STANDARD

2m MULTI MODE TRANSCEIVER

C5400

OWNER'S MANUAL

STANDARD COMMUNICATIONS CORP.

We are confident that you will be entirely satisfied with your 144 MHz Multi Mode Transceiver Model C5400. Our very strict quality control and inspection ensure that each transceiver left the factory in perfect condition. If the unit is damaged or fails to operate, immediately notify your dealer.

To obtain the best performance and longest use from your transceiver, please study these instructions carefully.

TABLE OF CONTENTS

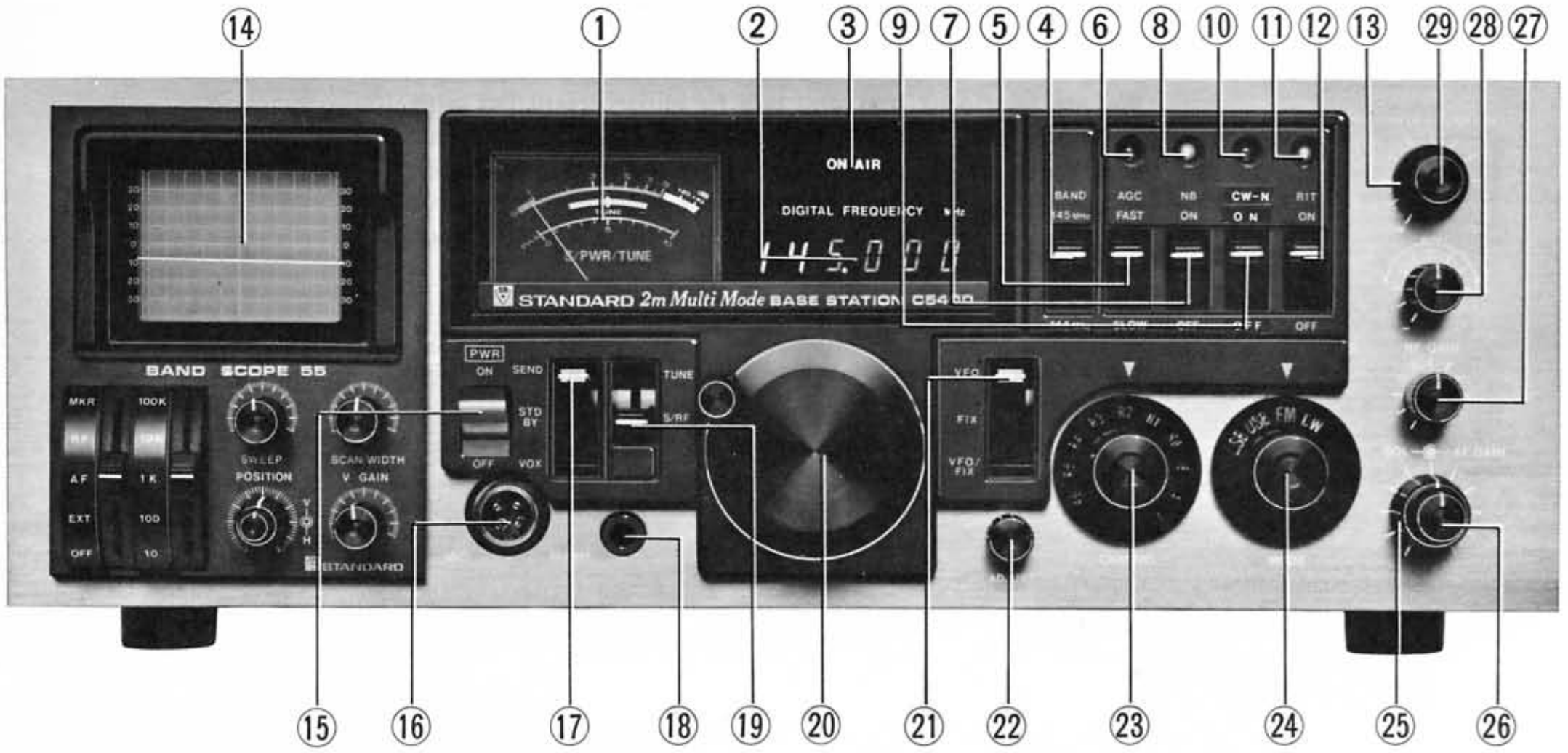


Photo 1.

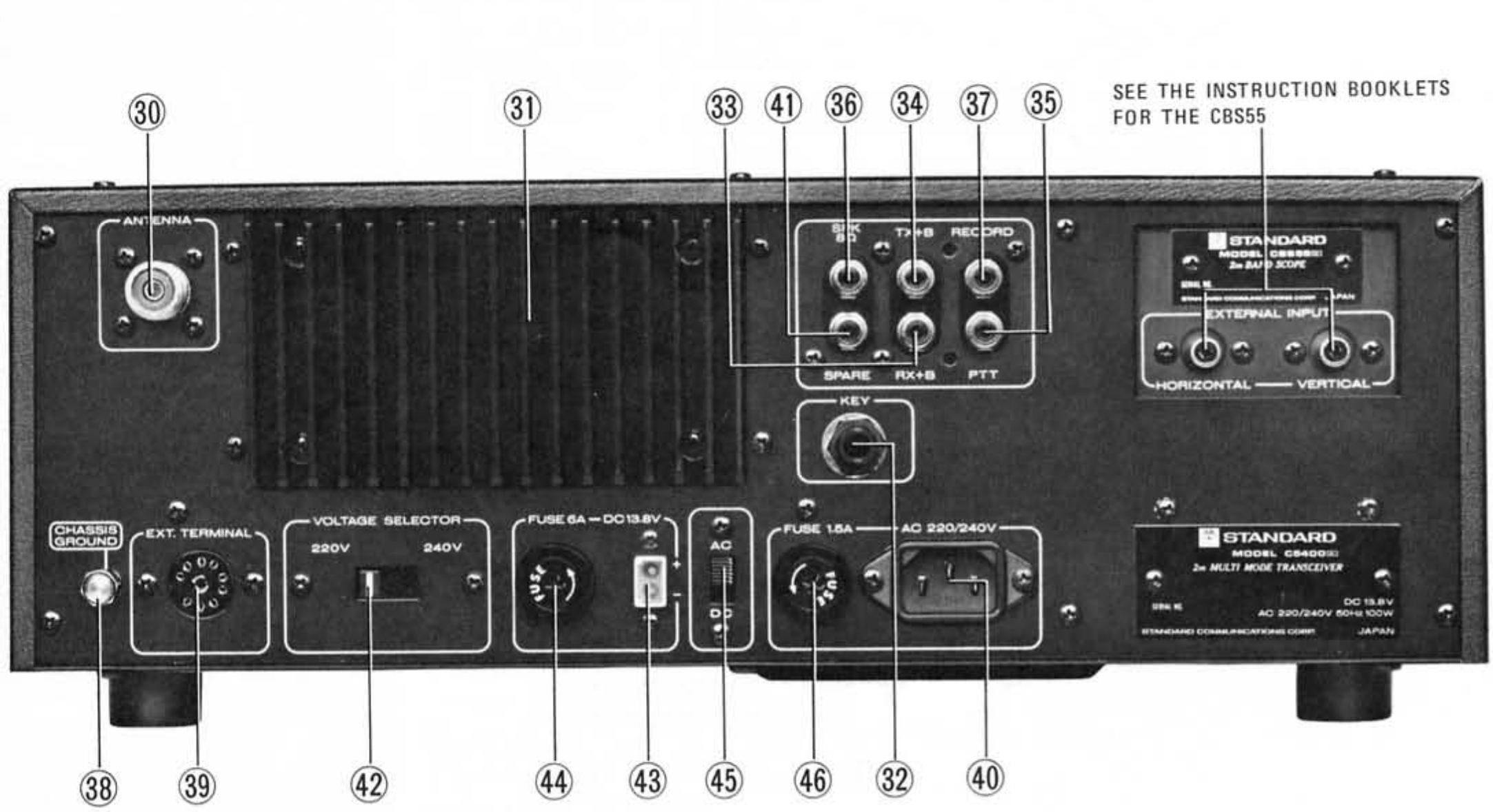


Photo 2.

1. ACCESSORIES

Hand Microphone 1
Bandscpope CBS 55. 1
DC Power Cord (with a connector) 1
AC Power Cord (with a connector) 1
Stereo Phono Plug 1
RCA Phono Plugs 3
Fuse 2
Microphone Hanger 1
Longer and Shorter Feet. . . . . 2 + 2
Circuit Diagrams (for C5400 and CBS 55) . . . . . 1 for each
Instruction Manuals (for C5400 and CBS 55) . . . 1 for each

2. ACCESSORY DESCRIPTIONS

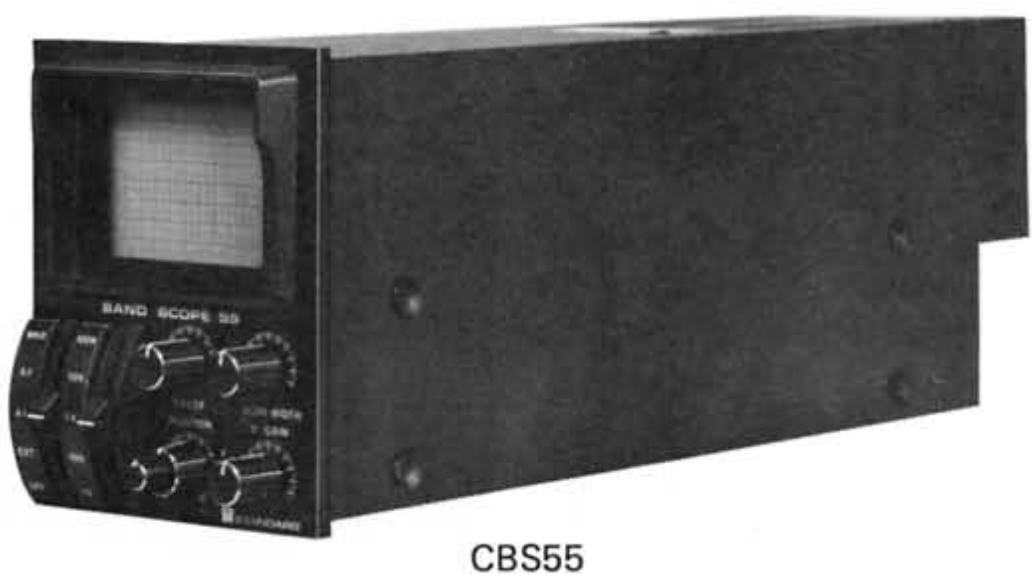
1. HAND MICROPHONE MP-416 (ACCESSORY)

The MP-416 is a dynamic-type hand microphone with an output impedance of 600 ohms. To attach the supplied Microphone Hanger to the Hand Mic, use the three screws provided on the left side panel of the transceiver unit. The supplied tapping screws may be used to mount the Microphone Hanger on any other convenient locations.

