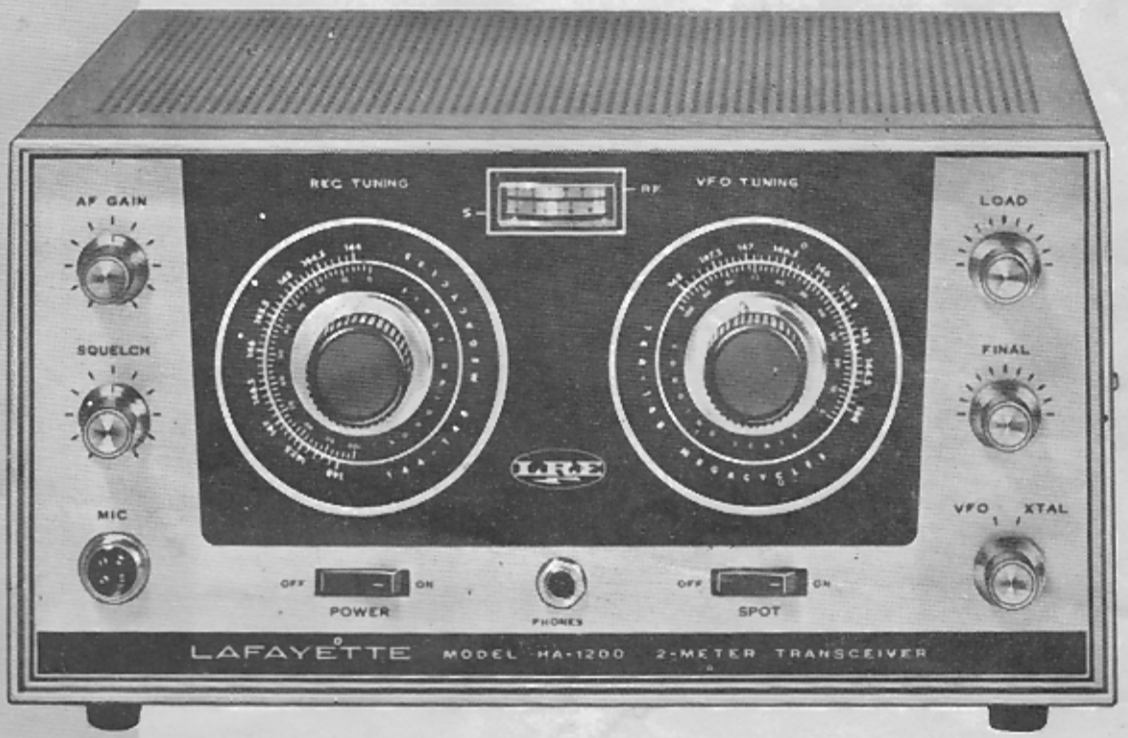
LAFAYETTE

Model HA-1200

(Stock No. 99-2582WX)



TWO-METER AMATEUR TRANSCEIVER

LRE

LAFAYETTE RADIO ELECTRONICS

INSTALLATION and OPERATING MANUAL

IM-451 6/67 1.5M/H

TABLE OF CONTENTS

SPECIFICATIONS

RECEIVER

SENSITIVITY	Less than 1 microvolt for 10 db S/N ratio.
SELECTIVITY	30 db down at 10 Kc.
SQUELCH SENSITIVITY	1 to 300 microvolts.
INPUT IMPEDANCE	50 to 100 ohms (coaxial connector)
OUTPUT IMPEDANCE	8 ohms.
TUNING RANGE	144 to 148 Mc.
IF FREQUENCIES	1st: 44 to 45 Mc; 2nd: 10.7 Mc; 3rd: 455 Kc.
AUDIO OUTPUT	3 watts.

TRANSMITTER

POWER INPUT	25 watts.
TUNING RANGE	144 to 148 Mc.
CRYSTAL FREQUENCIES	8.0 to 8.222 Mc.
MICROPHONE	High impedance with "push-to-talk" switch.
OUTPUT IMPEDANCE	50 to 100 ohms (coaxial connector).
TRANSMISSION MODE	Type A3 emission (AM phone).

GENERAL

AC POWER REQUIREMENTS	117 volts, 50/60 cycles, 1.5 amps (maximum).
DC POWER REQUIREMENTS	12 volts DC at 10 amps (maximum).
ENSIONS	11-7/8" W x 6-5/8" H x 12-3/4" D.
WEIGHT	22 lbs.

GENERAL DESCRIPTION

INTRODUCTION

The Lafayette Model HA-1200 is a compact, self-contained transceiver specifically designed to provide consistent communications on the 2-meter amateur band. This band includes frequencies used by the radio amateur as well as by Military Affiliate Radio System (MARS), Civilian Defense (CD), and Civil Air Patrol (CAP). The universal power supply makes the unit ideally suitable for operation as a 12 volt DC mobile unit or fixed station operation from a 117 volt, 50/60 cycle AC power source.

The only additional items required for operation are an 8 ohm speaker and a suitable antenna.

NOTE

An FCC amateur license is required by anyone operating this equipment.

FEATURES

Built-in solid-state universal regulated power supply. Operates from 117 volts AC or 12 volts DC.

Crystal-controlled or VFO transmitter operation.

Audio squelch control.

Spot switch.

S-meter/Relative power indicator.

6CW4 Low-Noise neutralized RF amplifier.

Crystal-controlled triple conversion IF system.

TUBE AND TRANSISTOR COMPLEMENT

V1	6CW4	RF Amplifier
V2	6BL8	1st Mixer
V3	6BL8	Osc/Osc Buffer
V4	6CB6	2nd Mixer/1st I.F.
V5	6BA6	2nd I.F.
V6	6BE6	3rd Mixer
V7	6BA6	3rd I.F.
V8	12AV6	Speech Amplifier
V9	12AX7	AF Amplifier/Phase Inverter
V10, V11	6AQ5	Audio Power Amplifier/Modulators
V12	6AQ8	VFO/Buffer/Xtal Osc
V13	6AU6	24 Mc Tripler
V14	12BY7A	72 Mc Tripler
V15	12BY7A	144 Mc Doubler
V16	6360	Final PA
V17	OA2	Voltage Regulator
Q1 - Q4	2SB449	DC Power Supply Transistors

DIODE COMPLEMENT

D1	1S72	Osc Tripler
D2	1N60	Detector
D3	1S72	Noise Limiter
D4	FR-1M	Squelch
D5	1N60	Meter RF Detector
D6, D7	FR-1K	Rectifier
D8	FR-1M	Relay Rectifier

