Rob

Apelco

VXL5110
VHF-FM Radiotelephone
Instruction Manual

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SECTION 1

INTRODUCTION

1.1 GENERAL

Congratulations on your purchase of Apelco's VXL5110 marine radiotelephone.

The VXL 5110 VHF-FM marine radiotelephone provides reliable simplex and duplex (two-frequency) communications between ships and from ships at sea to public or private shore stations. The VXL5110 provides two-way communications on the International and US channels, reception on nine separate weather channels, and two-way communications on the international calling and safety channel (16). Installation requires attaching the mounting yoke and microphone bracket and connection to a 13.6 Vdc power source and a proper VHF antenna.

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

1.2 EQUIPMENT FEATURES

The VXL 5110 is designed and manufactured to provide ease of installation and operation with excellent reliability. The important built-in features of the equipment are listed below:

- All solid-state circuitry for low current drain, minimum heat dissipation and maximum reliability.
- High-performance receiver section with optimum selectivity.
- 54 channel transmit and 91 channel receive capability within the assigned VHF FM maritime band. All US channels and International channels are included.
- Four watts audio output power to the speaker provides adequate volume even in a noisy environment.
- Exclusive circuit that automatically selects channel 16 and 25 watts output power when radio is turned on.
- Phase-locked loop frequency synthesizer generates channel frequencies to eliminate the need for conventional crystals for each channel.

- Microcomputer-controlled channel frequencies and characteristics.
- Selected channel number indicated on the LCD digital display.
- Keyboard entries for distress channel 16, and nine weather channels WX-1 thru WX-9.
- Full 25 watts RF output power to the antenna connector with protective circuitry to prevent damage when operating into faulty antenna systems.

1.3 EQUIPMENT SUPPLIED.

Figure 1-1 shows the VXL 5110VHF-FM radiotelephone with mounting yoke attached. Table 1-1 provides a complete list of the equipment supplied, the part numbers, and the quantities.

