



LAFAYETTE

MODEL HA-700
(Stock No. 99-2580WX)



**AM/CW/SSB
Amateur
Communications
Receiver**



LAFAYETTE RADIO ELECTRONICS CORPORATION

INSTALLATION AND OPERATING MANUAL

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TECHNICAL SPECIFICATIONS

FREQUENCY COVERAGE.....	.15 to .40 Mc. .55 to 1.6 Mc. 1.6 to 4.8 Mc. 4.8 to 14.6 Mc. 10.5 to 30 Mc.
RECEIVING MODES	AM, CW, and Single Sideband.
ANTENNA INPUT	50 to 400 ohms unbalanced.
SENSITIVITY.....	1 μ v for 6 db. $\frac{S+N}{N}$
SELECTIVITY.....	± 5 Kc at -55 db. ± 1.3 Kc at -6 db.
INTERMEDIATE FREQUENCY.....	455 Kc.
BFO FREQUENCY.....	455 Kc. ± 2.5 Kc.
AUDIO POWER OUTPUT.....	1.3 watts.
OUTPUT IMPEDANCE.....	4 or 8 ohms.
POWER REQUIREMENT	110 to 120 VAC 50/60 cycles.
POWER CONSUMPTION	45 watts.
DIMENSIONS.....	7-5/8" H. x 15" W. x 10" D.
WEIGHT	21 lbs.
TUBE COMPLEMENT	V1 6BA6 RF Amplifier V2 6BL8 Mixer & Local Oscillator V3 6BA6 First IF Amplifier V4 6BA6 Second IF Amplifier V5 6AQ8 Product Detector & Beat Frequency Oscillator V6 6BM8 First Audio Amplifier & Audio Power Output
DIODE COMPLEMENT.....	D1,D2 1N60, SW-05S AVC Rectifiers D3 1N60 AM Detector D4 SW-05S Automatic Noise Limiter D5,D6 FR-1K AC Rectifiers D7 Meter Rectifier

GENERAL DESCRIPTION

The Lafayette Model HA-700 is a sensitive superheterodyne communications receiver which covers the popular .55 Mc to 30 Mc portion of the radio frequency spectrum plus additional coverage of the low frequencies from 150 Kc to 400 Kc. The receiver is designed to receive CW (code), AM (voice) and SSB signals in the covered bands.

The receiver employs tuned RF and first mixer stages to give maximum sensitivity and a high signal-to-noise ratio, while two IF stages plus two 455 Kc mechanical filters provide a high degree of selectivity. A product detector operating in conjunction with a BFO is employed for CW and Single Sideband operation, while a separate diode detector is used for AM reception.

For main tuning, the receiver employs a calibrated slide rule dial. A special bandspread tuning dial, calibrated for amateur bands, provides for extremely accurate, easy tuning. A logging scale of 0 to 100 is also provided for shortwave listeners use.

The receiver operates from a power source of 110-120 volts, 60 cycles. A 1 ampere fuse in the primary of the power transformer is used for protection of the equipment. The B+ power supply consists of two silicon diodes in a full-wave rectifier circuit. Filament voltage is supplied to the mixer and local oscillator at all times (even with receiver switched off). This ensures maximum frequency stability of these circuits.

The antenna input can be connected to a coaxial type of lead-in and it is designed for use with unbalanced lines of 50-400 ohms impedance. Outputs for 4 or 8 ohm speakers are provided at the rear of the receiver. A front panel jack provides for headphone listening. Inserting the headphones into the jack automatically silences any speaker connected to the 8 ohm output terminal.

Other receiver features include an Antenna Trimmer control, an "S" meter calibrated in "S" units from 1 to 9 and in decibels above S9, an RF-IF Gain Control, Automatic Noise Limiter on AM, and a full-time AVC circuit.

UNPACKING INSTRUCTIONS

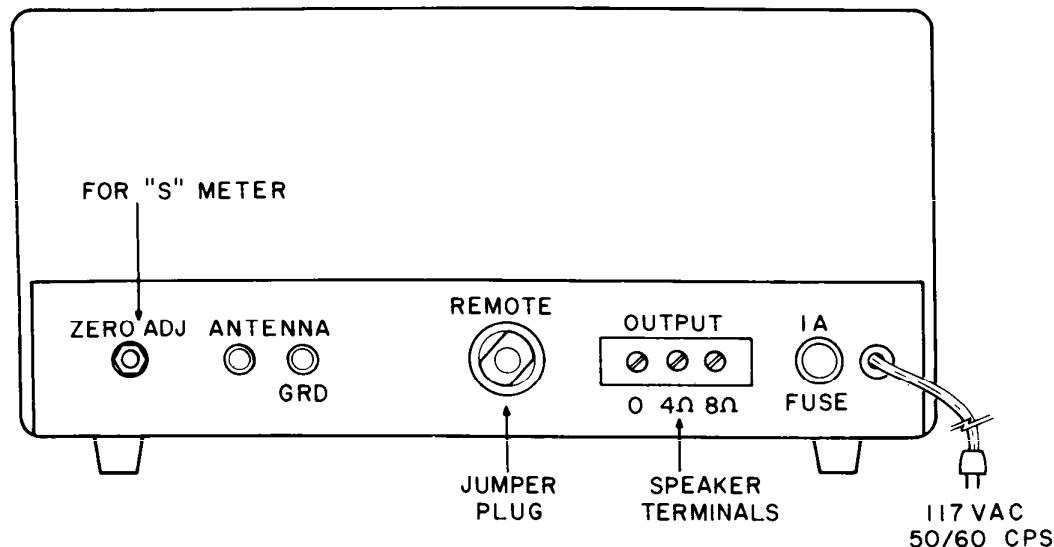
After unpacking the receiver, carefully check for possible damage which may have occurred in transit. Should any signs of damage be apparent (tubes broken, case dented, etc.), notify the store from which the receiver was purchased. If the unit was shipped to you, also file a claim with the carrier.

