trimmer capacitors for maximum grid current. See figure 4-1 for trimmer locations.

c. Set BAND switch to 21.2 and tuning dial to 100. Adjust MIC GAIN and EXCITER TUNING for midscale grid current. Set meter switch to PLATE, and dip plate current. Reset meter switch to GRID. Peak the four (D)21 trimmer capacitors for maximum grid current.

d. Set BAND switch to 14.0 and tuning dial to 150. Adjust MIC GAIN and EXCITER TUNING for midscale grid current. Set meter switch to PLATE and dip plate current. Reset meter switch to GRID. Peak the four (C)14 trimmer capacitors for maximum grid current.

e. Set BAND switch to 7.0 and tuning dial to 150. Adjust MIC GAIN and EXCITER TUNING for midscale grid current. Set meter switch to PLATE, and dip plate current. Reset meter switch to GRID. Peak the four (B)7.0 trimmer capacitors for maximum grid current.

f. Set BAND switch to 3.6 and tuning dial to 100. Adjust MIC GAIN and EXCITER TUNING for midscale grid current. Set meter switch to PLATE, and dip plate current. Reset meter switch to GRID. Peak the four (A)3.5 trimmer capacitors for maximum grid current.

g. Set EMISSION switch to LSB.

4.5.4 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.

CAUTION

Do not make this adjustment unless switching from one sideband to the other makes readjustment of tuning dial necessary to keep output signal from shifting. It will always be necessary, after this adjustment, to make carrier balance (null) adjustment given in paragraph 4.5.5.

a. Set EMISSION switch to LSB, meter switch to PLATE, BAND switch to 14.0, and tuning dial to 100. Turn VOX GAIN (under top cover) full counterclockwise until switch clicks.

b. Rotate CARRIER BAL potentiometer R15 to one end to allow carrier feedthrough.

c. Adjust EXCITER TUNING control for maximum plate current, and dip plate current with P.A. TUNING control.

d. Tune station receiver to zero beat with transmitter.

e. Set EMISSION switch to USB, and adjust trimmer C308 (top of vfo can) for zero beat.

4.5.5 CARRIER BALANCE (NULL) ADJUSTMENT.

a. Set BAND switch to 3.6 and tuning dial to 100.

b. Set EMISSION switch to LSB, and turn MIC GAIN fully counterclockwise until it clicks. Key KWM-2/2A by turning VOX GAIN counterclockwise until it clicks or by grounding push-to-talk (PTT) line at jack J16.

c. Loosely couple receiver antenna lead to dummy load, and peak EXCITER TUNING and P.A. TUNING to obtain a midscale reading on receiver S-meter.

d. Adjust CARRIER BAL potentiometer R15 and trimmer capacitor C9 for minimum indication on receiver S-meter. These adjustments interact, so adjust first one and then the other until neither produces any further decrease in S-meter indication.

e. Switch EMISSION switch back and forth between USB and LSB to see that the carrier suppression is

about the same for either sideband. If it is not, repeat step d until carrier suppression is about equal for both sidebands.

f. Remove receiver antenna lead from near dummy load, and remove short from PTT line.

4.5.6 ALC ZERO ADJUSTMENT.

a. Set EMISSION switch to TUNE position. Tune and load transmitter to 14.1 mc. Set EMISSION switch to USB.

b. Set MIC GAIN control to minimum, and set meter switch to ALC position. Short PTT jack J16 to ground.

c. Adjust ALC ZERO potentiometer (inside cabinet) until meter indicates zero. Remove PTT short.

4.5.7 FIRST MIXER BALANCE ADJUSTMENT.

a. Set BAND switch to 21.0 and tuning dial to 0. Tune and load KWM-2/2A into dummy load, then set EMISSION switch to LSB and MIC GAIN to counter-clockwise limit until switch clicks.

b. Loosely couple receiver antenna lead to dummy load. Tune receiver across 21.455 mc until signal is heard.

c. Adjust mixer balance potentiometer R24 and trimmer capacitor C21 for minimum signal. These adjustments interact, so adjust first one and then the other until neither produces any further decrease in output.

4.5.8 S-METER ZERO ADJUSTMENT.

a. Set BAND switch to 14.2 and tuning dial to 100. Connect output of 100-kc crystal calibrator in test receiver to 50-ohm dummy load. Peak KWM-2/2A EXCITER TUNING for maximum KWM-2/2A S-meter indication. Set R.F. GAIN to clockwise limit, and turn off 100-kc crystal calibrator.

b. Short RCVR ANT. jack J2 to ground. Adjust S METER ZERO potentiometer R121 for zero indication on S-meter.

4.5.9 CRYSTAL CALIBRATOR ADJUSTMENT.

a. Tune KWM-2/2A to zero beat with carrier of station WWV at 15.0 mc at a time when station WWV is not transmitting a tone.

b. Set OFF-ON-NB-CAL switch to CAL. Adjust CAL ADJUST trimmer C76 (inside cabinet on chassis) for zero beat of calibration signal.

4.5.10 VFO END-POINT ADJUSTMENT.

The calibration of the KWM-2/2A vfo must be checked against a receiver with a 100-kc crystal calibrator. With the BAND switch set to 3.6, the KWM-2/2A output should be in zero beat with the calibrator signal at 3600 kc (0 on the KWM-2/2A dial) and 3800 kc (200 on the KWM-2/2A dial). The hairline indicator should be vertical in the dial window. If there is no end-point spread, but the hairline is slanted to left or right, loosen the setscrews on the dial hub, and slip the dial mechanism on the oscillator shaft until zero beat occurs with the hairline vertical.

If there is end-point spread, correct it as follows before correcting a slanting hairline:

a. Zero beat KWM-2/2A output against 100-kc calibrator signal at 3800 kc, and set KWM-2/2A hairline right on 200.

b. Zero beat KWM-2/2A output against 100-kc calibrator signal at 3600 kc. Note difference in kilocycles between hairline and 0 on KWM-2/2A dial (for example, -1.5 kc).

c. Without moving hairline, move dial to opposite side of 0 by an amount equal to frequency difference noted above (for example, +1.5 kc).

d. Adjust L302 for zero beat. It is located on top of vfo can.

e. Set KWM-2/2A hairline over 0.

f. Check zero beat at 200 on dial (3800 kc). If zero beat does not occur at exactly 200, repeat steps a through e.

g. If, after adjustment of end points, hairline is not vertical in dial window, loosen setscrews on dial hub, and move dial with respect to the oscillator shaft so that zero beat occurs with end points (0 and 200) set at center.

h. After these adjustments of vfo calibration, recheck vfo sideband frequency shift adjustment according to paragraph 4.5.4.

4.5.11 VFO DIAL CENTERING.

a. Tune the KWM-2/2A to 14.3 mc LSB, and set function switch to CAL.

b. Tune the KWM-2/2A to zero beat.

c. With the hairline vertical, 100 should be exactly under the hairline. If not, loosen the two setscrews on the dial hub (accessible from the bottom of the chassis with the cabinet removed), and set 100 exactly under the hairline.

d. Retighten the setscrews.

4.5.12 VFO OVERTRAVEL.

a. With the hairline vertical, turn the main tuning dial to the end stop past 0.

b. Note the overtravel between the hairline and 0.

c. Turn the main tuning dial to the end stop past 200, and note the overtravel.

d. If the overtravel is not equal, loosen the two setscrews in the vfo end stop collar (accessible from the bottom of the chassis with the cabinet removed).

e. Set the main tuning dial for half the total difference, and tighten the setscrews.

f. This completes the field alignment of the KWM-2/2A.

4.6 Laboratory Alignment Procedures.

4.6.1 LABORATORY ALIGNMENT.

Laboratory alignment of the KWM-2/2A is performed only when extensive component replacement

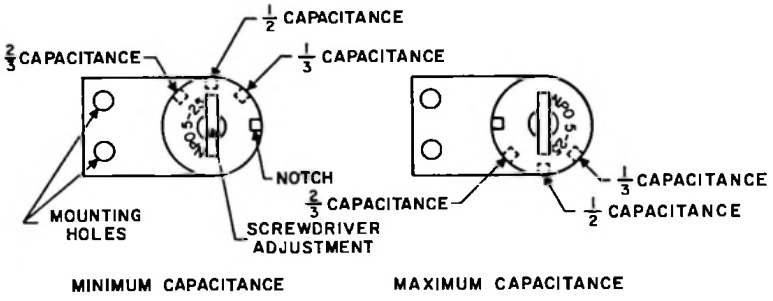


Figure 4-2. Ceramic Trimmer Capacitors

has taken place or when the KWM-2/2A is being placed in service after a long period of storage. These adjustments should be performed by a skilled technician. Laboratory alignment requires the KWM-2/2A to be removed from its cabinet. Refer to paragraph 4.1 for removal instructions.

4.6.2 TEST EQUIPMENT REQUIRED.

Test equipments required for laboratory alignment of the KWM-2/2A are a 50-ohm, 100-watt dummy load, a receiver with a 100-kc crystal calibrator and an S-meter, an r-f signal generator with a calibrated output attenuator, and a vtvm with an r-f probe.

4.6.3 TRANSMITTING 455-KC I-F ALIGNMENT.

a. Disable the screen circuit of the PA tubes by unsoldering one end of the jumper between PA DISABLE jacks J5 and J6. Remove V301 from its socket.
b. Connect an r-f vtvm from pin 2 of V5 to ground.
c. Set OFF-ON-NB-CAL switch to ON. Set EMISSION switch to TUNE. Turn MIC GAIN off.
d. Any voltage reading on the vtvm is due to carrier. Roughly adjust carrier balance potentiometer R15 and capacitor C9 for minimum vtvm indication.
e. Set MIC GAIN to full on.
f. Adjust the bottom slug of T1 for peak vtvm reading. Adjust filter input trimmer C54 for peak vtvm reading.
g. Disconnect vtvm, and replace V301.
h. After performing the above procedure, adjust the carrier balance according to paragraph 4.5.5.

4.6.4 BANDPASS I-F ALIGNMENT.

a. Set OFF-ON-NB-CAL switch to ON. Set EMISSION switch to TUNE. Tune and load KWM-2/2A into a dummy load at 14.3 mc. Switch meter to GRID position.
b. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect the swamping tool across terminal 3 (secondary winding) of T2 to ground. This terminal is connected to the T2 end of coupling capacitor C25.
c. Keep grid current to approximately midscale or lower by adjusting MIC GAIN control, and peak the primary of T2. The primary slug for T2 is at the bottom of the can. Use grid current as peak indication.
d. Remove the swamping tool from the secondary of T2, and connect it across terminals 1 and 2 (primary winding) of T2 (between pins 1 and 6 of the first mixer, V5). Peak the secondary of T2 (slug at top of shield can). Remove the swamping tool.
e. Retune and reload at 14.255 mc. Without swamping any of the tuned circuits, peak L4 for grid current indication.

4.6.5 R-F CIRCUITS ALIGNMENT.

a. Adjust all ceramic trimmer capacitors, including the three below the chassis, to 1/2-maximum capacitance, except as follows: DO NOT change the setting of CARRIER BAL capacitor, and set 3.8-mc trimmers C70, C37, C109, and C130 to two-thirds maximum capacitance. Maximum capacitance of these trimmers occurs when the large square notch is set midway between the two mounting screws. One-half capacitance occurs with the notch pointed directly at the front or rear of the unit. Two-thirds capacitance occurs with the notch turned off the half-point toward the mounting screws. Refer to figure 4-2.
b. Connect the KWM-2/2A output to a 50-ohm dummy load. Set the dial to 100, BAND switch to 3.6, and EXCITER TUNING control to 2.1 on the logging (lower) scale. Set meter switch to GRID and EMISSION switch to LOCK.

CAUTION

Keep MIC GAIN setting low to protect PA. Check frequently to be sure the PA is resonated.

c. Adjust MIC GAIN control for approximately 1/4-scale grid current. Tune and load the PA into the dummy load.

d. Adjust all slugs except the rear one for maximum grid current. Reduce MIC GAIN setting as necessary to keep the grid current indication below 1/4 scale. Make no adjustment to rear slug L14 at this time. Return MIC GAIN control to minimum setting.

NOTE

If slugs must be turned more than two turns in either direction, the unit has a defect other than alignment. Troubleshoot the unit.

e. Set dial to 150, BAND switch to 7.0, and EXCITER TUNING to 3.6 on the logging (lower) scale.

f. Adjust MIC GAIN for 1/4-scale grid current. Tune and load the PA into the dummy load. Adjust the 7-mc trimmers for peak grid current, keeping grid current below 1/4 scale with MIC GAIN control. Return MIC GAIN to minimum position.

g. Set BAND switch to 140, dial to 150, and EXCITER TUNING to 6.1 on logging (lower) scale. Adjust MIC GAIN for 1/4-scale grid current. Tune and load PA into dummy load.

h. Tune rear slug L14 for maximum grid current, keeping the current at 1/4 scale or less with the MIC GAIN control.

i. Adjust all 14-mc trimmers for peak grid current, keeping current below 1/4 scale with MIC GAIN control. Return MIC GAIN control to minimum setting.

j. Set BAND switch to 21.2, dial to 100, and EXCITER TUNING to 7.6 on logging (lower) scale. Set grid current to 1/4 scale, and tune and load the PA into the dummy load.

k. Adjust all 21-mc trimmers for peak grid current, keeping grid current at 1/4 scale or less with the MIC GAIN control. Return the MIC GAIN control to minimum setting.

l. Set BAND switch to 28A, dial to 100, and EXCITER TUNING to 9.0 on the logging (lower) scale. Set grid current to 1/4 scale with MIC GAIN control, and tune and load the PA into dummy load.

m. Adjust all 28-mc trimmers for maximum grid current, keeping grid current at 1/4 scale with the MIC GAIN control. Return MIC GAIN to minimum position.

4.6.6 CRYSTAL OSCILLATOR ALIGNMENT.

a. This procedure is a refinement which peaks the oscillator plate circuits in the center of the 200-kc tuning range. Turn the tuning dial to 100.

b. Set BAND switch to 28A. Set EMISSION switch to TUNE. Increase MIC GAIN setting, if necessary, to obtain grid current indication. Adjust EXCITER TUNING control for a peak on the PA grid current meter.

c. Repeak the (E)28 trimmer in the crystal oscillator plate circuit.

d. Set the BAND switch to 21.2, and adjust EXCITER TUNING control for peak in grid current.

e. Repeak the (D)21 trimmer in the oscillator plate circuit.

f. Repeat this procedure with BAND switch settings of 14.0, 7.0, and 3.6, adjusting crystal oscillator plate circuit trimmers (C)14, (B)7.0, and (A)3.8 respectively.

4.6.7 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.

Refer to paragraph 4.5.4 for vfo sideband frequency shift adjustment procedure.

4.6.8 CARRIER BALANCE (NULL) ADJUSTMENT.

Refer to paragraph 4.5.5 for carrier balance (null) adjustment procedure.

4.6.9 ALC ZERO ADJUSTMENT.

Refer to paragraph 4.5.6 for alc zero adjustment procedure.

4.6.10 FIRST MIXER BALANCE ADJUSTMENT.

Refer to paragraph 4.5.7 for first mixer balance adjustment procedure.

4.6.11 VFO DIAL CALIBRATION.

Refer to paragraphs 4.5.9 through 4.5.12 for vfo dial calibration and adjustment procedures.

4.6.12 PA NEUTRALIZING.

a. Disconnect the high voltage (800 volts) from the transmitter by removing the high voltage rectifier tube from the power supply.

b. Disable the screen circuit of the PA tubes by unsoldering one end of the jumper between PA DISABLE jacks J5 and J6.

c. Connect a 50-ohm, noninductive, 100-watt dummy load to RF OUT jack J1.

d. Connect a vtvm r-f probe across the 50-ohm dummy load.

e. Set the OFF-ON-NB-CAL switch to ON; set the BAND switch to 28A; and set the EMISSION switch to LOCK and the tuning dial to 100. Set the meter switch to GRID.

f. Advance the MIC GAIN control as necessary, and adjust the EXCITER TUNING control for maximum grid current.

g. Adjust the P.A. TUNING control for a maximum r-f voltage indication on the vtvm. Adjust the MIC GAIN control to keep this indication below 0.5 volt.

h. From the bottom of the chassis, adjust PA neutralizing capacitor C184 (refer to figure 6-3) for a minimum r-f indication on the vtvm. This voltage is the PA plate circuit feedthrough and is minimized by neutralization.

i. Remove the vtvm r-f probe from the dummy load, and reconnect the jumper between the PA DISABLE jacks.