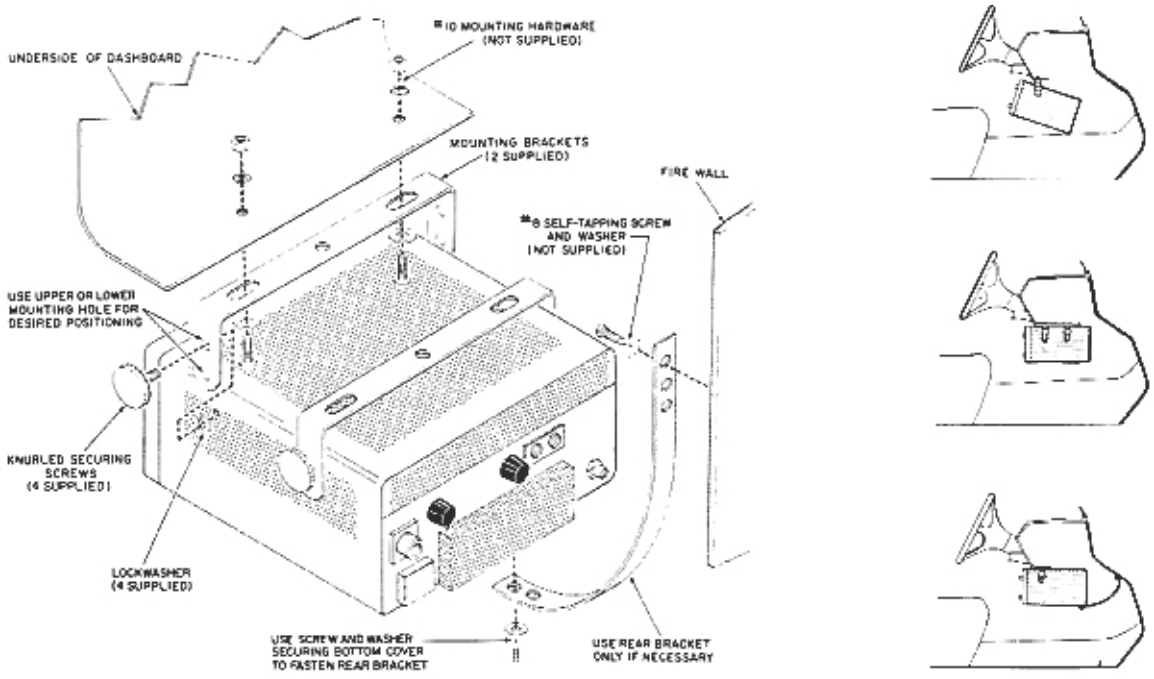


FIGURE 1 MOBILE INSTALLATION

INSTALLATION

LOCATION

The HA-1200 may be placed in any location that will permit free air circulation through the ventilation holes and openings in the cabinet.

In fixed-station use, avoid excessively warm locations such as those near radiators and heating vents. Also, avoid direct blasts of air from circulating fans, etc. Do not place any object on the cabinet cover that will impair natural ventilation.

In mobile installations, avoid direct air blasts from heaters or air conditioning units. See Figure 1 for mounting procedure.

CONNECTION TO POWER SOURCE

The HA-1200 may be used for 117 volt, 60 cycle AC operation or 12 volt DC operation (positive or negative ground) by selecting the correct power cord and plug assembly.

In fixed installations where a 117 volt AC source will be used, the power cord with the standard two-contact plug on one end is used.

In mobile installation select one of the two DC power cables. One cable is wired for 12 volts DC positive ground; the other for 12 volts DC negative ground. Each cable is clearly identified by the tag tied to each of the cables.

After the proper cable has been selected, it is recommended that the bare ends be connected directly to the battery terminals. Connection of the cable to other points may cause reduced voltage, increased ignition interference, etc. If additional length is required, wire no smaller than No. 12 AWG should be used.

Connect the "red" positive lead to the positive battery terminal; connect the "blue" negative lead to the negative battery terminal.

OPERATION

The function of controls, indicators and connectors necessary for operation of the HA-1200 are listed below.

FIGURE 2

FRONT PANEL CONTROLS

REC TUNING Control..... Tunes receiver over the entire 2-Meter band (144-148 Mc).

VFO TUNING..... When in the VFO mode, permits variable tuning of transmitter frequencies over the entire 2-Meter band (144-148 Mc).

AF GAIN Control..... Adjusts the level of the audio output.

SQUELCH Control..... Quiets the receiver during "no-signal" conditions. Degree of sensitivity to incoming signals is adjustable. Full clockwise direction provides maximum squelch.

MIC Jack..... Permits connection of "push-to-talk" microphone.

POWER Switch..... Turns transceiver ON or OFF.

PHONE Jack..... Permits connection of headphones.

SPOT Switch..... In the ON position applies plate voltage to the transmitter VFO/XTAL Osc in the receive mode. This causes generation of a strong unmodulated signal which may be tuned in on the receiver to determine the frequency of transmission.

VFO-XTAL Switch..... Selects either VFO or XTAL operation of the transmitter oscillator.

FINAL Control..... Tunes input side of pi-network for maximum power output.

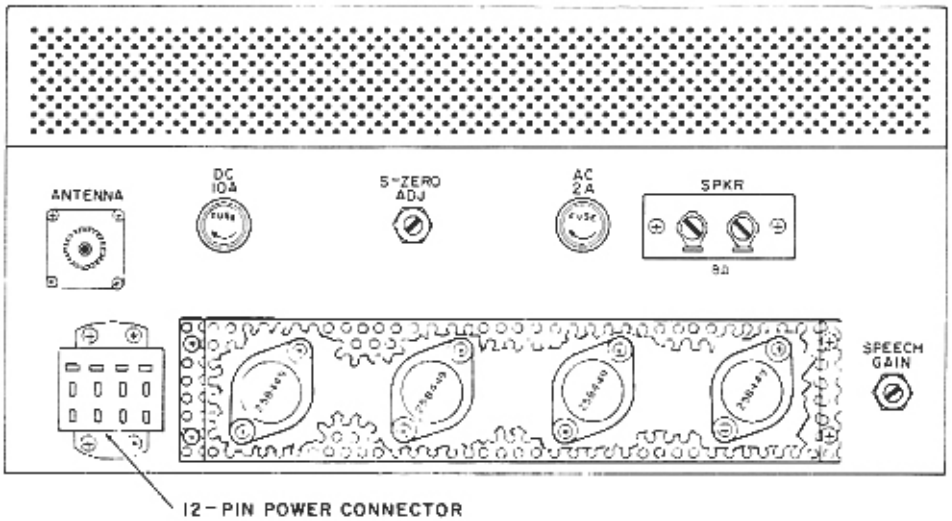
LOAD Control..... Tunes output side of pi-network to the antenna for maximum power output.

NOTE: There will be slight interaction between the LOAD and FINAL Controls; therefore, both should be adjusted repeatedly until no further upward meter deflection can be obtained. These controls should always be adjusted at the operating frequency.

S-METER/RELATIVE POWER INDICATOR..... Receive Mode: Indicates strength of received signal on S-Meter calibrated in S-Units from 1 to 9.

Transmit Mode: Indicates relative power output of transmitter from 1 to 20 watts.

FIGURE 3



REAR CHASSIS CONNECTORS AND ADJUSTMENTS

ANTENNA Coax Connector.. For connection of antenna transmission line.

