A Raytheon Company

VHF 5200

+ RAY 52

Instruction Manual

PURPOSE

THIS MANUAL CONTAINS IMPORTANT INFORMATION ON THE INSTALLATION, OPERATION, AND MAINTENANCE OF YOUR EQUIPMENT.

*******IMPORTANT NOTICE*******

THIS DEVICE IS ONLY AN AID TO BOATING SAFETY AND NAVIGATION. IT'S PERFORMANCE CAN BE AFFECTED BY MANY FACTORS INCLUDING EQUIPMENT FAILURE OR DEFECT, ENVIRONMENTAL CONDITIONS, AND IMPROPER HANDLING OR USE. IT IS THE USER'S RESPONSIBILITY TO EXERCISE COMMON PRUDENCE AND NAVIGATIONAL JUDGMENT, AND THIS DEVICE SHOULD NOT BE RELIED UPON AS A SUBSTITUTE FOR SUCH PRUDENCE AND JUDGMENT.

APELCO MARINE COMPANY products are supported by a network of Authorized Service Representatives. For product information, you may contact the following regional centers:

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NOTE

"This device complies with PART 15 of the FCC Rules. Operation is subject to the conditions that this device does not cause harmful interference."

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GLOSSARY OF TERMS

VHF	Very High Frequency (30MHz to 300MHz).
FM	Frequency Modulation.
MODULATION	To vary a carrier wave.
CARRIER WAVE	A radio frequency on which intelligence is superimposed.
DUAL WATCH	Monitors channel 16 while working on another channel.
U.S.A.CHANNELS	Channel designations as defined by the FCC.
INTERNATIONAL CHANNELS	Channel designations as defined by the international Telecommunication Union.
CANADIAN CHANNELS	Channel designation as defined by the IC.
WEATHER CHANNELS..	Channels for routine and emergency weather information broadcast by NOAA.
SIMPLEX	Transmit and receive on the same frequency.
DUPLEX	Transmit and receive on different frequencies.
SQUELCH	To suppress totally.
LCD	Liquid crystal display.
TX	Transmit.
RX	Receive.
RF	Radio Frequency.
CPU	Control Processor Unit.
PLL	Phase Lock Loop (A type of Frequency Synthesizer).
VCO	Voltage Controlled Oscillator.
PTT SWITCH	Microphone push-to-talk swith.

SECTION 1

GENERAL DESCRIPTION

1 .1 INTRODUCTION

Congratulations on your purchase of Apelco'sVHF5200 marine radiotelephone.

The VHF5200 is a CPU-controlled, digitally synthesized, compact transceiver which provides reliable simplex and duplex (two-frequency) communications between ships and from ships at sea to public or private shore stations. The VHF5200 provides two-way communications on the International and US channels, reception on 10 separate weather channels, and two-way communications on the International calling and safety channel (16).

This manual describes the physical and functional characteristics of the radiotelephone.

1.2 EQUIPMENT FEATURES

The VHF5200 is designed and manufactured to provide ease of operation with excellent reliability. The important built-in features of the equipment are listed below:

- Waterproofto U.S.C.G. standard CFR-46.
- All solid-state circuitry for low current drain and maximum reliability.
- Series diode protection on input power circuits to prevent reverse polarity damage.
- High-performance receiver section with optimum selectivity.
- 53 channel transmit and 93 channel receive capability within the assigned VHF-FM maritime band. All US and International channels are included.
- Exclusive circuit that automatically selects 16 PLUS (priority) channel when the radio is turned on.
- Exclusive weather alert feature (when in monitor mode).
- Selected channel number indicated on the LCD digital display.
- Key entries for "Quick" 16 PLUS, and 10 weather channels WXO through WX9.
- All-Scan and Memory Scan features.

SECTION 2

INSTALLATION

2.1 UNPACKING AND INSPECTION

Use care when unpacking the unit from the shipping carton to prevent damage to the contents, It is also good practice to save the carton and the interior packing material. The original packing material should be used in the unlikely event it is/necessary to return the unit to the factory.

2.2 EQUIPMENT SUPPLIED

The following is a list of materials supplied with the VHF5200:

Description	Part No.
Radiotelephone	M56797
Instruction Manual	G623682-1
Microphone Bracket w/hardware	G623680-2
Power/External Speaker Cable	G623680-3
FCC Instruction	FCC Form 506
Mounting Yoke	G623680-4
Yoke Knob	G623680-5
Yoke Knob Spacer	G623680-6

22.1 Optional Accessories

Item #	Description	Part No.
1	Flush Mounting Kit	M99-113
2	Flush Mounting Face Cover	M99-135
3	8'Fiberglass VHF Antenna	M51118E
4	18'Fiberglass VHF Antenna	M51105
5	3'Stainless Antenna w/STD Mount Thread	M511352
6	3'Stainless Antenna w/60'Cable	M51152
7	3'Stainless Antenna w/Winder&60'Cable	M51153
8	4-Way Lexan Mount w/Thru Deck Fitting	M51054
9	4-Way Brt Chrome Mount w/Thru Deck Fitting	M51116
10	Swivel Mount w/Standoff (18'Antenna)	M51117

Table 2.2 Optional Accessories

These optional accessories may be ordered by calling your Apelco dealer or our Customer Service Department directly at (603) 647-7530 ext. 2120 Monday through Friday 8:30 a.m. - 5:00 p.m. E.S.T.

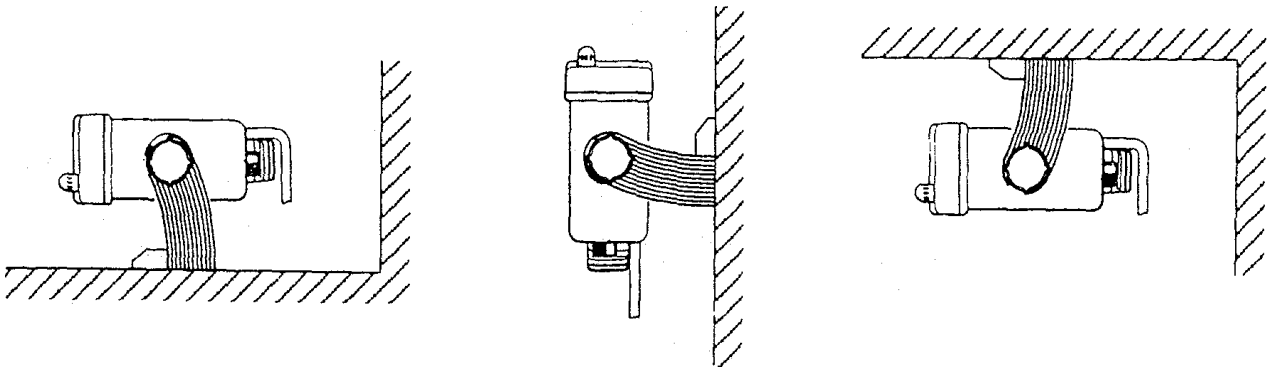
2.3 PLANNING THE INSTALLATION

When planning the installation for your VHF5200, the following conditions should be considered to insure dependable and trouble-free operation.

- The mounting location should be easily accessible to allow operation of the front panel.
- There should be adequate ventilation for the control unit.
- A sufficient space should be secured behind the transceiver to allow for proper cable connections to the rear panel connectors.
- The transceiver should be located as near to the power source as possible.
- The selected location should be as far apart as is possible from any devices that may cause interference such as motors, generators, and other on board electronics.
- Generally speaking, the transceiver should be protected from prolonged direct exposure to rain and salt spray. It is always a good practice to protect your valuable electronic equipment as much as possible.
- Use adequate sized wire for all DC power connections and make sure to solder all in-line connectors or splices.

2.3.1 Typical Mounting Methods

The VHF5200 can be conveniently mounted on a chart table, bulkhead, overhead, or any other desired location. (Refer to Figure 2-1 for typical mounting methods)



(table top mount) (bulkhead mount) (overhead mount)

Fig. 2-1 TYPICAL MOUNTING METHODS

2.3.2 Flush Mounting

In addition to the Typical Mounting Methods, the VHF5200 may also be flush mounted using the optional Flush Mount kit (M99-113).

These kits are available from your Apelco dealer or our Customer Service Department.

1) Select the location for the VHF. A clear, flat area, of sufficient height having at least 6" of clear depth behind the panel is required.

2) Unpack the Flush Mount kit and confirm that all hardware is present.

3) Place the ring at the desired location on the panel. Using the inside of the trim ring, trace a cutout guide. Remove the trim ring.

4) Drill a pilot hole inside of the cutout guide area.

5) Using an appropriate saw, cut along the outside of the cutout line.

6) Remove the yoke knobs and the bracket from the VHF cabinet. Check that the VHF will fit into the cutout area.

7) Install the power and antenna cables in the console.

8) Insert the trim ring in the console cutout and secure in place with the countersunk flat head screws. A suitable sealant may be used between the trim ring and console to prevent moisture entry. Position the radio in the trim ring and secure in place with the two hex-head bolts and washers supplied.

9) Connect the power/external speaker and antenna cables.

CAUTION

Make sure there are no hidden electrical wires or other items behind the desired location before proceeding.Check that free access for mounting and cabling is available.

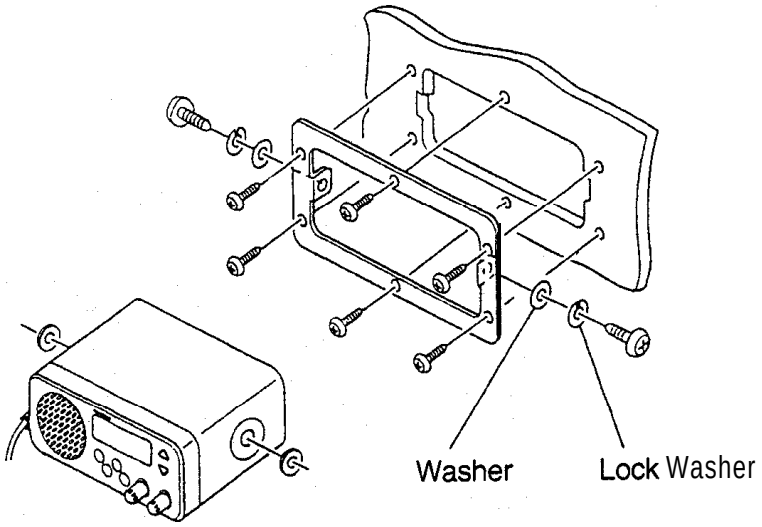
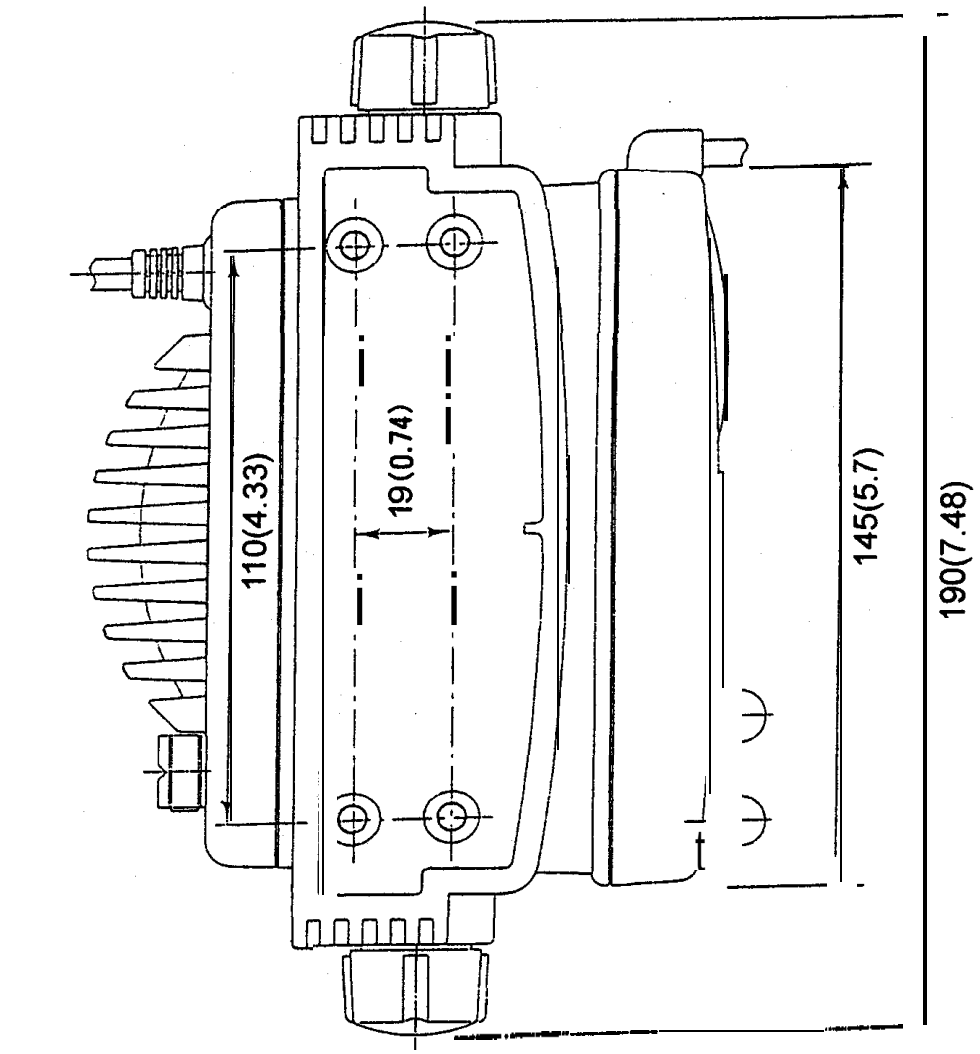