4.6.13 DRIVER NEUTRALIZING.

a. Set the OFF-ON-NB-CAL switch to OFF. Remove heater voltage from driver tube V8 by unsoldering L29 from C241 (see figure 6-3), or, if an old 6CL6 tube having no short circuits is available, clip off its filament pins, and substitute it for V8.

b. Connect r-f probe to dummy load. Set OFF-ON-NB-CAL switch to ON, BAND switch to 28A, and tuning dial to 100. Set EMISSION switch to LOCK and meter switch to PLATE.

c. Increase MIC GAIN setting, and adjust EXCITER TUNING and P.A. TUNING controls for maximum voltage across dummy load. This level should be less than 0.3 volt.

d. Adjust driver neutralizing capacitor C117 for a voltage dip. This capacitor is located on the shield partition closest to the shield can. Refer to figure 6-3.

e. Set the OFF-ON-NB-CAL switch to OFF, and replace V8 in its socket.

4.6.14 FEEDBACK NEUTRALIZING.

a. Set BAND switch to 28A position and tuning dial to 100, EMISSION switch to TUNE, and meter switch to PLATE position.

b. Adjust EXCITER TUNING control for a peak in PA plate current.

c. Dip the PA plate current with the P.A. TUNING control.

d. Switch to LOCK, and repeat steps b and c.

e. Adjust feedback neutralizing capacitor C120 (on driver-PA shield below chassis and farthest from shield cans; see figure 6-3) until PA plate current dip and grid current dip coincide. Readjust the MIC GAIN as necessary to hold PA grid current at about half-scale during this adjustment.

f. Set BAND switch to 21.2, peak EXCITER TUNING control, and dip PA plate current with P.A. TUNING control.

g. Check that PA plate current dip and grid current dip occur at same setting of P.A. TUNING control.

h. Repeat this check on bands 14.2, 7.0, and 3.6.

4.6.15 PA LOADING TRIMMER ADJUSTMENT.

These trimmer capacitors are adjusted to provide the required total output capacity for matching 50-ohm antenna loads on the amateur bands with the INCR LOAD control set at the 50 Ω mark. Normally, they will not need readjustment since, when the PA is properly loaded, the tuning is relatively broad. If it is determined that adjustment is necessary, proceed as follows:

a. Refer to figure 7-2 for location of the loading trimmers.

b. Connect a 50-ohm nonreactive dummy load to the transceiver RF OUT jack.

c. Set INCR LOAD control to 50 Ω mark.

d. Tune up at 21.3 mc, and set EMISSION switch to lock.

e. Set MIC GAIN to the point which begins to produce PA grid current. This is grid current threshold.

f. Adjust C155 until PA draws 230-ma plate current at the dip.

g. Tune up at 28.6 mc, and check plate current. If not 230 ma, readjust C155 for best compromise between 21.3 and 28.6 mc.

h. Tune up at 14.150 mc, and set MIC GAIN as in step e.

i. Adjust C152 as in step f.

j. Tune up at 7.150 mc, and set MIC GAIN as in step e.

k. Adjust C153 as in step f.

1. Tune up at 3.700 mc, and set MIC GAIN as in step e.

m. Adjust C154 as in step f.

n. Set OFF-ON-NB-CAL switch to OFF.

4.6.16 RECEIVING 455-KC I-F ALIGNMENT.

a. Remove vfo tube V301 from socket, and set OFF-ON-NB-CAL switch to ON.

b. Set EMISSION switch to USB.

c. Connect signal generator to pin 8 of V17B, and set to 455 kc. Increase signal generator output until S-meter shows slight indication (S3). Rock the signal generator frequency to center the signal at the approximate center of the filter passband.

NOTE

If a vtvm is available, it may be connected to avc bus and used as alignment peak indicator.

d. Adjust the slugs of L9 and T5 for peak indication on the S-meter. Reduce signal generator output as necessary to keep S-meter indication low. Repeak L9 and T5 as in any standard alignment procedure.

e. Replace vfo tube.

4.6.17 RECEIVER R-F GAIN AND S-METER ZERO ADJUSTMENT.

a. Set receiver to 14.3 mc, and peak EXCITER TUNING control for maximum output. Set R.F. GAIN control (front panel) to maximum clockwise position. Tune calibrated signal generator to same frequency as receiver.

b. Short RCVR ANT. jack J2 to ground; adjust S METER ZERO potentiometer R121 so S-meter reads zero.

c. Remove short from J2. Using a 50-ohm calibrated signal generator, apply 25 uv to the circuit shown in figure 4-3. Adjust RCVR GAIN ADJUST R132 until S-meter just moves off zero (1/2 S-unit or less).

d. Repeat step b.

e. This completes the laboratory alignment of the KWM-2/2A. Replace it in its cabinet.

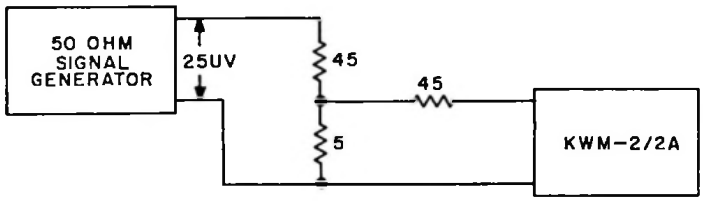


Figure 4-3. Receiver Gain Adjustment Setup

4.7 Dial Cord Replacement. (Refer to figure 4-4).

4.7.1 BAND-SWITCH CORD.

a. Remove the power cable from the KWM-2/2A.

b. Using a knife blade or small screwdriver, pry open the tabs, and remove the broken or defective cord from the two band-switch pulleys. The band-switch pulleys are located near the front panel, one above and the other below the chassis. Loosen the idler pulley so it will not be in the way during restringing.

c. Place the BAND switch in position 1A, and rotate the PA band-switch pulley to the approximate position shown in figure 4-4.

NOTE

The band detent pulley may not be in the exact same position shown in figure 4-4. Do not reposition this pulley, but assume it to be in the correct position during restringing.

d. Replace the old cord with three feet of new cord, Collins part number 432-1009-00. When ordering dial cord, be sure to state the desired length in feet. String the cord according to the band-switch cord illustration in figure 4-4. Make sure cords do not overlap on the pulleys. Pull cord tight, and tie to the tab. Mash the tab down to clamp the cord securely. Tighten the idler gear to bring the cord to tension.

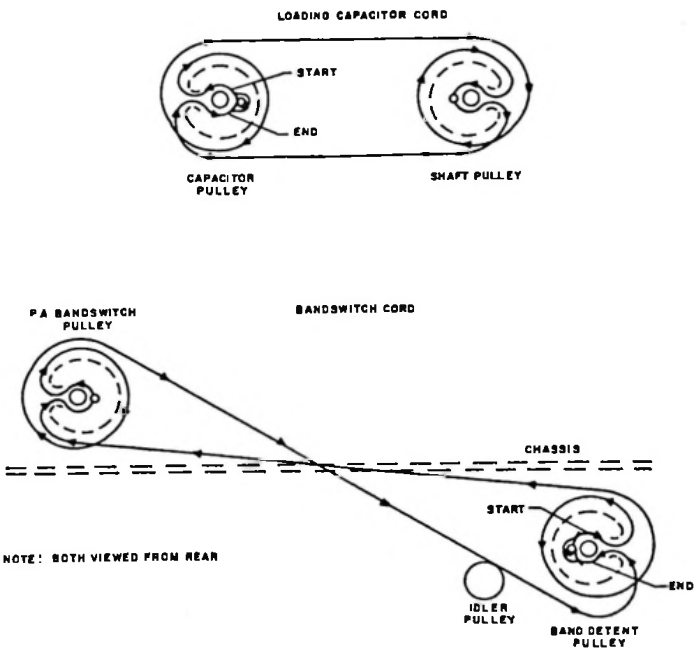


Figure 4-4. Dial Cord Stringing Diagram

e. Turn the band switch to position 3E, and check to see that the movable contact (rotor blade) of both S7 and S8 (refer to figure 6-1 for location of S7 and S8) are at position 1 and 2. This may be determined by counting clockwise on the wafer from the X-mark. The X-mark should be visible on the left side of S8 (as viewed from the front of the KWM-2/2A) without the PA cage removed. If the movable contacts are incorrectly positioned, loosen the PA band-switch pulley, and turn the switch to its proper position. Tighten the PA band-switch pulley.

f. Apply a little airplane cement on the dial cord knots to keep them tight. After the cement is dry, trim the loose end back NO CLOSER than one-quarter inch from the knot.

4.7.2 LOADING CAPACITOR CORD.

a. Remove the power cable from the KWM-2/2A.

b. Remove the PA cage by unscrewing the five self-tapping Phillips-head screws (located on the bottom side of the chassis) which secure the cage to the chassis.

c. Using a knife or small screwdriver, pry open the tabs, and remove the broken or defective cord from the two loading capacitor pulleys.

d. Manually position the loading capacitor to its fully meshed position and the INCR LOAD control to position 10 on the P.A. TUNING logging scale.

e. String the cord according to the loading capacitor cord illustration in figure 4-4. Make sure cords do not overlap on the pulleys. Pull cord tight, and tie to the tab. Mash the tab down to clamp the cord securely. Tighten the idler gear to bring the cord to tension. Check to make sure that the loading capacitor and INCR LOAD control are still in the positions set up in step d above. If not, loosen the shaft pulley, mesh capacitor plates manually, and retighten the pulley.

f. Apply a little airplane cement on the knots in the dial cords to help hold them tight. After the cement is dry, trim the loose ends back NO CLOSER than one-quarter inch from the knot.

4.8 Relay Maintenance.

Gradual accumulations of dust, lint, or oxidation may cause the contacts of relays to become high-resistance connections and degrade switching functions. Relays K2 and K4 are plug-in types and can be removed for cleaning. Relay K3 is wired in place and cannot be removed except by disconnecting all leads to it.

If cleaning of the relay contacts is necessary, use a relay contact burnishing tool. If such a tool is not available, use a piece of rough paper soaked in carbon tetrachloride. Be careful not to bend any of the contact springs. DO NOT use files, emery paper, or abrasives, as the silvered surfaces of the contacts are very thin. Observe the contacts in a dental mirror, and press the armature down with thumb or finger. Check that all normally closed contacts have opened before any of the normally open contacts close. If this is not the case, the relay may have to be replaced.

section 5

specifications

5.1 KWM-2 and KWM-2A Transceivers.

The KWM-2 and KWM-2A tranceivers are capable of covering any frequency within the ranges of 3.4 to 5.0 mc and 6.5 to 30.0 mc. With crystals furnished, they cover the entire amateur bands of 80, 40, 20, and 15 meters, the 28.5- to 28.7-mc portion of the ten-meter band, and WWV at 15.0 mc. The KWM-2 is equipped with 14 crystal sockets which are selectable from the front panel and provide 14 operating bands, each 200 kilocycles wide. The KWM-2A differs only in regard to the number of crystal sockets furnished, the method of switching crystals, and slight electrical and mechanical differences related to crystal switching. It is equipped with an extra crystal-mounting board which doubles the number of selectable crystal sockets. Crystals for added coverage may be plugged into spare sockets in either transceiver, or crystals for other bands may be substituted for those furnished.

5.2 Requirements for Operation.

Either transceiver requires a 110-volt, 50- to 60-cps, a-c power source, and a power supply such as the 516F-2 for fixed-station operation. It consumes approximately 235 watts of power from the line in receive function and approximately 475 watts on peaks in transmit function. The transceiver may be operated mobile by using a power supply such as the MP-1 for 12-volt d-c operation or a 516E-2 for 24- to 28-volt operation. In mobile operation the transceiver requires 800 volts d-c at approximately 175 ma; 275 volts d-c at approximately 210 ma; a bias supply adjustable between -60 and -80 volts; and 6-, 12-, or 24-volt d-c filament supply at 11.0, 5.5, or 2.75 amperes respectively. Any high-impedance crystal or dynamic microphone may be used. A 4-ohm speaker is required. The antenna and feed system must present a 50-ohm load with swr not exceeding 2.0 to 1.

5.3 Specifications.

Frequency range	3.4 to 30.0 megacycles. With crystals furnished, bands are as follows:
	80 meters - 3.4 to 3.6 mc, 3.6 to 3.8 mc, and 3.8 to 4.0 mc.
	40 meters - 7.0 to 7.2 mc and 7.2 to 7.4 mc.
	20 meters - 14.0 to 14.2 mc, 14.2 to 14.4 mc and 14.8 to 15.0 mc (WWV).
	15 meters - 21.0 to 21.2 mc, 21.2 to 21.4 mc, and 21.4 to 21.6 mc.
	10 meters - 28.5 to 28.7 mc.
Mode	Single sideband (either sideband selectable) or CW.
Type of service	SSB-continuous; CW-50% duty cycle.
Power consumption from a-c line	235 watts in receive function 475 watts peak in transmit function.
Plate power input	175 watts PEP on SSB, 160 watts on CW.

SECTION 5
Specifications

Power output	100 watts PEP (nominal) into 50 ohms.
Microphone input impedance	High impedance.
R-f output impedance	50 ohms with not more than 2.0-to-1 swr.
R-f input impedance	50 ohms.
Matching speaker impedance	4 ohms.
Matching phone-patch impedance	500 to 600 ohms, receive output to phone patch; high impedance phone-patch input to transmitter.
Frequency stability	Total variation after warmup not more than 100 cps.
Calibration accuracy	1 kilocycle.
Keying	Break-in.
Audio-frequency response	300 to 2400 cps ±6 db.
Carrier suppression	Carrier 50 db down from output signal.
Unwanted sideband	50 db down from output signal.
Oscillator feedthrough or mixer products (undesired)	50 db down from output signal.
Second harmonic radiation	40 db down from output signal.
Third order distortion	30 db down from output signal.
Receiver sensitivity	0.5 microvolt for 10-db signal to noise ratio in amateur bands.
Receiver selectivity	2.1-kc bandwidth at 6 db down, 4.2-kc bandwidth at 60 db down.
Receiver spurious responses	Image rejection better than 50 db. Internal spurious signals below one microvolt equivalent antenna input.
Receiver output level	1.0 watt maximum.
Size	7-3/4 h, 14-3/4 w, 14 d.
Weight	18 pounds 3 ounces.