Check to see if a jumper plug is in the packing case or plugged into the remote socket on the rear chassis of the HA-700. THIS PLUG MUST BE INSERTED INTO THE REMOTE SOCKET FOR NORMAL RECEIVER OPERATION.

INSTALLATION

POWER SOURCE

This receiver is designed to operate from 110 to 120 volts, 50/60 cycles AC. Attempting to operate the HA-700 receiver from any other power source will result in serious damage to the receiver's circuitry.



SPEAKER CONNECTION

A three terminal strip marked OUTPUT is provided at the rear of the receiver for speaker connections. Any PM (permanent magnet) speaker with either 4 or 8 ohm impedance can be used. Simply connect one lead to the ground terminal marked "0" and the other lead to the terminal that corresponds to the speaker impedance. The output of the HA-700 is sufficient to drive a 4-12 inch PM speaker adequately.

HEADPHONES

A standard phone jack is provided on the front panel of the receiver for headphone reception. Low impedance (8 to 16 ohms) headphones are recommended for optimum results. Use of headphone impedance up to 2000 ohms will provide satisfactory operation. Insertion of a phono plug into the front panel jack automatically disconnects any speaker attached to the 8 ohm output terminal. If operation of both headphone and speaker is desired, the headphones should be wired to the OUTPUT terminal on the rear apron of the receiver. In this case it will be important to keep the volume control low so as to not exceed the headphone's audio power limit.

ANTENNAS

The HA-700 receiver is designed to operate from any antenna with a transmission line impedance of 50 to 400 ohms. The antenna input circuit is of the unbalanced type and is ideally suited for use with a coaxial transmission line.

SINGLE WIRE ANTENNA

The single wire or inverted "L" type of antenna will provide satisfactory performance over the entire tuning range. Simply connect one end of the antenna wire to "ANT". For good reception, the antenna wire should be placed as high as possible and 50-100 feet long (see Fig. 1). Generally, this type of antenna provides maximum pick-up at right angles to its entire length. This should be borne in mind when installing the antenna. In some locations, reception may be improved by connecting a ground wire from the GND terminal to a cold water-pipe or outside ground rod. For protection against lightning, a lightning arrester should be included in any outdoor antenna system.

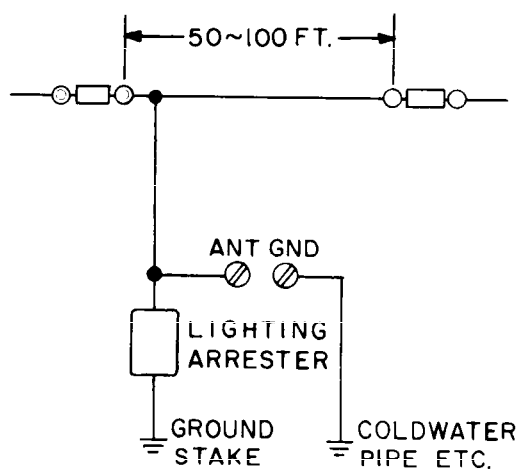


FIGURE 1

DOUBLET ANTENNA

A doublet antenna will give excellent results, especially on amateur bands. A 75 ohms balanced transmission line should be used (as shown in Fig. 2). Since the doublet antenna provides optimum performance only at a given frequency, it should be cut to the length for the most often used band of frequencies. The overall length of a doublet antenna can be determined by using the following formula:

$$L \text{ (Length in feet)} = \frac{468}{\text{Frequency in megacycles}}$$

Since the doublet antenna displays directional properties broadside to its length, it should be oriented in such a manner that maximum signal pickup can be realized.

OTHER ANTENNA SYSTEMS

More elaborate antenna systems may be installed to provide better performance. Information on a number of different types can be obtained by referring to the Radio Amateur's Handbook or the A.R.R.L. Antenna Book, both published by the American Radio Relay League, West Hartford, Conn.

FUSE

A 1 ampere protective fuse is located at the rear of the receiver. To remove it, unscrew the spring loaded cap. Replace this fuse only with one of a 1 ampere rating if fuse failure occurs.

AUXILIARY CONTROL SOCKET (Remote)

A socket on the back of the HA-700 receiver allows simultaneous control of this receiver with a transmitter. An external switching device can be constructed so that the receiver will become inoperative during periods of transmission. In this case the function switch is placed in the SEND position. The external switch is attached to the 8-pin jumper plug so that pins 4

