

Fig 3-2 Rear, Top Panel

3.2 REAR PANEL

① ANT (ANTENNA) CONNECTOR

This UHF connector should be attached to a suitable antenna for transmitting and receiving. The antenna cable should be 50-ohm coax, terminated with a PL-259 connector.

② GND (GROUND) TERMINAL

The TS-130S(V) should be grounded through this terminal to avoid the possibility of TVI and BCI. Use as short and heavy a lead as possible.

③ CW KEY JACK

For CW operation, connect your key to this terminal using a two conductor phone plug and shielded cable.

④ SPEAKER (EXTERNAL SPEAKER) JACK

An external speaker of 4 ~ 16 ohms impedance (such as the SP-120) can be connected here. This will disable the internal speaker.

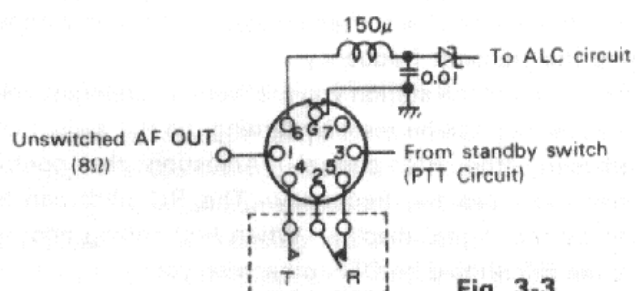


Fig. 3-3

INTERNAL WIRING IN THE TS-130S(V)

⑤ REMOTE CONNECTOR

This is used for interconnecting a linear amplifier or other equipment. For connection, refer to the illustration below, fig. 3-3.

⑥ EXT VFO (EXTERNAL VFO) CONNECTOR

This is for connection of an external VFO-120, remote Frequency Controller DFC-230. (Note: the VFO-520 and VFO-820 cannot be used, since their operating frequency is incorrect.)

⑦ DC POWER CONNECTOR

This is used to connect the DC power supply.

⑧ REFERENCE FREQUENCY ADJUSTMENT

For PLL reference oscillator adjustment. Use WWV signal for calibration.

⑨ COOLING FAN

The cooling fan operates when the heat-sink temperature rises.

SECTION 4. OPERATION

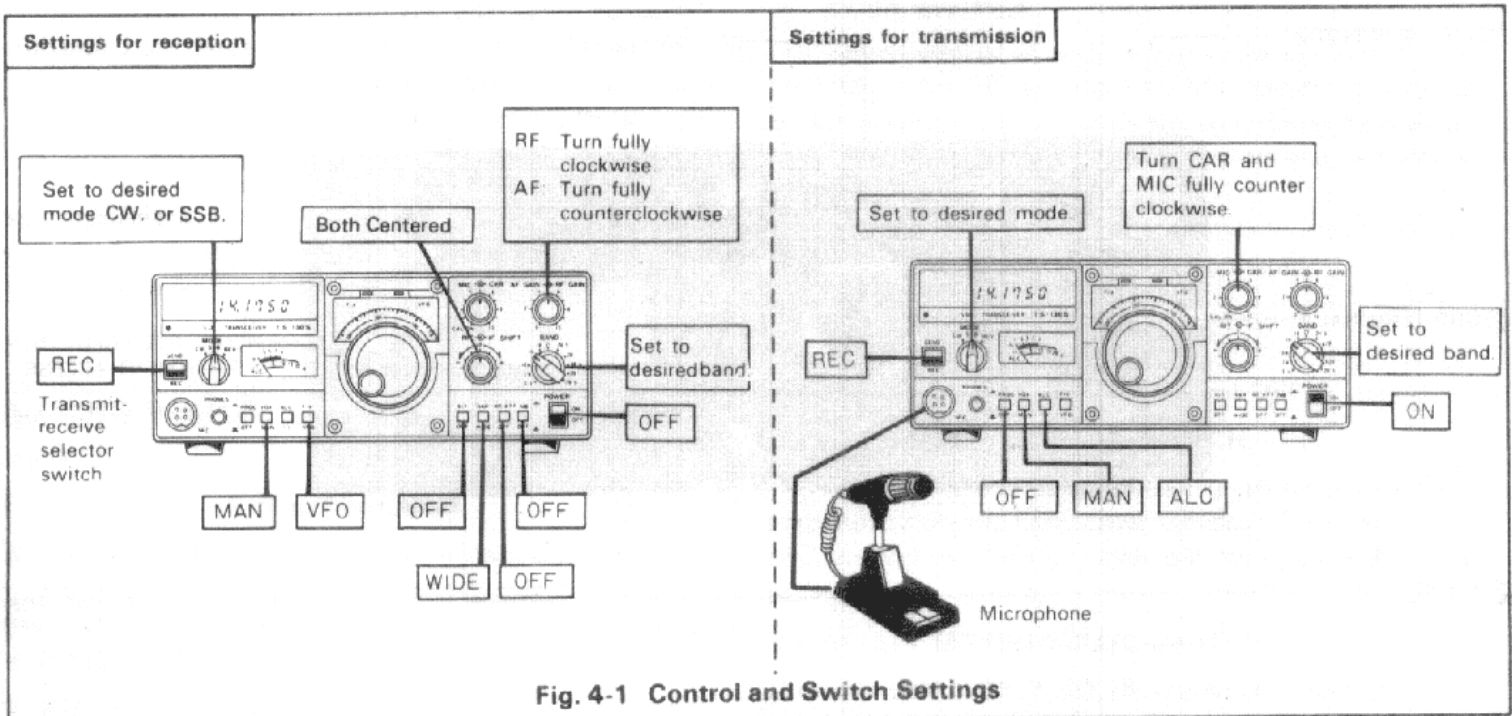


Fig. 4-1 Control and Switch Settings

4.1 RECEPTION

First connect the antenna, microphone and key. Then, set the controls and switches referring to Fig. 4-1.

