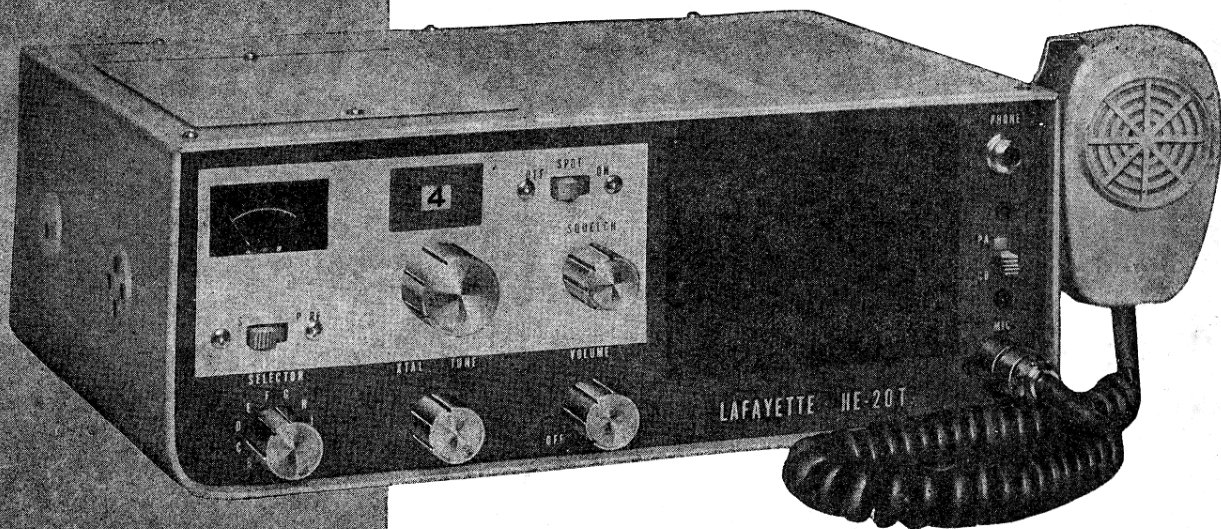




LAFAYETTE

MODEL HE-20T



20T Stock No.99-30884WX

TRANSISTORIZED CB TRANSCEIVER

INSTALLATION AND OPERATING MANUAL



LAFAYETTE RADIO ELECTRONICS

SPECIFICATIONS

RECEIVER

CIRCUIT TYPE	Crystal-controlled superheterodyne with RF stage and 455 Kc Mechanical Filter.
FREQUENCY.....	23 channels tunable with spotting switch plus provision for 12 crystal-controlled channels.
SENSITIVITY.....	Better than $0.5\mu\text{v}$ for 10 db $\frac{S+N}{N}$
SELECTIVITY.....	6 db down at ± 3 Kc; 45 db down at ± 6 Kc.
INTERMEDIATE FREQUENCY.....	455 Kc.
AUDIO OUTPUT.....	4 watts maximum into 4" round PM-type speaker.
AUXILIARY CIRCUITS.....	"S" and RF power meter, Variable Squelch, Automatic Noise Limiter, AVC. Plug-in facilities for Lafayette Priva-Com III selective call unit
RECEIVING CURRENT DRAIN	0.15 amps at 12 volts DC. in standby, maximum signal 0.6 amps.

TRANSMITTER

FREQUENCY.....	Provision for 12 crystal-controlled channels.
POWER INPUT.....	5 watts
SPURIOUS RESPONSE REJECTION	All harmonic & spurious suppression greater than 50 db.
MODULATION.....	AM, full 100% modulation capability.
PA (Public Address).....	Provision for PA using microphone and audio stages with external speaker.
ANTENNA MATCHING.....	30-100 ohms impedance.
TRANSMIT/REC SWITCHING	Relay, operated by push-to-talk dynamic microphone.
TRANSMITTING CURRENT DRAIN.....	1.6 amps at 12 volts DC. at 100 % modulation.

GENERAL

POWER SOURCE.....	Operates from 11.5-14.5 volts DC with built-in solid state power supply for 117/220 volts 50/60 cycles AC.
TRANSISTORS, DIODES	13 Transistors, 11 Diodes,
DIMENSIONS.....	11-3/4" W. x 4-3/8" H. x 7-7/8" D.
NET WEIGHT.....	11 lbs..

- ACCESSORIES..... (1) Push-to-talk dynamic mic with coiled cord & connector.
(2) AC power cable.
(3) DC power cable (fused for 2 amps).
(4) Mobile Mounting Bracket.
(5) Microphone Bracket.
(6) Warranty Card.

GENERAL INSTRUCTIONS

CITIZENS RADIO SERVICE

The Lafayette Model HE-20/T Transceiver is designed for use in Class "D" operation in the 11 meter Citizens Radio service and meets the Federal Communications Commission requirements applicable to equipment operating in this service under class "D" emission. Part 95 of the FCC regulations defines operation in this service and the licensee is required to read and understand these regulations prior to operating a CB transmitter. Volume VI (covering the FCC regulations for the Citizens Band Radio Service) includes Part 95 and is available for \$1.25 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. A station license may be obtained by submitting a properly completed Station License Application, Form 505, as directed.

It is illegal to operate the transmitter section of this transceiver prior to receiving a valid station license and call sign. NOTE: It is the transmitter that is licensed -- NOT the operator. Anyone may operate a properly licensed CB transmitter but the licensee will be held responsible for any violations incurred during use. A properly completed Identification Card FCC Form 452-C must be attached to the transmitter.

