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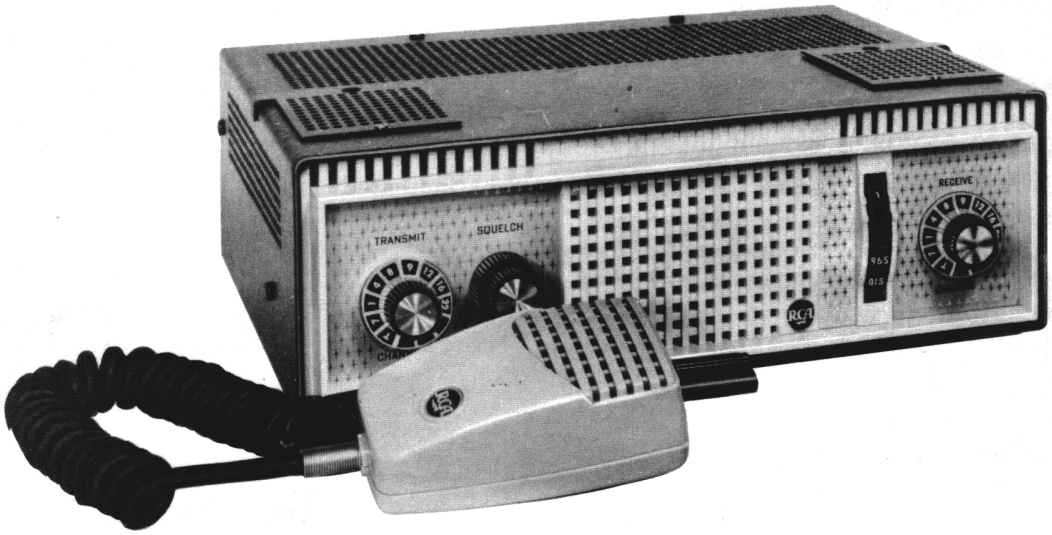
INSTRUCTION BOOK

MARK VIII RADIO PHONE

Type No. 17704

27 mc CITIZENS' BAND

2-WAY RADIO



RADIO CORPORATION OF AMERICA

Electron Tube Division

HARRISON, NEW JERSEY

Form EI-109

ADDENDA - MARK VIII INSTRUCTION BOOK EI-109

Schematic:

C18 is 56 uuf.

C20 is 62 uuf.

C45 should read 0.01 uf.

Page 14:

Symbol No. C18 should read C20.

Symbol No. C20 should read C18.

Page 12:

3. Adjust C21 for maximum output as indicated .....

Should read:

3. Adjust C69 for maximum output as indicated .....

PRELIMINARY INSTRUCTIONS

NOTE: The Mark VIII RADIO–PHONE as described herein is a self-contained unit for operation on 117V A.C. only.

If mobile or marine operation is required, a separate D.C. power supply is available as an optional accessory.

See accessory list below.

These instructions cover the installation and operation of the RCA Mark VIII RADIO–PHONE. To obtain the best possible performance from your new RADIO–PHONE read these instructions thoroughly before you begin installation.

As you unpack the equipment examine it for any apparent damage that might have occurred in shipment. If damage is found, file a claim with your carrier or dealer immediately. Supply full information promptly in order to expedite your claim.

The Mark VIII RADIO–PHONE was carefully tested and inspected before leaving the factory. If this equipment is properly installed and operated in accordance with the instructions given in this booklet, you will be assured of top performance.

The following items are packed with the RADIO–PHONE:

1 – Microphone
1 – Microphone Holder
1 – AC Line Cord
1 – Envelope, containing:
  Instruction Book
  License Application
  Warranty Card
2 – Channel Marker Strips

ACCESSORIES

The following accessories are available for use with your new Mark VIII RADIO–PHONE:

Ground Plane Antenna 555500
Light Duty Ground Plane Antenna 555501A
Auto Bumper Mount Antenna 555578
Auto Swivel Ball Mounting Antenna 555579
Marine Stainless Steel Antenna 555580
Coaxial Cable, 50 ft., with connectors attached, for connecting ground plane antenna to RADIO–PHONE 555586
Power Supply (6V. D.C.) 17705-A
Power Supply (12V. D.C.) 17705

MARK VIII RADIO-PHONE

Your new RADIO–PHONE is a precision instrument that will provide you with reliable two-way communication in the 27 megacycle Citizens' Band. This band of frequencies, which includes individual channels, was allocated by the Federal Communications Commission for the use of any citizen of the United States who has a need for short range communication (business or personal) and who has reached the age of eighteen.