5.4 Tube and Semiconductor Complement.

TABLE 5-1. TUBES AND SEMICONDUCTORS

SYMBOL	FUNCTION	TYPE
V1A	First microphone amplifier	6AZ8
V1B	First receiver i-f amplifier	6AZ8
V2A	Vfo cathode follower	6U8A
V2B	Tone oscillator	6U8A
V3A	Microphone amplifier cathode follower	6AZ8
V3B	Receiver second i-f amplifier	6AZ8
V4A	Transmitter i-f amplifier	6AZ8
V4B	Vox relay amplifier	6AZ8
V5	First transmitter mixer	12AT7
V6	Second transmitter mixer	12AT7
V7	Receiver-transmitter r-f amplifier	6DC6
V8	Transmitter driver	6CL6
V9	Transmitter power amplifier	6146
V10	Transmitter power amplifier	6146
V11A	Beat-frequency oscillator	6U8A
V11B	Second microphone amplifier	6U8A

SYMBOL	FUNCTION	TYPE
V12A	Crystal calibrator	6U8A
V12B	Crystal oscillator cathode follower	6U8A
V13A	High-frequency crystal oscillator	6U8A
V13B	Receiver first mixer	6U8A
V14A	Vox rectifier (one diode), antivox rectifier (other diode)	6BN8
V14B	Vox amplifier	6BN8
V15A	Avc rectifier (both diodes)	6BN8
V15B	Product detector	6BN8
V16A	Receiver first a-f amplifier	6EB8
V16B	Receiver a-f output amplifier	6EB8
V17A	Alc rectifier (both diodes)	6BN8
V17B	Receiver second mixer	6BN8
V301	Variable-frequency oscillator	6AU6
CR1-CR4	Balanced modulator matched quad	1N457
CR5	Receiver r-f trimming	HC7001
CR6	Calibrator harmonic generator	1N34A
CR7	Screen voltage gate	1N1490

5.5 Available Accessories.

TABLE 5-2. AVAILABLE ACCESSORIES

ITEM	FUNCTION	COLLINS PART NUMBER
136B-2 Noise Blanker	Eliminates noise pulses when the noise components present on the antenna have energy distribution in the 40-mc portion of the spectrum, and when the noise pulses have a repetition rate not in excess of 100,000 pulses per second.	522-1661-00
312B-3 Speaker	Station speaker.	522-1166-00
312B-4 Station Control	Speaker, phone patch, directional wattmeter, and station control switches.	522-1167-00
312B-5 Station Control	Combination of features and functions of 312B-4 and 399C-1 accessories.	522-1168-00
399C-1 External VFO	Speaker, extra 70K-2 vfo, and vfo control switches for operating transmitter and/or receiver in different portions of 200-kc band.	522-1597-00
351D-2 Mobile Mount	Mount for mobile operation.	522-1726-00
351E-4 Mounting Plate	Mount on table or bench.	522-1482-00
516F-2 A-C Power Supply	A-c power supply for fixed station operation (110-volt a-c).	522-1170-00
MP-1 D-C Power Supply	Mobile power supply for 12- to 14-volt d-c source.	522-2750-00
PM-2 A-C Power Supply	Portable power supply (110- or 220-volt a-c)	522-2639-004
516E-2 D-C Power Supply	Mobile power supply for 24- to 28-volt source.	522-0984-005
302C-3 Directional Wattmeter	Measure forward and reflected power.	522-1696-00
440E-1 Cable	Mobile power connections when 351D-2 is not used.	522-2051-00
SM-1 Microphone	Desk top, high impedance, nonmetallic dynamic microphone. Output level of -53 db. Finished in brushed satin chrome. Equipped with stand and five-foot length of Koiled Kord. Frequency response of 100-3500 cycles.	097-5944-00
SM-2 Microphone	Slender, grey and chrome, desk top unit which blends with KWM-2/2A. Omnidirectional, frequency response of 200-3000 cycles, output level of -53 db. Equipped with five-foot length of Koiled Kord.	097-5946-00
MM-1 Microphone	Pressure-operated dynamic microphone for mobile use. Equipped with mounting kit and five-foot length of Koiled Kord. Frequency response from 200 to 10,000 cycles with output level of -48 db.	097-5945-00
MM-2 Microphone	High-impedance resistance microphone and single earphone for fixed or mobile operation. Frequency response from 100 to 7000 cycles, output level -50 db.	097-6027-00

TABLE 5-2. AVAILABLE ACCESSORIES (Cont)

ITEM	FUNCTION	COLLINS PART NUMBER
DL-1 Dummy Load	100-watt resistor load with switching capabilities allowing for remote (from the operating position) or front panel operation.	597-0361-00
CC-2 Carrying Case	Carrying case to carry the KWM-2/2A plus PM-2, the KWM-2/2A alone, the 30L-1, 51S-1, or 62S-1.	597-0393-00
CC-3 Carrying Case	Carrying case for accessory components. Accommodates a 312B-5 (or 312B-4) Station Control Console, a 516E-2 (or MP-1) Power Supply, and a TD-1 Dipole Antenna, as well as a 90-day supply of spare tubes and fuses.	597-0403-00
TD-1 Antenna	Dipole antenna designed for use when portability and operation on different frequencies are primary considerations.	099-1106-00
399B-5 Crystal Oscillator Adapter	Crystal controlled oscillator which is used for frequency control in place of the VFO in the transmit function.	522-1781-00
180S-1 Antenna Tuner	Basically a 1-kw pi network for matching various antenna impedances to a 50-ohm coaxial transmission line in the range of 3-30 mc.	
CT-1 Cable Trough	Housing of cables for KWM-2/2A interconnect.	097-6192-00
CP-1 Crystal Packet	Provides crystals to insert in the KWM-2/2A crystal oscillator circuit for operation throughout the entire range of the system.	597-0404-00
Logbook	Station logbook for general logging purposes.	097-7629-00

section 6

parts list

ITEM	DESCRIPTION	COLLINS PART NUMBER
	KWM-2 TRANSCEIVER	522-1611-00
	KWM-2A TRANSCEIVER	522-1792-00
C1	CAPACITOR, FIXED, CERAMIC: 0.02 uuf ±20%, 500 v dc; Erie Resistor Corp. part no. 841011 W5V0 203Z	913-2142-00
C2	CAPACITOR, FIXED, MICA: 220 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F221K01	912-2841-00
C3	CAPACITOR, FIXED, CERAMIC: 4700 uuf ±20%, 500 v dc; Sprague Electric Co. of Wisconsin	913-3012-00
C4	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C5	CAPACITOR, FIXED, CERAMIC: 1000 uuf -20% +80%, 500 v dc; Erie Resistor Corp. part no. 327047 X5T0 102Z	913-1292-00
C6	CAPACITOR, FIXED, CERAMIC: 0.47 uf -20% +80%, 25 v dc; Sprague Electric Co. part no. 5C11A	913-3804-00
C7	CAPACITOR, FIXED, CERAMIC: 10,000 uuf ±20%, 500 v dc; Sprague Electric Co. of Wisconsin	913-3013-00
C8	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C9	CAPACITOR, VARIABLE, CERAMIC: 5.0 to 37.5 uuf, 350 v dc; Erie Resistor Corp. part no. 557018 C0P0 39R	917-1073-00
C10	CAPACITOR, FIXED, MICA: 10 uuf ±10%, 500 v dc; MIL type CM05C100K03	912-2754-00
C10	CAPACITOR, FIXED, MICA: 20 uuf ±5%, 500 v dc; MIL type CM05E200J03	912-2754-00
*C10	CAPACITOR, FIXED, MICA: 33 uuf ±5%, 500 v dc; MIL type CM05E330J03	912-2780-00
**C10	CAPACITOR, FIXED, MICA: 39 uuf ±5%, 500 v dc; MIL type CM05E390J03	912-2786-00
C10	CAPACITOR, FIXED, MICA: 43 uuf ±5%, 500 v dc; MIL type CM05E430J03	912-2789-00
*C10	CAPACITOR, FIXED, MICA: 47 uuf ±5%, 500 v dc; MIL type CM05E470J03	912-2792-00
C10	CAPACITOR, FIXED, MICA: 62 uuf ±5%, 500 v dc; MIL type CM05E620J03	912-2801-00
C10	CAPACITOR, FIXED, MICA: 75 uuf ±5%, 500 v dc; MIL type CM05E750J03	912-2807-00
**C10	CAPACITOR, FIXED, MICA: 82 uuf ±5%, 500 v dc; MIL type CM05E820J03	912-2810-00
C10	CAPACITOR, FIXED, MICA: 91 uuf ±5%, 500 v dc; MIL type CM05F910J03	912-2813-00
C10	CAPACITOR, FIXED, MICA: 110 uuf ±5%, 500 v dc; MIL type CM05F111J03	912-2819-00
**C10	CAPACITOR, FIXED, MICA: 120 uuf ±5%, 500 v dc; MIL type CM05F121J03	912-2822-00
*C10	CAPACITOR, FIXED, MICA: 130 uuf ±5%, 500 v dc; MIL type CM05F131J03	912-2825-00
C10	CAPACITOR, FIXED, MICA: 150 uuf ±5%, 500 v dc; MIL type CM05F151J03	912-2928-00
C11	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C12	CAPACITOR, FIXED, CERAMIC: dual section; 0.01 uf each section; 500 v dcw; Centralab Div of Globe-Union, Inc. part no. DA142-001CB	913-3829-00
C13	CAPACITOR, FIXED, CERAMIC: Other half of C12	913-3829-00
C14	CAPACITOR, FIXED, MICA: 47 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15E470J01	912-2792-00
C15	CAPACITOR, FIXED, CERAMIC: 1000 uuf ±20% 500 v dc; Erie Resistor Corp. part no. 851000 X5U0 102Z	913-3009-00
C16	CAPACITOR, FIXED, MICA: 33 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM16E330K01	912-2781-00

*Used on KWM-2 only
**Used on KWM-2A only
C10 - Chosen per operation requirements