MP416

2. BANDSCOPE CBS 55

The Bandscope CBS 55 is a multi-purpose oscilloscope specifically designed for communication use. It can be operated simply by plugging it, instead of the speaker unit, into the speaker mount provided in the C5400 transceiver unit. During reception, the CBS 55 operates as a band scope, providing a 10.7 MHz marker or AF output displays. During TX operations, MIC AMP output can be monitored on the CRT. It also has horizontal and vertical input terminals on its rear panel to operate as an oscilloscope.
The CBS 55 Bandscope operates on an AC power source only; it does not operate when the transceiver is powered by a DC power source. For further details, refer to the Instruction Manual for the CBS 55.



CBS55

3. SPEAKER CSP 55 (OPTIONAL)

The CSP 55 is an optional speaker unit specifically designed for transceivers, and is rated at 8 ohms. When the Bandscope CBS 55 is not used, the CSP 55 can be mounted in the transceiver unit; when the Bandscope is plugged into the transceiver instead of the speaker unit, the speaker unit may be mounted on a speaker stand to be operated as an external speaker by connecting it to the SPK 8 Ω terminals on the rear of the transceiver unit.

CSP55

3. FEATURES

* GENERAL FEATURES

1. The C5400 is an all-solidstate, multi-mode transceiver covering continuously the entire 2-meter amateur frequencies from 144.000 MHz to 146.000 MHz with the built-in VFO. The FM mode has a double conversion construction, while other modes have a single conversion construction.
2. Tuning dial torque is adjustable by means of an adjusting knob. The newly-developed flywheeled tuning dial is very advantageous for quick and fine tuning.
3. A 6-digit DIGITAL FREQUENCY readout provides highly-precision frequency display down to 1 kHz.
4. Fixed channels consist of 12 channels in 144 MHz band, and another 12 channels in 145 MHz band - 24 channels in all. For R0 - R9 channels, 10 X'tals are provided for repeater frequencies in 145 MHz band. For other two vacant channels, operating frequencies can be optionally set by selecting crystals. When any crystal is not mounted for the fixed channels, the DIGITAL FREQUENCY readout displays "140.000", indicating that the channels are empty.
5. Combining fixed channel operations with VFO control permits "cross" operations which provide the repeater system with channels R0 - R9.
6. The optional speaker unit CSP 55 is designed to operate not only as a built-in speaker but an external speaker unit.
7. The Bandscope CBS 55 is easily replaceable with the CSP 55 speaker unit.
8. In the SSB mode, AGC time constants are selectable for more flexible reception.
9. A simple switch operation switches in a VOX circuit providing stablest VOX operations. Semi-breakin operation is available with the CW mode.
10. A built-in CW monitor circuit is provided for error-free CW operations. It can also be used as a Morse trainer when the transceiver is set in the reception mode.
11. Highly reliable standby circuit without a relay.
12. Easily accessible trimmer allow adjustments of MONITOR GAIN, MIC AMP GAIN, VOX GAIN, ANTI-TRIP GAIN, and VOX DELAY TIME.
13. One 9-pin jack and one RCA jack are provided on the rear of the unit for auxiliary purposes. In addition, a double-contact, single-circuit relay is furnished in the unit for controlling external devices.
14. RECORD jack on the rear of the unit permits recording communications being carried out.
15. PHONE jack convenient for mid-night operations.
16. AF output is available also on the MIC jack, so that a telephone hadset can be connected to it.
17. Operating the Tone-Call switch activates a built-in tone oscillator and drives the repeater.
18. Operation convenience and outer refinement are combined into one on the C5400 Multi Mode Transceiver's operating panel.

* RECEIVER SECTION FEATURES

1. Receiver's RF stage has a 2-band herical resonator utilizing a variable capacitance device, eliminating interference and spurious.
2. MOS-FETs are used not only in the RF amplifier and mixer but in the 1st IF stage, achieving superior intermodulation characteristic.
3. The 1st IF amplifier has a monolithic crystal filter providing superb selectivity.
4. The AF amplifier has a rated output power of 2 watts into 8 ohms.
5. The meter indicator has two independent drive circuits for each operating mode. During FM reception, it operates as a "center meter," enabling precise tuning.
6. Reception frequencies can be finely adjusted by means of the RIT knob. The adjustment is effective for both VFO and fixed-channel receptions, and especially for SSB or CW mode receptions. While the RIT is activated, an indicator lamp is lit.
7. Amplification type AGC circuit serves to distortion-free demodulation even in SSB or CW reception. Demodulation time constants are available in "slow" and "fast" for SSB reception. For CW mode, it is fixed in the "fast".
8. Optimal RF gain can be obtained by adjusting the RF Gain Control.
9. A tone filter circuit with very narrow selectivity is provided for CW operation which is likely to be interfered.

***TRANSMITTER SECTION FEATURES**

1. Transmitter output is continuously adjustable from the rated power down to less than 1 watt. This feature is very useful for local communications or adjustments.
2. FM mode uses a speech-roll-off filter providing speech clearity, while suppressing occupating band width.
3. A double-balanced modulator IC provides clear SSB waves without affected by long-term degradation or temperature variation.
4. FET balanced-type pre- and local-mixers have superior spurious rejection ratio for transmission.
5. During transmission, ON AIR lamp is lit.
6. The final stage combines large heatsink, microstrip lines, and a glass-epoxy board, ensuring high performance and reliability.
7. Built-in ALC circuit suppresses splutter, and assures distortion-free transmission.

4. BEFORE OPERATION

1. INSTALLATION

Install your C5400 Multi Mode Transceiver on a well-ventilated bench, avoiding high temperature, humidity, dust, and especially direct exposure to sunlight. For adequate ventilation, allow plenty of space behind the unit. If you wish to install the unit under the dashboard of your car, pay special attention on ventilation as well as vibration.

2. POWER CONNECTION

The C5400 operates on either AC 220V/240V (50/60 Hz) or DC 13.8 V. Switching between AC and DC operation modes can be made by means of a switch provided on the rear of the unit. The red (+) and black (—) leads are to be used for connecting an external DC power source. AC primary voltage can be selected by means of the AC VOLTAGE switch on the rear of the unit.

To prevent break-down of the main body and electric shock, be sure to make certain that the PWR switch is in OFF and the STD BY switch is in STD BY, before plugging or replacing the power cord or changing the power voltage and power mode.

3. ANTENNA CONNECTION

Use of a well-designed antenna is a key to successful communications. For long-distance communications or those with specific stations, use a high gain directional antenna, such as a Yagi antenna, as shown in Figure 1 (a). For local communications, use a non-directional ground-plane antenna installed at a height of 10 to 20 meters as shown in Figure 1 (b). A 5D-2V coaxial cable should be used to connect your antenna to the transceiver unit's ANTENNA terminal if the cable length is within 10 meters. For more than 20-meter connection, use a 8D-2V or 10D-2V cable.

NOTE: Be sure to set the PWR switch of the unit to the OFF position before making antenna connection.