Fig.2-2 FLUSH MOUNTING



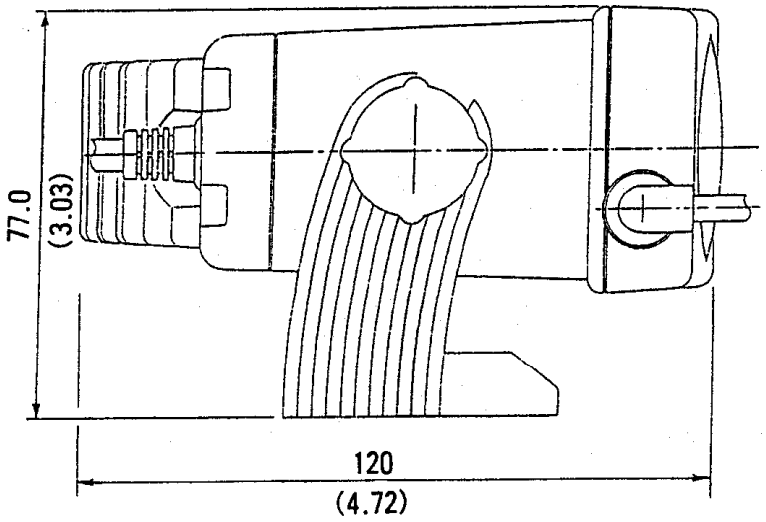


Fig. 2-3 OUTLINE AND MOUNTING DIMENSIONS

All dimensions are shown in (inches) and millimeters

2.4 ELECTRICAL CONNECTIONS

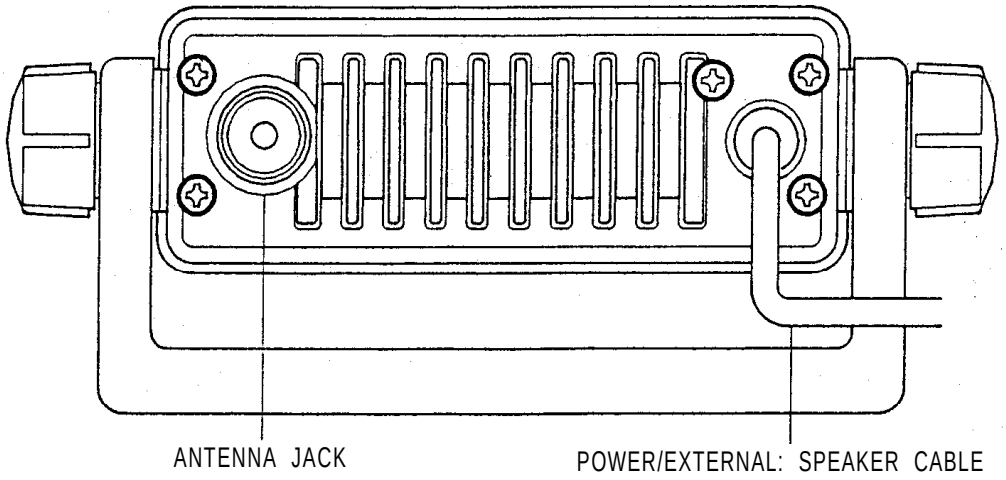


Fig. 2-4 REAR VIEW

CAUTION

DO NOT INSTALL THIS RADIO ON VESSELS WITH POSITIVE GROUND BATTERY SYSTEMS.

2.4.1 DC Power Connections

The power cable comes with external speaker attachments. The power/external speaker cable provided is 6 feet long and plugs into the 4 pin connector cable at the rear panel of the radio. The RED (+) wire with an in-line fuse (10 amps) and the BLACK (-) wire of the 4 pin connector cable are used for connecting the VHF5200 to the ship's 12 VDC power system. (Refer to Fig. 2-4)

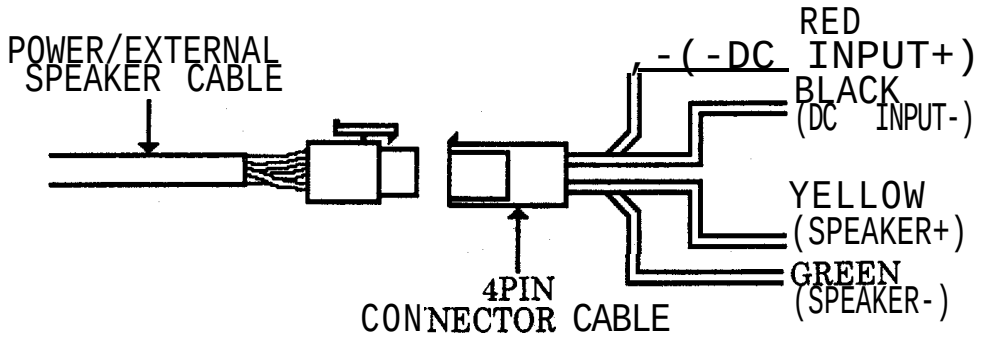


Fig. 2-5 POWER/EXTERNAL SPEAKER CABLE AND 4 PIN CONNECTOR CABLE

In most cases, the length of the supplied cable should be adequate to reach the DC power source. If additional wire length is required, the cable can be extended by adding more cable as necessary. However, for power cable runs longer than 15 feet, larger wire diameter size should be used to prevent line loss. Fig 2-5 provides recommended wire sizes to use for various cable run distances.

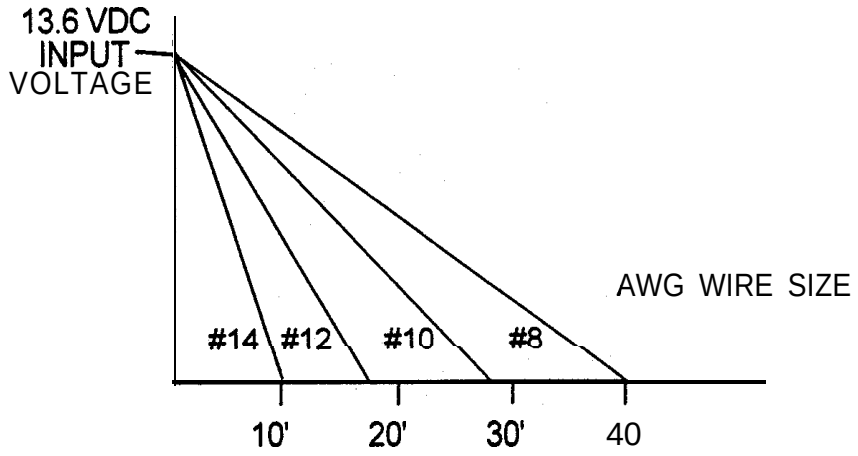


Fig. 2-6 POWER CABLE LENGTH

Your VHF radio should be connected to the nearest primary source of ship's DC power. A typical source may be a circuit breaker on the power panel or a fuse block located near the unit. When connecting to either of these sources, the circuit breaker or other in-line fuse should be rated at 10 amps.

It is recommended that terminal lugs be used to connect the power cable to the DC supply and that the lugs should be both **crimped and** soldered. This is very important in order to insure adequate current draw to the equipment. Intermittent operation may result if an inadequate connection is made to the power source. The connection terminals should be clean and with no sign of corrosion.

The RED (+) wire is connected to the positive terminal of the power source or battery. The BLACK (-) wire is connected to the negative (ground) of the power source or battery. Should the power polarity be inadvertantly reversed, the 10 amp. in-line fuse located in the RED (+) conductor will open. Check the input power leads for correct polarity with a VOM, reconnect the leads observing correct polarity, and replace the fuse. Be sure to use the same rate and type of fuse.

2.4.2 External Speaker Connections

The YELLOW (+) wire and GREEN (-) wire are used for connecting the VHF5200 to an external speaker. (Refer to Fig. 2-4)

Three 3 watts of audio output power is provided for an external 4 ohm speaker. A suitable speaker can be purchased from your local marine dealer.

Connect the YELLOW (+) wire and GREEN (-) wire to the speaker observing polarity as it is marked on the speaker. When connected, the external speaker will function simultaneously with the internal speaker.

2.4.3 Antenna Connections

The coaxial cable from your VHF antenna is intended to be connected to the antenna jack on the rear chassis using a PL259 VHF-type connector. The antenna cable may be cut to desired length. If a longer cable length is required, RG-58 50-ohm coaxial or equivalent cable may be used for antenna runs up to a maximum of 50 feet. If the distance required is even greater, then we recommend using low loss RG-213 or equivalent cable for the entire run in order to avoid excessive losses in power output.

If the antenna connector is likely to be continuously exposed to the marine environment, protective coating of silicon grease (similar to Dow Corning DC-4) can always be applied to the connector before mating it to the radio to help prevent corrosion. Any other extension or adapters in the cable run should also be protected by silicon grease and then wrapped with a weather-proofing tape.

2.4.4 Antenna Mounting Suggestions

The best radio in the world is useless without a good antenna location. Mounting the VHF antenna properly is very important because how it is mounted will directly affect the performance of your VHF radio. A standard VHF antenna which is designed for use aboard water craft should be used.

There are several factors to consider so as to maximize the effective communication range of the radio.

- Since VHF transmissions are essentially Line-of Sight, mount the antenna at the highest possible location on the vessel. The location should also be free of obstructions in order to obtain maximum range.
- Use an antenna with the highest possible gain characteristics.
- If you must extend the length of the coaxial cable between the antenna and the radio, use a cable designed for the least amount of power loss over the entire cable length.
- Keep the coaxial cable between the radio and antenna as short as possible.