GENERAL DESCRIPTION

RECEIVER

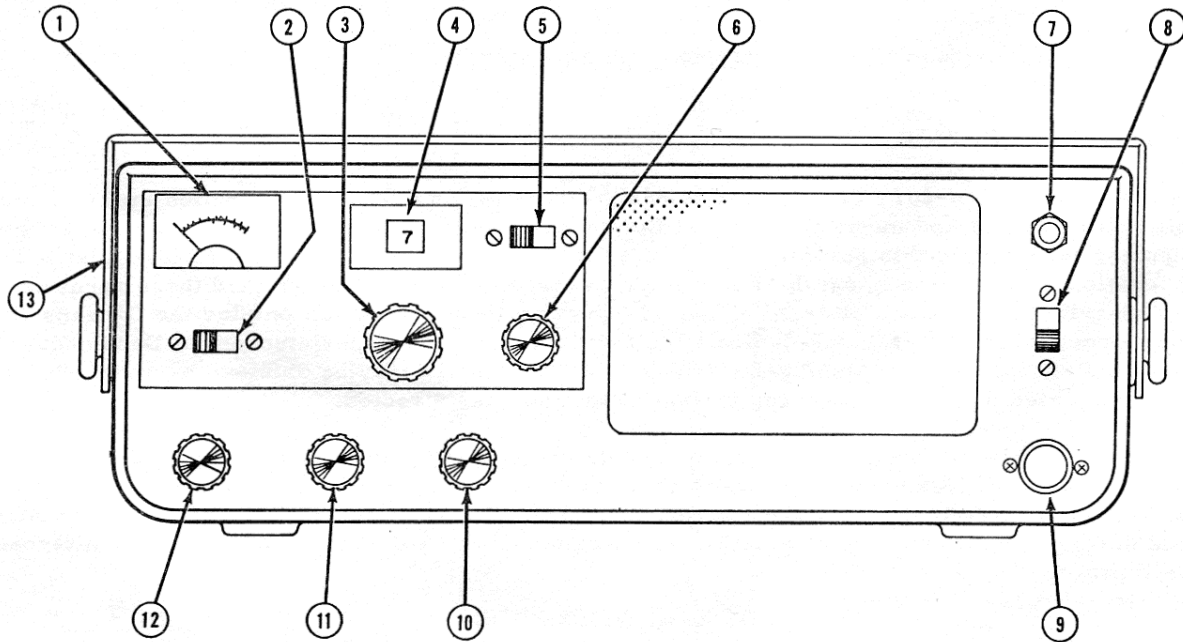
The receiver is designed to receive AM signals in the 26.965 to 27.255 (11-meter) Citizens Band. The circuit is a sensitive all-transistor superheterodyne type offering up to 12 crystal-controlled channels plus full 23-channel variable tuning. A spotting switch permits the receiver to be precisely tuned to your transmit crystal in the variable tuning mode. This permits the use of transmit crystals only, if desired (the transceiver is supplied with transmit and receive crystals for channel 9 only). A special feature is the use of a mechanical filter which assures razor-sharp selectivity and thus minimizes interference from stations on adjacent channels. Other circuit features include a full-time automatic noise limiter, adjustable squelch control, automatic volume control, "S" meter circuit, and a receptacle for external speaker or headphones. Also provided are plug-in facilities for the use of the Lafayette PRIVA COM III Selective Call unit.

TRANSMITTER

The transmitter is designed to transmit AM signals in the 26.965 to 27.255 (11-meter) Citizens Band. The unit has provision for up to 12 crystal-controlled channels in this band, and full 5-watt collector input with up to 100 % modulation capability. Features include provision for PA (public address) operation using the audio/modulator stages in conjunction with an external speaker, push-to-talk dynamic microphone which operates through a rugged enclosed relay for receive-transmit switching, a relative RF power output meter (which also reads "S" units on receive), plus a Pi-network for matching to 30-100 ohm antenna impedances.

POWER SUPPLIES

The transceiver is designed to operate from either 117/220 volts, 50/60 cycles AC or 11.5 to 14.5 volts DC. Two power supply cables are supplied -- one for AC operation, the other for DC operation. All that is required is that the appropriate power cable be plugged into the 11-pin power socket on the transceiver.



OPERATING CONTROLS AND FEATURES

- (1) ILLUMINATED S/P-RF METER..... Indicates relative strength (in "S" units) of incoming signal or relative RF power output, depending upon switch position (beneath).
- (2) S/P-RF SWITCH Function switch for meter above.
- (3) TUNER This control used to provide continuous tuning of the receiver over all 23 channels when the Receive switch is in the TUNE position.
- (4) RECEIVER TUNING DIAL..... Illuminated dial in window shows channel to which receiver is tuned (when Receive switch is in the TUNE position).
- (5) SPOT..... Permits exact tuning of the receiver to your transmitting frequency.
- (6) VARIABLE SQUELCH..... May be used to "quiet" the receiver during "no-signal" conditions. Adjustable control offers varying degrees of sensitivity to incoming signals.
- (7) PHONE Receptacle for use of headphones or external speaker (16-32 Ω). Insertion of plug automatically silences the internal speaker.

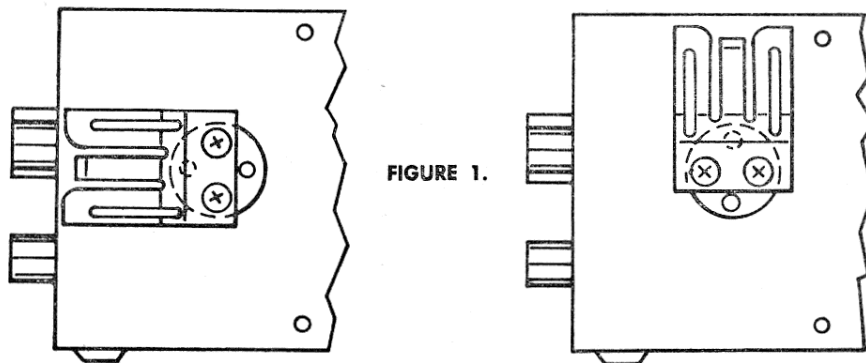
- (8) PA SWITCH..... PA position lets you use transceiver as PA amplifier with external speaker connected to PHONE jack,
- (9) MIC 4-pin socket for insertion of plug-in push-to-talk dynamic microphone (supplied).
- (10) VOLUME/ON-OFF..... Adjusts the level of sound from the speaker. Also incorporates an on-off power switch at the extreme counter-clockwise position.
- (11) RECEIVE Switch permits choice of crystal-controlled or continuously variable tuning for the receiver. In XTAL position, receiver tuning is determined by channel Selector.
- (12) SELECTOR..... Rotary switch selects one of 12 crystal positions for transmit and receive operation (A through L).
- (13) MOUNTING BRACKET..... Specially designed mounting bracket simplifies mobile installation -- also permits easy removal of transceiver.

BASE STATION INSTALLATION

The transceiver should be placed in a convenient operating location, close to an AC power outlet, suitable ground and the antenna lead-in cable.

MICROPHONE BRACKET

The microphone bracket may be attached to the left or right side of the transceiver in any one of the two positions shown in Figure 1, whichever is most convenient.