ITEM	DESCRIPTION	COLLINS PART NUMBER
C17	NOT USED	
C18	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C19	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C20	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C21	CAPACITOR, VARIABLE, CERAMIC: same as C9	917-1073-00
C22	CAPACITOR, FIXED, MICA: 22 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15C220J01	912-2768-00
C23	CAPACITOR, FIXED, CERAMIC: same as C15	
C24	CAPACITOR, FIXED, CERAMIC: same as C3	
C25	CAPACITOR, FIXED, CERAMIC: 6 uuf ±1/2 uuf, 500 v dc; Centralab Division of Globe Union Inc.	916-0122-00
C26	CAPACITOR, FIXED, CERAMIC: same as C25	
C27	CAPACITOR, FIXED, CERAMIC: same as C15	
C28	CAPACITOR, FIXED, CERAMIC: same as C7	
C29	CAPACITOR, FIXED, CERAMIC: same as C7	
C30	CAPACITOR, FIXED, MICA: 10 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15C100K01	912-2754-00
C31	CAPACITOR, FIXED, MICA: same as C30	
C32	CAPACITOR, VARIABLE, CERAMIC: 8.0 uuf min to 75.0 uuf max, 350 v dc; Erie Resistor Corp. part no. 557018 U2P0 34R	917-1075-00
C33	CAPACITOR, FIXED, MICA: 130 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F131J01	912-2825-00
C34	CAPACITOR, VARIABLE, CERAMIC: same as C32	
C35	CAPACITOR, FIXED, MICA: same as C22	912-2768-00
C36	CAPACITOR, VARIABLE, CERAMIC: same as C9	
C37	CAPACITOR, VARIABLE, CERAMIC: same as C32	
C38	CAPACITOR, FIXED, MICA: 360 uuf ±2%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F361G01	912-2854-00
C39	CAPACITOR, VARIABLE, CERAMIC: 1.5 to 10.5 uuf, 350 v dc; Erie Resistor Corp. part no. 557018 C0P0 10R	917-1071-00
C40	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C41	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C42	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C43	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C44	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C45	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C46	CAPACITOR, FIXED, CERAMIC: 0.1 uf -20% +80%, 500 v dc; Sprague Electric Co. of Wisconsin part no. 41C92	913-3152-00
C47	CAPACITOR, FIXED, PAPER: 0.047 uf ±10%, 400 v dc; Sprague Electric Co. part no. 160P47394	931-0295-00
C48	CAPACITOR, FIXED, CERAMIC: same as C1	
C49	CAPACITOR, FIXED, CERAMIC: same as C46	
C50	CAPACITOR, FIXED, MICA: 470 uuf ±5%, 300 v dc; Electro Motive Mfg. Co. part no. DM15F471J01	912-2864-00
C51	CAPACITOR, FIXED, MICA: same as C50	912-2864-00
C52	CAPACITOR, FIXED, MICA: same as C50	912-2864-00
C53	CAPACITOR, FIXED, MICA: 15 uuf ±10%, 500 v dc; Electro Motive part no. DM15C150K01	912-2760-00
C54	NOT USED	
C55	CAPACITOR, FIXED, MICA: 180 uuf ±5%, 500 v dcw; MIL type CM05F181J03	912-2834-00
C56	CAPACITOR, FIXED, CERAMIC: same as C1	913-2142-00
C57	NOT USED	
C58	CAPACITOR: part of Z5	
C59	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C60	CAPACITOR, FIXED, MICA: Same as C30	912-2754-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
C61	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C62	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C63	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C64	CAPACITOR, FIXED, MICA: 120 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F121K01	912-2823-00
C65	CAPACITOR, VARIABLE, CERAMIC: same as C32	
C66	CAPACITOR, FIXED, MICA: same as C14	912-2792-00
C67	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C68	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C69	CAPACITOR, FIXED, MICA: 220 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F221J01	912-2840-00
C70	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C71	NOT USED	
C72	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C73	NOT USED	
C74	CAPACITOR, FIXED, MICA: same as C14	912-2792-00
C75	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C76	CAPACITOR, VARIABLE, CERAMIC: 3.0 uuf min to 18.0 uuf max, 350 v dc; Erie Resistor Corp. part no. 557018 C0P0 17R	917-1072-00
C77	CAPACITOR, FIXED, MICA: 510 uuf ±5%, 500 vdcw; MIL type CM06F511J03	912-2980-00
C78	NOT USED	
C79	CAPACITOR, FIXED, MICA: same as C30	912-2754-00
C80	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C81	NOT USED	
C82	CAPACITOR, FIXED, CERAMIC: same as C5	913-1292-00
C83	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C84	CAPACITOR, FIXED, CERAMIC: 0.1 uf -30% -80%, 75 v dc; Centralab part no. DA150-001CB	913-3794-00
C85	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C86	CAPACITOR, FIXED, CERAMIC: Other half of C85	913-3829-00
C87	CAPACITOR, FIXED, MICA: 100 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F101K01	
C88	CAPACITOR, FIXED, MICA: same as C77	912-2980-00
C89	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C90	CAPACITOR, FIXED, CERAMIC: same as C46	913-3152-00
C91	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C92	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C93	CAPACITOR, FIXED, CERAMIC: same as C6	913-3804-00
C94	CAPACITOR, FIXED, MICA: same as C30	912-2754-00
C95	NOT USED	
C96	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C97	CAPACITOR, FIXED, MICA: 27 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15E270K01	912-2775-00
C98	CAPACITOR, FIXED, CERAMIC: 470 uuf -20 +100%, 500 v dc; Sprague Electric Co. of Wisconsin part no 19C372	913-3007-00
C99	CAPACITOR, FIXED, CERAMIC: same as C98	913-3007-00
C100	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C101	CAPACITOR, FIXED, CERAMIC: same as C84	913-3794-00
C102	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf -10%, +100%, 6 v dc; Sprague Electric part no. D28121	183-1782-00
C103	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C104	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C105	CAPACITOR, FIXED, MICA: same as C50	912-2864-00
C106	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf, 20 uf, 15 uf, each -10%, +40%, 350 v dc; Sprague Electric part no. D29413	183-1702-00
C107	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C108	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C109	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C110	CAPACITOR, FIXED, MICA: 360 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F361J01	912-2855-00
C111	CAPACITOR, VARIABLE, CERAMIC: same as C76	917-1072-00
C112	CAPACITOR, FIXED, MICA: 240 uuf ±2%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F241G01	912-2842-00
C113	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C114	CAPACITOR, FIXED, MICA: 56 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15E560K01	912-2799-00
C115	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C116	CAPACITOR, VARIABLE, CERAMIC: same as C9	917-1073-00
C117	CAPACITOR, VARIABLE, CERAMIC: same as C39	917-1071-00
C118	CAPACITOR, FIXED, CERAMIC: 1 uuf ±1/4 uuf, 50 v dc; Centralab Division of Globe Union, Inc.	916-0070-00
C119	CAPACITOR, FIXED, CERAMIC: same as C30	912-2754-00
C120	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C121	CAPACITOR, FIXED, MICA: same as C69	912-2840-00
C122	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C123	CAPACITOR, FIXED, MICA: 1000 uuf ±10%, 500 v dc; Erie Resistor Corp. part no. SK10066-S	912-5232-00
C124	CAPACITOR, FIXED, CERAMIC: 2200 uuf ±20%, 500 v dc, Allen-Bradley Co.	913-1192-00
C125	CAPACITOR, FIXED, MICA: 330 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15F331J01	912-2851-00
C126	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C127	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C128	CAPACITOR, FIXED, MICA: 51 uuf ±10%, 500 v dcw; Electro Motive, Mfg. Co. part no. DM15E510K01	912-2796-00
C129	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C130	CAPACITOR, VARIABLE, CERAMIC: same as C32	917-1075-00
C131	CAPACITOR, FIXED, MICA: same as C69	912-2840-00
C132	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C133	CAPACITOR, FIXED, MICA: same as C33	912-2825-00
C134	CAPACITOR, VARIABLE, CERAMIC: same as C9	917-1073-00
C135	CAPACITOR, FIXED, MICA: same as C16	912-2781-00
C136	CAPACITOR, VARIABLE, CERAMIC: same as C9	917-1073-00
C137	CAPACITOR, FIXED, CERAMIC: 1000 uuf ±10%, 500 v dc; Erie Resistor Corp. part no. 327029 H3M0 102K	913-4061-00
C138	CAPACITOR, FIXED, CERAMIC: same as C118	916-0070-00
C139	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C140	CAPACITOR, FIXED, CERAMIC: 500 uuf, ±10%, 500 v dc; Erie Resistor Corp. part no. 331013 X5U0 501K	913-0998-00
C141	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C142	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C143	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C144	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C145	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C146	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C147	CAPACITOR, FIXED, CERAMIC: Other half of C132	913-3829-00
C148	CAPACITOR, FIXED, CERAMIC: 0.001 uf, +100 -20%, 2000 v dcw; Centralab Division of Globe Union, Inc. part no. DA172-057CB	913-3537-00
C149	CAPACITOR, FIXED, CERAMIC: same as C148	913-3537-00
C150	CAPACITOR, VARIABLE, AIR: 12.0 uuf min. to 250.0 uuf max, 1000 v rms; Hammerlund Mfg. Co. part no 4112-26	920-0136-00
C151	CAPACITOR, VARIABLE, AIR: dual section 13.5 uuf min to 452.3 uuf max ea section, 360 v ac, 60 cps min breakdown; Radio Condenser Co. part no. CN-2521574	920-0138-00
C152	CAPACITOR, VARIABLE, MICA: 100 uuf to 500 uuf, 1000 v dcw; Electro Motive Mfg. Co. part no. PD52414	918-0006-00
C153	CAPACITOR, VARIABLE, MICA: same as C152	918-0006-00
C154	CAPACITOR, VARIABLE, MICA: same as C152	918-0006-00
C155	CAPACITOR, VARIABLE, MICA: 15 uuf to 120 uuf, 1000 v dcw; Electro Motive Mfg. Co. part no. PD52207	918-0005-00
C156	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C157	CAPACITOR, FIXED, CERAMIC: 0.1 uf -20% +80%, 100 v dc; Erie Resistor Corp. part no. 825013 X5G0 104P	913-3681-00
C158	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C159	CAPACITOR, FIXED, CERAMIC: same as C84	913-3794-00
C160	CAPACITOR, FIXED, CERAMIC: same as C6	913-3804-00
C161	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C162	CAPACITOR, FIXED, CERAMIC: 10,000 uuf ±20%, 1000 v dc; Centralab Division of Globe Union, Inc. part no DA134-048CB	913-3922-00
C163	CAPACITOR, FIXED, CERAMIC: same as C162	913-3922-00
C164	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C165	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C166	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
C167	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C168	CAPACITOR, FIXED, CERAMIC: 0.001 uf -20% +100%; 2000 v dc; Centralab Division of Globe Union, Inc. part no. DA172-057CB	913-3537-00
C169	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C170	NOT USED	
C171	CAPACITOR: part of T1	
C172	CAPACITOR: P/O T2	
C173	CAPACITOR: same as C172	
C174	CAPACITOR: same as C172	
C175	CAPACITOR: P/O L4	
C176	CAPACITOR: same as C175	
C177	CAPACITOR: P/O L9	
C178	CAPACITOR: P/O T5	
C179	CAPACITOR: same as C178	
C180	CAPACITOR, FIXED, CERAMIC: 10 uuf ±10%, 5000 v dc; Centralab Division of Globe Union, Inc. part no. DA855-03S	913-0972-00
C181	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C182	CAPACITOR, FIXED, CERAMIC: Other half of C181	913-3829-00
C183	CAPACITOR, FIXED, CERAMIC: same as C148	913-3537-00
C184	CAPACITOR, VARIABLE, AIR: 2.2 uuf to 8.1 uuf, plate meshing, 9 plates; E.F. Johnson Co. part no. 160-104-3	922-0031-00
C185	NOT USED	
C186	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C187	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C188	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C189	NOT USED	
C190	CAPACITOR, FIXED, CERAMIC: 0.01 uf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA112-001CB	913-3829-00
C191	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C192	CAPACITOR, FIXED, CERAMIC: Other half of C191	913-3829-00
C193	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C194	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C195	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C196	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C197	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C198	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C199	CAPACITOR, FIXED, CERAMIC: Other half of C198	913-3829-00
C200	CAPACITOR, FIXED, CERAMIC: Other half of C197	913-3829-00
C201	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C202	CAPACITOR, FIXED, CERAMIC: Other half of C194	913-3829-00
C203	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C204	CAPACITOR, FIXED, CERAMIC: Other half of C203	913-3829-00
C205	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C206	CAPACITOR, FIXED, CERAMIC: Other half of C205	913-3829-00
C207	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C208	CAPACITOR, FIXED, CERAMIC: Other half of C207	913-3829-00
C209	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C210	CAPACITOR, FIXED, CERAMIC: Other half of C209	913-3829-00
C211	CAPACITOR, FIXED, CERAMIC: same as C46	913-3152-00
C212	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C213	NOT USED	
C214	CAPACITOR, FIXED, CERAMIC: same as C98	913-3007-00
C215	CAPACITOR, FIXED, CERAMIC: same as C98	913-3007-00
C216	CAPACITOR, FIXED, CERAMIC: same as C1	913-2142-00
C217	CAPACITOR, FIXED, MICA: same as C69	912-2840-00
C218	CAPACITOR, FIXED, MICA: same as C69	912-2840-00
C219	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C220	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C221	CAPACITOR, FIXED, CERAMIC: same as C46	913-3152-00
C222	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C223	CAPACITOR, FIXED, CERAMIC: same as C98	913-3007-00
C224	CAPACITOR, FIXED, CERAMIC: same as C1	913-2142-00
C225	CAPACITOR, FIXED, CERAMIC: same as C84	913-3794-00
C226	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C227	CAPACITOR, FIXED, CERAMIC: same as C46	913-3152-00
C228	CAPACITOR, FIXED, CERAMIC: same as C5	913-1292-00
C229	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C230	CAPACITOR, FIXED, CERAMIC: same as C5	913-1292-00
C231	CAPACITOR, FIXED, CERAMIC: same as C167	913-3681-00
C232	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C233	NOT USED	
C234	CAPACITOR, FIXED, CERAMIC: same as C15	913-3009-00
C235	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C236	CAPACITOR, FIXED, CERAMIC: same as C12	913-3829-00
C237	CAPACITOR, FIXED, CERAMIC: Other half of C236	913-3829-00
C238	CAPACITOR, FIXED, CERAMIC: same as C46	913-3152-00
C239	NOT USED	
C240	NOT USED	
C241	CAPACITOR, FIXED, CERAMIC: same as C5	913-1292-00
C242 thru C247	CAPACITOR, FIXED, CERAMIC: same as C190	913-3829-00
C248	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C249	CAPACITOR, FIXED, CERAMIC: same as C140	913-0998-00
C250	CAPACITOR, FIXED, CERAMIC: same as C190	913-3829-00
C251	CAPACITOR, FIXED, CERAMIC: same as C190	913-3829-00
C252	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C253	CAPACITOR, FIXED, CERAMIC: same as C84	913-3794-00
C254	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf -10% +100%, 350 v dc; Sprague Electric Co. part no. D29343	183-1783-00
C255	NOT USED	
C256	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C257	CAPACITOR, FIXED, MICA: 12 uuf ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15C120K01	912-2757-00
C258	NOT USED	
C259	CAPACITOR, FIXED, ELECTROLYTIC: 8 uf -10% +100%, 25 v dc; Sprague Electric Co. part no. D31582	183-1167-00
C260	CAPACITOR, FIXED, CERAMIC: same as C1	913-2142-00
C261	CAPACITOR, FIXED, MICA: same as C87	912-2817-00
C262	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C263	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
C264	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf -10% +50%, 350 v dc; P. R. Mallory and Co., Inc. part no. TC65	183-1049-00
C265	CAPACITOR, FIXED, CERAMIC: same as C7	913-3013-00
*C266	CAPACITOR, FIXED, MICA: 27 uuf, ±10%, 500 v dc; Electro Motive Mfg. Co. part no. DM15E270K01	912-2775-00
C267	CAPACITOR, FIXED, MICA: same as C30	912-2754-00
C268	CAPACITOR, FIXED, CERAMIC: same as C84	913-3794-00
C269	CAPACITOR, FIXED, CERAMIC: same as C1	913-2142-00
C270	NOT USED	
C271	NOT USED	
C272	CAPACITOR, FIXED, MICA: 10 uuf ±5%, 500 v dc; Electro Motive Mfg. Co. part no. DM15C100J01	912-2753-00
CR1	SEMICONDUCTOR DEVICE, MATCHED QUAD: four matched silicon diodes encapsulated; 0.2 in. by 0.468 in. by 0.5 in. Fairchild Semiconductor Corp. part no. FA4000	353-3271-00
CR2	SEMICONDUCTOR DEVICE, MATCHED QUAD: P/O CR1	353-3271-00
CR3	SEMICONDUCTOR DEVICE, MATCHED QUAD: P/O CR1	353-3271-00
CR4	SEMICONDUCTOR DEVICE, MATCHED QUAD: P/O CR1	353-3271-00
CR5	CAPACITOR, VARIABLE, VOLTAGE SENSITIVE: 35 uuf, ±20%, 130 max working volts; Clarke Production Machine Co. part no. 1N950	922-6002-00
CR6	SEMICONDUCTOR DEVICE, DIODE: germanium; JEDEC type 1N34A	353-0103-00
CR7	SEMICONDUCTOR DEVICE, DIODE: silicon, hermetically sealed; JEDEC type 1N1940	353-1659-00
CR8	SEMICONDUCTOR DEVICE, DIODE: silicon, JEDEC type 1N458	353-0205-00
CR9	SEMICONDUCTOR DEVICE, DIODE: same as CR8	353-0205-00
CR10	SEMICONDUCTOR DEVICE, DIODE: same as CR7	353-1659-00
DS1	LAMP, INCANDESCENT: 6.3 v, 0.150 amp design current, miniature bayonet base; T-3-1/4 clear bulb; 1.187 in. max lg o/a; General Electric Co. part no. 47	262-3240-00
DS2	LAMP, INCANDESCENT: same as DS1	262-3240-00
FL1	FILTER, BANDPASS: 455 kc operating frequency, 454.30 to 455.70 kc band w/, 0.438 in. by 2.188 in.; Collins Radio Company part no. F455Y-21	526-9337-00
J1	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation, brass contacts; Cinch Mfg. Corp. part no. 201-11-01-018	360-0088-00
J2	JACK, TELEPHONE: steel, miniature, panel mtd; Switchcraft, Inc. part no. 3501FP	360-0148-00
J3 thru J12	JACK, TELEPHONE: same as J2	360-0148-00

*Used on KWM-2 only

ITEM	DESCRIPTION	COLLINS PART NUMBER
J13	CONNECTOR RECEPTACLE, ELECTRICAL: 11 male contacts, 5 amps; Amphenol-Borg Electronics Corp. part no. 86-CP11-1008	372-1950-00
J14	JACK, TELEPHONE: spring leaf contact, J5-2C; 0.253 in. id, 3/4 in. od; thd 1/4 in. barrel 0.276 in. lg; 3/8-32 NEF-2; Switchcraft Inc. part no. 13A	360-0169-00
J15	JACK, TIP: three circuit telephone jack for plug 3/16 in. dia barrel; 1/8 in. thk panel; P.R. Mallory & Co., Inc.	358-1050-00
J16	JACK, TELEPHONE: same as J2	360-0148-00
J17	SOCKET, ELECTRON TUBE: 9 pin miniature, top mtg; molded construction; low loss composition; Elco Mfg. Co., Inc. part no. 274BC	220-1054-00
J18 thru J23	JACK, TELEPHONE: same as J2	360-0148-00
J24	SOCKET, ELECTRON TUBE: same as J17	220-1054-00
J25	CONNECTOR, PLUG, ELECTRICAL: 9 male contacts, 3800 v rms, 5 amps; Amphenol-Borg part no. 86-CP9-1003	372-1951-00
J26	JACK, TELEPHONE: same as J2	360-0148-00
J27	JACK, TELEPHONE: same as J2	360-0148-00
K1	NOT USED	
K2	RELAY, ARMATURE: 2C contact arrangement; low level or 2 amp at 29 vdc, 1 amp at 115 vac resistive or 1 amp at 29 vdc, 0.5 amp at 115 vac resistive; 15,000 ohms; continuous duty cycle; American Lava Corp. part no. T163-4C115VDC	970-2439-010
K3	RELAY, ARMATURE: antenna switching type, 2 C contact arrangement 2 amp, 175 w, 2.30 mc; 1 inductive winding 115 v dc, 10,000 ohms; Potter and Brumfield, Inc. part no. KR-2565	970-1914-00
K4	RELAY, ARMATURE: 3C contact arrangement, low level or 2 amp at 29 vdc, 1 amp at 115 vac resistive or 1 amp at 29 vdc, 0.5 amp at 115 vac resistive, 9000 ohms continuous duty cycle; American Lava Corp. part no. T163-6C115VDC	970-2439-020
L1	COIL, RADIO FREQUENCY: 2000 uh nom inductance, 27.5 ohms dc resistance, 0.1 amp current rating; James Millen Mfg. Co., part no. J301-2000	240-2547-00
L2	COIL, RADIO FREQUENCY: 10 mh, ±5% at 250 kc; 5/8 in. lg excluding leads by 3/8 in. dia; National Coil Company part no. C-0047327	240-0199-00
L3	NOT USED	
L4	COIL, P/O T2	
L5	COIL, RADIO FREQUENCY: single layer wound, 220 uh ±5%, 7.20 ohms max dc resistance, 210 ma dc current rating; James Millen Mfg. Co., Inc part no. J301-220	240-2524-00
L6	COIL, RADIO FREQUENCY: same as L5	240-2524-00
L7	COIL, RADIO FREQUENCY: same as L1	240-2547-00
L8	COIL: P/O Z4	
L9	TRANSFORMER, INTERMEDIATE FREQUENCY: 455 kc, 25/32 in. by 25/32 in by 3 in. o/a dim.; J. L. Thompson Co. part no. 281-1	278-0277-00
L10	COIL, RADIO FREQUENCY: single layer wound, 14 turns of no. 28 AWG formvar insulated wire; 0.192 ohms dc res	546-7833-002
L11	COIL, RADIO FREQUENCY: same as L5	240-2524-00
L12	COIL, RADIO FREQUENCY: same as L1	240-2547-00
L13	COIL, RADIO FREQUENCY: single layer wound; 22 turns no. 28 AWG	543-8123-002
L14	COIL, RADIO FREQUENCY: single layer wound, 12 turns no. 28 AWG, formvar insulation	543-8028-002
L15	COIL: P/O Z1	
L16	COIL: P/O Z2	
L17	COIL, RADIO FREQUENCY: single layer wound; 220 turns no. 32 AWG, formvar insulation	543-8024-00
L18	COIL, RADIO FREQUENCY: single layer wound; 6.5 turns of no. 14 AWG wire; 0.004 ohms dc res	544-9701-00
L19	TRANSFORMER, RADIO FREQUENCY: 1 winding, 32 turns no. 18 AWG, 32 taps; 1.015 in. dia by 3 in. lg	506-7848-002
L20	COIL, RADIO FREQUENCY: 33.0 uh ±10% inductance; 1.90 ohms max dc resistance; 19 mc min. resonant frequency; 500 ma rated dc current; Delevan Electronic Corp. part no. 2150-36	240-0170-00
L21	COIL, RADIO FREQUENCY: multiple section duolateral wound; 4 sections; 2.5 mh, 35 to 50 ohms, 0.125 amp; Meissner Mfg. Co. part no. 02242	240-2100-00
L22	COIL, RADIO FREQUENCY: same as L5	240-2524-00
L23	COIL, RADIO FREQUENCY: 22 uh ±10%, 0.31 ohms dc max resistance; 1330 ma; powdered iron coil form; Jeffers Electronics Part no. 10404-20	240-0186-00
L24	COIL, RADIO FREQUENCY: same as L5	240-2524-00
L25	COIL, RADIO FREQUENCY: same as L5	240-2524-00
L26	COIL, RADIO FREQUENCY: 10 uh inductance 0.60 ohms max dc resistance, 600 ma max current rating, 3/16 in. dia, 7/16 in. lg, Delevan Electronics Corp. part no. 1840-30	240-0149-00
L27	COIL, RADIO FREQUENCY: 2.70 uh ±10%, 1.20 ohms max dc resistance, 400 ma dc rated current; Jeffers Electronics Division of Speer Carbon Co. part no. 10100-131	240-0069-00
L28	COIL, RADIO FREQUENCY: single layer wound; 120 uh, 425 ma cur; 4 ohms; Jeffers Electric Division of Speer Carbon Co. part no. 10404-36	240-0194-00
L29	COIL, RADIO FREQUENCY: single layer wound; 20 turns of no. 26 AWG formvar insulated wire; 0.053 ohms dc res	544-9700-00
L30	COIL, RADIO FREQUENCY: single layer wound; 20 turns of no. 18 AWG formvar insulated wire; 1.02 ohms dc res	544-9699-00
L31	COIL, RADIO FREQUENCY: same as L1	240-2547-00
L32	COIL, RADIO FREQUENCY: same as L28	240-0194-00
L33	COIL, RADIO FREQUENCY: same as L2	240-0199-00
L34	COIL, RADIO FREQUENCY: same as L30	544-9699-00
L35	COIL, RADIO FREQUENCY: same as L26	240-0149-00
L36	COIL: P/O Z6	
L37	COIL: P/O Z7	
L38	COIL, RADIO FREQUENCY: 1000 uh, 16 ohms dc res, 135 ma dc current rating, 700 v ac; James Millen Mfg. Co., part no. J301-1000	240-2540-00
L39	COIL, RADIO FREQUENCY: same as L38	240-2540-00
M1	VOLTMETER: panel type, dc type, measures 0-400 ma or 0-60 db; plastic case; Electric Design part no. 458-0491-00	458-0491-00
O1	KNOB: Push-on type, spring steel; 0.250 in. od, flatted 0.156 in.; used w/Function Switch	543-8039-002
O2	KNOB: same as O1, used w/Mic Gain Switch	543-8039-002
O3	KNOB: same as O1; used w/Band Switch	543-8039-002
O4	KNOB: same as O1; used w/AF Gain Switch	543-8039-002
O5	KNOB: same as O1, used w/RF Gain Switch	543-8039-002
O6	KNOB: same as O1; used w/Emission Switch	543-8039-002
O7	KNOB, SPINNER: plastic; 0.859 in. by 2.078 in. by 2.515 in.; used w/Main Tuning Switch	553-5787-003
O8	KNOB: Fluted, push-on type; incl spring; spring steel w/spring steel finish; 0.250 in. od, flatted to 0.156 in; used w/P.A. Tuning Switch	543-8044-00
O9	KNOB, BAR: aluminum, black semi-gloss enamel; 11/16 in. by 11/16 in. o/a; used w/ Crystal Bank Selector Switch	544-7268-002
O10	KNOB: phenolic with aluminum insert; setscrew type; round shaft with two flatted sides spaced 60° apart; 0.750 in. by 0.937 in. by 1.093 in. o/a dim.; used w/Band Switch	544-0799-004
O11	KNOB: phenolic; 1.009 in w across flats by 0.750 in. thk; used w/Preselector Switch	543-8043-00
O12	KNOB: aluminum, black anodize enamel; 0.421 in. by 0.500 in.; used w/Zero Set Switch	543-8078-002
O13	LEVER, TRIMMING: black nylon; 0.453 in. by 0.861 in. by 1.306 in.; used w/Loading Lever	544-3148-003
O14	INDICATOR: black nylon; 0.406 in. by 0.861 in. by 1.163 in.; used w/Preselector Pointer	543-8088-002
O15	KNOB: screw on type; plain gripping surface; black cast phenolic body; 1/2 in lg by 3/8 in. dia; brass insert tapped 8-32 by 11/32 min. thd depth; used w/Meter Switch	281-0330-00
O16	KNOB: setscrew type, black phenolic, brass insert for 1/4 in. shaft, 13/32 in. by 1 in. dia, 8-32NC-2 setscrew supplied; Harry Davies Moulding Co. part no. 1400-W-BLACK; used w/Vox Control Switch	281-0069-00
O17	KNOB: same as O16, used w/Vox Time Constant Switch	281-0069-00
O18	KNOB: same as O16; used w/Antivox Switch	281-0060-00
P1 thru P14	NOT SUPPLIED	
P15	PLUG, TELEPHONE JACK: 3 circuit, 3/16 in. nom barrel dia. black plastic, straight, 3.218 in. lg by 0.500 in. dia; MIL type PJ-068	361-0001-00
P16	NOT SUPPLIED	
P17	DUMMY CONNECTOR, PLUG: 9 contacts, 1 connector mating end, plastic dielectric, straight shape, plastic polarized shell; Amphenol-Borg Electronics Corp. part no. 20-3048	372-1819-00
P18 thru P27	NOT SUPPLIED	

