ICOM

INSTRUCTION MANUAL

VHF P25 REPEATER
IC-FR9010

UHF P25 REPEATER
IC-FR9020

Icom Inc.

FORWARD

Thank you for purchasing this Icom repeater. The IC-FR9010/FR9020 VHF/UHF P25 REPEATERS are designed and built with Icom's state of the art technology and craftsmanship. With proper care, this product should provide you with years of trouble-free operation.

We want to take a couple of moments of your time to thank you for making the The IC-FR9010/FR9020 your repeater of choice, and hope you agree with Icom's philosophy of "technology first." Many hours of research and development went into the design of your IC-FR9010/FR9020.

This manual covers up to firmware version 71MDV024 and DSPV326.

IMPORTANT

READ THIS INSTRUCTION MANUAL carefully and completely before attempting to operate the repeater.

SAVE THIS INSTRUCTION MANUAL—This instruction manual contains important safety and operating instructions for the IC-FR9010/FR9020 VHF/UHF repeaters.

EXPLICIT DEFINITIONS

WORD	DEFINITION
⚠WARNING!	Personal injury, fire hazard or electric shock may occur.
CAUTION	Equipment damage may occur.
NOTE	If disregarded, inconvenience only. No risk of personal injury, fire or electric shock.

PRECAUTIONS

⚠ **WARNING HIGH VOLTAGE! NEVER** attach an antenna or internal antenna connector during transmission. This may result in an electrical shock or burn.

⚠ **WARNING HIGH VOLTAGE! NEVER** install the antenna at any place that person touch the antenna easily during transmission. This may result in an electrical shock or burn.

⚠ **WARNING! NEVER** apply AC to the DC power receptacle on the repeater rear panel. This could cause a fire or damage the repeater.

⚠ **WARNING! NEVER** apply more than 16 V DC, such as a 24 V battery, to the DC power receptacle on the repeater rear panel. This could cause a fire or damage the repeater.

⚠ **WARNING! NEVER** let metal, wire or other objects touch any internal part or connectors on the rear panel of the repeater. This may result in an electric shock.

⚠ **WARNING!** The antenna (s) used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 6 meters from all persons during normal operation. The peak conducted output power at each antenna terminal must not exceed 250 Watts and the peak radiated output power must not exceed 1000 Watts EIPR. Users and installers must ensure that FCC requirements for satisfying RF exposure compliance are met. (See FCC Rules Part 1, Sections 1307 and 1310)

CAUTION: NEVER expose the repeater to rain, snow or any liquids.

DO NOT use or place the repeater in areas with temperatures below −30°C (−22°F) or above +60°C (+140°F). Be aware that temperatures can exceed 70°C (+158°F), resulting in permanent damage to the repeater if left there for extended periods.

DO NOT place the repeater in excessively dusty environments or in direct sunlight.

DO NOT put anything on top of the repeater. This will obstruct heat dissipation. Place the repeater in a secure place to avoid inadvertent use by children.

BE CAREFUL! The heatsink will become hot when operating the repeater continuously for long periods.

BE CAREFUL! If a linear amplifier is connected, set the repeater's RF output power to less than the linear amplifier's maximum input level, otherwise, the linear amplifier will be damaged.

Use Icom microphones only. Other manufacturer's microphones have different pin assignments, and connection to the repeater may damage the repeater.

Approved Icom optional equipment is designed for optimal performance when used with an Icom repeater.
Icom is not responsible for the destruction or damage to an Icom repeater in the event the Icom repeater is used with equipment that is not manufactured or approved by Icom.

For U.S.A. only
CAUTION: Changes or modifications to this repeater, not expressly approved by Icom Inc., could void your authority to operate this repeater under FCC regulations.

NOTICE: The AMBE + 2 ™ voice coding Technology embodied in this product is protected by intellectual property rights including patent rights, copyrights and trade secrets of Digital Voice Systems, Inc. This voice coding Technology is licensed solely for use within this Communications Equipment. The user of this Technologies explicitly prohibited from attempting to extract, remove, decompile, reverse engineer or disassemble the Object Code, or in any other way convert the Object Code into a human readable form. U.S. Patent Nos. #8,595,002, #8,359,197, #8,315,860, #8,200,497, #7,970,606, #6,912,495 B2.

FCC INFORMATION

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

SAFETY TRAINING INFORMATION

⚠ WARNING **Your Icom radio generates RF electromagnetic energy during transmit mode. This radio is designed for and classified as "Occupational Use Only", meaning it must be used only during the course of employment by individuals aware of the hazards, and the ways to minimize such hazards. This radio is NOT intended for use by the "General Population" in an uncontrolled environment.**
This radio has been tested and complies with the FCC and IC RF exposure limits for "Occupational Use Only". In addition, your Icom radio complies with the following Standards and Guidelines with regard to RF energy and electromagnetic energy levels and evaluation of such levels for exposure to humans:

• FCC OET Bulletin 65 Edition 97-01 Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
• American National Standards Institute (C95.1-1992), IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
• American National Standards Institute (C95.3-1992), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields– RF and Microwave.

⚠ CAUTION **To ensure that your expose to RF electromagnetic energy is within the FCC and IC allowable limits for occupational use, always adhere to the following guidelines:**

• **DO NOT** operate the radio without a proper antenna attached, as this may damaged the radio and may also cause you to exceed FCC and IC RF exposure limits. A proper antenna is the antenna supplied with this radio by the manufacturer or antenna specifically authorized by the manufacturer for use with this radio.
• **DO NOT** transmit for more than 50% of total radio use time ("50% duty cycle"). Transmitting more than 50% of the time can cause FCC and IC RF expo-sure compliance requirements to be exceeded.

Electromagnetic Interference/Compatibility
During transmissions, your Icom radio generates RF energy that can possibly cause interference with other devices or systems. To avoid such interference, turn off the radio in areas where signs are posted to do so. **DO NOT** operate the transmitter in areas that are sensitive to electromagnetic radiation such as hospitals, aircraft, and blasting sites.

Occupational/Controlled Use
The radio transmitter is used in situations in which persons are exposed as consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.