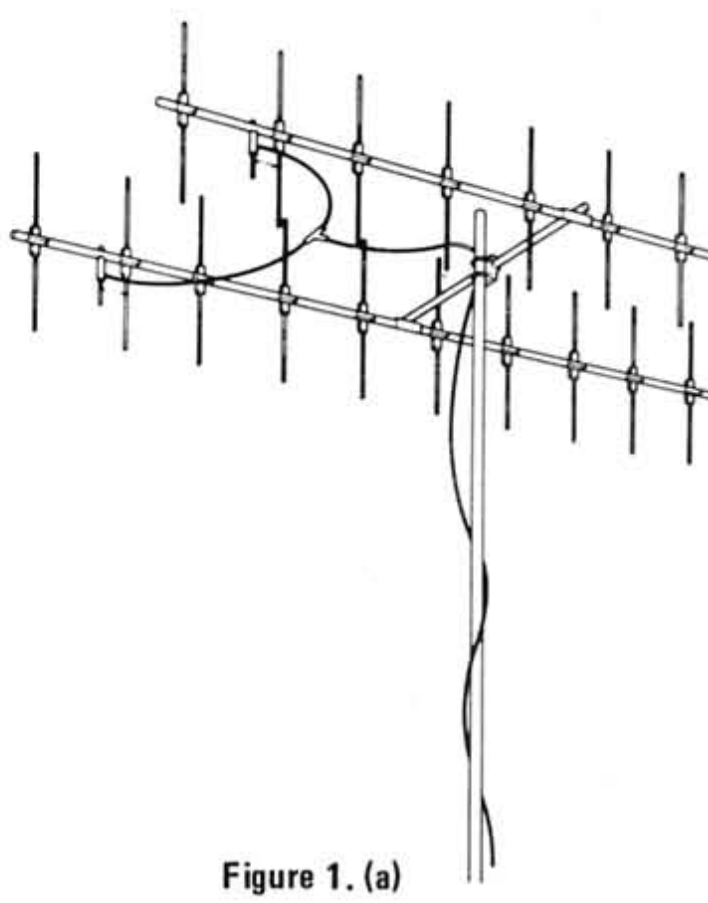


Figure 1. (a)

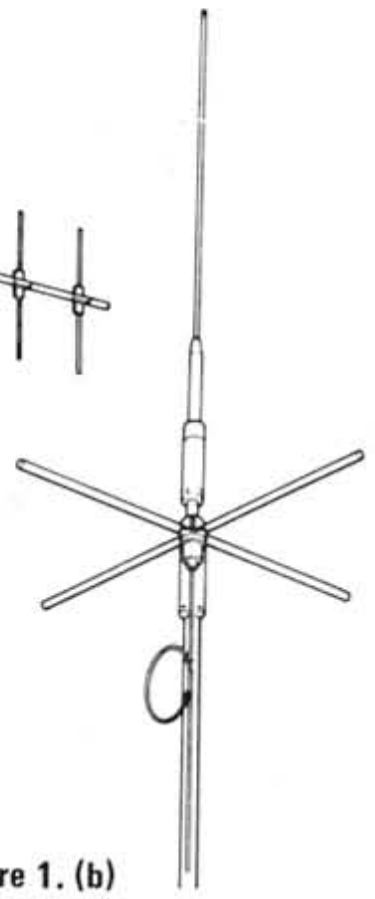


Figure 1. (b)

4. MICROPHONE

The supplied Hand Microphone MP416 is a single directional dynamic microphone with a rated impedance of 600 ohms. When using a microphone other than the MP416, be sure to use a high-performance, AC-coupled microphone with an impedance of 500 to 600 ohms. If a DC-coupled microphone is used, the microphone element may possibly be damaged.

In case that microphone input gain is not sufficient, open the sub-lid on the top of the unit and turn the MIC AMP GAIN trimmer clockwise until an adequate gain can be obtained.

For microphone connection, see Figures 2 and 3.

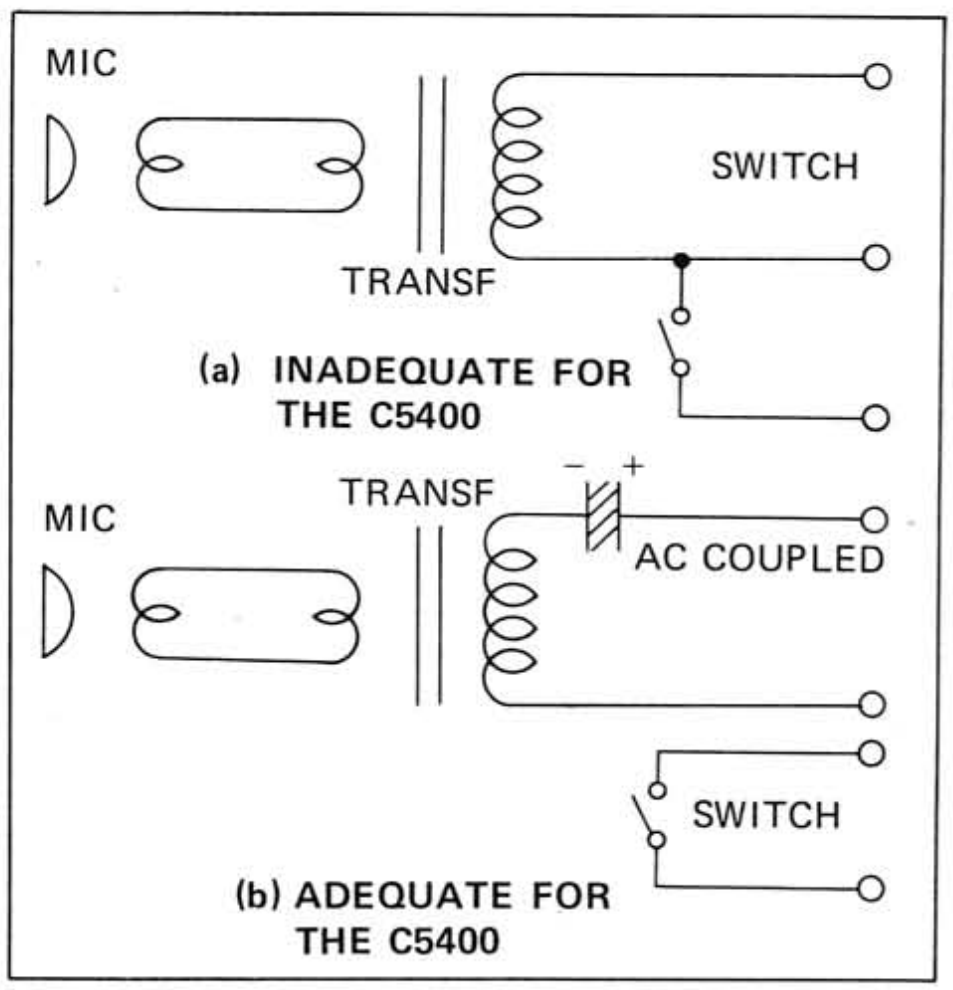


Figure 2. Microphone for the C5400

5. KEY

For CW operation, plug your key into the KEY jack on the rear of the unit. The key input is inhibited for the operation modes other than the CW mode.

6. EXTERNAL SPEAKER

The C5400 has a built-in speaker. If you wish to use an external speaker, plug it into the SPK jack on the rear of the unit using a supplied RCA plug. A communication-use speaker with an impedance of 8 ohms will be suited for the external speaker. Use care to avoid shorting the AF output when connecting your external speaker to the unit. For speaker cord, a shielded wire should be used to prevent high-frequency interference.

NOTES: 1. Do not plug an external speaker into the PHONE jack.
2. When using the optional speaker CSP 55 instead of the CBS 55 Bandscope, use a speaker jack provided inside the unit (see Photo-3). When the SPK 8Ω jack on the rear panel is in use, the internal speaker and jack are switched off.

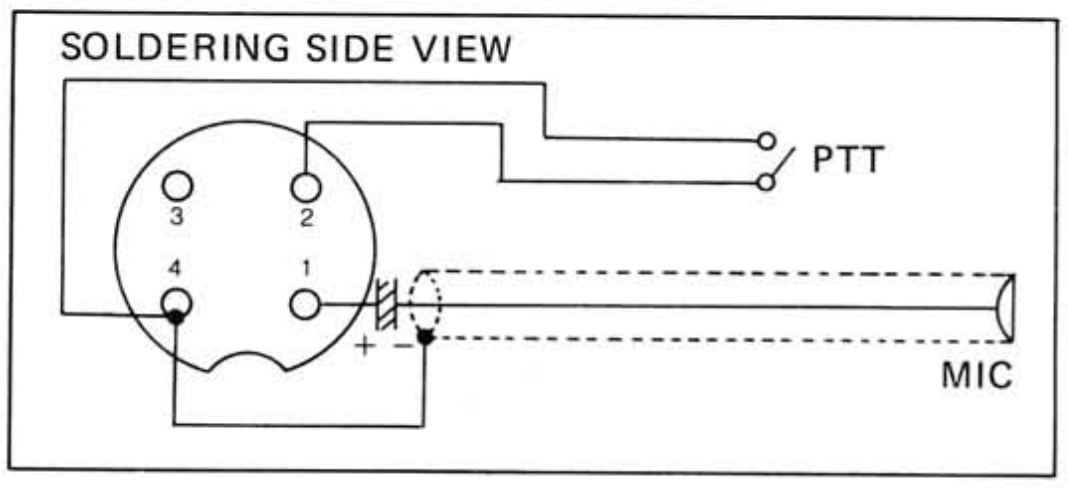


Figure 3. Microphone Connection

7. CBS 55 BANDSCOPE

To remove the CBS 55 Bandscope from the main transceiver unit, remove two screws each provided on the rear and the bottom of the unit, then push the Bandscope unit from its back.

To secure the CSP55 speaker unit (optional) in the main unit, use a screw hole on the bottom of the unit.

NOTE: Be sure to turn off the power to the transceiver unit when removing the CBS 55 Bandscope.

5. PANEL FEATURES

1. FRONT PANEL FEATURES

① Meter
The large meter in your transceiver indicates S/PWR/TUNE levels. During reception, it operates as a "S" meter indicating antenna input levels normalized into the ranges from 1 to 9, and +20 dB to +40 dB. RF transmission power can be read in the meter when transmitting. If the meter switch is set in the TUNE position, the meter works as a center meter in the FM mode of reception.

② DIGITAL FREQUENCY Readout
The DIGITAL FREQUENCY readout provides transmission and reception frequency display down to 1 kHz. It indicates a center frequency for FM, suppressed carrier frequency for USB and LSB, and carrier frequency for CW, in both transmission and reception modes. Therefore, a relevant frequency readout can be obtained simply by setting the MODE selector to the desired mode without adjusting the VFO. When a fixed channel is not equipped with a crystal, the display reads "140.000", indicating that the channel is "empty".