ITEM	DESCRIPTION	COLLINS PART NUMBER
R1	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0809-00
R2	RESISTOR, FIXED, COMPOSITION: 1 megohm ±10%, 1/4 w; Allen Bradley type CB	745-0857-00
R3	RESISTOR, FIXED, COMPOSITION: 180 ohms ±10%, 1/2 w; Allen Bradely type EB	745-1321-00
R4	RESISTOR, FIXED, COMPOSITION: 68,000 ohms ±10%, 1/2 w; Allen Bradely type EB	745-1429-00
R5	RESISTOR, FIXED, COMPOSITION: 0.47 megohms ±10%, 1/4 w, Allen Bradley type CB	745-0845-00
R6	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1352-00
R7	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/2 w; Allen Bradely type EB	745-1422-00
R8	RESISTOR, VARIABLE, COMPOSITION: 500,000 ohms, ±30%, 1/4 w; Chicago Telephone Supply Co. part no. LL6075	376-7404-00
R9	RESISTOR, FIXED, COMPOSITION: 56 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0704-00
R10	NOT USED	
R11	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R12	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R13	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R14	RESISTOR, FIXED, COMPOSITION: 180 ohms ±10%, 1/4 w; Allen Bradely type CB	745-0722-00
R15	RESISTOR, VARIABLE, COMPOSITION: 1000 ohms ±20%, 0.3 w; Chicago Telephone Supply Co. type 70	376-4623-00
R16	RESISTOR, FIXED, COMPOSITION: same as R14	745-0722-00
R17	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0785-00
R18	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1 w; Allen Bradley type GB	745-3422-00
R19	RESISTOR, FIXED, COMPOSITION: 120 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1314-00
R20	RESISTOR, FIXED.COMPOSITION: 68,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5729-00
R21	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1296-00
R22	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w; MIL type RC20GF101K	745-1310-00
R23	RESISTOR, FIXED, COMPOSITION: same as R19	745-1314-00
R24	RESISTOR, VARIABLE, COMPOSITION: 250 ohms ±20%, 0.2 w; Chicago Telephone type 70	376-4621-00
R25	RESISTOR, FIXED, COMPOSITION: same as R19	745-1314-00
R26	RESISTOR, FIXED, COMPOSITION: same as R5	745-0845-00
R27	RESISTOR, FIXED, COMPOSITION: 0.10 megohms ±10%, 1/4 w; Allen Bradley type CB	745-0821-00
R28	RESISTOR, FIXED, COMPOSITION: same as R9	745-0704-00
R29	RESISTOR, FIXED, COMPOSITION: 220 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1324-00
R30	RESISTOR, VARIABLE, COMPOSITION: same as R24	376-4621-00
R31	RESISTOR, FIXED, COMPOSITION: same as R27	745-0821-00
R32	RESISTOR, FIXED, COMPOSITION: same as R22	745-1310-00
R33	RESISTOR, FIXED, COMPOSITION: 33,000 ohms ±10%, 1w; Allen Bradley type GB	745-3415-00
R34	RESISTOR, FIXED, COMPOSITION: same as R27	745-0821-00
R35	RESISTOR, FIXED, COMPOSITION: 0.10 megohms ±10%, 1/2 w; Allen Bradley type EB	745-1436-00
R36	RESISTOR, FIXED, COMPOSITION: same as R29	745-1324-00
R37	RESISTOR, FIXED, COMPOSITION: same as R4	745-1429-00
R38	RESISTOR, FIXED, COMPOSITION: 68 ohms ±10%; MIL type RC20GF680K	745-1303-00
R39	RESISTOR, VARIABLE, COMPOSITION: 500,000 ohms ±30%, 1/4 w; Chicago Telephone Supply Co. part no. LL6067	376-7202-00
R40	RESISTOR, FIXED, COMPOSITION: 0.10 megohms ±10%, 1 w; Allen Bradley type GB	745-3436-00
R41	RESISTOR, FIXED, COMPOSITION: 330 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1331-00
R42	RESISTOR, FIXED, COMPOSITION: 8.2 megohms ±10%, 1/4 w; Allen Bradley type CB	745-0890-00
R43	RESISTOR, VARIABLE: 10,000,000 ohms ±4%, 1/4 w; Chicago Telephone Supply Co. part no. LL6071	376-7206-00
R44	RESISTOR, FIXED, COMPOSITION: 0.27 megohms ±10%, 1/2 w; Allen Bradley type EB	745-1454-00
R45	RESISTOR, VARIABLE, COMPOSITION: same as R39	376-7202-00
R46	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1/2 w; MIL type RC20GF332K	743-1373-00
R47	RESISTOR, FIXED, COMPOSITION: same as R20	745-5729-00
R48	RESISTOR, FIXED, COMPOSITION: same as R42	745-0890-00
R49	RESISTOR, FIXED, COMPOSITION: same as R35	745-1436-00
R50	RESISTOR, FIXED, COMPOSITION: same as R7	745-1422-00
R51	RESISTOR, FIXED, COMPOSITION: 0.39 megohms ±10%, 1/4 w; Allen Bradley type CB	745-0842-00
R52	RESISTOR, FIXED, COMPOSITION: same as R51	745-0842-00
R53	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0809-00
R54	RESISTOR, FIXED, COMPOSITION: 1 megohm ±10%, 1/2 w; Allen Bradley type EB	745-1478-00
R55	RESISTOR, FIXED, COMPOSITION: 220,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1450-00
R56	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1384-00
R57	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R58	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R59	RESISTOR, FIXED, COMPOSITION: same as R27	745-0821-00
R60	NOT USED	
R61	RESISTOR, FIXED, COMPOSITION: 150 ohms ±10%, 1/2 w, Allen Bradley type EB	745-1317-00
R62	RESISTOR, FIXED, COMPOSITION: same as R27	745-0821-00
R63	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R64	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R65	RESISTOR, FIXED, COMPOSITION: same as R54	745-1478-00
R66	RESISTOR, FIXED, COMPOSITION: same as R55	745-1450-00
R67	RESISTOR, FIXED, COMPOSITION: same as R35	745-1436-00
R68	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1401-00
R69	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ±10%, 1 w; Allen Bradley type GB	745-3401-00
R70	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5708-00
R71	RESISTOR, FIXED, COMPOSITION: same as R35	745-1436-00
R72	RESISTOR, FIXED, COMPOSITION: 6,800 ohms ±10%, 4 w; Allen Bradley Co. part no. HM6821	745-9732-00
R73	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5701-00
R74	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R75	RESISTOR, FIXED, COMPOSITION: 10 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1268-00
R76	RESISTOR, FIXED, COMPOSITION: same as R7	745-1422-00
R77	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R78	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R79	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1419-00
R80	RESISTOR, FIXED, COMPOSITION: same as R7	745-1422-00
R81	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 1 w; Allen Bradley type GB	745-3384-00
R82	RESISTOR, FIXED, COMPOSITION: 4,700 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0773-00
R83	RESISTOR, FIXED, COMPOSITION: 1.5 megohms ±10%, 1/2 w; Allen Bradley type EB	745-1485-00
R84	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms ±30%, 1/4 w; Chicago Telephone Supply Co. part no. LL5887	376-7402-00
R85	RESISTOR, FIXED, COMPOSITION: 12,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1398-00
R86	RESISTOR, FIXED, WIREWOUND: 2500 ohms ±10%, 7 w; IRC type PW7	710-9000-00
R87	RESISTOR, FIXED, COMPOSITION: 6800 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1387-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
R88	RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1349-00
R89	RESISTOR, FIXED, COMPOSITION: 0.18 megohm ±10%, 1/2 w; Allen Bradley type EB	745-1447-00
R90	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1412-00
R91	RESISTOR, FIXED, COMPOSITION: same as R1	745-0809-00
R92	RESISTOR, VARIABLE, COMPOSITION: 500,000 ohms ±30%, 1/4 w; Chicago Telephone Supply Co. part no LL6073	376-7405-00
R93	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R94	RESISTOR, FIXED, COMPOSITION: 2.2 meg-ohms ±10%, 1/4 w; Allen Bradley type CB	745-0869-00
R95	RESISTOR, FIXED, COMPOSITION: same as R56	745-1384-00
R96	RESISTOR, FIXED, COMPOSITION: same as R55	745-1450-00
R97	RESISTOR, FIXED, COMPOSITION: same as R38	745-1303-00
R98	RESISTOR, FIXED, COMPOSITION: same as R5	745-0845-00
R99	RESISTOR, FIXED, COMPOSITION: 12,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5698-00
R100	RESISTOR, FIXED, COMPOSITION: 10 ohms ±10%, 1 w; Allen Bradley type GB	745-3268-00
R101	RESISTOR, FIXED, COMPOSITION: same as R21	745-1296-00
R102	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R103	RESISTOR, FIXED, COMPOSITION: same as R17	745-0785-00
R104	RESISTOR, FIXED, COMPOSITION: same as R22	745-1310-00
R105	RESISTOR, FIXED, COMPOSITION: same as R70	745-5708-00
R106	RESISTOR, FIXED, COMPOSITION: same as R61	745-1317-00
R107	RESISTOR: P/O Z1	
R108	RESISTOR: P/O Z2	
R109	RESISTOR, FIXED, COMPOSITION: 12 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1272-00
R110	RESISTOR, FIXED, COMPOSITION: same as R109	745-1272-00
R111	RESISTOR, FIXED, COMPOSITION: same as R109	745-1272-00
R112	RESISTOR, FIXED, COMPOSITION: same as R109	745-1272-00
R113	RESISTOR, FIXED, COMPOSITION: same as R109	745-1272-00
R114	RESISTOR, FIXED, COMPOSITION: same as R109	745-1272-00
R115	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%, 1/2 w; RC20GF222K	745-1366-00
R116	RESISTOR, FIXED, COMPOSITION: 18,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1405-00
R117	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R118	RESISTOR, FIXED, COMPOSITION: 0.68 megohms ±10%, 1/4 w; Allen Bradley type CB	745-0851-00
R119	RESISTOR, FIXED, COMPOSITION: 1.5 megohms ±10%, 1/4 w; Allen Bradley type CB	745-0863-00
R120	RESISTOR, FIXED, COMPOSITION: same as R79	745-1419-00
R121	RESISTOR, VARIABLE, COMPOSITION: 100,000 ±20%, 0.2 w; Chicago Telephone type 70	376-4622-00
R122	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5722-00
R123	RESISTOR, FIXED, COMPOSITION: same as R7	745-1422-00
R124	RESISTOR, FIXED, COMPOSITION: 3,900 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0770-00
R125	RESISTOR, FIXED, COMPOSITION: same as R7	745-1422-00
R126	RESISTOR, FIXED, COMPOSITION: 680 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1345-00
R127	RESISTOR, FIXED, COMPOSITION: 0.47 megohms ±10%, 1 w; Allen Bradley type GB	745-3464-00
R128	RESISTOR, FIXED, COMPOSITION: same as R83	745-0875-00
R129	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R130	RESISTOR, FIXED, COMPOSITION: same as R35	745-1436-00
R131	RESISTOR, FIXED, COMPOSITION: 33,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5715-00
R132	RESISTOR, VARIABLE, COMPOSITION: same as R15	376-4623-00
R133	RESISTOR, FIXED, COMPOSITION: same as R116	745-1405-00
R134	RESISTOR, FIXED, COMPOSITION: 0.12 megohm ±10%, 1/2 w; Allen Bradley type EB	745-1440-00
R135	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R136	RESISTOR, FIXED, COMPOSITION: same as R5	745-0845-00
R137	RESISTOR, FIXED, COMPOSITION: 82,000 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1433-00
R138	RESISTOR, FIXED, COMPOSITION: same as R1	745-0809-00
R139	RESISTOR, FIXED, COMPOSITION: same as R1	745-0809-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
*R140	RESISTOR, FIXED, COMPOSITION: 390 ohms ±10%, 1/4 w; MIL type RC07GF391K	745-0734-00
*R140	RESISTOR, FIXED, COMPOSITION: 470 ohms ±10%, 1/4 w; MIL type RC07GF471K	745-0737-00
R140	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0740-00
R140	RESISTOR, FIXED, COMPOSITION: 680 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0743-00
R140	RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0746-00
R140	RESISTOR, FIXED, COMPOSITION: 1,000 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0749-00
R140	RESISTOR, FIXED, COMPOSITION: 1200 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0752-00
R141	RESISTOR, FIXED, COMPOSITION: same as R79	745-1419-00
R142	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5694-00
R143	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±20%, 1 w; Allen Bradley type GB	745-3360-00
R144	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1 w; Allen Bradley type GB	745-3373-00
R145	RESISTOR, FIXED, COMPOSITION: same as R1	745-0809-00
R146	RESISTOR, FIXED, WIREWOUND: 15,000 ohms ±10%, 7 w; IRC type PW 7	710-9001-00
R147	RESISTOR, FIXED, COMPOSITION: same as R4	745-1429-00
R148	RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 2 w; Allen Bradley type HB	745-5649-00
R149	NOT USED	
R150	RESISTOR, FIXED, COMPOSITION: same as R14	745-0722-00
R151	RESISTOR, FIXED, COMPOSITION: same as R124	745-0770-00
R152	RESISTOR, FIXED, COMPOSITION: 5,600 ohms ±10%, 1/4 w; Allen Bradley type CB	745-0776-00
R153	RESISTOR, FIXED, COMPOSITION: 6,800 ohms ±10%, 2 w; Allen Bradley type HB	745-5687-00
R154	RESISTOR, FIXED, COMPOSITION: same as R35	745-1436-00
R155	RESISTOR, FIXED, COMPOSITION: same as R83	745-1485-00
R156	RESISTOR, FIXED, COMPOSITION: same as R83	745-1485-00
R157	RESISTOR, FIXED, COMPOSITION: 68 ohms ±10%, 1 w; Allen Bradley type GB	745-3303-00
R158	RESISTOR, FIXED, COMPOSITION: same as R29	745-1324-00
R159	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00
R160	RESISTOR, FIXED, COMPOSITION: same as R134	745-1440-00
R161	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%, 1/2 w; MIL type RC20GF222K	745-1366-00
*R161	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%, 1/2 w; MIL type RC20GF272K	745-1370-00
R161	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1/2 w; MIL type RC20GF332K	745-1373-00
R161	RESISTOR, FIXED, COMPOSITION: 3900 ohms ±10%, 1/2 w; MIL type RC20GF392K	745-1377-00
R161	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1/2 w; MIL type RC20GF472K	745-1380-00
R161	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 1/2 w; MIL type RC20GF562K	745-1384-00
R161	RESISTOR, FIXED, COMPOSITION: 6800 ohms ±10%, 1/2 w; MIL type RC20GF682K	745-1387-00
R161	RESISTOR, FIXED, COMPOSITION: 8200 ohms ±10%, 1/2 w; MIL type RC20GF822K	745-1391-00
R161	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1/2 w; MIL type RC20GF103K	745-1394-00
R161	RESISTOR, FIXED, COMPOSITION: 12,000 ohms ±10%, 1/2 w; MIL type RC20GF123K	745-1398-00
R162	RESISTOR, FIXED, COMPOSITION: same as R21	745-1296-00
R163	RESISTOR, FIXED, WIREWOUND: 6000 ohms ±10%, 5 w; International Resistance Co. part no. PW5-6001-10	710-9118-00
R164	RESISTOR, FIXED, COMPOSITION: 0.47 megohms ±10%, 1/2 w; Allen Bradley type EB	745-1464-00
R165	RESISTOR, FIXED, COMPOSITION: same as R164	745-1464-00
R166	RESISTOR, FIXED, COMPOSITION: same as R126	745-1345-00
R167	RESISTOR, FIXED, COMPOSITION: same as R22	745-1310-00
R168	RESISTOR, FIXED, COMPOSITION: same as R9	745-0704-00
R169	RESISTOR, FIXED, COMPOSITION: same as R6	745-1352-00