The Mark VIII RADIO–PHONE has provisions for nine crystal controlled transmitting and receiving channels. The requisite transmit and receive channels are selected by individual switches, thereby making possible transmission and reception on separate channels, in addition to the normal condition of carrying out 2-way communication on the same channel.

One pair of crystals for transmitting and receiving on one of the allocated frequencies is supplied in the equipment. Additional transmit and/or receive crystals may be added at any time. (See page 8 for ordering instructions.)

The receiver may also be manually tuned to any channel in the citizens' band, enabling reception to take place without receive crystals. The advantages of crystal controlled reception will then not be available.

The Mark VIII RADIO–PHONE is a self contained unit for operation on 115V 60 ~ AC only. For mobile or marine operation a separate DC power supply must be used. Refer to list of accessories.

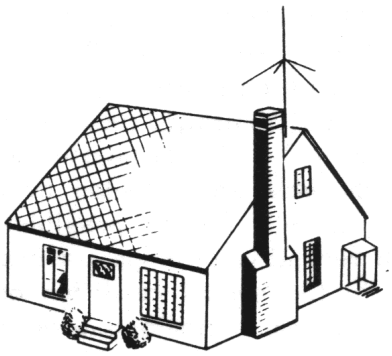
Important Note: If a Mark VIII RADIO–PHONE is set up as a mobile installation with a separate D.C. Power Supply, it can be conveniently removed from the automobile and be used on AC simply by attaching the supplied AC cord. No further modifications are required except of course the provision of a fixed station antenna.

Since there are so many places where the RADIO–PHONE can be used, each with a different antenna and antenna mounting re-

quirement, no antenna is supplied with the equipment. Several different antennas are available. Each one is designed to give best performance for a particular type of installation.

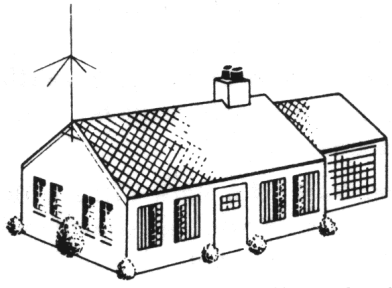
FIXED INSTALLATION

When operating the RADIO–PHONE in your home, office building or any other building, a ground plane antenna may be used. This antenna consists of a vertical whip, approximately nine feet in length, and four similar elements extending horizontally from the base.



There are two types available–the light duty model, 555501A, and the more rugged standard duty model, 555500. For best results and maximum range use one of the recommended antennas or other antenna with a low standing wave ratio.

The light duty antenna can be clamped to any round mast up to one inch in diameter. The standard duty type screws onto a 1¼-inch IPS pipe. No mast is supplied with the

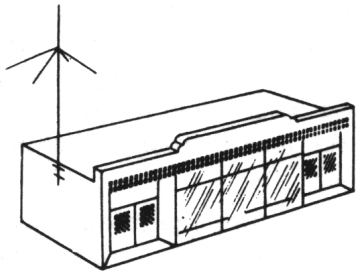


antenna but one can be readily obtained from your local television service shop or plumbing supply store.

The mast for either antenna can be secured to the building by means of one of the standard television antenna mounting kits. Several types are available at your local television service shop or radio and television parts dealer. With the appropriate mounting kit, the mast can be secured to a chimney, a wall, or the eaves ridge of a peaked roof. Installation instructions are normally supplied with the kit.

To minimize the possibility of damage from lightning, connect a heavy wire (#10 AWG or larger) between the antenna mast and a good ground.

Use either RG-58/U or RG-8/U coaxial cable



to connect the antenna to the RADIO–PHONE. For cable runs longer than 75 feet, RG-8/U cable is preferred to minimize the power loss. Each end of the cable must be terminated in a UHF connector, PL-259. If RG-58/U cable is used, a type UG-175/U adapter is also required. See Figure 1 for connector assembly instructions.

If you prefer, a fifty foot long RG-58/U cable with connectors on both ends is available from your dealer. This assembly is identified as part number 555586.