Votre radio Icom produit une énergie électromagnétique de radiofréquences (RF), en mode de transmission. Cette radio est conçue pour un «usage professionnel seulement» et classée comme tel, ce qui signifie qu'elle doit être utilisée uniquement dans le cadre d'un travail par des personnes conscientes des dangers et des mesures visant à minimiser ces dangers. Elle N'EST PAS conçue pour une«utilisation grand public», dans un environnement non contrôlé.

Cet appareil a été évalué et jugé conforme, aux limites d'exposition aux RF de la FCC et d'IC, pour une «utilisation grand public». En outre, votre radio Icom satisfait les normes et directives qui suivent en matière de niveaux d'énergie et d'énergie électromagnétique de RF et d'évaluation de tels niveaux en ce qui concerne l'exposition humaine:

• Supplément C, édition 97-01, du Bulletin OET n° 65 de la FCC,«Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields».
• Norme de l'American National Standards Institute(ANSI): IEEE C95.1-1992 sur les niveaux de sécurité compatibles avec l'exposition humaine aux champs électromagnétiques de radio fréquences (3 kHz à 300 GHz).
• Norme de l'ANSI: IEEE C95.3-1992 sur la méthode d'évaluation recommandée du champ magnétique potentiellement dangereux des radiofréquences et des micro-ondes.

Afin de vous assurer que votre exposition à une énergie électromagnétiquede RF se situe dans les limites permises par la FCC et d'IC pour une utilisation grand public, veuillez en tout temps respecter les directivessuivantes:

• **NE PAS** faire fonctionner la radio sans qu'une antenne appropriée y soit fixée, car ceci risque d'endommager la radio et causer une exposition supérieure aux limites établies par la FCC et d'IC. L'antenne appropriée est celle qui est fournie avec cette radio par le fabricant ou une antenne spécialement autorisée par le fabricant pour être utilisée avec cette radio.
• **NE PAS** émettre pendant plus de50% du temps total d'utilisation de l'appareil («50% du facteur d'utilisation»). La notion «50% du facteur d'utilisation» s'applique également au mode VOX/PTT. Émettre pendant plus de 50% du temps total d'utilisation peut causer une exposition aux RF supérieure aux limites établies par la FCC et d'IC. Lorsque le voyant DEL rouge s'allume, cette radio est en train d'émettre. La radio émettra si vous appuyez sur le bouton du microphone.

Interférence électromagnétique et compatibilité
En mode de transmission, votre radio Icom produit de l'énergie de RF qui peut provoquer des interférences avec d'autres appareils ou systèmes. Pour éviter de telles interférences, mettez la radio hors tension dans les secteurs où une signalisation l'exige. **NE PAS** faire fonctionner l'émetteur dans des secteurs sensibles au rayonnement électromagnétique tels que les hôpitaux, les aéronefs et les sites de dynamitage.
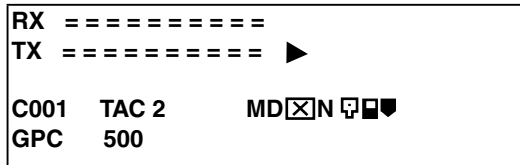
Usage professionnel/contrôlé
Ce radio émetteur est utilisé dans des cas où des personnes sont exposées en raison de leur travail, pourvu qu'elles soient conscientes du risque d'exposition et qu'elles puissent exercer un contrôle sur cette exposition.

TABLE OF CONTENTS

1 LCD DISPLAY

LCD display consists of 4 x 20 characters as shown.

```
RX = = = = = = = = = =
TX = = = = = = = = = = ▶

C001   TAC 2      MD☒N ⌸❑▼
GPC    500
```

Line 1: The incoming RSSI with 10 steps
Line 2: The output power levels with 10 steps
Line 3: The left 4 letters show channel numbers.
    The middle 8 letters shows the channel name.
    (If not programmed, it will be blank.)
    The right 4 letters displays the status of the radio as described below.
    a. RX mode:
        M = Mix, both analog and digital can be received
        D = Only digital can be received
    b. TX mode:
        D = PTT digital transmission
        A = PTT analog transmission
    c. Monitor mode:
        ☒ = Monitor off
        S = Selective squelch
    d. P25 squelch:
        N = Normal squelch
        S = Selective squelch
    e. Low Voltage Icon:
        ❑ = Low Voltage state (Icon flashes with ALM LED)
    f. Key lock mode:
        ⌸ = Key lock (Not displayed if in Low Voltage alarm)
    g. Shift mode:
        ▼ = SHIFT KEY ICON (reverts to normal within 2 seconds)
Line 4: The left 2 letters show GPC (GROUP CALL), AC (ALL CALL), IC (INDIVIDUAL CALL). The right 18 letters displays the GROUP NAME, INDIVIDUAL NUMBERS, and so on.

2 LED DISPLAY

The IC-FR9010/FR9020 has 5 LED's from left to right.
  DIGI = The LED is ON when receiving a digital signal
  REP = The LED is ON when in repeat mode
    (The IC-FR9010/FR9020 can be programmed for SIMPLEX - SEMIDUPLEX - DUPLEX - REPEATER on a per channel basis.)
  ALM = The LED flashes when an error on either TX or RX occurs
  TX = The LED is ON when in Transmit
  BUSY = The LED is ON when receiving a signal

3 KEY CONTROLS

3.1 Key entry without [SHIFT] key

[0]–[9] = Channel numbers and individual call address (target address)
[A] = P25 calls (Group Call, All Call, and Individual Call)
[B] = The beginning and the end of individual call number
[C] = TX Transmit mode (Clear or Secure), only models with encryption
[D] = P25 mode (analog or digital TX)
[✱] = Cancel channel number, individual number
[#] = Ending channel number, individual number
[CH] = Channel number entry, depress CH, then 0–9 for channels
[F] (Scan) = P25 Conventional Control Messages (SBC)
[MON] = monitor ON or OFF
Rotary knob = Volume, Squelch, Back Light Dimmer and Timer

