

Operation

1. Controls

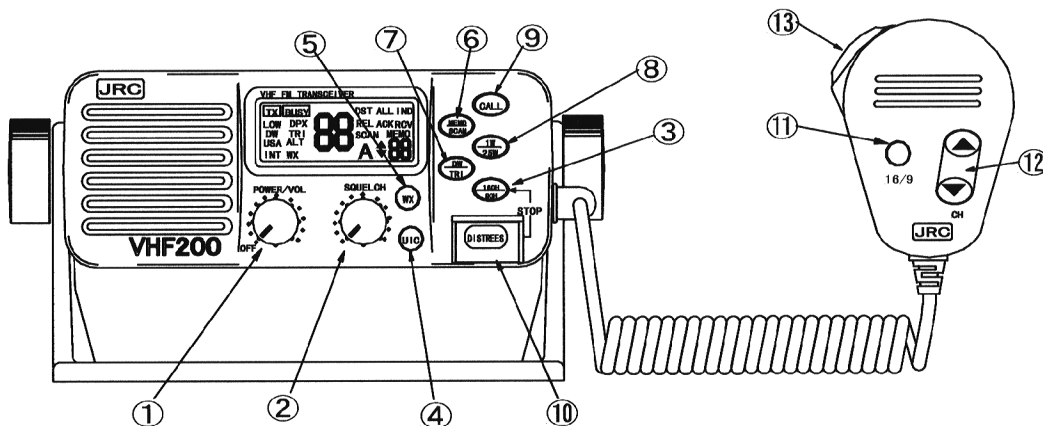


Figure 1: Controls

- ① **POWER/VOL Control:** Turns the radio on and off, and adjusts volume of the speaker.
- ② **SQUELCH Control:** Adjusts the squelch. Rotate the control counter-clockwise until noise is heard, then rotate it clockwise slowly until noise just fades out.
- ③ **16/9 Key:** Immediately recalls CH16 from any channel location. Pressing this key for more than 1 sec recalls CH09.
- ④ **U/I/C(USA, International, Canadian)Key :** Holding down this key for more than 1 sec changes the channel modes from USA, International to Canadian. "USA" or "INT" will appear on the LCD display for each mode, but no indicator will be displayed for Canadian channel mode.
- ⑤ **WX Key:** This key has double functions. When pressed once, it selects the weather channels receiving mode. "WX" will appear. While the radio is in this mode, the transmitter is always disabled.
When pressed for more than 2 sec, it switches the LCD backlight on and off.

- ⑥ **MEMO/SCAN** Key: Controls the memory function. All receiving channels except weather channels can be stored in this memory.

Channel Memory:

First select the channel to be memorized, then hold the **MEM/SCAN** key down until a beep sounds (approx. 2 seconds). “MEMO” and the channel number will appear on the LCD.

To store more channels, repeat the same procedure.

Memory Scan:

Memorized channels can be scanned by simply pressing this key. “MEMO” blinks and the memorized channels are scanned one by one in an upward direction. This operation is invalid if no channel is stored in the memory.

Memory Clear:

To cancel a memorized channel, select the channel to be cleared. Then hold the key down until a beep sounds (approx. 2 seconds). “MEMO” will disappear from the LCD.

* Usage of this key in the DSC mode is explained in the DSC section.

- ⑦ **DW/TRI** Key: There are two kinds of scan mode; Dual watch and Tri-watch. First pressing of this key selects Dual watch, and pressing again leads to Tri-watch..

- ⑧ **1W/25W** Key: Alternately changes the transmitter output power between 1 watt (“LOW” appears) and 25 watts (“LOW” disappears). USA channels 13,17,67 and 77 are automatically set to 1 watt, but channels 13 and 67 can be switched to 25 watts if **1/25** key is pressed while **PTT** switch is on.

- ⑨ **CALL** Key: Selects DSC operation. See the DSC section for details.

- ⑩ **DISTRESS** Key: Remove the cover, press the key once, then press for 3 seconds or more to send the distress call transmission using the DSC function. See the DSC section for details.

- ⑪ **16/9** Key: Works same as (3) **16/9** Key.

- ⑫ **UP/DWN▲▼**Key: Selects channels. Also selects functions in the DSC operation.

- ⑬ **PTT** Switch (Push-to-Talk): Hold this switch down to transmit, and release it to listen. “TX” appears during transmission.