Ascertain that the TS-130S(V) is ready for operation, then turn the POWER switch ON. The meter, dial scale and digital display will illuminate, indicating the transceiver is in operation. The transceiver is fully solid-state, allowing reception as soon as the POWER switch is turned ON.

Advance the AF GAIN control clockwise until some receiver noise is heard from the speaker. Turn the main tuning control so the desired signal can be heard clearly.

4.1.1. WWV RECEPTION

To receive WWV at 10 MHz, set the BAND switch to "10" and turn the main tuning control until the subdial reads "0".

4.1.2 RF ATT switch

The input to the receive RF amplifier is attenuated approximately 20 dB, providing distortion-free reception. This feature may be used in cases of receiver overload, caused either by a strong local signal, or during weak signal reception when a strong adjacent signal may blank the receiver.

4.1.2. NB SWITCH

The TS-130S(V) has a sophisticated noise blanker designed to reduce ignition-type pulse noise. The noise blanker is particularly important for mobile operation. When necessary, activate the noise-blanker by depressing the NB switch ON.

4.1.3. RF GAIN CONTROL (Fig. 4-2)

For normal operation, this control should be turned fully clockwise for maximum sensitivity. Receive sensitivity is reduced by turning the control counterclockwise.

Adjust the RF GAIN so the S-meter does not show excessive deflection. This minimizes noise during reception and allows the S-meter to indicate signal peak (or a little below that point). Noise is markedly reduced when the signal is absent.

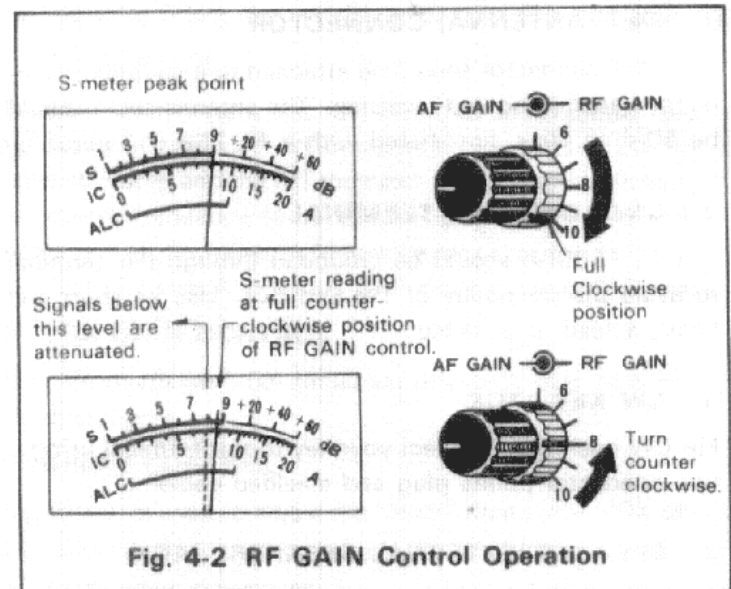


Fig. 4-2 RF GAIN Control Operation

4.1.4. RIT CONTROL

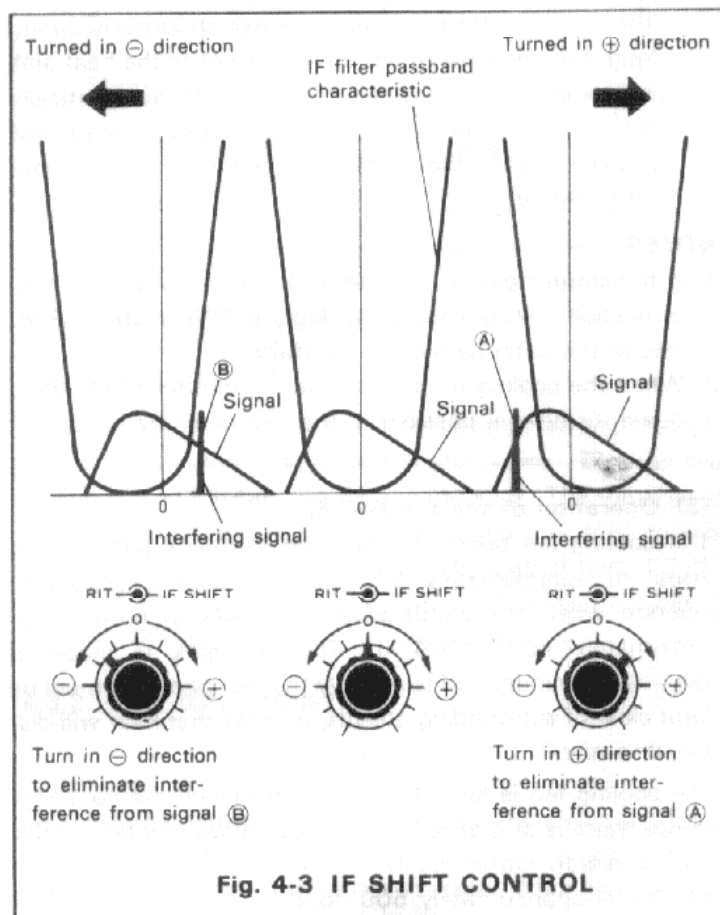
By using the RIT (Receiver Incremental Tuning) control, the receive frequency can be shifted by about ± 1.5 kHz without changing the transmit frequency.

