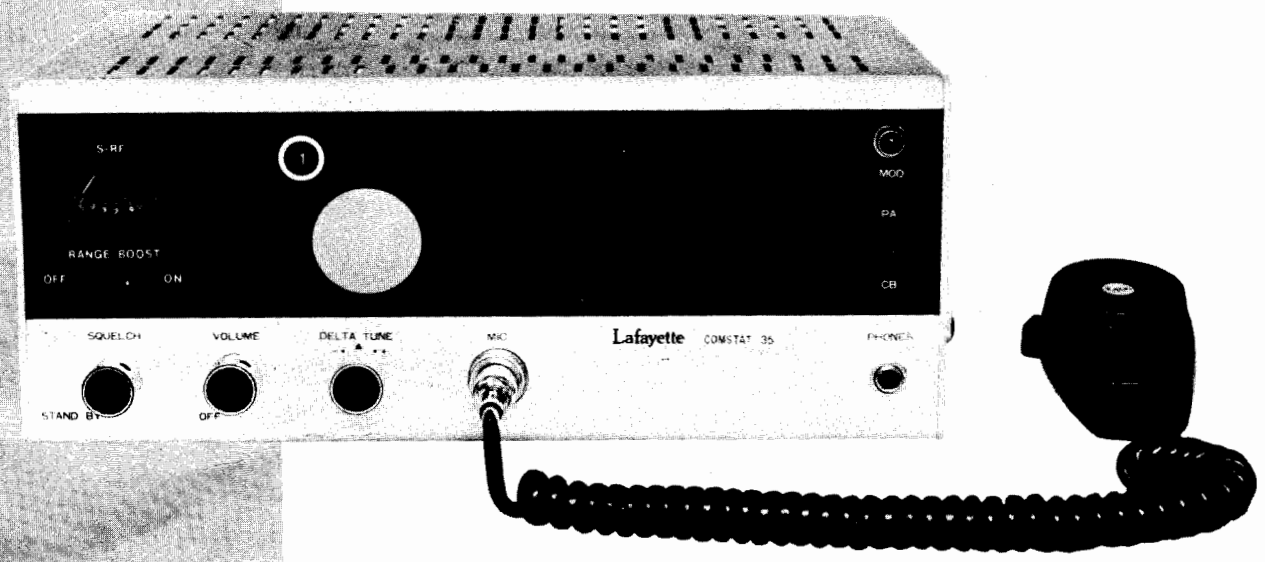
Lafayette

"COMSTAT 35"



STOCK NO. 99-32971W

23-CHANNEL CB TRANSCEIVER

INSTALLATION AND OPERATING INSTRUCTIONS

LAFAYETTE RADIO ELECTRONICS

SPECIFICATIONS

RECEIVER

CIRCUIT TYPE	Dual conversion superheterodyne; crystal-controlled 23 channel reception with "Delta Tuning" capability ±1 KHz on each channel. A crystal frequency synthesizer circuit is used to provide 23 channel operation on transmit and receive.
SENSITIVITY	0.8 μv for 10 db S/N ratio.
SELECTIVITY	6 KHz bandwidth −6 db.
INTERMEDIATE FREQUENCY	1st IF 11.275 MHz, 2nd IF 455 KHz.
IMAGE REJECTION	−75 db.
AUDIO OUTPUT	4 watts into 4" round speaker.
EXTERNAL SPEAKER IMPEDANCE	4–8 ohms.
AUXILIARY CIRCUITS	Full-time Automatic Noise Limiter, Adjustable Squelch, AVC.

TRANSMITTER

PLATE POWER INPUT TO FINAL	5 watts.
MODULATION	AM, via plate modulation; up to 100% capability.
RANGE-BOOST	Yields high average modulation at all times at average speaking levels.
HARMONIC SUPPRESSION	Exceeds FCC requirements.
CARRIER DEVIATION	Exceeds FCC requirement of ± .005%.
ANTENNA MATCHING	Will match resistive antenna loads of 50–70 ohms.
TRANS/REC SWITCHING	Relay switching, push-to-talk on microphone.
PUBLIC ADDRESS	PA facilities using microphone and audio stage in conjunction with an external speaker.

TUBES AND SEMI-CONDUCTORS

		Receiver Function	Transmitter Function
V1	6BL8	RF Amp/1st Mixer	–
V2	6BL8	2nd Mixer/2nd Osc.	–
V3	6BA6	1F Amp [455 KHz]	–
V4	6BA6	1F Amp [455 KHz]	–
V5	12AX7	1st Audio	Modulator/Mic Preamp
V6	6BQ5	Audio Output	Modulator
V7	6GH8	Local Oscillator,	
V8	6GH8	–	Converter/1st Osc.
V9	6BA6	–	Buffer Amp
V10	6BQ5	–	RF Power Amp
V11	12AT7	–	Buffer/Synthesizer
D1	1S1588	Det, AVC	–
D2	1S72	ANL	–
D5	VO6E	–	Range-Boost
D3, D9	1S34	Meter Rectifier ["S"]	Meter Rectifier [RF power]
D6, D8	VO6G	B + Rectifiers [voltage doubler]	
D7	VO6G	Rectifier [Bias Supply]	
D10, D11	VO6E	Absorber	
D12	VO6E	–	Modulation Limiting Diode
D4	VO6C	Squelch Bias	

COMMON

POWER SUPPLY ..... 105–120 volts, 50/60 Hz AC.

POWER CONSUMPTION ..... 117 volts AC: 80 watts max.

DIMENSIONS ..... 12"w x 5"H x 8-1/4"D (excluding knobs and plugs at rear).

NET WEIGHT ..... 17 lbs.

BECAUSE ITS PRODUCTS ARE SUBJECT TO CONTINUOUS IMPROVEMENT, THE LAFAYETTE RADIO ELECTRONICS CORPORATION RESERVES THE RIGHT TO MAKE DESIGN CHANGES OR MODIFICATIONS AT ANY TIME WITHOUT INCURRING ANY OBLICATION TO INCORPORATE THEM IN PRODUCTS PREVIOUSLY SOLD.

GENERAL INSTRUCTIONS

The Lafayette "Comstat 35" is a combination transmitter and receiver designed for use in Class "D" operation in the 11 meter citizens radio service. It is designed to meet the Federal Communications Commission requirements applicable to equipment operating in this service under class "D" emission, and not to be used for any other purpose. Rules 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. Copies of Manual VI [covering the FCC regulations for the Citizens Band Radio Service] includes Part 95 and are available 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. A properly completed Identification Card Form 452-C must be attached to the transmitter.

The transceiver will provide economical and reliable radio communication in its intended application if installed and operated in accordance with instructions contained herein.

GENERAL DESCRIPTION

RECEIVER SECTION

The receiver is designed to receive amplitude modulated signals in the 26.965 to 27.255 MHz [11-meter] citizens band. The circuit is a highly sensitive and selective dual-conversion superheterodyne type, with one RF and two IF amplifiers. The unit employs a frequency-synthesized circuit in which 12 crystals [all supplied] are used to provide full 23 channel crystal-controlled operation [receive and transmit], switch-selected from the front panel.

Features incorporated into the receiver section include an S-meter for reading signal strength, a full time automatic noise limiter, and an adjustable squelch control which can be used to "quiet" the receiver when no signal is being received. The receiver also includes "Delta tuning"—a three position switch which permits fine tuning of ±1 KHz. This feature, which is crystal-controlled, permits optimum reception of station that may be slightly off frequency.