*Used on KWM-2 only
R140 - Chosen per operation requirements
R161 - Chosen per operation requirements

ITEM	DESCRIPTION	COLLINS PART NUMBER
R170	RESISTOR, FIXED, COMPOSITION: same as R27	745-0821-00
R171	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R172	NOT USED	
R173	RESISTOR, FIXED, COMPOSITION: 220 ohms ±10%, 2 w; Allen Bradley type HB	745-5582-00
R174	RESISTOR, FIXED, COMPOSITION: 56 ohms ±10%, 1/2 w; MIL type RC20GF560K	745-1300-00
R175	RESISTOR, FIXED, COMPOSITION: same as R21	745-1296-00
R176	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1 w; Allen Bradley type GB	745-3380-00
R177	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 2 w; Allen Bradley type HB	745-5712-00
R178	RESISTOR, FIXED; COMPOSITION: same as R116	745-1405-00
R179	RESISTOR, FIXED, COMPOSITION: same as R85	745-1398-00
R180	RESISTOR, FIXED, COMPOSITION: 0.68 megohms ±10%, 1/2 w; Allen Bradley type EB	745-1471-00
R181	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R182	RESISTOR, FIXED, COMPOSITION: same as R38	745-1303-00
R183	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R184	RESISTOR, FIXED, COMPOSITION: same as R118	745-0851-00
R185	RESISTOR: P/O Z4	
R186	RESISTOR: P/O Z6	
R187	RESISTOR: P/O Z7	
R188	NOT USED	
R189	NOT USED	
R190	RESISTOR, FIXED, COMPOSITION: same as R115	745-1366-00
R191	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10%, 1/2 w; Allen Bradley type EB	745-1359-00
R192	RESISTOR, FIXED, COMPOSITION: same as R44	745-1454-00
R193	RESISTOR, FIXED, COMPOSITION: same as R2	745-0857-00
R194	RESISTOR, FIXED, COMPOSITION: same as R40	745-1464-00
R195	RESISTOR, FIXED, COMPOSITION: same as R21	745-1296-00
R196	NOT USED	
R197	RESISTOR, FIXED, COMPOSITION: same as R115	745-1366-00
R198	RESISTOR, FIXED, COMPOSITION: same as R21	745-0800-00
S1	NOT USED	
S2	SWITCH SECTION, ROTARY: 1 moving contact, 14 fixed contacts, 1 pole, 1 amp, 100 v ac, 2 amp, 28 v dc; Oak Mfg. Co. part no. 192798-CK	269-2023-00
S3	SWITCH SECTION, ROTARY: 1 moving contact, 9 fixed contacts, 1 pole, 1 amp, 100 v ac, 2 amp, 28 v dc; Oak Mfg. Co. part no 190305-CK	269-2048-00
S4	SWITCH SECTION, ROTARY: same as S3	269-2048-00
S5	SWITCH SECTION, ROTARY: same as S3	269-2048-00
S6	SWITCH SECTION, ROTARY: 2 moving contacts, 15 fixed contacts, 2 poles, 1 amp, 100 v ac, 2 amp, 28 v dc; Oak Mfg. Co. 88216-CK	269-1983-00
S7	SWITCH SECTION, ROTARY: 1 moving contact, 9 fixed contacts, 1 pole, 1 amp, 100 v ac, 2 amp, 28 v dc; Oak Mfg. Co. part no. 88128-CK	269-1981-00
S8	SWITCH SECTION, ROTARY: 1 moving contact, 5 fixed contacts, 1 pole, 1 amp 100 v ac, 2 amp, 28 v dc; Oak Mfg. Co. part no. 88130-CK	269-1982-00
S9	SWITCH, ROTARY: 4 sections, 5 positions, 8 poles 8 moving, 48 fixed contacts, 100 v ac, 1 amp, 28 v dc, 2 amp; Oak Mfg. Co. part no. 197029-K4	259-1076-00
S10	SWITCH: P/O R8	
S11	SWITCH, ROTARY: 4 positions, 1 moving, 4 fixed contacts, 1 pole, 28 v dc, 1 amp, 110 v ac, 0.5 amp; Oak Mfg. Co. part no. 196302-F1AC	259-1075-00
S12	SWITCH LEVER: 3 lever positions, 0.5 amp, 110 v ac, 1 amp, 28 v dc; Grigsby Allison Co., Inc. part no 22698-6MLW	259-1014-00
S13	SWITCH ROTARY: 14 positions, 1 moving, 15 fixed contacts, 1 pole, 28 v dc, 2 amp, 100 v ac, 1 amp; Oak Mfg. Co. part no. 196304-CK1	259-1081-00
S14	SWITCH SECTION, ROTARY: same as S2	269-2023-00
T1	TRANSFORMER, INTERMEDIATE FREQUENCY: 440 kc to 470 kc tuning range, for use in amateur equipment, 1500 ohms, 300 v ac; Communications Coil Co. part no. X-682-1	278-0696-00
T2	COIL ASSEMBLY, INTERMEDIATE FREQUENCY: 3.055 mc center frequency; 220 kc bandpass at 3 db, attenuation 35 db min. from 2.5 mc to 2.7 mc; Communications Coil Co. part no. X-094-1	278-0293-00
T3	TRANSFORMER, RADIO FREQUENCY: 1 winding w/ 3 turns of no. 26 AWG wire; 1 winding w/ 239 turns of no. 28 AWG wire	544-9715-002
T4	NOT USED	
T5	TRANSFORMER, INTERMEDIATE FREQUENCY: 440 kc to 470 kc frequency range; Communications Coil Co. part no. X-083-1	278-0281-00
T6	TRANSFORMER, AUDIO FREQUENCY: plate coupling type, 8000 ohms primary, 500, 4 ohms secondary impedance, 35 ma dc primary, 2 w max audio operating level, 300 to 3000 cps operating peak frequency, ±2 db over frequency range; Stancor Electronics, Inc. part no. 27682	667-0368-00
V1	ELECTRON TUBE: triode-pentode; Radio Corp. of America part no. 6AZ8	255-0333-00
V2	ELECTRON TUBE: triode-pentode; Radio Corp. of America part no. 6U8A	255-0328-00
V3	ELECTRON TUBE: same as V1	255-0333-00
V4	ELECTRON TUBE: same as V1	255-0333-00
V5	ELECTRON TUBE: twin triode type; Radio Corp. of America part no. 12AT7	255-0205-00
V6	ELECTRON TUBE: same as V5	255-0205-00
V7	ELECTRON TUBE: glass envelope, pentode; Radio Corp. of America part no. 6DC6	255-0226-00
V8	ELECTRON TUBE: power pentode; General Electric Co. part no. 6C1-6	255-0216-00
V9	ELECTRON TUBE: beam power pentode; RCA Electron Tube Division of Radio Corp. of America part no. 6146A	256-0149-00
V10	ELECTRON TUBE: same as V9	256-0149-00
V11	ELECTRON TUBE: same as V2	255-0328-00
V12	ELECTRON TUBE: same as V2	255-0328-00
V13	ELECTRON TUBE: same as V2	255-0328-00
V14	ELECTRON TUBE: triode-diode; Sylvania Electric Products, Inc. Tube Division part no. 6BN8	255-0335-00
V15	ELECTRON TUBE: same as V14	255-0335-00
V16	ELECTRON TUBE: triode-pentode; Sylvania Electric Products, Inc., Tube Division part no. 6EB8	255-0336-00
V17	ELECTRON TUBE: same as V14	255-0335-00
XDS1	LAMPHOLDER: for use with miniature bayonet bulb; 1-3/8 in. lg o/a; Micarta Fabricators, Inc. part no. DB718	262-1210-00
XK1	NOT USED	
XK2	SOCKET ASSEMBLY, RELAY: supplied in plastic bag; incl retainer, ground wire and socket Allied Controls Co. part no. 30055-2	220-1471-00
XK3	NOT USED	
XK4	SOCKET ASSEMBLY, RELAY: supplied in plastic bag; incl retainer, ground wire and socket; Allied Controls Co. part no. 30055-20	220-1511-00
XV1	SOCKET, ELECTRON TUBE: E noval type, 9 miniature pins; Elco Mfg. Co., Inc. part no. 274BC	220-1054-00
XV2	SOCKET, ELECTRON TUBE: same as XV1	220-1054-00
XV3	SOCKET, ELECTRON TUBE: same as XV1	220-1054-00
XV4	SOCKET, ELECTRON TUBE: 9 pin noval socket, molded construction, phenolic body; Cinch Mfg. Corp.	220-1103-00
XV5	SOCKET, ELECTRON TUBE: same as XV4	220-1103-00
XV6	SOCKET, ELECTRON TUBE: same as XV4	220-1103-00
XV7	SOCKET, ELECTRON TUBE: 7 miniature pins, copper base alloy contacts, silver plated, molded construction, plastic body; Amphenol-Borg Electronics Corp. part no. 166-002	220-1111-00
XV8	SOCKET, ELECTRON TUBE: same as XV4	220-1103-00
XV9	SOCKET, ELECTRON TUBE: 8 female contacts; Amphenol-Borg Electronics Corp. part no. 168-013-1000	220-1155-00
XV10	SOCKET, ELECTRON TUBE: same as XV9	220-1155-00
XV11	SOCKET, ELECTRON TUBE: same as XV4	220-1103-00
XV12 thru XV17	SOCKET, ELECTRON TUBE: same as XV1	220-1054-00
XY1	SOCKET, CRYSTAL: 14 contact positions, silver plated copper contacts; phenolic body; 0.434 in. by 2.062 in. by 2.450 in. excl terminals	544-2825-002

ITEM	DESCRIPTION	COLLINS PART NUMBER
XY2	SOCKET, CRYSTAL: 2 regularly spaced contacts positions, 0.486 in. c to c each contact 0.243 in. from center; cadmium plated phosphor bronze or beryllium copper; Hugh H. Eby, Inc. part no. 8879	292-0082-00
XY3	SOCKET, CRYSTAL: same as XY1	544-2825-002
Y1	CRYSTAL UNIT, QUARTZ: 6555.0 kc frequency Midland Mfg. Co., Inc. part no. MO 9009	290-9009-00
Y2	CRYSTAL UNIT, QUARTZ: 6755.0 kc frequency Midland Mfg. Co., Inc. part no. MO 9010	290-9010-00
Y3	CRYSTAL UNIT, QUARTZ: 6955.000 kc frequency Midland Mfg Co., Inc. part no. MO 9011	290-9011-00
Y4	CRYSTAL UNIT, QUARTZ: 10155.0 kc frequency Midland Mfg. Co., Inc part no. MO 9027	290-9027-00
Y5	CRYSTAL UNIT, QUARTZ: 10355.0 kc frequency Midland Mfg. Co., Inc. part no. MO 9028	290-9028-00
Y6	CRYSTAL UNIT QUARTZ: 8577.500 kc frequency Midland Mfg. Co., Inc. part no. MO 9062	290-9062-00
Y7	CRYSTAL UNIT QUARTZ: 8677.50 kc frequency Midland Mfg. Co., Inc. part no. MO 9063	290-9063-00
Y8	CRYSTAL UNIT QUARTZ: 8977.50 kc frequency Midland Mfg. Co., Inc. part no. MO 9066	290-9066-00
Y9	CRYSTAL UNIT QUARTZ: 12077.50 kc frequency Midland Mfg. Co., Inc. part no. MO 9097	290-9097-00
Y10	CRYSTAL UNIT QUARTZ: 12177.50 kc frequency Midland Mfg. Co., Inc. part no. MO 9098	290-9098-00
Y11	CRYSTAL UNIT QUARTZ: 12277.50 kc frequency Midland Mfg. Co., Inc part no. MO 9099	290-9099-00
Y12	CRYSTAL UNIT QUARTZ: 15827.50 kc frequency Midland Mfg. Co., Inc. part no. MO 9201	290-9201-00
Y13	NOT SUPPLIED	
Y14	NOT SUPPLIED	
Y15	CRYSTAL UNIT QUARTZ: 100.0000 kc; Bliley Electric Co. Inc. part no. SC-37-100R	289-1424-00
Y16	CRYSTAL UNIT QUARTZ: 453.650 kc freq; Bliley Electric Co., Inc.	290-8705-00
Y17	CRYSTAL UNIT QUARTZ: 456.350 kc freq; Bliley Electric Co., Inc	290-8706-00
Z1	SUPPRESSOR, PARASITIC: 2 turns of no. 18 AWG wire; 47 ohms, 2 w resistor	544-3125-002
Z2	SUPPRESSOR, PARASITIC: same as Z1	544-3125-002
Z3	NOT USED	
Z4	SUPPRESSOR, PARASITIC: 4 turns of no. 26 AWG wire; 56 ohm, 0.25 w resistor	544-9698-00
Z5	COIL, RADIO FREQUENCY: 9 to 11.5 mc tuning range, solder type terminals, 0.656 in. by 0.687 in by 2.062 in.; Communcations Coil Co. part no. X-239-1	278-0538-00
Z6	SUPPRESSOR, PARASITIC: 4 turns of no. 20 AWG wire; 47 ohms res; 1/2 w; 0.204 in. dia by 0.375 in. lg o/a dim., excl terminals	548-8217-00
Z7	SUPPRESSOR, PARASITIC: same as Z6	548-8217-00
	70K-2 OSCILLATOR	522-1093-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA933-002	913-0053-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA933-006	913-0054-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA933-007	913-0055-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA933-008	913-0056-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA934-017	913-0057-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA934-018	913-0058-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±2 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA934-023	913-0232-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±2 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA934-024	913-0233-00
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±2 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA934-025	913-0234-00