③ ON AIR Indicator
The ON AIR indicator lights up while the transceiver is in the transmission mode.

④ BAND Switch
This switch selects from 144 MHz band and 145 MHz band.

⑤ AGC SLOW/FAST Switch
For the SSB mode only, AGC time constants can be selected in SLOW or FAST by this switch.

⑥ FAST Indicator Lamp
This lamp lights up only when AGC time constant is set in the FAST for the SSB mode.

⑦ NB (Noise Blanker) Switch
Activating this switch during reception rejects pulse noise (igniting noise, etc.), largely contributing to reception clearity.

⑧ NB Indicator Lamp
This lamp is lit when the NB switch is ON.

⑨ CW-N Switch
Activating this switch provides ultra-narrow selectivity for CW reception, eliminating interference. This switch operates only when the MODE selector is in the CW position.

⑩ CW-N Indicator Lamp
This lamp is lit when the CW-N switch is ON.

⑪ RIT Indicator Lamp
The RIT indicator lamp is lit when the RIT switch is turned ON.

⑫ RIT Switch
When adjusting the RIT control knob, turn this switch ON.

⑬ RF POWER Control Knob
This knob controls transmission power continuously from the rated power down to less than 1 watt. The LOW position provides minimum transmission power while the HIGH position provides the maximum. This control knob may be used only for the FM mode. For other operation modes, set this knob always in the HIGH (maximum) position.

NOTE: When this knob is set to the LOW (minimum) position, the RF meter will waggle only slightly.

⑭ CBS 55 Bandscope
The CBS 55 is a multi-purpose oscilloscope. For further details, refer to the Instruction Manual for the CBS 55 Bandscope.

⑮ PWR Switch
The PWR switch turns On and Off the power to the transceiver unit.

⑯ MIC Jack
This jack accepts microphone output and PTT switch, and provides AF output for a telephone handset. Refer to the "Microphone" section on page 5.

⑰ STD BY Switch
This switch selects the SEND, STD BY, and VOX position:

* SEND position
Regardless of PTT switch state, the transceiver is set into the transmission mode in this position.
* STD BY position
In this position, the PTT switch controls transmission/reception switching.
* VOX position
Transmission/reception switching is automatically controlled by voice signals from the microphone. For further details, refer to the "VOX" section on page 11.

⑱ PHONE Jack
The PHONE Jack accepts your headset. When a headphone set is plugged into this jack, the speaker output is automatically cut out.

⑲ Meter Switch
When this switch is set in the S/RF position, the meter indicates either reception signal strength or transmission power. Setting this switch in the TUNE position makes the meter to operate as a center meter for FM reception only.

⑳ Tuning Knob
A desired station can be tuned in by turning this knob. One rotation of this knob covers 25 kHz. When this knob is tuned fully clockwise or counterclockwise, the DIGITAL FREQUENCY readout stays still at the maximum or minimum frequency with a heavier rotating torque required. In this case, a slipping mechanism protects tuning gears from damage. Tuning knob's rotating torque is adjustable by means of the ADJUST knob.

㉑ VFO/FIX Switch
This switch selects VFO, FIX, and VFO/FIX positions:

* VFO position

In this position, the VFO controls both transmission and reception frequencies.

* FIX position

Both transmission and reception frequencies are controlled by fixed channels. This position is convenient for monitoring repeater input frequency.

* VFO/FIX position

In this position, fixed channels control transmission frequency; and the VFO controls reception frequency. This "cross" operation permits repeater operations.

㉒ ADJUST Knob
The ADJUST knob adjusts tuning-dial torque. Turning this knob clockwise increases tuning-dial torque required. Turning it fully counterclockwise releases a brake mechanism of the dial, minimizing the turning torque required.

㉓ CHANNEL Selector
The CHANNEL selector selects fixed-channel frequencies. It selects 12 channels for 144 MHz band, and another 12 channels for 145 MHz band - 24 channels in total. If R1 (144.025 MHz) is selected in 144 MHz band, 145.025 MHz is selected when the BAND switch is set into the 145 MHz band. Crystals for channels R0 - R9 are provided in the unit for fixed channels. (Refer to the following table for fixed-channel frequencies.)

CHANNEL	144 MHz BAND	145 MHz BAND
R0	144.000	145.000
R1	144.025	145.025
R2	144.050	145.050
R3	144.075	145.075
R4	144.100	145.100
R5	144.125	145.125
R6	144.150	145.150
R7	144.175	145.175
R8	144.200	145.200
R9	144.225	145.225
A	—	—
B	—	—

Table 1.

㉔ MODE Selector
The MODE selector selects the following operation modes:

* LSB (Lower Side Band)

Transmission and reception using lower side band.

* USB (Upper Side Band)

Transmission and reception using upper side band.

* FM

Transmission and reception using FM modulation.

* CW

Transmission and reception for Morse codes.

㉕ SQL Control Knob
Turning this knob clockwise during FM reception eliminates noise by activating a squelch circuit.

㉖ AF GAIN Control Knob
This knob controls audio output levels. Turning this knob fully clockwise makes the output maximum.

㉗ RF GAIN Control Knob
This knob controls receiver's RF amplifier gain. Turning this knob fully clockwise yields maximum gain, and fully counterclockwise yields minimum gain.

㉘ RIT Control Knob
The RIT control knob controls reception frequency without changing transmission frequency. When this knob is set in "0" position, the transmission frequency is made equal to the reception frequency. The RIT control is effective for both VFO and fixed-channel operations. Note that when the RIT switch is set to OFF, the RIT control does not work. For further details, refer to the RIT Control on page 11.

㉙ Tone Call Switch
Pressing this switch sets the transceiver into the transmission mode, and at the same time, generates a tone signal at 1750 Hz. This tone signal drives repeater during FM operation. In the SSB mode, carrier is transmitted to the frequency distant from the sub-carrier frequency by 1750 Hz. This feature is convenient for antenna adjustments, etc. In the CW mode, tone modulation is not available, though pressing this switch sets the unit in transmission mode.

2. REAR PANEL FEATURES

㉚ ANTENNA Jack
The ANTENNA jack accepts your antenna with an impedance of 50 ohms.

㉛ Heatsink
This heatsink is provided for transmitter's final transistors.

㉜ KEY Jack
This jack accepts your key for CW operation.

㉝ RX + B Terminals
The (RX + B) power (DC 9V) is available on these terminals.

㉞ TX + B Terminals
The (TX + B) power is available on these terminals.

㉟ PTT Jack
Shorting this jack with ground sets the transceiver into the transmission mode.

㊱ SPK 8 Ω Jack
This jack accepts an external speaker.

㊲ RECORD Jack
This jack accepts your taperecorder input to allow recording communications being carried out.

㊳ CHASSIS GROUND Terminal
A ground wire is to be connected to this terminal.

㊴ EXT. TERMINAL
Built-in relay's contact signal is available on this EXT. TERMINAL for the use of controlling external devices. The built-in relay is rated at 24 V, 100 mA, so the power drain from this TERMINAL should be limited within this rating. Connections are shown in figure 4.

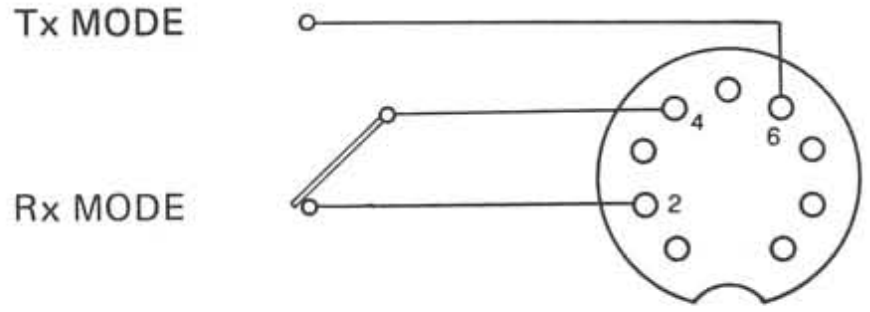


Figure 4. EXT. TERMINAL Connections

㊵ AC Inlet
The AC inlet accepts an AC plug supplying the proper voltage.

㊶ SPARE Jack
The SPARE Jack is an unwired auxiliary jack.

㊷ AC Voltage Selector
For AC operation, this selector selects AC voltages, on which the unit operates, out of 220 V and 240 V. Set this selector to the correct voltage position according to your local supply voltage.

㊸ DC Inlet
The DC inlet accepts DC 13.8 V power source for DC opration.

㊹ FUSE 6 A Bracket
The FUSE 6 A bracket contains a 6 A-fuse for DC power source. When replacing it, use a new one with the same current capacity.

㊺ DC/AC Selector Switch
This switch selects AC or DC power source.

㊻ FUSE 1.5A Bracket
This contains a 1.5A AC line fuse. For replacement, use the same fuse as the 1.5A rated one.

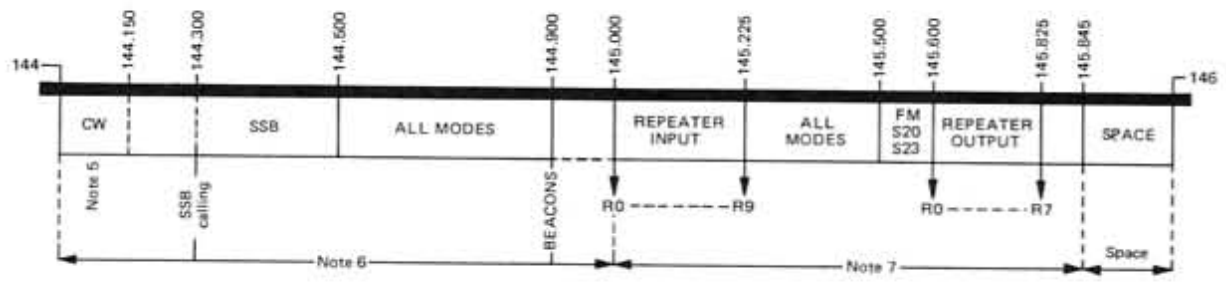
6. OPERATING INSTRUCTIONS

1. PRECAUTION

The C5400 Multi Mode Transceiver is capable of transmitting varied types radio waves. Use utmost care to avoid any trouble in comfort to your local regulations.