TRANSMITTER SECTION

The transmitter is designed to transmit amplitude modulated signals in the 26.965 to 27.255 Mc [11-meter] citizens band. The frequency synthesized circuit used for receive is also common to the transmitter and used in the transmit mode to provide full 23 channel crystal-controlled operation. A push-to-talk button on the ceramic microphone [supplied] offers reliable relay switching. Plate modulation is employed [100% capability], with up to 5 watts plate power input to the final RF. Also included is a special "Range-Boost" circuit which, when "on", concentrates more audio power into the sidebands by providing maximum modulation on all syllables. This feature offers maximum communication distance when noisy conditions make reception of your signal difficult. A relative RF power meter [which automatically functions as an S-meter on receive] indicates relative RF power at the antenna. An added feature is a provision for public address, utilizing the microphone and audio circuits to feed an external speaker connected to the Phones output jack.

POWER SUPPLY

The transceiver is designed to operate from either 105–120 volts, 50/60 Hz AC or 12.6 volts DC [Optional]. An AC power supply cable is supplied with unit for AC operation. Simply plug the AC power cable into the 8-pin "POWER" socket located at the rear of the unit.

If you wish to operate the transceiver on 12.6 volts DC you may order an optional package [Lafayette Stock No. 99-63851] including a DC power cable, mobile mounting bracket, knurled screws [used for fastening mounting bracket to chassis] and hardware.

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 INSTALLATION

The microphone bracket may be installed on the left or right-hand side of the transceiver as shown Figure 1.

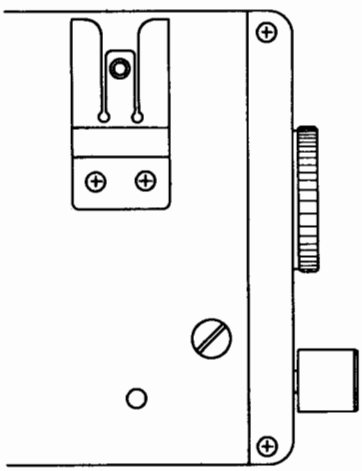


Figure 1. Microphone Bracket Installation

AC POWER CONNECTION

Connect the AC power cord [supplied] to the transceiver by attaching the 8-pin female connector [on one end of power cord] to the 8-pin male connector on the rear of the unit marked "POWER".

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 position of the "VOLUME" control], insert the AC plug at the other end of the cord into an outlet supplying 105–120 volts, 50/60 Hz AC. For protection, the AC input to the transceiver is fused [the fuse is located within the transceiver].

MICROPHONE CONNECTION

Attach the 4-pin male connector at the end of the microphone coil cord to the 4-pin female connector located on the front of the transceiver. Secure it firmly by means of the knurled securing ring.

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.

BASE STATION ANTENNAS

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

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 Antennas" [2nd Ed. Sams] is particularly recommended. This book offers a complate 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.

ANTENNA CABLE

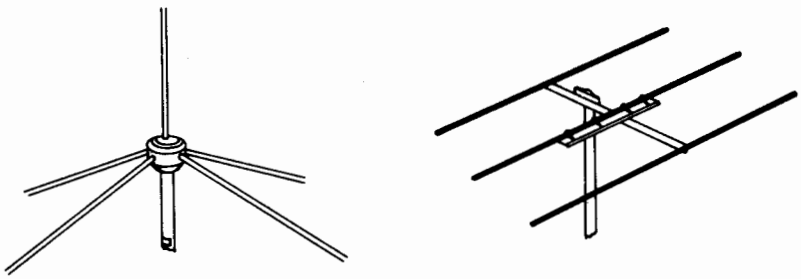
In a base station installation, an exceptionally long lead-in cable may be required. When lengths of over 50 feet are necessary, RG-8/U coaxial cable is more suitable since it offers lower loss than RG-58/U.

SHORT RANGE

A short, center-loaded whip antenna [Stock No.99-31890] is a vailable from Lafayette Radio Electronics. This antenna mounts directly onto the antenna connector on the transceiver and is ideally suited for short-range communications within buildings, or from building to building.

LONG RANGE

There are two basic types of long-range antennas as shown in Figure 2.



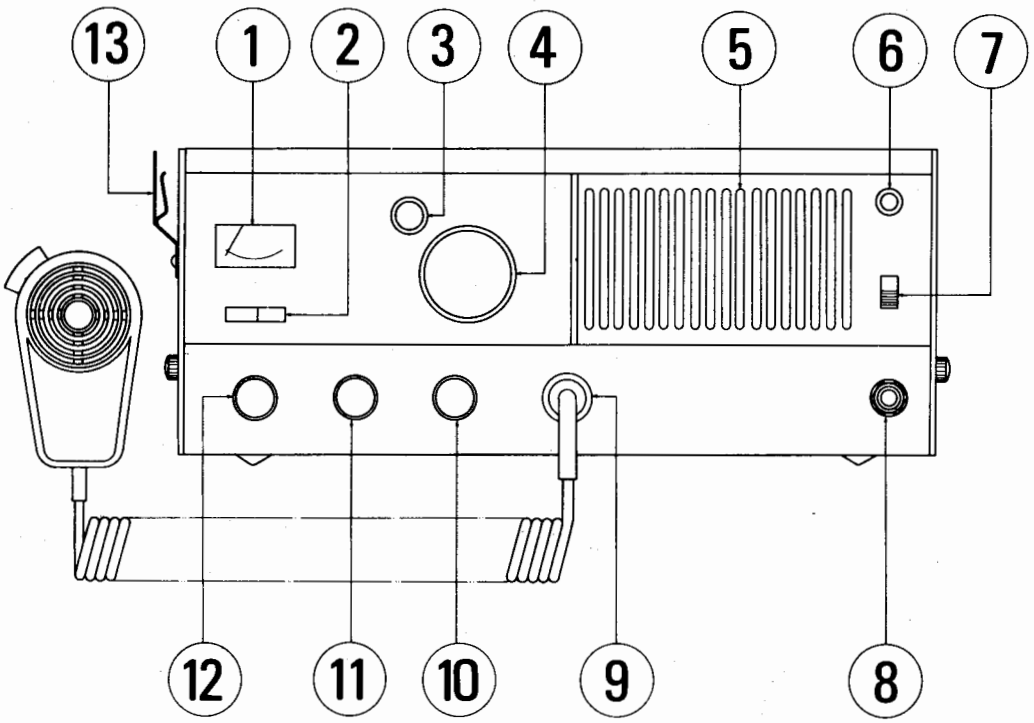
(A) GROUND PLANE **(B) DIRECTIONAL BEAM ANTENNA**

Figure 2. Base Station Antennas

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-long range communications work.

B. Directional Beam Antennas. Highly efficient and directional antennas generally intended for fixed-to-fixed long range communications.

OPERATING CONTROLS AND FEATURES



[1] ILLUMINATED METER ..... Automatically indicates relative strength [in "S" units] of incoming signal or RF antenna power [in watts] of the transmitter.

[2] RANGE-BOOST ..... Concentrates more audio power into the transmitted sidebands by providing high average modulation on all syllables, offers maximum communication distance when noisy conditions make reception of your signal difficult.

[3] CHANNEL INDICATOR ..... Illuminated dial shows channel to which the transceiver is set.

[4] CHANNEL SELECTOR ..... Continuously rotating switch that selects any one of 23 CB channels.

[5] SPEAKER ..... PM-type 4" round speaker located behind grille.

[6] MODULATION INDICATOR ..... Functions as modulation indicator on transmit.

[7] PA-CB ..... "CB" position provides normal operation. "PA" position permits Public Address operation on transmit when an external speaker is connected to the "PHONES" jack. On receive, "PA" position provides channel monitoring over the external speaker.

[8] PHONES JACK ..... Standard phone jack for headphones or external speaker [4–8 ohms]. Insertion of plug into the jack automatically silences the internal speaker.

