

LAFAYETTE

6 METER AMATEUR BAND TRANSCEIVER

MODEL HE-35-A

OPERATING AND INSTALLATION INSTRUCTIONS

T 11773
S 37538

The Lafayette Model HE-35-A transceiver is a combination transmitter and receiver designed for use in the 6 meter (50.1 to 54 Mc) amateur radio service. Designed to meet the Federal Communications Commission (FCC) requirements, the unit will provide economical and reliable radio communication in its intended application if installed and operated in accordance with instructions contained herein.

The transmitter may be operated on any frequency in the 6 meter amateur band (50.1 to 54 Mc). Provision has been made for front panel insertion of a crystal. Crystals covering any frequency within the 6 meter amateur band can very easily be inserted into the unit.

Crystal controlled and plate modulated, the transmitter delivers a power input of 7 watts to the final RF amplifier.

The receiver utilizes a sensitive superheterodyne circuit with AVC and incorporates a controlled noise limiter. An RF stage precedes the detector for added sensitivity and selectivity and to keep RF radiation to a minimum. The receiver tunes the entire 6 meter band.

A variable "Pi" network is incorporated that permits matching to any type of antenna.

INPUT SUPPLY

The HE-35-A may be operated from a 115 volt 50-60 cycle AC source or from a 6 or 12 volt battery source. Accessory power units are available for use with the transceiver when operated from 6 or 12 volts DC.

115V 50-60 cycle AC Source: An AC line cord, terminated at one end with a normal AC plug and at the other with an 11-pin socket, is supplied with the Transceiver. The 11-pin socket should be connected to the matching plug on the transceiver before inserting the AC plug into the wall outlet.

6V or 12V DC Source: Model HE-18 (6 volt) and Model HE-16 (12 Volt) Power Units are available as external power supplies for the transceiver when 6 or 12 volt operation is desired. Make certain that the proper power supply is used before connecting to battery power.

INSTALLATION OF ANTENNA

The most important single factor determining optimum transmission is the antenna. The antenna chosen should be selected for each transceiver on the basis of the application involved.

INSTALLATION OF FIXED ANTENNA

For short range communication, an inexpensive base load type of antenna or spiral whip antenna will be adequate. An antenna of the "ground plane" type will provide greater, more reliable coverage. Both of these types are essentially non-directional and are ideal for applications involving fixed-to-mobile operation.

The directional "beam" type of antenna with ant. rotator may be used to extend the range of the Transceiver and will provide reliable communication over an unusually long range or under adverse weather conditions. Because of their directional properties these antennas are ideal for point-to-point communication, that is, from fixed station to another. A good 4 or 5 element beam is recommended.

The range of the transceiver also has a direct bearing on the height of the antenna used. Regardless of the type chosen, always locate the antenna as high as possible. It is important therefore, to choose a location for the transceiver that is favorable to your antenna location. A long lead-in cable will introduce a certain amount of power loss and should be avoided where possible unless the antenna location justifies its use. Up to 25 feet of cable lead-in may be used if it permits a favorable antenna location.

Wherever possible, use a good water pipe ground. In most cases this will provide greatly improved operation.

INSTALLATION OF MOBILE ANTENNA

The type of antenna best suited for mobile service is a vertically polarized whip antenna. In any mobile installation (Cars, trucks, boats, etc.), an antenna system that is non-directional has to be used. Other factors likely to offset performance are lack of a good earth ground and ignition interference. However, the base-load

type whip antenna will normally provide good results for short-range communications. Greater range and more reliable operation can be obtained with a full quarter-wave vertical whip antenna. Both of these types of antennas use the metal body of the vehicle as a "ground plane". If the transceiver is not mounted to any metal surface, it will be necessary to run a separate ground wire from the unit to a good metal ground in the vehicle. If installed in a boat the transceiver will not operate at maximum efficiency without a ground plate, unless your vessel has a steel hull. However, before installing the transceiver, consult a qualified marine technician regarding an adequate grounding system. The new type hi-gain horizontally polarized Halo antenna for 6 meters or a coaxial antenna is also recommended for mobile operation.

ANTENNA TERMINATION

The antenna lead-in cable, RG-58/U, should be terminated with a UHF type PL-259 connector. The receptacle, SO-239, located on the transceiver accepts this type of connector.

The LAFAYETTE Model HE-748WX Halo type antenna or the cowl mount universal 6 Meter Mobile antenna, Model HE-801WX may be connected directly to the transceiver.