AC POWER CONNECTION

Select the AC power cord and attach the 11-pin female connector to the male power connector at the rear of the transceiver. **CAUTION:** Always line up the keyway properly before pushing the cable connector onto the transceiver. Do not attempt to force the connector onto the pins -- when properly lined up, the connector will slip on easily. Making sure the transceiver is off (switch is located at the extreme counter-clockwise of the VOLUME control), insert the AC plug at the other end of the cord into an outlet supplying 117/220 volts, 50/60 cycles AC. For protection, the AC input to the transceiver is fused (rear of transceiver).

MICROPHONE CONNECTION

Insert the 4-pin plug at the end of the coiled cord into the 4-pin socket at the lower right front of the transceiver.

ANTENNA CONNECTION

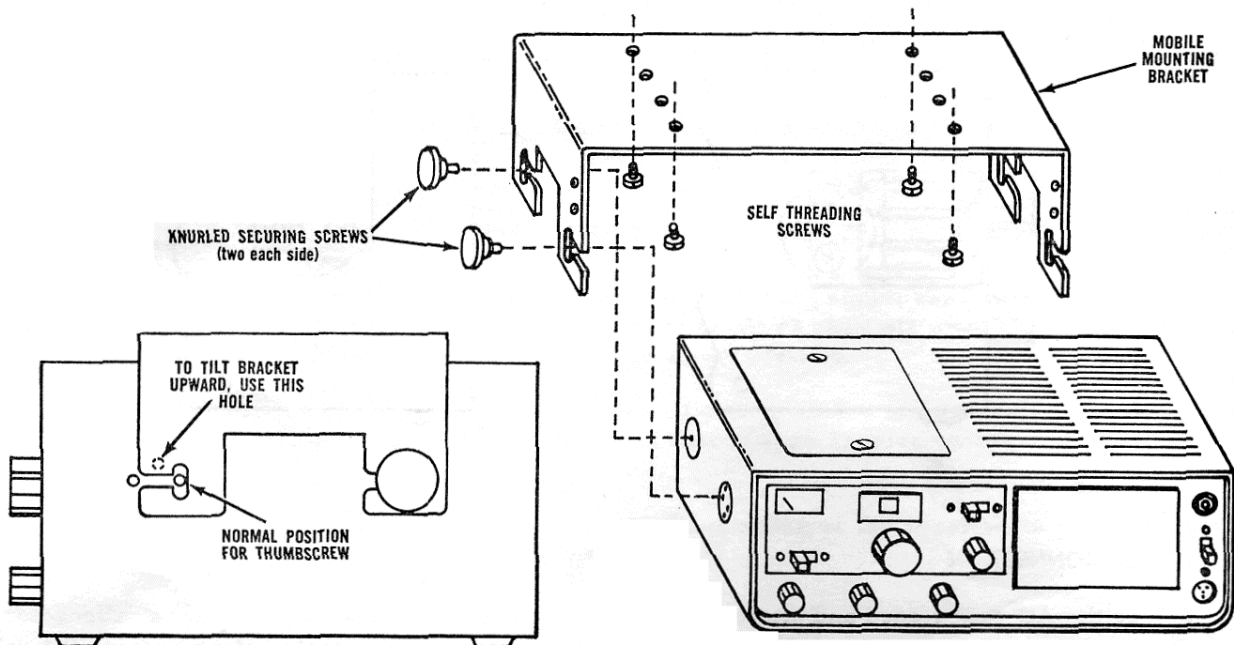
The antenna lead-in cable (RG-58/U or RG-8/U) should be terminated with a PL-259 type male coaxial connector which should then be attached to the matching antenna connector at the rear of the transceiver.

MOBILE INSTALLATION

TRANSCEIVER MOUNTING

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. The transceiver may be mounted to the underside of the instrument panel or dashboard of a car, truck, etc., by means of the special bracket that is supplied with the transceiver. Remove the bracket from the transceiver by loosening the four large knurled screws at the sides. Attach the bracket to the underside of the instrument panel using four self-threading screws (see Fig. 2). Secure the transceiver to the bracket by means of the large knurled side screws.

Figure 2 also shows the additional holes that may be used for the front pair of thumbscrews. This permits the transceiver to be set at any angle which provides the operator with the clearest view of the front panel. The actual position chosen will be determined by the particular installation.



MOBILE INSTALLATION OF TRANSCEIVER

FIGURE 2.

12V DC POWER CONNECTIONS

CAUTION: This transceiver as shipped from the factory is designed for use only in vehicles employing a negative ground system. For positive ground, order 99-3106 positive ground cable.

The Red lead in the DC power cable should be connected to the main "hot" battery source in the vehicle. "Hot" points normally available are the accessory post on the ignition switch or the accessory side of the fuse block. The Black lead should be connected to the metal firewall or any other point that is connected to the vehicle chassis (negative battery potential). Make sure the Red lead has been connected to a point which provides power only when the ignition switch is turned on.

As a final step, the 11-pin female connector at the end of the DC power cable should be attached to the 11-pin male connector at the rear of the transceiver. **CAUTION:** Always line up the Keyway properly before pushing the cable connector onto the transceiver. Do not attempt to force the connector onto the pins -- when properly lined up, the connector will slip on easily.

IMPORTANT. To avoid possible failure, you should make sure that the vehicle supply voltage does not exceed 14.5 volts at any time. If necessary, adjust the voltage regulator to cut out at this voltage (14.5).

ANTENNA CONNECTION

The antenna lead-in cable should be terminated with a PL-259 type male connector. Attach to the matching antenna input connector at the rear of the transceiver.

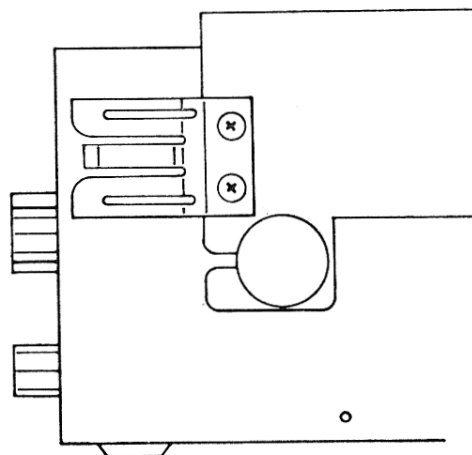
ANTENNA CABLE

For optimum results in a mobile installation, the length of the RG-58/U 50 ohm coaxial cable should be 11 ft. 9 in. or multiples thereof (23 ft. 6 in., etc.). Lengths other than multiples of 11 ft. 9 in. may be used when perfect antenna matching exists. However, this ideal condition is generally difficult to obtain because of a number of factors which affect impedance, such as the type of antenna, its tuning, its height above ground, and the transmission line employed.