2.4.5 Grounding

While special grounding is not generally required for VHF radiotelephone installations, it is a good marine practice to properly ground all electronic equipment to the ship's ground system. The VHF5200 can be connected to ground by attaching a wire to the screw indicated in the drawing below and then to the nearest ship's ground connection point. The recommended wire to be used for grounding is #1 0 AWG.

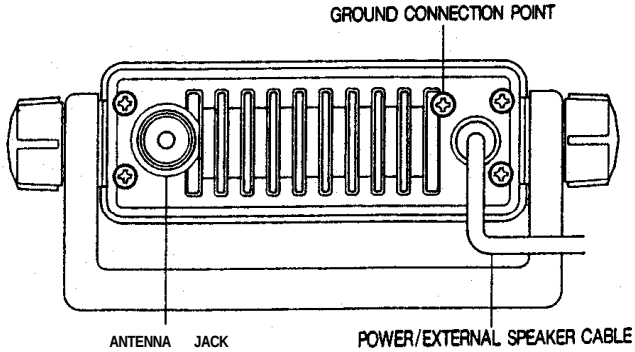


Fig. 2-7 TYPICAL GROUNDING METHODS

SECTION 3

OPERATIONS

3.1 INTRODUCTION

Your VHF5200 has the capability to transmit on 53 and receive on 93 Marine VHF radiotelephone channels. There are channels that are FCC approved but may only be used by authorized stations for specific purposes, depending on the type of vessel (commercial or non-commercial). Refer to Table 3-I on pages 16 and 17. These tables list all of the marine VHF channels available in your VHF5200 for International and U.S. radiotelephone use. Full familiarization with this table is essential when selecting your channels. The International frequencies were agreed upon by the attending countries at the 1968 International Telecommunication Union meeting in Geneva and are in active use around the world. The U.S. channels are those channels authorized for use in the U.S.A. by the FCC.

3.2 CONTROLS AND LCD DISPLAY

Refer to Fig. 3-I for familiarization with the controls and mode display.

3.2.1 Controls

① **VOLUME Control (On/Off)**
Turns the radio On and Off and controls the Volume of the audio output to the speaker.

② **[▲] [▼] Keys**
The Up and Down keys are used to move the channel numbers up or down. The channel number can be increased or decreased by one with each key press, or will continue to increase or decrease the number as long as the key is held.

③ **SQUELCH control**
Provides an adjustable input signal threshold to eliminate random RF background noise during "no signal" conditions. This control sets the signal-to-noise ratio at which a signal will become audible.

④ **[16 PLUS] Key**
Used to select channel 16 immediately. This channel has been preset to channel 16 at the factory prior to shipment. Refer to section 3.3.2 for instructions on how to change the 16 PLUS channel. The 16 PLUS key on the microphone has the same functions as the 16 PLUS key on the radio.

⑤ **[WX/INT] Key**
When pressed once, puts the radio into the weather channel receiving mode. A "WX" will be displayed on the LCD along with the weather channel number (0-9). When in this mode, the transmitter is always disabled.

To select International channels, press and hold the WX/INT key for two seconds. You will hear "beep" and "INT" will appear on the display. This causes the synthesizer to program International channel frequencies. When pressed and held again for two seconds, you will again hear a "beep" and the synthesizer programs US frequencies. ("INT" indication disappears)

⑥ **[MON/1/25] Key**
When pressed once, the radio enters the MONITOR mode and "MONITOR" is displayed on the LCD. In this mode, the radio will scan (monitor) 16 PLUS (priority) channel, a selected working channel, and a weather channel for the weather alert tone.

When pressed and held for two seconds, this key changes the transmitter output power from 1 Watt ("1W" will be displayed) to 25 Watts ("1W" disappears) and vice-versa.

⑦ [SCAN] Key

-With no channels entered in memory:

When pressed once, “SCAN” will begin to flash on the LCD and Ail-Scan will be initiated in three seconds. To stop scanning, press the “SCAN” key again.

-With one or more channels entered in memory:

When pressed once, “SCAN” and “MEMORY” will begin to flash on the LCD and Memory Scan will be initiated in three seconds. To stop the unit from scanning, press the “SCAN” key again.

-With one or more channels entered in memory:

When pressed once, “SCAN” and “MEMORY” will begin to flash on the LCD. If pressed again within three seconds, “MEMORY” will disappear and “SCAN” will continue flashing indicat ing All-Scan is now the selected mode and will be initiated in three seconds.

More detailed operational information is available in Section 3.3.4 Scan Modes.

When the “SCAN” key is pressed and held for two seconds, “MEMORY” will appear on the LCD and the channel that is selected when the key is pressed will be stored in memory. A channel may be removed from memory by selecting the channel to be removed and press ing and holding the “SCAN” key again for two seconds. “MEMORY” will disappear from the LCD. Weather channels can not be placed into memory.

⑧ PTT (Push-To-Talk) Switch

When pressed, puts the radio into the transmit mode and “TX” will be displayed on the LCD.

All of the above keys except PTT will produce an audible "beep" when pressed.

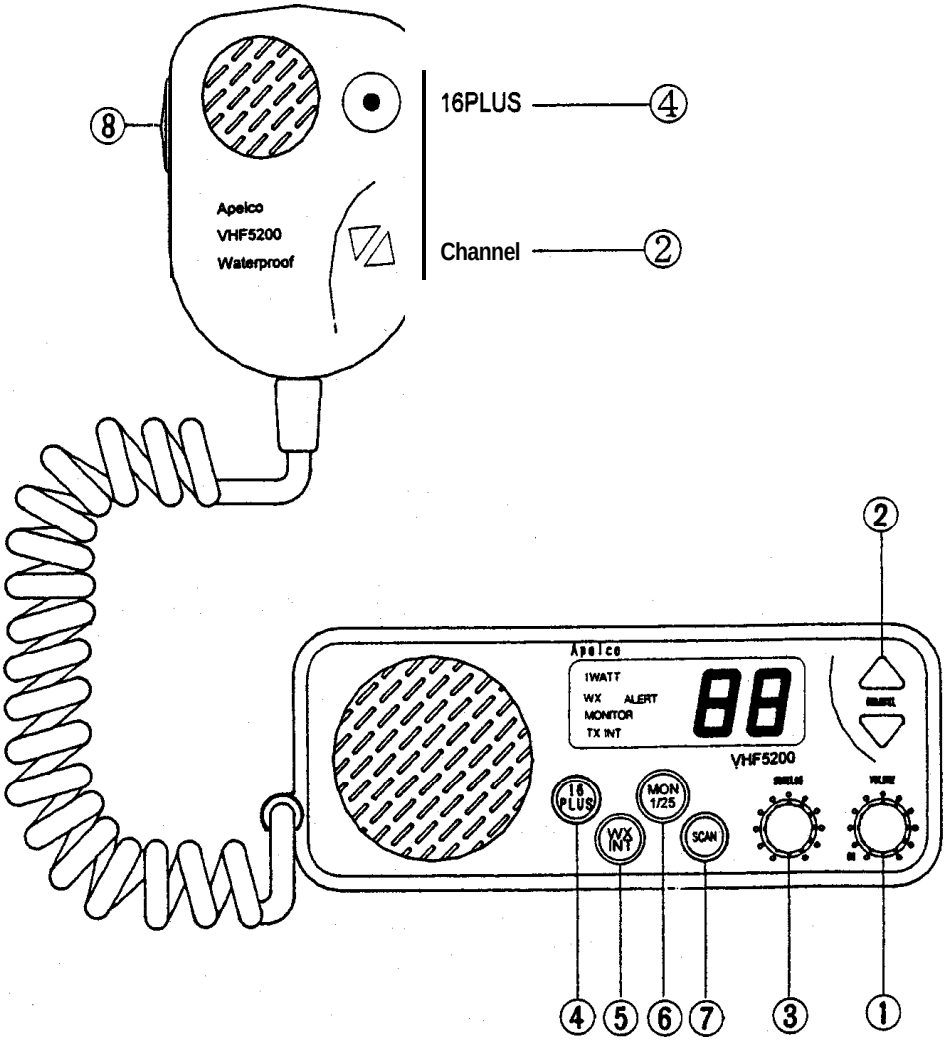


Fig. 3-1 LAYOUT OF CONTROLS AND CONNECTORS

3.2.2 LCD Display

A number of characters appear on the LCD display in different locations. The following list describes the characters as well as when and where they will appear.

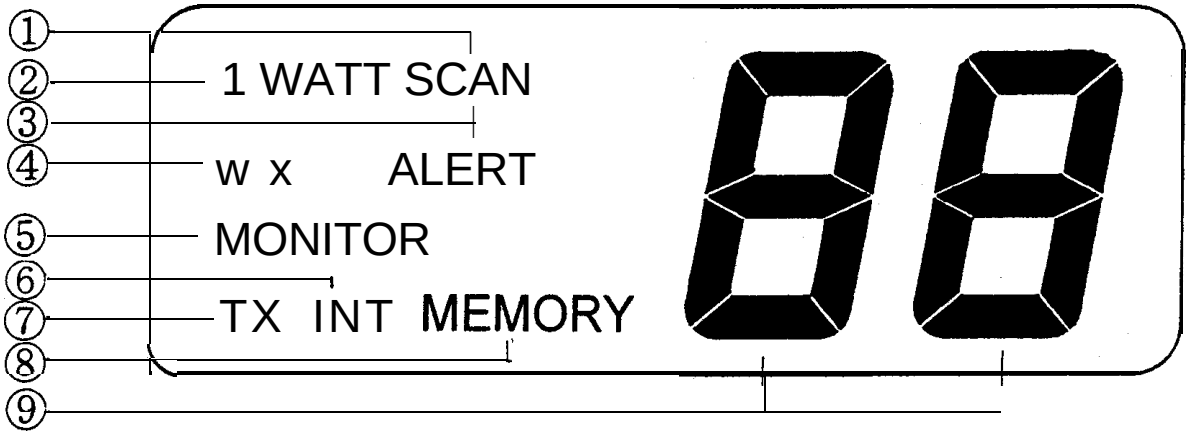


Fig. 3-2 LCD DISPLAY

① SCAN: Will flash by itself when All-Scan mode is to be initiated or will **flash** in unison with "MEMORY' when Memory Scan mode **is** to be initiated.

② 1 WATT (High/Low Power): Will be displayed when the transmitter circuits are providing 1 Watt of power to the antenna. When the transmitter is supplying 25 Watts to the antenna, the **"1 WATT"** indication will be extinguished.

③ ALERT (Weather Alert): Will blink when a Weather Alert Tone has been detected.

④ **WX** (Weather): Will be displayed when the channel selected to be monitored is a weather channel.

⑤ MONITOR: Will be displayed when the **MON/INT** key is pressed. This indicates the radio is in the MONITOR mode.

⑥ INT (International/USA): Will be displayed when International channels are programmed for use. **"INT"** is not displayed when US channels are programmed for use.

⑦ TX (Transmit): Will be displayed on the LCD when the Push-To-Talk (PTT) switch is depressed indicating the transmitter circuits are providing a signal to the antenna.

⑧ MEMORY: Will be displayed when the SCAN key is pressed and held for two seconds, or when the radio is programmed to the MEMORY SCAN mode.

⑨ LCD Segments: Will display channel number in use.

3.3 OPERATING PROCEDURES

Specific operating procedures for the VHF5200 are presented in this section, General information regarding **correct** marine channel usage may be found in the Appendix section. Refer to the Controls section 3.2.1 beginning on page 10 for a thorough description of all VHF5200 functions.