IGNITION INTERFERENCE

Engine ignition interference in a car or truck should not present a serious problem. The suppression carried out on vehicles equipped with a standard broadcast radio will normally suffice. However, if an ignition interference problem is present, any skilled auto radio repairman should be able to correct it for you.

Electrical noise from engines and other electrical equipment aboard a boat or vessel can render your transceiver useless. The worst offender will be the ignition system of gasoline engine power boats. Generators on both gasoline and diesel engines, auxiliary generators, electric motors on refrigerators, bilge pumps, fans, etc., must be filtered for quiet radio reception.

Unfortunately, there is no hard and fast rule for the elimination of noise. It is best to attack the problem systematically. The ignition system can be filtered by the use of a "spark shield" made to fit most common gasoline marine engines. These shields are easily installed and can be removed for spark plug and point servicing in less than a minute.

Auxiliary generators are quieted down by condenser installations. Condensers of the highest quality, in metal cans, should be used. We recommend that a capacity of 1.0 mfd be used. These are of greater capacity than the condensers normally used in automobile radio installations. The same condensers can be used to filter the other motors. Condensers are installed at the generator armature terminal or, in extreme cases, directly on each brush holder. The metal can is connected to the generator frame. Never connect a condenser to the field terminal of a generator.

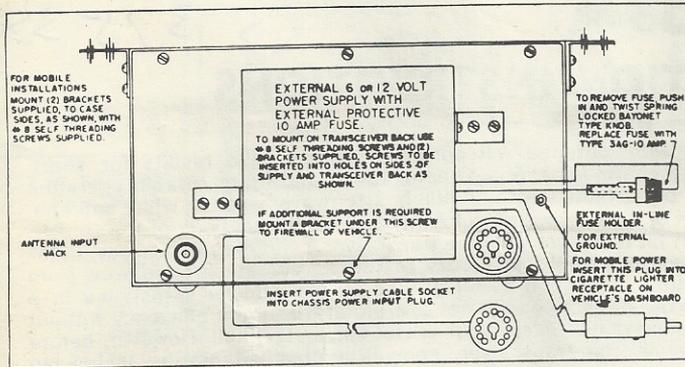
The voltage regulator on the larger generators is frequently a source of troublesome noise. Before attempting any filtering on the regulator, have the unit cleaned and adjusted by an expert. If noise is still present, install condensers on the armature terminal of the regulator. Again, do not put a condenser on the field terminal.

Another, more infrequent source of noise is caused by the rotation of the propeller shaft in its various bearings. This rotation causes static electricity discharge. If noise is present when the vessel or boat is underway but goes away when you throw the engine out of gear, you most probably have "shaft noise". This noise can usually be eliminated by installing phosphor bronze "fingers" in such a way as to allow wiping contact with the shaft. The finger is then connected to the engine block with a heavy wire.

Diesel engines have no ignition system and therefore need no shields. The generators must be filtered just as they are for gasoline engines.

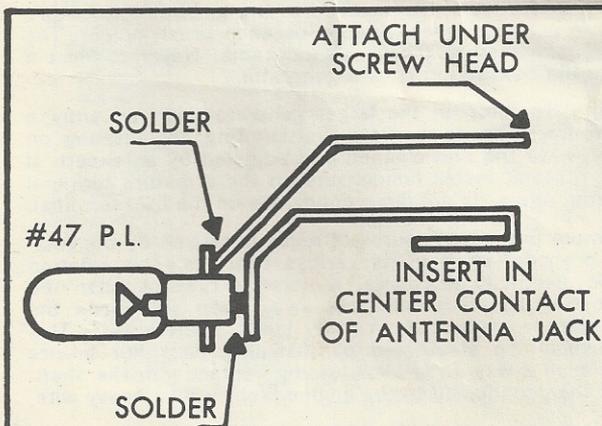
Other electrical accessories such as fans, bilge pumps, electric toilets, fresh water system motors, etc., are also a possible source of noise. These units can be noise suppressed by means of condensers.