*Chosen per operation requirements

ITEM	DESCRIPTION	COLLINS PART NUMBER
*C301	CAPACITOR, FIXED, CERAMIC: 20 uuf ±2 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA934-026	913-0235-00
C302	CAPACITOR, FIXED, MICA: 1,000 uuf ±1%, 500 v dc; Electro Motive part no. DM20F102F-500WV	912-1749-00
C303	CAPACITOR, FIXED, MICA: 3000 uuf, ±1%, 500 vdcw; Electro Motive Mfg. Co. part no. DM20F302F-500WV	912-1748-00
C304	CAPACITOR, FIXED, MICA: 200 uuf ±1%, 300 v dc; Electro Motive part no. DM15E201F-300WV	913-3468-00
*C305	CAPACITOR, FIXED, CERAMIC: 100 uf ±2%, 500 v dc; Centralab part no. DA932-005	913-0074-00
*C305	CAPACITOR, FIXED, CERAMIC: 100 uuf ±2 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA933-916	912-0244-00
C306	CAPACITOR, FIXED, CERAMIC: 0.02 uf -40% +60%, 250 v dc; Sprague Electric Co. part no. 20C109	913-2097-00
C307	CAPACITOR, FIXED, CERAMIC: same as C306	913-2097-00
C308	CAPACITOR, VARIABLE, CERAMIC: 5.0 uuf min. to 37.5 uuf max., 350 v dc; Erie Resistor Corp. part no. 557018 COPO 39R	917-1073-00
C309	CAPACITOR, FIXED, CERAMIC: same as C306	913-2097-00
C310	CAPACITOR, FIXED, CERAMIC: same as C306	913-2097-00
C311	CAPACITOR, FIXED, CERAMIC: 10 uuf ±1 uuf, 500 vdcw; Centralab Div. of Globe-Union, Inc. part no. DA933-001	913-0043-00
CR301	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania part no. 1N34A	353-0103-00
H301	WASHER, FLAT, brass, cadmium plated; 0.218 in. id, 0.375 in. od, 0.031 in. thk	503-4964-001
H302	LEADSCREW: brass, chrome plated; rh spiral groove, 8 turns per in, 1 in. lg; 0.187 in dia by 2.952 in. lg o/a	543-7332-003
H303	WASHER, STOP: steel, cadmium plated; 0.191 in. id, 0.500 in. od, 0.164 in. thk; 1/8 in w by 0.094 in. lg stop	542-5438-002
H304	WASHER, KEY: steel, cadmium plated; 0.191 in. id, 0.500 in. od, 0.253 in. h; 0.075 in. w by 0.093 in. lg prebent key	543-7328-002
H305	NUT, PLAIN, HEXAGON: brass, nickel plated; 4-40NC-2 thd, 3/16 in. by 1/16 in. by 1/16 in. Pheoll Mfg. Co.	313-0156-00
H306	WASHER, FLAT: stainless steel; passivate finish; 0.120 in. id, 0.203 in. od, 0.025 in thk	540-3022-003
L301	TRIMMER ASSEMBLY: 9 turns #28 AWG wire, 1 toroid coil and hardware	543-7323-00
L302	TRIMMER ASSEMBLY: same as L301	543-7323-00
L303	COIL, RADIO FREQUENCY: 10 turns no. 30 AWG; single layer wound	543-7333-003
L304	COIL, RADIO FREQUENCY: angle layer wound, magnet wire 3.30 uh; Communications Coil Co.	240-0695-00
MP301	BALL, GLASS: pyrex; 0.125 in. dia; Hartford Steel Ball Co. Inc.	309-0778-00
MP302	COVER, OSCILLATOR: aluminum; 1.978 in. by 2.180 in. by 2.5000 in. excl hardware	543-7321-00
MP303	COVER REAR, OSCILLATOR: aluminum, chromate dipped; 5/8 in. by 2-3/16 in. by 3-1/4 in.	543-7329-002
MP304	CONTACT, ELECTRICAL: copper, gold plated; 0.250 in. by 0.673 in. by 1.030 in.	542-5439-002
MP305	COLLAR, STOP: cres, gold plated; 0.375 in. dia by 0.171 in. w	542-5437-002
MP306	PLATE, REAR: CRES, passivate finish; 0.078 in. thk; 1 in. dia	542-5431-002
R301	RESISTOR, FIXED, COMPOSITION: 0.10 megohms ±10%, 1/2 w; Allen Bradley Co. type EB	745-1436-00
R302	RESISTOR, FIXED, COMPOSITION: 82,000 ohms ±5%, 1/2 w; Allen Bradley Co. type EB	745-1432-00
R303	RESISTOR, FIXED, COMPOSITION: same as R301	745-1436-00
T301	TRANSFORMER, RADIO FREQUENCY: pri 380 uh nom; 790 kc; sec 2.7 uh nom; 2.6 mc; Delevan Electronics	240-0665-00
V301	ELECTRON TUBE: sharp cut - off pentode; RCA	257-0301-00
XV301	SOCKET, TUBE: turret type, 7 pin miniature; 1-3/32 in. by 1-5/8 in. lg; Eby, Hugh H., Inc. part no. 9737-95	220-1189-00

KWM-2 and KWM-2A Transceivers

GENERAL COVERAGE CRYSTALS AVAILABLE								
CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER
6555.000	3.4-3.6	290-9008-00	8577.500	14.0-14.2	290-9062-00	12977.500	22.8-23.0	290-9106-00
6755.000	3.6-3.8	290-9010-00	8652.500	14.15-14.35	290-9180-00	13077.500	23.0-23.2	290-9107-00
6955.000	3.8-4.0	290-9011-00	8677.500	14.2-14.4	290-9063-00	13177.500	23.2-23.4	290-9108-00
7155.000	4.0-4.2	290-9012-00	8777.500	14.4-14.6	290-9064-00	13277.500	23.4-23.6	290-9109-00
7355.000	4.2-4.4	290-9013-00	8877.500	14.6-14.8	290-9065-00	13377.500	23.6-23.8	290-9110-00
7555.000	4.4-4.6	290-9014-00	8977.500	14.8-15.0	290-9066-00	13477.500	23.8-24.0	290-9111-00
7755.000	4.6-4.8	290-9015-00	9077.500	15.0-15.2	290-9067-00	13577.500	24.0-24.2	290-9112-00
7955.000	4.8-5.0	290-9016-00	9177.500	15.2-15.4	290-9068-00	13677.500	24.2-24.4	290-9113-00
9755.000	6.6-6.8	290-9025-00	9277.500	15.4-15.6	290-9069-00	13777.500	24.4-24.6	290-9114-00
9955.000	6.8-7.0	290-9026-00	9377.500	15.6-15.8	290-9070-00	13877.500	24.6-24.8	290-9115-00
10155.000	7.0-7.2	290-9027-00	9477.500	15.8-16.0	290-9071-00	13977.500	24.8-25.0	290-9116-00
10355.000	7.2-7.4	290-9028-00	9577.500	16.0-16.2	290-9072-00	14077.500	25.0-25.2	290-9117-00
10555.000	7.4-7.6	290-9029-00	9677.500	16.2-16.4	290-9073-00	14177.500	25.2-25.4	290-9118-00
10755.000	7.6-7.8	290-9030-00	9777.500	16.4-16.6	290-9074-00	14277.500	25.4-25.6	290-9119-00
10955.000	7.8-8.0	290-9031-00	9877.500	16.6-16.8	290-9075-00	14377.500	25.6-25.8	290-9120-00
11155.000	8.0-8.2	290-9032-00	9977.500	16.8-17.0	290-9076-00	14477.500	25.8-26.0	290-9121-00
11355.000	8.2-8.4	290-9033-00	10077.500	17.0-17.2	290-9077-00	14577.500	26.0-26.2	290-9122-00
11555.000	8.4-8.6	290-9034-00	10177.500	17.2-17.4	290-9078-00	14677.500	26.2-26.4	290-9123-00
11755.000	8.6-8.8	290-9035-00	10277.500	17.4-17.6	290-9079-00	14777.500	26.4-26.6	290-9124-00
11955.000	8.8-9.0	290-9036-00	10377.500	17.6-17.8	290-9080-00	14877.500	26.6-26.8	290-9125-00
12155.000	9.0-9.2	290-9037-00	10477.500	17.8-18.0	290-9081-00	14977.500	26.8-27.0	290-9126-00
12355.000	9.2-9.4	290-9038-00	10577.500	18.0-18.2	290-9082-00	15077.500	27.0-27.2	290-9127-00
12555.000	9.4-9.6	290-9039-00	10677.500	18.2-18.4	290-9083-00	15177.500	27.2-27.4	290-9128-00
12755.000	9.6-9.8	290-9040-00	10777.500	18.4-18.6	290-9084-00	15277.500	27.4-27.6	290-9129-00
12955.000	9.8-10.0	290-9041-00	10877.500	18.6-18.8	290-9085-00	15377.500	27.6-27.8	290-9130-00
13155.000	10.0-10.2	290-9042-00	10977.500	18.8-19.0	290-9086-00	15477.500	27.8-28.0	290-9131-00
13355.000	10.2-10.4	290-9043-00	11077.500	19.0-19.2	290-9087-00	15527.500	27.9-28.1	290-9142-00
13555.000	10.4-10.6	290-9044-00	11177.500	19.2-19.4	290-9088-00	15577.500	28.0-28.2	290-9132-00
13755.000	10.6-10.8	290-9045-00	11277.500	19.4-19.6	290-9089-00	15627.500	28.1-28.3	290-9143-00
13955.000	10.8-11.0	290-9046-00	11377.500	19.6-19.8	290-9090-00	15677.500	28.2-28.4	290-9133-00
14155.000	11.0-11.2	290-9047-00	11477.500	19.8-20.0	290-9091-00	15727.500	28.3-28.5	290-9144-00
14355.000	11.2-11.4	290-9048-00	11577.500	20.0-20.2	290-9092-00	15777.500	28.4-28.6	290-9134-00
14555.000	11.4-11.6	290-9049-00	11677.500	20.2-20.4	290-9093-00	15827.500	28.5-28.7	290-9201-00
14755.000	11.6-11.8	290-9050-00	11777.500	20.4-20.6	290-9094-00	15877.500	28.6-28.8	290-9135-00
14955.000	11.8-12.0	290-9051-00	11877.500	20.6-20.8	290-9095-00	15927.500	28.7-28.9	290-9145-00
7577.500	12.0-12.2	290-9052-00	11977.500	20.8-21.0	290-9096-00	15977.500	28.8-29.0	290-9136-00
7677.500	12.2-12.4	290-9053-00	12077.500	21.0-21.2	290-9097-00	16027.500	28.9-29.1	290-9146-00
7777.500	12.4-12.6	290-9054-00	12177.500	21.2-21.4	290-9098-00	16077.500	29.0-29.2	290-9137-00
7877.500	12.6-12.8	290-9055-00	12277.500	21.4-21.6	290-9099-00	16127.500	29.1-29.3	290-9147-00
7977.500	12.8-13.0	290-9056-00	12377.500	21.6-21.8	290-9100-00	16177.500	29.2-29.4	290-9138-00
8077.500	13.0-13.2	290-9057-00	12477.500	21.8-22.0	290-9101-00	16227.500	29.3-29.5	290-9148-00
8177.500	13.2-13.4	290-9058-00	12577.500	22.0-22.2	290-9102-00	16277.500	29.4-29.6	290-9139-00
8277.500	13.4-13.6	290-9059-00	12677.500	22.2-22.4	290-9103-00	16327.500	29.5-29.7	290-9149-00
8377.500	13.6-13.8	290-9060-00	12777.500	22.4-22.6	290-9104-00	16377.500	29.6-29.8	290-9140-00
8477.500	13.8-14.0	290-9061-00	12877.500	22.6-22.8	290-9105-00	16477.500	29.8-30.0	290-9141-00