Plug one end of the AC cord into the receptacle on the back of the RADIO–PHONE and the other end into an AC outlet (115 volt, 60 cycle AC only). Mount the microphone holder in a convenient location and plug the microphone cord into the receptacle located at the bottom center of the front panel, such that the microphone cable is seen to emerge from the microphone plug on its left side, looking into the front of the set.

MOBILE INSTALLATION

If you plan to install your new RADIO–PHONE in an automobile, truck, tractor, or other vehicle, it will be necessary to obtain a separate power supply. For 12V operation a power supply 17705 is required, and for 6V

operation a power supply 17705-A.

I. POWER SUPPLY INSTALLATION:

a. Mount on passenger side of firewall in convenient location with the hardware supplied with the power supply.

b. If additional grounding is necessary, solder ground strap to power supply lug. (Both provided) Connect other end of strap to convenient ground on automobile.

c. Connect battery lead to live side of battery.

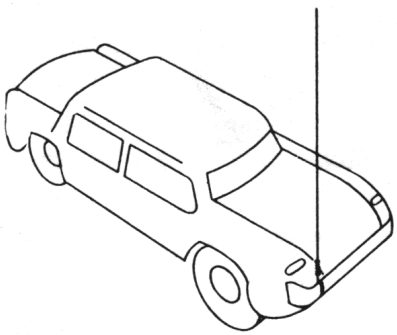
II. MARK VIII RADIO–PHONE:

a. Attach bracket provided to dash in convenient place with hardware provided.

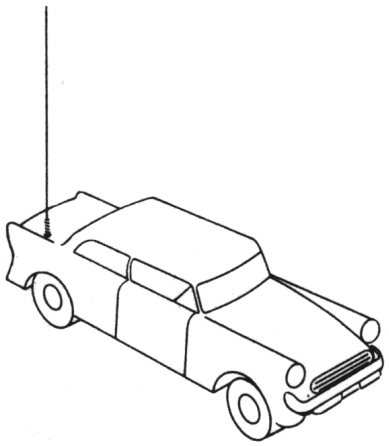
b. Slide Mark VIII RADIO–PHONE into this bracket. Three sets of holes are available on the Mark VIII. Line up the most suitable pair with the bracket holes and mount set to bracket with screws provided.

c. Attach strap provided to hold back of set in place.

d. Plug power supply into Mark VIII RADIO–PHONE.



For best results a one-quarter wave length whip antenna approximately nine feet long, available in two mounting styles, should be used. The 555578 antenna is supplied with a bumper mount, which is normally clamped to the rear bumper. This is the most convenient mobile antenna to install because it does not require drilling any mounting holes in the automobile. A lead-in cable, 20 feet long, for connecting between the antenna and RADIO–PHONE, is supplied with the antenna. Also supplied with the antenna is a rain gutter clip that is used to hold the antenna down when not in use or when entering a garage.



The 555579 antenna, supplied with a swivel ball mounting, is designed to be mounted through any surface of the vehicle. A twenty foot lead-in cable and gutter clip is also supplied with this antenna.

Mount the microphone holder in a convenient location and plug the microphone into the receptacle located at the bottom center of the front panel.

You may notice that there is more noise coming from the loudspeaker when the automobile engine is running. This is usually caused by electrical interference from the ignition system, or the generator, or both. If the interference is excessive it can be reduced by proper shielding, bonding and filtering of the vehicle's electrical system.

Generator interference can usually be reduced by connecting a .1 mfd coaxial capacitor (Sprague type 48P-9 or equivalent) in the *armature* lead. To install this type of capacitor, secure the capacitor to the generator case using the capacitor mounting hole. Disconnect the lead from the *armature* terminal of the generator and connect it to either end of the capacitor. Connect a short jumper wire between the other end of the capacitor and the *armature* terminal. Do *not* connect a capacitor to the field terminal as it would probably interfere with the proper operation of the voltage and current regulator.

MARINE INSTALLATION

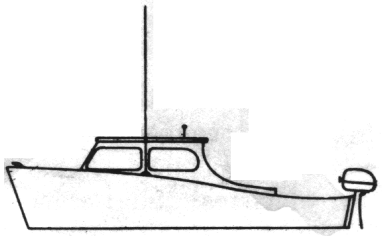
If 115V AC is available, mount the Mark VIII RADIO–PHONE in any convenient location and use as described under fixed installation, page 2, except that the antenna described below should be used.