3.2 Key entry following [SHIFT] key

[0] = P25 test mode start and finish
[1] = Backlight ON/OFF
[2] = TX power HIGH/LOW
[3] = Talkaround ON/OFF
[4] = Change
[5] = No function
[6] = No function
[7] = Indicates Analog channel data
[8] = Key lock ON/OFF
[9] = No function
[A] = Manual CWID send key
[B] = Programmed CWID Start/Stop key
[C] = Cryptogram Test
[D] = No function
[✱] = Indicating P25 data (while depressed)
[#] = DTMF Entry
[CH] = Toggle Bar-Graph or TX RX Frequencies
[F] (Scan) = SBC (Conventional Control Messages) Log/Emergency Call
[MON] = P25 squelch normal or selective and analog MONITOR modes

4 CONTROL KNOB

4.1 VOLUME

Rotate the knob to change the volume level.
The volume level varies from 0 to 34. If the local speaker is active, the audible beep level will change as the knob is rotated.
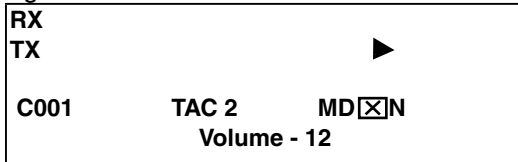Figure 1 shows the Volume at level 12.

```
RX
TX                    ▶

C001        TAC 2        MD☒N
              Volume - 12
```
Figure 1

4.2 SQUELCH CONTROL

Push the rotary knob once to select the squelch level and then turn the knob to vary the level from 0 to 15. 0 is open squelch.
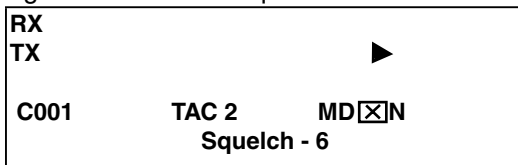Figure 2 shows the Squelch at level 6.

```
RX
TX                    ▶

C001        TAC 2        MD☒N
              Squelch - 6
```
Figure 2

4.3 LCD BACKLIGHT DIMMER

Push the rotary knob twice to select the dimmer level and then turn the knob to select a level from 0 to 15. 0 is the darkest.
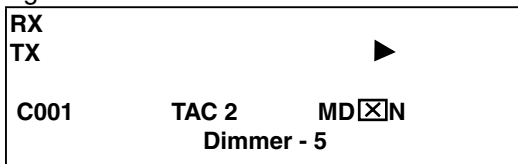Figure 3 shows the Dimmer at level 5.

```
RX
TX                    ▶

C001        TAC 2        MD☒N
              Dimmer - 5
```
Figure 3

4.4 LCD BACKLIGHT TIMER

Push the rotary knob three times to adjust the Backlight Timer. The time varies from 0 to 30 seconds. This function is inactive when the backlight has been turned ON with [SHIFT] + [1] (backlight ON/OFF).
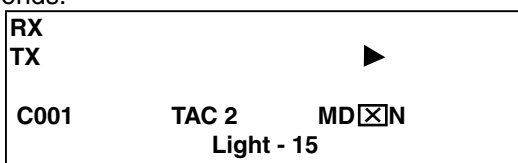Figure 4 shows the Backlight Timer set for 15 seconds.

```
RX
TX                    ▶

C001        TAC 2        MD☒N
              Light - 15
```
Figure 4

5 CHANNEL SELECTION

The IC-FR9010/FR9020 has capability of up to 500 channels.
Push [CH], and then enter the channel number.
Example-1 CH-8; Push [CH] + [0] + [0] + [8] or [CH] + [8] + [#]
Example-2 CH-500; Push [CH] + [5] + [0] + [0]

6 P25 CALLING SELECTION (Digital Base Mode Only)

Push and release [A] repeatedly to scroll through the menu. Radio displays GPC 00001 = Group 1 Call, GPC every group = All Call, IDC--------- = Individual Call.
Figure 5 shows Talk Group Identification (TGID), Group 1 Call.
Figure 6 shows an All Call (everygroup), to everygroup on the same NAC.
Figure 7 shows an Individual Call, to and individual unit ID on the same NAC.
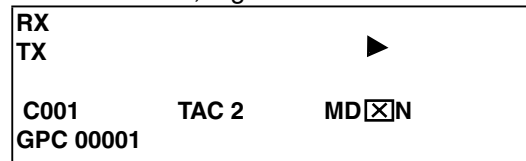(Refer to Section 10, Figure 11 and 12 for ID entry.)

```
RX
TX                       ▶

 C001        TAC 2        MD☒N
GPC 00001
```
Figure 5

```
RX
TX                       ▶

 C001        TAC 2        MD☒N
GPC everygroup
```
Figure 6

```
RX
TX                       ▶

 C001        TAC 2        MD☒N
IDC--------------
```
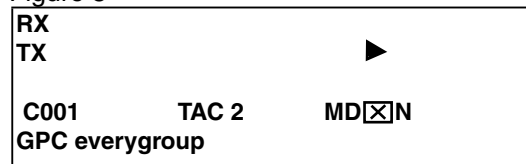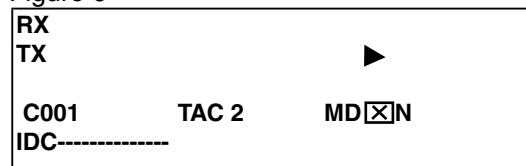Figure 7

6.1 INDIVIDUAL CALL ENTRY (Digital Base Mode Only)

Push and release [A] repeatedly until "IDC-----" is displayed.
Push [B], and enter the numerical Unit ID.
To deleted a digit, push the star [✳] key. Push [B] or [#] to complete entry.
Figure 8 shows entry start, when [B] is pushed.
Figure 9 shows completed entry, [1] + [2] + [3] + [4] + [5] + [B].
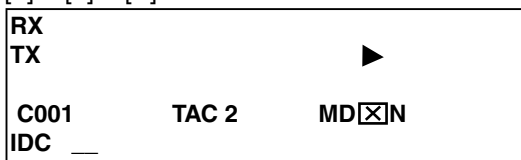
```
RX
TX                          ▶

  C001        TAC 2       MD☒N
IDC __
```
Figure 8

```
RX
TX                          ▶

  C001        TAC 2       MD☒N
IDC 12345
```
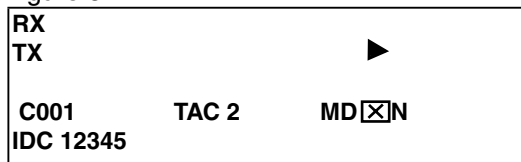Figure 9