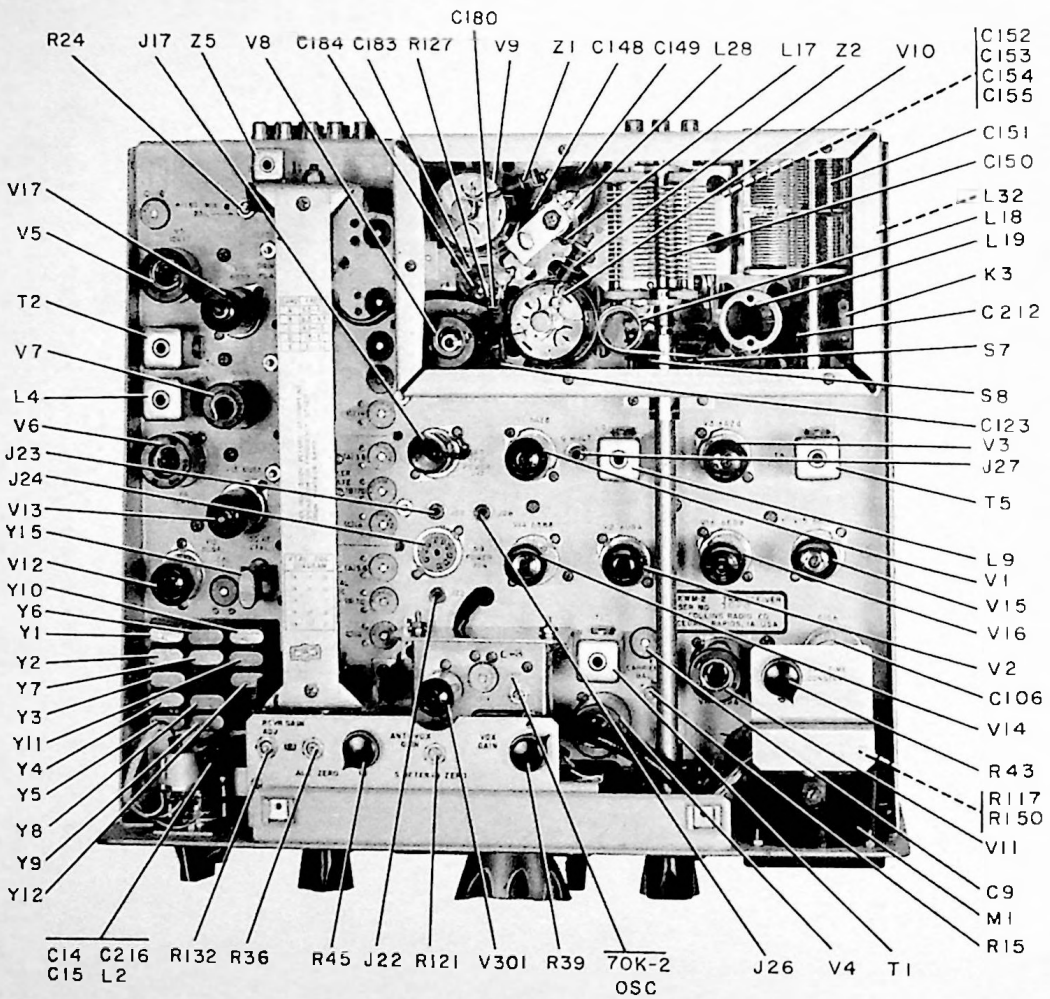


Figure 6-1. Top View, Parts Identification

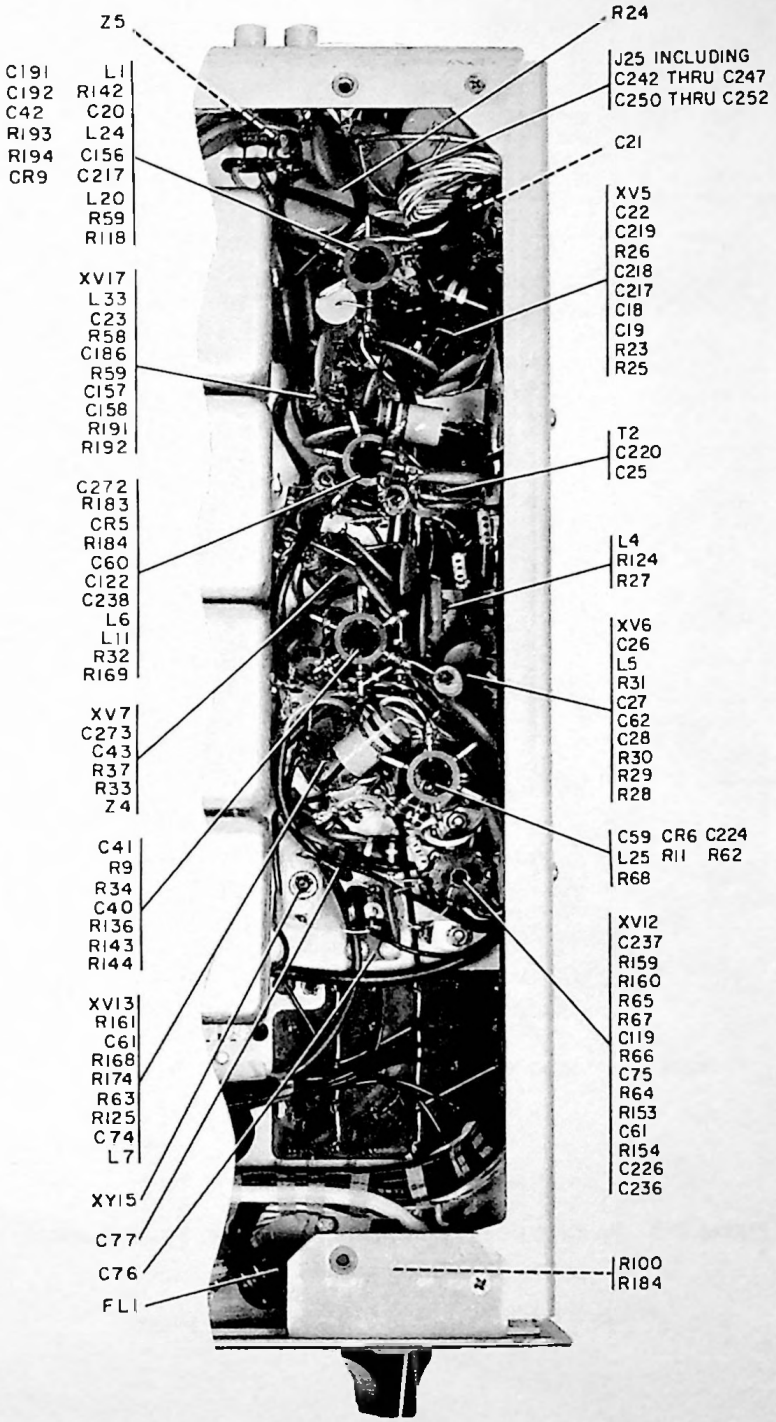


Figure 6-2. Bottom Right View, Parts Identification

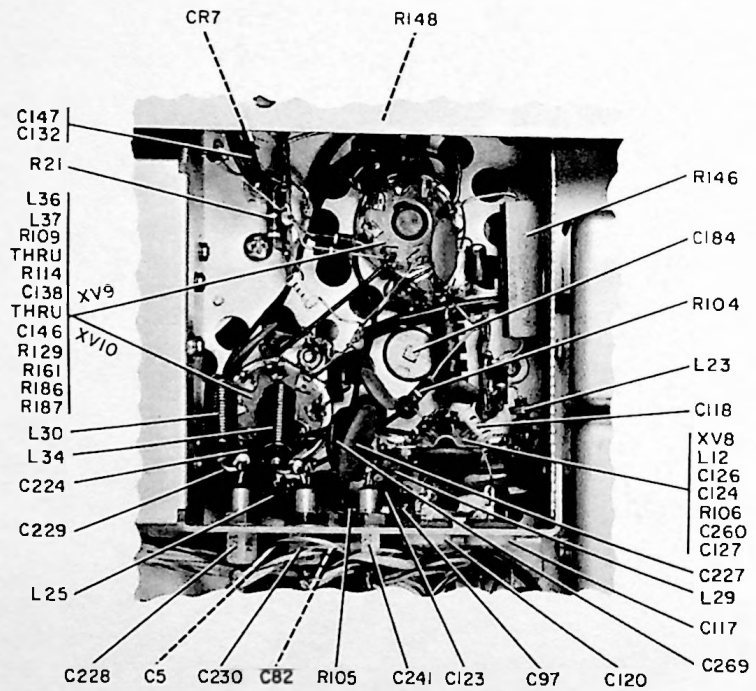


Figure 6-3. PA Grid Compartment, Bottom View, Parts Location

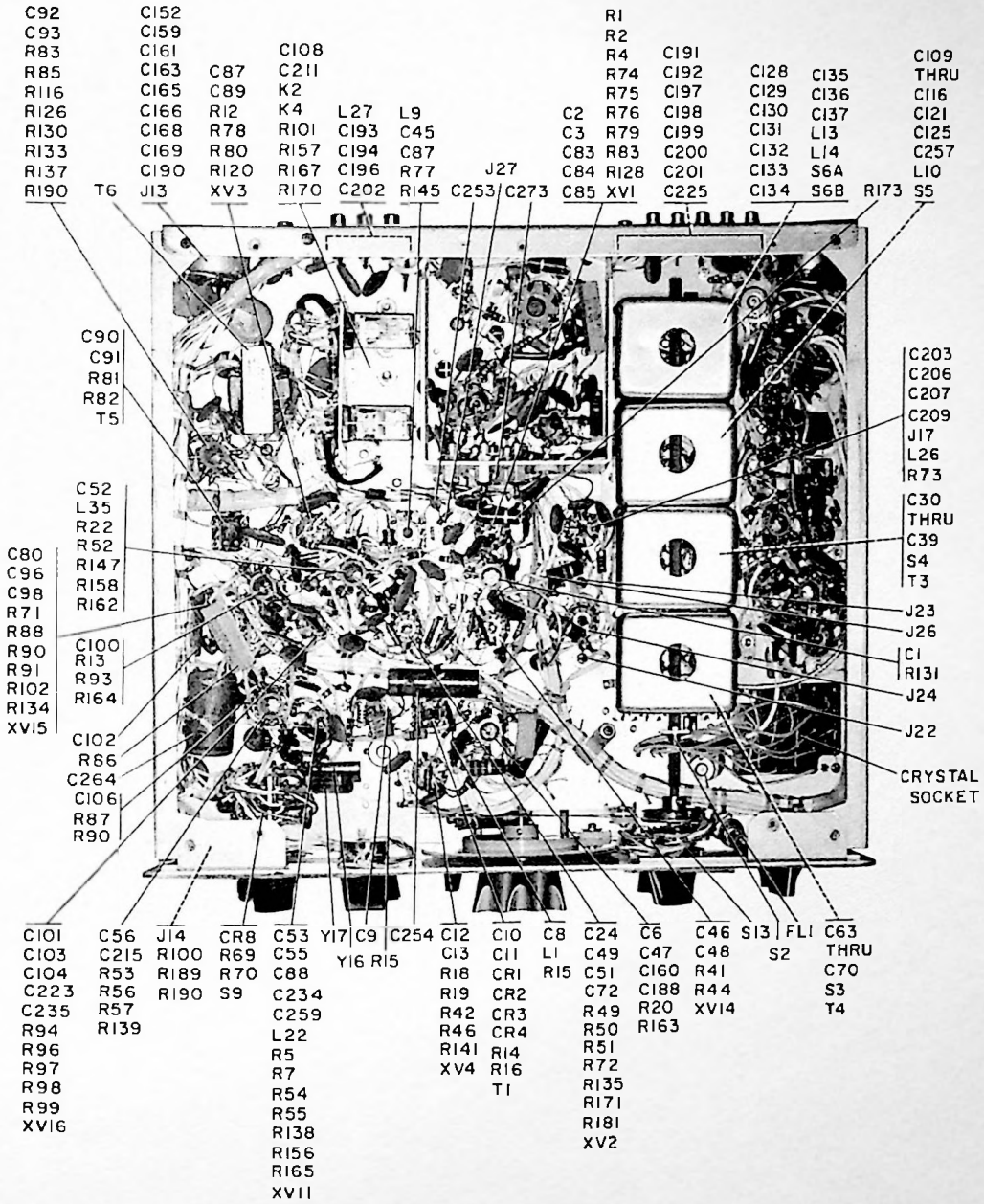


Figure 6-4. Bottom View, Parts Identification

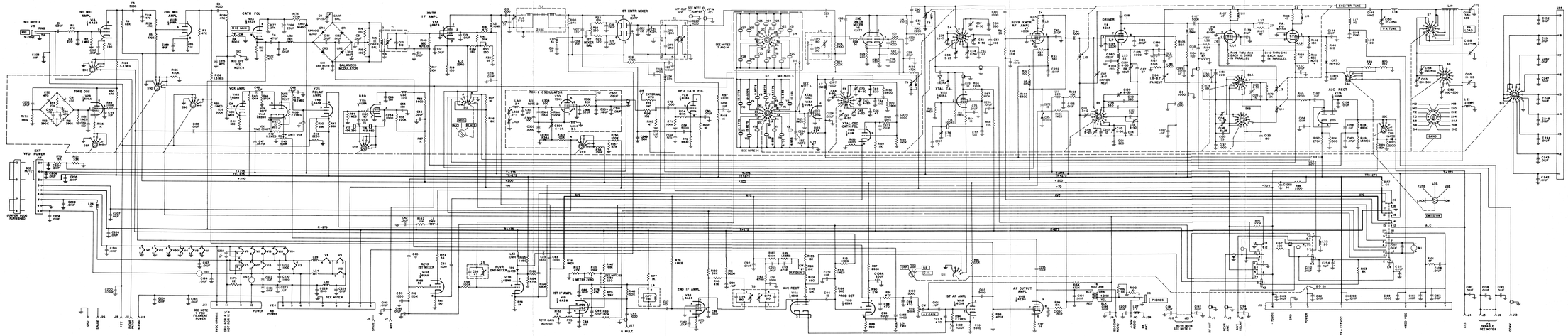
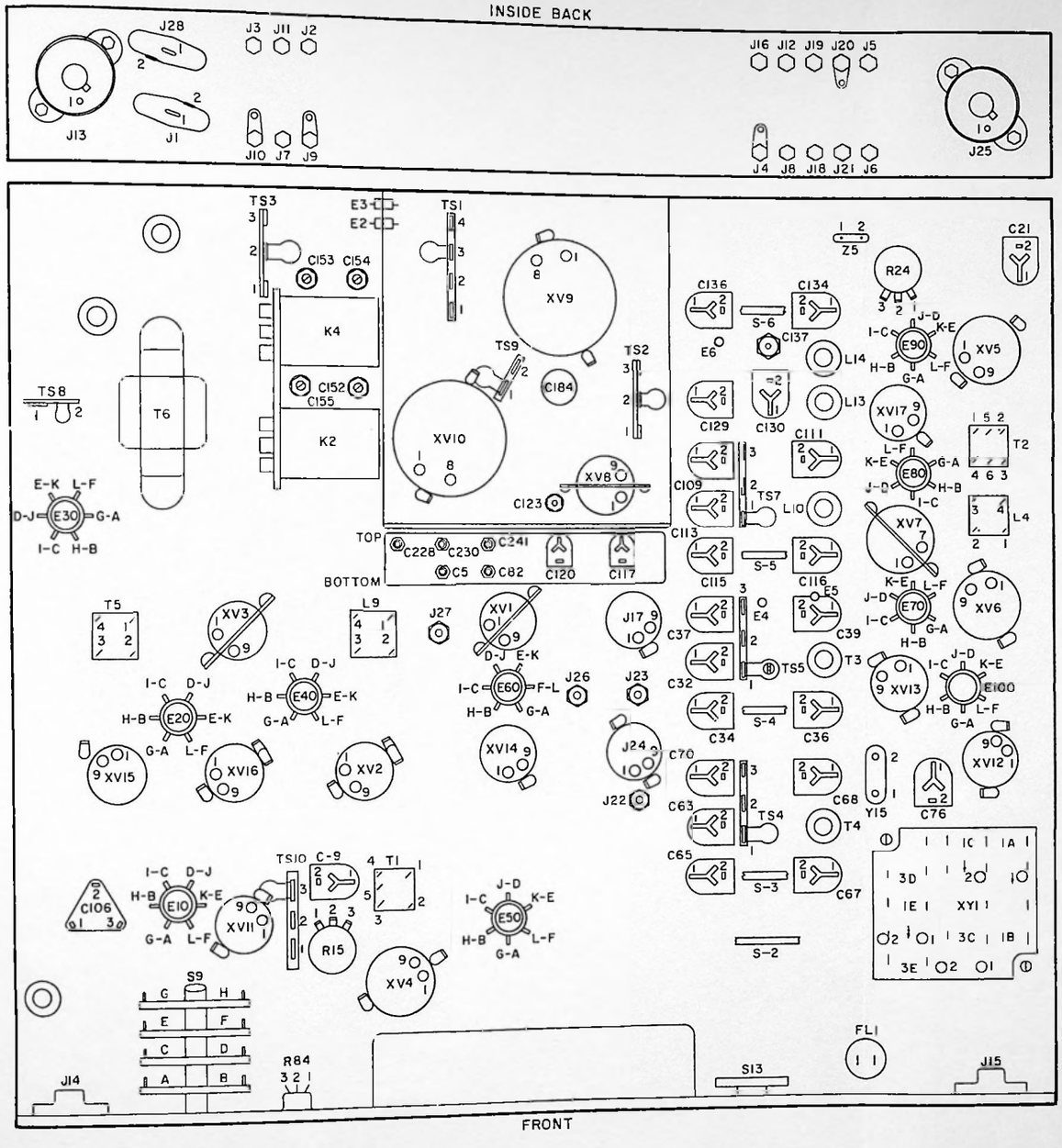


Figure 7-1. KWM-2 and KWM-2A Transceivers, Schematic Diagram



K4

22	12	13
20	21	11
19	9	10
17	18	8
16	6	7
14	15	5
4	3	1

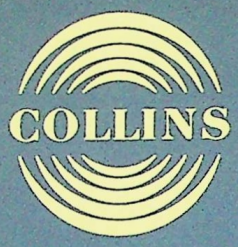
1 WHT-BLK-RED-GRN AND R167
2
3 WHT-RED-ORN AND R157
4 WHT-BRN-RED-GRN
5 WHT-ORN-BLU
6 WHT-BLK-BLU
7 WHT-BLK-RED-ORN
8 WHT-GRN-BLU
9 WHT-BLU
10 WHT-BLK-RED (2)
11 NO CONN
12 WHITE AND C108
13 BLACK AND R101
14 WHT-ORN-GRN
15 WHT-ORN-GRN-BLU
16 WHT-RED-BLU
17 WHT-ORN
18 BUS TO TIE POINT
19 WHT-RED (2)
20 COAX, 75 OHMS
21 COAX, 50 OHMS
22 STRAP TO GRD AND BUS TO COAX SHIELD

1 WHT-RED-ORN (3)
4 WHT-RED
5 WHT-BLK (2)
6 BUS TO GRD
7 R167
8 COAX
9 COAX (2) VIOLET AND ORN DOTS
10 STRAP TO GRD AND BUS TO COAX SHIELDS
11 BUS TO PIN 16, WHT-BRN-ORN
12 WHT TO GRD
13 BUS TO PIN 14 AND TIE POINT
14 BUS FROM PIN 13
15 BUS TO TIE POINT
16 BUS FROM PIN 11

K2

16	9	10
14	15	8
13	6	7
11	12	5
4		1

Figure 7-2. KWM-2 and KWM-2A, Location of Chassis Mounted Components, Bottom View


COLLINS