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## FINE TUNING

The FINE TUNING control has a total range of approximately 2.5 Kc and may be used for reception of a station that is slightly off frequency. Simply tune for best reception and highest "S" meter reading.

**IMPORTANT NOTE:** When better reception is obtained with this control in either the extreme left or right 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 selectivity 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 Fine Tuning control 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.

## PRIVA-COM SOCKET

An 11-pin socket at the rear of the transceiver is provided for use with the Lafayette "PRIVA-COM" selective call unit. A jumper plug (with pins 2 & 3 and pins 4 & 5 shorted) is normally inserted into the socket and should be removed only when the selective call unit is used.

## 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 press the microphone button. Hold the microphone at the corner of the mouth so **that** your voice projects forward (this provides best results) and speak at a normal level. The Modulation indicator light should "flicker", 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.

## 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 circuitry 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 (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.

## 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.

## 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.

## 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.

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.

## 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.

## SIMPLE TROUBLE SHOOTING

### 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 diagram (on a following page) which shows the correct tube locations.

### SOLID-STATE DC POWER SUPPLY

This transceiver employs a solid-state (2-transistors) power supply circuit during 12 volts DC operation (no vibrator is used). The transistors, which are located on the rear panel, have been treated with a light protective coating to avoid possible oxidation. Under no circumstances should the transistors be allowed to come into contact with the vehicle chassis, metal brackets, etc. This will cause a short-circuit and may destroy the transistors.

### PILOT LAMPS

There are three pilot lamps used in the transceiver. Two of these are built into the meter, and the third provides illumination for the channel dial plate. All three are run considerably below their maximum rating and should therefore last almost indefinitely.

### FUSES

The 12-volt DC power cable uses an "in-line" fuse. The value of this fuse is 8 amp. Provision has also been made for fusing the primary circuit 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.

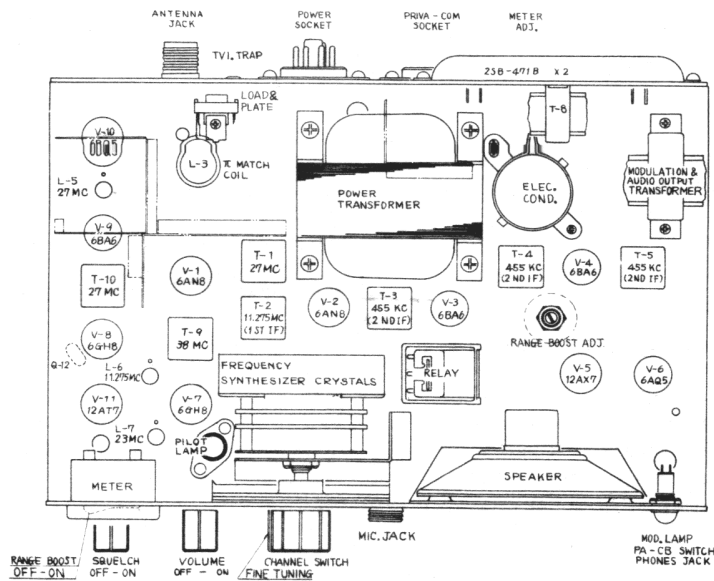
## RECEIVER ALIGNMENT

### 455 KC IF ADJUSTMENT

Connect the transceiver to a power source and attach the microphone. Turn volume to its mid-position, squelch at minimum, and the PA switch in the CB position. Set FINE TUNING to the mid-position (normal) and the CHANNEL selector to channel 13.

Connect an AC voltmeter (VTVM) across the speaker terminals in the transceiver. Alternatively, the meter can be connected to the "Phone" jack by means of a standard phone plug.

Connect a 455 Kc signal generator (modulated 30% at 1 Kc) to pin 8 of V2(6AN8). Make certain the output frequency of the generator is within 1 Kc of 455 Kc. 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 Mc IF adjustments.

#### 11.275 MC IF ADJUSTMENT

Connect the signal generator to pin 2 of V1 (6AN8), with the VTVM connected to the speaker terminals. Make sure the Fine Tuning control is in the normal, center position. Tune the generator in the vicinity of 11.275 Mc until a maximum reading is obtained on the VTVM. Reduce generator output level until the meter reads 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