When the use of the particular lengths specified results in an over-long line, the excess should be wound in a neat coil not less than 8 inches in diameter.

MICROPHONE BRACKET

The microphone bracket may be attached to the left or right side of the support bracket, as shown in Figure 3.



MICROPHONE BRACKET MOUNTED
ON SUPPORT BRACKET
(MOBILE)

FIGURE 3

ANTENNAS

The results obtained with your new Lafayette Citizens Band Transceiver will be greatly determined by the efficiency of the antenna system used.

NEVER ATTEMPT TO TRANSMIT WITHOUT AN ANTENNA CONNECTED TO THE TRANSCEIVER

Due to the complexity of the subject, it is not within the scope of this manual to provide detailed information on antenna systems. Although this section does contain some general information which may be of value to the beginning CB enthusiast, we suggest you purchase one of the numerous books available which covers this subject in greater detail. The Howard W. Sams publication by David E. Hicks, "CB Radio Antenna Guidebook," is particularly recommended. This book offers a complete guide to the selection and installation of CB antennas and includes a great deal of information that will be useful in obtaining optimum results with your antenna system.

MOBILE ANTENNAS

The type of antenna best suited for mobile service is a vertically polarized whip antenna. The vertical whip is non-directional and can be of the loaded type (top, center or base-loaded), or a full quarter-wave, the latter usually being more efficient. Both types use the metal body of the vehicle as a "ground plane". There are a number of locations that may be used for the installation of an antenna on a car. Four of the most popular locations are those shown in Figure 4.

FRONT COWL MOUNTING

Front cowl mounting offers a number of advantages. The CB antenna can be mounted in place of the regular auto radio antenna and will thus provide the minimum of installation problems. The antenna can then be used for both the CB and standard auto radio by employing any of the commercially made two-way couplers available (such as the Lafayette HP-202, Stock #42-0903). In this location you can install a short loaded whip, with only a small loss of efficiency.

The horizontal radiation pattern in such a location is slightly irregular, radiation being slightly greater in the direction of the rear fender opposite to the side on which the front cowl antenna is mounted.

ROOF MOUNTING

Roof mounting is usually the best location because it provides an almost perfect omnidirectional radiation pattern. However, the use of a full 108-inch quarter-wave antenna on the roof of a vehicle is fairly impracticable and a shorter, loaded whip is usually installed in this location, even though this type offers lower efficiency.

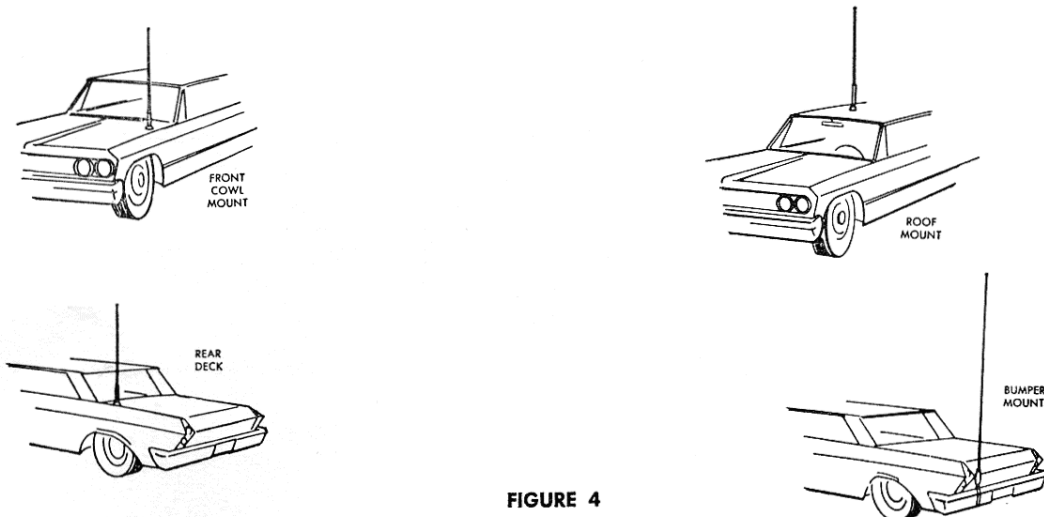


FIGURE 4

REAR DECK MOUNTING

Rear deck mounting permits the use of a full quarter-wave antenna or a shorter, loaded whip. The radiation pattern in such a location is somewhat irregular, radiation being slightly greater in the direction of the front fender opposite to the side on which the rear deck antenna is mounted.

BUMPER MOUNTING

This arrangement uses the rear bumper of the car and is by far the most practical for use with full 108-inch quarter-wave whips. Another advantage is that removal of the antenna is simple and leaves no holes in the car body. The radiation pattern produced by an antenna mounted on the left rear bumper is fairly irregular, with greatest radiation being in two directions -- one to the right and forward slightly, the other to the rear and left slightly.

BASE STATION ANTENNAS

SHORT RANGE

The Lafayette HE-19 (Lafayette Stock No. 99-3015) is a small base loaded whip designed for short range communications work -- intercommunication between buildings, etc. It mounts directly onto the back of the transceiver. Extended -- it measures 45", closed -- 15".

LONG RANGE

There are three basic types of long-range antennas as shown in Figure 5.

In a base station installation, an exceptionally long lead-in cable may be required. When lengths of over 50 feet are necessary, RG-8/U coaxial cable is more suitable since it offers lower loss than RG-58/U.

- A. Vertical Ground Plane Antennas. These are omnidirectional antennas that provide optimum performance for contacting other fixed stations using vertical type antennas in addition to all mobile stations. For medium and long range communications work.
- B. Coaxial Antennas. These are high efficiency type radiators with omnidirectional characteristics, performing as well in most applications as the ground plane type. Ideal for those installations where a vertical ground plane is not feasible. For medium and long range communications work.
- C. Directional Beam Antennas. Highly efficient and directional antennas generally intended for fixed-to-fixed long range communications. An average 3-element beam provides an equivalent of 8 db increase in transmitter power.