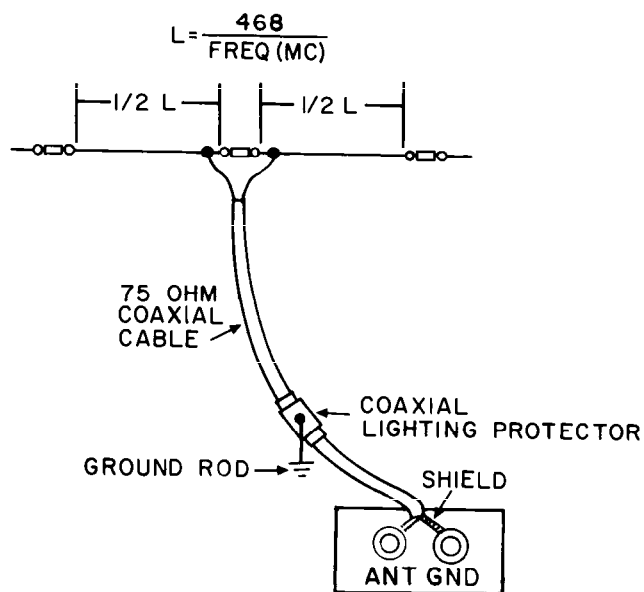
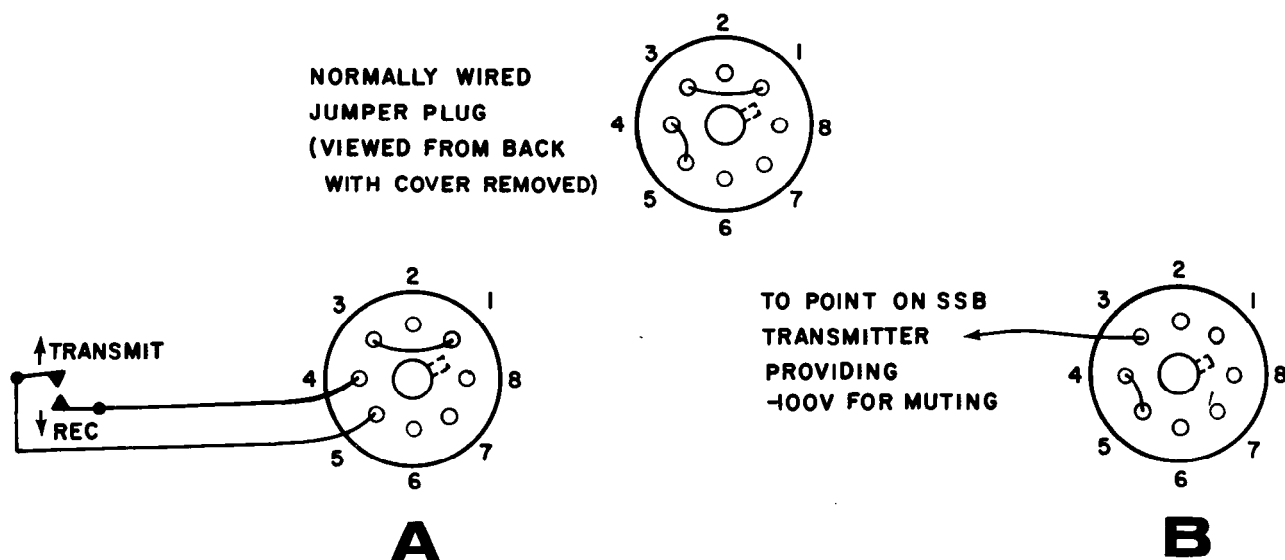


FIGURE 2



and 5 will be connected when signal reception is desired. When wiring the plug in this manner, the jumper between pins 1 and 3 should be left in place (see Fig. A). The re-wired plug is then inserted into the 8-pin socket. In this manner, signal reception will be instantaneous, as plate voltage will be applied when the switch is closed. The plug can also be rewired for use with an SSB transmitter as shown in Figure B. The muting voltage (available on most SSB transmitters) can be applied to pin 3 of the jumper plug (after removing the existing jumper between pins 3 and 1) so that the receiver is muted during transmission. For normal operation, the unmodified jumper plug (with pins 1 and 3 shorted, and pins 4 and 5 shorted) must be used. Pins 4 and 5 of this plug are shorted to provide plate voltage to the receiver's circuitry. To disable the receiver under these conditions, set the **FUNCTION** switch to the **SEND** position. In this position, the plate voltages are cut off. Returning the switch to the **AM**, **AM ANL**, or **CW-SSB** positions will provide instantaneous operation.

DESCRIPTION OF CONTROLS

FUNCTION

This switch selects the mode of operation for the receiver. Each position selects the following mode:

- POWER OFF**..... In this position, the receiver is inoperative. However, to ensure stability, voltage is applied to the filament of V2 (Mixer and Oscillator) at all times. In all other positions (except "Send"), filament voltage and B+ is applied to all tubes.
- AM**..... This position provides for normal reception of amplitude modulated signals using diode detection.
- AM ANL**..... This position provides for reception of amplitude modulated signals under conditions of excessive external interference. ANL stands for Automatic Noise Limiter.
- SEND** In this position, the receiver's B+ voltage is cut off while the filament voltage keeps the tubes ready for instant use. This position is sometimes called "stand-by".
- CW-SSB**..... This position is used for CW (continuous wave or code) and SSB (Single sideband) operation. A product detector is used for this type of reception.

AF GAIN

This is a variable resistor in the grid circuit of the first audio amplifier which provides control of the audio input to this stage and thus permits adjustment of the audio output.

BFO

This control varies the frequency of the Beat Frequency Oscillator to provide a change in pitch of the signal that is heard in the CW or SSB mode of operation. Movement of the control counter-clockwise selects lower sideband operation and movement clockwise selects upper sideband operation.

BAND SEL

This switch selects the desired band of operation. The switch is marked off into the following positions:

0.15 - 0.40	(aircraft or marine beacons, etc.)
0.55 - 1.6	(standard AM broadcast)
1.6 - 4.8	(short-wave bands)
4.8 - 14.6	(short-wave bands)
10.5 - 30.0	(short-wave bands)

The numbers represent frequency coverage in megacycles.

RF-IF GAIN

This is a variable resistor in the RF amplifier and IF amplifier stages which varies the gain of these tubes. As a general rule, the RF-IF Gain control is set to maximum during AM operation. During CW or SSB operation however, the AF gain control should be set to about mid-position and the output loudness level should be adjusted by means of the RF-IF Gain control.