If 6V or 12V DC operation is required, it will be necessary to obtain a separate power supply.

For 12V operation a power supply 17705 is required, and for 6V operation power supply type 17705-A.

Mount the power supply in any convenient location with the hardware provided, ensuring that an effective ground is obtained. A ground strap may be needed, and is furnished with the power supply for this purpose. Connect battery lead to live side of battery. It is immaterial which polarity of the battery is grounded.

Mount the Mark VIII RADIO–PHONE in any convenient location with the hardware provided, and plug the power supply into the Mark VIII RADIO–PHONE.



For shipboard installation, the nine-foot stainless steel marine antenna (555580) should be used. A twenty-foot lead-in cable is supplied with this antenna. When connecting the lead-in to the antenna, connect the center conductor of the cable to the antenna rod (center stud) and the cable shield to the stud on the metal mounting plate. On steel vessels, make sure there is a good electrical connection between the metal plate and the hull. On wooden vessels connect a short lead (not over three feet in length) between the metal plate and the nearest grounded object.

If there is no nearby ground point, it might be desirable to install a ground plate directly under the antenna. The ground plate consists of a copper sheet, at least five square feet in area, fastened to the vessel below the water line. Connect the metal plate on the antenna mounting to the ground plate through a .001 mfd (or larger value) mica or ceramic capacitor. On small craft using an outboard motor, the metal plate on the antenna mounting may be connected to the motor housing, provided the connecting wire is short.

POSITIONING OF CRYSTALS

Each set is furnished with Channel 7 crystals equipped on both transmit and receive. (Frequency 27.035 Mcs). This channel is also identified on the channel selector knob. The procedure listed below must be followed when adding extra crystals:

TRANSMIT

1. Turn transmit channel selector switch fully clockwise. This is position 10 of the switch, and it will be noted that it is identified by being masked on the selector knob.
2. Turn the switch to position 9, one step CCW. It will be noted that the equipped Channel 7 is identified on the selector knob.
3. Open the cover located on the top left of the cabinet viewed from the front. The transmit crystal sockets will be seen directly below. Notice that they are lettered, and that the equipped Channel 7 crystal is in socket position D.
4. As can be seen, crystal socket position D coincides with switch position 9.
5. Turning the switch CCW step-by-step position 8-1 inclusive will be passed.
6. The following is a table of switch positions coinciding with crystal socket positions:

Switch	Crystal Socket
1	F
2	G
3	H
4	I
5	E
6	A
7	B
8	C
9	D

Example: To add channel 4 crystal in switch position 2, place in socket lettered G.

RECEIVE:

Crystal sockets similar to transmitter crystal

sockets are available on right side of set. The addition of extra receive crystals is exactly as for transmit, in conjunction with the receive selector switch.

NOTE: On receive, switch position 10 places the receiver in the tune condition, and is identified by the letter T on the receive knob.

LABELLING:

When transmit and receive crystals have been added, position the appropriate channel numbers on the selector knobs using the stickers provided.

OPERATION

Read these instructions carefully, and be especially careful in setting the SQUELCH control as outlined in step 4 to obtain maximum performance from your RADIO–PHONE.

1. Turn on the RADIO–PHONE by rotating the volume control knob clockwise.
2. Select the required channel by means of the CHANNEL selector knob (Transmit and Receive). The receive selector may be set to T (tune) if so desired.

   It will be noted that the tuning dial is capable of 360° rotation. One half of the dial is calibrated in channel numbers, the other half in frequency. The channel frequency will be marked exactly 180° from the corresponding channel number. For example Channel 7 operates at a frequency of 27.035 Mcs. The figures 035 will be 180° (diametrically opposite) Channel 7. Similarly the last three figures of the channel frequency will be diametrically opposite the channel number of any other channel. For all three figure numbers starting with 9, add 26 Mcs, and for all others add 27Mcs to arrive at the correct frequency. The equipment is shipped from the factory with crystals installed in switch position #9 for Channel 7 only. Therefore the other channels cannot be used until additional crystals are installed. See page 8 for ordering instructions and page 4 for installation instructions.
3. Rotate the SQUELCH control fully clockwise.
4. Turn up the VOLUME until noise or a signal is heard. *The SQUELCH control must be set only when noise, (no signal), is heard.* When only noise is present, turn the SQUELCH control slowly counter-clockwise to the point where the noise just disappears. The receiver is now properly adjusted so that transmitted signals will be heard but the receiver will be quiet between transmissions. *Do not turn the SQUELCH control further than necessary to just quiet the noise, as this would result in weak signals being missed that might otherwise be heard.*
5. To transmit, press the button on the side of the microphone. Talk directly into the microphone at a distance of a few inches. Release the button to receive. The equipment will not function as a receiver unless the button is released.