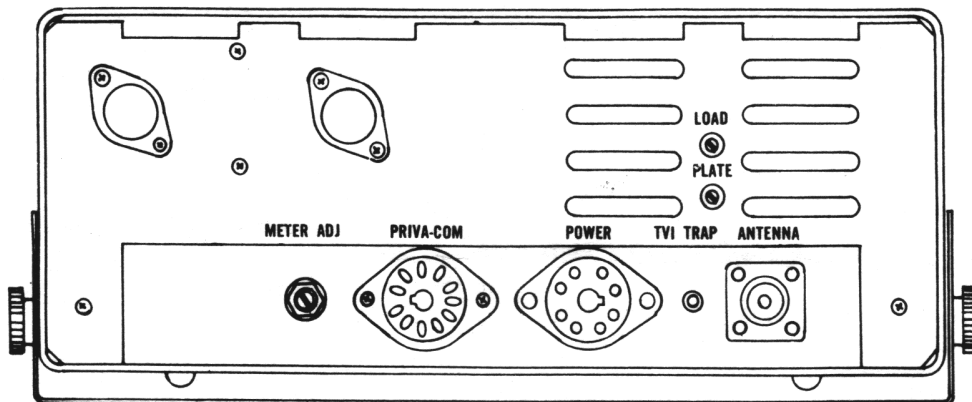
The second oscillator V2B (6AN8) is crystal-controlled. The Fine Tuning control permits fine tuning of the receiver and has a total range of about 2.5 Kc. A normally functioning oscillator will develop approximately -1.5 to -8 volts at pin 2 of V2B. Differences in individual crystal activity will cause 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 Mc 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 Kc) to the antenna connector. Use RG58/U or equivalent 52 ohm cable. Set generator output to approximately  $10 \mu\text{V}$ , and switch receiver to channel 13. Tune the generator around 27.115 Mc until a signal is heard in the receiver. Adjust the generator output frequency for maximum output voltage reading on the VTVM (at speaker terminals). Adjust the top and bottom tuning cores of T1 for maximum output.

## "S" METER ADJUSTMENT

After receiver alignment has been completed, adjust VR1 for a "S-9" reading on the "S" meter with  $100 \mu\text{V}$  at the antenna input and transceiver set to channel 13.

## TRANSMITTER ALIGNMENT

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 reading may indicate trouble in the 11.275 Mc converter stage. If the receiver is normal, it is likely that the trouble lies beyond T9, in which case V8 or the 11.275 Mc 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. Adjust 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 equal reading on all channels.

#### MAXIMUM RF OUTPUT

VC3 (Load) and VC4 (Plate) should now be adjusted for maximum power output on the RF wattmeter. Adjustment of VC3 and VC4 affects the power input to the final amplifier. Remember, maximum RF input power has been set at 5 watts by the FCC. 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 --  $223 \times 0.019 = 4.24$  watts.

If the voltage measured across R55 is higher than 19 volts, set VC3 fully clockwise and then peak VC4 for maximum. Now adjust VC3 clockwise until a reading of 19-volts is measured across R55.

#### 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 mfd condenser to pin 1 of the microphone jack. Set generator frequency to 1 Kc. and adjust same to 40 mv. output. Place the Range Boost switch in the ON position and adjust VR4 to produce 80% modulation. To recheck the adjustment of VR4, place Range Boost switch in the ON position and adjust the generator output (5mv) so that the modulation monitor indicates 50%. Now place the Range Boost switch in the OFF position and the modulation monitor should indicate a lower percentage of modulation that requires an increase of 10 db in input level (15mv) 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), 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.

#### 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 orig-

inal 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.



### VOLTAGE CHART

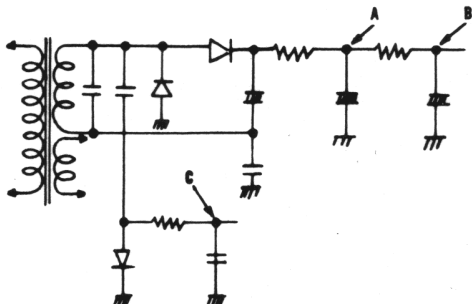
1. All readings taken with VTVM from chassis (negative) to point indicated.
2. Input to transceiver set at 117 volts AC. Similar readings are obtained with 12.6 volts DC input.
3. Transceiver set to channel 13.
4. PA switch in CB position, VOLUME and SQUELCH at minimum (counter-clockwise), FINE TUNING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

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

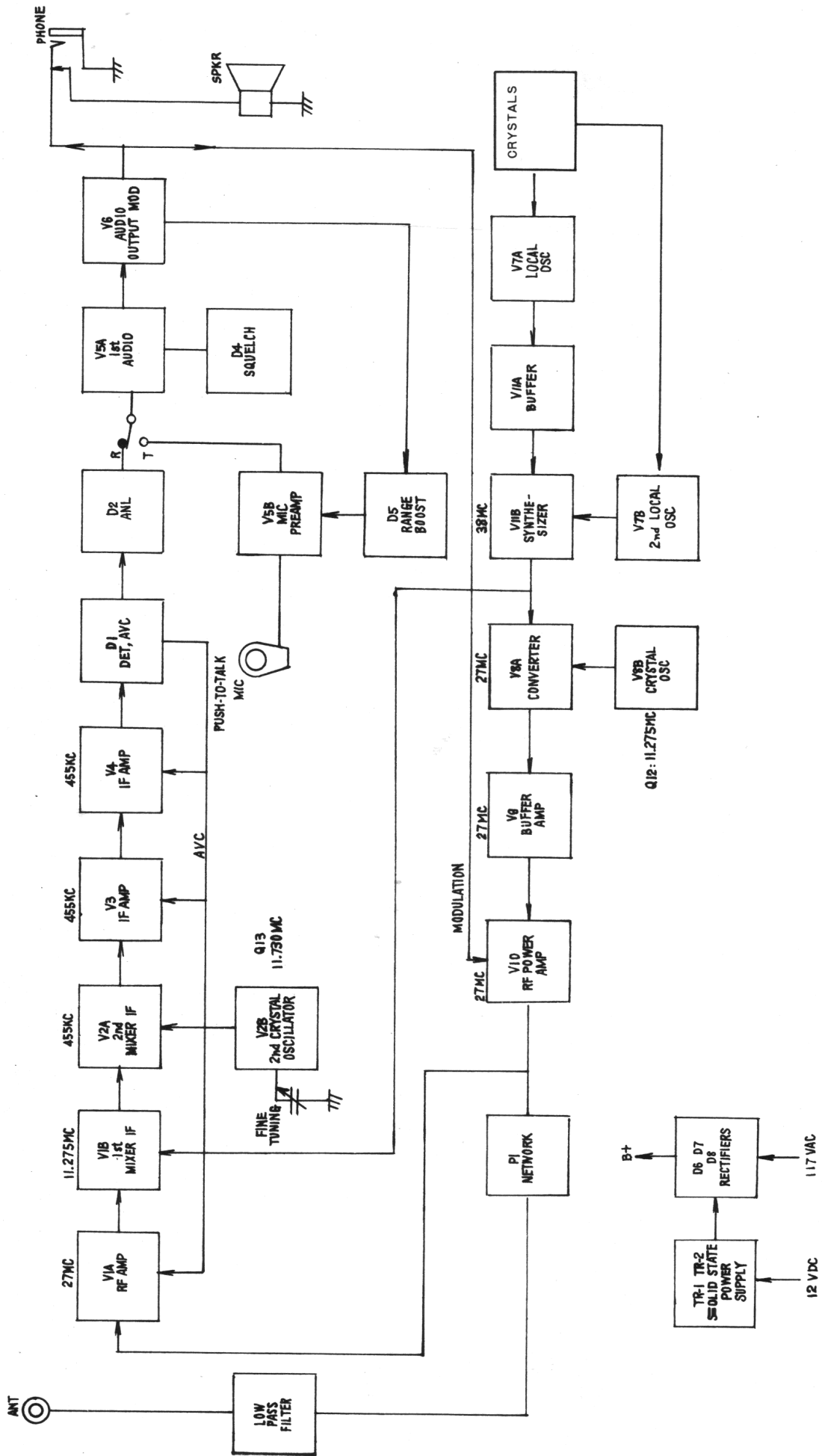
#### TUBE VOLTAGES

| TUBE      | MODE      | PIN NUMBERS |                |          |        |            |            |            |             |                |  |
|-----------|-----------|-------------|----------------|----------|--------|------------|------------|------------|-------------|----------------|--|
|           |           | 1           | 2              | 3        | 4      | 5          | 6          | 7          | 8           | 9              |  |
| 6AN8 V1   | TR<br>REC | 100         | NDV            | 3.5      | H      | H          | 240        | 90         | NDV         | 0.8            |  |
| 6AN8 V2   | TR<br>REC | 30          | -5 *           | 0        | H      | H          | 115        | 125        | NDV         | 2.3            |  |
| 6BA6 V3   | TR<br>REC | NDV         | 0              | H        | H      | 230        | 78         | 0.9        |             |                |  |
| 6BA6 V4   | TR<br>REC | NDV         | 0              | H        | H      | 230        | 65         | 0.9        |             |                |  |
| 12AX7 V5  | TR<br>REC | 90<br>90    | NDV<br>NDV     | 0.9      | H<br>H | H<br>H     | 90<br>85   | NDV<br>NDV | 0.7<br>0.65 | NC<br>NC       |  |
| 6AQ5 V6   | TR<br>REC | NDV<br>NDV  | 10<br>11.5     | H<br>H   | H<br>H | 260<br>280 | 250<br>270 | NDV<br>NDV |             |                |  |
| 6GH8 V7   | TR<br>REC | 65<br>70    | -0.3*<br>-0.3* | 65<br>70 | H<br>H | H<br>H     | 100<br>115 | 1.8<br>2   | 0<br>0      | -4.5*<br>-5.0* |  |
| 6GH8 V8   | TR<br>REC | 100         | -0.4*          | 110      | H      | H          | 180        | 2.5        | 0           | -1.7*          |  |
| 6BA6 V9   | TR<br>REC | NDV         | 0              | H        | H      | 210        | 180        | 1.8        |             |                |  |
| 6BQ5 V10  | TR<br>REC | NC          | -15 *          | 0        | H      | H          | 0          | NM         |             | 223            |  |
| 12AT7 V11 | TR<br>REC | 100<br>110  | NDV<br>NDV     | 0<br>0   | H<br>H | H<br>H     | 100<br>110 | NDV<br>NDV | 0<br>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 |



"COMSTAT 25A" FUNCTIONAL BLOCK DIAGRAM