ANT TRIM

The ANT TRIM control acts as a compensating capacitor to permit optimum matching of the receiver to the antenna at all frequencies. Initially, the control should be set to its mid-position. The control should be always adjusted for maximum background noise as heard through the loudspeaker or headphones. Each setting will be good only over a limited range of frequencies. The trimmer should therefore always be readjusted after tuning to the general area where the expected signal is to be found.

BANDSPREAD AND MAIN TUNING

These flywheel operated controls vary the receiving frequency by changing the capacity in the RF and local oscillator circuitry. Their operation will be covered in the next section entitled Tuning.

TUNING

The main tuning and bandspread dials are calibrated in megacycles and contain special markings to simplify tuning. The major amateur radio bands are contained in the 1.6 to 4.8, 4.8 to 14.6 and 10.5 to 30.00 megacycle scales. The location of each amateur band is indicated by heavy white scale lines on the main tuning dial. The circled letter or letters which appear with

each band indicate the bandspread scale to be used. Calibration of the main tuning scales is correct when the bandspread pointer is set at 100 on the LOGGING SCALE.

Bandspreading on the amateur bands is carried out in the following manner: Set the bandspread pointer initially to 100 and the main tuning pointer directly over the circled letter for the band to be tuned. In some cases the band is split between two such letters. For example, B1 and B2 together cover the range of 7.0 to 7.3 megacycles — B1 from 7.0 to 7.145, B2 from 7.145 to 7.3 megacycles. The calibrated bandspread scale which is used is indicated to the right and left-hand side. Thus, if the main tuning pointer is set over B1, the bandspread scale in use is the one marked B1, the fourth one down. Tuning is then accomplished solely with the BAND-SPREAD control.

Short-wave bandspreading, for other than amateur bands, is accomplished by setting the bandspread pointer at 100 on the Logging Scale and the main tuning pointer at the high end of the short-wave band to be tuned. Rotate the bandspread control to tune over the band. Moving the bandspread pointer towards "0" on the logging scale subtracts from the frequency indicated on the main tuning scale. Logging of short-wave stations is possible by noting the readings on both the Main Tuning and Logging Scales.

S-METER READINGS

The S-Meter provides a means of measuring the relative strength of incoming AM signals. Relative readings are only correct when the RF-IF GAIN control is fully clockwise. Measurements are read in "S" units from 1 to 9 and in decibels above S9 from 0 to 40 db.

A ZERO ADJ control at the rear of the receiver is provided for zeroing the S-Meter electrically. This adjustment is made with the antenna disconnected, and RF-IF GAIN control at maximum.

OPERATING INSTRUCTIONS

The following chart indicates the initial settings of the various controls for each type of operation. Thereafter, the degree of strength or clarity with which signals will be received will depend upon proper readjustment of the various controls.

CONTROL	AM SETTING	CW SETTING	SSB SETTING
Function	AM or ANL	CW-SSB	CW-SSB
AF GAIN	Adjust for desired audio level	Mid-Position	Mid-Position
BFO	Inoperative	Mid-Position	Mid-Position
Band Sel	Set for desired range	Set for desired range	Set for desired range
RF-IF Gain	Maximum	Adjust for desired audio level	Adjust for desired audio level
ANT TRIM	12 o'clock position	12 o'clock position	12 o'clock position
Bandspread	Set to 100 on Logging Scale	Set to 100 on Logging Scale	Set to 100 on Logging Scale
Main Tuning	Set to desired frequency	Set to desired frequency	Set to desired frequency

AM OPERATION

For the reception of broadcast stations, short-wave listening, etc., place all controls in the positions indicated in the Initial Control Settings chart. Tune in station, using Main and Bandspread tuning controls as indicated in the section under "TUNING". Adjust ANT TRIM for highest "S" meter reading on signal. This antenna control setting is satisfactory while operating over a limited frequency range. If excessive spurious noises such as those caused by auto ignition make reception difficult, place the FUNCTION switch in the AM ANL position. The automatic noise limiter should be used only when necessary, since it tends to reduce the overall efficiency of the receiver.

CW OPERATION

The control settings required for the reception of code signals are indicated in the chart. The AF GAIN control is set to approximately mid-position and the RF-IF GAIN control is used as a volume control. Tune signal to zero beat. The BFO control should then be adjusted on either side of the center dot for desired pitch.

SINGLE SIDEBAND OPERATION

Control settings for sideband reception are virtually the same as for CW. Note, however, that markings on either side of the BFO control are provided to permit selection of either the upper or lower sideband, as necessary. The sideband that must be selected will depend upon the band in use. As indicated in the sideband selection chart, the lower sideband is usually required for SSB reception on 80 and 40 meters, the upper sideband for SSB reception on 20, 15 and 10 meters.

SIDEBAND SELECTION

METERS	FREQUENCY	SIDEBAND USED
80	3.5 to 4.0 Mc	Lower
40	7.0 to 7.5 Mc	Lower
20	14.0 to 14.5 Mc	Upper
15	21.0 to 21.5 Mc	Upper
10	28.0 to 29.7 Mc	Upper

SINGLE SIDE BAND TUNING

The initial settings of controls for SSB reception is essentially the same as for CW (see chart). The BFO frequency, however, is used in this case for carrier reinsertion. The AF GAIN control is set to approximately mid-position and the RF-IF GAIN control used to adjust the level. Tune station in with BANDSPREAD control and then adjust the BFO control in the direction required (either upper or lower) until clarity of speech is obtained. Slight readjustment of the BANDSPREAD may be necessary to provide best audio quality.