2. Indications

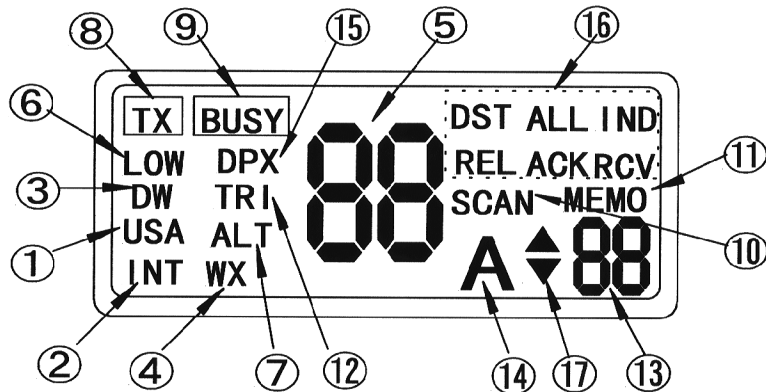


Figure 2: Indications

- ① **USA:** Appears when USA mode is selected with the **U/I/C** key.
- ② **INT:** Appears when International mode is selected with the **U/I/C** key.
- ③ **DW:** Appears when Dual watch mode is selected with the **DW** key.
- ④ **WX:** Appears when the Weather channel mode is selected with the **WX** key.
- ⑤ **LCD Segments:** Indicates the current channel number.
- ⑥ **LOW:** Appears when the low transmitter output power (1 watt) is selected with **1/25** key. It also appears when a low power channel has been selected with the **CHANNEL** key.
- ⑦ **ALT (Weather Alert):** Blinks when a weather alert signal has been received.
- ⑧ **TX (Transmit):** Appears when the **PTT** switch on the microphone is pressed and held.
- ⑨ **BUSY:** Appears while a signal is being received.
- ⑩ **SCAN :** Appears while the radio is scanning.
- ⑪ **MEMO:** Appears with the memorized channel number. If “SCAN” and “MEMO” appear together, the radio is in the Memory Scan mode.
- ⑫ **TRI:** Appears when Tri-watch mode is selected by the **SCAN** key.
- ⑬ **88:** In the normal receiving mode

CH16: being monitored while the radio is in the DW or TRI mode.

In the DSC mode

- "dS" Appears when **DISTRESS** key is pressed. once
- "rO" Appears when **CALL** key is pressed for more than 2 sec.
- "Un" Appears when "Unable to comply" is selected in the Individual Call Mode.
- "U0—U4" Shows the stored calling channels during "Unable to comply" mode is selected.
- "cA" Appears when Distress Cancellation Mode is selected.
- "GE" Appears when Geographical area call is received.
- "digit" (1) digit 1–9(ID number):Appears when ID number is registered.
(2) digit 0–19(Voice communication channel): Appears when the Individual Call mode is selected by **CALL** key.

⑭ **A**: Appears when the channel is simplex on the U.S.A. or Canadian channel assignments.

⑮ **DPX** : Appears when the channel duplex mode is selected.

⑯ Indications during DSC Operation:

- * **DST**: Appears when the Distress Call mode is selected with the **DISTRESS** key.
- * **ALL**: Appears when the All Ships Call mode is selected with the **CALL** key.
- * **IND**: Appears when the Individual Call mode is selected with the **CALL** key.
- * **REL**: Appears when the Distress Relay Call has been received.
- * **ACK**: Appears when the Acknowledgement of the distress call has been received.
- * **RCV**: Appears when the DSC call signal has been received.

⑰ **▲▼** : Appears when the **UP/DWN ▲▼** key is used in the DSC operation.

3. DSC (Digital Selective Calling) Operation

This device complies with RTCM SC101-STD.

3-1: Transmitting DSC (Digital Selective Calling) Calls

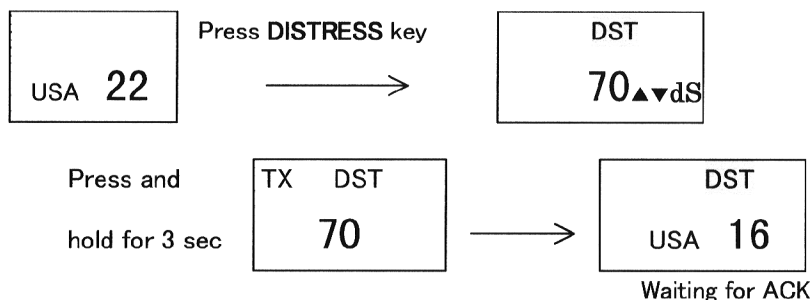
This radio is equipped with the DSC function necessary for maritime traffic.

* Distress Call

The Distress Call automatically sends the information including the vessel's DSC MMSID (Maritime Mobile Service ID) and Lat/Lon position.

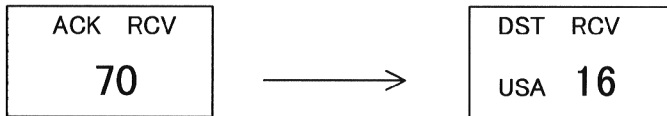
Note: It is necessary that the radio is connected to GPS or LORAN to send the vessel's position.