7 P25 PTT MODE

Push [D] to select PTT (Push-To-Talk) mode.
When the display shows PTT is Analog, the radio transmits in analog mode.
When the display shows PTT is Digital, the radio transmits in digital mode.
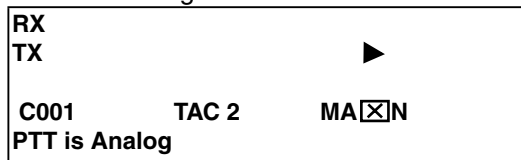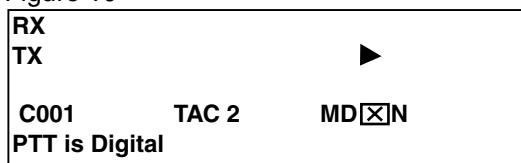Figure 10 shows Analog.
Figure 11 shows Digital.

```
RX
TX                          ▶

  C001        TAC 2       MA☒N
PTT is Analog
```
Figure 10

```
RX
TX                          ▶

  C001        TAC 2       MD☒N
PTT is Digital
```
Figure 11

8 P25 CONVENTIONAL CONTROL SIGNALLING (SBC) (DIGITAL BASE MODE ONLY)

NOTE: SBC functions are selectable in the Programming Software. The IC-FR9010/FR9020 has been developed to work with any P25 radio under the TIA specifications. However not all subscriber radios have the capability of these functions.

8.1 EMERGENCY MODE TX/RX

Push and hold the [F] key to send an Emergency Call.
Reboot the radio to clear the Emergency Alert.

NOTE: The radio will transmit on the programmed EMERGENCY channel not necessarily the channel that appears on the display.

EMERGENCY MODE RX
To clear a received Emergency call, push and release [F] twice.
Push [F] to enter the SBC mode.

Key functions after entering menu selection;
Push [A] for the next and [B] for the previous menu item.
[C] stops transmission. (The radio transmits the SBC 4 times until acknowledged.)
[D] moves the cursor between items within the selection.
[✳] deletes the last digit.
[#] transmits the selected SBC mode.

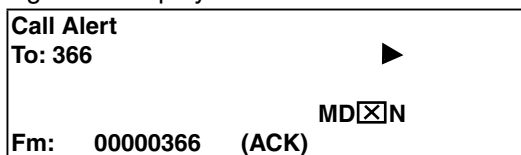**NOTE:** When the radio is in SBC mode, it can receive Group calls, All Call and Individual calls but no source address (caller unit ID) is displayed. Emergency calls can be received when in SBC mode but the radio gives priority to Radio Inhibit. Both Emergency and Radio Inhibit are ignored when in SBC transmitting mode.

The radio will revert to normal operation if no key is pushed for 10 seconds.

8.2 CALL ALERT

To send a Call Alert, push [F] then push [A] or [B] until the selection is displayed, then enter the target ID of the radio to alert and push [#]. If the target radio has received the Call Alert the display should show "ACK" (acknowledgement).
Figure 12 displays a Call Alert ACK.

```
Call Alert
To: 366                    ▶


                      MD☒N
Fm:    00000366    (ACK)
```
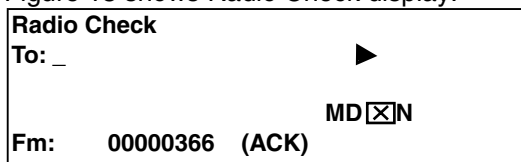Figure 12

8.3 RADIO CHECK

The dispatcher can send a message to a subscriber unit requesting a response from the radio. (For example, to check if it is in operation.)

To initiate a Radio Check, push [F] then push [A] or [B] until the selection is displayed, then enter the target ID of the radio to alert and push [#]. If the target radio has received the Call Alert the display should show "ACK" (acknowledgement).
Figure 13 shows Radio Check display.

```
Radio Check
To: _                      ▶


                      MD☒N
Fm:    00000366    (ACK)
```
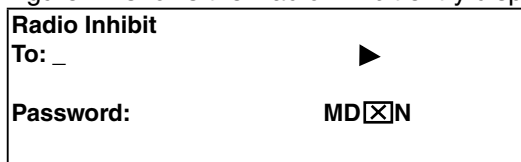Figure 13

8.4 RADIO INHIBIT

This function is used to disable a subscriber unit (mobile or portable). The subscriber unit cannot be turned ON at all until an Uninhibit Command is sent. The password must match the password entered in the BTIII program for inhibit to occur.

To inhibit a radio, push [F] then push [A] or [B] until the selection is displayed then enter the target radio's ID. Push [D] and enter the programmed password, then push [#]. The target radio will be totally disabled. If the target radio has received the Call Alert the display should show "ACK" (acknowledgement).
Figure 14 shows the Radio Inhibit entry display.

```
Radio Inhibit
To: _                      ▶


Password:           MD☒N
```
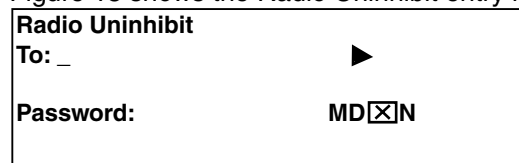Figure 14

8.5 RADIO UNINHIBIT

Used to enable a subscriber unit that has been disabled, the password must match the password entered in the BTIII program.