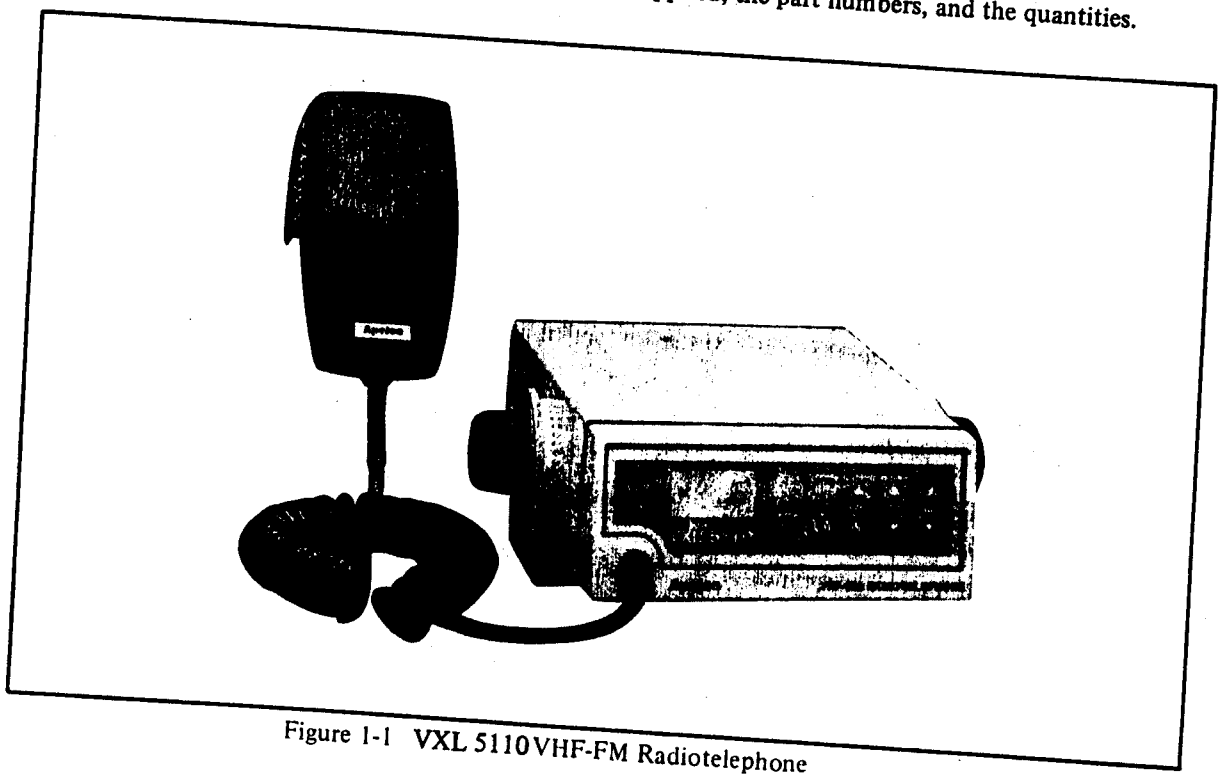


Figure 1-1 VXL 5110VHF-FM Radiotelephone

Table 1-1
Equipment Supplied

Equipment Name	Part No.	Quantity
Radiotelephone	M56761	1
Microphone Bracket w/Attaching Hdw.	G263204-9	1
Mounting Yoke	G263204-10	1
Yoke Thumb Screw	G263204-11	2
Washer, Thumb Screw	G263204-12	2
Yoke Spacer	G263204-13	2

Table 1-1
Equipment Supplied (cont'd)

Equipment Name	Part No.	Quantity
Fuse(s) Kit	NPN	1
Manual	G263203-2	1
Warranty Certificate	G259101	1

1.4 SPECIFICATIONS

Transmitter

Channels	54
Frequency stability	10 PPM (0.001%) (-20°C to +50°C)
Frequency range	156.025 to 157.425 MHz
Channel Spacing	25 kHz increments
Power output	25 watts switchable to 1 watt into 50 ohms at 13.6 Vdc +1dB at 15.6 Vdc and functional at 10.5 Vdc
Modulation	Frequency modulated 16F3 (±4.5 kHz +500 - 0 Hz deviation for 100% modulation at 1000 Hz).
Audio distortion	Less than 4% at 1000 Hz for ±3 kHz deviation
Audio roll-off filter	Exceeds FCC requirements of 18 dB per octave beyond 3000 Hz.
Spurious & harmonic radiated outputs	At least 57 dB below rated carrier power

Receiver

Channels	91
Frequency range	156.025 to 162.025 MHz in 25 kHz increments plus: 162.550 MHz (W1) 162.400 MHz (W2) 162.475 MHz (W3) 161.650 MHz (W4) 162.425 MHz (W5) 162.450 MHz (W6) 162.500 MHz (W7) 162.525 MHz (W8) 161.775 MHz (W9)

Frequency stability	**10 ppm or 0.001% from -20°C to +50°C**
Adjacent channel rejection	60 dB
IF frequencies	**1st IF = 16.9 MHz** **2nd IF = 455 kHz**
Sensitivity (20 dB quieting)	**0.5 µV.**
Usable Sensitivity 12 dB (SINAD)	**0.35 µV at 1.0 watt audio output**
Audio response	**+2, -8 dB from standard 6 dB/octave de-emphasis characteristic from 300 to 3000 Hz referenced at 1000 Hz**
Modulation acceptance	7.0 kHz bandwidth
Intermodulation rejection	55 dB
Squelch sensitivity threshold	0.3 µV or better
Tight squelch sensitivity	0.5 µV to 2.0 µV
Audio output	4.0 watts or more at 10% or less distortion into 8 ohm load
Spurious and image rejection	55 dB or more
Operating Power Requirements	
Input voltage	13.6 Vdc ±15% (nominal), negative ground only
Operating range	11.6 to 15.6 Vdc
Input current	
Transmit	5.5 amps max at 25 watts
Receiving (squelched)	0.6 amps max
Operating Temperature	
Transmit and receive modes	-20°C to +50°C
Radio Dimensions	
Height	73 mm (2.87 inches) includes bracket.
Width	178 mm (7 inches) includes mounting screw.

1.4 SPECIFICATIONS (cont'd)

Depth	**190 mm (7.5 inches)**
Weight	**Approximately 1.2 Kg (2.6 lbs)**

NOTE
The VXL-5110 VHF-FM Radiotelephone, meets all applicable sections of FCC Parts 2, 15 and 83.

SECTION 2

INSTALLATION

2.1 GENERAL

Select the most appropriate mounting location to eliminate the possibility of damage from spray or rain. The mounting location for the radiotelephone and the antenna is determined by the size of the vessel, available space, operator convenience, and proximity to the power source and grounding point. The radio is weather resistant, but must not be installed where it will be exposed to direct spray or sunlight.

2.2 MOUNTING THE RADIO

This radio is designed so that the mounting bracket can be secured to a horizontal shelf, to a bulkhead as shown in Figure 2-1. Install the radio by positioning it in the mounting bracket and securing the two thumb screws. Either the top or the bottom of the radio will fit into the bracket.

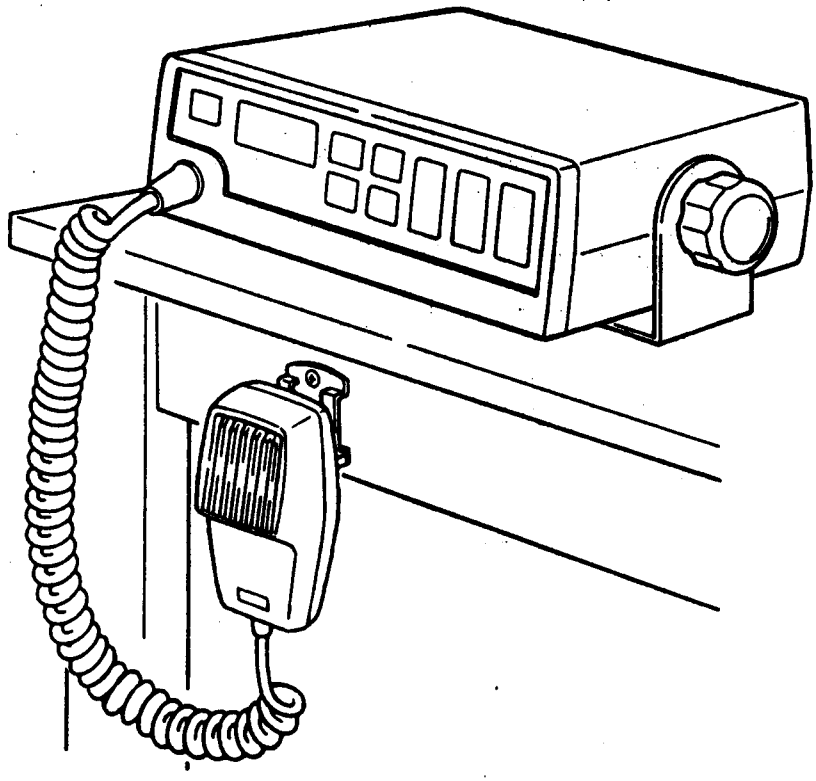


Figure 2-1 Typical Installations

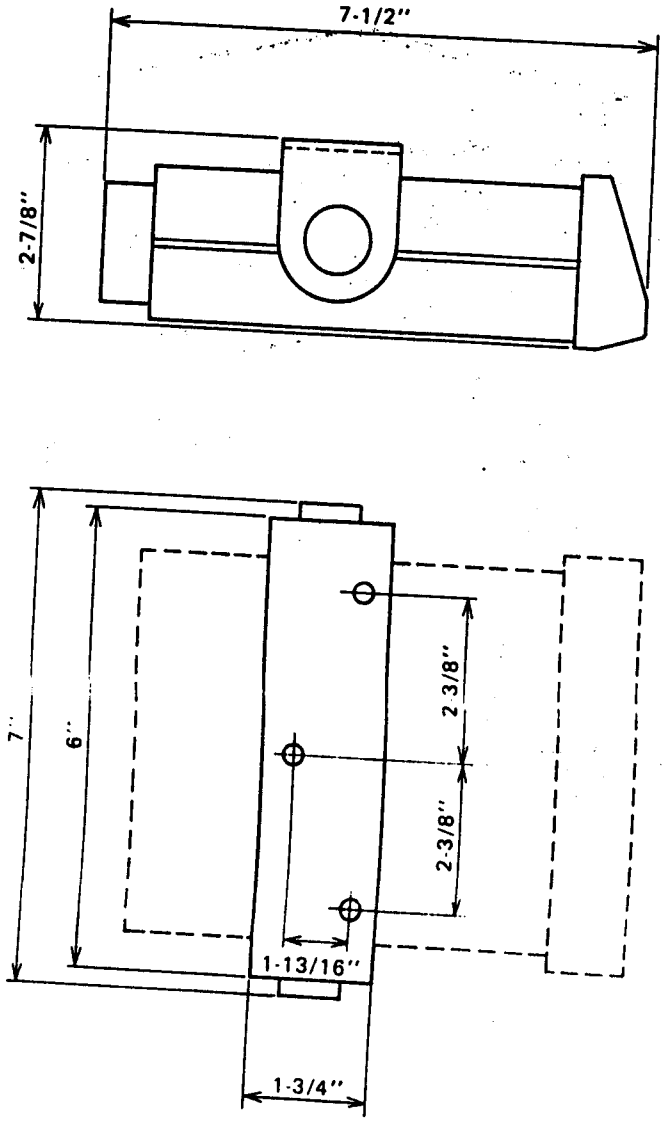


Figure 2-2 Outline and Mounting Dimensions

2.3 ANTENNA

Marine VHF Antennas

Only a proper marine VHF antenna can give you proper potential communications range. Your communications range may be extended by either or both of the following:

1. Increase the mounting height of the antenna.
2. Use an antenna with a higher gain.

These recommendations can substantially increase range. The dealer from whom the radiotelephone was purchased can advise as to the best antenna/mounting configuration for a particular application (Figure 2-3).

Mounting instructions are furnished with the antenna. If the cable length required is greater than that supplied, it is recommended that RG-8/U cable be used for as much of the distance as feasible. If the mounting surface selected (deck or cabin top) does not have sufficient strenght to support the antenna during heavy weather, it may be reinforced with a backing plate.

When additional lengths of RG-8/U antenna cable must be added, the cable supplied with the VHF antenna should be shortened to a convenient length and the PL-259 plug installed. The additional cable does not require any retuning of the radio (Figure 2-3). All intermediate antenna cable connections must be weatherproofed upon final installation.

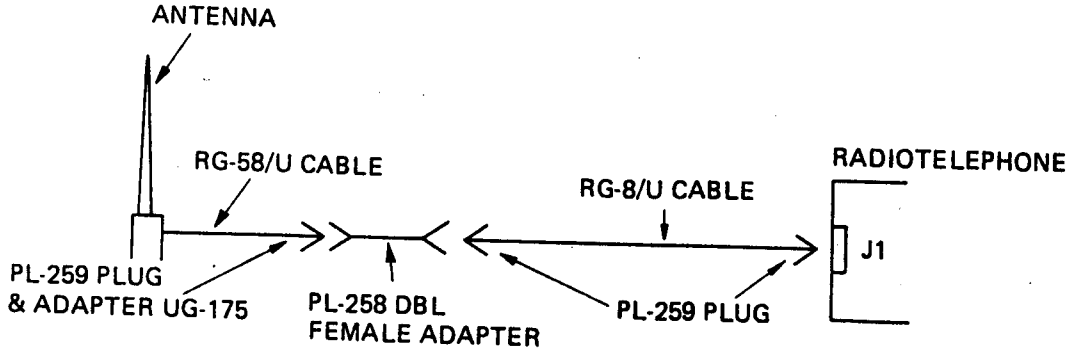
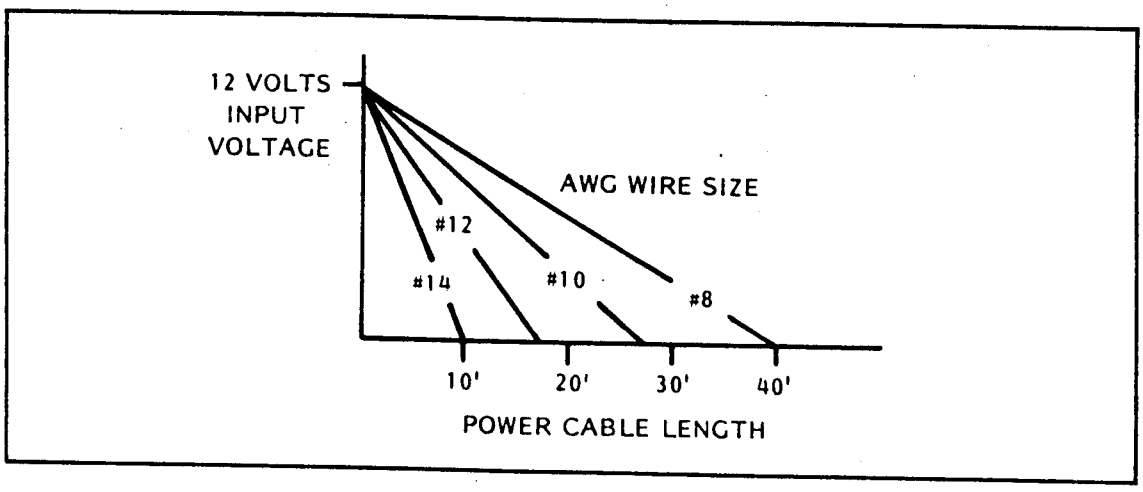


Figure 2-3 Antenna Cable Connections



POWER CABLE LENGTH

Figure 2-4 Power Cable Size Versus Length

2.4 ELECTRICAL CONNECTIONS (Refer to Figure 3-2)

2.4.1 DC Power Connection (3)

2 meters of #14 AWG stranded wire through fuse holder is furnished for connecting the 13.6 Vdc power to the radio: Red to (+), Black to (−). The power cable from the 13.6 volt power source to the radio should be #14 AWG stranded wire for a run of less than 10 feet. Longer cable runs require an even larger wire size to minimize the voltage drop (Figure 2-4). Connections should be made directly to the battery with a proper protective fuse located near the battery. Check that all connections are clean and bright.

Should the power connections be inadvertently reversed, protective fuse F1 (7A), located on the power cable, will blow. Check the input power leads for correct polarity with a VOM, reconnect the leads observing correct polarity, and replace the fuse.

2.4.2 External Speaker Connection (2)

The VXL 5110 radiotelephone has an external speaker jack (EXT-SP) mounted on the rear panel. This jack provides the user with the option of connecting an external 8 ohm speaker to the radiotelephone. The speaker is not provided with the radiotelephone package and must be obtained separately. When an external speaker is plugged into J104 it automatically disconnects the radiotelephone 3.12 ohm internal speaker. Mating plug type: 3.5mm Diameter standard plug, miniature phono plug, Part # G263056-1 is required to plug the external speaker into the radio.

2.4.3 Antenna Connection (1)

The coaxial transmission line to a suitable VHF antenna is connected here using a PL259, UHF type of connector and suitable 50 ohm coaxial cable. Generally RG-58 is used for up to 50 feet of length. Above 50 feet, RG-8 or similar is recommended.

2.5 GROUNDING

No special grounding is necessary for the radiotelephone installation. However, when the radiotelephone is mounted on a non-grounded surface, a ground wire should be attached to a heat sink screw.

SECTION 3

OPERATION

3.1 AVAILABLE CHANNELS

Your VXL 5110 has the capability to transmit on 54 and receive 91 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). Table 3-1 lists all of the marine VHF channels available in your VXL 5110 for International and U.S. radiotelephone use. Full familiarization with this table is essential. These international frequencies were agreed upon by the attending countries at the 1968 International Telecommunication Union meeting in Geneva. These frequencies are in active use around the world. The U.S. channels are those channels authorized for use in the U.S. by the FCC.

3.2 CONTROLS AND MODE DISPLAY

Refer to Figure 3-1 for familiarization with the following controls and mode display.

3.2.1 LCD Mode Display (① of Figure 3-1)

1) INT (International): [INT] mode will appear on the LCD display when the International channel frequencies are programed. When [INT] display is extinguished, US channel frequencies are programed. This display can be turned on and off by the INT key.

2) WX (Weather): [WX] mode will appear on the LCD display when the channel being monitored is a weather frequency.

3) 1W: [1W] will appear on the LCD display when the radio is in the 1 watt output condition. When [1W] display is extinguished, the transmitter is operating at a full output power.

4) TX: [TX] mode will appear on the LCD dipslay when the microphone push-to-talk switch has been pressed and the transmitter circuits are providing a signal to the antenna.

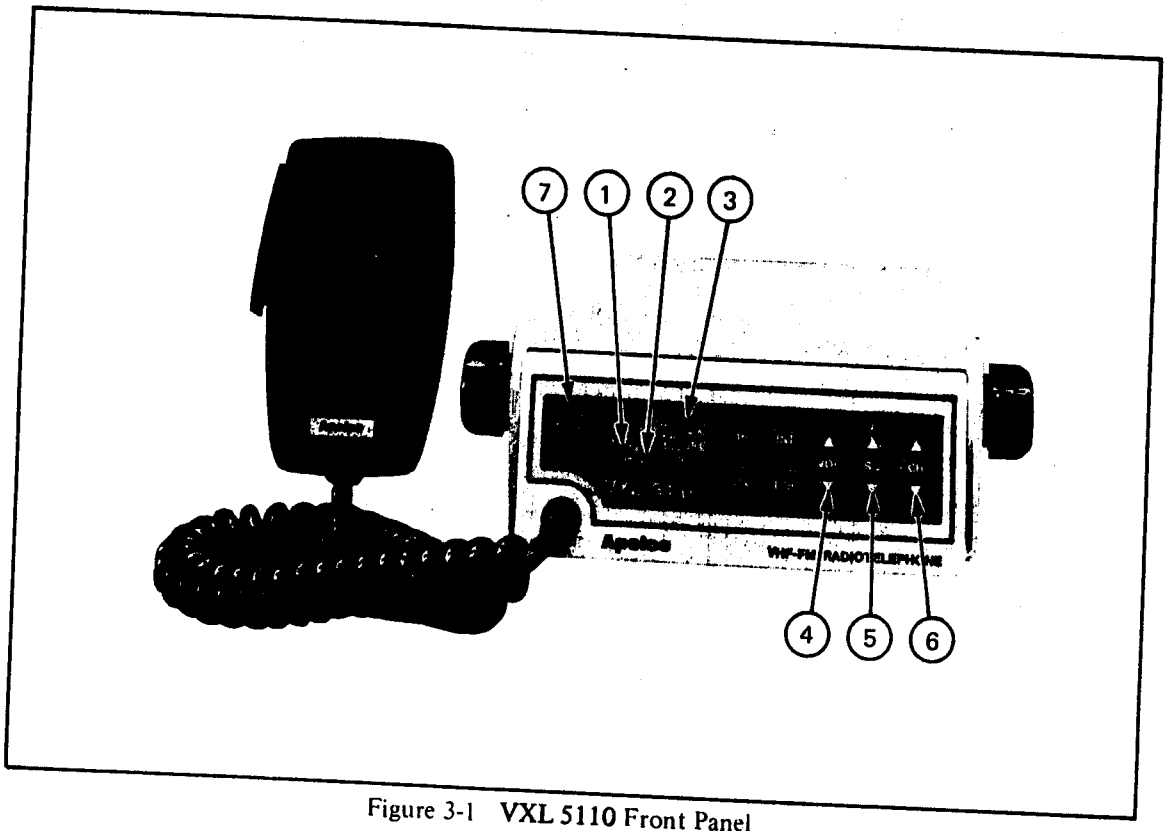


Figure 3-1 **VXL 5110** Front Panel

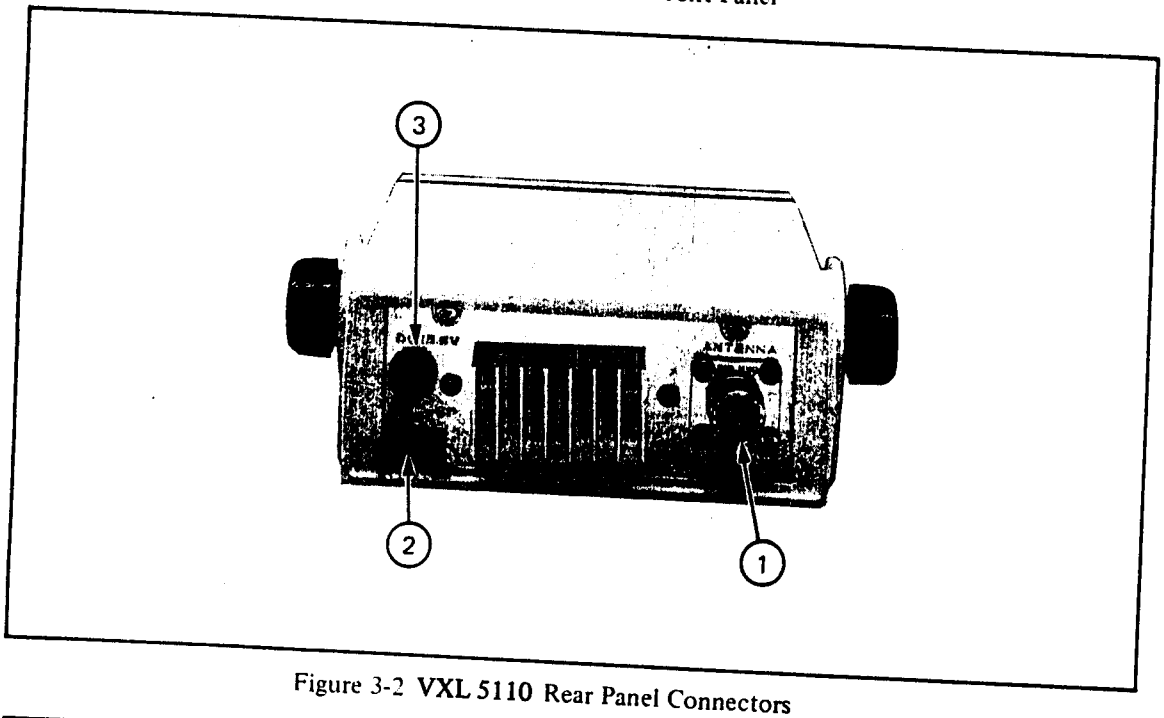


Figure 3-2 **VXL 5110** Rear Panel Connectors

5) SQ (Squelch): SQ will appear on the LCD display when the radio is in receive.

6) LCD Level Meter (② of Figure 3-1) is a two function meter.

   1) In RX, the bars indicates the squelch level setting.

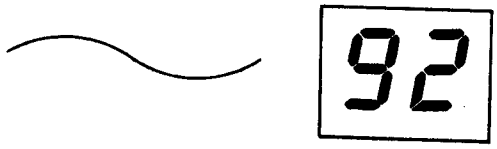
   2) In TX, the 8 bars indicate power of the transmitter output, showing 3 bars at 1 watt, and 8 bars at 25 watt power output.

7) Channel Display (③ of Figure 3-1): the selected Channel No will appear on the LCD display as shown below:

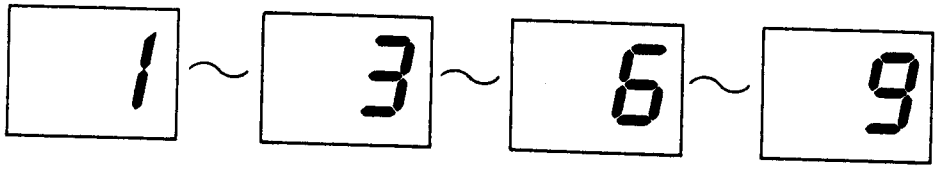
Channel 1 through 92 are displayed as follows:

Ch 01 – 09

Ch 10 – 92



Weather Channels W1 to W9 are displayed on the LCD display as follows:



3.2.2 Keyboard (Figure 3-1)

1) [CH] [▼] [▲] (channel select) Key ⑥ :
Depress either decrease [▼] or increase [▲] to select communication channels.

2) [16] Key:
Used to select Channel 16 immediately. When pressed again, the radio reverts to the channel previously used.

3) [WX] Key:
Pressing the WX key followed by depressing the CHANNEL SELECT key [▲] or [▼] causes the selection of the designed WX channel. The transmitter is locked out when receiving these channels.

4) [L/H] Key:
Select 1 watt or 25 watt power output to the antenna. When [1W] is displayed, approximately one watt of power is applied to the antenna. When [1W] is not displayed, full transmitter power is applied to the antenna. To increase output to 25 watt on the Auto one watt channel press [L/H] Key and hold.

5) [INT] Key:
When pressed, causes the synthesizer to program only international channel frequencies and [INT] is displayed on the LCD.

3.2.3 Controls (⑤ , ④ , ⑦ Figure 3-1)

1) SQUELCH Control (⑤):
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.

2) VOLUME Control (④):
Controls the volume of the audio output from the speaker.

3) POWER ON/OFF Switch (⑦):
Switches dc power on and off.

3.3 REAR PANEL CONNECTORS

See Figure 3-2 for the location of the unit rear panel connectors.

1) EXT-SP Connectors (② Figure 3-2)
Provides the connection for an optional, 8 ohm, remote speaker which can be placed remotely from the unit. Connecting an external speaker automatically disconnects the unit's internal speaker. This connection uses a miniature phono plug, P # G763056-1.

2) ANTENNA Connector (① Figure 3-2)
Provides the coaxial connection for the antenna cable with a PL-259, UHF type coaxial connector.

3.4 OPERATING PROCEDURES

Specific operating procedures for your VXL 5110 are presented below.

3.4.1 Transmit/Receive

After installation of your VXL 5110, you are ready to operate by following this procedure:

1. Depress POWER key to turn the radio on.

> **NOTE**
>
> When the POWER key is depressed, the synthesizer automatically programs for USA channel frequencies and selects the calling channel 16.

2. Select an idle channel (one without "traffic") by using the chnl decrease [▼] or increase [▲] keys.
3. Depress SQUELCH control key [▼] until noise is emitted by the speaker.
4. Adjust VOLUME control key [▼] or [▲] for a comfortable level.
5. Adjust SQUELCH control key [▲] until noise ceases.

6. Set transmitter power to either the 1W or 25W position depending on the distance the message is to be transmitted and transmitting conditions. In U.S. harbors and on certain channels the FCC requires power to be limited to one watt.

7. Select your "working" channel, refering to Table 3-1. To select the appropriate channel, press the [▼] or [▲] CHANNEL Select Keys.

> **NOTE**
>
> Initial communication contacts are usually made over channel 16 as all ships and shore stations monitor this channel.

8. To transmit, press the push-to-talk switch (PTT) on the microphone, release to receive. Speak across the face of the microphone using a clear normal voice. Do not shout and do not speak to rapidly or slowly.

9. Select the "calling" channel 16, press the 16 key. If 16 key is pressed again, radiotelephone will return to last channel entered before pressing 16 key, your "working" channel.

10. To receive weather information, refer to Table 3-1 for the appropriate channel. Press WX key and [▼] or [▲] CHANNEL Select Keys. Transmitter is locked out in this mode.

11. To transmit and receive on international frequencies on the selected channel, press INT key, observe INT mode appears on the LCD.

Table 3-1

VXL 5110
MARINE VHF RADIOTELEPHONE CHANNELS

CHANNEL DESIG.	DISPLAY	FREQUENCY SHIP RX	FREQUENCY SHIP TX	SIMPLEX DUPLEX	CHANNEL DESIG.	DISPLAY	FREQUENCY SHIP RX	FREQUENCY SHIP TX	SIMPLEX DUPLEX
01	01+	160.650	156.050	D	60	60	160.625	156.025	D
1A	01	156.050	156.050	S	61	61	160.675	156.075	D
02	02+	160.700	156.100	D	62	62	160.725	156.125	D
2A	02	156.100	156.100	S	63	63+	160.775	156.175	D
03	03+	160.750	156.150	D	63A	63	156.175	156.175	S
3A	03	156.150	156.150	S	64	64	160.825	156.225	D
04	04+	160.800	156.200	D	65	65+	160.875	156.275	D
4A	04	156.200	156.200	S	65A	65	156.275	156.275	S
05	05+	160.850	156.250	D	66	66+	160.925	156.325	D
5A	05	156.250	156.250	S	66A	66	156.325	156.325	S
06	06	156.300	156.300	S	67 *	67	156.375	156.375	S
07	07+	160.950	156.350	D	68	68	156.425	156.425	S
7A	07	156.350	156.350	S	69	69	156.475	156.475	S
08	08	156.400	156.400	S	70	70	156.525	156.525	S
09	09	156.450	156.450	S	71	71	156.575	156.575	S
					72	72	156.625	156.625	S
10	10	156.500	156.500	S	73	73	156.675	156.675	S
11	11	156.550	156.550	S	74	74	156.725	156.725	S
12	12	156.600	156.600	S	75	75	156.775	----	-
13	13 *	156.650	156.650	S	76	76	156.825	----	-
					77 *	77	156.875	156.875	S
14	14	156.700	156.700	S	78	78+	161.525	156.925	D
15	15	156.750	-----	–	78A	78	156.925	156.925	S
16	16	156.800	156.800	S	79	79+	161.575	156.975	D
17	17	156.850	156.850	S	79A	79	156.975	156.975	S
18	18+	161.500	156.900	D	80	80+	161.625	157.025	D
18A	18	156.900	156.900	S	80A	80	157.025	157.025	S
19	19+	161.550	156.950	D	81	81+	161.675	157.075	D
19A	19	156.950	156.950	S	81A	81	157.075	157.075	S
20	20+	161.600	157.000	D	82	82+	161.725	157.125	D
21	21+	161.650	157.050	D	82A	82	157.125	157.125	S
21A	21	157.050	157.050	S	83	83+	161.775	157.175	D
22	22+	161.700	157.100	D	83A	83	157.175	157.175	S
22A	22	157.100	157.100	S	84	84	161.825	157.225	D
					85	85	161.875	157.275	D
23	23+	161.750	157.150	D	86	86	161.925	157.325	D
23A	23	157.150	157.150	S	87	87	161.975	157.375	D
24	24	161.800	157.200	D	88	88+	162.025	157.425	D
25	25	161.850	157.250	D	88A	88	157.425	157.425	S
26	26	161.900	157.300	D	*60A	89	156.025	156.025	S
27	27	161.950	157.350	D	*61A	90	156.075	156.075	S
28	28	162.000	157.400	D	*62A	91	156.125	156.125	S
					*64A	92	156.225	156.225	S

+ These channels are available only in the international (INT) mode.

* These channels are Auto one watt channel.

* These channels are assigned by the Canadian Government. Ensure proper authorization prior to use.

S : SIMPLEX
D : DUPLEX
– : NO TX