1. Remove the cover and press the **DISTRESS** key. CH70, ▲▼dS and "DST" will appear On the display.
2. Press the key again (for about 3 seconds) and "TX" will appear.
3. After the distress signal has been sent, an alarm is sounded, and the radio dual-watches between CH16 and CH70 until an ACK is received. ("DST" blinks)



Transmission is repeated at the interval of 3.5min to 4.5min until an ACK signal is received.
To quit this mode, press **16/9** key.

4. If an ACK signal is received, "ACK RCV" appears, the channel goes to CH16 automatically, and the Distress Alarm is sounded. To stop this Distress alarm, press any key.

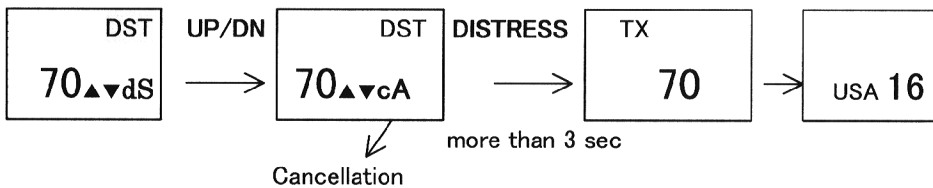


5. Distress Cancellation Mode:

To cancel the Distress call previously transmitted, press the **DISTRESS** key once

(Blinking "DST" and **▲▼dS** appear at CH70). **cA** is displayed by pressing the **UP/DOWN** key once.

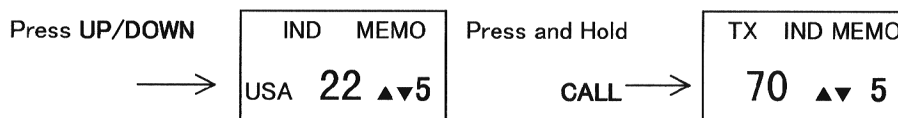
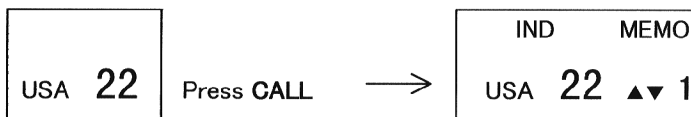
Then press the **DISTRESS** key for more than 3 sec and the Distress cancellation call is sent. This cancellation function is invalid after an ACK signal has been received, or when the equipment is switched off.



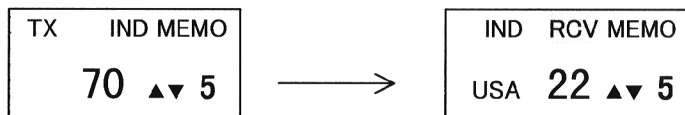
* Individual Call

This function is to send a DSC signal to a specific party only.

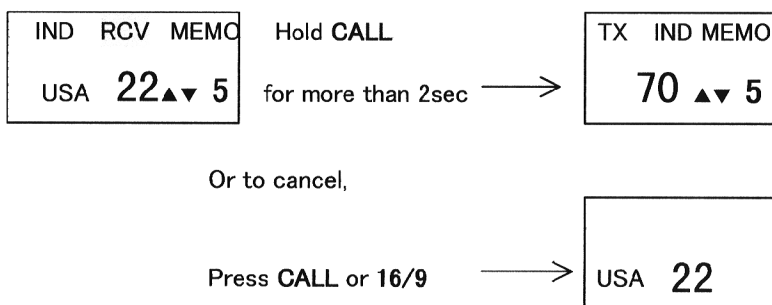
1. Select a channel for voice communication, and press the **CALL** key. A beep is heard, "IND" appears, and the registered calling channel is displayed. (max. 20 channels)
2. Select a calling channel you want to contact by pressing the **UP/DOWN** key.
3. Press the **CALL** key for more than 2 seconds to transmit the individual DSC call.



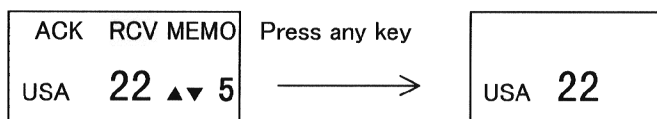
4. After the individual DSC call is transmitted, the transceiver waits 10 seconds for the acknowledgement. If no reply arrives after 10 seconds, the second call is transmitted automatically, and blinking "RCV" appears.



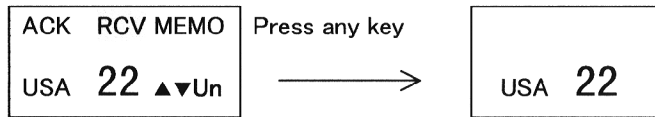
5. If the reply signal is not received after the second call, press the **CALL** key for more than two seconds to transmit again, or cancel this mode by pressing **CALL** key or **16/9** key.