If the frequency of the station you are working changes, your receive frequency can be reset by turning the RIT switch ON and adjusting the RIT control. Adjusting the control clockwise increases the frequency. The RIT shift can be checked by the digital display. When first calling another station, the RIT should be OFF, otherwise your transmit and receive frequency will not coincide.

4.1.5. IF SHIFT CONTROL

The IF SHIFT control is used to shift the passband of the IF filter without changing receive frequency. By turning this control in either direction, the IF passband is shifted as shown in Fig. 4-3.

The IF SHIFT is effective in eliminating interference when the receive signal is superimposed on nearby signals during operation in both SSB or CW mode.



(1) USB Mode (10 MHz and above)

Adjust the IF SHIFT control in the \oplus direction and lower frequencies are cut. Adjust the control in the \ominus direction and high frequencies are cut.

(2) LSB Mode (3.5, 7 MHz)

Adjust the control in the \oplus direction and higher frequencies are cut. Adjust the control in the \ominus direction and low frequencies are cut.

(3) CW Mode

By using the IF SHIFT in conjunction with the RIT, tone quality can be adjusted.

4.1.7 NAR-WIDE switch operation

For short to medium distance communication, the WIDE position may be used for both SSB and CW operation. For DX (long distance) communication, the NAR position will be an advantage in reducing interference.

This feature, in combination with the IF SHIFT control, will provide outstanding interference rejection. The receive IF

bandwidth is 2.4 kHz in the wide position, and 270 or 500Hz for CW (with optional filters YK-88CN and YK-88C respectively) and 1.8 kHz for SSB (with optional filter YK-88SN), both in the NAR position. In transmit, bandwidth is automatically WIDE.

PASSBAND WIDTH (−6dB) kHz

MODE FILTER	CW		SSB	
	WIDE	NARROW	WIDE	NARROW
No optional filter	2.4	*	2.4	*
YK-88C or CN	2.4	500 or 270	2.4	*
YK-88SN	2.4	1.8	2.4	1.8
YK-88C or CN YK-88SN	2.4	500 or 270	2.4	1.8

* Can not be received.

4.2 TRANSMISSION (Fig. 4-4)

CAUTION:

Before transmitting, be sure to connect an antenna or dummy load with a VSWR of less than 1.5:1. Never attempt to transmit with the antenna terminal left open.

When testing the transmitter, connect a 50-ohm dummy load, rated at more than 100W (TS-130S), or 10W (TS-130V). Refer to Fig. 4-1 for initial control settings.

When the TS-130S(V) is ready for transmission, use the following procedure:

● SSB Operation

- 1 Set the MODE switch to SSB.
- 2 Meter switch to ALC.
- 3 Standby switch to SEND.
- 4 Speak into the microphone and adjust the MIC GAIN for meter deflection within the ALC zone at signal peaks.

● PROC (processor) operation

In DX (long distance) operation, it may be desirable to increase talk-power by using the speech processor.

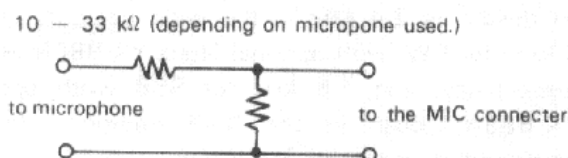
The speech processor in the TS-130S(V) Series combines an audio compression amplifier with changes in ALC time constant to provide extra audio punch and to increase average SSB output power, while suppressing sideband splatter.

To activate, turn on the PROC switch, and readjust mic gain operated as described, distortion will be minimal, however, tone quality will be affected, it is therefore advisable to conduct normal operation with the processor disabled.

NOTE:

When a high-output microphone is used, input overload and distortion will result.

