FURUNO

OPERATOR'S MANUAL

NBDP TERMINAL

MODEL DP-6

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⚠ SAFETY INSTRUCTIONS

"**WARNING**" and "**CAUTION**" notices appear throughout this manual. It is the responsibility of the operator of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.

The level of risk appearing in the notices is defined as follows:

⚠ WARNING	This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or property damage.

⚠ WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Turn off the power immediately if water leaks into the equipment or the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire or electrical shock.

⚠ CAUTION

Use the proper fuse.

Use of a wrong fuse can result in fire or permanent equipment damage.

Do not use the equipment for other than its intended purpose.

Personal injury can result if the equipment is used as a chair or stepping stool, for example.

Do not place objects on the top of the equipment.

The equipment can overheat or personal injury can result if the object falls.

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FOREWORD

FURUNO Electric Company thanks you for selecting and purchasing the FURUNO DP-6 NBDP (Narrow Band Direct Printing) Terminal. We are confident you will discover why the FURUNO name has become synonymous with quality and reliability. To get maximum performance from your unit, please carefully read and follow the recommended procedures for operation and maintenance.

The DP-6 is an advanced, microprocessor controlled NBDP Terminal designed to protect teleprinting communications from radio signal mutilation due to interference in the radio signal path. It provides dependable, fully automatic error-free telex communication with other ships, as well as with any telex subscriber, in full compliance with all GMDSS requirements for automatic radiotelex operation.

The microprocessor used in the DP-6 enables fully automatic operation of your radio station, including automatic frequency scanning, unattended reception and transmission of messages, automatic adjustment of transmitter frequency, and more. Operation is simplified by the use of menus: Simply move the cursor to items on the screen that you want to select.

The DP-6 provides a complete line of word processing facilities in its Text Editor, where you may create, edit and store multiple messages for later transmission.

Features

- Simple operation by use of pop-up menus
- LCD displays information in easy-on-your-eyes white on black
- Automatic frequency control and message handling permit unattended operation
- Real time printing of incoming messages
- Storage capacity for 100 user channels
- Remote control of a transceiver by commands entered via the keyboard
- Inputs for IEC61162-1 2nd edition(NMEA0183 version 3.0) data, to display ship's L/L position, water temperature, and more on the LCD
- Fully automatic radiotelex by use of macro operation
- Conforms to the following standards and regulations:

  IMO Resolution A.806 (19), A.694 (17)

  IEC 61097-11/9, 60945 (3rd edition), 61162-1 (2nd edition)

  ITU-R M.625-3, M.490, M491-1

  ITU-T F.130

  ETS 300 067

Program number

TERMINAL UNIT	0550189020 (Version 1.22)
MAIN UNIT	0550187017 (Version 1.17)
MODEM	0550196017 (Version 1.18)

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1. RADIOTELEX COMMUNICATION

1.1 General

Telex subscribers can attest to radiotelex as a reliable and efficient method for sending and receiving teleprinter connections. Telex subscribers, especially those who often use HF-band radio circuits, will also attest that the telex connection is subject to interference from a variety of sources, including atmospherics, fading and noise disturbance. This interference plays havoc with radio signals, resulting in the receiving of information different from the intended information. Thus a means must be provided to prevent mutilation of radio signals by interference on HF-band radio.

Radiotelex communication today owes its reliability and efficiency to error detection and correction. The ITU-R defined both a constant-ratio code for automatic error detection and requirements for the error correction in Recommendation M.625-3.

1.2 Code Description

The DP-6 employs a 7-element synchronous code providing 2^7 = 128 combinations. Among these 128 combinations, there are 35 constant-ratio combinations having a ratio of 3 (Y) mark bits to 4 (B) space bits. Thus ratio is used to test the validity of each received character.

Of the 35 combinations, 32 are used for the required alphanumeric teleprinter signals. The remaining three 7-element codes are used exclusively for operational purposes. These are:

Idle Signal α (ARQ Mode), Phasing Signal 1 (FEC Mode)
Idle Signal β
RQ Signal (ARQ mode), Phasing Signal 2 (FEC Mode)

Transmission rate is 100 bauds. If the 4B/3Y ratio is disturbed due to interference, the output of the receiver is blocked to restrict the mutilated character from passing on to the teleprinter.

Frequency Shift

The frequency shift is 85 Hz with a center frequency of 1700 Hz, as specified in ITU-R Recommendation M.625-3.

Space Tone Frequency 1700+85 = 1785 Hz
Mark Tone Frequency 1700-85 = 1615 Hz

1.3 ARQ Mode (A-Mode)

Description

The ARQ (Automatic Re-transmission request, or Automatic Request for repetition) Mode allows private communications between any two stations using semi-duplex communication. Reception confirmation is done to assure that each character is received correctly. Since the two stations (automatically) exchange identities, this affords some degree of protection for confidential messages.

Traffic Exchange Sequence

In the ARQ mode two stations communicate directly with one another. One station sends information and receives controls signals, while the other station receives information and sends confirming control signals. The first station is the ISS (Information Sending Station), and the second is the IRS (Information Receiving Station). These functions are interchangeable by a special control signal.