To uninhibit a radio, push [F] then push [A] or [B] until the selection is displayed and enter the target radio's ID, enter the password and then push [#]. The target radio will be returned to normal operation. The target radio should send an ACK if successful.
Figure 15 shows the Radio Uninhibit entry mode.

```
Radio Uninhibit
To: _                      ▶


Password:           MD☒N
```
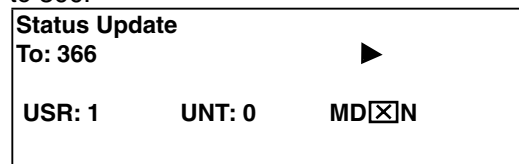Figure 15

8.6 STATUS UPDATE

Used to send user status. The status numbers relates to an actual message list. Indicates the User status (0–255) and Unit status (0–255).
To send a Status Update, push [F] then push [A] or [B] until the selection is displayed and enter the target radio ID. Then push [D] and enter the user (USR), message number, push [D] again and enter the unit number, then push [#]. If the target radio has received the Call Alert the display should show "ACK" (acknowledgement).
Figure 16 shows Status Update ready to be sent to 366.

```
Status Update
To: 366                    ▶


USR: 1        UNT: 0     MD☒N
```
Figure 16
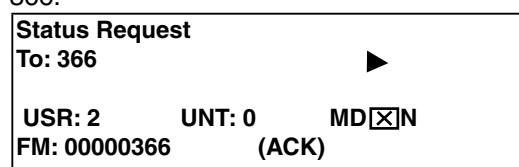
8.7 STATUS REQUEST

Used to request the status of another unit. After the request is sent the target unit should respond with the current status. In the example below USR: 2 means the number 2 status message.

To send a Status Request, push [F] then push [A] or [B] until the selection is displayed and enter the target radio ID then push [#]. The target unit should respond with the message number, unit ID and ACK.
Figure 17 shows Status Request received from 366.

```
Status Request
To: 366                    ▶


USR: 2        UNT: 0     MD☒N
FM: 00000366        (ACK)
```
Figure 17

8.8 PREDEFINED MESSAGES

Used to send a predefined system message.

To send a Predefined Message, push [F] then push [A] or [B] until the selection is displayed, then enter the target radio ID, push [D] and enter a message number and push [#]. The target radio should send and ACK if successful.
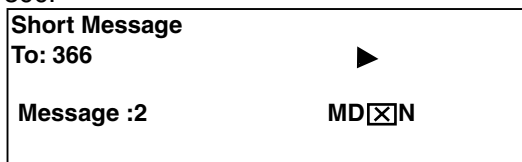
Figure 18 shows Message 2 ready to be sent to 366.

```
Short Message
To: 366              ▶

Message :2           MD☒N
```
Figure 18

8.9 RADIO MONITOR

Used to key up a target radio from 10 to 60 seconds and monitor the transmit audio.

To monitor a radio, push [F] then push [A] or [B] until the selection is displayed, then enter the target radio ID, push [D] and enter 1 (10 seconds), 2 (30 seconds), or 3 (60 seconds).

Figure 19 shows Radio Monitor request to 366 to transmit for 30 seconds.
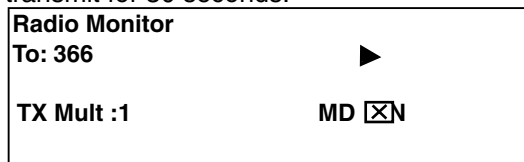
```
Radio Monitor
To: 366              ▶

TX Mult :1           MD ☒N
```
Figure 19

8.10 SBC LOG

To toggle the SBC Log ON, push [SHIFT] + [F], to turn the log OFF, push [F]. When the SBC Log is entered, the last SBC call is displayed. Push [B] to scroll to the previous records and push [A] to scroll to the end of the list. The radio will store up to 99 log entries. When more than 99 entries are made the oldest log will be deleted.

NOTE: When the radio is reset or reprogrammed, all logs are deleted.

Figure 20 shows the fifth entry of the SBC Log.

```
            <SBC Log>
       5: To: 00000366 F
          Radio Monitor
            TX Mult: 3
```
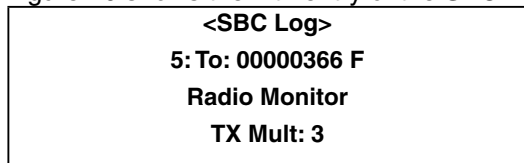Figure 20

9 P25 SQUELCH ADJUSTMENT

Push [SHIFT] + [MON] to choose the P25 squelch mode.

Normal SQL = If NAC is the same, the receiver will unmute

Selective SQL = If NAC and GROUP is the same, the receiver will unmute

Figure 21 shows Normal SQ.
Figure 22 shows Selective SQ.

```
RX
TX                   ▶

 C001      TAC 2     MD☒N
Normal SQL
```
Figure 21

```
RX
TX                   ▶

 C001      TAC 2     MD☒S
Selective SQL
```
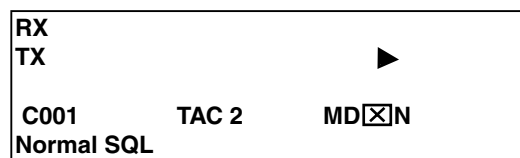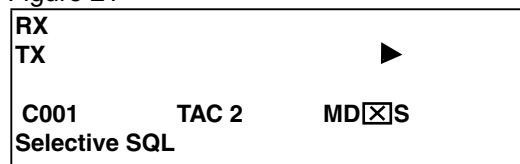Figure 22

10 TALKGROUP ALIAS ID

When GPC is selected with the [A] key, the TGID alias is indicated as programmed (Maximum 8 characters).
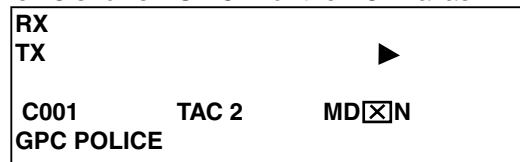Figure 23 shows POLICE for the TGID alias.

```
RX
TX                   ▶

 C001      TAC 2     MD☒N
GPC POLICE
```
Figure 23