[9] MICROPHONE JACK ..... Four-pin socket for connection of push-to-talk ceramic microphone supplied with transceiver.

[10] DELTA TUNING SWITCH ..... This is a three position switch[−1.0 KHz, Normal, + 1.0 KHz] which permits slight adjustment of receiver tuning for clearer reception of stations that are slightly off frequency.

[11] VOLUME/ON-OFF SWITCH ..... Varies the sound output from the speaker during CB reception. Also incorporates an on-off power switch at the extreme counter-clockwise position.

[12] SQUELCH/STANDBY ..... This control is used to "quiet" the receiver during "no-signal" conditions. Degree of sensitivity to incoming signals is adjustable. Fully counter-clockwise position switches to Standby.

[13] MICROPHONE CLIP ..... Hang-up clip for microphone [supplied spearately for installation in various positions].

OPERATING INSTRUCTIONS

Make sure the transceiver is properly installed as indicated previously, and that the attenna and power source are connected. If you have already done so, plug in the microphone.

CAUTION: NEVER ATTEMPT TO TRANSMIT WITHOUT AN ANTENNA CONNECTED TO THE TRANSCEIVER.

RECEIVING MODE

1. Place the "PA-CB" switch in the "CB" position.

2. Rotate the "SQUELCH" control to the extreme counter-clockwise position [without operating the Standby switch] .

3. Select desired channel by rotating the Channel Selector to the appropriate position, as indicated by the Channel Indicator.

4. Rotate the VOLUME/ON-OFF switch clockwise until a discernable click is heard. The "S" meter dial light should glow softly. Advance the volume control to about 1/3 setting. As the unit warms up, the characteristic noise [rushing sound] of a high gain receiver should be heard. Adjust to a comfortable listening level. The receiver is now ready for operation.

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 relatively 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 – but without operating the Standby switch.

In the "Standby" position of the Squelch control, the high voltages [B+] in the transceiver are switched off but filament voltages are still maintained. This reduces power consumption when the unit is not in actual use while allowing the transceiver to remain in a "warmed-up" condition ready for instant use when needed [simply rotate Squelch clockwise to operate the switch] .

DELTA TUNING

The "DELTA TUNE" switch acts as a "fine tuning" control [±1 KHz] and may be used for reception of a station that is slightly off-frequency. Try all positions and select the one that provides the best reception.

IMPORTANT NOTE: When better reception is obtained with the "DELTA TUNE" switch in either the plus ⊕ or minus ⊖ position, there is always the possibility that the station you are receiving is actually on an adjacent channel. While this is not usual, it can occur when the received station is off frequency or when the incoming signal is of sufficient strength to overcome the normal high selectivi-

ty of the receiver. To determine whether you are actually tuned to the correct channel, simply switch to each adjacent channel in turn, and note whether better reception [and higher "S" reading] is obtained with the "DELTA TUNE" switch in the normal [center] position.

"S"/RF POWER METER

This meter is automatically switched to indicate incoming signal strength in the receive mode, and relative RF power output in the transmit mode.

During reception, the "S" meter provides a relative indication of signal strength in "S" units and thus offers a basis for comparison between one incoming signal and another. The S-meter circuit has been pre-adjusted at the factory to indicate "S-9" with 100 microvolts at the antenna input. The meter reading may be readjusted by means of a control located at the rear of the transceiver. Normally, the "S" meter should read "0" with no antenna connected.

During transmission, 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 completely accurate.

TRANSMITTING

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

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.

VIOLATORS OF ANY OF THE ABOVE ARE SUBJECT TO SEVERE PENALTIES

Before attempting to transmit, always make sure that the "PA-CB" switch is in the "CB" position. To transmit, simply depress the push-to-talk button on the microphone. Hold the microphone 3 to 5 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. A design feature of this transceiver is that high average modulation can be achieved easily at normal voice levels.

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 he is transmititng – each must take turns. To receive again, simply release the microphone push-to-talk button.

RANGE-BOOST

If the station you are attempting to contact reports difficulty in receiving you due to ignition noise, interference, excessive background noise, etc., switch the Range-Boost "on" and speak normally into

the microphone. Special circutry will increase the modulation density in the sidebands and increase 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 when using "Range-Boost" 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 4–8 ohm speaker connected to the PHONES jack. Set the "PA-CB" switch to "PA" and press the push-to-talk button on the microphone and talk into it – your voice will be heard from the external speaker.

NOTE: As soon as the microphone push-button is released, the transceiver will return to the normal receive mode to provide CB reception.

SERVICE AND MAINTENANCE

The transceiver was carefully designed to provide reliable service over a long period of time. However, in common with all electronic equipment, a component may fail or change characteristics, and thus necessitate replacement of the faulty part. Certain items, such as tubes and pilot lamps, will age and may become defective. However, these can be easily replaced by the user if he wishes to do so. More serious failures will usually require the services of a competent technician.

As an aid to the service technician, this manual contains a complete voltage chart, a layout diagram identifying tubes, transformers, coils, etc., a schematic diagram, and a functional block diagram. Also included are instructions for aligning the receiver and transmitter sections.

WARNING: BEFORE REMOVING THE TRANSCEIVER TOP OR BOTTOM COVERS MAKE SURE THE AC POWER CABLE COMING FROM THE UNIT IS DISCONNECTED FROM THE AC OUTLET, AS HAZARDOUS VOLTAGES MAY BE PRESENT WITHIN THE UNIT.

CABINET REMOVAL

Disconnect the power cable and the antenna cable. To detach the top cover, remove four large slotted-head screws [two each side]. To detach the bottom cover, remove six screws on the underside of the cabinet.

TUBES

Tubes may be checked in a do-it-yourself tube tester in a neighborhood store, or may be taken to a service shop for testing. Replace any weak or defective tubes with new ones of identical type. Before replacing tubes in the transceiver, refer to the Interior Layout Diagram which shows the correct tube locations.

PILOT LAMPS

There are two pilot lamps used in the transceiver. One of these is built into the meter, and the other provides illumination for the channel dial plate. Both are run considerably below their maximum rating and should therefore last almost indefinitely.

FUSES

Provision has been made for fusing the transceiver during 117 volt AC operation by means of a 2 amp fuse located within the transceiver [remove bottom cover for access to the fuse]..

In the event of complete failure [tube filaments and pilot lamps not lighting], the fuse should always be checked first. If it has failed, replace only with one of a similar rating. Repeated failure of a fuse would indicate a serious fault in the transceiver which should be investigated.

RECEIVER ALIGNMENT

455 KHz IF ADJUSTMENT

Connect the transceiver to an AC outlet and attach the microphone. Turn volume to its mid-position squelch at minmium, and the "PA-CB" switch to the "CB" position. Set the "DELTA TUNE" switch to the center [normal] position and the Channel Selector to channel 13.

Connect an AC voltmeter [VTVM] across the speaker terminals on the transceiver. Alternatively, the meter can be connected to the "PHONES" jack by means of a standard phone plug.

Connect a 455 KHz signal generator [modulated 30% at 1 KHz] to pin 2 of V2 [6BL8]. Make certain the output frequency of the generator is within 1 KHz of 455 KHz, Increase generator output until the VTVM reads approximately 0.5 volts.

Adjust the top and bottom tuning cores of T3, T4 and T5 for maximum output. Reduce generator output progressively as circuits come into line so that VTVM reading does not exceed about 0.5 volts. When no further increase can be obtained by adjusting the cores, disconnect the signal generator and proceed with the 11.275 MHz IF adjustments.