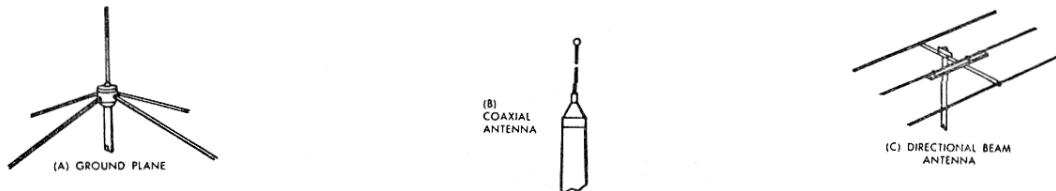


FIGURE 5.

TV INTERFERENCE SUPPRESSION

The transceiver contains a highly efficient filter that suppresses all spurious signals well below the prescribed FCC limits at the time of manufacture. In the event of TVI, it may be necessary to use an additional low pass filter (Lafayette Stock No. 42-0123), connected between the transmission line and unit. A high pass filter (Lafayette Stock No. 99-4009) installed at the TV set may also help.

IGNITION INTERFERENCE

AUTO

The suppression carried out on vehicles equipped with a standard broadcast radio will usually prevent any serious ignition interference from occurring. However, because of the high sensitivity of the receiver, sufficient noise may be picked up from your own vehicle to make reception of weaker stations difficult. In such a case, additional suppression is recommended. Several noise suppressor kits are available (such as the Lafayette HP-204, Stock No. 42-0905) which include all necessary parts and instructions for effectively suppressing ignition noise. Alternatively, you can take the vehicle to a skilled auto radio technician who will be able to carry out the suppression for you.

OPERATING INSTRUCTIONS

NOTICE

FCC REGULATIONS REQUIRE THAT THE DC INPUT TO THE FINAL BE LIMITED TO 5 WATTS FOR CB OPERATION. REMEMBER, IT IS YOUR RESPONSIBILITY TO SEE THAT THIS FIGURE IS NOT EXCEEDED.

Make sure the transceiver is properly installed for base or mobile operation, and that the antenna and power source are connected. If you have not already done so, insert the 4-pin plug at the end of the microphone cord into the microphone socket on the transceiver.

RECEIVING

Rotate the Squelch control fully counter-clockwise, Spot switch "off", and XTAL-TUNE switch to "XTAL". Set the SELECTOR to the desired position (the transceiver is normally shipped with crystals for channel 9 in position A), and place the PA switch in the CB position. Rotate the Volume control clockwise to operate the on-off switch. Increase volume for desired sound level.

SQUELCH ADJUSTMENT

The Squelch control is used to eliminate annoying background noise when no signals are present. To adjust the SQUELCH control properly during reception, turn up VOLUME until background noise is heard (no signals should be present). Rotate the SQUELCH slowly clockwise until the background noise just disappears. At this point, the receiver will be quiet under "no-signal" conditions, but an incoming signal will overcome the squelch action and be heard. Since this control is variable, it can be used to provide varying degrees of sensitivity to incoming signals. As the control is advanced (from the extreme counter-clockwise position), the squelch action is progressively increased and progressively stronger incoming signals are needed to overcome it. To receive extremely weak signals or to disable the squelch circuit, simply turn the control fully counter-clockwise.

RECEIVE SWITCH

This switch affects only the receiver and operates as follows: In the XTAL position, receiver tuning is crystal-controlled, the channel of operation being determined by the position of the SELECTOR switch. In the TUNE position, the receiver can be continuously tuned over all 23 channels by means of the TUNER control, and is independent of the SELECTOR switch setting which now sets the channel of operation for the transmitter only.

SPOT SWITCH

The Spot switch, when on, permits the receiver to be quickly and accurately tuned to your transmitting frequency. To use this feature, set VOLUME at minimum, RECEIVE switch to "TUNE", and set SPOT switch to "ON". Tune receiver until a peak is observed on the "S" meter. The receiver is now precisely tuned to your transmitting frequency.

NOTE: Tune for a prominent peak -- incoming signals will also produce peaks, but these will generally be lower in level.

"S" METER READING

Place the S/P-RF switch in the "S" position. During reception, the "S" meter will then provide a relative indication of signal strength in "S" units and thus offers a basis for comparison between one incoming signal and another.

TRANSMITTING

CAUTION: NEVER PLACE THE TRANSCEIVER IN THE TRANSMIT MODE WITHOUT AN ANTENNA CONNECTED. THIS MAY DESTROY THE RF POWER OUTPUT TRANSISTOR.

Before operating the transmitter the following must be done:

1. A valid Class D citizens band equipment license shall be posted at the main control (fixed) station location.
2. A properly filled out and SIGNED mobile identification card, 452C, must be affixed to the unit.
3. Rules Part 95 must be obtained, read and understood.

Before attempting to transmit, place the meter switch in the P-RF position (relative power output is read on the 0-5 scale) and be sure the PA switch is off. Depress the push-to-talk button on the microphone. Hold the microphone 4 to 6 inches from the mouth and slightly to one side so that the voice does not project directly into the microphone (this provides best results). Speak at a normal level -- never raise your voice or shout into the microphone. The meter should "flicker" slightly, indicating that you are modulating the RF carrier. During periods of transmission, the receiver is silenced and reception is therefore impossible. In the same way, your signal cannot be heard by another station when they are transmitting. Each must take turns.

NOTE: The RF power meter will read true antenna power output only when the transceiver is connected to a 50-ohm resistive load. If the antenna and transmission line do not offer such a load, the meter readings will not be accurate.

RANGE-BOOST

Range-Boost circuitry increases the modulation density in the sidebands and increases the average audio in your signal, permitting it to be heard under conditions which might otherwise make its reception impossible. Never shout or raise your voice since this will not increase the range of your transmission in any way.

PUBLIC ADDRESS OPERATION

Special provision has been made for Public Address (PA) operation, utilizing the microphone and audio stages in the transceiver. For PA operation, you should use an external 16-32Ω speaker connected to the PHONE jack. Set the PA switch to PA, press the push-to-talk button on the microphone and talk into it -- your voice will be heard from the external speaker (which may be mounted on the exterior of a car or building). NOTE: As soon as the microphone push-button is released, the transceiver will return to the normal receive mode to provide CB reception. During PA, the Volume control on the transceiver is inoperative.

OPERATING PROCEDURES

A Citizens Band station is NOT intended to be a replacement for a ham station. Transmission of a "CQ" (calling any station) to alert any station that might be listening is in violation of Citizens Band Regulations. For information on permissible types of communications, you should always refer to Part 95 of the FCC Rules and Regulations.