2m Band Plan (I.A.R.U. Region 1)

MHz	Allocation
144.000–144.010	E-M-E
144.050	CW calling
144.100	CW random ms
144.150	Upper limit cw exclusive
144.200	SSB random ms
144.300	SSB calling
144.500	SSTV calling
144.600	RTTY calling
144.700	FAX calling
144.900	Regional beacons' centre
145.000–145.225	Repeater input–R0 to R9
145.300	RTTY (local)
145.500	Mobile calling
145.500 (S20), 145.525 (S21)	FM simplex
145.550 (S22), 145-575 (S23)	FM simplex
145.600–145.825	Repeater output



Notes:
1. Established simplex frequencies on repeater output channels may be retained.
2. The segment 145.250–145.500 MHz may be allocated, if desired, to fm channels.
3. No regional planning for beacons of erp less than 50 W.
4. Regional planning fg beacons of erp more than 50 W.
5. CW permitted over v-hole band, CW exclusive 144.0–144.150 MHz.
6. Channelized nets should not operate in this portion at any time.
7. Local traffic should operate above 145 MHz during contests and band openings.

Table 2. VHF Band Plans

2. RECEPTION

After connecting the power cord, antenna, microphone, key, etc. to your transceiver unit, set the controls and switches on the transceiver as follows:

PWR Switch . . . . . .OFF (out)
STD BY Switch. . . . . .STD BY
Meter Switch . . . . . .S/RF
VFO/FIX Switch. . . . . .Any position
BAND Switch. . . . . Either 144 MHz or 145 MHz
SLOW/FAST Switch . . . . . Either SLOW or FAST
NB Switch . . . . . OFF
CW-N Switch . . . . . OFF
RIT Switch . . . . . OFF
ADJUST Knob . . . . . Set where it is
CHANNEL Selector. . .When VFO/FIX switch is set in FIX position or repeater is used, select a desired channel.
MODE Selector. . . . . Desired mode
RF POWER Knob . . . . . .HIGH
RIT Control Knob. . . . . "0"
RF GAIN Control Knob . . . . . Maximum (fully clockwise)
SQL Control Knob . . . Minimum (fully counterclockwise)
AF GAIN Control Knob . . . . . Minimum

After setting the controls and switches as instructed above, turn on the power of the unit by setting the PWR switch to the ON position. The meter and indicators will light up. Then adjust the knobs as follows:

AF GAIN Control: Listening to speaker output, turn this knob clockwise until adequate background noise level is obtained.

Tuning Dial: Watching the FREQUENCY readout, tune in a desired station.

RIT Control: After turning ON the RIT switch, finely tune the reception frequency with this knob.

RF GAIN Control: This knob should be set to maximum for usual reception. For very strong signal input, reduce this control for adequate reception level.

SQL Control: This control is effective for the FM mode only. When turning this knob gradually clockwise, there will be a point where background noise is shut out. Leave the knob right there.

NOTES: 1.When operating on a fixed channel, set the VFO/FIX switch to the FIX position, and set the CHANNEL selector to the desired channel frequency instead of tuning with the tuning dial. The CHANNEL indicator will indicate the channel being selected.
2.If your desired frequency is interfered with beats, slightly tune off the frequency and use the RIT feature.

1) SSB Mode Reception
SSB waves include USB (Upper Side Band) and LSB (Lower Side Band); and their operations are basically identical. Today, USB is widely used in accordance with international convention.

(How to discriminate SSB from FM)
When the MODE selector is set in the FM position, SSB won't be demodulated, while FM signals would be clearly audible. Otherwise, you can distinguish SSB from FM by the existance of beat noise: if beat noise disappears during intermissions of voice, it means that you are hearing a SSB signal; and if beat noise remains during voice intermissions, it would be an FM station.

(Tuning in)
After checking the reception signal mode, set the MODE selector to the USB position. Then turn the tuning dial counterclockwise (downward) by several kiro-hertz. A high-pitch tone will be heard. Now, as gradually turning up (clockwise) the tuning dial, voice will become clear and natural; and the clearest point obtained is the "zero-in" point. Once the tuning dial goes beyond this "zero-in" point, clearity of voice will be suddenly loosen. If the above tuning procedure does not demodulate the signal, set the MODE selector to the LSB position, and find a "zero-in" point following the procedure reverse to the above. In case that the reception frequency deviates after abtaining a "zero-in" point, turn the RIT switch ON, then adjust the RIT control knob. When the RIT control is adjusted, the reception frequency slightly differs from the transmission frequency. Therefore, before making another call, be sure to turn off the RIT switch or set the RIT control knob to the "0" position.

2) FM Mode Reception
First, tune in the desired station until clear voice is obtained, then set the Meter Switch to the TUNE position. The meter will operate as a center meter. Finely adjust the tuning knob so that the meter needle points the center. These adjustments provide an agreement between the reception and transmission frequencies. Setting the meter switch to the S/RF position will reveal reception signal strength. In FM reception, a slight off-tuning won't raise any problem; but it is advisable to precisely tune in the reception frequency since it may be sent on a fixed channel.

3) CW Mode Reception
To obtain a "zero-in" point of your partner station, adjust the tuning knob to obtain CW beat tone of 900 Hz, after checking that the RIT switch is set in the OFF position. When your transmission frequency gets "zero-in" with the partner station, a response of 900 Hz beat will be heard from the partner station. If the partner's beat tone deviates from 900 Hz, or a specific beat tone is desired, adjust the RIT control knob after turning the RIT switch ON. In case severe interferences cause a number of beats heard at different frequencies, turn the CW-N switch ON. Beats below 800 Hz will be completely suppressed.

3. TRANSMISSION

1) SSB/FM Mode Transmission
Set the MODE selector and BAND switch to the desired operation mode and band respectively, then tune the transmission frequency by turning the tuning dial knob. Setting the STD BY switch into the SEND position starts transmission with the ON AIR lamp lit up. When microphone input gain adjustment is desired, open the sub lid on the top of the unit, and adjust the MIC AMP GAIN. To radiate distortion-free waves, set the MIC AMP GAIN as low as possible.

2) CW Mode Transmission
Plug your key into the KEY jack on the rear of the unit with the MODE selector set in the CW position. Setting the STD BY switch to the SEND position starts transmission; and the ON AIR lamp will light up. As you are keying, the meter will waggle; and at the same time, keying tone at approximately 700 Hz will be heard for monitoring. The monitoring level is adjustable by means of the MONITOR GAIN trimmer hidden under the sub lid. This keying tone may be used for keying practice while setting the transceiver in the reception mode.

3) PTT Switch Operation
When using a microphone with a PTT switch (such as the MP416), switching between transmission and reception may be performed by this PTT switch while the STD BY switch is remained in the STD BY position. The ON position of the PTT switch provides transmission mode, and the OFF position provides reception mode.

4. NOTES ON FREQUENCY READOUT

Frequencies displayed on the DIGITAL FREQUENCY readout indicate carrier frequencies as shown in Figure 5. The DIGITAL FREQUENCY readout has an inherent readout error of maximum 900 Hz. Therefore, the readout will display 144.001 MHz when the actual frequency ranges from 144.0000 to 144.0009 MHz.

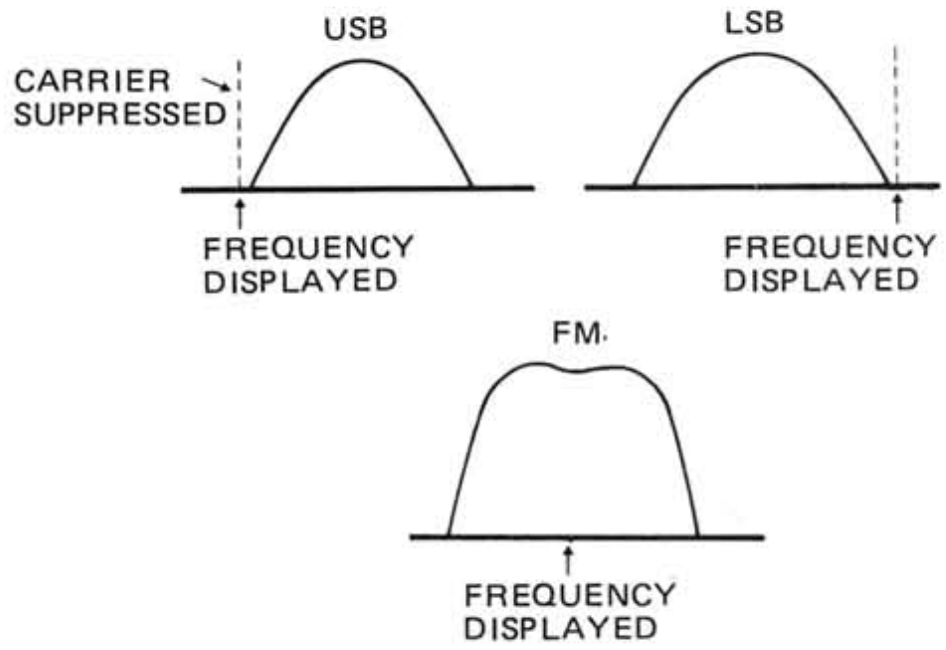


Figure 5.