TUBE REPLACEMENT

If tube replacement becomes necessary, the set must be removed from the cabinet. The set is held in the cabinet by means of standard slot-head type screws, three of which are on the bottom of the RADIO–PHONE, two on each side, and two on the top. Remove these nine screws and slide the unit out of the cabinet. *Do not remove any other screws from the case.*

The replacement tube must have the same type number as the original.

A tube location diagram can be found on the bottom of the equipment and on page 20 of this book.

TECHNICAL SECTION

THE FOLLOWING INFORMATION IS SUPPLIED FOR THE USE OF A TECHNICIAN IN SERVICING THE EQUIPMENT.

TYPICAL TUBE SOCKET VOLTAGES

Symbol, Tube Type and Function	*Type of Operation*	*Pin Numbers*								
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
V1 – 6GV8 Crystal Oscillator/ R.F. Power Amplifier	Receive	240	–77	0	H	H	245	245	0	–78
	Transmit	106	–8.5	1.3	H	H	135	116	0	–20
V2 – 6BA6 R.F. Amplifier	Receive	0	0	H	H	160	50	0.4	–	–
	Transmit	–50	0	H	H	180	75	0.2	–	–
V3 – 6BE6 Mixer – Oscillator	Receive	–3.2	0	H	H	112	92	–1.2	–	–
	Transmit	–3.5	0	H	H	170	92	–7.5	–	–
V4 – 6BA6 First I.F. Amplifier	Receive	0	0	H	H	155	74	–0.7	–	–
	Transmit	–45	0	H	H	205	205	0	–	–
V5 – 6EA8 Second I.F. Amplifier/ Microphone Amplifier	Receive	205	–0.2	73	H	H	85	1.3	0	–60
	Transmit	38	–44	205	H	H	205	0	0	–0.6
V6 – 6AV6 First Audio – Detector- Squelch Clamp	Squelch Clockwise Receive	–0.75	0	H	H	0	–0.6	200	0	–
	Squelch Counter-Clockwise Receive	–18	0	H	H	–28	–0.3	75	–	–
	Transmit	–0.75	0	H	H	0	–6	70	–	–
V7 – 6AQ5 Audio Output-Modulator	Receive	0	11	H	H	240	210	0	–	–
	Transmit	0	11	H	H	230	215	0	–	–

Voltages measured to chassis with VTVM (RCA VoltOhmyst or Equivalent) and are positive except where noted.

Transmitter tuned and loaded, with no signal input to receiver.

TECHNICAL SUMMARY

Electrical

Frequency Range ..... Approx. 26.965 - 27.255 Mcs.

Transmitter Frequency

All units equipped with Channel 7 crystals, (frequency 27.035 Mcs) in position 9 of the channel selector switches.

Other channels cannot be used until additional crystals are installed (see page 8).

Transmitter Power * ..... 5 watts

Receiver Audio Power Output ..... 2 watts

Receiver Sensitivity (6 db signal-to-noise ratio) ..... 1 microvolt

Power Drain

Supply Voltage	*Receive*	*Transmit*	*Batt. Cable Fuse*
6.3 volts DC	8.7 amp	9.5 amp	10 amp
12.6 volts DC	3.7 amp	4.3 amp	5 amp
115 volts AC 60 cycle	47 watts	52 watts	—

Mechanical

Height	3 3/4	inches
Width	11 5/16	inches
Depth	8 1/16	inches
Weight (Less accessories)	9	pounds
Shipping Weight	12	pounds

* Plate input power to final radio frequency stage.

TUBE COMPLEMENT

1 RCA 6GV8 Crystal Oscillator/Power Amplifier

1 RCA 6BA6 RF Amplifier

1 RCA 6BE6 Mixer-Oscillator

1 RCA 6BA6 IF Amplifier

1 RCA 6EA8 IF Amplifier/Microphone Amplifier

1 RCA 6AV6 Noise Limiter, Detector, Squelch Clamp, Audio Amplifier

1 RCA 6AQ5 Audio Output/Modulator

NEON LAMPS

2 NE2

ADDING NEW FREQUENCIES

IMPORTANT: Use only crystals listed in the table. The use of any other type of crystal may result in illegal (off-frequency) operation. Transmitting crystals must be installed and checked by a person holding a first or second class commercial operator's license.

The Mark VIII RADIO–PHONE is shipped from the factory with one pair of Channel 7 crystals installed in position 9. If additional frequencies are required, order the desired crystals from your dealer by specifying the RCA part number listed in the table. Normally a transmitting and receiving crystal for a new channel are installed at the same time. However, a transmitting crystal may be added and the receiver tuned to the new frequency by means of the tuning dial, with the CHANNEL selector in the TUNEABLE (T) position.

The table lists the crystals that are available for the Mark VIII RADIO–PHONE. The actual crystal frequency is stamped on the crystal case. This frequency is the same as the channel frequency for transmitting crystals and 1.65 mc higher than the channel frequency for the receiving crystals. These transmitting crystals are stamped with the letter "T" and the receiver crystals are stamped with the letter "R". Be sure they are plugged into the correct sockets.

CIRCUIT DESCRIPTION

GENERAL

The entire circuits of both transmitter and receiver are built up on a printed-circuit board.

The receiver is of the superheterodyne type, with an intermediate frequency of 1650Kcs. It can function either as a crystal controlled receiver, (nine crystal positions), or as a tuneable receiver covering all channels allotted to the Citizen's Band.

The transmitter is crystal controlled, (nine crystal positions), and is of the Master Oscillator-Power Amplifier type.

The tank circuit of the transmitter, (L3-C8), also serves as the input circuit to the receiver, and has been carefully designed to ensure that maximum transfer of power to the antenna is achieved in the transmit condition, and that the signal is transferred to the input of the receiver for optimum signal-to-noise ratio in the receive condition.

RECEIVER

The choke L4 serves to discharge to ground any static charges built up on the antenna. The functions of C7, C70 and L5 are described in the transmitter section.

The plate of V2 is coupled to the signal input of the mixer tube (V3) by means of a double-tuned RF Transformer (T1). The secondary of this transformer is temperature compensated by means of C14 to minimize frequency drift with temperature.

The RF amplifier circuit enables the receiver to provide better than 40 db rejection for image interference, and improves the signal-to-noise ratio of the receiver. The signal-to-noise ratio for an input level of one microvolt, modulated 30% at 400 cps is better than 6 db.

The oscillator portion of the mixer, (V3), is either crystal-controlled or tuneable, depending upon the position of the receiver channel selector switch (S2).

In both cases the oscillator functions as a grounded plate Hartley oscillator. However, with crystal operation, the crystal is switched directly into the feed-back path, and acts as a closed switch at its series resonant frequency. At any other frequency the crystal

MARK VIII RADIO-PHONE TRANSMITTING AND RECEIVING CRYSTALS

Channel Frequency (mc)	*Transmitter Crystals*			*Receiver Crystals*		
	*RCA Type No.**	*Frequency (mc)*	*Marking*	*RCA Type No.**	*Frequency (mc)*	*Marking*
26.965	17707–1	26.965	3460421–1	17706–1	28.615	3460419–1
26.975	17707–2	26.975	3460421–2	17706–2	28.625	3460419–2
26.985	17707–3	26.985	3460421–3	17706–3	28.635	3460419–3
27.005	17707–4	27.005	3460421–4	17706–4	28.655	3460419–4
27.015	17707–5	27.015	3460421–5	17706–5	28.665	3460419–5
27.025	17707–6	27.025	3460421–6	17706–6	28.675	3460419–6
27.035	17707–7	27.035	3460421–7	17706–7	28.685	3460419–7
27.055	17707–8	27.055	3460421–8	17706–8	28.705	3460419–8
27.065	17707–9	27.065	3460421–9	17706–9	28.715	3460419–9
27.075	17707–10	27.075	3460421–10	17706–10	28.725	3460419–10
27.085	17707–11	27.085	3460421–11	17706–11	28.735	3460419–11
27.105	17707–12	27.105	3460421–12	17706–12	28.755	3460419–12
27.115	17707–13	27.115	3460421–13	17706–13	28.765	3460419–13
27.125	17707–14	27.125	3460421–14	17706–14	28.775	3460419–14
27.135	17707–15	27.135	3460421–15	17706–15	28.785	3460419–15
27.155	17707–16	27.155	3460421–16	17706–16	28.805	3460419–16
27.165	17707–17	27.165	3460421–17	17706–17	28.815	3460419–17
27.175	17707–18	27.175	3460421–18	17706–18	28.825	3460419–18
27.185	17707–19	27.185	3460421–19	17706–19	28.835	3460419–19
27.205	17707–20	27.205	3460421–20	17706–20	28.855	3460419–20
27.215	17707–21	27.215	3460421–21	17706–21	28.865	3460419–21
27.225	17707–22	27.225	3460421–22	17706–22	28.875	3460419–22
27.255	17707–23	27.255	3460421–23	17706–23	28.905	3460419–23

* Specify this RCA Type No. when ordering crystals.

acts effectively as an open circuit. Oscillations are therefore only sustained at the series resonant frequency of the crystal. Any of nine different crystals may be selected.

The oscillator is frequency stabilized with respect to temperature by means of the temperature compensating type capacitors C18 and C20.

C18 provides short-term frequency stability, and C18 and C20 together provide long term stability. Also, due to the careful design of this circuit, the tuning capacitor C21 can be at any setting without affecting the receive oscillator crystal frequency by more than 100 cps. (±.0003%).

The output of the mixer is followed by two stages of IF amplification. (V4, V5A). The IF transformers, (T3, T4, T5), have been carefully designed and factory adjusted to give optimum adjacent channel selectivity together with sufficient bandwidth to accomodate the crystal frequency error allowed by FCC regulations. (±.005% for both the transmit and receive crystals, a total of ±.01%).

The output from the IF stages is demodulated by one diode section of tube V6, and the audio output is fed via a series diode, CR1, and the volume control, R32A, to the input of the triode section of V6 for audio amplification.

Due to the polarity of CR1, and the bias applied to it via the AGC line together with the small positive potential derived from the cathode of V7 via the potentiometer network R33 and R31, CR1 acts as a series noise limiter, and effectively limits ignition noise induced into the receiver.

The audio output from the triode section of V6 is applied to the power amplifier tube V7.

The squelch circuit operates as follows:

The control grid return of V6 triode is connected to the arm of the squelch control, R32B. This control is part of a voltage divider between the first IF amplifier screen grid and the negative supply. The squelch control is adjusted to just cut-off the triode with no signal input.

When a signal is received, the AGC voltage applied to the first IF amplifier reduces the screen grid current of V4, causing the screen voltage to rise. This in turn causes the control grid voltage of V6 to rise, bringing it out of the cut-off condition. The control grid voltage of V6 is prevented from going positive by a diode clamp. (Part of V6).

TRANSMITTER

The crystal oscillator, (V1A), is crystal controlled by a third overtone type crystal. The setting of the oscillator plate inductor adjustment screw, (L1), affects the transmitter frequency. The factory setting must not be changed except by a properly licensed operator who has equipment capable of accurately measuring the output frequency.

The oscillator output is coupled to the control grid of the power amplifier, (V1B), by capacitor C2. The power amplifier tank circuit, (L3, C8), is a pi-network in conjunction with the output capacitance of V1B, and is adjusted to transfer maximum power from the power amplifier to the antenna. Capacitor C7 enables this network to be adjusted within sufficient limits to accommodate the slight discrepancies encountered between different antennas.

The network C70, L5, is for harmonic rejection, and is factory adjusted.

Neutralization is accomplished by means of the capacitive divider network C64, C1, connected directly across V1B output, with the top of this network returned to V1B input via L1 and C2.

As many as nine crystals may be incorporated, and are selected by switch S1.

The audio output from the microphone is amplified by V5B and the triode section of V6. The audio power-amplifier V7 also serves as the transmitter modulator, and modulates both plate and screen of the power amplifier V1B.

TRANSMIT-RECEIVE SWITCHING:

When on receive, the transmitter is cut off due to the crystal oscillator control grid being returned directly to the negative supply line via R1. The transmit audio amplifier V5B is also cut-off by the same negative voltage via R43.

On transmit, the negative cut-off voltage is

This manual is missing pages 11, 12, 13
Sorry about this, this manual I bought it off ebay.
If I find another one I will add the pages to this file.