11.275 MHz IF ADJUSTMENT

Connect the signal generator to pin 9 of VI [6BL8], with the VTVM connected to the speaker terminals. Make sure the DELTA TUNE switch is in the normal, center position. Tune the generator in the vicinity of 11.275 MHz until a maximum reading is obtained on the VTVM. Reduce generator output level until the meter indicates about 0.5 volts. Adjust top and bottom cores of T2 for maximum reading, reducing generator output if necessary so that reading does not exceed 0.5 volts.

SECOND OSCILLATOR

The second oscillator V2B [6BL8] is crystal-controlled. The DELTA TUNE switch permits fine tuning of the receiver and has a total range of about ±1 KHz. A normally functioning oscillator will develop approximately −1.5 to −8 volts at pin 9 of V2B. Differences in individual crystal activity will cause a variation in grid voltage from crystal to crystal.

LOCAL OSCILLATOR

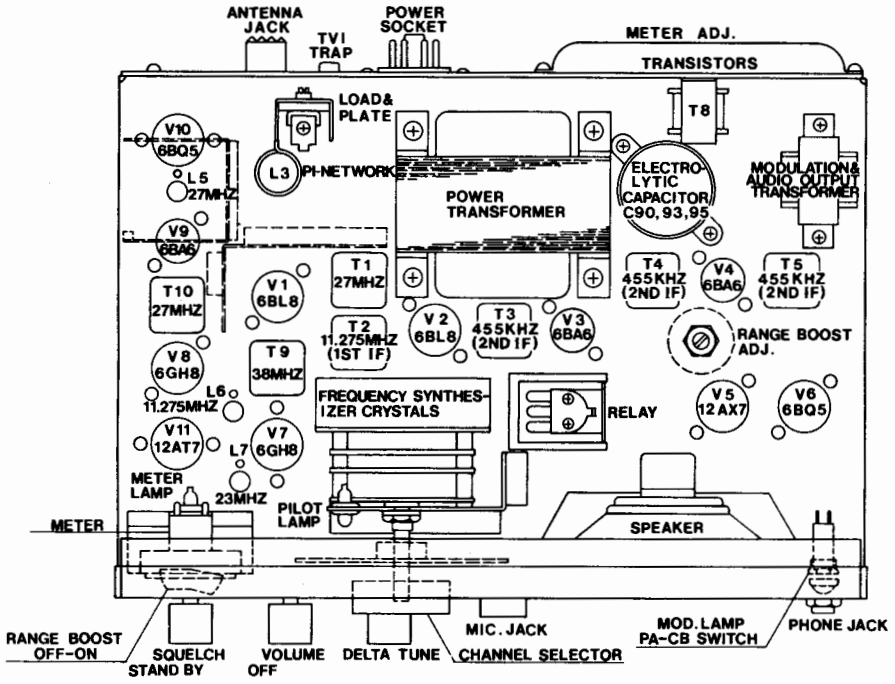
The master local oscillator, V7A, is crystal-controlled and is used during both transmit and receive. A normally functioning oscillator will develop approximately −4.5 volts at pin 9 of V7 [see voltage chart]. Differences in individual crystal activity will cause a variation in the voltage measured at this point.

The local oscillator is tuned as follows: adjust the bottom core of L7 for maximum negative reading at pin 9 of V7A with the channel selector switch set to channel 23, then back off from peak in a clockwise direction to about 70% of the maximum reading. Check all channels for activity. A defective crystal will produce zero voltage at pin 9 in four consecutive channels.

After this adjustment has been made, check transmitter output frequency to make sure it is within FCC specification on all channels. Readjust L7 if necessary.

SYNTHESIZER, 2nd LOCAL OSCILLATOR

The synthesizer [V11B] is used during both transmit and receive. A normally functioning oscillator will develop approximately −0.3 volts at V7 pin 2 [see voltage chart], depending upon crystal activity. The output from V7A and the output from V7B produce a 38 MHz output in the plate circuit of V11B. T9 being tuned to this frequency.



RF ADJUSTMENTS

When it has been ascertained that all oscillators are functioning normally, connect the signal generator [modulated 30% at 1 KHz] to the antenna connector. Use RG58/U or equivalent 52 ohm cable. Set generator output to approximately 10 μV, and switch receiver to channel 13. Tune the generator around 27.115 MHz until a signal is heard in the receiver. Adjust the generator output frequency for maximum output voltage reading on the VTVM [at speaker termianls]. Adjust the top and bottom tuning cores of T1 for maximum output.

"S" METER ADJUSTMENT

After receiver alignment has been completed, adjust "METER ADJ" [VR1, located on the rear panel] for a "S-9" reading on the "S" meter with 100 μV at the antenna input and transceiver Channel Selector set to channel 13. Refer to Figure 3.

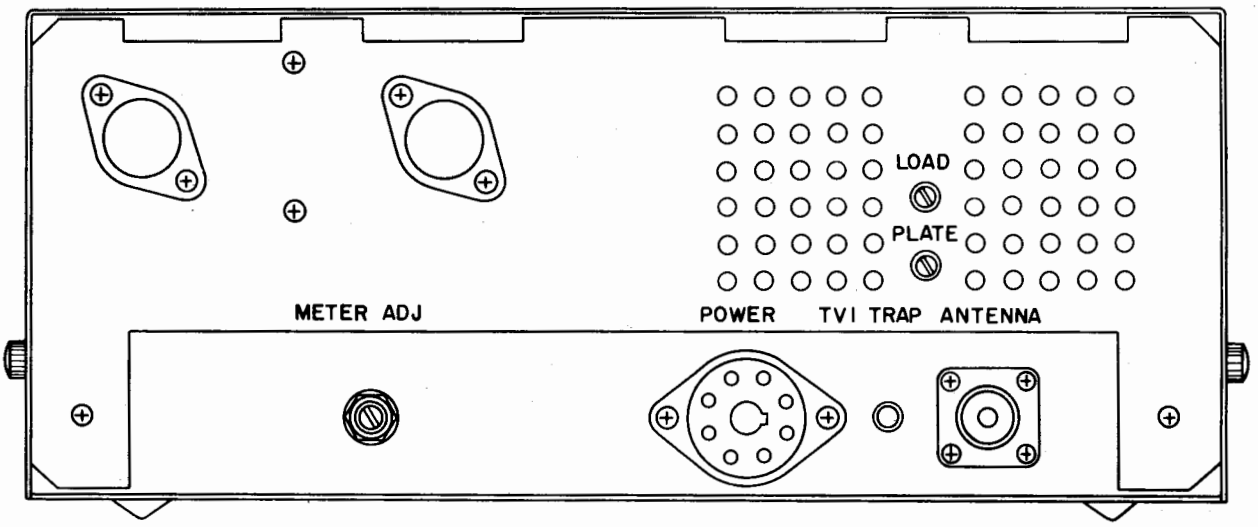


Figure 3. Transceiver Rear Panel View

TRANSMITTER ALIGNMENT

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.

The detailed operation and alignment of the local oscillator and synthesizer has been covered previously. Both oscillators are used for the transmit operation.

In the receive mode, B + is removed from V8 and V9 and a large bias is applied to the grid of the RF power output tube V10. In the transmit mode, B + is removed from V1, V2, V3 and V4 in the receiver and applied to V8 and V9 in the transmitter. The bias formerly applied to V10 is removed.

NOTE: Connect a 50 OHM dummy load to antenna connector before proceeding [use two 100 ohm 2 watt resistors in parallel].

Connect VTVM [with AC probe] to pin 1 of V9. With mike button pressed, adjust T10 for maximum reading on channel 13. A reading of approximately 1.4 volts is normal. Failure to obtain any indication on VTVM may indicate trouble in the 11.275 MHz converter stage. If the receiver is normal, it is likely that the trouble lies beyond T9, in which case V8 or the 11.275 MHz crystal should be suspected. After this adjustment has been made, check transmitter output frequency to make sure it is within FCC specification on all channels. Readjust L6 if necessary.