SHORT-WAVE LISTENING

On the short wave frequencies are to be found radio stations transmitting from all over the world. Many of these stations provide English-language broadcasts. The frequencies on which most shortwave broadcast stations operate are found in the two upper bands of your receiver. The majority of shortwave broadcast stations operate within certain internationally assigned groups of frequencies, or "bands". For your convenience, a list of the shortwave bands which

offer best reception has been provided. Since shortwave reception varies with the time of day, season of the year and with weather conditions, recommended listening times have also been shown along with each shortwave band. "Better Shortwave Reception" by William I. Orr (available from Lafayette Radio under stock no. 10-5006) is highly recommended to the shortwave listener. It provides an introduction to shortwave radio for the beginner and presents some of the practical aspects and helpful advice for the more experienced listener.

SHORTWAVE BROADCAST BAND*	FREQUENCY (Megacycles)	LISTENING TIME
60 meter band	4.80 to 5.00	Winter nights
49 meter band	5.90 to 6.40	Winter nights
41 meter band	7.10 to 7.40	Winter nights
31 meter band	9.20 to 9.70	Nights, all year
25 meter band	11.60 to 12.00	Nights, all year
19 meter band	15.10 to 15.45	Days, all year and Summer nights
16 meter band	17.70 to 17.90	Days, all year and Summer nights
13 meter band	21.45 to 21.75	Days, all year
11 meter band	25.40 to 26.10	Days, all year

*These are separate and distinct from the Amateur Shortwave bands which operate over different groups of frequencies.

RETURNING THE UNIT FOR REPAIR

In the event that repair is necessary (either in or out of warranty), we recommend that you return the receiver 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

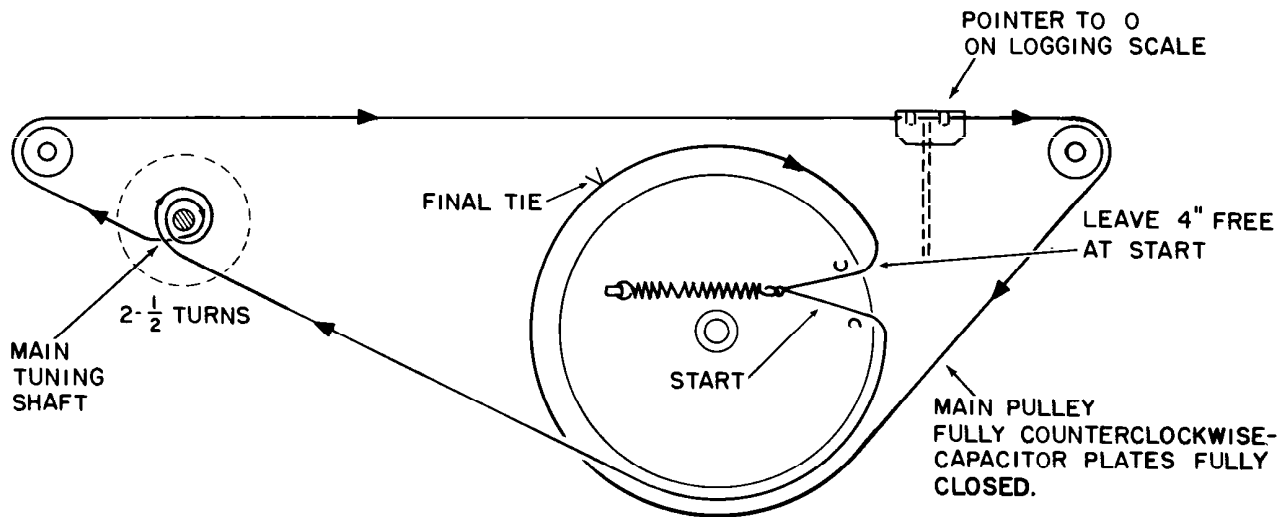
Pack the unit very carefully to avoid damage in transit, preferably in its original carton. If the original carton is not available, use a sturdy carton with at least 3 inches of shredded paper or excelsior around the unit. In the latter case, wrap the unit in paper first to avoid particles of packing 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