3.3.1 Turning the Power On

1) Rotate the ON/OFF/VOLUME control clockwise to turn the radio on.

> NOTE
> When the Power is on , the synthesizer automatically programs for USA channel frequencies and selects the calling channel 16. (Refer to16 PLUS operation to change this channel.)

Setting the Volume

1) Rotate the SQUELCH control fully counterclockwise. Background noise will be heard.
2) Rotate the VOLUME control for the desired volume level.

Setting the Squelch

1) Rotate the SQUELCH control **slowly clockwise** until the background noise ceases.

Setting the Power Output

1) Simply press the **"MON/1/25"** key for two seconds to toggle between 1 Watt output and 25 Watt output. When **"1** WATT' is displayed. the output power is 1 Watt. If "1 **WATT"** is extinguished, 26 watts is being output. The choice of power output is dependent upon the distance of transmission and transmitting conditions. In certain US harbors and on certain channels, the FCC requires the power to be limited to 1 Watt. On these "required" **chan nels,** the radio automatically selects the 1 Watt power output when the channel is selected.

> NOTE
> Channels 13 and 67 are restricted to 1 Watt operation but may be **overridden** in emergencies. To obtain 25 Watt output on these channels, while in transmit mode (pressing the **PTT** switch), press and hold the **MON/1/25** key. As long as the **MON/1/25** key is held, power output will be 25 Watts. When the key is released, the radio reverts back to 1 Watt as indicated on the LCD.

Selecting the Channel

1) To select the appropriate channel, press the [A] or [I] channel select keys. Refer to Table 3-I to select your 'working" channel.

To Transmit

1) Select the desired mode (INT or USA) by pressing and holding the **WX/INT** key **for two** seconds. When **"INT"** is displayed, International mode is selected. When **extinguised,** USA mode is active. Then press the Push-To-Talk switch and speak into the microphone using a clear **normal** voice.

2) When the power is initially turned on, simply press the Push-To-Talk switch, the radio will be ready for transmission on CH 16 or a user selected priority channel (16 PLUS).

The VHF5200 is designed to meet the new FCC Rules Part 80.203. which states, if the **Push-**To-Talk switch is pressed continuously for over five minutes, transmission is forcibly inhibited. If this occurs, audible beeps will sound and **"TO"** (time out) blinks on the LCD until the **Push-**To-Talk switch is released. After releasing the Push-To-Talk switch, the radio is ready for reception.

> NOTE
> Initial communication contacts are usually made over channel **16** as all ships and shore stations monitor this channel. Then a shii to a working channel will be necessary.

To Select a Weather Channel

1) Simply press the **WX/INT** key, then use the Up [A] or Down **[▼]** key to select the desired weather channel from 0 to 9 When this mode is selected, the transmitter is always inhib **ited.**

2) If a weather alert signal is received on your selected WX channel (when in the Monitor Mode) **there is a fiv**e-second audible alarm generated. To cancel the audible alarm, simply press any key.

3.3.2 The 16 PLUS (priority) Channel

The 16 PLUS channel has been preset to channel 16 prior to shipment from the factory, but the 16 PLUS channel can be changed freely, with the exception of all weather channels.

1) Press the Up [A] or Down **[▼]** key to select the desired channel. Then press and hold the 16 PLUS key for three seconds. An audible beep tone will confirm that the selected channel is stored In memory as the 16 PLUS channel.

2) To reselect channel 16 as the 16 PLUS channel. repeat step 1 for channel 16.

3.3.3 Channel Memory

The VHF5200 has the capability of memorizing all U.S. or International channels, The channels memorized will be scanned in the Memory Scan mode.

1) Channel Memory: To put a channel into memory, simply select the channel to be stored with the Up or Down arrows. Push and hold the "SCAN" key for approximately two seconds until a "beep" is heard and "MEMORY" is displayed on the LCD. This procedure can be repeated for all U.S. or International channels.

2) Memory Clear: To clear a channel from memory, select the channel to be cleared with the Up or Down arrows. Press and hold the "SCAN" key for approximately two seconds until a "beep" is heard and "MEMORY' disappears from the LCD.

3.3.4 Scan Modes

The VHF5200 is equipped with two types of scan options, All-Scan and Memory Scan. How these options are accessed is dependent upon whether there are any channels stored in memory.

1) All-Scan mode
If no channels are stored in memory, when the SCAN key is pressed once, "SCAN" will begin to flash on the LCD. In three seconds, if no other keys are pressed, the radio will begin scanning all channels (except weather channels) as long as no signal is received. If a signal is received, the scan will stop and monitor the receiving channel. If the signal is lost for five seconds, the radio will resume scanning. If the scan has stopped on a received signal, you may resume scanning by pressing the SCAN key. To cancel the scan mode, press the SCAN key once while the radio is scanning.

2) Memory Scan mode
If one or more channels are stored in memory, when the SCAN key is pressed, "SCAN" and "MEMORY" will begin to flash simultaneously on the LCD. If no other key is pressed, the radio will begin scanning all channels currently in memory in three seconds.As with All-Scan, if a signal is received, the scan will stop on the receiving channel until the signal is lost for five seconds or the SCAN key is pressed. To cancel memory scan, press the SCAN key while the radio is scanning.

If you have one or more channels in memory and want to initiate Ail-Scan, perform the following:

Press the SCAN key. "SCAN" and "MEMORY' will flash on the LCD. Press the SCAN key again within three seconds and "MEMORY' will disappear from the LCD leaving only "SCAN" flashing. All-Scan will begin in three seconds if no other key is pressed.

3.3.5 Master Reset

To perform a master reset, press and hold the 16 PLUS key while turning the unit on. This feature clears all channels from memory and programs the 16 PLUS feature back to channel 16.

3.3.6 Monitor Mode

Before entering the Monitor Mode you must first select the WX channel you wish to monitor for the weather alert tone. Next, you must also select a working channel to be monitored for traffic. (Refer to section 3.3 for instructions on channel section) For this example, we will use channel 83 as our working channel and WX2 as our weather channel. Now simply press the MON/1/25 key and the radio will begin to scan the channel designated for 16 PLUS, 83, and WX2, repetitively. The 16 PLUS channel programmed into the radio is automatically selected as one of the monitored channels. To cancel the Monitor mode, press the MON/1/25 key again.

Working Channel
If a signal is received on CH 83, the scan will stop on CH83, but will continue to monitor 16 PLUS and the selected weather channel every five seconds.

16 PLUS (priority) Channel
If while scanning, a signal is received on the designated 16 PLUS channel, the scanning will stop on 16 PLUS as long as the signal is being received. If the signal ceases for more than five seconds, the scanning will continue.

Weather Channel
Until a weather alert tone signal is received on WX2, the scan will stop on WX2 briefly, but will not give any audio output. When a weather alert tone (1050 Hz) is received, the monitor will stop and an audible alarm will sound. When the audio alert ends in five seconds, the emergency weather broadcast will be heard. To silence the alarm, simply push any key.

3.3.7 VHF5200 Marine Channels and Their Usage

CAUTION

The transmitter of the VHF5200 is disabled when channel 15 or WXO - WX9 is displayed.

CHANNEL DESIG.	FREQUENCY (MHZ)			TYPE OF TRAFFIC	FUNCTION	
	TX	RX (USA)	RX (INT'L)		SHIP TO SHIP	SHIP TO SHORE
01#	156.050	156.050	160.650	-		
02#	156.100	156.100	160.700	-		
03#	156.150	156.150	160.750	-		
04#	156.200	156.200	160.800	-		
05	156.250	156.250	160.850	Port Operations	Yes	Yes
06	156.300	156.300	156.300	Intership Safety	Yes	No
07	156.350	156.350	160.950	Com'l	Yes	Yes
08	156.400	156.400	156.400	Com'l	Yes	No
09	156.450	156.450	156.450	call & ship/ship	Yes	Yes
10	156.500	156.500	156.500	Com'l & ship/ship	Yes	Yes
11	156.550	156.550	156.550	Com'l & Ship/Ship	Yes	Yes
12	156.600	156.600	156.600	Port Operations	Yes	Yes
13**	156.650	156.650	156.650	Nav. Ship/Bridge	Yes	Yes
14	156.700	156.700	156.700	Port Operations	Yes	Yes
15#		156.750	156.750	Environmental		
16	156.800	156.800	156.800	Emerg/Calling	Yes	Yes
17*	156.850	156.850	156.850	State Controlled	Yes	Yes
18	156.900	156.900	161.500	Com'l	Yes	Yes
19	156.950	156.950	161.550	Com'l	Yes	Yes
20	157.000	157.000	16X.600	Port Operations	Yes	Yes
21(CG)	157.050	157.050	161.650	Coast Guard	Yes	Yes
22(CG)	157.100	157.100	161.700	Coast Guard	Yes	Yes
23(CG)	157.150	157.150	161.750	Coast Guard	Yes	Yes
24	157.200	161.800	161.800	Public Corresp.	No	Yes
25	157.250	161.850	161.850	Public Corresp.	No	Yes
26	157.300	161.900	161.900	Public Corresp.	No	Yes
27	157.350	161.950	161.950	Public Corresp.	No	Yes
28	157.400	162.000	162.000	Public Corresp.	No	Yes
60+	156.025	156.025	160.62s	-		
61+	156.075	156.075	160.675	-		
62+	156.125	156.125	160.725	-		
63	156.175	156.175	160.775	Com'l	Yes	Yes
64+	156.225	156.225	160.82s	-		

Table 3-1

* 1 Watt only

** 1 Watt initially. User can override to high power (25 watts) via front panel controls.

The transmitter is automatically disabled when channels 1, 2, 3, and 4 for USA are selected and when 15 for USA and International are selected.

+ Assigned by the Canadian Government, proper authorization must be ensured prior to use.

CAUTION

Operation on channels not designated for use by your classification of craft or on International Channels within the US territorial waters is a violation of FCC Rules and Regulations and may result in severe penalties.

CHANNEL DESIG.	FREOUENCY (MHZ)			TYPE OF TRAFFIC	FUNCTION	
	TX	RX (USA)	RX (INT'L)		SHIP TO SHIP	SHIP TO SHORE
6.5	156.275	156.275	160.875	Port Operations	Yes	Yes
66	156.325	156.325	160.925	Port Operations	Yes	Yes
67"	156.375	156.375	156.375	Com'l	Yes	No
68	15 6.425	156.425	156.425	Non Com'l	Yes	Yes
69	156.475	156.475	156.475	Non Com'l	Yes	Yes
70#		156.525	156.525	DSC	Yes	Yes
71	156.575	156575	156.575	Non Com'l	Yes	Yes
72	156.625	156.625	156.625	Non Com'l	Yes	No
73	156.675	156.675	156.675	Port Operations	Yes	Yes
74	156.725	156.725	156.725	Port Operations	Yes	Yes
75#		156.775	156.775	-		
76#		156.825	156.825	-		
77'	156.875	156.875	156.875	Port Operations	Yes	No
78	156.925	156.925	161.525	Non Com'l	Yes	Yes
79	156.975	156.975	161575	Com'l	Yes	Yes
80	157.025	157.025	161.625	Com'l	Yes	Yes
81	157.075	157.075	161.675	Coast Guard	Yes	Yes
82	157.125	157.125	161.725	Coast Guard	Yes	Yes
83	157.175	157.175	161.775	Coast Guard	Yes	Yes
84	157.225	161.825	161.825	Public Corresp.	No	Yes
85	157.275	161.875	161.875	Public Corresp.	No	Yes
86	157.325	161.925	161.925	Public Gnesp.	No	Yes
87	157.375	161.975	161.975	Public Corresp.	No	Yes
88	157.425	157.425	162.025	Com'l	Yes	No

Table 3-1 (Continued)

* 1Watt only

** 1Watt initially. User can override to high power (25 **watts)** via front panel controls.

The transmitter is disabled when channels 75 and 76 are selected. Channel 70 is *now used* for DSC calling only, therefore transmission on this channel is disabled on this radio.

CAUTION

Operation on channels not designated for use by your classification of craft or on International Channels within US territorial waters is **a** violation of FCC Rules and Regulations and may result in severe penalties.

VHF 5200 Weather Channels and Frequencies

CHANNEL	FREQUENCY (MHZ)	TYPE OF TRAFFIC	FUNCTION-SHIP TO SHORE
WX0	163.275	NOAA Weather	Receive Only
WX1	162.550	NOAA Weather	Receive Only
WX2	162.400	NOAA Weather	Receive Only
WX3	162.475	NOAA Weather	Receive Only
WX4	162.4'25	NOAA Weather	Receive Only
WX5	162.450	NOAA Weather	Receive Only
WX6	162.500	NOAA Weather	Receive Only
WX7	162.525	NOAA Weather	Receive Only
WX8	161.650	Canadian Weather	Receive Only
WX9	161.775	Canadian Weather	Receive Only

SECTION 4

TECHNICAL DESCRIPTION

4.1 GENERAL

The VHF5200 can be considered as consisting of two major sections. They are:

- The Control Circuitry (consisting of the front panel controls, the LCD display, control CPU).
- The Transmitter/Receiver/PLL circuits.

4.2 THE CONTROL SECTION

The heart of the control section is the CPU, IC201, located on the main PCB.
The CPU controls all of the following items:

- Controls the Squelch circuit by detecting a busy signal from the second IF circuit IC5.
- Generates a beep tone when a key is activated on the keyboard.
- Mutes the transmitter modulation circuit when receiving.
- Controls the output power of the transmitter High/Low.
- Controls the dividing ratio N of the PLL circuit.
- Switches On/Off the transmitter power.
- Mutes AF audio.
- Detects a weather alert signal (when in Monitor Mode).
- Controls the LCD display.

4.3 THE TRANSMITTER/RECEIVER/PLL SECTION

In reading through the following circuit descriptions, it may be helpful to refer to Figure 4-l Block Diagram of the TX/RX/PLL circuits.

4.3.1 PLL (Phase Lock Loop Circuit)

The PLL circuit is the frequency synthesizer in the VHF5200.

The reference frequency of 12.8 MHz is provided by crystal XTL1 and IC3. IC3 contains the reference oscillator (12.8 MHz) circuit, the phase comparator, the program counter and the phase detector. The 12.8 MHz reference signal is divided by 512 in the program counter in IC3 to obtain a 25 KHz reference signal. The dividing ratio is determined by CPU IC201. The VCO output from oscillator Q4 is amplified by buffer amplifier Q3, and returned to IC3 and is divided by the dividing ratio N to obtain a 25 KHz signal. N for 1 N in IC3 is determined by CPU IC201. Both of these 25KHz signals are fed into the phase comparator circuit of IC3.

The phase detected signal, obtained by comparing the phase difference between these two signals, is applied to LPF between pins 11 and 12 of IC4 to get a DC voltage correlated with the phase difference.

The DC voltage acts on the VCO to make the two 25 KHz signals the same phase. When this condition is met, the PLL circuit is locked. If the two signals have a large phase difference, the PLL is unlocked. In this condition, the unlocked signal is fed to CPU IC201 from IC3 and the transmitter is compelled to stop.

The VCO output from Q4 is fed to the TX amplifier Q2 and the first RX mixer Q19 through buffer amplifier Q3.

4.3.2 Transmitter Circuit

A signal from the microphone is fed to a pre-emphasis operations amplifier IC3, and modulates VCO(Q4) through active LPF IC2.

The VCO output signal from Q4 is sent to the RF power amplifiers ICI, Q1 and Q2 through buffer amplifier Q3. The RF signal from ICI is fed to the antenna through a low pass titter.

The DC voltage correlative to the RF output is detected by D2 and Q9, amplified by Q24 and fed to ICI .The output voltage from ICI controls the RF power to keep the RF output at a con stant level.

4.3.3 Receiver Circuit

1) RF Circiut

The signal from the antenna passes through the single tuned band pass filter, and is amplified by RF amplifier Q17, and is fed into a triple tuned band pass filter. The signal is then mixed by Q19 (first mixer) and produces the first IF signal of 21.6 MHz. This signal is sent to a crystal filter (21.6 MHz) and first IF amplifier Q20, mixed by IC4 , the second mixer, and becomes an audio signal after detection.

2) IF Circuit

The output of the first IF amplifer Q20 is fed into IC4. IC4 contains the second mixer, second local oscillator, 455KHz amplifer, quadrature detector and DC switching amplifer.

A455 KHz ceramic filter is installed between pins 3 and 5 of IC4 to examine the selectivity of this unit.

The detector output is separated into audio and noise components by an RC filter. The noise component is fed back to the noise amplifer section of IC4. Its output is rectified by a diode in IC4 and then fed to the switching amplifer in IC4.

3) AF Circuit

The AF signal from IC4 is amplified by IC5 to drive the speaker while the receiver is in the **squelched condition. Muting** control of IC5 is carried out by the CPU IC 201.

4) Weather Alert Tone Detecting Circuit

If a weather alert tone is included in the AF signal from IC4 while receiving the weather service broadcast, IC6 detects it and notifies an alert condition to CPU IC201.

BLOCK DIAGRAM

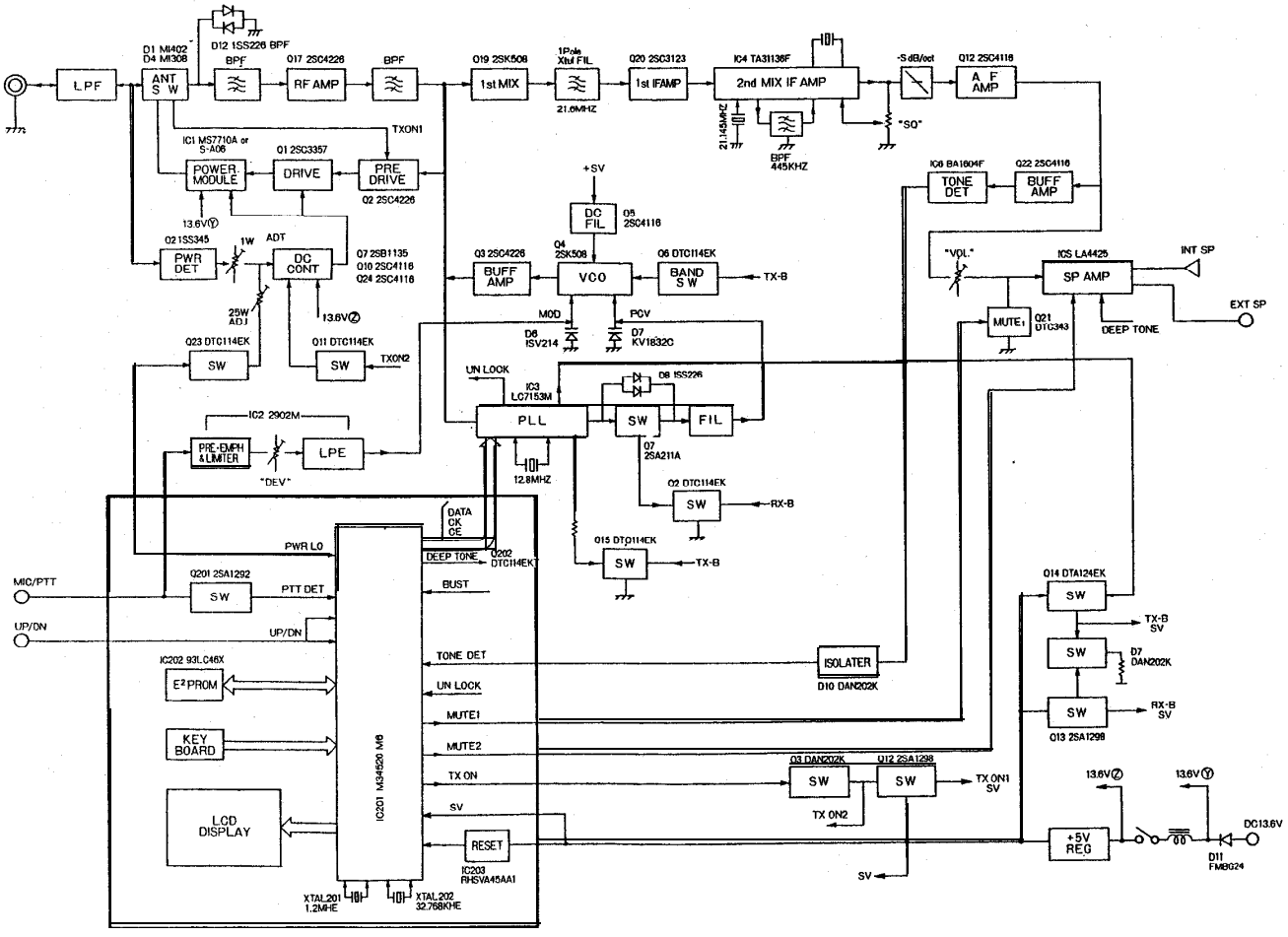


Fig. 4-I VHF 5200 Block Diagram

4.4 SPECIFICATIONS .

Transmitter

Channels	53 US/international
Frequency Stability	10PPM (0.001%) (-20 ℃ to+50℃)
Frequency Range	156.025 to 157.425MhHz
Channel Spacing	25 KHz Increments
Power Output	25 Watts switchable to 1 Watt into 50 Ohms at 13.6 Vdc
Modulation	Frequency modulated 16F3 (±4.5KHz at 1000Hz)
Modulation Audio Response	Shall not vary +1/-3 dB from true 6 dB pre-emphasis from 300 to 2500Hz, reference 1000 Hz. Audio frequences 3-20 KHz shall be attenuated (at 1 KHZ by 60 log f/3 dB. Above 20KHz by 50dB)
FM Hum & Noise Level	Greter than -40dB below audio
Audio Distortion	Less than 10% at 1 KHz for±3KHz deviation
Spurious & Harmonic Emssions	Attenuated at least 43+10 log Po (below rated radiated carrier power) per FCC Rules Parts 2 & 80
Antenna Impedance	50 Ohms
Transmitter Protection	Shall survive open or short circuit of antenna system without damage (10 min.test)

Receiver

Channels	93(includes 10 weather channels
Frequency Range	‘156.25 to 163.275 MHz in 25 KHz increments
Frequency Stability	±10 PPM(0.001%) from -20°C to +50℃
Usable Sensitibivity	0.3μV for 12dB (SINAD)
Squelch Sensitivity Threshold	0.2μV or better 1 .0μV full squelch
Adjacent Chl Rejection	Greater than 70 dB
Spurious Image Rejection	Greater than 70 dB
Intermodulation Rejection	Greater than 70 dB

Audio Output	3 Watt or more at 10% or less distortion into 4 Ohm load
Hum & Noise in Audio	**Less than** -40dB

Operating Requirements

Input Voltage	**13.6** Vdc ± 15%(11.6 **to** 15.6Vdc)
Current Required Transmit	**Less than 5.8 amp at 25 Watts** **Less** than **1.5 amp at 1 Watt**
Operating Temperature	**-20°C to** +50°C
Duty Cycle	**Continuous,** 80%receive, 20%transmit **(max 1 Omin,** @25°C)
Humidity	**100% at** 50°C **for 8hours**

Radio Dimensions

Height	**54 mm** (2.2inches)
Width	**145 mm (5.7 inches)**
Depth	**120** mm **(14.72 inches)**
Weight	Approx. 750g **(1.7 lb)**

SECTION 5

MAINTENANCE AND ALIGNMENT

5.1 GENERAL

The purpose of this section is to provide maintenance and servicing instructions for the service technician. The equipment is designed to provide long periods of trouble-free operation. It is recognized, however, that environmental and other factors will result in a need for occasional service.

5.1.1 Product Support and Customer Service

"We at Apelco, have gone to great lengths to insure that the product you have purchased holds up to our high quality and performance standards. If, however, you are ever in need of service, please contact Apelco directly, or an authorized Apelco dealer for assistance. You may contact Apelco directly at the following numbers, to speak to one of our knowledgeable and courteous specialists".

Customer Service: (603) 647-7530 ext 2120

Phone calls to this deparment should deal primarily with questions regarding Purchasing Parts and accessories, authorized Apelco dealer locations, basic product information, and brochure/ literature requests.

Product Support: (603) 647-7530 ext. 2444

Phone calls made to this deparment should deal primarily with the operation and technical aspects of Apelco Marine equipment.

When calling the above numbers, your phone call will be placed in a queue and will be answered in the order in which it was received. The normal operating hours for this system are from 8:30am-5:00pm Eastern Standard Time.

5.2 PREVENTIVE MAINTENANCE

The VHF5200 has been constructed to be virtually maintenance free. Your attention to a few basic points should assure many years of service.

1) Although the unit is waterproof, always keep the unit as dry as possible.

2) Clean the exterior of the unit with a tissue or soft non-abrasive cloth.

CAUTION
Do not use solvents or other chemicals for cleaning this equipment

3) Inspect the radio case and antenna for any physical damage.

5.3 ALIGNMENTS AND SERVICE

This transceiver is completely aligned at the factory and does not require any adjustments at installation. The test equipment listed below are used for the test setup shown in Fig 5-1.This test setup is used either in part or in total during the following adjustments.

TEST EQUIPMENT

1. **DC Power Supply** (20V,10A)set at 13.6Vdc
2. **RF Power Meter** (40W,50ohn,150-200 **MHz)**
3. **RF Signal Generator** (50ohm Output,150-200MHz)
4. **FM Linear Detector (FMLD) or Deviation Monitor** 150-200MHz
5. **Frequency Counter**
6. **Digital Voltmeter (DC Voltmeter)**
7. **Oscilloscope (any osilioscope accurate for audio signal tracing)**
8. SINAD **Meter**
9. **Distortion Meter**
10. **Toggle Switch (for use as a PTT switch)**
11. **Coaxial Switch for TX/RX antenna switching**

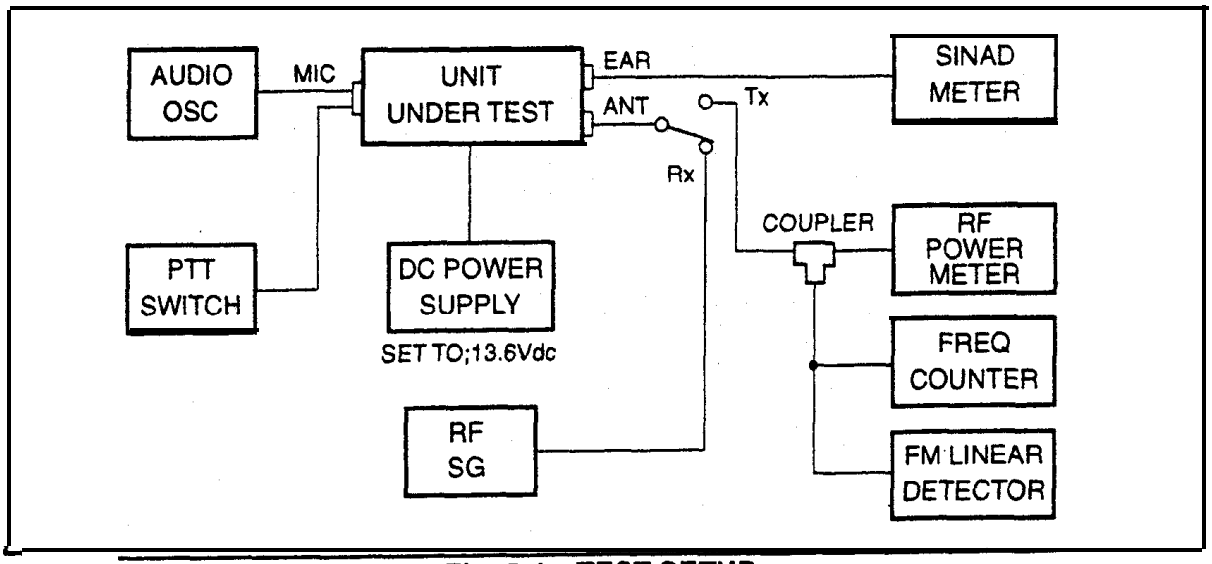


Fig. 5-1 TEST SETUP

5.3.1 PLL Adjustment (TRANSMITTER/RECEIVER)

1) Connect the power supply (13.6 V,10 A)to the power line and the PTT switch to the microphone terminal.
2) Connect a digital voltmeter or high impedance tester (positive lead to TP1 negative to ground) and adjust T1 on the RF module as shown in Table 5-I (See Fig 5-2)

Sequence	Item	Condition	Adj. point	Adj. volt.
1	TX	transmit CH.60 USA	T1	3.5 ± 0.1 Vdc
2	RX	receive CH.60	---	check for 1.65± 0.3Vdc
3	RX	receive CH.WXO	---	check for 3.4± 0.3Vdc

Table 5-I

53.2 Frequency Adjustment (TRANSMITTER)

1) Connect the coupler output to a frequency counter, set the radio on CH16(156.800MHz), key the transmitter, and read the indication on the frequency counter.
2) Adjust trimmer capacitor CV1 on the RF module for the desired frequency(156.800MHz) ±200 Hz on the frequency counter.

5.3.3 Modulation Adjustment (TRANSMITTER)

1) Connect the coupler output to an FM linear detector.
   Connect an audio oscillator to the microphone connector and key to the transmitter,
2) Set the audio oscillator output to-20 dBm,300 Hz and adjust RV 3 on the RF module for a deviation of 4.5 KHz ± 300 Hz.
3) Set the audio oscillator output to 43 dBm,1 KHz and read the deviation meter (±2.8 KHz —±3.2 KHz).

5.3.4 Power Output Adjustment (TRANSMITTER)

1) Connect an RF power meterto the antenna connector through the coupler. Key to transmit and adjust RV1 and RV2 on the main PCB as shown in Table 5-2. (See Fig. 5-2)

Sequence	Condition	Adj. Point	Target Power
1	13.6VDC H/L:L	RV1 LOW Power	0.9w+/-0.05w (limit 1.0 w)
2	13.6VDC H/L:H	RV2 High Power	24w+/-0.5w (limit25w)

Table 5-2

5.3.5 RF Sensitivity Adjustment (RECEIVER)

1) Connect an RF signal generatorto the antenna connector and a SINAD meter to the external speakerline.

2) Set the deviation of the RF signal generator to 1 KHz +/- 3 Hz.

3) Set the output level of the RF signal generator and adjust T2-T6 and T301 on the RF module as shown in Table 5-3,(See Fig.52).

Sequence	Conditlon	Adj. Point	Target Level
1	CH.88(157.425MHZ) SG output:60dBu	T2-T6 T301	Max.Sensitivity
2	CH.WXO SG output:-6dBu	T2-T6 T301	Over 12 dB SINAD

Table 5-3

5.3.6 Weather Alert Frequency Adjustment (RECEIVER)

1) Connect an RF signal generatorto the antenna connector
Set the RF signal generator as follows:
. Frequency: 162.550 MHz with no modulation
. Output level: 60dBu

2) Select the weather channel WX1 .

3) Connect a frequency counter to TP3 on the MAIN PCB and adjust VR4 to obtain 1050 kHz +/- 5 Hz on the frequency counter. (See Fig. 5-2)

5.4 TROUBLESHOOTING GUIDE

Table 5-4 provides a general troubleshooting chart for use by a technician to isolate circuitry failures to specific functional areas within the VHF radio.

NOTE

Miiponents within the radio are generally not field replaceable. Therefore repairs to the radio typically go down to the PC board level only. A replacement parts iii for the VHF 5200 can be found in Section 6.

Item Number	Symptom	Possible Cause
1	Unit does not turn on	a. Defective power switch b. 10amp. Fuse in power line open c. Diode D11 open d. Noise filter L15 open e. Capacitor CI19 and CI20 shorted f. Defective regulator IC7(5v)
2	No sound with AF signal applied to pins 1 and 2 of IC6	a. Defective internal speaker b. Defective IC5 and/or associated components
3	No sound with AF signal applied to volume control	a. Defective volume control b. Defective mute circuitry (IC201)
4	Squelch circuit inoperative	a. Check squelch control b. Defective IC4and /or associated circuitry between pins 7 and 9
5	No receive (RX)	a. Defective regulators IC7(5V) b. Defective Q13(RX B+) c Check IC4 audio output voltage at pin 9 d. Defective AF amplifier Q21 e. Defective mute circuitry IC201 f. Check XLT2 output for 21.145 MHz signal g. Check 21 .6MHz output of first mixer Q19 h. Check 21.6MHz output of ceramic filter IF amplifier FIL1 *i.* Check 21 .6MHz output of first IF amplifier Q20 j. Check 455KHz signal from ceramic filter FIL2 k. Failure of VCO circuit (Q4,Q3, and/or PLL IC3) l. Defective CPU (IC201)
6	Low receiver sensitivity	a. Check antenna and connector for possible corrosion or bad connection b. Failure of the output from Q17, Q19, Q20, and/or IC4 c. Check the output level of VCO per para. 5.3.1

Table 54 TROUBLESHOOTING CHART

Item Number	Symptom	Possible Cause
7	CPU inoperative	a. Turn off the power once, and try again b. Check CPU clock frequencies (pins 22 and 23, and pins 26 and 27 of IC201) c. If clock frequency is not present, check for +5VDC line
8	Display malfunction	a. Check the interconnection to the LCD display b. Inoperative CPU
9	No transmit (TX)	a. Defective PTT switch b. Defective regulators IC7(5V) c. Defective Q12(TX +B) d. Check power transmit circuit (Q1,Q2,and/or ICl) e. Failure ofiVCO circuit (Q4 and /or Q3) or PLL IC3 f. Check PLL control voltage for 3.5 VDC at TP1 on channel 60. g. Failure of talk detection circuit (IC201)
10	Low RF power output	a. Check RF power output from IC1. If it checks good, check the triple Pi type network components (C2-6,L1-3,etc.) and antenna switching diode (D4). If not good then check the voltage level outputs of the drive amplifiers Qland Q2 as well as the associated circuitry b. Check power control circuit (Q24,Q9,Q10) and IC4
11	Poor or no modulation	a. Check VCO output frequency at pin 14 of PLL IC3 PLL phase detector output at pin 12 of PLL IC3 and associated circuitry b. Check 12.8 MHz crystal (XLT1)
12	PLL output frequency or level incorrect	a. Check frequency of 12.8 MHz crystal(XLT1) b. Check the frequency input at pin 14 of IC3 and verify the transmit frequency

Table 54 (Continued)

SECTION 6

PARTS LIST AND DRAWINGS

6.1 PARTS LOCATION LIST

MAIN PCB ASSEMBLY SECTION

CKT, SYMBOL	DESCRIPTION	PART NO.
	Main PCB Assembly	G623681-1
D1,4	Ant Sw, Ml 308	
D2	RF Power Det, ISS345	
D3	----------	
D5	RF Sw, ISVl28	
D6	Mod/Vari/Cap, ISV214	
D7	VCO/Vari/Cap, KV1 832C	
D8	Sw, ISS226	
D9	Sw, DAN202	
D10	Isolator, DAN202	
D11	Isolator, FMBG24	
FL101	Xtal, 32.768 Khz	
F901,F907	Xtal, MF21.6-RB	
F905	Xtal, 21 .145 Khz	
F906	Xtal, 12.8 Mhz	G263479-55
IC1	TX Power Module, M5771 OA (or S-AV6)	1032698-85
IC2	OP Amp, 2902M	
IC3	PLL IC, LC7153M	
IC4	FN IC, TA31136FN	
IC5	AF Power Amp, LA4485	G263720-10
IC6	Tone Detector, BA1 604	
IC7	+5V Regulator, 78M05	
Q1	TX Driver, 2SC3357	
Q2	TX Pre-Driver, 2SC4226	
Q3	Buff Amp, 2SC4226	
Q4	VCO, 2SK508	
Q5	DC Fil, 2SC4116	
Q6,8,11,15,23	Sw, DTC114EK	
Q7	Sw, 2SA811A	
Q9	DC Control, 2SB1185	
Q10	DC Control, 2SC4116	

MAIN PCB ASSEMBLY SECTION (CON'T)

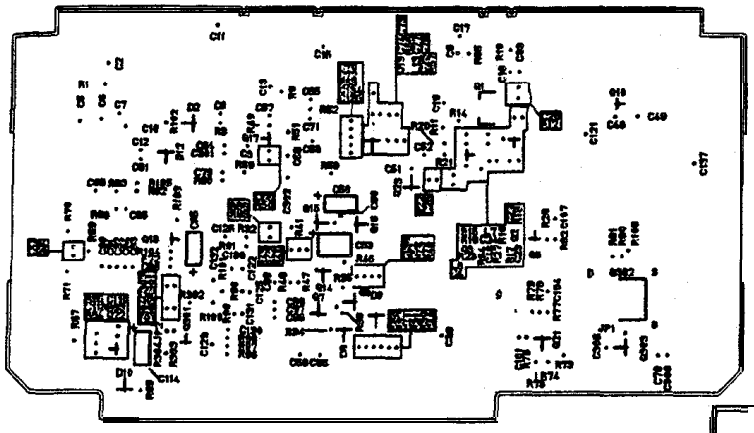
CKT, SYMBOL	DESCRIPTION	PART NO.
Q12,13	Sw, 2SA1298	
Q14	Sw, DTA124EK	
Q16,21	AF Sw, DTC343	
Q17	RF Amp, 2SC4226	
Q18,22	AF Amp, 2SC4116	
Q19	First Mixer, 2SK508	
Q20	First IF Amp, 2SC3123	
Q301	High Pass Filter, 2SC4116	

CPU PCB ASSEMBLY SECTION

CKT, SYMBOL	DESCRIPTION	PART NO.
	CPU PCB Assembly	G623682-2
H200	LCD, 211	
IC201	CPU, M34520M6	
IC202	EEPROM, 93LC46X	
IC203	Reset, RH5VA45AA	
PL-201	Pilot Lamp, 93 (14V)	G263720-24
Q201	Sw,2sa1298	
Q202	Sw, DTC124EKT	

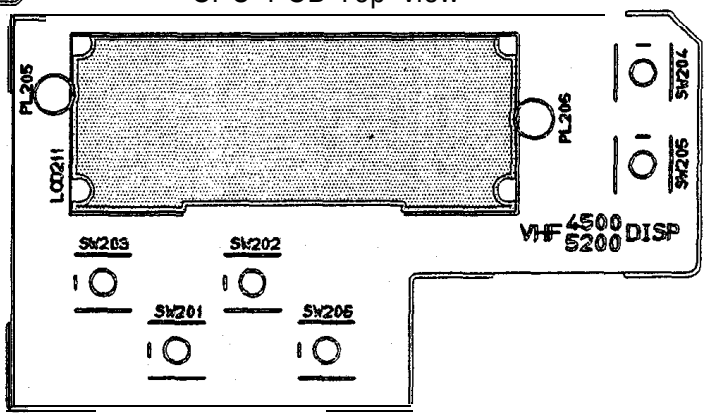
VOLUME/SQUELCH PCB ASSEMBLY

CKT, SYMBOL	DESCRIPTION	PART NO.
	Volume/Squelch PCB Assembly	G623681-3

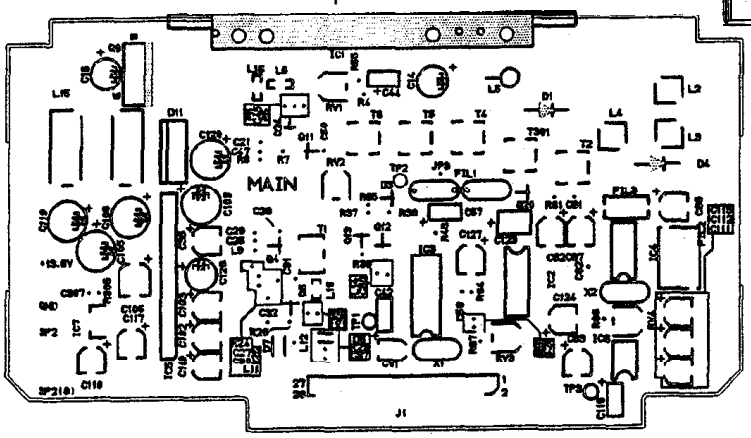


Main PCB-Bottom view

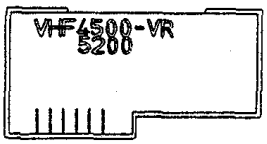
CPU PCB-Top view



Main PCB-Top view

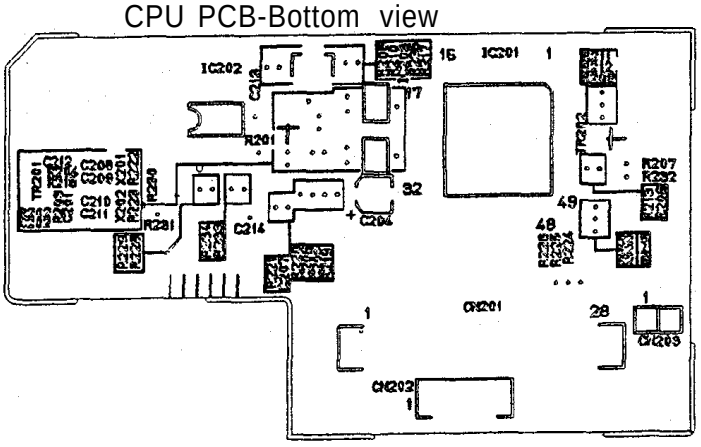


Bottom view



VOL/SQ PCB

CPU PCB-Bottom view



Top view

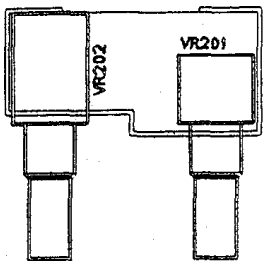


Fig. 6-3 VHF 5200 PCB LAYOUT

INTERNAL WIRING DIAGRAM

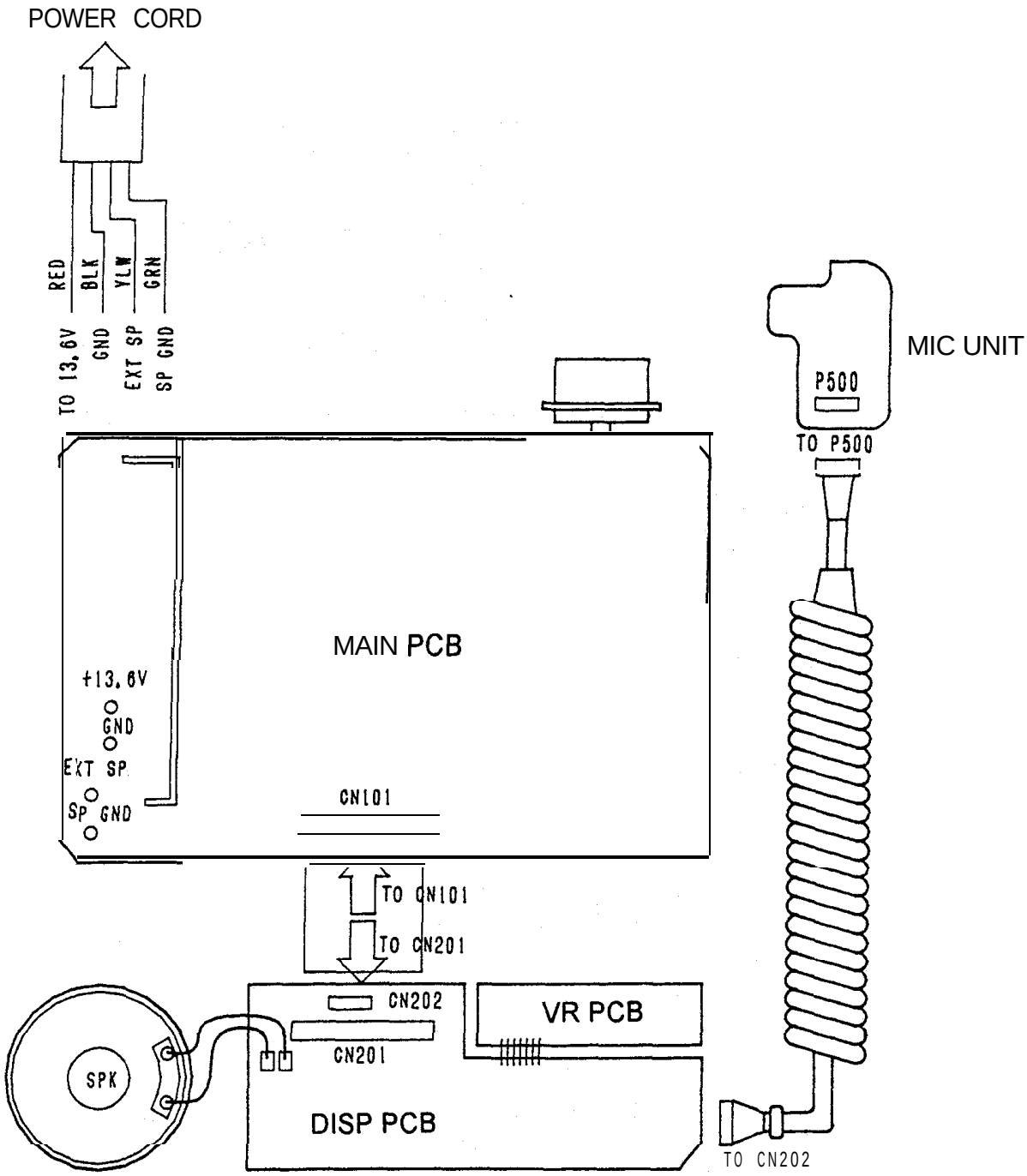


Fig. 6-4 INTERNAL WIRING DIAGRAM

SECTION 7

APPENDIX

7.1 VHF MARINE CHANNEL USAGE GUIDE AND LICENSING REQUIREMENTS

Most of the information found in this section is reprinted in whole or in part from FCC information Bulletin No. 2 REVISED EDITION February 1991 and FCC Fact Sheet PR-5000 March 1990.

REMEMBER:

- Maintain a radio watch on Channel 16. Channel 16 is used for distress and safety purposes only.
- Use VHF Channel 70 only for Digital Selective Calling (DSC). It may be used for general-purpose calling using DSC. Your cooperation in not using Channel 70 for general intership communications is necessary to prevent interference.
- Your VHF transceiver has a high-low power switch. Use low power whenever feasible. Unnecessary high-power operations can interfere with other important communications.
- Always use your radio call sign at the beginning and end of each transmission.
- Be sure only qualified persons operate your radio. You are responsible for control of your radio. Know the rules.
- Limit calls to other vessels to 30 seconds. If you receive no reply, wait 2 minutes; then try again. Keep communications brief and avoid chit-chat.
- Never transmit false distress messages, and never use profanity on the air.

OTHER REMINDERS:

- Do not install or operate your radio until it is licensed. You can obtain a station license and call sign by completing FCC Form 506 and mailing it with the required fee to the FCC, Marine Ship Service, PO. Box 358275, Pittsburgh, PA 15251-5275. Form 506-A provides you with immediate operating authority, valid for 90 days after you mail your license application.

You need a radio operator license to operate a VHF Marine Radio only if you plan to dock in a foreign port or leave a foreign port to dock in a U.S. port.

- Your radio license is not transferable. If you sell your boat, request the FCC to cancel your station license.

If you replace your radio, you do not need to change your license unless the new radio operates on another frequency band. If you install equipment to operate on another frequency band, apply for modification of your license.

- If you carry more than six passengers for hire, your vessel must be certified as a passenger-carrying vessel by the FCC and the Coast Guard.

Licensing Requirements for Hand Held Portable VHF Marine Transceivers 10 Watts Power or Less

All transceivers, hand helds included, operated in the Maritime Radio Services are required to be operated under an appropriate maritime station license. Operation of hand held VHF Marine transceivers without proper station license can lead to fines and/or administrative sanctions issued against its user and/or owner.

VHF Marine hand held transceivers can be operated and licensed as follows:

a) Associated Ship Unit: A hand held VHF Marine transceiver can be operated under an existing valid ship station license under the following conditions only:

   i) Except for safety purposes, the hand held transceivers must be used only to communicate with the ship station with which it is associated. Such associated ship units MAY NOT be operated from shore.

   ii) The transmitting power is limited to ONE WATT only.

   iii) The hand held transceiver must be identified by the call sign of the ship station along with its associated unit designator.

b) Portable Ship Station: The Commission may grant a station license permitting operation of a portable ship station aboard different vessels of the United States. Each application (FCC Form 506-Application for a Ship Radio Station License) for a portable ship station license must include a showing that:

   i) The station will be operated aboard a vessel.

   ii) A station license for portable equipment is necessary to eliminate separate applications to operate a ship station aboard different vessels.

c) Marine Utility Station: A utility station in the maritime mobile service consists of one or more hand held transceiver units licensed under a single authorization. Each unit is capable of operating while being hand carried by an individual. There are two types of stations authorized:

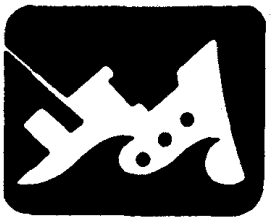
   i) Marine Utility Coast- when transmitters are located on land; may communicate directly to vessels only.

   ii) Marine Utility Coast/Ship- transmitters from land may communicate with vessels or when aboard a vessel, may communicate with other vessels or coast stations.

   NOTE: A Marine Utility Ship license will not be authorized.

The station operates under the rules applicable to a private coast station when the unit (s) are on land and under the rules applicable to a ship station when the unit (s) are aboard a vessel. FCC Form 503, application for Land Radio Station License is used when applying for a marine utility License.

USAGE GUIDE



Emergency

Channel 16

If:

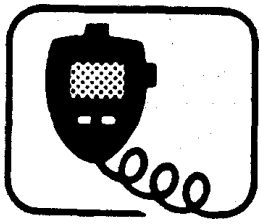
- Your ship is **sinking, or on fire**
- Someone has been lost overboard
- There exists grave and imminent danger

Use this distress procedure:

- Select Channel 16
- Say "Mayday, Mayday, Mayday."
- Give call sign and boat name
- Give location of boat
- Describe emergency
- If no answer, repeat; then try and other channel

Caution

Every ship at sea is obliged to give absolute priority to radio communications relating to ships in distress-it is vital that false distress calls or messages not be broadcast.



Calling

Channel 16 & Working Channel

If-you wish to establish communications with another station

And-you know which working channel the station is monitoring

Then-initiate the call directly on that working channel

If-you wish to establish communications with another station

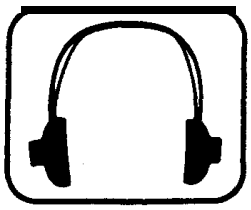
And-you do not know what working channel the station may be monitoring

Theninitiate the call on channel 16. After contact is made switch to a working channel.
NOTE: Due to congestion on channel 16 caused by frequent hailing of other vessels, the FCC has approved channel 9 as a second hailing channel.

Avoid excessive calling and radio checks

Always monitor before transmitting

Never interrupt emergency communications



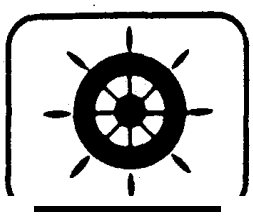
'Monitoring

Channel 16 & Working Channel

When-your VHF station is turned on and it is not being used to exchange communications

You Must-monitor channel 16

As an operating convenience, many stations employ a second receiver so that they can monitor a working channel and channel 16 simultaneously.



Intership Safety

Channel: 6

Vessels: Any

Use: Communicating navigational and weather warnings to other ships

Communicating with U.S. coast Guard stations or other vessels during search and rescue operations

Between: Ship-to-ship only

Comments: Do not use for routine communications. This is a safety channel.

U.S. Coast Guard

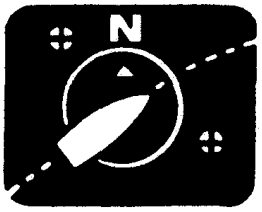
Channel: 22

Vessels: Any

Use: Working channel for exchange of communications with stations of the U.S. Coast Guard

Between: Ship to U.S. Coast Guard ship, coast to aircraft stations

Comments: U.S. Coast Guard does not regularly monitor this channel. Establish contact on channel 16 and shift to channel 22 as directed.



Navigation

Channel: 13

Vessels: Any

Use: Safety communications pertaining to the maneuvering of vessels or the directing of vessel movements

Primarily ship-to-ship and secondarily ship-to coast

This is commonly called the Bridge-to-Bridge channel. Large vessels and towboats depend on this channel for their safe navigation, Railway or highway bridges which open for ship navigation often operate on this channel.

Bridge-to-Bridge stations must reduce power to one watt for routine operations.

Port Operations

Channels: 5,12, 14, 20, 65, 66, 73, 74, [77]

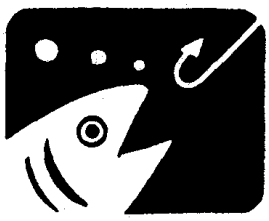
Vessels: Any

Use: Messages relating to the operational handling, movement and safety of vessels in or near ports, locks and waterways

Between: Ship-to-ship or ship-to-coast

Comments: Channel 77 is limited to communications to and from commercial pilots concerning the movement and docking of vessels.

Note: Channels 11, 12, 13 and 14 are used for vessel traffic service on the Great Lakes, St. Lawrence Seaway and designated major ports.



Non commercial
(Boat Operations)

Channels: 19, 68, 69, 71, 72 78

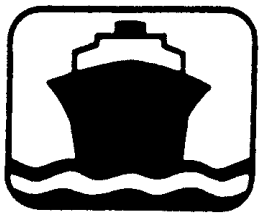
Vessels: Recreational boats and any others not used primarily for commercial transport.

Use: Communications pertaining to the needs of the vessel (i.e., fishing, rendezvous, maneuvers, berthing, scheduling of repairs, provisioning, etc.)

Between: Ship-to-ship *or* ship to limited coast stations

Comments: Channel 72 may not be used for ship to coast communications. Channel 9 is shared with Commercial users.

If you regularly monitor one of these channels with a second receiver, please notify frequently-called stations of this practice. Help reduce congestion on channel 16.



Commercial

Channels: 7, 8, 9, 10, 11, 18, 19, 67, 79, 80, [88]

Vessels: Those used primarily for commercial transport of persons or goods, or engaged in servicing other vessels

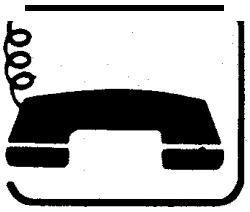
Use: Communications pertaining to the purpose for which the vessel is used

Between: Commercial transport vessels (ship-to-ship) or between commercial transport vessels and limited coast stations

Channels 8, 67 and 88 may not be used for ship-to-coast communications

Recreational boats are not permitted to use these channels

Channel 88 not available on Great Lakes and St. Lawrence Seaway.



Marine Operator

Channels: 24, 25, 26, 27, 28, 84, 85, 86, 87, 88

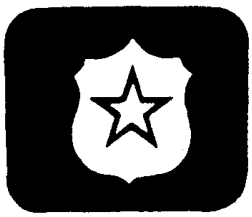
Vessels: Any

Use: To place a telephone call to any location in the world or to a vessel outside of your transmitting range

Between: Vessels and public coast stations

Comments: Contact the marine operator on the channel assigned to your navigating area.
If unable to determine this channel, use channel 16.

Be patient. Do not interrupt calls in progress. Avoid excessive calling if the operator does not answer-give the operator a chance to reply.



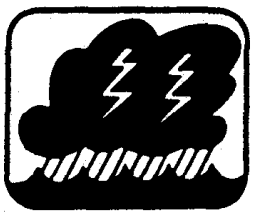
State Control

Channel: 17

Vessels: State and local government

Use: Coordination, regulation and control of boating activities and the rendering of assistance to vessels.

Between: Ship and coast stations associated with state and local governments.



Environmental

Channel: 15

Vessels: Any (receive only)

Use: Broadcast of information concerning the environmental conditions in which vessels operate-weather, sea conditions, time signals, notices to mariner, hazards to navigation

Between: One-way broadcast from coast to ship stations

Note: Currently used for Class C EPIRB emergency signals.

Weather

Channels: WX1, WX2, WX3

Vessels: Any

Use: Continuous weather information from NOAA (National Oceanic and Atmospheric Administration

Between: One-way broadcast from NOAA to any interested parties

Comments: Receive only. You are not allowed to transmit on these frequencies.

PHONETIC ALPHABET:

To help make call letters more clearly understood, and to assist in spelling out similar sounding or unfamiliar words, radiotelephone users usually employ the international phonetic alphabet.

Phonetic alphabet:

A- ALPHA

B- BRAVO

C- CHARLIE

D- DELTA

E- ECHO

F- FOX-TROT

G- GOLF

H- HOTEL

I- INDIA

J- JULIET

K- KILO

L- LIMA

M- MIKE

N- NOVEMBER

0- OSCAR

P- PAPA

Q- QUEBEC

R- ROMEO

S- SIERRA

T- TANGO

U- UNIFORM

V- VICTOR

W- WHISKEY

X- X-RAY

Y- YANKEE

z- ZULU

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