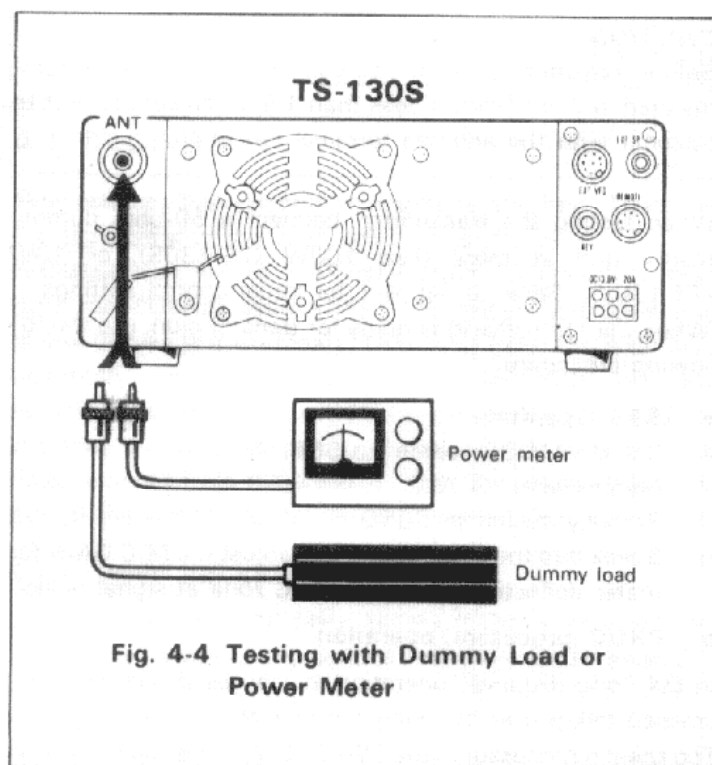
To prevent this, use an attenuator in the microphone circuit as shown below, or connect a 10 — 33k Ω resistor (depending on microphone used) across the microphone input. (Mic control setting should be approximately 12 O'clock)



The MC-50 microphone is recommended (Microphone sensitivity: $-55 \pm 3\text{dB}$ when for approx. 5 cm distance to the mic.)

● CW Operation

- 1 Set the MODE switch to CW and the meter switch to ALC.
- 2 Set the standby switch to SEND and adjust the CAR control so the meter deflects within the ALC zone. If a key is connected, it should be depressed during the adjustment.



4.2.1. FINAL STAGE PROTECTION

The TS-130S(V) features a VSWR protection circuit to protect the final-amplifier transistors. The circuit in the TS-130V is different than the circuit in the TS-130S.

(1) TS-130V

If the VSWR increases because of improper antenna impedance, the protection circuit activates to prevent the final-stage transistors from being overloaded. In this case, transmitter output power is reduced.

(2) TS-130S

Three different protection circuits are designed into the TS-130S.

- i) The same VSWR protection method as used in the TS-130V is used in the TS-130S. That is, the final-stage transistors are protected by detecting VSWR of the antenna system and automatically lowering transmitter output power if the VSWR is too high.

this cooling fan sufficiently cools off the heat sink radiator.

- ii) When the heat-sink temperature rises, a detection circuit activates a cooling fan. Under normal conditions,
- iii) The heat-sink temperature could rise abnormally during long transmissions, if the area adjacent to the heat-sink is blocked. In this case, the TS-130S automatically returns to the receiving mode, and transmitting is not possible until the heat-sink cools to the proper temperature.

NOTES:

1. If transmitter output decreases due to activation of the protection circuit caused by high VSWR, recheck and retune the antenna system carefully.
2. When the cooling fan starts to turn, determine that adequate air flow is possible in the heat-sink area.

(3) Operation of the Cooling Fan

The cooling fan operates when the heat-sink temperature rises, to approximately 50°C (122°F) and it ceases to operate when the temperature decreases to normal, approximately 40°C (104°F). The heat-sink is made of die-cast aluminum and is actually the rear panel. It must be kept clear of surrounding objects, in order that heat will dissipate easily.

The cooling fan is designed to operate when the heat-sink temperature is at a specific level, regardless of whether the unit is in transmit or receive mode.

Fan life is approximately 500 hours.

4.2.2. MIC GAIN CONTROL (Fig. 4-5)

This control adjusts the microphone input level. When using the TS-130S(V) in SSB mode, connect a microphone and set the standby switch to SEND (antenna or dummy load MUST be connected).

Set the meter switch to ALC and speak into the microphone. Adjust the MIC GAIN control so the meter does not deflect out of the ALC zone at signal peaks.

The TS-130S(V) accepts either a low or high impedance microphone ($500\ \Omega$ to $50\ \text{k}\Omega$). When using a low impedance microphone ($500\ \Omega$) the MIC GAIN control should be advanced higher than when a high impedance microphone is used, while observing the ALC meter.

● ALC (Automatic Level Control)

The ALC monitors the transmitter final stage output to minimize distortion in your transmitted signal. It automatically adjusts output to an optimum level.

Pointer should not deflect beyond ALC zone at signal peaks.

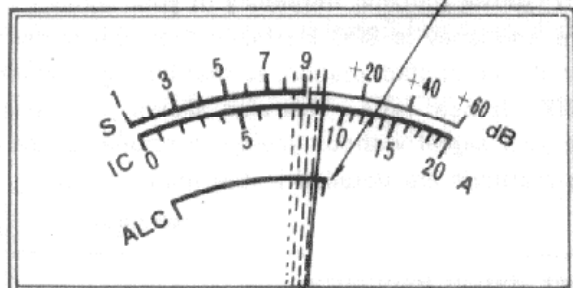


Fig. 4-5 ALC Adjustment

4.3 VOX OPERATION

4.3.1. VOX SWITCH

VOX (voice operated transmit) is used to switch the TS-130S(V) into transmit mode by your voice. Depress the switch ON and speak into the microphone. The transceiver automatically switches to transmit mode (the MIC control should be adjusted in advance as explained in Item 4.2.2). Both the send switch and the MIC P.T.T. switch are left in the REC position.