11 KEY-LOCK

Push [SHIFT] + [8] to enable and disable the key-lock. This symbol ⌷ shows on the LCD. Key-lock and Key-Unlock icon is displayed for 2 seconds and then reverts to show the TGID. The [PTT], [MON] and [SHIFT] key are not locked. If [PTT], [MON] and [SHIFT] needs to be locked, select DISABLE in the programming software. If the station is to be remotely controlled it is recommended to leave [PTT] enabled, remote [PTT] will not work when [PTT] is locked. To release key lock, push [SHIFT] + [8] again.
Figure 24 shows Key locked.
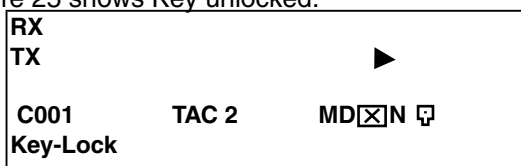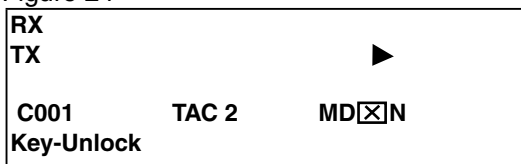Figure 25 shows Key unlocked.

```
RX
TX                      ▶


 C001        TAC 2      MD☒N ⌷
Key-Lock
```
Figure 24

```
RX
TX                      ▶


 C001        TAC 2      MD☒N
Key-Unlock
```
Figure 25

12 MANUAL CWID START AND STOP

Push [SHIFT] + [A] to manually send the programmed CWID.

CAUTION: The transmitter will energize immediately when [A] is pushed.

To turn off CWID, push [SHIFT] + hold [B] for 2 seconds. (This disables both programmed and manual CWID.)
To return to normal operation, either reboot the radio or push [SHIFT] + hold [B] for 2 seconds. (CWID must be enabled in programming to use these functions.)
Figure 26 shows CWID Sending.
Figure 27 shows CWID function stop.
Figure 28 shows CWID function start.

```
CWID sending
Code: ICOM              ▶


 C001        TAC 2      MD☒N

```
Figure 26

```
RX
TX                      ▶


 C001        TAC 2      MD☒N
CWID function stop
```
Figure 27
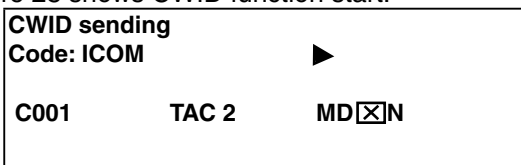
```
RX
TX                      ▶


 C001        TAC 2      MD☒N
CWID function start
```
Figure 28
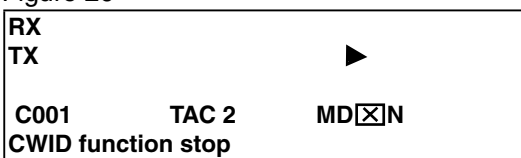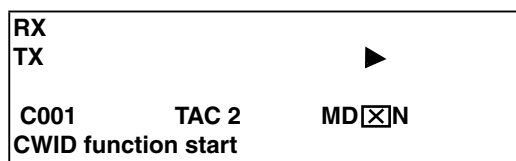
13 DTMF ENCODE

Push [SHIFT] + [#] and then enter 0-9, [✱] or [#] to transmit DTMF. The DTMF modulation level will be the same as the CWID level.
Figure 29 displays DTMF Encode mode.

```
DTMF Encode
 123456                 ▶

                        MD☒N

```
Figure 29

14 ANALOG CHANNEL DATA

Push [SHIFT] + [7] to scroll through the data. [7] must be depressed to scroll.
1) RX width (narrow/wide/4 kHz)
2) TX width (narrow/wide/4 kHz)
3) Base mode (Simplex/Semi-duplex/Duplex/Repeater)
4) RX CTCSS/DCS, CTCSS and DCS are used in RX
5) TX CTCSS/DCS, CTCSS and DCS are used in TX
6) TX RX Modulation type either PM or FM (PM is the default)
(Depending on the pre-setting, this information cannot be displayed. Ask your dealer for details.)
Figure 30 displays indicates a narrow channel during scroll.

```
RX
TX                      ▶

 C001        TAC 2      MD☒N
RX Narrow Channel
```
Figure 30

15 P25 CHANNEL DATA

Push [SHIFT] + [✱] to scroll through the data, [✱] must be depressed to scroll.

1. Unit ID (source address)
2. RX NAC
3. TX-NAC
4. TGID
5. Emergency Alarm RCV
6. Call Alert RCV
7. Radio Check RCV
8. Radio Inhibit RCV
9. Radio Uninhibit RCV
10. Status Update RCV
11. Status Request RCV
12. Short Message RCV
13. Radio Monitor RCV
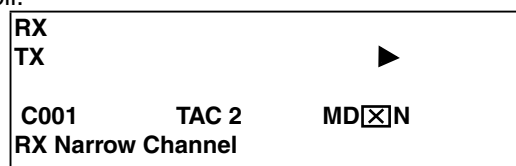
These functions may be enabled and disabled in the programming software's "MISCELLANEOUS/INFOR-MATION DISPLAY" section.
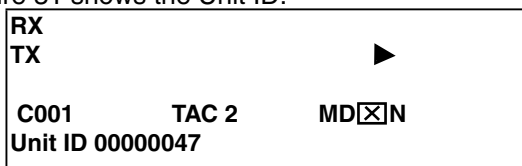
Figure 31 shows the Unit ID.

```
RX
TX                        ▶

 C001        TAC 2       MD☒N
Unit ID 00000047
```
Figure 31

16 BAR GRAPH/CHANNEL DIS-PLAY

Push [SHIFT] + [CH] to eliminate the channel name/ bar graph and display the frequencies for TX and RX. Push [SHIFT] + [CH] to toggle back.

Figure 32 displays the frequencies instead of channel name.

The 1st and 2nd character on line 1 indicates Receive Channel.

The 3rd character indicates Wide band.

The 4th character indicates Simplex mode.

The modes of operation are: "S" = Simplex, "H" = Semi duplex; "D" = Duplex and "R" = Repeat Line 2, "TXN" indicates TX is Narrow band.
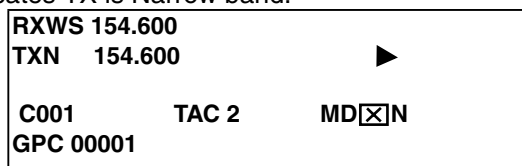
```
RXWS 154.600
TXN   154.600            ▶

 C001        TAC 2       MD☒N
GPC 00001
```
Figure 32

17 LCD BACKLIGHT TOGGLE

By Default, the Backlight illuminates for 5 seconds after pushed any key then goes out. Push [SHIFT] + [1] for the backlight to stay ON. Push [SHIFT] + [1] again to return to default operation.