Connect VTVM [with series resistor] to pin 2 of V10. Adjsut L5 for maximum reading on channel 13. A reading of approximately −15 volts is normal. At this point, check all channels with an RF wattmeter connected to the antenna connector. Make sure that there is approximately equal power output on all channels. If output is low on some channels, slightly re-adjust L5 for same reading on all channels.

MAXIMUM RF OUTPUT

The "LOAD" [VC3] and "PLATE" [VC4] adjustments [see Figure 3] should now be adjusted for maximum power output indication on an RF wattmeter. These adjustments affect the power input to the final amplifier.

IMPORTANT: The maximum RF input power has been set at 5 watts by the FCC. Therefore, when making this adjustment for this unit, make sure that 5 watts RF input power is not exceeded.

The RF power input may be determined as follows: check the voltage across resistor R55 [1K, 2W]– it should not exceed 19 volts. This figure has been arrived at on the basis of an average of 223 volts on the plate with 19 mA plate current – 223 x 0.019 = 4.24 watts.

If the voltage measured across R55 is higher than 19 volts, rotate the "LOAD" adjustment screw fully clockwise and then peak the "PLATE" adjustment screw for maximum. Now readjust the "LOAD" adjustment screw counter-clockwise until a reading of 19 volts is measured across R55, Then, re-adjust the "PLATE" adjustment screw for maximum. If necessary, re-adjust the "LOAD" and "PLATE" adjustment screws until no further change is indicated.

MODULATION ADJUSTMENT

Connect a modulation monitor to the transceiver. Connect the shield lead of an audio generator to a ground point on the transceiver. Connect the "hot" center lead of the generator in series with a .05 mid condenser to pin 1 of the microphone jack. Set generator frequency to 1 KHz, and adjust same to 40 mV output. Set the "RANGE BOOST" switch to the "ON" position and adjust VR4 to produce 80% modulation.

To recheck the adjustment of VR4, leave the Range Boost switch in the "ON" position and adjust the generator output [5 mV] so that the modulation monitor indicates 50%. Now set the "RANGE BOOST" switch to the "OFF" position, and the modulation monitor should indicate a lower percentage of modulation that requires an increase of 10 db in input level [15 mV] to produce 50% modulation.

NOTE: Following the above steps will produce 100% modulation on speech. In no case shall modulation exceed 100%.

TV INTERFERENCE TRAP

This transceiver contains a built-in adjustable network in series with the antenna. When tuned correctly, it suppresses television interference. This network is a filter which offers little opposition to the transmitter frequency but will help eliminate the second harmonic radiation.

Turn on a TV receiver that you can see from your transmitting location, and tune to one of the three lower TV channels that has a station-operating in your vicinity. If you notice a "cross-hatch" or "wavy line" pattern on the screen while you are transmitting, it will be necessary to adjust the RF network coil slug screw [L1], marked "TV1 TRAP" in rear of cabinet, to eliminate or minimize this interference. This will usually only be necessary when the transmitter antenna is located near the TV antenna, or that of a neighbor.

FREQUENCY SYNTHESIZING SYSTEM

This transceiver employs a method whereby 10 crystals are used in various combinations to produce 23 fundamental oscillator frequencies (See Table A). This arrangement, known as frequency synthesis, permits full 23 channel crystal-controlled operation on both transmit and receive using relatively few crystals. Selection of the proper combinations of crystals in the transceiver is completely automatic in each case, and no special procedures are required by the operator other than the normal operation of a single-control channel selector switch. The tables which follow show the particular crystals used for each channel. It should be noted that failure of one crystal will lead to malfunction on a number of channels. If malfunction on a number of channels is experienced therefore, refer to Table B which will offer a quick means of determining which crystal may have failed.

TABLE A

U.S. Channel	Channel Frequency	Crystals Used	Derived Freq.
1	26.965 MHz	1 and 7	38.240
2	26.975 MHz	1 and 8	38.250
3	26.985 MHz	1 and 9	38.260
4	27.005 MHz	1 and 10	38.280
5	27.015 MHz	2 and 7	38.290
6	27.025 MHz	2 and 8	38.300
7	27.035 MHz	2 and 9	38.310
8	27.055 MHz	2 and 10	38.330
9	27.065 MHz	3 and 7	38.340
10	27.075 MHz	3 and 8	38.350
11	27.085 MHz	3 and 9	38.360
12	27.105 MHz	3 and 10	38.380

U.S. Channel	Channel Frequency	Crystals Used	Derived Freq.
13	27.115 MHz	4 and 7	38.390
14	27.125 MHz	4 and 8	38.400
15	27.135 MHz	4 and 9	38.410
16	27.155 MHz	4 and 10	38.430
17	27.165 MHz	5 and 7	38.440
18	27.175 MHz	5 and 8	38.450
19	27.185 MHz	5 and 9	38.460
20	27.205 MHz	5 and 10	38.480
21	27.215 MHz	6 and 7	38.490
22	27.225 MHz	6 and 8	38.500
23	27.255 MHz	6 and 10	38.530

Note that the derived frequency is exactly 11.275 MHz higher than the channel frequency in each case. During transmit, the derived frequency is converted to the channel frequency by the 11.275 MHz crystal oscillator V8b. During receive, the derived frequency is heterodyned with the incoming channel frequency at the 1st Mixer/1 F [V1B] to produce a 1st IF of 11.275 MHz.

TABLE B

Crystal	Frequency	Used in Channels (Transmit & Receive)
1	23.290 KHz	1, 2, 3, 4
2	23.340 KHz	5, 6, 7, 8
3	23.390 KHz	9, 10, 11, 12
4	23.440 KHz	13, 14, 15, 16
5	23.490 KHz	17, 18, 19, 20

Crystal	Frequency	Used in Channels (Transmit & Receive)
6	23.540 KHz	21, 22, 23
7	14.950 KHz	1, 5, 9, 13, 17, 21
8	14.960 KHz	2, 6, 10, 14, 18, 22
9	14.970 KHz	3, 7, 11, 15, 19
10	14.990 KHz	4, 8, 12, 16, 20, 23

Failure of any one of the ten crystals used will cause a malfunction on a group of channels, as indicated above. For example, failure of crystal 1 would cause the transceiver to be inoperative on channels 1, 2, 3 and 4; failure of crystal 7 would cause the transceiver to be inoperative on channels 1, 5, 9, 13, 17 and 21.

VOLTAGE CHART

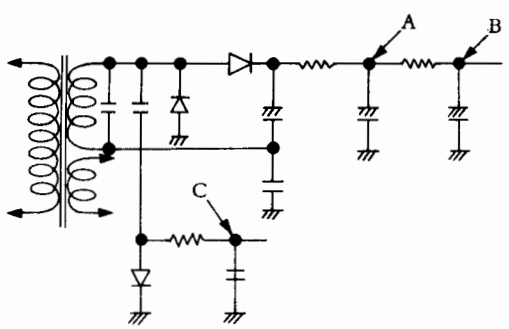
1. All readings taken with VTVM from chassis (negative) to point indicated.
2. Input to transceiver set at 117 volts AC. Similar readings are obtained with 12.6 volts DC input.
3. Transceiver set to channel 13.
4. PA/CB switch in CB position, VOLUME and SQUELCH at minimum (counter-clockwise), DALTA TUNE SW in center (normal) position.
5. 50 ohm dummy load connected to antenna connector.
6. Readings on individual units may vary by as much as ±20%.

NDV = No detectable voltage. NC = No connection. NM = Not measurable.