4.3.2. VOX GAIN CONTROL

This adjusts the VOX circuit sensitivity. Speak into the microphone at normal voice levels and adjust the control. Clockwise increases sensitivity, allowing transmission with a low voice level. Transceiver operating condition can be checked by the sound from the speaker. When the speaker is silent, the transceiver is in transmit mode.

Note that if the control is advanced too far, the VOX circuit is "tripped" by ambient noise.

4.3.3. ANTI-VOX CONTROL

This prevents the VOX circuit from being "tripped" by sound from the speaker.

Adjust the control so the VOX will not operate at the desired speaker volume level.

4.3.4. VOX DELAY CONTROL

This control adjusts the transmit hold time of the VOX circuit. If the hold time is too short, the transceiver will return to receive mode as soon as you stop talking into the microphone. This can be eliminated by turning the control clockwise. Adjust the control for comfortable operation at a normal rate of speech.

4.4 SEMI-BREAK-IN OPERATION

The TS-130S(V) has a built-in side-tone oscillator to permit semi-break-in operation, besides the normal CW operation. During semi-break-in operation, the transceiver is placed in transmit mode when the key is depressed, and returns to receive mode when the key is released. The VOX circuit is activated by the side-tone.

For semi-break-in operation, set the VOX switch ON and the MODE switch to CW. Adjust the VOX GAIN to insure that the transceiver is set in transmit mode whenever the key is depressed. Also, adjust the VOX DELAY for desired hold-in. ANTI VOX adjustment is not required.

4.5 OPERATION WITH A LINEAR AMPLIFIER

The ACSY connector on the rear panel provides for interconnection with an amplifier. See the amplifier instruction manual to determine whether the linear requires a normally opened or normally closed (during receive) relay contact.

Connect the amplifier control line to either pin 5 (N.C.) or pin 4 (N.O. during receive). Connect the Ground (Shield) of the Control Line to Pin 2 and Pin 7. Connect amplifier ALC to pin 6 of the ACSY connector. The TS-130S output is quite adequate to drive most amplifiers to full rated output.

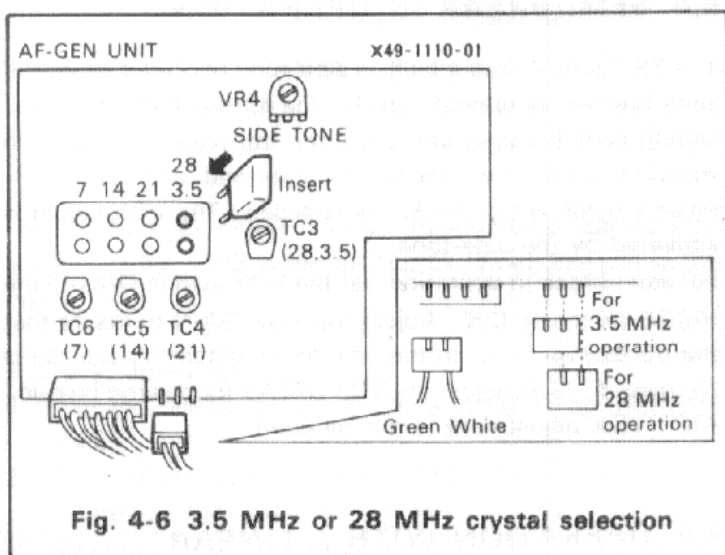
4.6 FIXED CHANNEL OPERATION (Fig. 4-6)

The TS-130S(V) has a built-in crystal-controlled oscillator for fixed-channel operation. This feature is most useful for commonly used frequencies, nets, or any situation where crystal-controlled operation is required.

The TS-130S(V) accepts a maximum of four crystals one each for the 7, 14, 21 and 28 MHz bands. The 14 MHz position can also be used as 10 MHz and 18 MHz position. The 28 MHz position can be used as 24.5 MHz position.

Since the 28 MHz band position can be used for the 24.5, 28.0, 28.5, 29.0, and 29.5 MHz bands, channel frequencies of 24.6, 28.1, 28.6, 29.1, and 29.6 MHz are obtained when a crystal of 28.6 MHz is used.

For operation in the 3.5 MHz band, change the position of the connector from the 28 MHz to the 3.5 MHz position as shown in Fig. 4-6



The crystal frequency is determined by the following formula:

Crystal frequency (MHz) = 5.5 - X + Operating frequency (MHz)

- X = 3.5 (80m band)
X = 7.0 (40m band)
X = 10.0 (30m band)
X = 14.0 (20m band)
X = 18.0 (17m band)
X = 21.0 (15m band)
X = 24.5 (12m band)
X = 28.0 (10m band)
X = 28.5 (10m band)
X = 29.0 (10m band)
X = 29.5 (10m band)

Crystal Specifications:

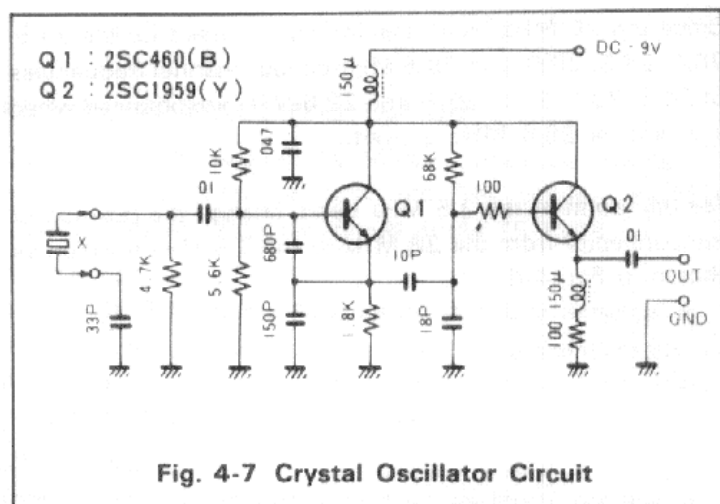
Type of crystal holder: HC-25/U

Oscillation frequency: 5.5 ~ 6.0 MHz

Multiplication: Fundamental

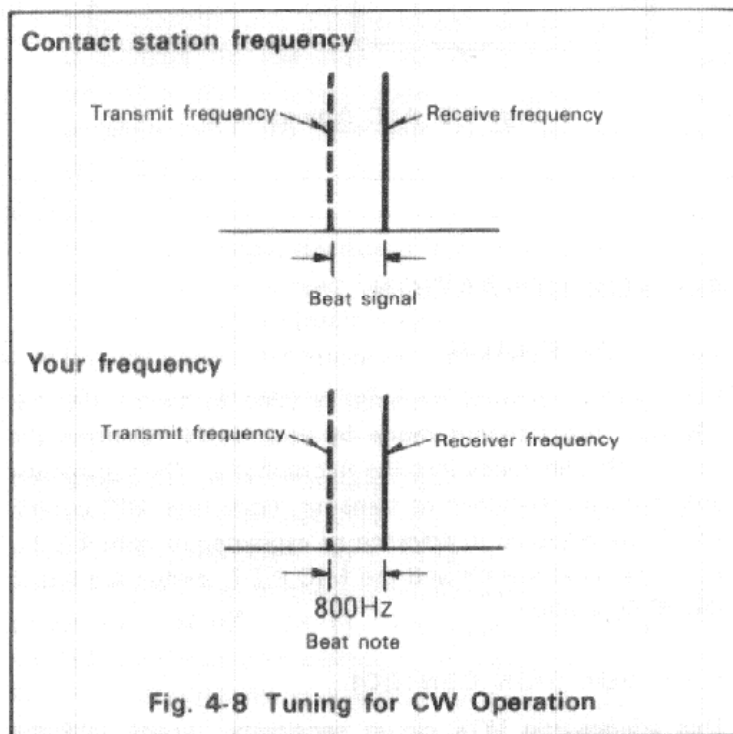
Frequency tolerance: $\pm 0.002\%$ at normal temperature

Oscillation circuit: See Fig. 4-7



4.7 CW OPERATION (Fig. 4-8)

For CW operation, your transmit frequency should be "zeroed" to the transmit frequency of your contact station. Receive frequency is 800 Hz lower than the transmit frequency of your contact station, so that his signal is received as a 800-Hz beat note. This also allows your contact to receive your signal without having to retune receiver. Tuning methods are detailed in the following paragraphs.



4.7.1. OPERATION WITHOUT OPTIONAL CW FILTER

Set the IF SHIFT control to its center position and the RIT switch OFF. Adjust the main tuning control for an 800-Hz beat note and your transmit frequency will then coincide with that of your contact station ("zeroed"). During reception, the side-tone monitor is activated by pressing down the key (VOX OFF). In this case, listen to the side-tone superimposed on the receive signal and adjust the main tuning for similar side-tone and incoming CW audio tone. By so doing, transmit frequencies will be zeroed.

You may now adjust the RIT for a pitch which suits your preference. If interference is encountered, adjust the IF SHIFT. For more convenient and effective CW operation, use of the optional YK-88C or YK-88CN CW crystal filter is recommended.

4.7.2. OPERATION WITH CW FILTER (YK-88C)

Set the IF SHIFT to its center position and the RIT to OFF. Adjust the main tuning control for maximum deflection of the S-meter. Receive signal pitch will be about 800 Hz, indicating correct tuning.

4.7.3. KEY CONNECTION (Fig. 4-9)

Your key should be connected as illustrated in Fig. 4-9. When using an electronic keyer, make sure that polarity is set for positive. Always use shielded line from the key to transceiver.