6. When an ACK signal (able to comply) is received, "ACK RCV" appears with an alarm. Cancel the alarm by pressing any key. Then the radio turns to the normal receiving mode.



7. When an ACK (unable to comply) is received, “ACK RCV” appears with an alarm, and “Un” is displayed. The established channel is automatically selected.

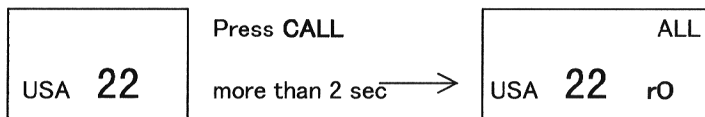


8.“ACK RCV” is displayed when an ACK signal is received and an alarm sounds for a few second.

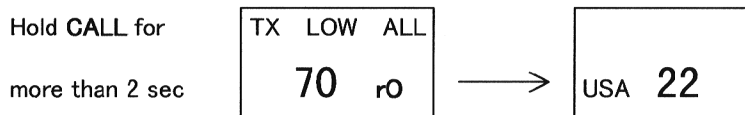
*** All Ships Call**

In the All Ships Call, it is not necessary to select the other vessel stations’ ID.

1.Select a channel for voice communication, then press the **CALL** key for more than 2 sec. “ALL” will appear on the LCD with rO, showing that the Routine Call is selected.



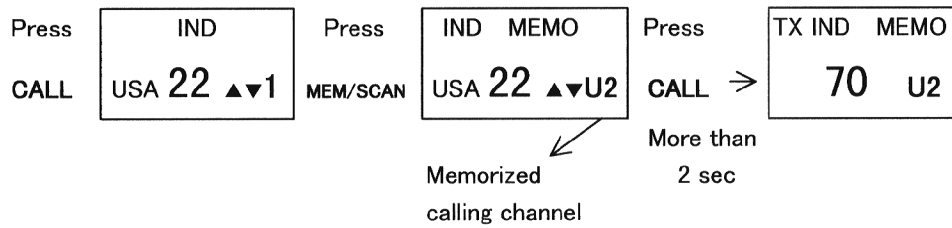
2.Press the **CALL** key again for more than 2 seconds. All Ships Call will be sent once. If CH70 is BUSY, transmission is invalid.



* “MEM” Individual Call

This function allows you to call again in your convenient time after you transmitted an “Unable to comply” ACK signal. Maximum 5 calling channels (U0 ~ U4) ※ can be stored.

※ “U” in this position means “ **Unable to comply**”.

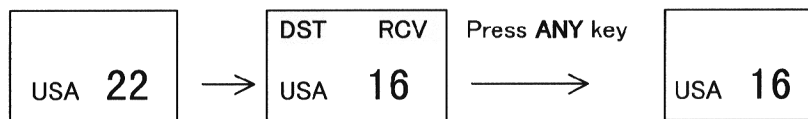


Note: The memorized calling channels change with each pressing of the **MEM/SCAN** key.

3-2: Receiving DSC Calls

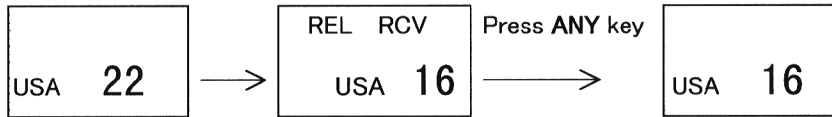
* Distress Call

When a Distress Call is received, an exclusive emergency alarm is sounded, and the channel is changed to CH16 automatically. Press any key to stop the alarm.



* Distress Relay Call

When a Distress Relay Call is received, an emergency alarm is sounded, and the channel turns to CH16 automatically. The emergency alarm is cancelled by pressing any key.

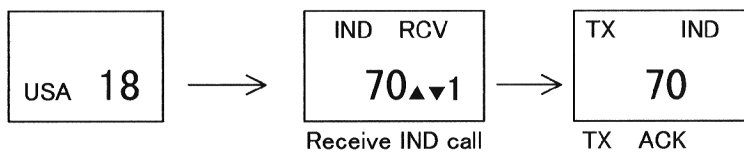


* Individual Call

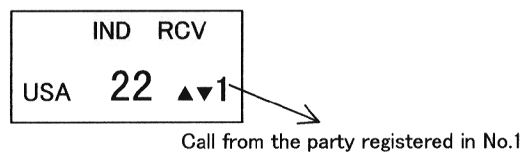
When an Individual Call is received, an ACK signal must be transmitted immediately. The ACK signal is either “able to comply” or “unable to comply”.