5. FIXED CHANNEL OPERATION

Two vacant fixed channels are provided for operations at your optional frequencies. When the VFO/FIX switch is set to the FIX position, the CHANNEL selector lamp lights up indicating that frequencies are being controlled by fixed channels. Channel frequencies provided with a crystal are indicated on the DIGITAL FREQUENCY readout, while for vacant channels, the readout indicates "140.000". By switching the BAND switch and CHANNEL selector, up to 24 channels including repeater channels are available for fixed channel operation.

(For FM and CW)

X (MHz) = F (MHz) – (125.10 + 10.70) (MHz)

where X: crystal's frequency
F: desired frequency
125.10 (MHz): 144 MHz band's local frequency
10.7 (MHz) : IF frequency

The C5400 has a BAND switch to select 144 MHz or 145 MHz band, so that if crystals are provided for the 144 MHz band, they can be used also for the 145 MHz band having the same kiro-hertz order frequencies as the 144 MHz band. Therefore, when the desired frequency is in the 145 MHz band, substitute 144 (MHz) for the "F" in the above equation.

(ex.) Crystal's frequency for 144.00 MHz can be determined by substituting 144 for the "F" in the above equation:

X (MHz) = F (MHz) – (125.10 + 10.70) (MHz)
F = 144.00
X = 144.00 – (135.80)
= 8.20 MHz

NOTE: In the CW mode, the transmission carrier frequency is set at 10.6994 MHz, requiring a frequency 600 Hz higher than the above frequency. However, replacement of the crystal will not be needed from a practical point of view, unless a specially accurate frequency is needed.

(For SSB)

For the SSB mode, if a crystal's frequency is set at the same as that for the FM mode, a deviation of 1.5 kHz from filter-center frequency will result. Therefore, the crystal's frequency must be set 1.5 kHz higher than that for the FM mode for USB, and 1.5 kHz lower for LSB.

(ex.) For USB:
X (MHz) = F (MHz) – 135.7985 (MHz)
For LSB:
X (MHz) = F (MHz) – 135.8015 (MHz)

NOTE: If a crystal with the frequency of 9.200 MHz should be used, it would provide 146.000 MHz for the 145 MHz band; and if a crystal with the frequency of 8.200 MHz is to be used, it would provide 144.00 MHz for the 144 MHz band. When such crystals are to be used, be sure to avoid transmitting at 146.00 MHz or 144.00 MHz.

6. RIT DESCRIPTIONS (Receiver Incremental Tuning)

When the RIT switch is turned ON, tuning frequency can be controlled over +1.5 kHz by adjusting the RIT Control Knob without changing transmission frequency. For instance, if your partner station's transmission frequency slightly deviates while communicating, you can follow up the deviation by adjusting the RIT without changing your transmission frequency. In the case that the RIT control is used, reception frequency slightly differs from transmission frequency. Make sure to turn the RIT switch OFF or set the RIT control knob to "0" before starting another communication.

The RIT control is effective for both VFO and fixed-channel operations. For RIT operation in the CW mode, refer to the "CW Mode Reception" on page 10.

NOTE: It should be noted that when there is a frequency difference of 1 to 2 kHz between transmission and reception frequencies due to the RIT, SSB operation may totally be unavailable.

7. RF POWER CONTROL

The RF POWER Control Knob controls transmission power continuously from the rated output down to less than 1 watt. The HIGH position of the RF POWER Control yields maximum output, and the LOW position yields minimum output. The RF meter indicates RF output power; however, the indication is not necessarily accurate because of antenna conditions. If the meter indicates "8" at the rated output, it will indicate "5" at 5 watts, and "1.5" at 1 watt of outputs. When there is a stronger FM signal and a weaker FM signal on the same frequency, the weaker is totally suppressed by the stronger. Therefore, FM transmission output should be strictly limited to serviceable minimum for more efficient FM band operations. For the operation modes other than FM, set the RF POWER Control Knob always to the HIGH (maximum) position. If the knob is not set to the HIGH position during SSB operation, output distortion may result.

8. VOX DESCRIPTIONS

1. CW mode (Semi-breakin operation)

Semi-breakin feature automatically sets the transceiver into the transmission mode upon the first depression of the key, and after maintaining the transmission mode for a certain period, then sets the transceiver into the reception mode. Set the MODE switch to the CW position and the STD BY switch to the VOX position to obtain the semi-breakin feature. Starting keying will light up the ON AIR lamp and initiate transmission with the waggling meter needle.

2. VOX for other modes

When the STD BY switch is set to the VOX position, microphone voice input can automatically set the transceiver into transmission without needing the PTT switch to be pressed ON.

When microphone input is gone, the reception mode is automatically restored after a certain period. The DELAY TIME trimmer is provided for controlling this restoration period. Clockwise rotation of the DELAY TIME trimmer enlongates the restoration time. If the VOX GAIN trimmer is set too high, the VOX will be activated by background noise, resulting in a random repetition of transmission and reception. In such case, turn the ANTI-TRIP GAIN trimmer clockwise until the erroneous operation ceases.

9. COMMUNICATIONS VIA OSCAR

Amssatte Oscar 6 (A0-6) and 7 (A0-7) are so far on their orbits around the earth for amateur radio communications.

The following table lists the link frequencies:

	REPEATER	BEACON
AO-6	(2 m → 10m) 145.900MHz 29.450MHz ↓ → ↓ 146.000MHz 29.550MHz	435.100MHz(300m W) 29.450MHz(200m W)
AO-7	(70cm → 2 m) 432.125MHz 145.975MHz ↓ → ↓ 432.175MHz 145.925MHz (2 m → 10m) 145.80MHz 29.40MHz ↓ → ↓ 145.95MHz 29.50MHz	29.502MHz(200m W) 145.975MHz(200m W) 435.10MHz (300～400m W)

The C5400 can be used as an up-link transmitter for 2 to 10 meters, and as a down-link receiver for 70 cm to 2 meters. In addition to the C5400, another 10-meter receiver and 70-cm transmitter will be needed as well as some knowledge and facilities for satellite tracking. For further details, refer to guides for communications via satellites.

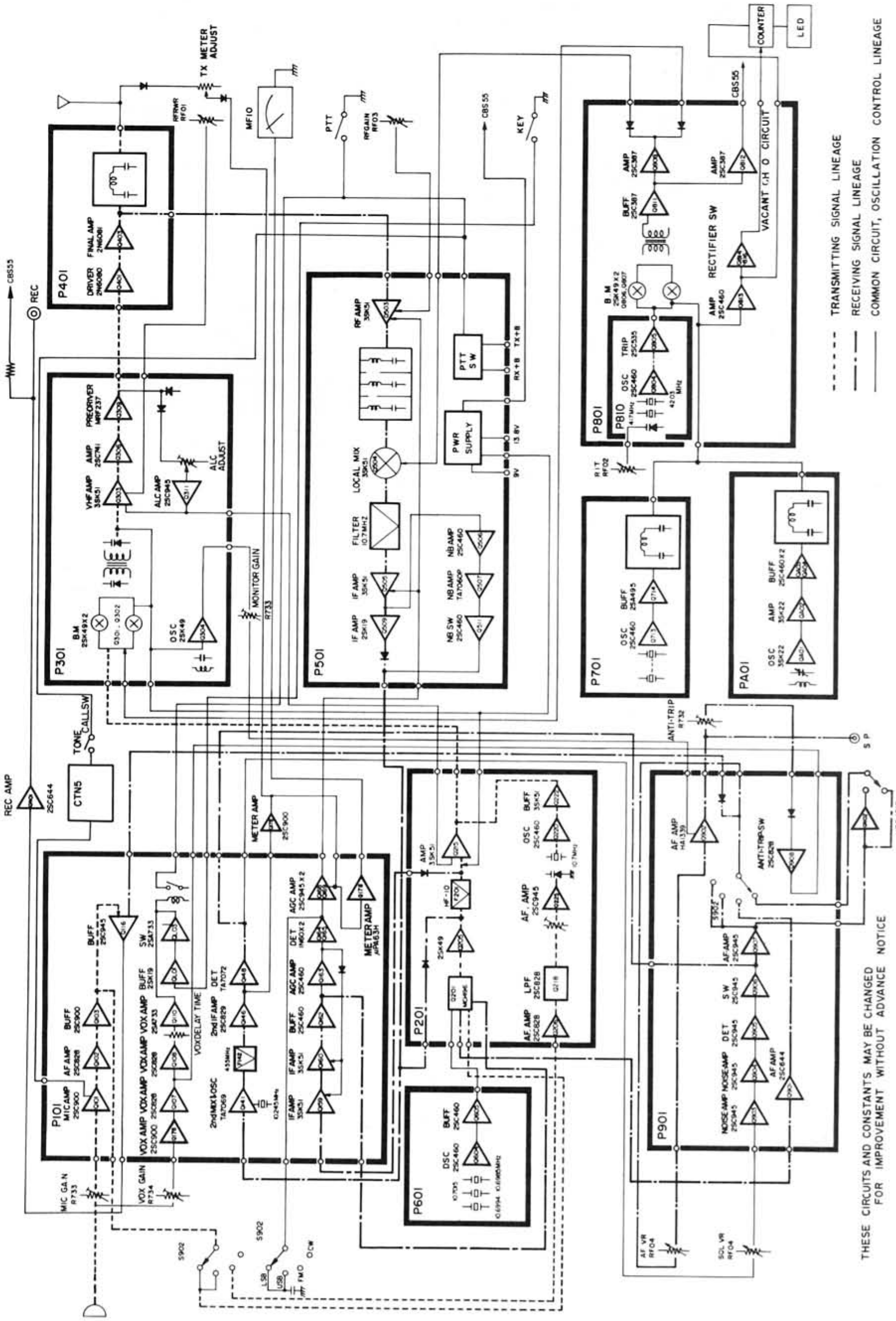
10. REPEATER OPERATION

For repeater operations, set the VFO/FIX switch to the VFO/FIX position. Repeater station's transmission frequency is set 600 Hz higher than reception frequency. Therefore, VFO frequency must be set 600 Hz higher than each of R0-R9 frequencies listed in Table 1. For instance, a R1 channel operation requires VFO frequency of 145.625 MHz. Since the R0 to R9 channels in the 145 MHz band correspond to repeater station's receiving frequencies, the BAND switch must be set always in the 145 MHz position for repeater operations. Now, turn the Tone Call switch ON for a few seconds. The repeater will be kept open by outgoing carrier. Starting transmission at the same time will make the repeater system available. When carrier off, the repeater switches also off after some seconds delay.