Figure 33 Indicates the Backlight is ON.

See section 4 for backlight timer settings.
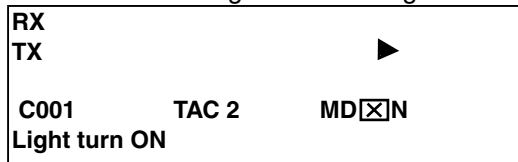
```
RX
TX                        ▶

 C001        TAC 2       MD☒N
Light turn ON
```
Figure 33

18 CHANGING TX POWER

Push [SHIFT] + [2] to select High or Low TX power. When high power is selected, the icon "▶" appears. If the radio is programmed for high power, the radio can be changed to low power with this function. If the radio is programmed for low power, it can be switched to high power with this function.

Figure 34 displays the high power symbol.
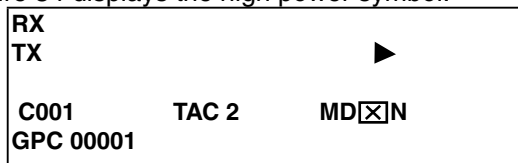
```
RX
TX                        ▶

 C001        TAC 2       MD☒N
GPC 00001
```
Figure 34

19 CALLER ID

In Simplex mode the IC-FR9010/FR9020 display indicates the source Unit ID or Individual ID.

Figure 35 displays the Source ID as 00000366 in group call mode.

Figure 36 displays the Source ID in Individual call mode.

```
RX
TX                        ▶

 C001        TAC 2       MD☒N
 CAL  00000366  (GPC)
```
Figure 35

```
RX
TX                        ▶

 C001        TAC 2       MD☒N
CAL  00000366  (IDC)
```
Figure 36

20 EMERGENCY CALL RECEPTION

The 4th line of the LCD shows the Emergency Alarm when an emergency call is received. The LCD back light flashes and the audible tone heard from the speaker can be increased or decreased with the volume control.

Figure 37 below displays the Emergency Caller's ID 00000366.

```
┌─────────────────────────────────┐
│ RX                              │
│ TX                    ▶         │
│                                 │
│  Emergency Alm        MD⊠N      │
│ Fm: 00000366                    │
└─────────────────────────────────┘
```
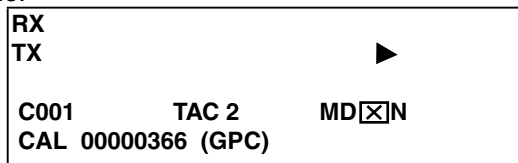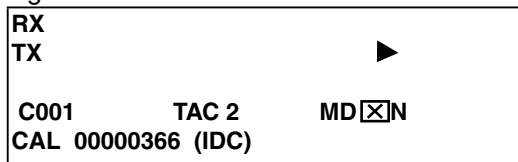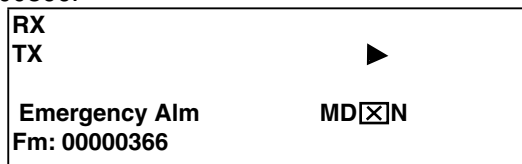Figure 37

21 REPEAT MODE

21.1 ANALOG

If the received CTCSS/DCS matches the programmed CTCSS/DCS, the radio transmits the programmed carrier frequency and CTCSS/DCS.

21.2 DIGITAL

Matching NAC (Network Access Code);

If the programmed NAC matches the received NAC it allows the radio to repeat. The programmed NAC and TGID (Talk Group Identification) is transmitted.

$F7F in RX NAC

If the RX NAC is $F7F, all incoming signals are repeated with the same NAC and TGID as received.

$F7F in RX NAC w/Through OFF;

If the RX NAC is $F7F, receives all incoming signals and transmits the programmed NAC and TGID.

21.3 MIXED

In Mixed mode, the radio receives both Analog and Digital signals automatically. Individual channel programming can be combined as described in 21.1 and 21.2 above. If the radio receives analog, it transmits analog, if it receives digital, it transmits digital.

22 BASE MODE

22.1 ANALOG

If the received CTCSS/DCS matches the programmed CTCSS/DCS, the radio's receiver will open. The [MON] key may be pushed to bypass any tone signaling.

22.2 DIGITAL

Matching NAC (Network Access Code);

If the programmed NAC/TGID matches the received NAC/TGID, the receiver will open. Push SHIFT] + [MON] to switch between selective SQL and normal SQL mode.

$F7E in RX NAC

If the NAC is set for $F7E, the radio should receive any incoming NAC.

22.3 MIXED

In Mixed mode, the radio receives both Analog and Digital signal automatically. Channel programming can be combined as described in 22.1 and 22.2 above on an individual channel.

23 REMOTE CONTROL

IC-FR9010/FR9020 can be controlled remotely by pulling pin 24 of the EXT OPTION 25 pin D-sub connector to a low level. Local operation is restored when pin 24 goes high. In the remote mode only channels 1–16 can be controlled. Also when in remote mode Front Panel MON and Channel Selection is disabled. Refer to the chart on page 11 for Channel control pinouts and other related information.

Figure 38 below shows CH–1 in remote control mode. The 3rd line shows E001 instead of C001. (EXXX means remote, CXXX is Local Mode.)

```
┌─────────────────────────────────┐
│ RX                              │
│ TX                    ▶         │
│                                 │
│  E001        TAC 2    MD⊠N      │
│ GPC 00001                       │
└─────────────────────────────────┘
```
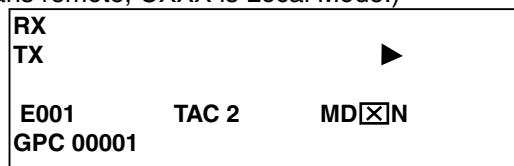Figure 38

24 DISPLAYING THE FIRMWARE VERSIONS

Both the radio and DSP firmware versions are indicated on the LCD after the radio switches ON for 2 seconds, unless a "Starting Message" has been programmed.