TUBE VOLTAGES

TUBE	MODE	PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
6BL8 V1	TR	100	NDV	90	H	H	240	0.8	3.5	NDV
	REC									
6BL8 V2	TR	30	NDV	125	H	H	115	2.3	0	−5*
	REC									
6BA6 V3	TR	NDV	0	H	H	230	78	0.9		
	REC									
6BA6 V4	TR	NDV	0	H	H	230	65	0.9		
	REC									
12AX7 V5	TR	90	NDV	0.9	H	H	90	NDV	0.7	NC
	REC	90	NDV		H	H	85	NDV	0.65	NC
6BQ5 V6	TR	NC	NDV	4.7	H	H	NC	250	NC	200
	REC	NC	NDV	5.0	H	H	NC	270	NC	215
6GH8 V7	TR	65	−0.3*	65	H	H	100	0.06	0	−4.5*
	REC	70	−0.3*	70	H	H	115	0.06	0	−5.0*
6GH8 V8	TR	100	−0.4*	110	H	H	180	2.0	0	−1.7*
	REC									
6BA6 V9	TR	NDV	0	H	H	210	180	1.8		
	REC									
6BQ5 V10	TR	NC	−15*	2.0	H	H	NC	NM	NC	223
	REC									
12AT7 V11	TR	100	NDV	0	H	H	100	NDV	0	
	REC	100	NDV	0	H	H	110	NDV	0	

* Measured with 1 megohm resistor in series with DC probe. Reading may vary at grid pins, depending on crystal activity.



Point	TR	REC
A	255 V	269 V
B	197 V	218 V
C	− 94 V	− 117 V

RETURNING THE UNIT FOR SERVICE

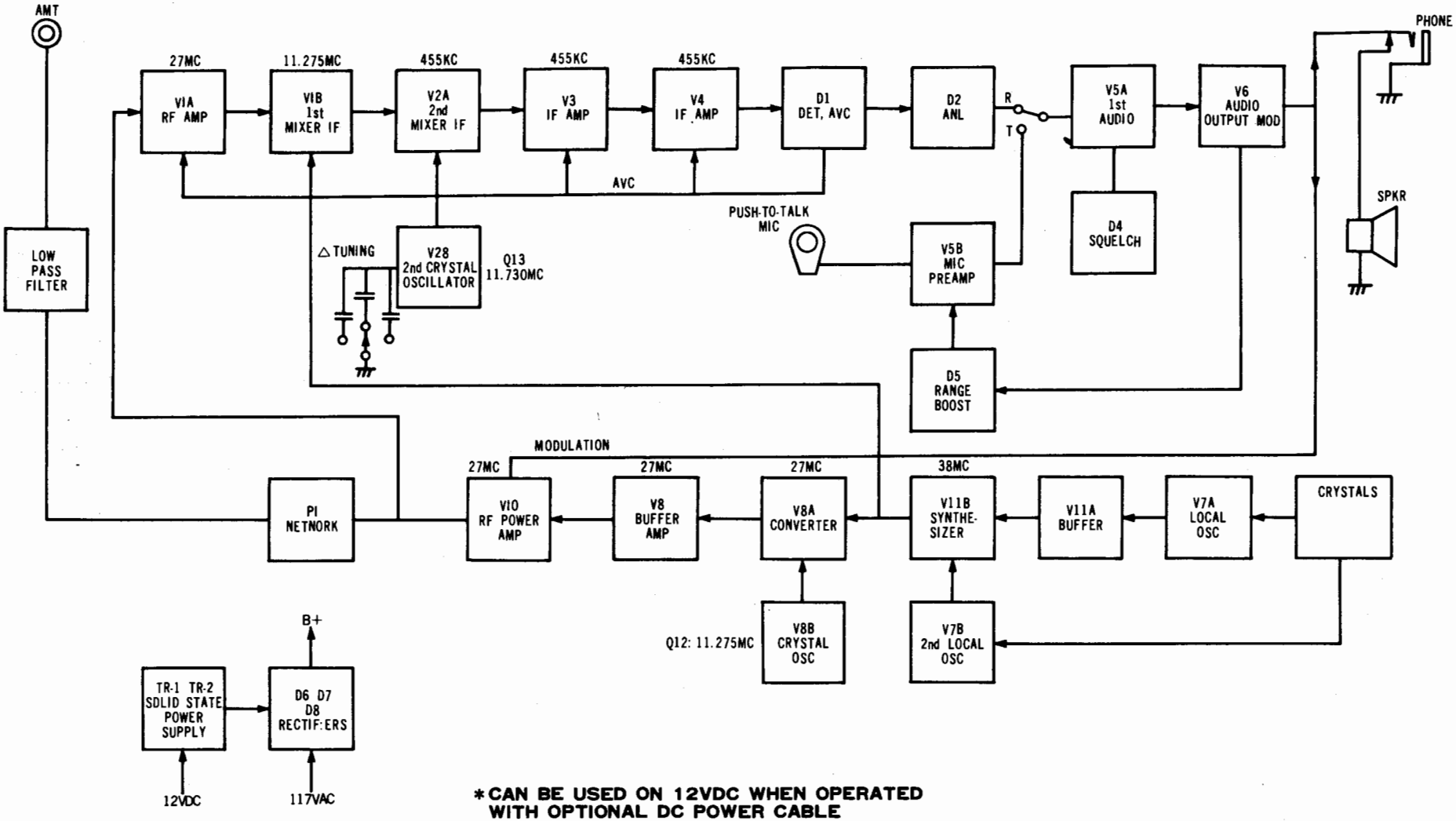
In the event that repair is necessary [either in or out of warranty], we recommend that you return the unit to the store from which it was purchased. In most cases, this will be your fastest and most efficient method of obtaining service.

If you wish to ship the unit to our main service center, 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 6 inches of crumpled newspaper or other packing material packed tightly around the unit to avoid any chance of damage in shipment. Be sure to use strong cord on tape around carton. If this unit is being returned under warranty, it must be accompanied by a copy of the original sales ticket or shipping documents to establish date of purchase. Also, include with the unit a letter explaining exactly what difficulties you have encountered [remember to add extra First Class 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.
150 Engineers Road
Hauppauge, L.I., N.Y. 11787



***CAN BE USED ON 12VDC WHEN OPERATED WITH OPTIONAL DC POWER CABLE**

LAFAYETTE "COMSTAT 35" FUNCTIONAL BLOCK DIAGRAM

7—75 AK—OK

Lafayette RADIO ELECTRONICS CORPORATION

111 Jericho Turnpike, Syosset, L.I., New York 11791

Printed in Korea

MOBILE OPERATION FOR COMSTAT-35 TRANSCEIVER

An optional package [Stock No. 99-6385] is available from Lafayette Radio Electronics for 12.6 volts DC operation. This package includes a DC power cable, mobile mounting bracket, knurled screws [used for fastening the mounting bracket to transceiver chassis]and hardware.

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. The transceiver may be mounted to the underside of the instrument panel or dashboard of a car, truck, etc., by means of the special mounting bracket that is supplied with this package. Attach the bracket to the underside of the instrument panel using the four self-threading screws provided. Figure 1 illustrates the manner in which the transceiver is mounted. Secure the transceiver to the bracket by means of the large knurled screws [two each side] Note that the bracket has additional holes for the front pair of securing screws. These will allow the transceiver to be set to an angle which provides the operator with the best view of the front panel.