ADDING NEW CHANNELS

The transceiver is normally supplied with a pair of crystals (one for transmit, the other for receive) inserted in position A for operation on U. S. channel 9 (Canadian channel 6). New channels may be added by inserting additional crystals into the transceiver. Suitable crystals may be obtained from the Lafayette store from which you purchased the transceiver. When requesting crystals, order by stock numbers (s) indicated, and also specify U. S. channel for which operation is required.

Transmit Crystal: #42-0907C (Specify U. S. channel)

Receive Crystal: #42-0137C (Specify U. S. channel)

NOTE: Since the receiver can be manually tuned over 23 channels, it is possible to add only transmit crystals if so desired.

CHANNEL		TRANSMIT CRYSTAL MC	RECEIVE CRYSTAL MC*
U. S.	CANADA		
1		26.965	26.510
2		26.975	26.520
3		26.985	26.530
4	1	27.005	26.550
5	2	27.015	26.560
6	3	27.025	26.570
7	4	27.035	26.580
8	5	27.055	26.600
9	6	27.065	26.610
10	7	27.075	26.620
11	8	27.085	26.630
12	9	27.105	26.650

CHANNEL		TRANSMIT CRYSTAL MC	RECEIVE CRYSTAL MC*
U. S.	CANADA		
13	10	27.115	26.660
14	11	27.125	26.670
15	12	27.135	26.680
16	13	27.155	26.700
17	14	27.165	26.710
18	15	27.175	26.720
19	16	27.185	26.730
20	17	27.205	26.750
21	18	27.215	26.760
22	19	27.225	26.770
23**		27.255	26.800

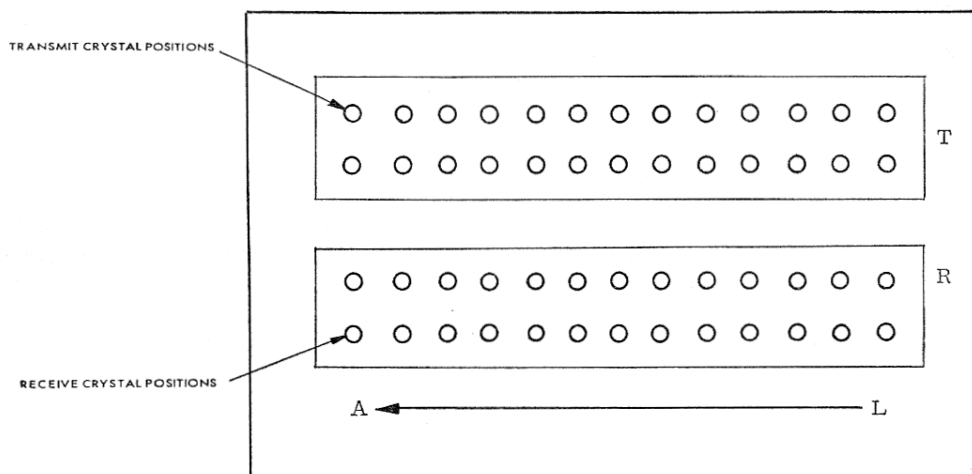
* Receive crystal is 455 Kc (0.455 Mc) lower in frequency than Transmit Crystal.

** Channel 23 is shared with Class C Radio Control.

INSERTING NEW CRYSTALS

IMPORTANT: No circuit adjustments or retuning procedures are necessary when adding crystals to this transceiver. However, FCC regulations require that after the insertion of new crystals, the transmitter frequency be checked by a person holding a valid first or second class commercial radio telephone operator's license.

1. With the front panel toward you, remove the access plate on the top of the transceiver to expose the crystal sockets (see Fig. 6).
2. There are two rows of crystal sockets -- the front row for receive crystals, the rear row for transmit crystals. The 12 pairs of sockets are in alphabetical order, with sockets A (usually containing channel 9 crystals) on the extreme left.
3. The crystals supplied will be suitably marked to permit identification.
4. For convenience, a record should be kept of the channels as they are added, and the positions in which they have been inserted.
5. When crystals have been inserted, replace the access plate and secure firmly.



FRONT
FIGURE 6.

ALIGNMENT INSTRUCTIONS

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

WARNING: FCC REGULATIONS REQUIRE THAT ANY ADJUSTMENTS MADE TO THE TRANSMITTER WHILE ON THE AIR WHICH MIGHT RESULT IN GENERATION OF A SPURIOUS FREQUENCY MUST BE MADE UNDER THE SUPERVISION OF, OR BY, A PERSON HOLDING A VALID FIRST OR SECOND CLASS RADIO TELEPHONE OPERATOR'S LICENSE.

CABINET REMOVAL

CAUTION. BEFORE WITHDRAWING CHASSIS YOU MUST REMOVE ACCESS PLATE ON TOP OF CABINET.

Remove four screws on the underside of the transceiver and five screws on the top of the cabinet. Slide chassis out from the rear of the cabinet.

RECEIVER ALIGNMENT

1. Set the Selector to position A (channel 9 crystals are normally in this position). Set Spot switch off, Squelch at minimum, Receive switch to "xtal", Volume at maximum, Meter switch in the "S" position, and PA switch to "CB".
2. Connect an AC Voltmeter across the speaker terminals.

455 KC IF

3. Connect a signal generator (through a 50 ohm load) to the antenna connector.
4. Vary generator frequency around 455 Kc (modulated signal) until a maximum reading is obtained on the AC voltmeter.
5. Adjust L8, L7, L6 and MF (455 Kc mechanical filter) for maximum output. Reduce generator output so that the lowest possible signal is passed through the IF's. Repeat all adjustments as necessary.

RF ADJUSTMENTS

6. Vary the generator frequency around 27.065 Mc (channel 9) until a maximum reading is obtained on the AC voltmeter.
7. Adjust L3 and L4 for maximum output. Be sure to use a non-metallic alignment tool. Reduce generator output so that the minimum input signal is used. Repeat as necessary.
8. Set generator output level for 100 microvolts. Reading on the "S" meter should be "S-9". If necessary, adjust the "S" meter level control for an S-9 reading. If generator output level cannot be accurately determined, simply adjust the control for zero reading with no signal input to the transceiver.

RECEIVER DIAL CALIBRATION

9. Set the Receive switch to "Tune". Install transmit crystals in the transceiver for channels 1 and 22 (or any other two channels covering the low and high ends of the band).
10. Set the Selector to the position which selects the low channel crystal. Set the receiver tuning dial to this channel and place Spot switch on.

Adjust oscillator coil L5 for maximum output on the "S" meter. CAUTION: Two peaks are obtainable spaced about one turn apart. The correct peak is that which is produced when the coil core will be further inward.