DC 10 AMP FUSE..... Provides protection to DC power supply section.

S-ZERO ADJ..... Provides an electrical zero for the S-Meter/Relative Power Meter.

AC 2AMP FUSE..... Provides protection to the AC power supply section.

SPKR Terminals..... For connection of external speaker.

SPEECH GAIN..... Adjusts transmitter audio gain.

POWER CONNECTOR..... The 12 pin power connector accepts plug connectors (supplied) for direct connection to 115 volts AC or 12 volts DC, positive or negative ground.

RECEIVER OPERATION

To operate the receiver portion of the HA-1200 Transceiver, proceed as follows:

(a) Connect a 2-meter antenna (50-100 ohms) to the ANT coax connector located on the rear of the chassis.

(b) Connect an 8 ohm speaker to the SPKR terminals located on the rear of the chassis.

NOTE: If desired, headphones may be used in place of the speaker. To use headphones, simply plug them into the PHONE jack on the front panel.

(c) Connect either the AC or DC power cord supplied with the unit to the 12-pin POWER connector located on the rear of the chassis, and the appropriate power source.

(d) Set the POWER switch to ON. Both dial windows should become illuminated indicating power is applied to the transceiver.

(e) Set the SQUELCH control fully counter-clockwise (squelch circuit disabled). Where squelch operation is desired, the SQUELCH control should be rotated in a clockwise direction to a point just below where the background noise is not heard. The threshold sensitivity can be varied from 1 microvolt to approximately 300 microvolts by means of the SQUELCH control.

(f) Adjust the AF GAIN control for the desired audio level.

(g) Rotate the REC TUNE control to the desired frequency.

TRANSMITTER OPERATION

To operate the transmitter portion of the HA-1200 Transceiver, proceed as follows:

(a) Connect antenna and power source.

(b) Connect the microphone (supplied) to the MIC receptacle on the front panel. If other than the standard microphone is used, wire the microphone as shown in Figure 4.

(c) Set VFO-XTAL switch to the desired mode of operation.

NOTE: If the XTAL mode of operation is chosen, a crystal must be inserted in the crystal socket. To gain access to the crystal socket, remove the phillips-head screws holding the small cover in place on the right side of cabinet. When using this mode of operation, the frequency of transmission is eighteen times the crystal frequency (see Transmitter Crystal Section below).

(d) If the VFO mode of operation is chosen, tune the VFO TUNE control to the desired frequency.

(e) Pre-set the FINAL and LOAD controls to mid rotation (pointer straight up).

(f) Set POWER switch to ON. Both dial windows should become illuminated indicating power is applied to the transceiver.

(g) With the microphone's push-to-talk button depressed, adjust the FINAL and LOAD controls for maximum meter indication. Repeat adjustments until no further increase in meter reading is obtainable.

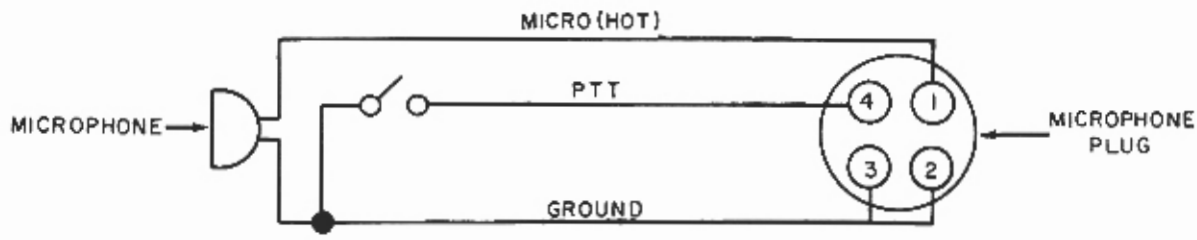
NOTE: Any time the operating frequency is changed, the FINAL and LOAD controls must be readjusted for maximum output.

(h) The transmitter is now ready for transmission. To transmit, press the push-to-talk switch on the microphone and talk into the microphone.

(i) To locate the frequency of transmission on the receiver dial, set the SPOT switch to ON and tune the receiver until a strong unmodulated signal is heard. Then, return the SPOT switch to OFF and proceed with operation of transceiver.

NOTE: Transmitter will not operate with the spot switch in the ON position.

FIGURE 4 MICROPHONE CONNECTIONS



TRANSMITTER CRYSTALS

Crystals are available from Lafayette Radio, or any of the well-known crystal manufacturers. To order crystals, proceed as follows:

1. Divide the desired operating frequency by 18 to determine the crystal frequency. Example: The desired operating frequency is 144 Mc.

$$\frac{144}{18} = 8.0 \text{ Mc (crystal frequency)}$$

2. The crystal order to the manufacturer should contain the following information:

   Crystal Type ..... FT 243

   Crystal Frequency ..... Determined by formula in step 1.

ANTENNA AND COMMUNICATION RANGE

The communication range of the Lafayette HA-1200 depends largely upon terrain factors and the antenna employed. At extreme ranges the weather also is a determining factor. It is not within the scope of this manual to attempt to cover thoroughly the considerations involved in VHF propagation, nor the design on antennas. Summarizing briefly, the higher the elevation of the site, the greater the range, particularly when the height of the antenna above ground is low. Also, the higher the antenna above ground, the greater the range, particularly when the site is not elevated (Height of the antenna above ground becomes less important when the station is located atop a hill).

The range also is dependent upon the same factors at the other end of the circuit, as well as the intervening terrain. It is also dependent upon the transmitter power, receiver sensitivity, and antenna gain of the other station. Because some stations employ more transmitter power and many have less receiver sensitivity, it is possible to hear more station than can be worked. The very high sensitivity of the receiver in the HA-1200 tends to make this condition the more noticeable.

To obtain the best possible performance from the HA-1200 at a given site, a good antenna is important. For general coverage fixed-station work with vertical polarization, a ground plane antenna is recommended. A good directional array such as a multi-element beam will greatly increase the range and reduce QRM problems. These multi-element beams may be oriented for either vertical or horizontal polarization.

The antenna should be connected to the coax connector using RG58/U. RG8/U is recommended for lengths in excess of 25 feet to minimize line loss. For mobile work, a quarter-wave car top whip will provide good performance as a ground-plane type antenna. If the car does not have a metal top, a coaxial "sleeve" type antenna may be used. The latter must be cut precisely to the frequency for good results.

For portable use, emergency work or casual mobile operation, a quarter-wave whip may be inserted in the coax connector at the rear of the HA-1200 (The use of a "right-angle" coax connector will be necessary). Good results have been obtained using the HA-1200 in this manner with it setting on the front seat of a metal-top sedan, though of course much better results will be obtained with a regular mobile type antenna connected via coaxial cable.