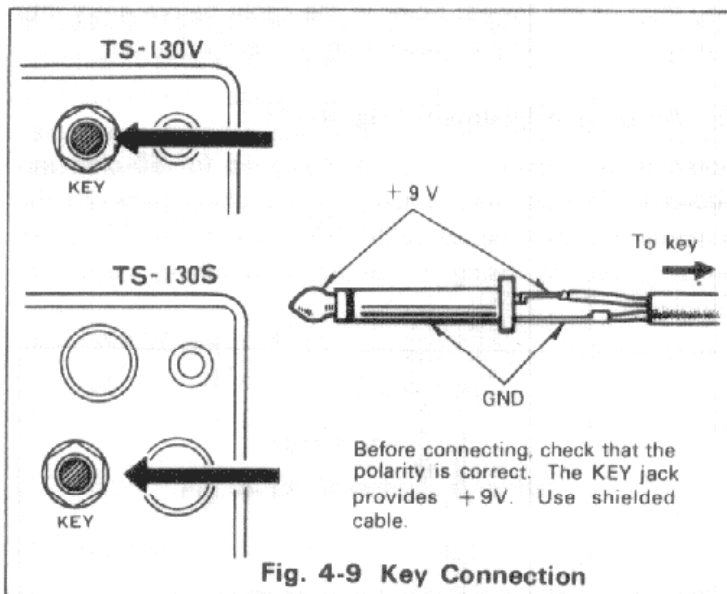


Fig. 4-9 Key Connection

4.8 MOBILE OPERATION (Fig. 4-10)

The TS-130S(V) being compact in design, is ideal for mobile operation. Satisfactory mobile operation is achieved through proper power and antenna connection, and thoughtful transceiver installation and adjustment.

4.8.1. TS-130S(V) INSTALLATION

Secure the TS-130S(V) under the dashboard using an optional MB-100 mounting bracket as shown in Fig. 4-10. As an alternative, use strapping, making sure that the TS-130S(V) will not slip out of place while driving the vehicle.

NOTES:

1. Do not install the TS-130S(V) near the heater outlet.
2. Allow sufficient space behind the TS-130S(V) to ensure proper ventilation.

4.8.2. HOW TO HANDLE THE POWER CABLE

When connecting or disconnecting the power cable to or from the power connector, be sure that the power switch is always in the "OFF" position. Observe polarity of the cable. The TS-130S(V) operates on 13.8 VDC, negative ground. Battery polarity must be correct. The power cord is color coded:

CAUTION: Observe battery polarity.