11. Set the Selector to the position which selects the high channel crystal. Set the receiver dial to this channel. Adjust TC-2 for maximum output on the S-meter.
12. Recheck the low end of the band. If calibration has changed, readjust L5 slightly. Repeat steps 10 and 11 until calibration is satisfactory.

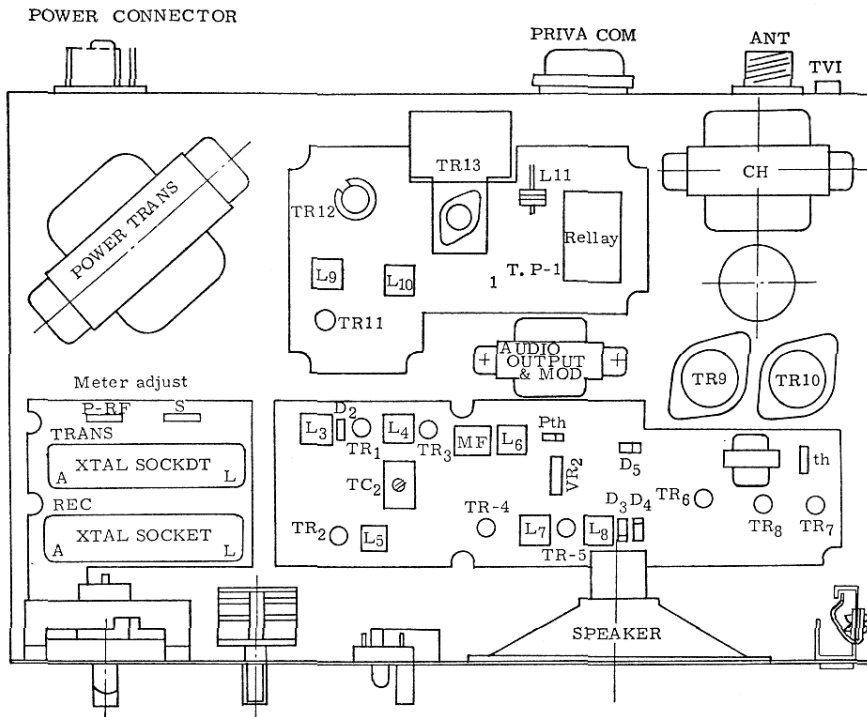


FIGURE 7.

TRANSMITTER ALIGNMENT

1. Connect an RF wattmeter (52 ohms) to the antenna connector.
2. Set the transceiver's selector to channel 9 (usually position A), meter switch in P-RF position.
3. With microphone push-to-talk button depressed, adjust oscillator coil L9 one turn clockwise from point where oscillation stops to insure stable operation.
4. Adjust L10, L11, L12 and TC-1 for maximum output on the RF wattmeter. NOTE: Adjustment of L11, L2 and TC-1 will affect the RF power input to the final. Remember, FCC regulations permit 5 watts maximum input to the final -- this figure cannot legally be exceeded. To determine RF input power, open test point (T. P. 1) circuit of TR13 (final) at RFC4 and measure collector current (on transmit). Reconnect T. P. and measure collector voltage (on transmit). RF power input can then be found as follows : collector current (in milliamps) x collector voltage x .001 = RF input power in watts.
5. Note reading on the transceiver power meter. If it is not the same as that indicated on the RF wattmeter, adjust the P-RF meter level control for the same reading.

**TYPICAL TUBE SOCKET AND
TRANSISTOR TERMINAL VOLTAGES**

TUBE AND TRANSISTOR NO.	PIN NO.	RECEIVE (Volts)	TRANSMIT (Volts)
TR-1	c	8.8	0
	b	1.5	0
	e	0.8	0
TR-2	c	5.8	0
	b	1.9	0
	e	1.6	0
TR-3	c	11.7	0
	b	0.7	0
	e	0.1	0
TR-4	c	10.0	0
	b	1.5	0
	e	0.9	0
TR-5	c	10.5	0
	b	1.7	0
	e	1.1	0
TR-6	c	7.5	0
	b	0.1	0
	e	0	0
TR-7	c	8.2	8.2
	b	2.6	2.6
	e	2.0	2.0
TR-8	c	0.9	0.9
	b	6.2	6.2
	e	6.4	6.4
TR9 and TR10	c	0.02	0.02
	b	11.9	11.9
	e	12.0	12.0
TR11	c	0	10.2
	b	0	-0.6
	e	0	1.8
TR12	c	0	9.5
	b	0	-0.3
	e	0	0
TR13	c	0	11.2
	b	0	-0.5
	e	0	0