Able to comply

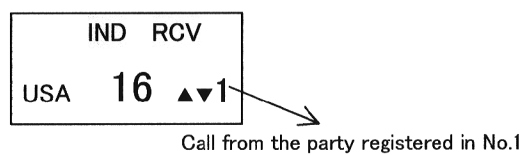
When an Individual call is received, an alarm is sounded, and the channel turns to the designated channel or CH16 (if there is no channel designated) automatically.



Designated channel

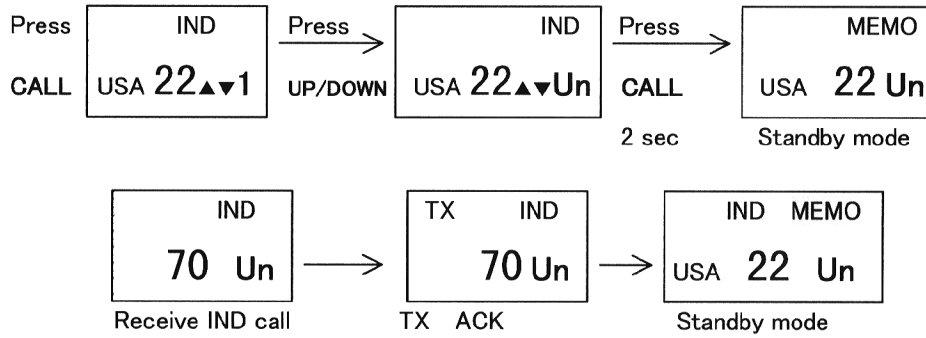


No designated channel



Unable to comply

Select Individual Call mode by pressing the **CALL** key. and select “Un” using the **UP/DOWN** key. Press the **CALL** key for more than 2 sec, and the transceiver is in Standby Receiving mode. If an IND Call is received in this mode, an “Unable to comply” ACK signal is transmitted.



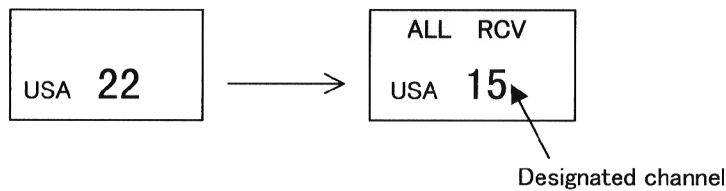
“MEMO” blinks on the LCD, showing that the ID number of the party you called has been registered. Maximum 5 ID numbers can be registered.

Standby receiving mode can be cancelled by pressing any key.

* All Ships Call

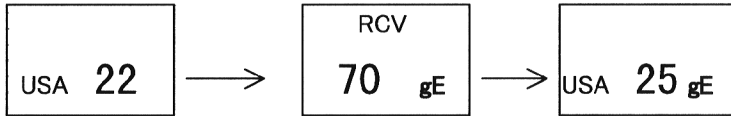
In the All Ships Call mode, the Routine Call mode is available.

When a Routine Call is received, an alarm sounds and the designated channel is selected. Press any key to stop the Emergency Alarm.



*** Geographical Area Call**

When a geographical area call is received, an Emergency Alarm sounds, and the channel turns to that designated by the other vessel automatically. Press any key to stop the Emergency Alarm.