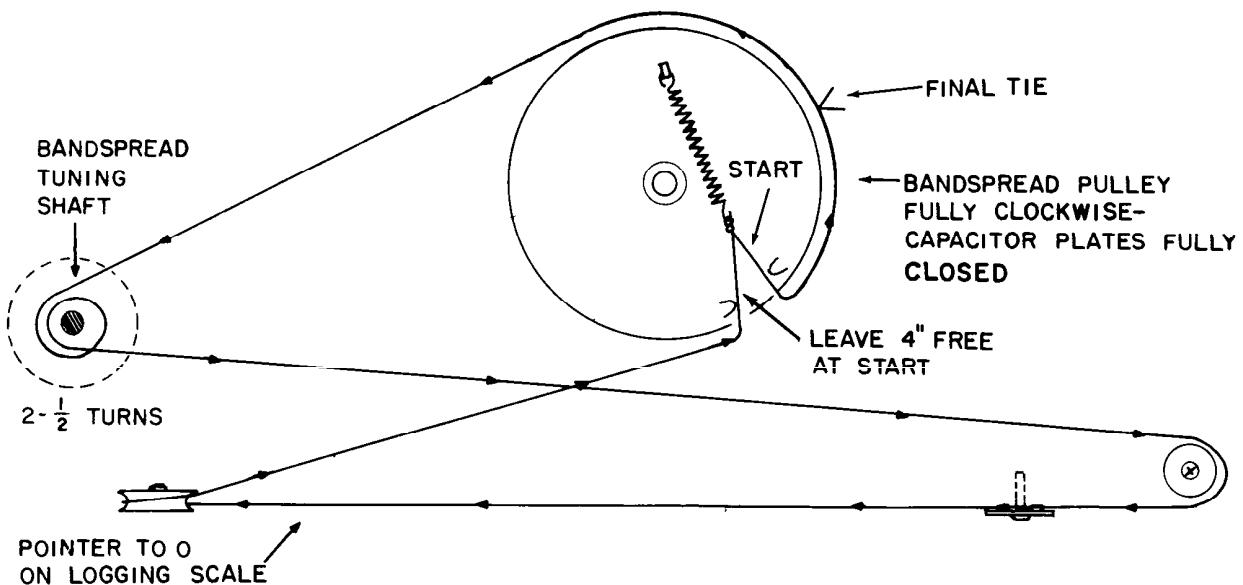
SERVICE AND ALIGNMENT

DIAL CORD STRINGING

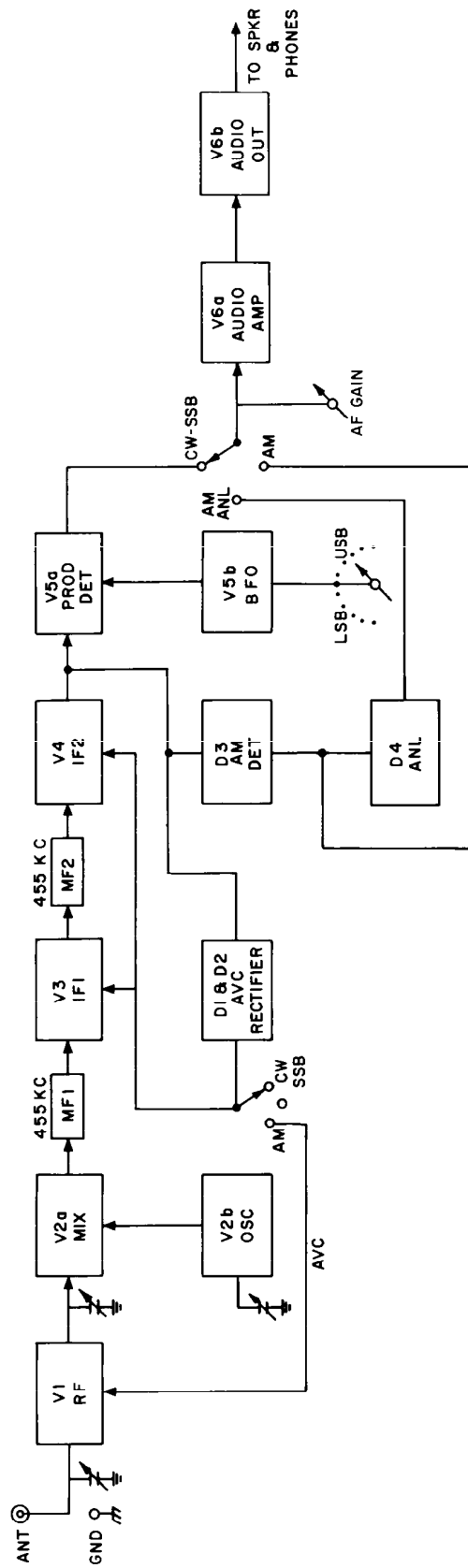
Set main or bandspread tuning capacitor as indicated. In both cases tie one end of the dial cord to the spring at the starting point leaving approximately 4 inches of cord free at this point. Re-string in the direction indicated with moderate tension. Make final tie to free end of cord left at beginning of this procedure. Apply firm tension before tying. Cut away excess cord.