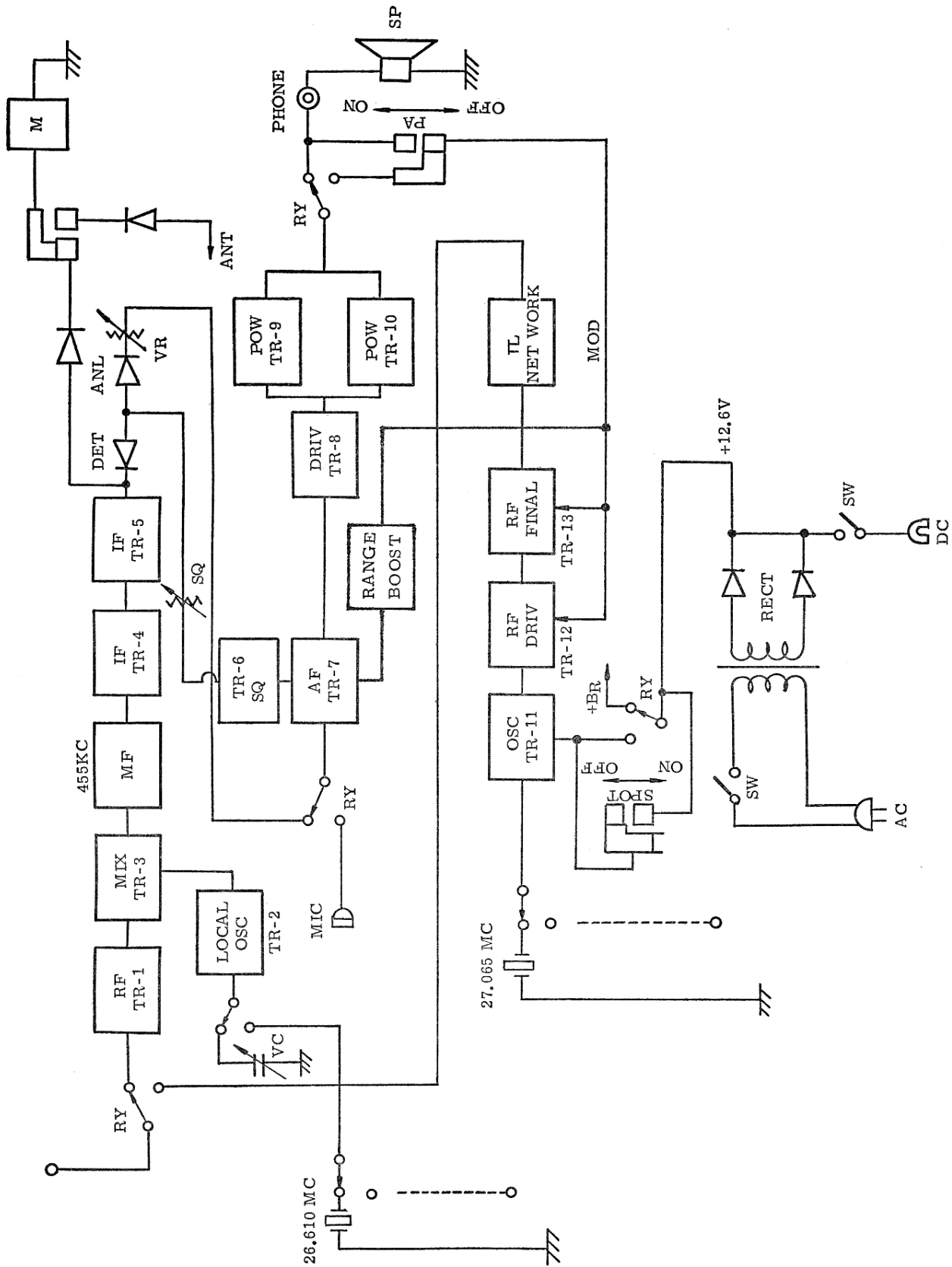
RETURNING THE UNIT FOR REPAIR

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.

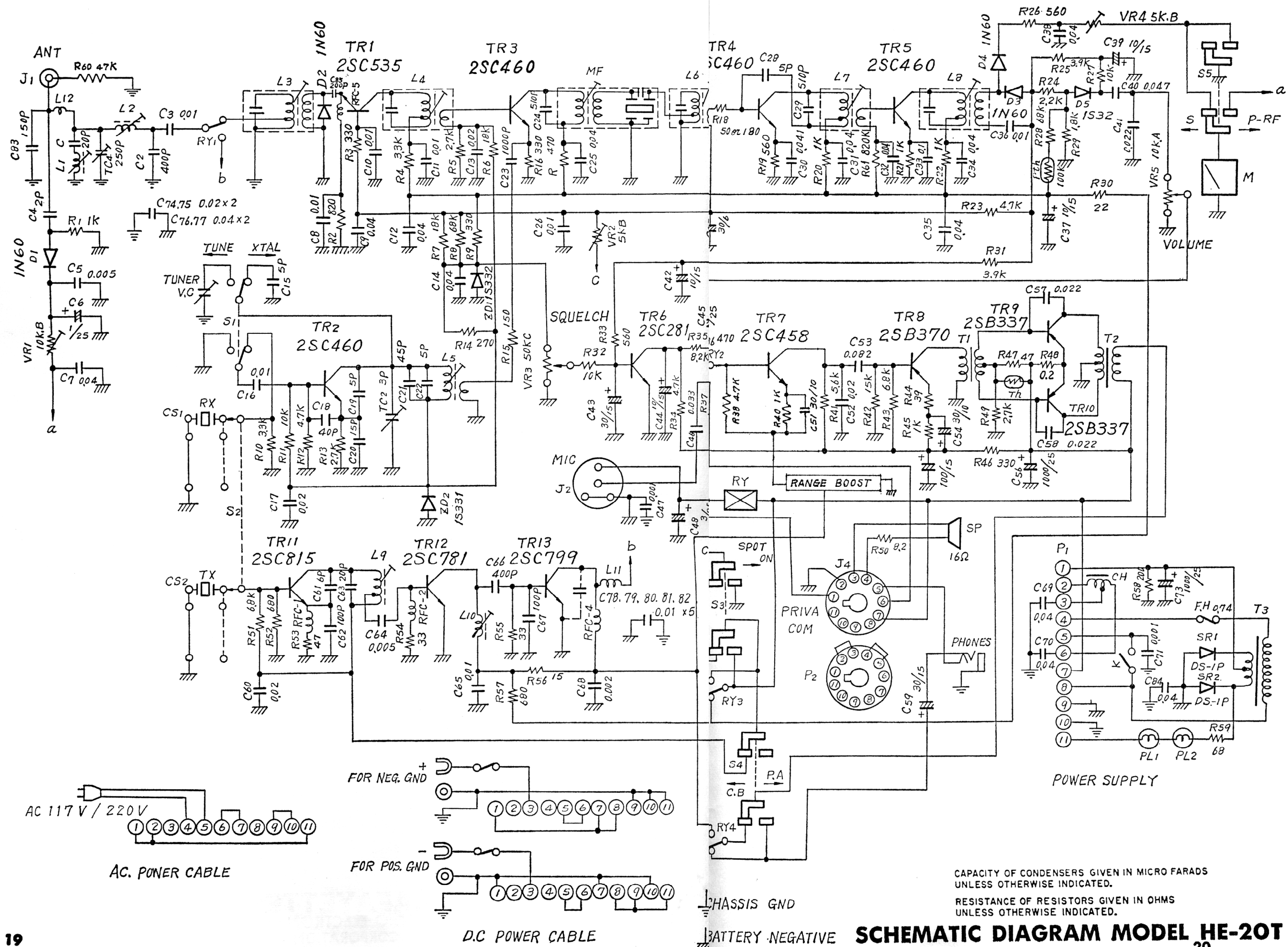
SHIPPING INSTRUCTIONS

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.



FUNCTIONAL BLOCK DIAGRAM HE - 20 T



CAPACITY OF CONDENSERS GIVEN IN MICRO FARADS UNLESS OTHERWISE INDICATED.
RESISTANCE OF RESISTORS GIVEN IN OHMS UNLESS OTHERWISE INDICATED.

SCHEMATIC DIAGRAM MODEL HE-20T