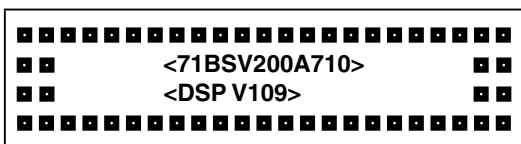Figure 39 displays Radio and DSP Firmware versions.

```
■■■■■■■■■■■■■■■■■■■■■■■■■
■■          <71BSV200A710>          ■■
■■          <DSP V109>              ■■
■■■■■■■■■■■■■■■■■■■■■■■■■
```
Figure 39

Figure 40 shows the programmable starting message "Your Message Here".

Your Message Here

Figure 40

25 DISPLAYING THE SERIAL NUMBER

Push and Hold [D], turn ON the radio, the serial number is indicated (Maximum 8 digits). When the [D] key is released, the radio will reboot in the normal mode.

Figure 41 shows KY0000329 serial number.

Serial KY000329

Figure 41

26 DISPLAYING THE PROGRAMMING SOFTWARE VERSION

Push and Hold [A], and turn ON the radio, the programming software version is indicated. When the [A] key is released, the radio will reboot in the normal mode.

Figure 42 shows V-0.2.3195 version.

Set by p-kgprg 023195

Figure 42

27 DATA CHECK

The IC-FR9010/FR9020 has a self diagnostic function. All data in the EEROM is checked every time the radio is switched ON. If the data is not properly stored, the radio automatically turns to programming mode.

Figure 43 shows ERROM Data error.

EEROM Data Error

Figure 43

28 ERROR MESSAGES

If there is a problem with the RX PLL, TX PLL or PA, then the ALM LED flashes ON and indicates which section has the issue. Figure 46 displays a RX PLL error, note this may be displayed in REM mode if the remote channel lines are open or a channel is selected remotely that is not programmed. (EXXX will be displayed instead of CXXX, where XXX is the channel number.)

Figure 44 displays a RX PLL error.
Figure 45 displays a TX PLL error.
Figure 46 displays a PA error.

```
RX
TX                          ▶

 C001              MD⊠N
RX PLL Error
```
Figure 44

```
RX
TX                          ▶

 C001              MD⊠N
TX PLL Error
```
Figure 45

```
RX
TX                          ▶

 C001              MD⊠N
PA Error
```
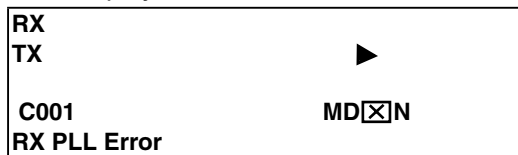Figure 46

29 FIRMWARE ERROR DETECTION

When the radio itself detects a malfunction, the main CPU will restart automatically.

30 RS-232 ERROR DETECTION

If the communications between PC and the repeater have trouble, the following messages are shown on the LCD.
- Overrun error
- Framing error
- Parity error
- Unknown command
- Data unmatched
- Send error
- Answer timeout
- Receive timeout

31 DSP ERROR DETECTION

When there is a problem with the DSP, the following message may be shown on the display. Please check that the DSP board is installed correctly, and the correct firmware version is displayed at startup.
Figure 47 shows DSP failure.
Figure 48 shows DSP not ready.
Figure 49 shows DSP serial error.

RX	
TX	▶
C001	MD⊠N
DSP Failure	

Figure 47

RX	
TX	▶
C001	MD⊠N
DSP Not Ready	

Figure 48

RX	
TX	▶
C001	MD⊠N
DSP Serial Error	

Figure 49

32 OPTION PORT PINOUT

25 pin D-sub connector for remote control is provided on the rear panel of IC-FR9010/FR9020. The functions of each pin are as follows:

Pin No.	Name	Description	I/O	Levels	Comments
1	CH 0	LSB external binary channel selection	I	0 to +3.3 V DC	0000 is channel 1
2	CH 1	External binary channel selection	I	0 to +3.3 V DC	
3	CH 2	External binary channel selection	I	0 to +3.3 V DC	
4	CH 3	External binary channel selection	I	0 to +3.3 V DC	1111 is channel 16
5	Unassigned				
6	REM MON	Remote Monitor	I	0 to +3.3 V DC	+3.3 V = Monitor On
7	GND	Ground			
8	Unassigned				
9	REM D/A	Remote Digital Analog select		0 V – 3.3 V	+3.3 V = Analog 0 V = Digital
10	DEM OUT	Discriminator audio out	O	≈330 mVrms 1 kHz @ ±3 kHz	C4FM on DIGITAL MODE
11	BUSY	Channel busy indication	O	0 to +3.3 V DC	+3.3 V = busy
12	RSSI	Receive signal strength indicator	O	0 to +2.5 V DC analog	
13	MOD1	External audio modulation input	I	≈50 mVrms 1 kHz for ±3 kHz	
14	GND	Ground			
15	PTT	Push to talk	I	0 to +3.3 V DC	0 V = transmit
16	MOD 2	External modulation input	I	≈400 mVrms 1 kHz for ±3 kHz	After limiter and filtering/LOW FREQ i.e. External CTCSS/DCS IN
17	SIMP	Simplex mode selected	O	0 to +3.3 V DC	0 V = simplex
18	ERR	Alarm indication	O	0 to +3.3 V DC	Duty Cycle Determines which alarm
19	DECODE	Decode valid indication	O	0 to +3.3 V DC	5 V = valid signaling
20	RX AUD 1	Buffered receive audio	O	≈700 mVrms 1 kHz @ ±3 kHz	1 & 2 Can produce 0 dBm into 600 Ω input
21	RX AUD 2	Buffered receive audio	O	≈700 mVrms 1 kHz @ ±3 kHz	1 & 2 Can produce 0 dBm into 600 Ω input
22	TX OUT		O		
23	EXT PW/SW	External power switch	I	0 Open source	0 V = ON
24	Remote	External channel selection mode	I	0 to +3.3 V DC	0 V = external
25	+12 V		O	12 V DC	800 mA Max out

NOTE: Pins 1–4, 6 and 9 are only available when pin 24 (Remote Mode) is at 0 V. See page 8 for more information on display indications.

MEMO

Count on us!