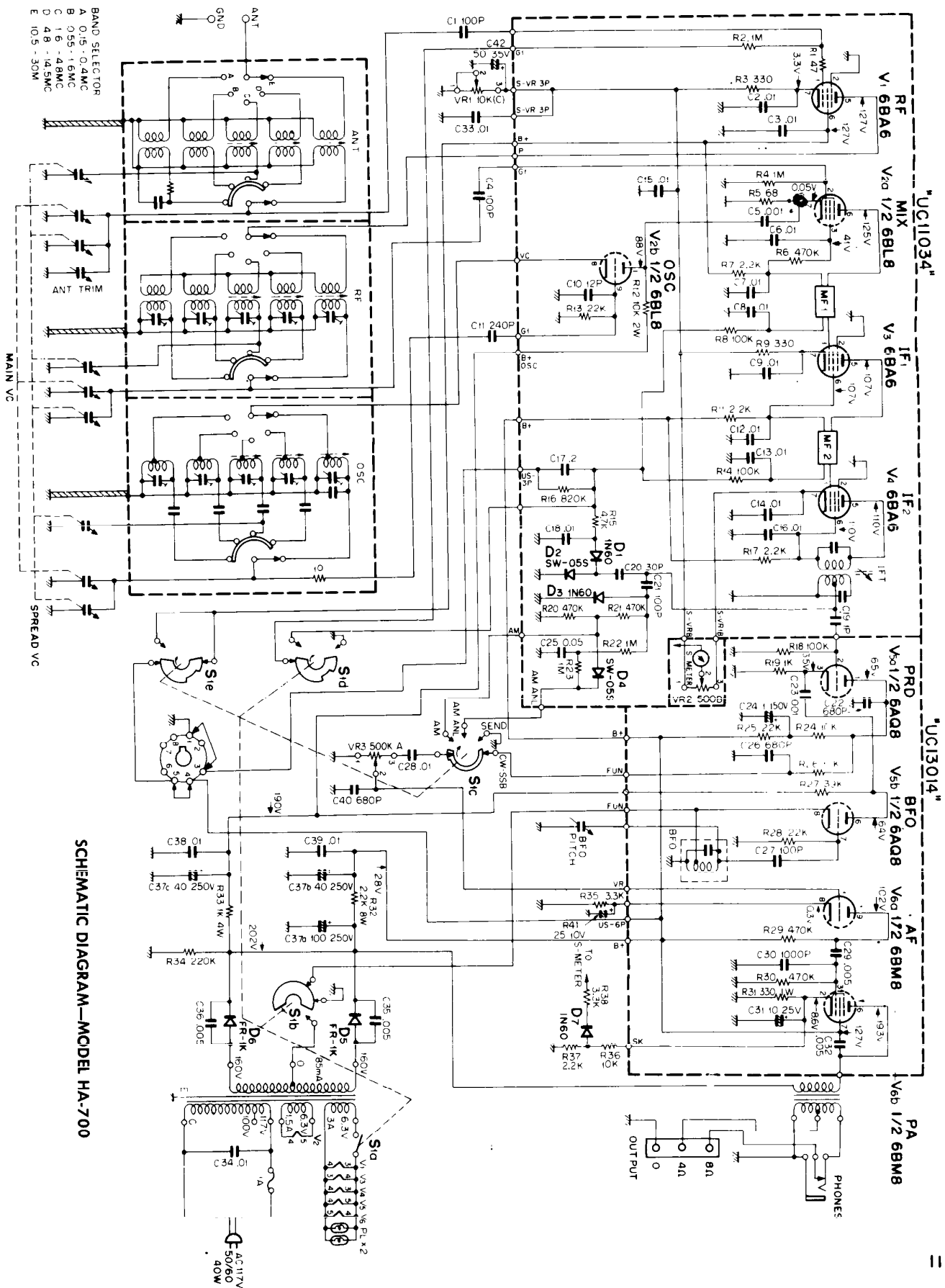
MAIN TUNING DIAL CORD STRINGING

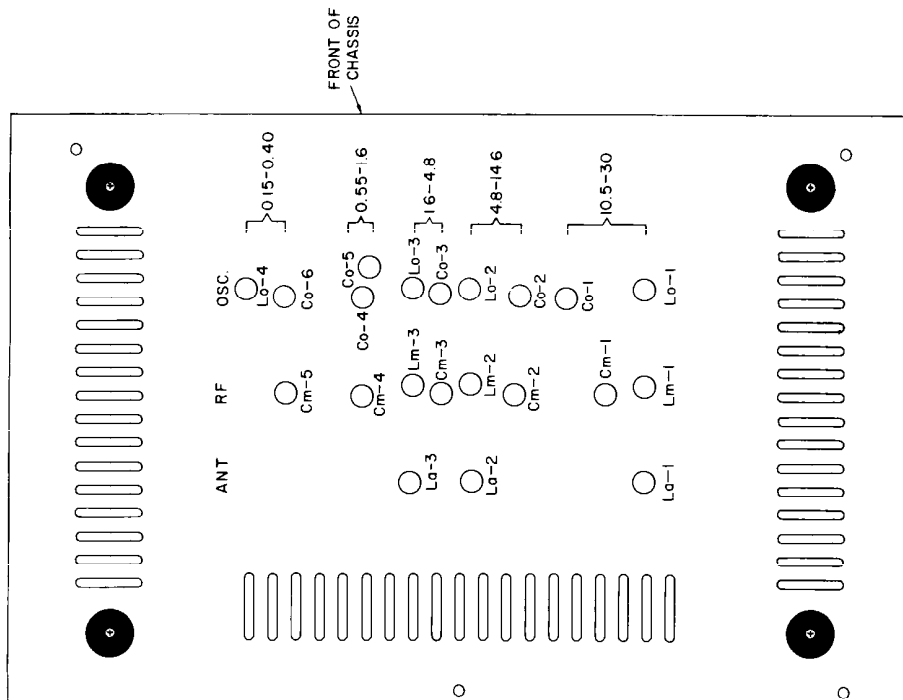
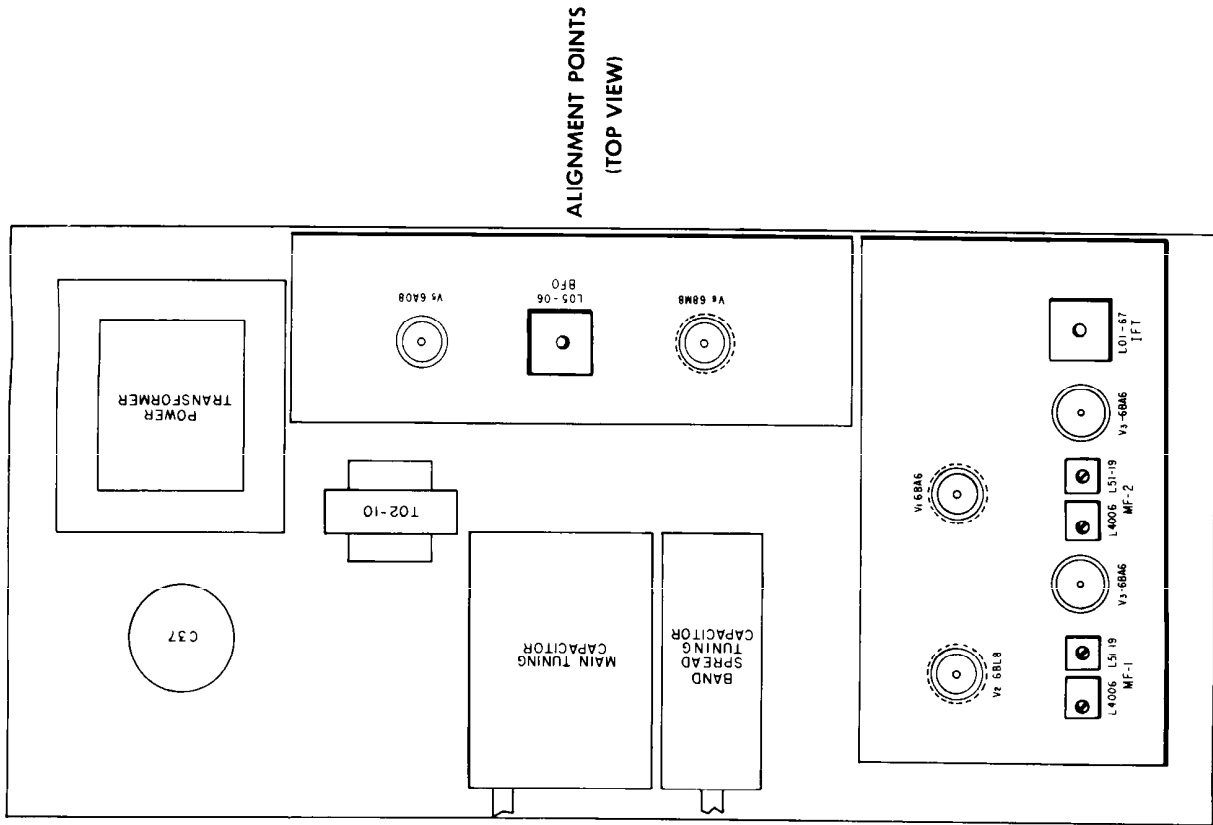