MOBILE INSTALLATION

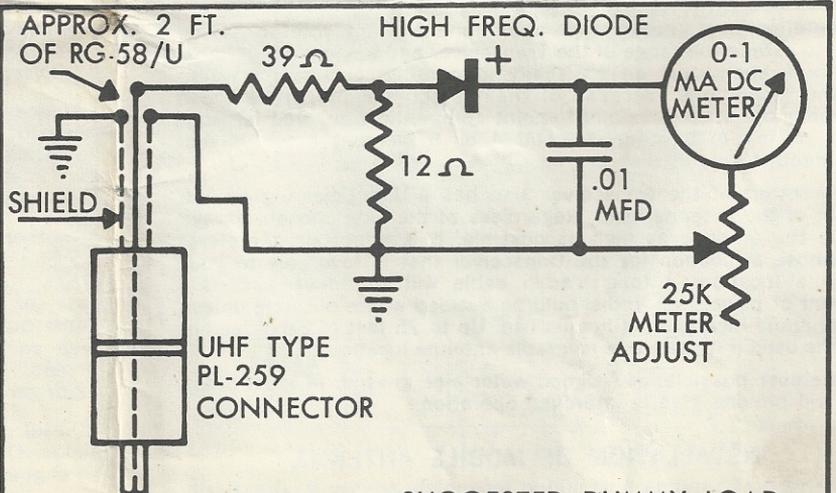


Before installing the transceiver in a car, truck, boat, etc., be sure to choose a location which is convenient to the operating controls, and will not interfere with the normal functions of the driver. In most installations, the power unit can be mounted directly to the rear of the transceiver by means of 2 mounting brackets and 8 self-threading screws as shown in the illustration. Connect the 11-pin socket at the end of the power cable to the corresponding input plug at the rear of the transceiver.

The transceiver may then be mounted to the underside of the instrument panel or dashboard of a car, truck, etc., by means of the 2 remaining brackets and 8 self-threading screws. A third bracket (not supplied) may be used as shown if additional support is required. If desired, the power unit can be mounted separately, using the two brackets to mount it directly to the mounting surface. The power unit is equipped with a power input cable terminated with a plug which may be inserted directly into the cigarette lighter socket on a car or truck. A 10 amp fuse is incorporated in the power unit. In a more permanent installation the plug should be removed and the cable connected to main battery source. A convenient place to make this connection would be the ignition switch. In this manner, the power supply to the transceiver will be controlled by the position of the ignition key. This will prevent unauthorized persons from using the transceiver and also prevent the transceiver from being left on. It is imperative that the "hot" or center lead of this plug is connected to the ignition switch. If this wire is reversed, the fuse in the vehicle will blow.



SIMPLE DUMMY LOAD ANTENNA FOR TRANSMITTER ADJUSTMENTS.



SUGGESTED DUMMY LOAD AND R.F. INDICATOR

DESCRIPTION OF CONTROLS

VOLUME CONTROL — Varies the sound output from the loudspeaker. Also incorporates an on-off switch at the most counter-clockwise end of rotation.

TUNING CONTROL — Provides receiver tuning of the entire 6 meter band. The small outer knob operates the larger panel knob through a reduction drive to provide fine tuning when necessary.

TRANSMIT-RECEIVE SWITCH — Normal position is in REC, placing the receiver section in operation. The lower TRANSMIT position permits short transmissions of an intermittent nature. When released, the control will return to the REC position automatically. The upper TRANSMIT position permits continuous transmission for longer periods of time, without applying continuous pressure to the control. Both TRANSMIT positions perform the same basic functions.

NOISE LIMITER — is used to reduce excessive noise (such as that caused by auto ignition or other disturbances) in those cases where this characteristic type noise is greater in intensity than the received signal. The use of this control may reduce slightly the overall sensitivity of the receiver.

CRYSTAL OSCILLATOR FREQUENCY ADJUSTMENT

The following adjustment is to be made every time a new crystal, whose frequency is more than 0.5 Mc than the replaced crystal, is inserted into the front panel crystal holder. With antenna disconnected, insert a #47 Pilot lamp into the antenna receptacle to serve as a dummy antenna. Make sure the center terminal or stud of the Pilot lamp makes contact with the center jack of the antenna receptacle. Connect the outer case of the Pilot lamp to any convenient chassis ground by means of a short lead. Remove small plug button located on top right side of cabinet. Set Transmit-Receive switch to the upper position. With a coil slug alignment tool adjust the crystal oscillator coil slug screw, located beneath plug opening, for maximum brilliance of the #47 Pilot lamp.

Remove large plug button on top of cabinet. With a combination coil slug alignment tool adjust (C1) antenna tank capacitor screw, (Slug type) located beneath plug button opening and slightly to cabinet rear, on chassis, for maximum brilliance of the Pilot lamp. Adjust antenna output capacitor screw (C4), flat ceramic condenser located on bracket near speaker, for maximum lamp brilliance. Repeat the above adjustments until maximum lamp brilliance is obtained.