In some cases an ordinary side-cowl auto radio antenna will give nearly as good results as a car top whip. The antenna should be extended to approximately 3/4 wavelength. Best results with this arrangement require that the lead-in be of the type using polyethylene insulation. Most of the better quality auto radio antennas employ this type of lead-in. An extension cable of RG58/U using the proper fittings will permit use of the auto antenna either for its intended purpose or for occasional "picnic" use of the HA-1200 as a mobile unit.

When working mobile, it may be noticed that a "flutter" is apparent on both the transmitted and received signal, particularly when the signal is weak. When working mobile-to-mobile, this effect is of course accentuated, as the amount of flutter being superimposed upon the receiver flutter (assuming that both vehicles are in motion).

This "flutter" is typical of VHF mobile operation and is not caused by any peculiar characteristic of the Lafayette HA-1200.

In either case, operating fixed or mobile, it is important that the antenna be adjusted for the lowest possible VSWR at the operating frequency.

THEORY OF OPERATION

INTRODUCTION

The following discussion of the theory of operation for the HA-1200 Transceiver is divided into four parts. The first part discusses the theory of operation for the receiver portion of the transceiver. The second part discusses the theory of operation for the transmitter portion of the transceiver. The third part discusses the power supply; the fourth part the S-meter/relative power indicator.

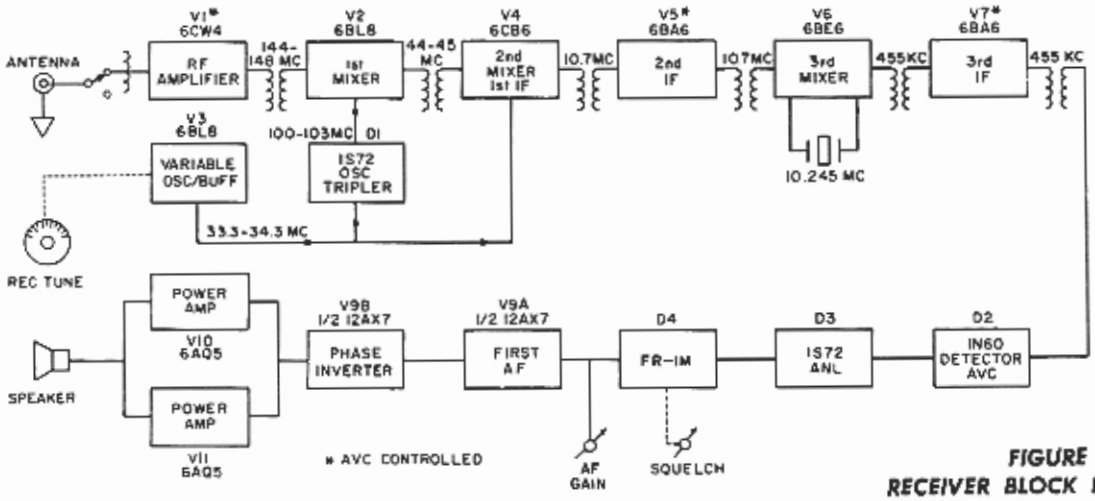


FIGURE 5
RECEIVER BLOCK DIAGRAM

RECEIVER

When an RF signal (144 to 148 Mc) is applied to the antenna input it is fed through the change-over relay to the broadband antenna coil. The signal is transformed to a higher impedance and the resultant voltage is applied to the grid of the neutralized 6CW4 RF Amplifier (V1) where it is amplified. Neutralization of the RF amplifier is important at these frequencies to provide for low noise, at high sensitivity levels.

After amplification, the signal is fed through a 144 to 148 Mc bandpass coupler to the first mixer stage (V2). Here it is heterodyned with the voltage developed by the oscillator tripler diode (D1) to produce a difference or first IF frequency of 44 to 45 Mc.

The variable oscillator/buffer (V3) has a tuning range of 33.3 to 34.3 Mc. The frequency of the oscillator is determined by the setting of the REC TUNE control. This frequency (33.3 to 34.3 Mc) is fed to the grid of the second mixer/first IF (V4) and is heterodyned with the incoming signal of 44 to 45 Mc. The frequency produced, or second IF frequency, is 10.7 Mc which is the difference between the two signals.

The 10.7 Mc second IF signal is fed through a double-tuned transformer to the grid of the second IF amplifier (V5) where the signal is further amplified.

After amplification, the 10.7 Mc signal is fed through another double-tuned transformer to the grid of the third mixer (V6). A portion of V6 is used as a self-excited crystal oscillator which oscillates, by means of a crystal, at a frequency of 10.245 Mc. The crystal oscillator frequency heterodynes with the incoming frequency (10.7 Mc) to produce a frequency of the third IF. The frequency of the third IF is 455 Kc which is the difference between the two signals.

The 455 Kc third IF signal is fed through a double-tuned transformer to the grid of the third IF amplifier (V7) for further amplification. V7 also serves as a DC amplifier for the AVC voltage in such a manner that small increases in negative voltage on the AVC line produce larger changes in the positive screen voltage. This voltage is used to open or close the squelch diode (D4).

After amplification, the 455 Kc signal is fed through another double-tuned transformer to the detector diode (D2) where the signal is rectified to produce an audio signal and AVC voltage.

The AVC voltage after filtering is applied to the third IF amplifier, second IF amplifier and RF amplifier to provide automatic volume control.

The audio signal, after filtering, is fed through the self-adjusting automatic noise limiter (D3) to the squelch diode (D4). The conduction of the squelch diode is controlled by means of the SQUELCH control setting on the front panel of the HA-1200.

The filtered audio signal is applied to the AF GAIN control where the amount of audio signal is controlled to the grid of the first AF amplifier (V9A). The amplified audio signal is fed to the grid of the phase inverter (V9B) which processes the audio signal and feeds it to the grids of the push-pull power amplifiers (V10 & V11). The output of the push-pull power amplifiers is fed through the combination output/modulation transformer to the speaker.

The secondary of the combination output/modulation transformer has two windings. One winding is used to drive the receive speaker. The second winding is used to modulate the transmitter when in the transmit mode of operation.

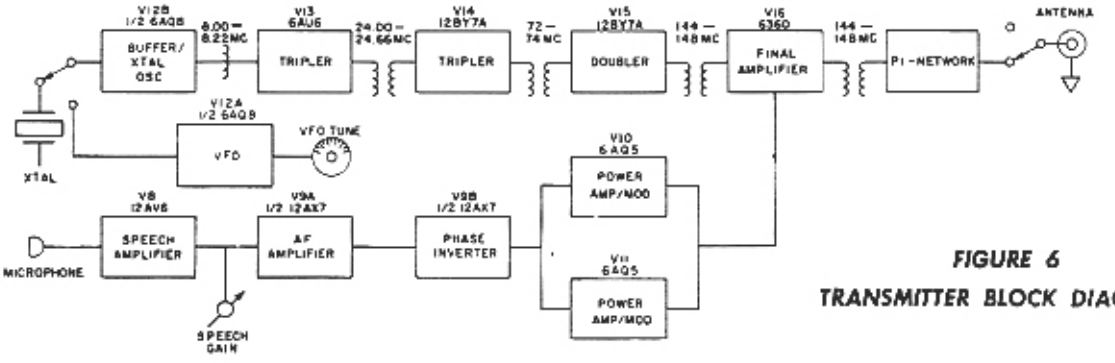


FIGURE 6

TRANSMITTER BLOCK DIAGRAM

TRANSMITTER

The transmitter signal is generated in the VFO/Buffer/Crystal Oscillator stage (V12A & V12B). VFO or Crystal operation can be obtained by the selection of the VFO - XTAL switch. When crystal operation is used, a crystal must be inserted in the crystal socket.

When in the VFO mode of operation V12A operates as a variable frequency oscillator producing a frequency of 8.0 to 8.22 Mc. The frequency of the oscillator is determined by the setting of the VFO TUNE control. The buffer amplifier (V12B) is used to isolate the oscillator from any undesirable effects that might be caused by the loading of the following circuitry.

In the XTAL mode of operation the plate voltage is removed from the variable frequency oscillator (V12A), and V12B is switched to operate as a crystal oscillator. With the proper crystal inserted in the crystal socket the output of the crystal oscillator is 8.0 to 8.22 Mc. The frequency output of the crystal oscillator is dependent upon the frequency of the crystal.

All multiplier stages up to the Final Amplifier grid incorporate bandpass couplers to provide ease of frequency change.

The 8.0 to 8.22 Mc frequency output from V12B is coupled to the grid of the first tripler stage (V13). The input frequency is tripled to produce an output frequency of 24.0 to 24.66 Mc. The 24.0 to 24.66 Mc signal is fed through a bandpass coupler to the input of the second tripler stage (V14).

The second tripler stage (V14) multiplies the incoming signal (24.0 to 24.66 Mc) three times to produce an output frequency of 72 to 74 Mc. The 72 to 74 Mc signal is fed through a bandpass coupler to the input of the doubler stage (V15).

The doubler stage (V15) doubles the incoming signal (72 to 74 Mc) to develop a signal in the 144 to 148 Mc region (2 meter band). The 144 to 148 Mc signal is fed through a bandpass coupler to the input of the Final Amplifier (V16) where the signal is then further amplified.

The Final Amplifier (V16) functions as a straight through Class C amplifier with plate and screen modulation. A pi-network output circuit, with both FINAL and LOAD panel controls, provides ability to match to a range of antenna characteristics. The pi-network transforms the amplifier plate impedance to the desired impedance at the antenna. The signal is then fed through a set of relay contacts to the ANTENNA coax connector.

To modulate the transmitter, an audio signal must be introduced into the microphone. The speech amplifier (V8) furnishes as an additional stage of gain as a microphone amplifier and is fed to the AF amplifier (V9A). The AF amplifier (V9A), phase inverter (V9B), and power amplifiers (V10 & V11) function in the same manner as in receive. Gain of the speech amplifier is varied (in transmit only) by the adjustment of the speech gain control on the rear of the chassis.

The audio output of the push-pull power amplifier/modulators is transformed through the combination output/modulation transformer to the plate and screen grid on the Final Amplifier(V16). Conventional high level plate and screen modulation is obtained in this manner.

POWER SUPPLY

The power supply of the HA-1200 is a universal type which may be operated on 12 volts DC, positive or negative grounding systems, or 117 volts AC by jumping the proper connections on the power plug.

When operating from 117 volts AC power source, the power supply functions in the usual manner with the AC being applied to the power transformer and rectified by a full wave rectifier and its associated filter networks.

When operating from a 12 volt DC source, four (4) 2SB449 transistors (Q1-Q4) are used to convert the DC to AC. The AC is then stepped up by the power transformer and rectified to produce the B+ voltage.

S-METER/RELATIVE POWER INDICATOR

A unique meter circuit is used to provide indication in both the receive and transmit modes. In the receive mode, the screen current of the AVC control-led IF amplifier (V5) is measured by the meter. The indication on the meter is proportional to the AVC voltage (or incoming signal strength). The meter is calibrated in "S" units from S1 to S9.

In transmit, a small portion of the RF output signal is rectified and filtered. This rectified voltage is measured by the meter and gives an indication of relative output of the transmitter.

TROUBLE SHOOTING HINTS

INTRODUCTION

In case a malfunction should develop in the HA-1200, the trouble-shooting hints given in Table 1 can be used as a general procedure for locating the defective section of the transceiver. Once the defective section has been located, the voltage measurements given in Table 2 can be used as a reference to further localize the malfunction.

TABLE 1. TROUBLE SHOOTING HINTS

TROUBLE	WHAT TO LOOK FOR	WHAT TO DO
Unit inoperative Dial light not on	Power source not connected	Connect power source
	Open fuse (AC or DC fuse)	Check for short and replace fuse
	Defective power cord	Replace power cord
Unit inoperative Dial light on Tubes lit	Defective rectifier diodes (D6, D7)	Check for B+ short and replace diodes
	Defect in B+ power supply	Check out B+ power supply and repair
Transmitter inoperative Receiver operating normally	Defective tube in transmitter section	Check tubes and replace any found to be defective
	Defective microphone push-to-talk switch	Check switch. Repair or replace as necessary
	Defective change-over relay	Check relay and replace if necessary
	Defect in transmitter section	Check voltages in transmitter section using Table 2 as a reference
Receiver inoperative Transmitter operating normally	Defective tube or diode in receiver section	Check tubes and diodes and replace any found to be defective
	Defect in receiver section	Check voltages in receiver section using Table 2 as a reference

TABLE 2. VOLTAGE MEASUREMENTS

TUBE	MODE	PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V1 † 6CW4	RCV		100		.25				0	
V2 6BL8	RCV	0	-.3	27	6.3*	12.6*	210	.5	0	0
V3 6BL8	RCV	75		150	6.3*	0	200	1.5	0	1.2
V4 6CB6	RCV	-.85	.45	0	6.3*	210	25	0		
V5 6BA6	RCV	-1	1.5	6.3*	12.6*	170	110	1.5		
V6 6BE6	RCV	-2.5	2.5	6.3*	0	210	80	0		
V7 6BA6	RCV	-1.5	2.5	12.6*	6.3*	200	130	2.8		
V8 12AV6	XMT	-1	1	12.6*	0	0	0	120		
V9 12AX7	RCV	120	0	1.1	0	12.6*	200	45	65	6.3*
	XMT	90	0	1	0	12.6*	170	35	55	6.3*
V10 6AQ5	RCV	0	18	12.6*	6.3*	300	300	0		
	XMT	0	15	12.6*	6.3*	250	250	0		
V11 6AQ5	RCV	0	18	6.3*	0	300	300	0		
	XMT	0	15	6.3*	0	250	250	0		
V12 6AQ8	XMT	110	-2	0	0	6.3*	150	-.7	1.2	0
V13 6AU6	XMT	-80	0	6.3*	12.6*	220	150	0		
V14 12BY7A	XMT	0	-10	0	12.6*	0	6.3*	230	150	0
V15 12BY7A	XMT	0	-22	0	12.6*	0	6.3*	230	150	0
V16 6360	XMT	-25	0	-30	0	12.6*	280	170	280	0
V17 0A2	RCV	150	0	0	0	150	0	0		
	XMT	130	0	0	0	130	0	0		

NOTES:

ALL MEASUREMENTS TAKEN FROM TUBE SOCKET PIN TO CHASSIS.
ALL VOLTAGES SHOWN ARE POSITIVE DC UNLESS OTHERWISE NOTED.
DATA TAKEN WITH 20K OHM p/v VTVM.
MEASUREMENTS GIVEN ARE FOR UNIT OPERATING ON 117 VAC.
*AC FILAMENT VOLTAGE †FILAMENT MEASUREMENT (PINS 10 & 12) SAME AS FOR V13.

RETURNING THE UNIT FOR REPAIRS

In the event that repair is necessary (either in or out of warranty), we recommend that you return the transceiver to the Lafayette store from which it was purchased. If the unit is to be shipped to our main office for service, please read the instructions which follow.

SHIPPING INSTRUCTIONS

Pack the unit very carefully to avoid damage in transit, preferably in its original carton. If the original carton is not available, use a sturdy carton with at least 3 inches of shredded paper or excelsior around the unit. In the latter case, wrap the unit in paper first to avoid particles of packing material getting into it. Include with the unit a letter explaining exactly what difficulties you have encountered (remember to add an extra 5¢ postage and indicate on the outside of the carton that First Class Mail is enclosed). Ship by prepaid express if possible and mark ELECTRONIC EQUIPMENT – FRAGILE. Clearly address the carton as follows:

SERVICE DIVISION
LAFAYETTE RADIO ELECTRONICS CORP.
111 JERICHO TURNPIKE
SYOSSET, L.I., N.Y. 11791

ALIGNMENT

The HA-1200 has been fully aligned at the factory before shipment to you and does not normally require further adjustment. When necessary, however, the transceiver may be aligned as indicated.

TEST EQUIPMENT REQUIRED

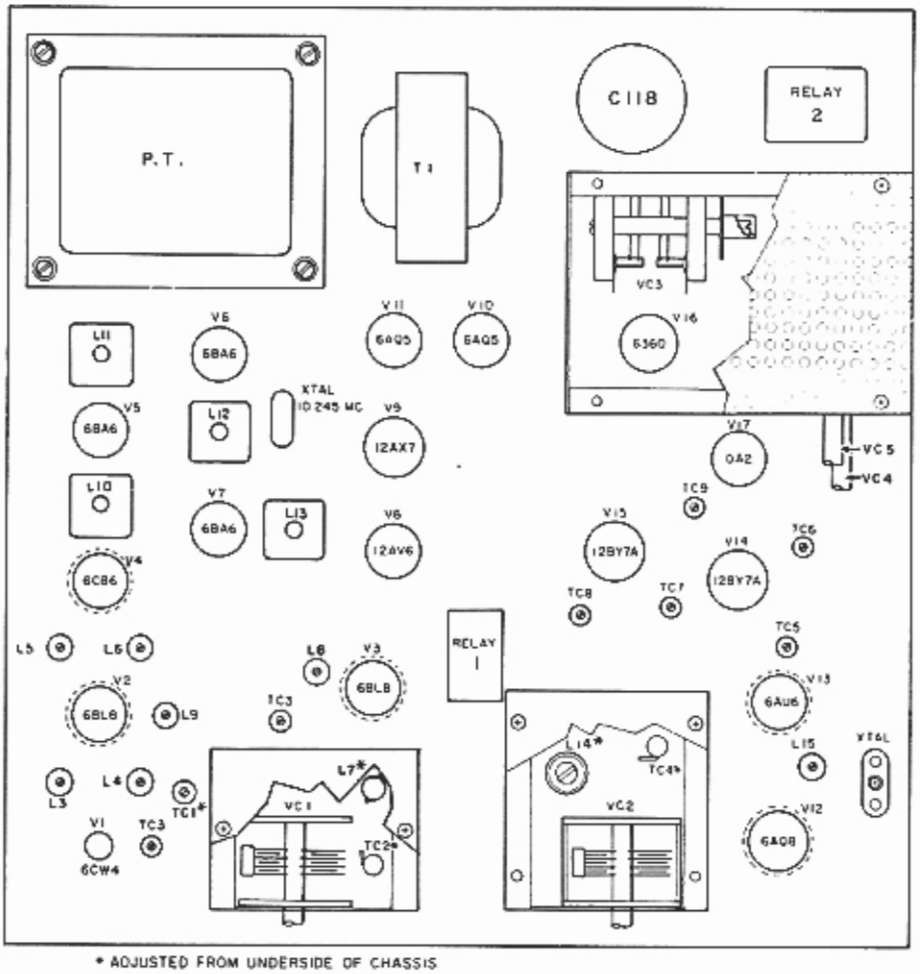
Calibrated RF Signal Generator	50 ohm, 25 watt dummy load
VTVM (10 megohm input or higher)	Non-metallic alignment tools

0-100 DC milliampere meter

SET CONTROLS AS FOLLOWS

AF GAIN	1/2 clockwise
SQUELCH	Full counter-clockwise
POWER	ON
SPOT	OFF
VFO-XTAL	VFO
FINAL	1/2 rotation
LOAD	1/2 rotation
PLATE TUNE (VC-3*)	Fully opened

* Located in final amplifier enclosure.



* ADJUSTED FROM UNDERSIDE OF CHASSIS

FIGURE 7 TUBE LOCATION AND ALIGNMENT POINTS

TABLE 3. RECEIVER ALIGNMENT

STEP	S. G. COUPLING AND INPUT SIGNAL	AC VTVM CONNECTIONS	REC TUNING	ADJUST	INDICATION
S-meter zero	No signal	-----	144 Mc	S-ZERO (on rear of chassis)	"0" on S-meter
Align 10.7 Mc and 455 Kc IF	Pin 1 of V4 10.7 Mc	Across speaker or SPKR terminals	144 Mc	L10 L11 L12 L13 (Adjust top and bottom of each IF can)	Maximum output on AC VTVM
Align 44-45 Mc IF bandpass	ANT terminals 44 Mc	Across speaker or SPKR terminals	144 Mc	L5	Maximum output on AC VTVM
	ANT terminals 45 Mc		148 Mc	L6	
Calibrate REC TUNING dial	ANT terminals 144 Mc	Across speaker or SPKR terminals	144 Mc	L7	Maximum output on AC VTVM
	ANT terminals 148 Mc		148 Mc	TC-2	
Frequency Injection level	ANT terminals 144 Mc	Across speaker or SPKR terminals	144 Mc	L8	Maximum output on AC VTVM
	ANT terminals 148 Mc		148 Mc	L8 Link*	
	ANT terminals 146 Mc		146 Mc	L9	
144-148 Mc bandpass	ANT terminals 144 Mc	Across speaker or SPKR terminals	144 Mc	L3	Maximum output on AC VTVM
	ANT terminals 148 Mc		148 Mc	L4	
Antenna input circuit	ANT terminals 144 Mc	Across speaker or SPKR terminals	144 Mc	L1, TC1	Maximum output on AC VTVM
	ANT terminals 148 Mc		148 Mc	L2, TC3	

*If L8 Link is cemented in place, adjustment is not necessary.

TRANSMITTER VFO

IMPORTANT: Do not attempt to align the VFO section unless the receiver portion of the HA-1200 is accurately calibrated or some means of accurate frequency measurement equipment is available.

1. Set all controls as indicated for receiver alignment.
2. Set SPOT switch to "ON".
3. Follow procedure given in Table 4.

TABLE 4. VFO ALIGNMENT

VFO TUNING DIAL SETTING	REC TUNING DIAL SETTING	ADJUST*	INDICATION
144 Mc	144 Mc	L14	Unmodulated tone as heard on receiver
148 Mc	148 Mc	TC-4	Unmodulated tone as heard on receiver

*Adjustments should be repeated to insure calibration is correct at both ends of dial.

4. Set SPOT switch to "OFF".

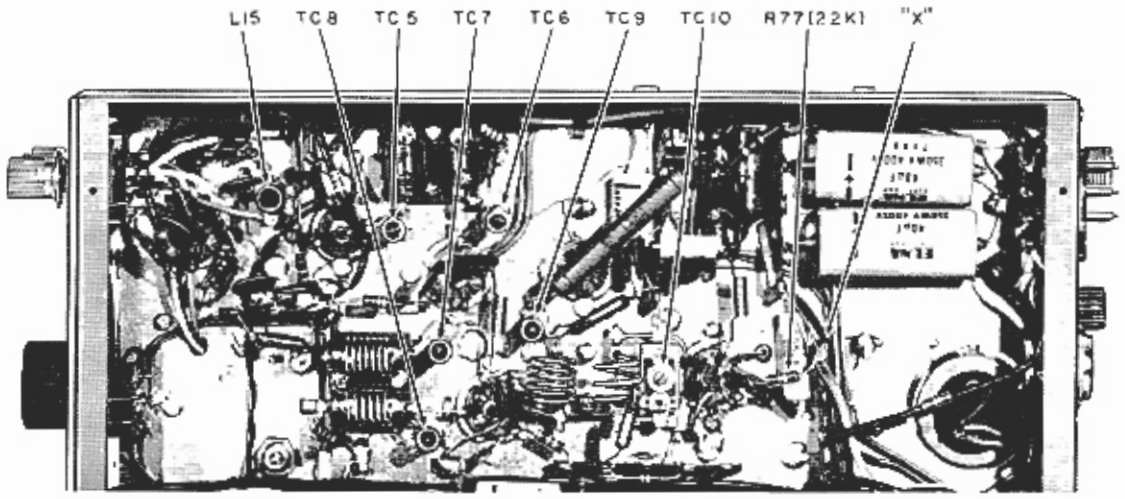


FIGURE 8 TRANSMITTER ALIGNMENT POINTS

TRANSMITTER

Before proceeding with the transmitter alignment, the Final Amplifier (V16) screen resistor R77 (22K) must be disconnected from the B+ supply at point "X". A 0-100 DC milliampere meter must also be inserted in series with the V16 plate supply lead. Depress the microphone's push-to-talk switch momentarily while performing each alignment step.

IMPORTANT: ATTEMPTING TO TUNE TRANSMITTER WITHOUT A PROPER ANTENNA LOAD CAN DAMAGE THE FINAL AMPLIFIER OUTPUT CIRCUITS.

1. Connect a push-to-talk high impedance microphone to the MIC jack.
2. Connect a 50-ohm, 25-watt dummy load to the ANTENNA coax connector.