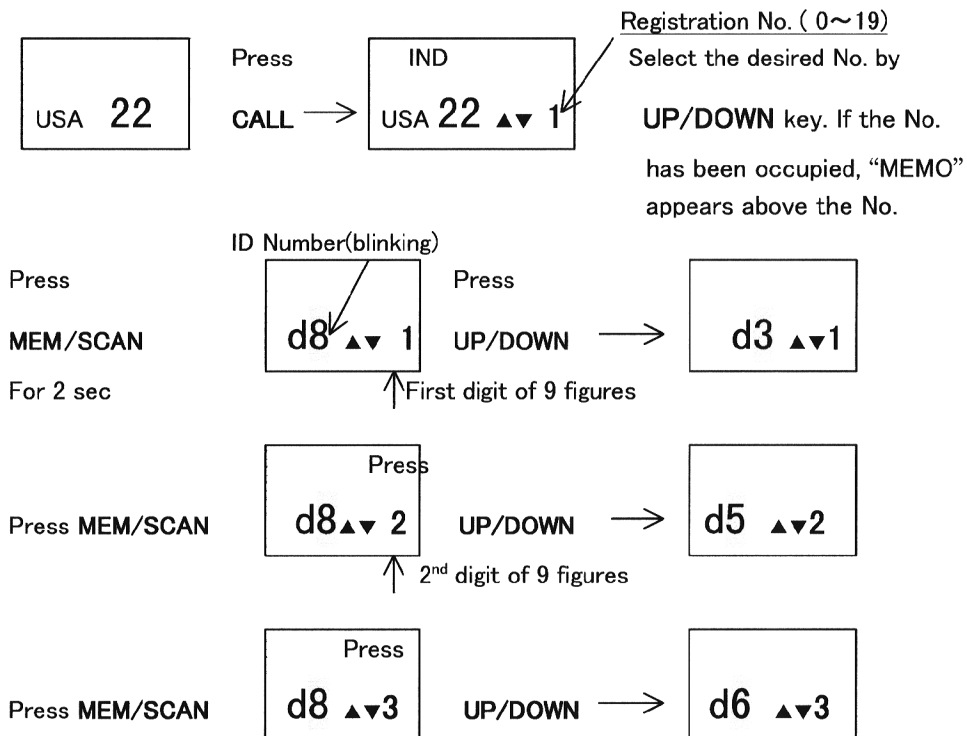


4. Registration of the Other Ship's ID Number

VHF marine radiotelephones are identified by MMSI (Marine Mobile Service Identity). which is composed of 9-figure digit numbers. To register the other ship's ID numbers (maximum 20), follow the procedure shown below.

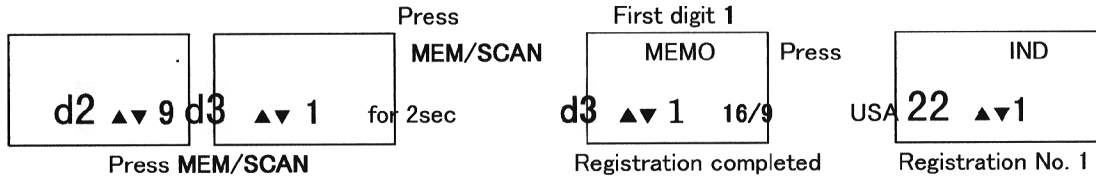
Example: Put [ID: 3 5 6 --- 2] to the Registration No. 1

Figure: ① ② ③ ---⑨



Repeat the same procedure till 9th digit of the 9 figures. Then press **MEM/SCAN** to return to the first digit, **d3 ▲▼1**. Press **MEM/SCAN** for 2sec.

“MEMO” appears on the LCD showing the registration is completed. Press **16/9** to return to the normal receiving mode.



d 8: If **UP/DOWN** key is pressed while 8 is blinking, the figure 8 is changed. If **MEM/SCAN** is pressed, the digit of the 9 figures ▲▼(1 ~ 9) is changed.

Note: * If the ID has been already registered, it is superscripted.

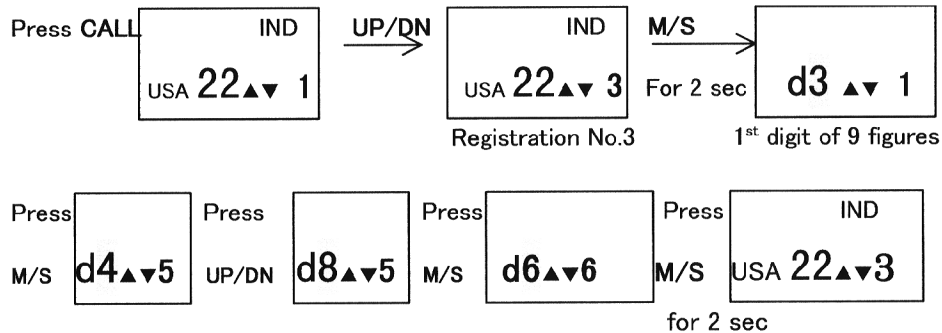
* Reconfirmation of the registered ID:

Select **IND** mode using **CALL** key. Then press **MEM/SCAN** key to select ID registration mode. Select ▲▼ number (1 ~ 9) in turn using **UP/DOWN** key, and reconfirm the ID numbers. (M/S = MEM/SCAN)



* Modification of the registered content:

Example: To correct the fifth figure of the ID from 4 to 8 (Registered in No.3) :



5. Registration of the Self ID Number

Turn the main power switch on while pressing the **CALL** key, and follow the same procedure as in the registration of the other ship's ID.

The trial of registration of the self ID is restricted to two times.