After the above adjustments have been made, switch the Transmit-Receive switch momentarily to receive, and then back to transmit. If the lamp does not light or lamp brilliance is reduced, repeat adjustments.

NOTE: Before making the above adjustments screw the RF trap capacitor screw down snug (Full clockwise).

MAXIMUM POWER TRANSFER TO ANTENNA

After making adjustments, connect antenna to Transceiver and take readings of transmitter output with a SWR bridge or the Lafayette TM-14 Field strength meter. Re-adjust antenna tank capacitor screw (C1) and the antenna output capacitor screw (C4), if needed, for maximum readings on the SWR bridge or the Lafayette TM-14 Field strength meter. Replace all plug buttons when all necessary adjustments have been made.

TRANSMITTING

Be sure that the power supply for the transceiver has been connected as discussed previously, and that the unit has an adequate ground (if not mounted to a metal surface). One of the antenna systems discussed earlier should be connected. Plug the microphone into the jack provided on the extreme left of the front panel.

1. Turn the Transceiver on, and set the TUNING control to the channel on which you wish to operate. The Power indicator lamp will light if power has been applied to the unit.
2. Set the TRANSMIT-RECEIVE control to the lower transmit position. The RF indicator lamp will light, indicating the presence of RF in the transmitter section. Hold the microphone 4 to 8 inches away and speak in a normal tone of voice. Shouting will not increase the strength of your signal. Speak clearly and slower than you would normally.

As you speak into the microphone you will notice that the RF indicator will "flicker", giving an indication that the speech amplifier and modulator circuits are operating properly. Release

the transmit control at the completion of your message. Use the fine tuning control (small outer knob) to tune in the answering station if necessary.

TV INTERFERENCE

This transceiver contains a built-in series-resonant trap (C2) in shunt with the antenna output receptacle. When tuned correctly, it suppresses television interference in the transmitting position. If when transmitting, the transmitter causes excess TV interference this trap may be tuned to help remove this effect.

This transceiver also contains a built-in parallel-resonant trap (C3) in series with the receiver's antenna input. When tuned correctly, it suppresses television interference in the receiver.

NOTE: For location of trap trimmer screws see license label. If these traps are tuned to either the receiving or transmitting frequency range the efficiency of either or both will be greatly effected.

The (C3) receiver interference trap, will adjust interference approximately within 1 Mc of the crystal operating frequency used. For other frequencies the C3 trap screw may have to be adjusted.

ADDITIONAL CRYSTALS

The Model HE-35-A is normally supplied with a crystal for 50.2 Mc already installed in the front panel crystal holder. Additional crystals for other 6 meter frequencies may be inserted provided they are of the 3rd overtone type and above 50.1 Mc.

When replacing crystals it is suggested that the user use the nearest operating frequencies in the range of 50.15 Mc to 50.5 Mc in order to prevent TV interference.

TYPICAL TUBE SOCKET VOLTAGES

SYMBOL TUBE TYPE & FUNCTION	TYPE OPER- ATION	PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V-1 6U8A/6EA8 R.F. AMPLIFIER MIXER	R'CVE	105	0	50	H	H	145	1V	0	
	TRANS.				H	H			0	
V-2 6U8A/6EA8 OSCILLATOR 1ST I.F. AMPLIFIER	R'CVE	100		80	H	H	80	1.2	0	-25
	TRANS.				H	H				
V-3 6AL5 DETECTOR NOISE LIMITER	R'CVE	.05		H	H	.05	0			
	TRANS.			H	H		0			
V-4 6CX8 CRYSTAL OSC. R.F. POWER OUTPUT	R'CVE	16	0	260	H	H	16	0	255	255
	TRANS.	0	-2	175	H	H	0	-2	175	235
V-5 12AX7 A.F. AMPLIFIER MICROPHONE AMP.	R'CVE	0	-.5	0	H	H	90	0	1V	H
	TRANS.	70	-.45	0	H	H	140	0	1.4	H
V-6 6V6GT MODULATOR AUDIO OUTPUT	R'CVE		H	255	260	0		H	16	
	TRANS.		H	225	250	0		H	14	

VOLTAGES MEASURED TO CHASSIS WITH VTVM (RCA VOLTOHMYST OR EQUIV.) AND ARE POSITIVE EXCEPT WHERE NOTED.
TRANSMITTER TUNED AND LOADED, WITH NO SIGNAL INPUT TO RECEIVER:

