

TELSAT SSB-140

40-CHANNEL

DIGITAL PLL SYNTHESIZED

AM/SSB BASE STATION CB TRANSCEIVER



TELSAT SSB-140

(Stock No. 99-33649W)

DIGITAL PHASE LOCK LOOP

SYNTHESIZED

40 CHANNEL

BASE STATION

AM/SSB CB TRANSCEIVER

THIS TRANSCEIVER IS FCC TYPE ACCEPTED
FOR USE IN CITIZENS CLASS D SERVICE

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TECHNICAL SPECIFICATIONS

GENERAL

Circuitry	Digital Phase Lock Loop Synthesizer
Channels	40 channels in 27 MHz CB Band
Mode of Operation	AM/SSB
Power Source	117V, 50/60 Hz AC or 13.8V DC

RECEIVER

Receiving System	SSB: Single conversion superheterodyne. AM: Dual conversion superheterodyne.
Sensitivity	SSB: 0.25 μ V for 10 dB S/N ratio. AM: 1 μ V for 10 dB S/N ratio.
Selectivity	SSB: 2 kHz at 6 dB down. AM: 6 kHz at 6 dB down.
Adjacent Channel Rejection	-70 dB
Fine Tune Control	\pm 800 Hz
Audio Output Power	3 watts at 8 ohms.
Squelch Range	SSB: 0.7 μ V to 500 μ V AM: 1 μ V to 500 μ V
Intermediate Frequency	SSB: 10.695 MHz AM: 1st - 10.695 MHz 2nd - 0.455 MHz

SSB TRANSMITTER

SSB Generation	Double balanced modulator with crystal lattice filter.
RF Output Power	PEP 12 Watts max at 13.8V DC.
Carrier Suppression	40 dB down.
Unwanted Sideband Suppression	60 dB down.
Harmonic Suppression	60 dB down.

AM TRANSMITTER

Modulation	High level class B
RF Output Power	4 Watts max at 13.8V DC.
Harmonic Suppression	60 dB down.

PA

Audio Output Power 3 Watts.

MISCELLANEOUS

Antenna Input Impedance Nominal 50 ohms.

Maximum Current Drain (13.8V DC) 1.5 AMPS.

Power Consumption (AC) 75 Watts.

Dimensions (Overall) 15-3/4"(W) x 12-1/4"(D) x 4-3/4"(H)
400 mm(W) x 311 mm(D) x 121 mm(H)

Net Weight 13 lbs. 4 oz./6 kg.

Accessories
1. Push-to-talk Dynamic Mic
2. AC Power Cable

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 OBLIGATION TO INCORPORATE THEM IN PRODUCTS PREVIOUSLY SOLD.

GENERAL INSTRUCTIONS

The Telsat SSB-140 is a combination transmitter and receiver designed for use in Class “D” operation in the 27 MHz Citizens Radio Service. It is designed to meet the Federal Communications Commission requirements applicable to equipment in this service under Class D emission, and is 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.

A station license must be applied for by submitting a properly completed Station License Application, FCC Form 505, as directed. You may operate your CB radio under a Temporary Permit while your regular license application is being processed by the FCC by completing FCC Form 555-B (supplied) as directed. This form, when filled in, becomes your Temporary Permit and is valid for 60 days from the date you mailed Form 505 to the FCC. Do not mail the Temporary Permit – keep it in your possession until you receive notification from the FCC that your regular license application has been approved.

This unit will provide efficient and reliable radio communication in its intended application if installed and operated in accordance with instructions contained herein.

GENERAL DESCRIPTION

This transceiver is an advanced solid-state 2-way CB radio designed primarily for base station operation. It employs the very latest technology to provide 40 transmit and receive channels in the 27 MHz Band by means of digital frequency synthesis with Phase Lock Loop (PLL) circuitry. The transceiver can be operated over all 40 channels in the conventional AM mode or in suppressed carrier Single Sideband mode using either the 40 upper or 40 lower sideband channels, as desired.

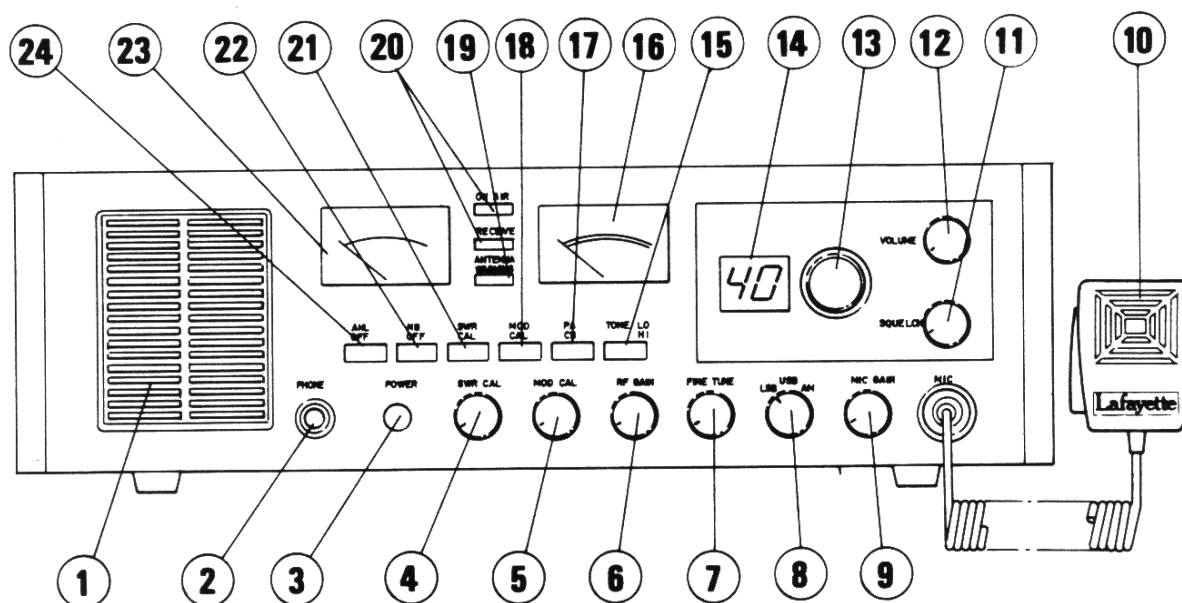
The transceiver has been carefully designed for ease of operation in the SSB mode. Selection of AM, upper sideband, or lower sideband, is achieved by a 3-position switch. To transmit on SSB, you just press the microphone button and talk – exactly as for AM, except that your SSB signal will reach farther and be heard more clearly than an AM signal. SSB reception on the selected sideband is simple too – you just adjust the Fine Tune control for clarity of the received voice transmission.

This transceiver also includes many features which will provide greater operating convenience and assure optimum communications under a wide range of conditions.

- * LED Digital Channel Read-Out
- * Illuminated RF Output and SWR Meter
- * Illuminated “S” and % Modulation Meter
- * Switchable Noise Blanker and ANL for reduction of all types of noise.
- * Mic Gain Control
- * RF Gain Control – permits adjustment of receiver sensitivity for optimum reception of weak or strong signals.
- * Fine Tune Control – acts as a clarifier on SSB, fine tuning on AM.
- * Variable Squelch Control
- * Provision for PA operation with volume control
- * Antenna Warning Indicator – alerts you to antenna problems.
- * “ON AIR”/RECEIVE Indicators
- * Tone Switch for tonal adjustment on receive.
- * Recording Output Jack
- * Headphone Jack
- * Provision for Emergency 12 volt Battery Operation

OPERATING CONTROLS AND FEATURES

FRONT PANEL



- [1] **SPEAKER**
Built-in front-mounted speaker.
- [2] **PHONE**
Standard phone jack for use of headphone or external speaker [8 – 32 ohms]. Insertion of phone plug automatically silences the internal speaker.
- [3] **POWER SWITCH**
This turns the supply power on or off.
- [4] **SWR-CAL CONTROL**
Operates in conjunction with the SWR-CAL pushbutton [see text]. RF position is used for RF power output readings; clockwise rotation provides calibration adjustment when reading SWR.
- [5] **MOD-CAL CONTROL**
Operates in conjunction with the MOD-CAL pushbutton [see text]. Provides calibration adjustment when reading % modulation on AM.
- [6] **RF GAIN CONTROL**
Used as gain control when receiving SSB signals; normally set to maximum when receiving AM.

- [7] FINE TUNE CONTROL
Permits slight adjustment of receiver tuning. Used for clarity during SSB reception, and fine tuning during AM reception.
- [8] MODE SWITCH
Selects mode of operation – lower sideband [LSB], upper sideband [USB], and [AM].
- [9] MIC GAIN CONTROL
Normally set to maximum when microphone supplied with transceiver is used (see section titled “Microphone Gain Control Operation”).
- [10] PLUG-IN MIKE
Push-to-talk mike equipped with coiled cord and terminated with 5-pin DIN plug. Plugs into matching socket on transceiver.
- [11] SQUELCH CONTROL
This control is used to eliminate any annoying background noise when no signals are present. The degree of sensitivity to incoming signals is adjustable. When the “SQUELCH” control is rotated to the fully clockwise position, it provides maximum squelch; in the fully counter-clockwise position, it provides minimum squelch.
- [12] VOLUME CONTROL
This is used to adjust the speaker output level in the CB mode.
- [13] CHANNEL SELECTOR SWITCH
Rotary switch selects one of 40 channels for transmit and receive operation.
- [14] CHANNEL INDICATOR
Window indicates the channel selected using an LED digital readout.
- [15] TONE HI-LO PUSHBUTTON
Used to adjust tonal quality on receive.
- [16] “S” AND MODULATION METER
Dual function meter used to read signal strength on receive, and modulation percentage on transmit [see MOD-CAL control].
- [17] PA-CB PUSHBUTTON
Set switch to “CB” for CB operation. In the “PA” position, the transceiver is used as a PA amplifier, providing an external speaker is connected to the “PA” jack [located at the rear of the unit].
- [18] MOD-CAL PUSHBUTTON
Used in conjunction with the MOD-CAL control to permit percent modulation readings on AM.
- [19] ANTENNA WARNING INDICATOR
Indicator alerts you to antenna problems such as severe antenna mismatch, or a shorted or open antenna, etc.
- [20] TRANSMIT AND RECEIVE INDICATORS
“ON AIR” lights up when transmitting; “RECEIVE” lights up when receiving.
- [21] SWR-CAL PUSHBUTTON
Used in conjunction with the SWR-CAL control to permit RF power output and SWR readings.
- [22] NOISE BLANKER PUSHBUTTON
“NB” position used to switch in special 3-stage Noise Blanker circuit to reduce noise on receive.

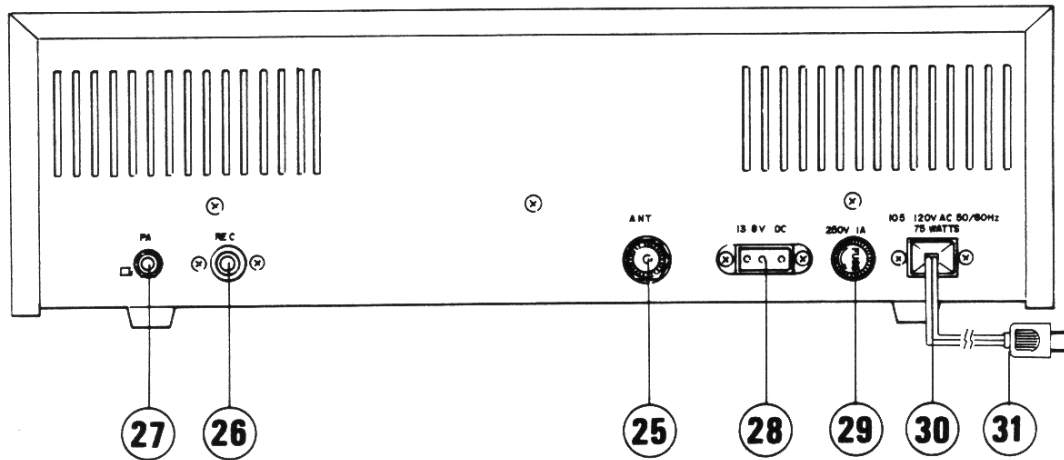
[23] RF AND SWR METER

Dual function meter used to read RF power output and SWR [see SWR-CAL control].

[24] ANL PUSHBUTTON

"ANL" position used to switch in standard peak noise limiter circuit.

REAR PANEL



[25] ANTENNA CONNECTOR

SO-239 connector for antenna lead-in cable with matching PL-259 connector.

[26] REC OUTPUT

RCA-type phono jack provides output for connection to a tape recorder to permit recording of received signals.

[27] PA OUTPUT

PA output jack for connection of PA speaker [8 – 32 ohms].

[28] DC 13.8V POWER SOCKET

DC power for the transceiver is supplied through this socket [see section titled "EMERGENCY 12VOLT BATTERY OPERATION"].

[29] AC FUSE

This fuse protects the primary circuit during AC operation.

[30] AC POWER SOCKET

AC power for the transceiver supplied through this socket, using the AC power cable supplied.

[31] AC POWER CABLE

Cable used to supply AC power to the transceiver.

BASE STATION INSTALLATION

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

AC POWER CONNECTION

Attach the AC power cable connector to the matching male AC connector at the rear of the transceiver.

CAUTION: Always line up the connector properly before pushing into the connector on the transceiver. Do not attempt to force it onto the pins – when properly lined up, the connector can be inserted easily.

Make sure the transceiver is off [POWER switch in the released position]. Insert the AC plug at the other end of the cable into an outlet supplying 105 – 120 volts, 50/60 Hz AC. For protection, the AC input to the transceiver is fused [rear of transceiver].

MICROPHONE CONNECTION

Insert the 5-pin connector at the end of the microphone cable into the MIC connector on the front of the transceiver.

EMERGENCY 12-VOLT BATTERY OPERATION

As supplied, the transceiver is designed to operate from AC [house current], as stated previously. In an emergency, the transceiver may be operated from a nominal 12 volt DC battery. An optional DC cable [Lafayette Stock No. 99-33169] is required to connect the 12 volt battery to the transceiver.

Connect the optional fused DC power cable as follows [see Figure 1].

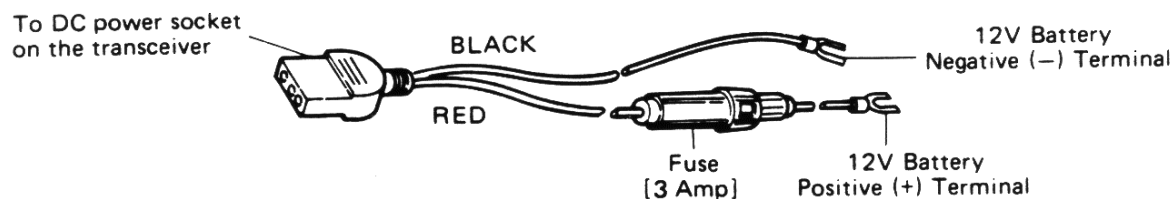


FIGURE 1. Connecting DC Power Cable

1. Insert the 3-pin connector at one end of the DC power cable into the DC 13.8V jack on the rear panel of the transceiver.

WARNING: Do not force this connector into the “DC” power socket. It will go in only one way, as the connector pins are unevenly spaced.

2. Connect the other end of the fused red lead to the positive [+] side of the battery. The black lead of the DC power cable should be connected to the negative [-] side of the battery.

CB 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. We suggest that you purchase one of the numerous books available which covers this subject in greater detail.

ANTENNA CABLE

RG-58/U cable is generally used to connect the CB antenna to the transceiver. The cable should be terminated with a PL-259 connector for connection to the antenna input on the transceiver.

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 than RG-58/U since it offers lower loss.

OPERATING INSTRUCTIONS

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

Make sure the transceiver is properly installed for base or mobile operation [as indicated previously] and that the antenna and power source are connected. If you have not already done so, plug in the microphone.

Initially, set all pushbuttons [ANL, NB, etc.] to their released positions, and the SWR-CAL and MOD-CAL controls to their fully counter-clockwise positions. Subsequently, the special circuits activated by these controls and switches may be used as required.

RECEIVING – AM

Initially, set front panel controls as follows:

SQUELCH:	Minimum [fully counter-clockwise]
FINE TUNE:	Center [12 o'clock position]
LSB-USB-AM:	AM
RF GAIN:	Maximum [fully clockwise]
CHANNEL SELECTOR:	Set to any desired channel [1 – 40]
POWER:	On [depressed]
VOLUME:	Turn clockwise and increase for desired volume

"S" METER [AM AND SSB RECEPTION]

During reception, the right-hand meter provides a relative indication of the signal strength of a received signal in "S" units on the top scale.

During reception of AM signals, the meter will indicate in the conventional manner, in accordance with the RF carrier signal received. However, during reception of SSB signals the meter will respond only during voice modulation, this being due to the fact that SSB transmissions do not contain a continuous RF carrier, as is found on AM.

SQUELCH CONTROL [AM AND SSB RECEPTION]

The Squelch control is used to eliminate any 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 signal 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 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.

CAUTION: In areas of high noise, you may be tempted to increase the setting of the squelch control in order to achieve a "quiet" condition. Under these conditions, a weak signal may not be able to overcome the squelch action and will not be heard. During very noisy conditions, it is therefore advisable to make use of one of the noise-reducing circuits which will usually prove effective in combating the noise. If severe noise is generated by your own vehicle, proper vehicle ignition suppression should be carried out.

FINE TUNE [AM AND SSB]

This control provides fine tuning of the receiver by ± 0.8 kHz. On AM reception, this will permit slight adjustment of your tuning in cases where the received signal is slightly off frequency. For SSB reception, this control is used as a voice clarifier by tuning it over the indicated area for clearest, most intelligible voice [see "Operating Notes on Sideband Operation"].

RECEIVING – SSB

Set all controls initially as follows:

SQUELCH:	Minimum [fully counter-clockwise]
FINE TUNE:	Center [12 o'clock position]
LSB-USB-AM:	LSB or USB depending on whether signal to be received is on the upper or the lower sideband.
RF GAIN:	9 o'clock initially
CHANNEL SELECTOR:	Set to desired channel [1 – 40]
POWER:	On [depressed]
VOLUME:	Turn clockwise and set to approx 12 o'clock

RF GAIN CONTROL

During AM reception, this control is normally left at maximum, the speaker output level being adjusted by means of the VOLUME control. During SSB reception, the VOLUME control should be set to about the mid-position [12 o'clock] and the output level adjusted by means of the RF GAIN control.

Note that even when turned to minimum, the RF GAIN control will not reduce the sound output to zero. If the minimum position of the RF GAIN control does not provide a sufficiently low output level for your needs, decrease the setting of the VOLUME control slightly; if the maximum position of the RF GAIN control does not provide a sufficiently high output level, increase the setting of the VOLUME control slightly.

OPERATING NOTES ON SIDEBAND RECEPTION

To receive a sideband signal properly on any channel, you must first make sure that the signal is, in fact, a sideband signal [unless you have made a prior arrangement with the other station as to the particular mode to be used for communication]. Switching momentarily to the "AM" mode will quickly tell you whether it is an AM signal – the voice communication will come through clearly in this mode. If the signal produces sound with an unintelligible "Donald Duck" quality, the signal is single sideband. If you are not sure which sideband the received signal is on, you will have to tune to the signal on the upper sideband [USB] first, and then on the lower sideband [LSB] if this fails. The general procedure for tuning sideband is as follows:

Switch to either the USB or LSB mode. Rotate the FINE TUNE control very slowly on either side of the 12 o'clock position [between the 7 o'clock position and the 5 o'clock position]. Within this range, it should be possible to clarify the sound so that the voice becomes intelligible.

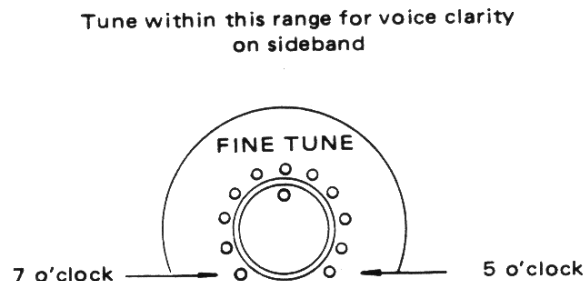


FIGURE 2.

If you are unable to clarify the voice, it is possible that the signal is not on the sideband you are using. Switch the transceiver to the other sideband and repeat the adjustment of the FINE TUNE control in this mode, until you are able to clarify the voice and make it intelligible.

Note that if the other station is off frequency by more than 0.8 kHz, it will not be possible to bring this station in clearly [this situation will not be encountered too often].

USING AN EXTERNAL SPEAKER OR HEADPHONES

The recommended plug for the PHONE jack [located at the front of the unit] is a standard phone plug. The impedance of phones or speakers connected to this jack should be 8 – 32 ohms. Insertion of a plug into this jack automatically silences the internal speaker.

USING THE NOISE REDUCTION CIRCUITS

The transceiver incorporates two separate noise reducing circuits – ANL and a Noise Blanker.

The Noise Blanker is a special 3-stage circuit operating in the RF section of the receiver which literally “chops out” ignition noise by silencing the receiver for the brief duration of each noise impulse. The period during which the receiver is silenced is of such short duration [10 microseconds or less] that there is virtually no audible effect on the output. You may notice a lower reading on the “S” meter when you switch the Noise Blanker into the circuit. This is caused by the reduction of noise passing through the receiver IF stages, and does not indicate a reduction in the actual signal which is virtually unaffected by the Noise Blanker [you may notice a slight “hissing” noise, however].

The RF Noise Blanker is not designed for use against interference caused by neons, atmospheric and various types of electrical machinery. Switching the Noise Blanker into the circuit when this type of interference is present may, in certain cases, actually produce an increase in noise heard at the receiver output. This type of interference is more effectively reduced by means of the ANL circuit.

In practice, you should use the noise reducing circuit which proves the most effective in reducing the noise, using both circuits if necessary.

TRANSMITTING ON AM AND SSB

WARNING: NEVER ATTEMPT TO TRANSMIT WITHOUT AN ANTENNA OR LOAD.

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.
Note: Operation under a Temporary Permit (FCC Form 555-B) is permissible while your regular license application is being processed by the FCC.
2. Rules Part 95 must be read and understood.

Transmitting with this unit on any of the 40 CB channels requires no unusual procedures except that you must first select one of the three modes of operation possible, AM, Upper Sideband or Lower Sideband.

If you are attempting to communicate with a station having a similar transceiver to yours, you can make initial contact on AM and then arrange to conduct subsequent communications in one of the sideband modes, either upper or lower sideband. Of course, if the other station is only capable of AM reception, you will also have to transmit in the AM mode.

Set the MIC GAIN Control to maximum initially, set the Mode switch to the desired mode of operation (AM, USB, or LSB) and simply depress the push-to-talk button on the microphone to transmit.

NOTE: As you speak, the ANTENNA WARNING indicator will flicker – this is normal. See text titles “Antenna Warning Indicator Operation”.

Hold the microphone 3 to 4 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—there is no need to raise your voice or shout into the microphone.

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

READING RF POWER OUTPUT

Place the SWR-CAL push button in the CAL [released] position, and turn the SWR-CAL control to the fully counter-clockwise position [RF]. Place the transceiver in the transmit mode. The left-hand meter will now read relative RF power output on the top scale [RF]. Note that in the SSB mode of transmission, the meter will read only when the carrier is modulated.

READING SWR [STANDING WAVE RATIO]

Place the SWR-CAL push button in the CAL [released] position initially. Place the transceiver in the AM transmit mode, then turn the SWR-CAL control clockwise to obtain an exact SET position reading on the lower scale [SWR] of the left-hand meter. Now depress the SWR-CAL push button [SWR position] and read SWR.

For maximum efficiency, the SWR should be as low as possible. A reading of 1.5 is considered satisfactory, taking into account the losses in the line and slight mismatching. A high SWR can frequently be reduced by proper adjustment of the antenna [when provided], or by the use of a matching device inserted in the transmission line.

WARNING

The checking of SWR and % Modulation with an antenna connected falls into the category of a test transmission and, as such, is governed by FCC Regulations Part 95.93 which specified that such a transmission shall not exceed a total of 1 minute during any 5 minute period, nor cause interference with communications already in progress, and shall be properly identified as required by Part 95.95.

READING % MODULATION [AM ONLY]

Place the MOD-CAL push button in the CAL [released] position initially. Place the transceiver in the AM transmit mode, then turn the MOD-CAL control clockwise to obtain an exact SET position reading on the lower scale [modulation] of the right-hand meter. Now depress the MOD-CAL push button [MOD position] and modulate the carrier. Read the modulation percentage on the modulation scale.

NOTE: The meter provides an indication of *average* modulation and will not register modulation peaks which will be higher. If you are using a power mic, do not rely on the modulation meter for proper mic level adjustment. Use a “radio check” to adjust the control on the mic for highest modulation without distortion.

READING “S” UNITS

When the transceiver is in the receiver mode, the received signal strength is automatically displayed on the “S” meter scale [regardless of the setting of the MOD-CAL push-button and MOD-CAL control].

ANTENNA WARNING INDICATOR OPERATION

A severe antenna mismatch (4 to 1 or worse) will cause the ANTENNA WARNING INDICATOR to illuminate in the AM transmit mode when the microphone is keyed (no modulation). A short or open will also cause the ANTENNA WARNING INDICATOR to light. When you key the microphone and talk into it, the ANTENNA WARNING INDICATOR will flicker – this is normal.

If the ANTENNA WARNING INDICATOR lights, do not continue transmitting until the problem in your antenna system has been rectified.

NOTE: When a very low SWR exists, the Antenna Warning Indicator will not flicker, even under modulating conditions.

MICROPHONE GAIN CONTROL OPERATION

CB MODE

Normally set to maximum when microphone supplied with transceiver is used.

If you are using an unamplified microphone with a higher output level than the microphone supplied with the transceiver, the MIC GAIN Control can be used to provide some reduction of the MIC output signal.

NOTE: Even in its minimum position (fully counter-clockwise), the MIC GAIN Control will not reduce the MIC input signal completely to zero – it provides only partial reduction of the MIC input level.

If you are using an Amplified (Power) Microphone, set the MIC GAIN Control to maximum (fully clockwise) and use the control provided on the Amplified Microphone for proper adjustment of the microphone input level.

PA MODE

During PA operation, the MIC GAIN Control will serve as a volume control to adjust the speaker output level.

PA (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 8–16 ohm speaker connected to the “PA” jack (located at the rear of the transceiver. The recommended plug for the “PA” jack is a subminiature phone plug (1/8”). To set the transceiver to the PA mode, set the CB/PA switch to the PA position to operate the PA circuit, then 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: During PA operation, the “VOLUME” control is inoperative. However, the “MIC GAIN” control will serve as a volume control to adjust the speaker output level.

To reduce acoustic feedback when the PA speaker is mounted on a car or truck, you may have to close the vehicle windows, or reduce the volume as necessary to stop any feedback that may occur.

USING A TAPE RECORDER TO RECORD COMMUNICATIONS

Provision has been made in this transceiver to permit recording of all received communications.

NOTE: Due to the high output level at the REC output jack in the transmit mode, overloading of the tape recorder will take place when you are transmitting.

A special output jack at the rear (marked REC) is provided for connection to the Radio/Aux input on a tape recorder. Use a shielded audio cable terminated at one end with a phone plug (this plug matches the REC jack on the transceiver). No special switching is required on the transceiver—an audio signal is applied to this jack at all times.

NOTE: The output at the REC jack is controlled by the volume control. You should therefore adjust the volume for desired listening level from the speaker and then adjust the recording level control on the tape machine as necessary. Thereafter, the volume on the transceiver should not be touched or the recording level will change.

OPERATING PROCEDURE

For information on proper operating procedures, refer to Part 95 Subpart D [Station Operating Requirements], of the FCC Rules and Regulations.

CITIZENS BAND FREQUENCIES

Your transceiver is capable of operation on all presently available U.S. Citizens Band channels, frequencies for which are listed as follows:

CHANNEL	CHANNEL FREQUENCY (MHz)	CHANNEL	CHANNEL FREQUENCY (MHz)
1	26.965	21	27.215
2	26.975	22	27.225
3	26.985	23	27.255
4	27.005	24	27.235
5	27.015	25	27.245
6	27.025	26	27.265
7	27.035	27	27.275
8	27.055	28	27.285
9	27.065 — Emergency	29	27.295
10	27.075	30	27.305
11	27.085	31	27.315
12	27.105	32	27.325
13	27.115	33	27.335
14	27.125	34	27.345
15	27.135	35	27.355
16	27.155	36	27.365
17	27.165	37	27.375
18	27.175	38	27.385
19	27.185	39	27.395
20	27.205	40	27.405

SERVICING THE TRANSCEIVER

Any unit requiring service should be returned to the Lafayette Store from which it was purchased or to any service organization qualified to make repairs or internal adjustments to the complex circuits in this unit.

NOTE: It should be noted that under the terms of the Warranty, units which show evidence of having been serviced by unauthorized personnel will be ineligible for free service.

WARNING

As prescribed in Part 95.58, paragraph [e] of the FCC Rules and Regulations, Lafayette the manufacturer of this transceiver, is required to issue the following warnings:

1. Certain repairs and adjustments to this transceiver may be made legally only by a person in possession of a valid First or Second Class FCC Radiotelephone Operators License [or equivalent in Canada], or by a person under the direct supervision of a holder of such a license. This applies particularly to those repairs or adjustments, such as replacement of crystals and transmitter oscillator components, which might affect the transmitter's ability to comply with FCC regulations.
2. Use only Lafayette approved replacement parts when servicing the transmitter. The use of a component [such as a crystal, semiconductor, capacitor, etc.] having different electrical characteristics and ratings than that originally used could result in a violation of the FCC Regulations and is therefore prohibited.

REPLACING THE AC POWER FUSE

If the Channel Indicator fails to come on and the transceiver is completely inoperative when the POWER switch is turned on, make sure that the AC power cord is plugged into an electrical outlet supplying 105 – 120 volts, 50/60 Hz AC. If this is not the problem, the AC power fuse located on the rear panel of the transceiver may have failed. To check the fuse, switch the unit off and disconnect the AC power cord from the outlet. Unscrew the AC power fuse cap, and remove the fuse. The small thin fuse wire within the cartridge should be intact. If it is not, replace the fuse with one of the same rating [1 amp, 3 AG type], and re-insert into the transceiver.

WARNING: DO NOT USE A FUSE OF A HIGHER VALUE THAN THE ONE SPECIFIED. ALSO, IF A REPLACEMENT FUSE FAILS AGAIN AFTER INSERTION, RETURN THE TRANSCEIVER FOR SERVICE.

Replacement 1 ampere, 3 AG fuses are available under Lafayette Stock Number 12-29087.

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.

Adjust DC power source to 13.8V and connect 50 ohms dummy load to Ant. receptacle.

1. Test Voltage

DC 13.8V \pm 5%, unless otherwise specified.

2. Test Equipment

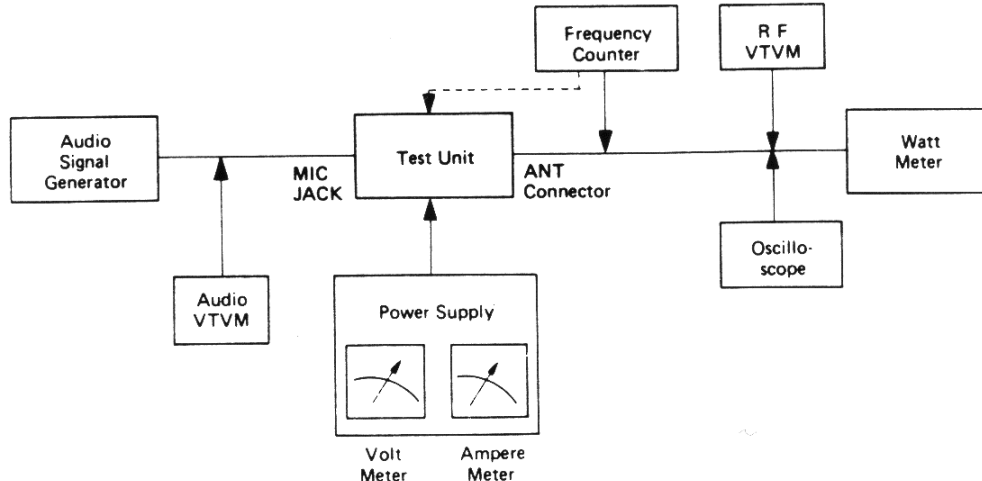
All test equipment should be properly calibrated.

1. Audio Signal Generator (10 Hz – 20 kHz)
2. Audio Level Meter (1 mV measurable)
3. DC Ampere Meter (2A)
4. Regulated Power Supply (DC 0 – 20V, 2A or higher)
5. Frequency Counter (0 – 40 MHz) High Input Impedance Type
6. RF VTVM, Probe Type
7. Oscilloscope (30 MHz) high input impedance
8. RF Watt Meter, thermo-couple type (50 ohm, 15W)
9. Standard Signal Generator (100 kHz – 50 MHz, –10 – 100 dB, 50 ohm unbalanced)
10. Speaker Dummy Resistor (8 ohm, 5W)
11. Circuit Tester, High Input Impedance Type (20k ohm/V or higher)

3. Alignment of Transmitter Circuitry

3.1.1 Test Setup

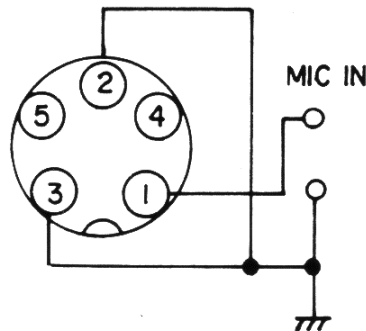
Connect all test equipment as shown below:



3.1.2 Alignment of Regulated Voltage Power Supply

Make sure the voltage at pin terminal No.3 on PTPW007COX is 13.8 V with AC voltage of 117V supplied. If not, adjust RV1 to obtain that voltage.

- 3.2** To set the transceiver into transmit mode without the microphone, insert the plug wired as shown below into the MIC jack on the transceiver. When applying the audio modulation signal to the microphone input circuit, also use the same plug.



3.3 PLL Circuit Alignment

NOTE: This alignment should be conducted with the frequency counter having high sensitivity and high input impedance.

3.3.1 10.240 MHz Frequency Alignment (USB. TX)

Place the Channel Selector in CH19 and mode switch in USB position. Connect a frequency counter to the testpoint TP2 through a 1000 pF coupling capacitor and adjust the trimming capacitor CT3 for the reading of:

$$10.240000 \text{ MHz} \pm 50 \text{ Hz}$$

3.3.2 10.0525 MHz Frequency Alignment

Connect both oscilloscope and frequency counter to the test point TP3 and adjust the core of T3 for maximum amplitude of scope display ($10.0525 \text{ MHz} \times 2$), then adjust the trimming capacitor CT1 to obtain the reading of:

$$20.105 \text{ MHz} \pm 40 \text{ Hz}$$

Next, place the mode switch in the LSB position and adjust CT2 to obtain the reading of:

$$20.1035 \text{ MHz} \pm 40 \text{ Hz}$$

3.3.3 10.695 (10.692) MHz Frequency Alignment

Connect the frequency counter to the TP5 and adjust CT5 to read $10.695 \text{ MHz} \pm 50 \text{ Hz}$ in the USB mode of operation. Next, place the mode switch in the LSB and adjust CT4 to read $10.692 \text{ MHz} \pm 50 \text{ Hz}$.

3.4 VCO Circuit Alignment

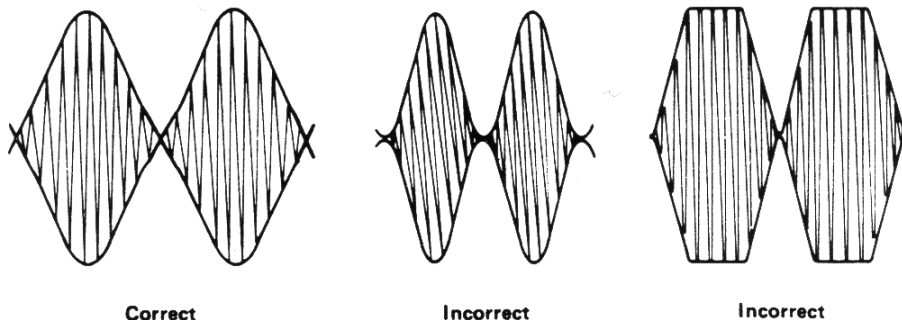
1. Place the channel selector in CH1 position.
2. Connect a circuit tester (DC 12V range) between the ground and TP4.
3. Adjust core provided in the VCO Block to obtain $3.6\text{V} \pm 0.1\text{V}$, starting from top to bottom when turning the core (the circuit tester used in this alignment should be calibrated and has an input impedance of 20k ohm/V or higher).
4. Next, place the channel selector in CH40 and make sure the reading should be within 1.4 – 2.3V.

3.5 Driver Stage Alignment

1. Apply 2.4 kHz, 2.5 mV audio signal to the MIC input circuit.
2. Place the channel selector in CH 40 position and mode switch in USB position.
3. Connect an oscilloscope and 50 ohm dummy load across the ANT connector.
4. Adjust T1 for maximum amplitude of scope display.
5. Next, place the channel selector in CH 1 position and adjust T2 for maximum amplitude.
6. Connect an ampere meter between the Q10 emitter and chassis ground and adjust RV1 to obtain bias current of $35 \text{ mA} \pm 10 \text{ mA}$.
7. Place the channel selector in CH 40 position and adjust T4 for maximum amplitude of scope display.
8. Place the channel selector in CH 1 position and adjust T5 for maximum amplitude.

3.6 SSB RF Power Amplifier Stage Alignment

1. Place the channel selector in CH 19 position and the mode switch in USB position.
2. Feed 2.4 kHz, 25 mV audio signal to the microphone input circuit.
3. Connect an oscilloscope to the Q7 emitter and adjust T11 for maximum amplitude of scope display.
4. Turn T6 core fully upward, then adjust RV11 to obtain the reading of 150 mV (peak-peak) on the scope.
5. Connect the oscilloscope to the ANT connector in parallel with the Watt-meter.
6. Temporarily adjust RV2 fully counter clockwise and adjust the L13 core so that the core top is flush with the top of coil bobbin.
7. Adjust T6, T11, L7 and L11 for maximum power output.
8. Decrease audio signal input to the microphone circuit to zero and adjust RV4 and RV5 for minimum amplitude of carrier leakage on the scope display.
9. Feed two tone (500 Hz and 2400 Hz) signals of 25 mV to the microphone circuit and adjust RV2 (ALC) to obtain PEP power of 10W. In this condition, make sure the PEP power output at each channel is within 9 ~ 11W. Also make sure the scope display of output wave shape shown below is obtained.



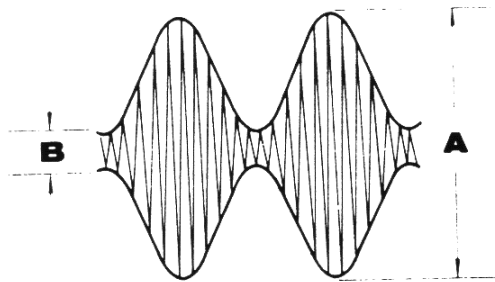
10. Place the mode switch in the LSB position and make sure the above alignments are not up-set and the similar results are obtained in this mode of operation.

3.7 AM RF Power Stage Alignment

1. Place the mode switch in the AM position and the channel selector in CH19 position.
2. Adjust VR4 for RF power output of 3.7W on the Wattmeter.

3.8 Modulation Alignment (AM)

1. Apply 2.5 kHz, 25 mV Audio input signal to the MIC input circuit.
2. Adjust RV12 so that modulation depth of 80 ~ 90% is obtained.
3. Next, decrease the signal input to 2.5 mV and make sure the modulation depth is still keeping 30% or higher.



$$\text{Modulation ratio} = \frac{A - B}{A + B} \times 100 [\%]$$

3.9 RF Power Meter Alignment (AM)

Adjust RV3 so that the P-RF meter provided on the front panel should indicate the same wattage as the one obtained on the Wattmeter.

3.10 Lock Out Circuit Check

Place the channel selector in the open (blank) channel (detent) position. Make sure the Voltage at Q1 base is 0.05 ~ 0.4V, using a circuit tester.

3.11 Transmit Frequency Check

1. Set the transceiver into transmit mode (AM), no modulation.
2. Connect the frequency counter to the antenna connector. And read the frequency at each channel. The frequency should be within ± 800 Hz from each center channel frequency as tabulated in the Frequency Table attached in page 18.

3.12 SWR Meter Adjustment

1. Connect a 100 ohm dummy load to the ANT connector on rear panel.
2. Place the MODE switch in "AM" position.
3. Place the SWR-CAL switch in the "CAL" position.
4. Depress the Push-to-Talk switch on the microphone and adjust the SWR-CAL control to obtain an exact SET mark on the lower scale.
5. Place the SWR-CAL switch in the "SWR" position. Depress the Push-to-Talk switch and adjust RV-501 to obtain the reading of "2" on the scale.

NOTE: During the adjustment, do not modulate the transmitter.

3.13 Modulation Meter Adjustment

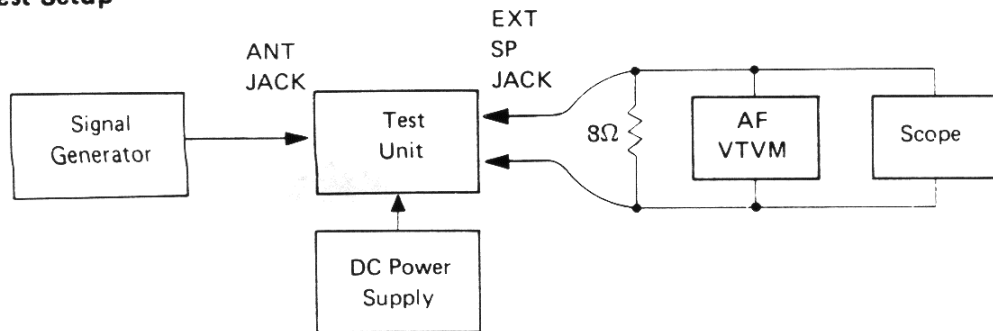
1. Connect a 50 ohm dummy load to the ANT connector on the rear panel. Also connect an oscilloscope between the dummy load.
2. Connect an audio signal generator (1 kHz) to the microphone input circuit.
3. Place the CAL-MOD switch in "MOD" position. Adjust the MOD-CAL control on the front panel so that the modulation meter pointer should exactly coincide the SET mark on the scale.
4. Place the CAL-MODE switch in the "MOD" position and adjust RV-521 so that 90% modulation is obtained.

3.14 AWI Circuit Adjustment

1. Set the transceiver into transmit mode, CH 19.
2. Connect 250 ohm resistor to the ANT connector on the rear panel.
3. Adjust RV-511 on PC board PTSR011COX so that the AWI indicator just turns off.

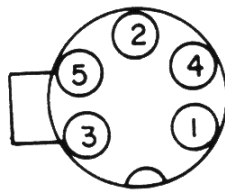
4. Alignment of Receiver Circuitry

4.1 Test-Setup



Unless otherwise noted, place the FINE TUNE control in the “12 o'clock” position and NB switch in the “OFF” position.

- 4.2 To make the transceiver into receive mode, insert the plug wired as shown below into the MIC jack on the front panel.



4.3 AGC Alignment

1. Connect the circuit tester to the No. 15 terminal on the P.C board and chassis ground.
2. Place the mode switch in the AM position.
3. Adjust RV8 to obtain the reading of 2V.

4.4 Receive Sensitivity Alignment (AM Mode)

1. Set the Signal Generator, 27.185 MHz, 1 kHz 30% modulation. Also set the transceiver into 19 channel position.
2. Tune the generator to the transceiver, 19 channel.
3. Adjust T7, T8, T9, T10, T13, T14 and T15 for maximum audio output between the 8 ohm dummy load resistor.
This alignment should be performed with very small signal input from the signal generator to avoid inaccurate alignment due to AGC action.
4. After completion of the step 3, rotate the T7 core, so that the audio output decreases by 2 dB.

NOTE: Throughout the above alignments, place the NB switch in “OFF”, Squelch control in minimum and FINE TUNE control in “12 o'clock” position.

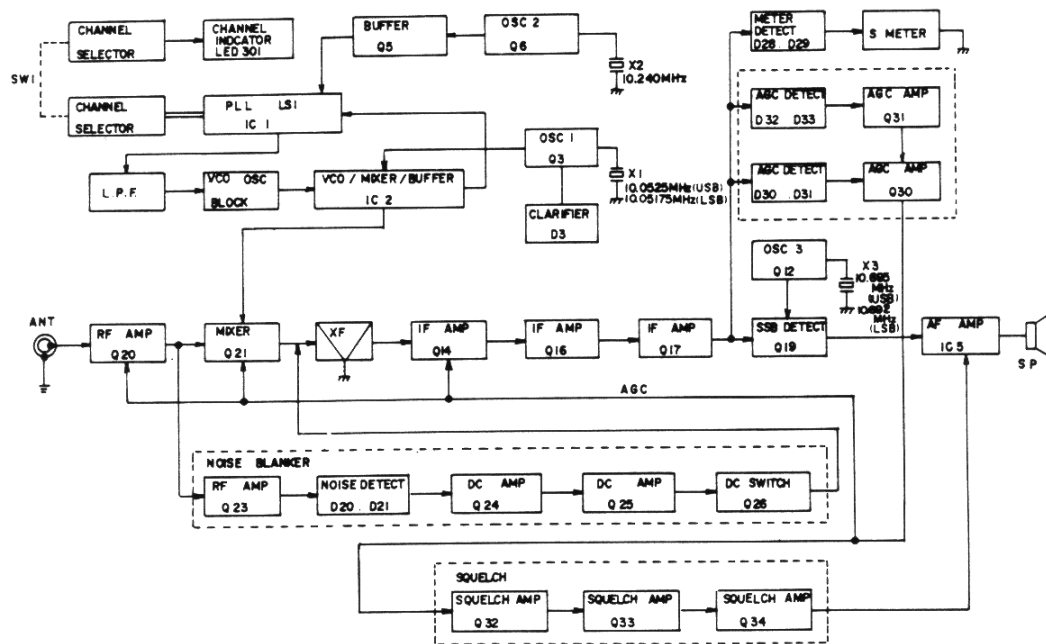
4.5 Squelch Circuit Alignment

1. Place the mode switch in AM position.
2. Set the signal generator to provide RF input signal of 54 dB (1 kHz, 30% mod.) and rotate the squelch control in full clockwise position.
3. Adjust RV9 so that the audio output just appears on the output terminal (scope-display).
4. Next, place the mode switch in USB position and adjust RV10 in the similar way.

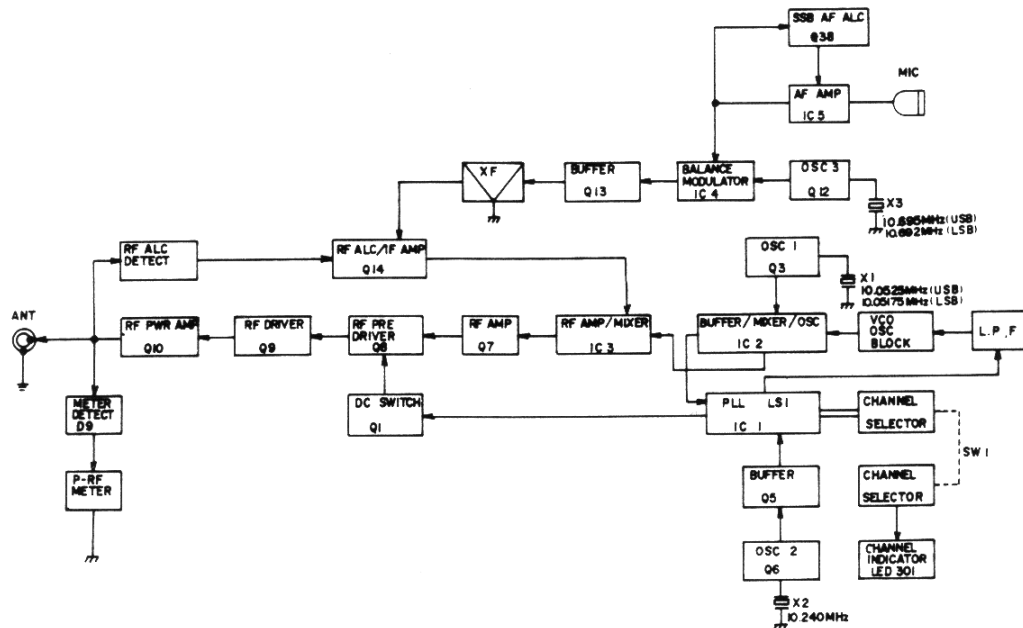
4.6 S-Meter Adjustment

1. Set the signal generator to provide 40 dB output and place the mode switch in the USB position.
2. Adjust RV7 so that the S-meter pointer should read "9" on the meter provided on the front panel.
3. Next, place the mode switch in the AM position, and tune the signal generator to the AM receiver.
4. Adjust RV6 so that the S-meter pointer reads "9" on the meter.

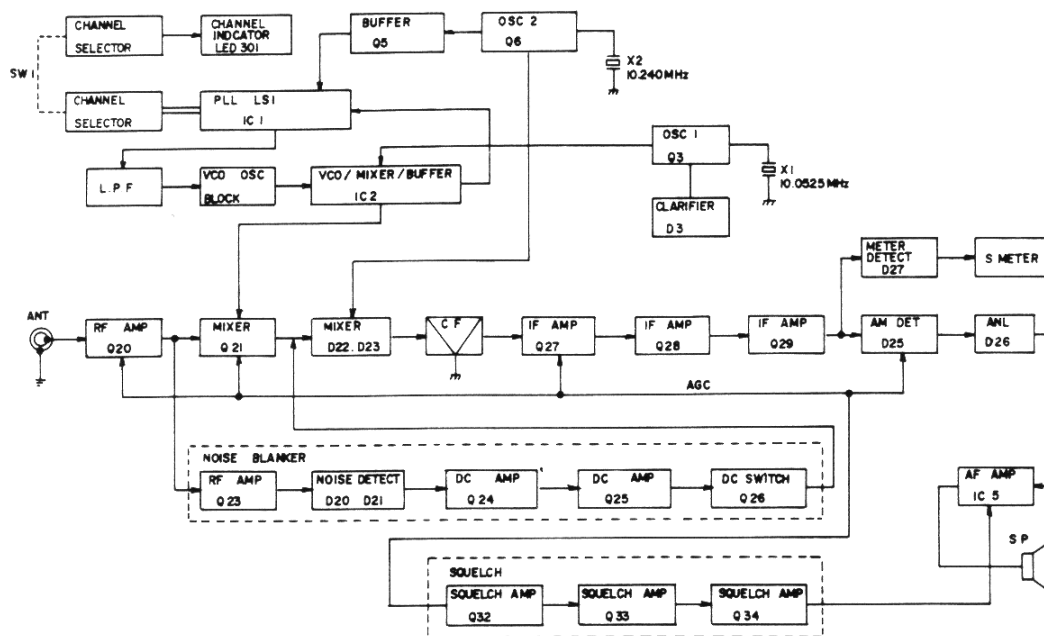
FUNCTIONAL BLOCK DIAGRAMS



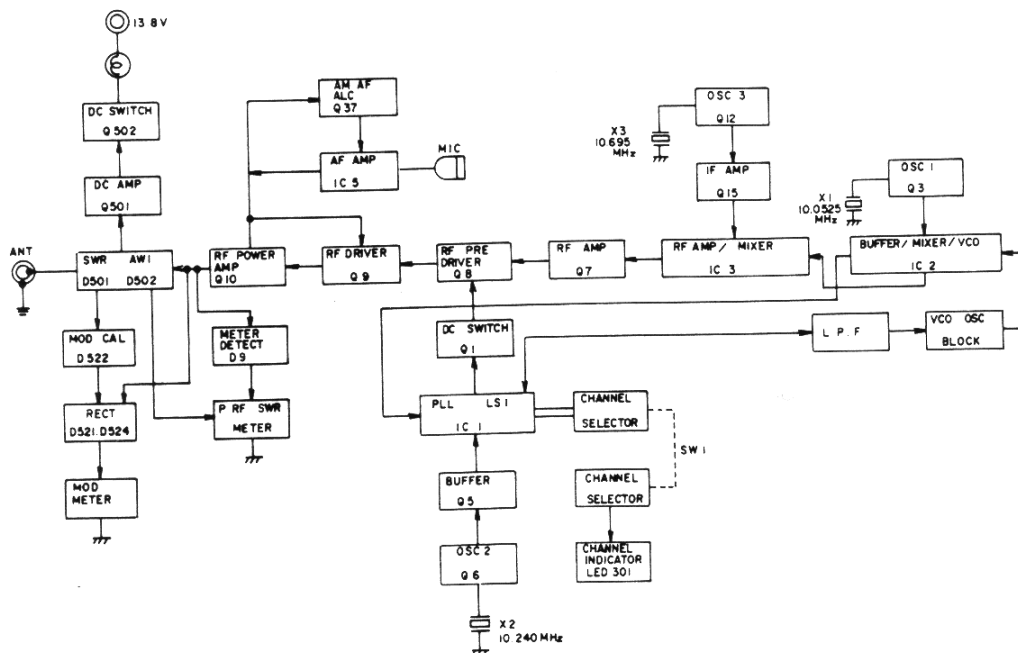
SSB RECEIVER



SSB TRANSMITTER



AM RECEIVER



AM TRANSMITTER