NOTE: The FIX position of the VFO/FIX switch permits monitoring repeater station's receiving frequency.

7. CIRCUIT CONFIGURATION

1. BLOCK DIAGRAM



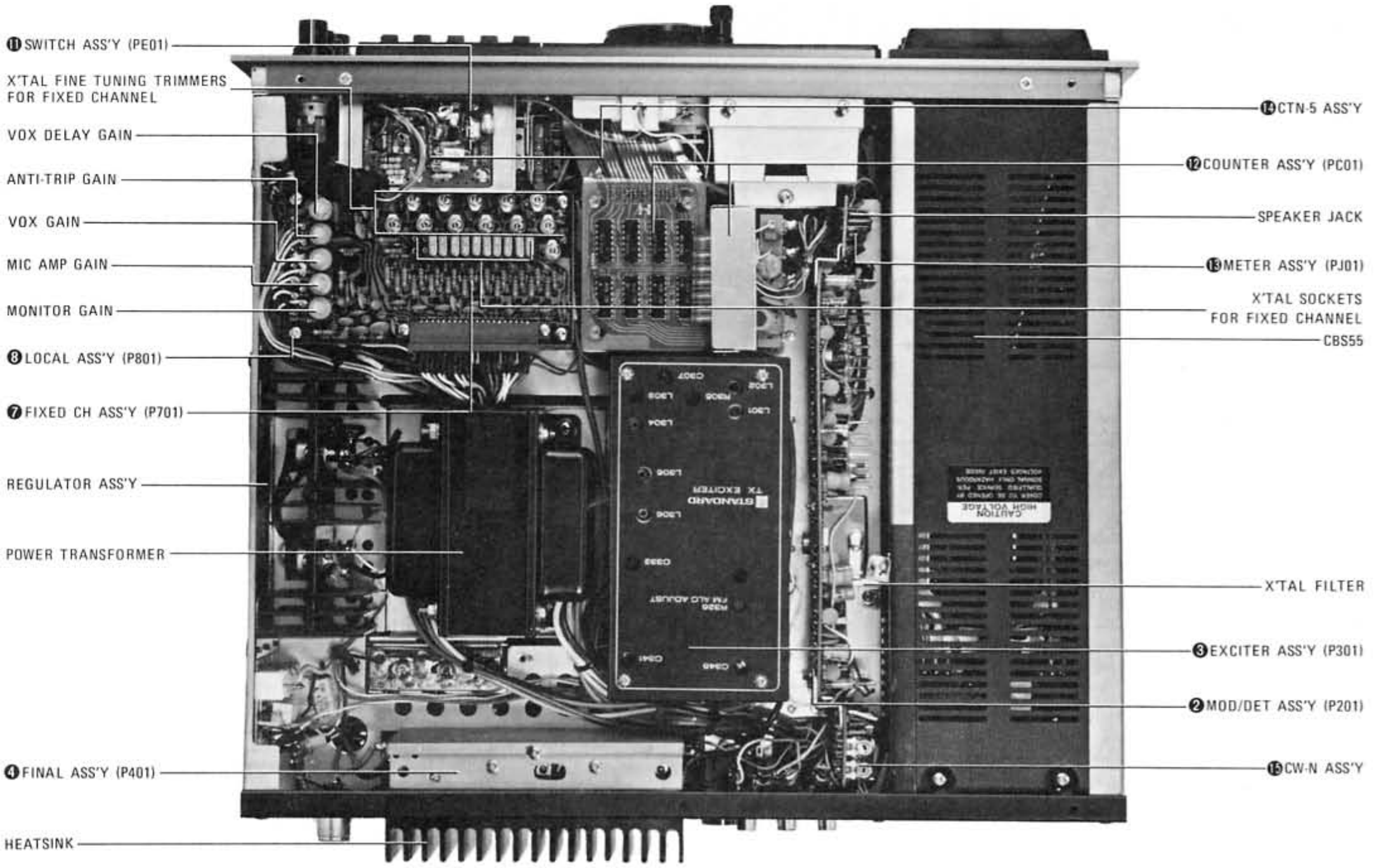


Photo 3.

2. ASSEMBLIES

❶ IF/MIC Assembly

The IF/MIC Assembly consists of a MIC amplifier, VOX circuit, FM- and SSB-IF circuits, and AGC amplifier. The FM-IF circuit contained in this ass'y includes the circuits from MIX to quadrature detector.

❷ MOD/DET Assembly

For SSB transmission, DSB (Double Side Band) is first generated in this ass'y, then filtered by the crystal filter to be transformed into SSB signal. For CW transmission, carrier is generated by controlling DC voltage balance in the Balanced Modulator.

❸ EXCITER Assembly

The EXCITER ass'y consists of a transmitter's heterodyne mixer, voltage and power amplifiers. Oscillator output is converted into 144 MHz carrier through the Balanced Mixer, voltage amplified via the tuning circuit, and pre-power amplified by the power amplifier.

Block-bias keying and side tone are made by the voltage amplifier's FETs for CW operation. ALC circuit is also involved in this EXCITER ass'y. Transmission power is controlled by controlling voltage amplifier FET gain by means of the RF PWR control on the front panel.

❹ FINAL Assembly

The FINAL ass'y consits of a power amplifier delivering a rated power of 10 watts. The whole final circuits and mechanisms are combined with the heatsink, achieving compactness.

❺ Rx RF/PWR Assembly

This assembly consists of receiver's RF amplifier, BPF, heterodyne mixer, crystal filter, 1st IF amplifier, and noise blanker (NB). When the NB switch is set to ON position, transistors detect noise inputs and close the IF path. This NB system is very advantageous for killing noise different from SSB signals, etc. in its frequency and amplitude configurations. However, it should be noted that the NB system is less effective against powerful adjacent signals, or noises similar to signals in their frequency and amplitude configurations—such as microwave welder or corona discharging noises. The DC 13.8 V power supply is obtained by bridge rectifying the transformer secondary output, then regulated through two transistors, and supplied to the FINAL and AF amplifiers. The 13.8 V is stabilized down to +9 V for other assemblies. The counter has a dedicated stabilized +5 V power supply; and the keying circuit is provided with a dedicated minus voltage supply.

❻ CARRIER OSC Assembly

This ass'y works as a carrier generator when transmitting, and as a BFO when receiving. The oscillator uses a crystal; and USB/LSB/CW switchings are made by diode switches.

❼ FIXED CH Assembly

The FIXED CH ass'y consists of a fixed-channel crystal oscillator and 6 trimmers: MONITOR GAIN, MIC AMP GAIN, VOX GAIN, ANTI-TRIP GAIN, and VOX DELAY TIME trimmers. For crystal replacement or timer adjustment, this assembly is easily accessible from the top of the unit.