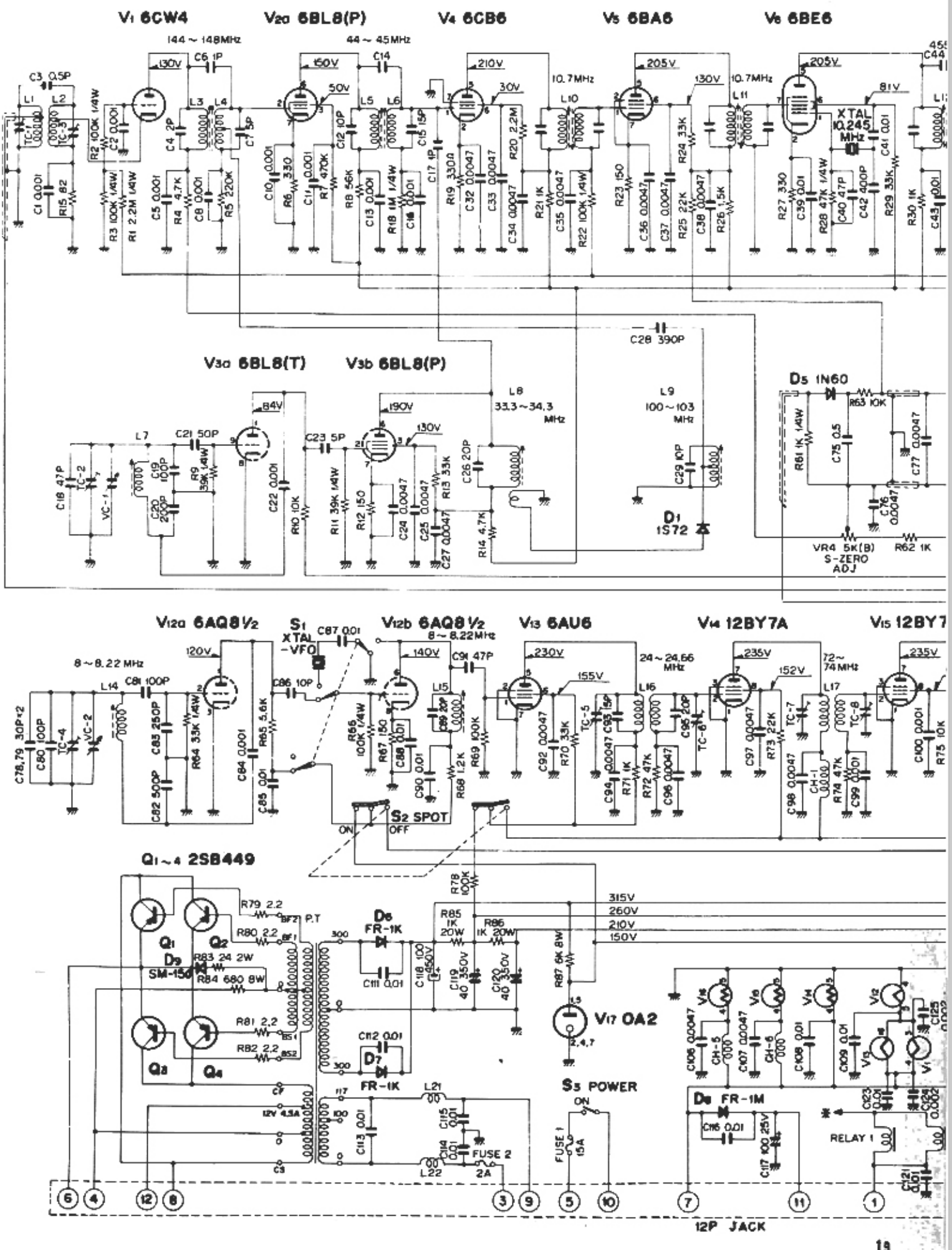
TABLE 5. TRANSMITTER ALIGNMENT

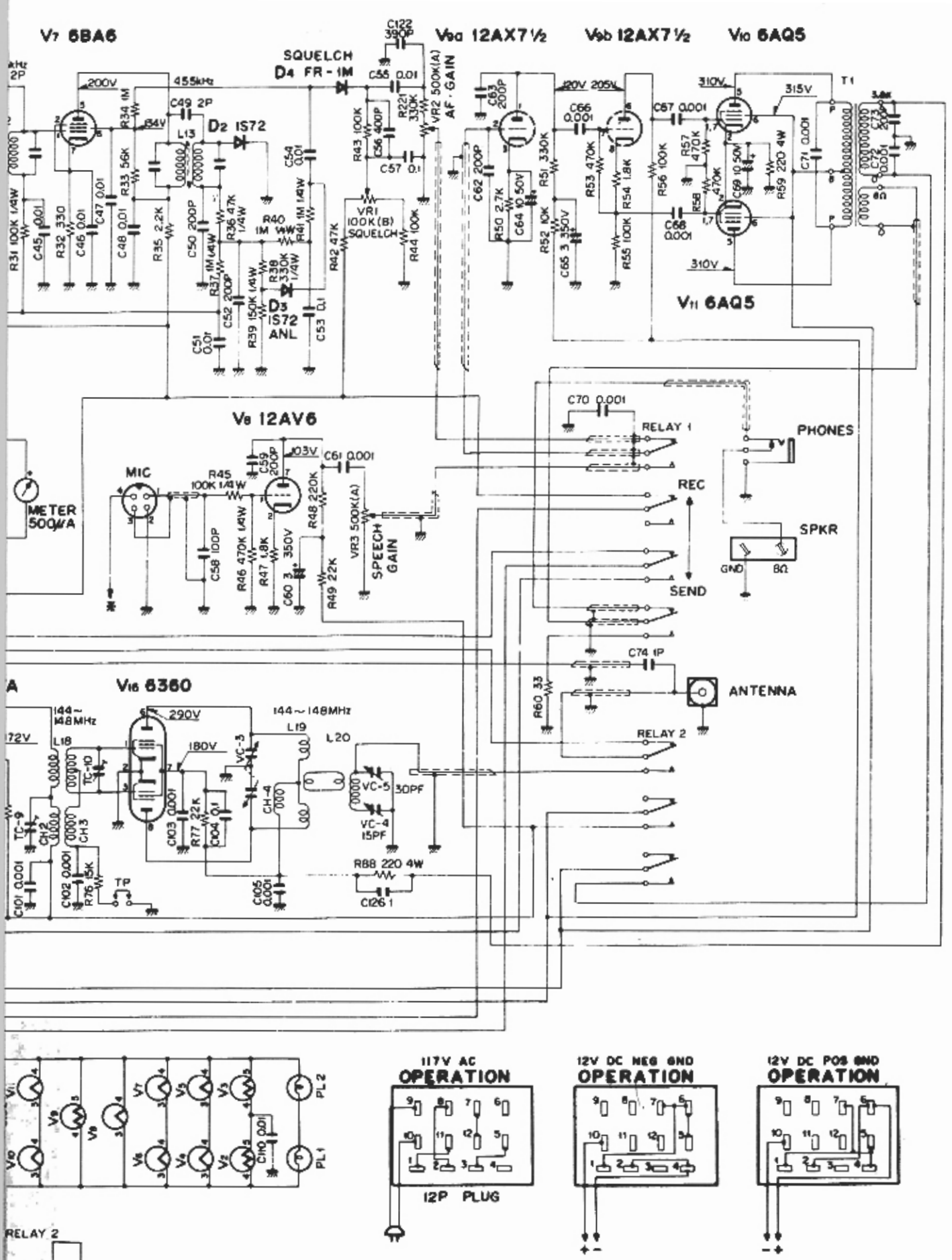
PURPOSE	DC VTVM CONNECTIONS	VFO DIAL SETTING	ADJUST	INDICATION
Buffer	Pin 1, V13	146.0 Mc	L15	Maximum - DC
1st Tripler	Junction of L16 and R72 (47K)	144.5 Mc	TC-5	Maximum - DC
		147.5 Mc	TC-6	
2nd Tripler	Junction of L17 and R74 (47K)	144.5 Mc	TC-7	Maximum - DC
		147.5 Mc	TC-8	
Doubler	Junction of RFC and R76	147.0 Mc	TC-9	Maximum - DC
		147.0 Mc	TC-10	
NOTE: Before continuing with the transmitter alignment, reconnect the screen resistor R77 (22K) to point "X".				
FINAL AMPLIFIER	-------	146.0 Mc	VC-3*	Minimum plate current as indicated on 0-100 DC ma. meter
Pi-Network	-------	146.0 Mc	VC-4	Maximum indication on front panel Relative Power Meter
			VC-5	

* Located in Final amplifier enclosure.

The Transmitter alignment is now complete. The 0-100 DC milliampere meter should be removed, and the V16 plate supply lead returned to the B+ line at point "X".

NOTES


V1 6CW4
V2a 6BL8(P)
V4 6CB6
V5 6BA6
V6 6BE6
144 ~ 148MHz
44 ~ 45MHz
10.7MHz
10.7MHz
XTAL 10.245 MHz
V3a 6BL8(T)
V3b 6BL8(P)
L8 33.3~34.3 MHz
L9 100~103 MHz
D1 1S72
D5 1N60
VR4 5K(B) S-ZERO ADJ
V12a 6AQ8½
S1 XTAL -VFO
V12b 6AQ8½
8 ~ 8.22MHz
V13 6AU6
V14 12BY7A
V15 12BY7
24 ~ 24.66 MHz
72 ~ 74 MHz
S2 SPOT
ON
OFF
Q1~4 2SB449
D6 FR-1K
D9 SM-150
D7 FR-1K
V17 0A2
S3 POWER
D8 FR-1M
RELAY 1
FUSE 1 15A
FUSE 2 2A
12V 4.5A
315V
260V
210V
150V
12P JACK



HA-1200 SCHEMATIC DIAGRAM