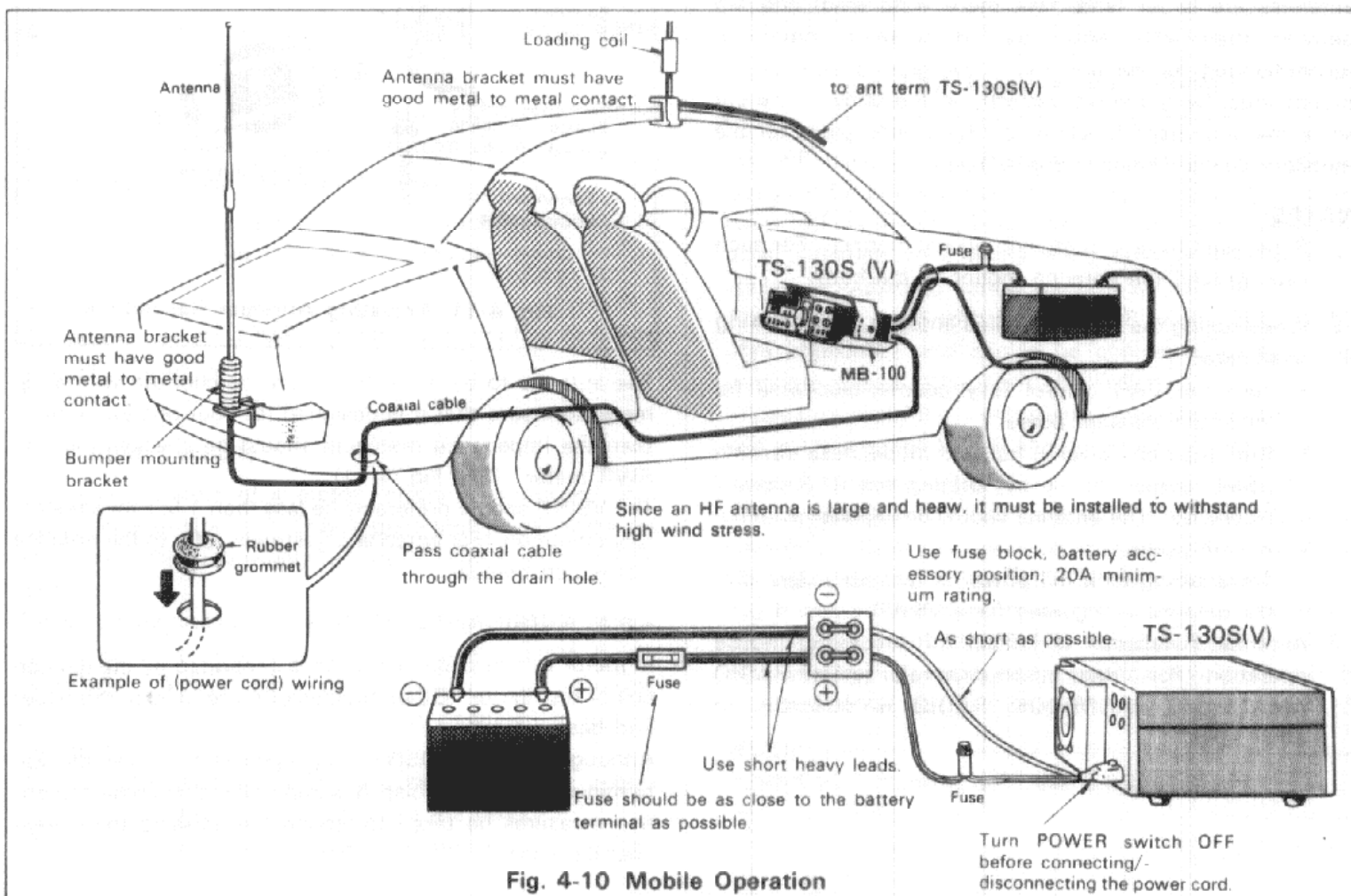


Fig. 4-10 Mobile Operation

POWER CABLE

TS-130V	TS-130S
red ⊕ red or black ⊖	red and white ⊕ black and gray ⊖

Connect the TS130S(V) power cable to the battery terminals, with consideration to current requirements and noise prevention. The maximum current drawn by the TS-130S reaches to between 18 and 20A when transmitting. Therefore, the cable should be made as short as possible, using the specified fuse. Also, determine that the power system of the car (including the battery and generator or alternator) will handle the increased load of the TS-130S(V).

Route battery and ANTENNA leads away from all high voltage secondary circuits to prevent ignition noise interference.

4.8.3. MOBILE ANTENNA

(1) Antenna Installation

Use a rugged mount for the mobile antenna because HF antennas are larger (and have more wind load) and are heavier than VHF antennas. A bumper mount is recommended for general use. The ground side of the mount must be grounded perfectly to the body of the car since the body itself functions as the ground plane for the mobile antenna. (Refer to Fig. 4-10.)

NOTES:

1. Some cars have a urethane plastic bumper. For such cars, ground the antenna mount to the body.
2. When tuning the newly installed antenna, use following procedure:
 - Turn the CAR control fully counter-clockwise for minimum transmit power.
 - With the transceiver in transmit mode, raise transmit power output slowly by rotating the CAR control clockwise. The antenna should be adjusted with minimum power.
 - Transmitting with full power is recommended after the antenna is adjusted for a VSWR below 1.5:1.
3. Antenna installation is critical for successful mobile operation. For further information refer to THE RADIO AMATEUR'S HANDBOOK, RADIO HANDBOOK, or other texts.

(2) Coaxial Cable Connection (Fig. 4-10)

When the antenna is mounted on the vehicles bumper, the coaxial cable from the antenna can be routed through a drain hole in the trunk. When the antenna is roof mounted pass the cable between the body and door. Leave a drip-loop at the lowest point in the cable before entry into the vehicle to prevent water from entering the car.

(3) Antenna Adjustment (Fig. 4-11)

Some mobile antennas are not designed for 50-ohm impedance. In this case, impedance matching between the antenna and the coaxial cable (50Ω) is required. This can be achieved by using an antenna matching device or coupler.

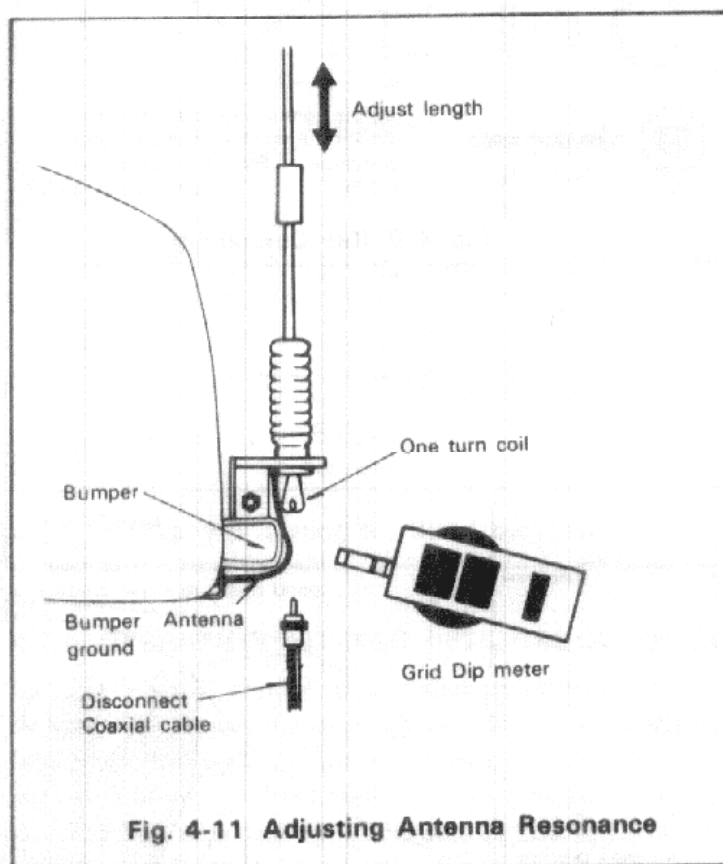


Fig. 4-11 Adjusting Antenna Resonance

The antenna to be used should first be checked with a dip meter to insure that it is designed for your operating band, then the impedance matching should be checked with an SWR meter. (See Fig. 4-11)

The VSWR should preferably be less than 1.5:1 for satisfactory operation. For antenna adjustment refer to the antenna instruction manual.

4.8.4. NOISE REDUCTION

In motor vehicles, ignition noise is generated by the ignition coil or distributor. Other sources of noise include the wiper and heater motor.

Although the TS-130S(V) is equipped with a noise blanker to minimize ignition noise, it is imperative that some preventive measures be taken to reduce the noise to the lowest possible level.