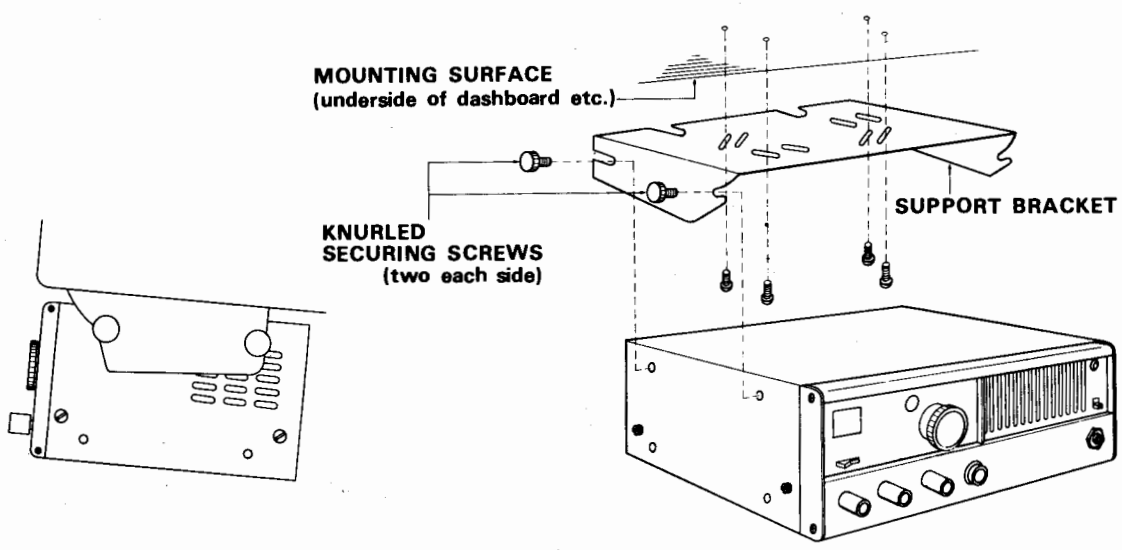


FIGURE 1. MOBILE INSTALLATION

DC POWER CONNECTION

CAUTION: THIS TRANSCEIVER IS DESIGNED FOR USE ONLY IN VEHICLES EMPLOYING A NEGATIVE GROUND SYSTEM. DO NOT USE IN POSITIVE GROUND VEHICLES.

The Red lead in the DC power cable [this is the lead that is fused for 8 amps] should be connected to the main positive 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.

Connect the other end of the DC power cable [which has the 8-pin female connector] to the 8-pin male connector marked "POWER" 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.

IGNITION INTERFERENCE

AUTO

The suppression carried out on vehicles equipped with a standard broadcast radio will usually prevent and serious ignition interference from occuring. 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 [see Lafayette Catalog] .These suppressor kits 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.

ANTENNA CONNECTION

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

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 2.

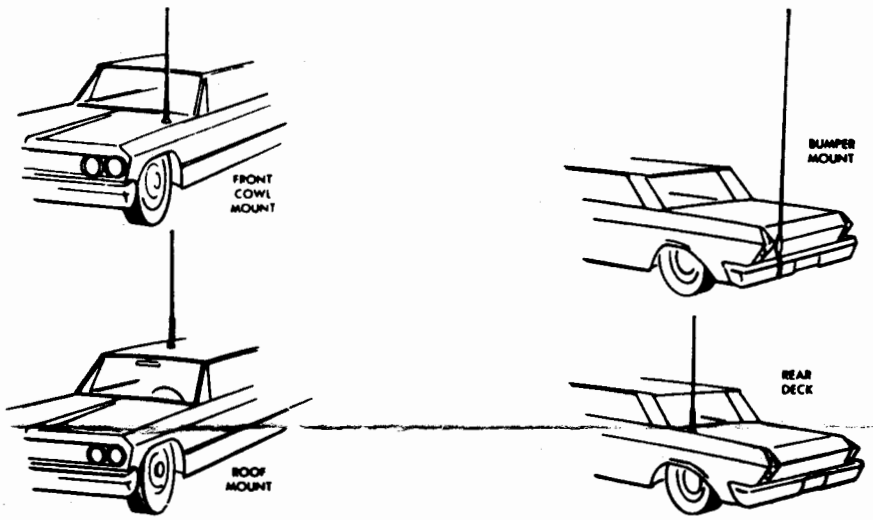


FIGURE 2. MOBILE ANTENNA MOUNTING

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. 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 rpovides an almost perfect omni-directional radiation pattern. However, the use of a full 108-inch quarter-wave antenna on the roof of a vehicle is fairly impractical and a shorter, loaded whip is usually installed in this location, even though this type offers lower efficiency.

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 pracrical 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 otner to the rear and left slightly.