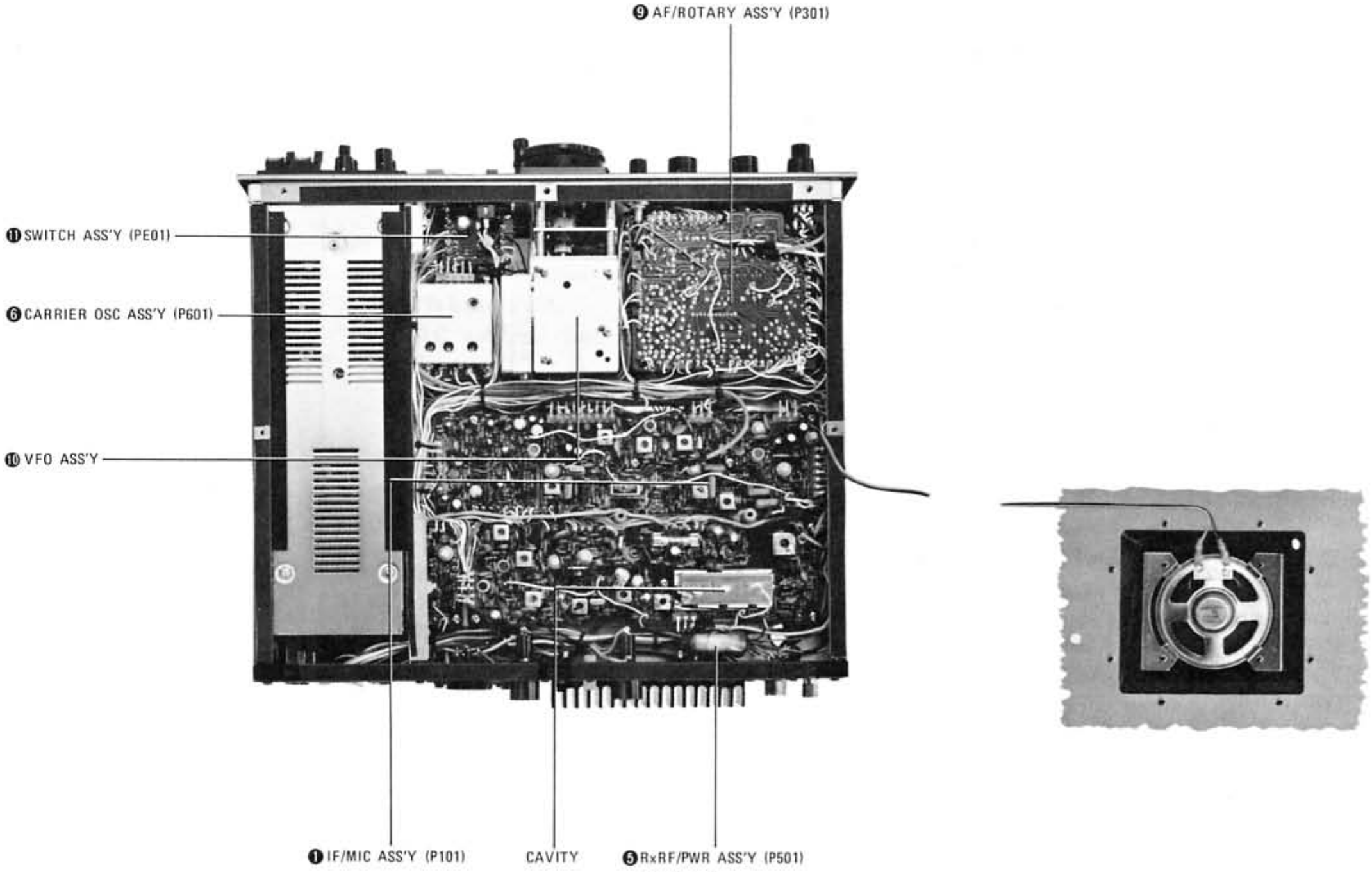


Photo 4.

❽ LOCAL Assembly

The LOCAL ass'y generates 133 MHz band signals by mixing 125 MHz and 8 MHz frequency from the VFO or fixed channels. The mixer uses a balanced-type circuit followed by a BPF circuit, preventing unnecessary radiation. The LOCAL ass'y also contains varied lamp power supplies, and a vacant channel indication circuit.

❾ AF/ROTARY Assembly

This ass'y incorporates the squelch circuit, AF amplifier, Anti-trip circuit, and rotary switches.

❿ VFO Unit

The VFO unit consits of 2 FETs, 2 transistors, and 2 diodes, completely shielded in a unit case. Since a most sophisticated technique is needed for adjusting the VFO, never try to make any readjustment or modification to it.

⓫ Switch Assembly

Lever switches are mounted on three PC boards.

⓬ Counter Assembly

The Counter ass'y consists of a counting, LED driver, and LED display circuit blocks. Each block is connected with both-sided flexible PC boards.

⓭ Meter Assembly

This ass'y incorporates a FMS meter circuit.

⓮ CTN-5 Assembly

The CTN-5 ass'y consists of a tone oscillator for repeater drive.

⓯ CW-N Assembly

This ass'y incorporates a BPF circuit for CW operation.

8. ADJUSTMENTS

The C5400 is factory adjusted requiring no further adjustment other than the following points:

1. FREQUENCY ADJUSTMENT

When a fixed-channel crystal with your optional frequency is mounted in a vacant channel, adjust frequency as follows:
Open the sub-lid on the top of the unit. Referring to Figure 6, adjust the trimmer corresponding to your crystal so that your desired frequency is obtained in the DIGITAL FREQUENCY readout. For higher accuracy, when, for example, 144.500 MHz is desired, set the trimmer at the transition point from 144.501 to 144.500 MHz.

2. OTHER ADJUSTMENTS

Under the sub-lid are also other adjustments: ANTI-TRIP GAIN (R732), MIC AMP GAIN (R733), VOX GAIN (R734), MONITOR GAIN (R735), and OVX DELAY TIME (R736), as shown in Figure 6.

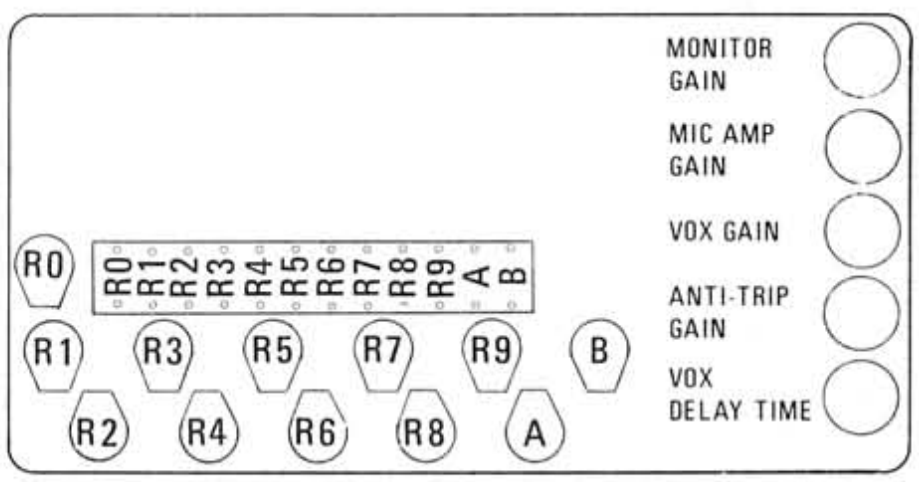


Figure 6.

9. TROUBLE SHOOTING

If your set is not operating properly, check the points listed in the following table. In case the following remedies do not solve your problem, immediately notify your dealer.

TROUBLE	POSSIBLE CAUSES	REMEDY
When turning on the POWER, indicators do not light up, nor sound available.	1. Improper connection of power cord. 2. Fuse is blown off. 3. DC/AC selector switch is not properly set in DC or AC position.	1. Plug the cord firmly into the AC outlet. 2. Replace the fuse. (If the replaced fuse blows again, do not replace it any more, and notify your dealer.) 3. Set the voltage selector to the proper position.
Reception signal is not available though the antenna is properly connected.	1. STD BY switch is set to SEND position. 2. SQL control is set to maximum. (for FM only) 3. Crystal is not mounted in the fixed channel. 4. RF gain is not sufficient.	1. Set the STD BY switch to STD BY position. 2. Turn SQL control fully counterclockwise. 3. Set the VFO/FIX switch to VFO. 4. Turn RF GAIN control fully clockwise.
Meter needle does not stay "0" despite no signal input.	Meter switch is set to the TUNE position in FM mode.	Set the meter switch to the S/RF position.
SSB signals cannot be demodulated properly.	1. Improper side band selection. 2. Selectivity is set in "narrow" in CW mode.	Set MODE selector to either USB or LSB.
Reception frequency does not change though RIT control is turned.	RIT switch is set to the OFF position.	Set the RIT switch to the ON position.
Transmission frequency differs from reception frequency.	RIT is in operation.	Set RIT switch to OFF position, or RIT control knob to "0" position.
NB switch is not very effective.	1. Powerful adjacent signal is present. 2. Noise similar to SSB signal is present.	Change operation frequency.
Too low or no transmission power.	RF POWER control is set too low.	Turn up the RF POWER control to HIGH position.
Too low or no transmission power in SSB mode.	Improper MIC connection.	Correct the connection.
Too shallow modulation for FM, and no output for SSB.	MIC volume is set too low.	Turn MIC AMP GAIN trimmer clockwise.
Meter does not waggle during transmission.	Meter switch is set to TUNE position.	Set the meter switch to S/RF position.

10. SPECIFICATIONS

General:

Transmission/reception frequency range	144 - 146 MHz
Wave	SSB (A3J), FM (F3), and CW (A1)
Microphone input impedance	600 ohms
Speaker impedance	8 ohms
Power requirements	AC 220 V/240 V, 50/60 Hz, DC +13.8 V
Dimensions	400 mm (W) x 137 mm (H) x 337 mm (D)
Weight	15 kg
Accessories	MP416 (MIC/SPK) and CBS 55
Power consumption	AC 220 V/240 V:0.75A DC +13.8 V:5.0A

Receiver Section:

Reception system	SSB & CW: single super heterodyne FM: double super heterodyne
Intermediate frequency	SSB & CW: 10.7 MHz FM 1st IF: 10.7 MHz 2nd IF: 455 kHz
Sensitivity	SSB & CW: –10 dB or less (S/N: 10 dB) FM: –4 dB or less (QS: 20 dB) –6 dB or less (SINAD: 12 dB)
Pass band width	SSB & CW: 2.2 kHz or less (–6 dB) FM: ±6 kHz or less (–6 dB)
Selectivity	SSB & CW: 4.8 kHz or less (–60 dB) FM (double signal): 60 dB or less
Squelch sensitivity	FM: –12 dB or less
AF output	2.0 W or more (8 ohms, 10% dist.)
Load impedance	8 ohms

Transmitter Section:

Rated transmission power	10 watts
Load impedance	50 ohms
Carrier suppression ratio	40 dB or more
Spurious	60 dB or more
Maximum frequency deviation (FM)	5 kHz
Modulation	SSB: balanced modulation FM: variable reactance direct modulation
AF frequency response	500 - 2,500 Hz (±3 dB)

These specifications and exterior designs may be changed for improvement without notice.