6. Specifications

General Characteristics

- 1. Radio Compliance : FCC Part 2, 15, 80, DOC V. DSC (SC101-STD)
- 2. Number of Channels : All USA, International, Canadian and 10 Weather channels are included.
- 3. Input Voltage : 13.8 VDC+/-15%
- 4. Input Current : TX Less than 5.0A Max at 25 Watts
Less than 1.5A Max at 1 Watt
: RX (squelch) less than 250mA Max
- 5. Modulation Type : Frequency modulated 16K0F3E (G3E), G2B for DSC
- 6. Operating Temperature : -20°C ~ +55°C

Transmitter Characteristics

- 1. Frequency Range : 156.025 to 157.425 MHz
- 2. Channel Spacing : 25KHz
- 3. RF Output Power : 25W / 1W, selectable into 50 ohms at 13.8VDC
- 4. Frequency Stability : +/-0.001% (-20°C ~ +55°C)
- 5. Frequency Deviation : +/-5KHz Max
- 6. Modulation AF Response : Within the limit of +1/-3 dB at 6dB/oct. frequency curve (300 ~ 3000Hz) reference (1000Hz)
- 7. Time-out-timer : 5 minutes +/-10%
- 8. Hum & Noise Level : Less than -40dB below audio
Less than 10% at 1KHz for +/-3KHz
- 9. Spurious & Harmonic Emission : Attenuated at least 43+10 Log Power (below rated radiated carrier power)

Receiver Characteristics

- 1. Frequency Range : 15.025 to 163.275MHz in 25KHz increment
- 2. AF Output : 3 Watts (Less than 10% at 1KHz)
- 3. AF Response : 6 dB/oct de-emphasis +1/-3dB from 300~3000Hz
- 4. Sensitivity : 0.3uV for 12 SINAD
- 5. Squelch Sens. Threshold : 0.15uV
- 6. Tight Squelch Sensitivity : 0.95uV
- 7. Adjacent Channel Selectivity : Better than 70dB
- 8. Spurious Image Rejection : Better than 70dB
- 9. Intermodulation : Better than 65dB
- 10. FM Hum and Noise : Less than -40dB

DSC

- 1,Mark : 1300Hz
- 2.Space : 2100Hz
- 3. Frequency Stability : +/-10Hz (-20°C ~ +50°C)
- 4.Baudrate : 1200 bit/sec
- 5.Modulation Index : 2+/-10%
- 6. DSC Format : RTCMSC101

Channel List: VHF Marine Channel Frequencies

USA Version

CH	TX	RX	Type of Operation
01A	156.050	156.050	Port operation &Com'l
05A	156.250	156.250	Port operation
06	156.300	156.300	Intership safety
07A	156.350	156.350	Com'l
08	156.400	156.400	Com'l
09	156.450	156.450	Boater calling
10	156.500	156.500	Com'l
11	156.550	156.550	Com'l
12	156.600	156.600	Port operation
13#	156.650	156.650	Intership safety
14	156.700	156.700	Port operation
15*	156.750		Environmental
16	156.800	156.800	Emerg/calling
17**	156.850	156.850	State controlled
18A	156.900	156.900	Com'l
19A	156.950	156.950	Com'l
20	157.700	161.600	Port operation
20A	157.000	157.000	Port operation
21A##	157.050	157.050	US Govern. only
22A	157.100	157.100	Coast Guard
23A##	157.150	157.150	US Govern. only
24	157.200	161.800	Public corresp.
25	157.250	161.850	Public corresp.
26	157.300	161.900	Public corresp.
27	157.350	161.950	Public corresp.
28	157.400	162.000	Public corresp.

CH	TX	RX	Type of Operation
63A	156.175	156.175	Port operation &Com'l
65A	156.275	156.275	Port operation
66A	156.325	156.325	Port operation
67#	156.375	156.375	Com'l
68	156.425	156.425	Non com'l
69	156.475	156.475	Non com'l
70	156.525	156.525	DSC
71	156.575	156.575	Non com'l
72	156.625	156.625	Non com'l
73	156.675	156.675	Port operation
74	156.725	156.725	Port operation
77**	156.875	156.875	Port operation
78A	156.925	156.925	Non com'l
79A	156.975	156.975	Com'l
80A	157.025	157.025	Com'l
81A##	157.075	157.075	US Govern. only
82A##	157.125	157.125	US Govern. only
83A##	157.175	157.175	US Govern. only
84	157.225	161.825	Public corresp.
85	157.275	161.875	Public corresp.
86	157.325	161.925	Public corresp.
87	157.375	161.975	Public corresp.
88	157.425	162.025	Public corresp.
88A	157.425	157.425	Com'l

* Transmitting is disabled.

** 1W only

1W initially. Can be switched to 25W.

Not for use by the general public in U.S. waters.