BANDSPREAD DIAL CORD STRINGING



FUNCTIONAL BLOCK DIAGRAM





**ALIGNMENT POINTS
(BOTTOM VIEW)**

ALIGNMENT INSTRUCTIONS

The HA-700 has been fully aligned at the factory before shipment to you and does not normally require further adjustment. When necessary, however, the receiver may be aligned as indicated.

CHASSIS REMOVAL

To remove the top cover, remove the four silvered screws on the sides of the receiver and lift off the cover.

To remove the bottom plate, unscrew the six phillips-head screws and remove the plate. During the RF alignment, the procedure should be followed with the bottom plate replaced. Access holes have been provided for slug and trimmer adjustments on the bottom plate.

EQUIPMENT REQUIRED

AC Voltmeter
Calibrated RF Signal Generator
Non-metallic Alignment Tools

SET CONTROLS AS FOLLOWS

FUNCTION switch on AM
AF GAIN control 3/4 full rotation
IF GAIN to maximum
ANT TRIM control pointer straight up
BAND SPREAD tuning dial to 100 on logging scale

Other controls may be set at any position unless otherwise stated.

Step	S.G. Coupling & Input Signal	Band Selector	Main Tuning Dial Setting	Adjustment	Output Indication
"S" Meter	No Signal	".55-1.6"	.55 MC	Zero Adj. at rear of chassis	Zero reading on "S" meter
Mechanical Filters	Connect S.G. to Pin 2 of V2A (mixer tube) and set it for 455 KC (400 cycles, 30° mod)	".55-1.6"	.55 MC	MF1 (L4006 L51-19) MF2 (L4006 L51-19) IFT (L01-67) Adjustments should be repeated several times to insure that all adjustments are peaked at 455 KC	Maximum output on AC Voltmeter
RF Alignment (See note below)	Connect S.G. across ANT. terminals. .16 MC (160 KC) .38 MC (380 KC) .38 MC (380 KC)	".15-.40"	.16 MC .38 MC .38 MC	Lo-4 (OSC) Co-6 (OSC) Gm-5 (MIXER)	Maximum output on AC Voltmeter

RF Alignment Con't (See note below)	.6 MC (600 KC) 1.4 MC (1400 KC) 1.4 MC (1400 KC)	".55-1.6"	.6 MC 1.4 MC 1.4 MC	Co-5 (OSC) Co-4 (OSC) Cm-4 (MIXER)	Maximum output on AC Voltmeter
	2.0 MC 4.0 MC 2.0 MC 4.0 MC 2.0 MC	"1.6-4.8"	2.0 MC 4.0 MC 2.0 MC 4.0 MC 2.0 MC	Lo-3 (OSC) Co-3 (OSC) Lm-3 (MIXER) Cm-3 (MIXER) La-3 (ANT)	Maximum output on AC Voltmeter
	5.0 MC 14.0 MC 5.0 MC 14.0 MC 5.0 MC	"4.8-14.6"	5.0 MC 14.0 MC 5.0 MC 14.0 MC 5.0 MC	Lo-2 (OSC) Co-2 (OSC) Lm-2 (MIXER) Cm-2 (MIXER) La-2 (ANT)	Maximum output on AC Voltmeter
	13.0 MC 28.0 MC 13.0 MC 28.0 MC 13.0 MC	"10.5-30"	13.0 MC 28.0 MC 13.0 MC 28.0 MC 13.0 MC	Lo-1 (OSC) Co-1 (OSC) Lm-1 (MIXER) Cm-1 (MIXER) La-1 (ANT)	Maximum output on AC Voltmeter
BFO*	Connect S.G. to ANT terminals - freq. 455 KC (un- modulated)	".55-1.6"	.55 MC	L05-06	Zero beat (minimum reading on AC Volt- meter)

* Change the setting of controls as follows:

FUNCTION switch to "CW-SSB"

BFO to mid-position (pointer straight up)

NOTE: OSC and MIXER adjustments should be repeated for each band until calibration is correct at both ends of the dial.

On all bands, the oscillator should be set on the high frequency side of the incoming signal.