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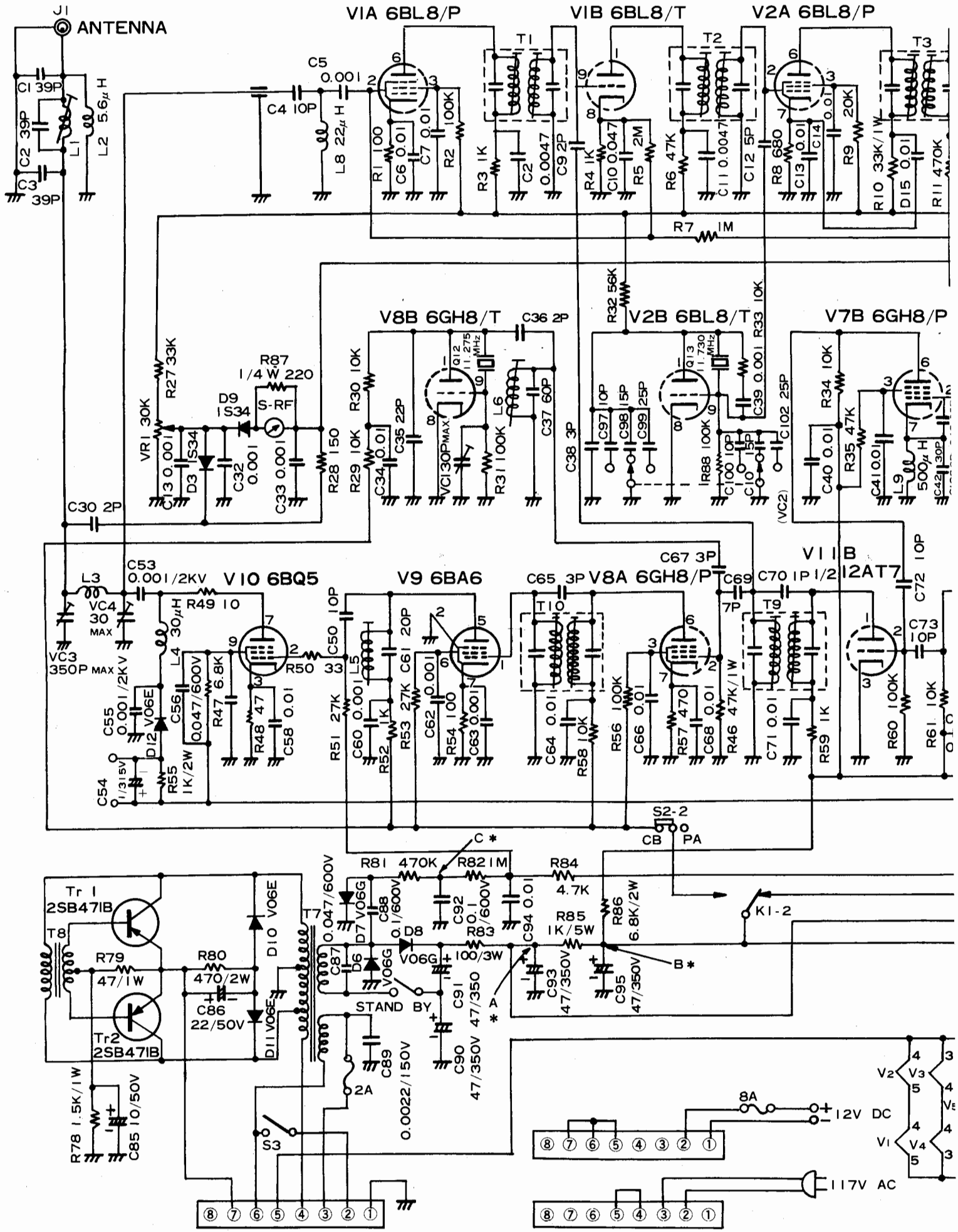
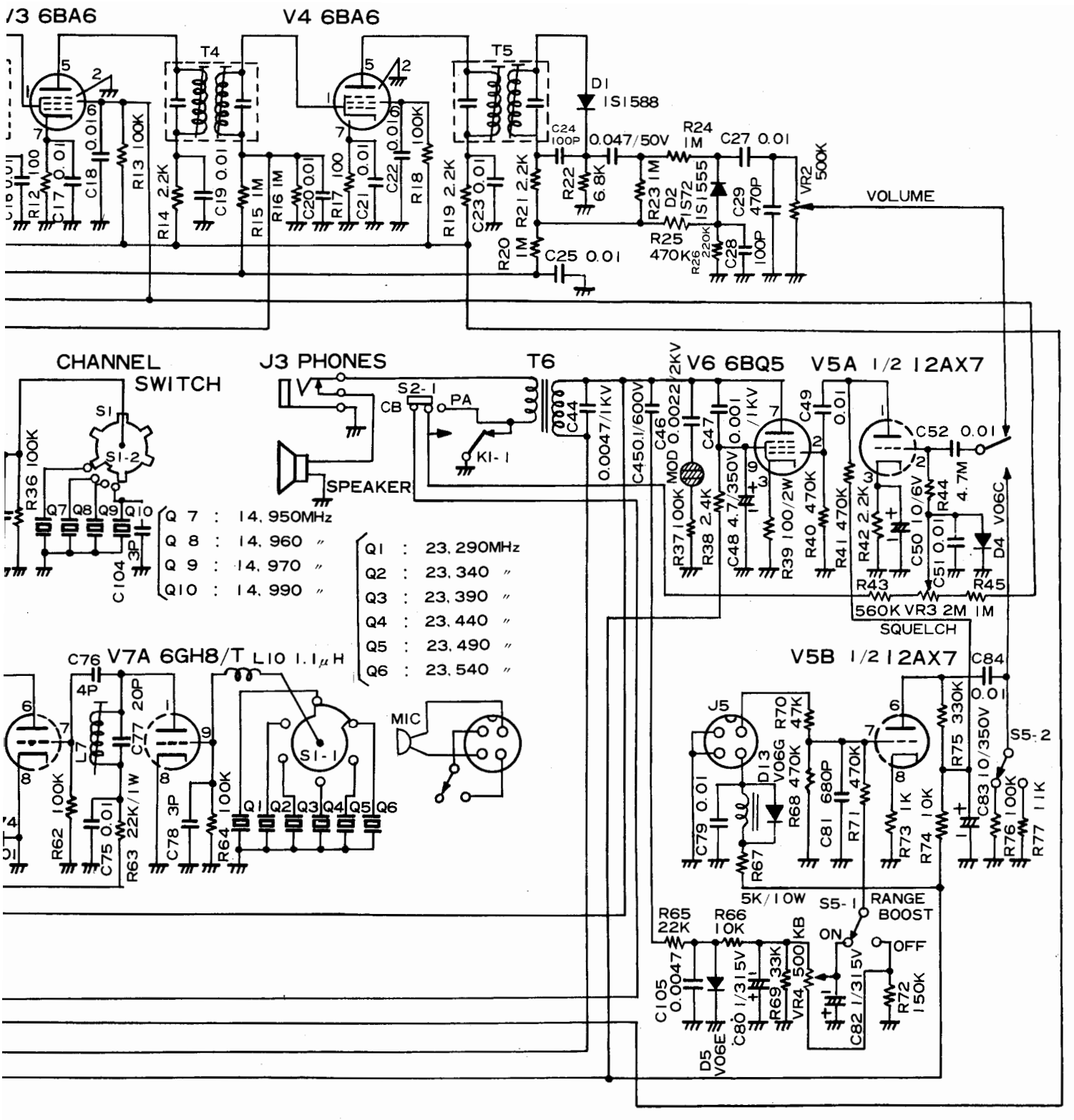

J1
ANTENNA
V1A 6BL8/P
V1B 6BL8/T
V2A 6BL8/P
T1
T2
T3
C1 39P
C2 39P
C3 39P
L1
L2 5.6μH
C4 10P
C5 0.001
L8 22μH
R1 100
C6 0.01
C7 0.01
R2 100K
R3 1K
C2
0.0047
C9 2P
R4 1K
C10 0.0047
R5 2M
R6 47K
C11 0.0047
C12 5P
R8 680
C13 0.01
C14
0.01
R9 20K
R10 33K/1W
D15 0.01
R11 470K
R7 1M
R32 56K
V8B 6GH8/T
C36 2P
V2B 6BL8/T
R33 10K
V7B 6GH8/P
R27 33K
R87
1/4W 220
S-RF
D9
1S34
VR1 30K
C31 0.001
S34
D3
C32
0.001
C33 0.001
R28 150
R30 10K
R29 10K
C34 0.01
C35 22P
Q12
11.275 MHz
VC1 30P MAX
R31 100K
L6
C37 60P
C38 3P
Q13
11.730 MHz
C39 0.001
C97 10P
C98 15P
C99 25P
C100 10P
C101 15P
R88 100K
C102 25P
(VC2)
R34 10K
R35 47K
C40 0.01
C41 0.01
L9
500μH
C42 30P
C30 2P
C67 3P
V11B
12AT7
C72 10P
L3
C53
0.001/2KV
V10 6BQ5
V9 6BA6
C65 3P
V8A 6GH8/P
C69
C70 1P 1/2
C73
10P
VC4
30
MAX
VC3
350P MAX
R49 10
L4 30μH
C50 10P
L5
C61 20P
T10
T9
C55
0.001/2KV
V06E
D12
C56
0.047/600V
R47 6.8K
R48 47
C58 0.01
R50 33
R51 27K
C60 0.001
R52 1K
R53 27K
C62 0.001
R54 100
C63 0.001
C64 0.01
R58 10K
R56 100K
C66 0.01
R57 470
C68 0.01
R46 47K/1W
C71 0.01
R59 1K
R60 100K
R61 10K
C54
1/315V
R55
1K/2W
S2-2
CB
PA
C*
R81 470K
R82 1M
R84
4.7K
R86
6.8K/2W
K1-2
Tr1
2SB471B
T8
R79
47/1W
R80
470/2W
C86
22/50V
D10 V06E
D11 V06E
T7
0.047/600V
D7 V06G
C88
0.1/600V
D8
C92
0.1
/600V
C94 0.01
R85
1K/5W
R83
100/3W
C87
D6
V06G
C91
47/350V
C93
47/350V
C95
47/350V
B*
A*
STAND BY
Tr2
2SB471B
C89
0.0022/150V
C90
47/350V
2A
S3
R78 1.5K/1W
C85 10/50V
8A
12V DC
117V AC
V2
V3
V1
V4
V5
V6
1 2 3 4 5 6 7 8



NOTE

* RESISTORS ARE 1/2WATT UNLESS NOTED
* CAPACITOR ARE 500WV UNLESS NOTED
* TEST POINT A, B & C: See the instruction. page 17.

SCHEMATIC DIAGRAM FOR "COMSTAT 35"

STOCK NO. 99-32971W

Lafayette RADIO ELECTRONICS CORPORATION

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