Canadian Version

CH	TX	RX	Type of Operation
01	156.050	160.650	Public corresp.
02	156.100	160.700	Public corresp.
03	156.150	160.750	Public corresp.
04A	156.200	156.200	Coast Guard Com'l
05A	156.250	156.250	Port operation
06	156.300	156.300	Intership, Safety
07A	156.350	156.350	Com'l, Intership
08	156.400	156.400	Com'l, Intership
09	156.450	156.450	Boater calling
10	156.500	156.500	Com'l, Intership
11	156.550	156.550	Com'l, Intership
12	156.600	156.600	Port operation
13	156.650	156.650	Intership safety
14	156.700	156.700	Port operation
15	156.750	156.750	Com'l, Non-com'l
16	156.800	156.800	Emerg/calling
17	156.850	156.850	State controlled
18A	156.900	156.900	Com'l
19A	156.950	156.950	Coast Guard
20	157.000	161.600	Coast Guard
21A	157.050	157.050	Coast Guard
22A	157.100	157.100	Coast Guard
23	157.150	161.750	Public corresp.
24	157.200	161.800	Public corresp.
25	157.250	161.850	Public corresp.
26	157.300	161.900	Public corresp.
27	157.350	161.950	Public corresp.
28	157.400	162.000	Public corresp.
60	156.025	160.625	Public corresp.
61A	156.075	156.075	Coast Guard Com'l
62A	156.125	156.125	Coast Guard
64A	156.225	156.225	Com'l

CH	TX	RX	Type of operation
65A	156.275	156.275	Port operation
66A	156.325	156.325	Port operation
67	156.375	156.375	Com'l
68	156.425	156.425	Non-com'l
69	156.475	156.475	Com'l
70	156.525	156.525	DSC
71	156.575	156.575	Non-com'l
72	156.625	156.625	Non-com'l
73	156.675	156.675	Com'l
74	156.725	156.725	Com'l
77	156.875	156.875	Port operation
78A	156.925	156.925	Non-com'l
79A	156.975	156.975	Com'l
80A	157.025	157.025	Com'l
81A	157.075	157.075	Environmental
82A	157.125	157.125	Coast Guard
83A	157.175	157.175	Coast Guard
84	157.225	161.825	Public corresp.
85	157.275	161.875	Public corresp.
86	157.325	161.925	Public corresp.
87	157.375	161.975	Public corresp.
88	157.425	162.025	Public corresp.

International Version

CH	TX	RX	Type of Operation
01	156.050	160.650	Public corresp.
02	156.100	160.700	Public corresp.
03	156.150	160.750	Public corresp.
04	156.200	160.800	Public corresp.
05	156.250	160.850	Public corresp.
06	156.300	156.300	Intership safety
07	156.350	160.950	Public correps.
08	156.400	156.400	Com'l
09	156.450	156.450	Boater calling
10	156.500	156.500	Com'l
11	156.550	156.550	Com'l
12	156.600	156.600	Port operation
13	156.650	156.650	Intership safety
14	156.700	156.700	Port operation
15	156.750	156.750	Com'l,Non-com'l
16	156.800	156.800	Emerg/calling
17	156.850	156.850	State controlled
18	156.900	161.500	Port operation
19	156.950	161.550	Port operation
20	157.000	161.600	Port operation
21	157.050	161.650	Port operation
22	157.100	161.700	Port operation
23	157.150	161.750	Public corresp.
24	157.200	161.800	Public corresp.
25	157.250	161.850	Public corresp.
26	157.300	161.900	Public corresp.
27	157.350	161.950	Public corresp.
28	157.400	162.000	Public corresp.
60	156.025	160.625	Public corresp.
61	156.075	160.675	Public corresp.
62	156.125	160.725	Public corresp.
63	156.175	160.775	Public corresp.
64	156.225	160.825	Public corresp.
65	156.275	160.875	Port operation
66	156.325	160.925	Public corresp.
67	156.375	156.375	Com'l

CH	TX	RX	Type of Operation
68	156.425	156.425	Non com'l
69	156.475	156.475	Port operation
70	156.525	156.525	DSC
71	156.575	156.575	Port operation
72	156.625	156.625	Non com'l
73	156.675	156.675	Port operations
74	156.725	156.725	Port operations
77	156.875	156.875	Port operations
78	156.925	161.525	Public corresp.
79	156.975	161.575	Port operation
80	157.025	161.625	Port operation
81	157.075	161.675	Port operation
82	157.125	161.725	Public corresp.
83	157.175	161.775	Public corresp.
84	157.225	161.825	Public corresp.
85	157.275	161.875	Public corresp.
86	157.325	161.925	Public corresp.
87	157.375	161.975	Public corresp.
88	157.425	162.025	Public corresp.

VHF Marine Weather Channels (USA Version)

CH	Receive Frq.	Service
WX0	163.275	NOAA weather
WX1	162.550	NOAA weather
WX2	162.400	NOAA weather
WX3	162.475	NOAA weather
WX4	162.425	NOAA weather
WX5	162.450	NOAA weather
WX6	162.500	NOAA weather
WX7	162.525	NOAA weather
WX8	161.650	Canadian weather
WX9	161.775	Canadian weather

Transmitting is disabled when WX0~WX9 is displayed.