The station which initiates the call is the *Master Station (MS)*. The MS initiates the call by sending the selective identity code of the called station, consisting of an RQ signal and two traffic information signals, listening between blocks.

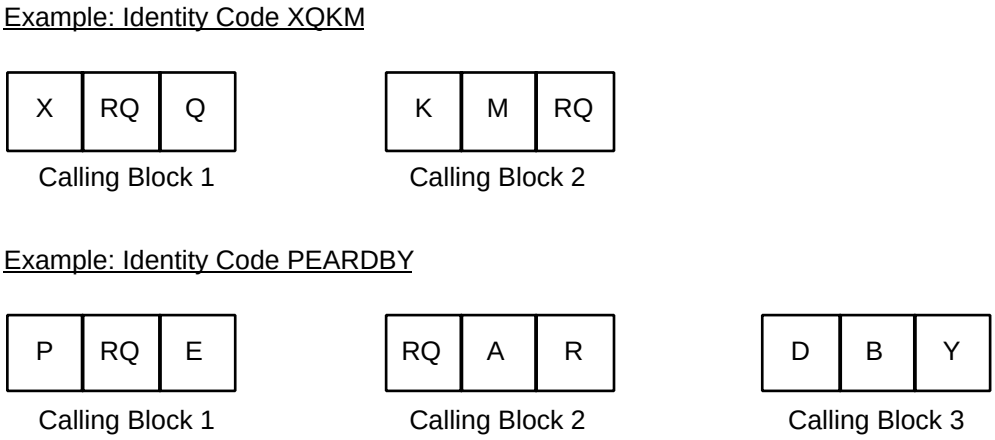


Figure 1-1 How identity code is transmitted

The *Slave Station (SS)* recognizes own identity code received and answers it is ready by sending a control signal. The calling station then initiates normal traffic.

The ISS sends information in blocks of three characters. Each character is sent at the rate of 100 bauds, amounting to 70 ms for one character or 210 ms for one character block. The block repetition cycle is 450 ms, so there is 240 ms during each cycle that the ISS is

not sending. This time is taken up by propagation time from the ISS to the IRS, 70 ms for the IRS to send its service information signal, and the return trip back to the ISS.

The IRS listens between blocks and sends a control signal (CS1 or CS2) to request either the next block, or retransmission of the last block in the case of error. Request for retransmission may be repeated up to 32 times, until the completed block has been received error-free. After 32 times, the ISS automatically initiates a new call.

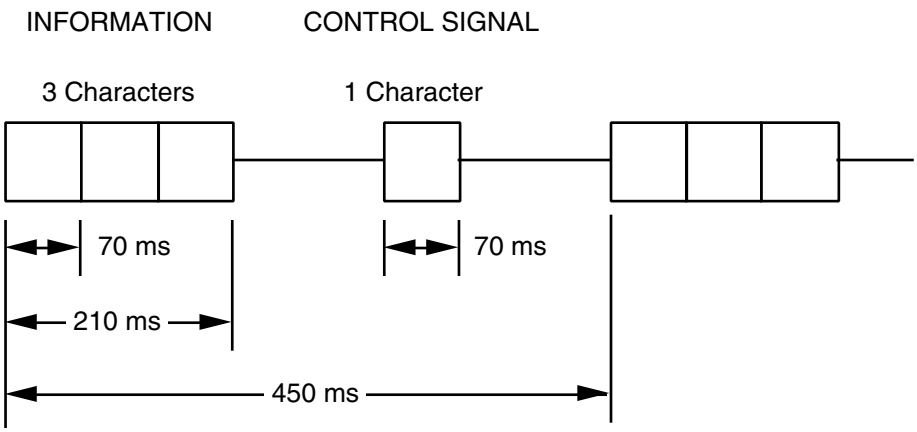


Figure 1-2 ARQ mode traffic exchange timing

Once an entire message is received (error-free), a station may switch its function from the IRS to the ISS by means of a control signal (CS3). This change is done by either the ISS by the sequence of " Figure shift + ? ", or by the IRS operator by activating the "OVER" control. Upon receipt of CS3, ISS answers with a βαβ block. This switches the ISS into IRS. However, the original Master and Slave stations' status remains unchanged, since the Master Station always controls the radio circuit.

Termination of Communication

Only the ISS may terminate the established circuit. It does this by sending three "idle signals α." The IRS and ISS exchange control signals, each reverting to standby after acknowledging each other's control signals. Then, the connection is cleared.

1.4 FEC Mode (B-Mode)

Description

The FEC mode is for one-way, uninterrupted transmission of messages, for example, weather forecasts and emergency bulletins, to no one particular station or stations. The sending station is known as the BSS (B-Mode Sending Station), the receiving station the BRS (B-Mode Receiving Station).

This mode uses a simple forward-error correcting (FEC) technique of sending each character twice at a 280 ms interval. The first transmission is termed DX (direct transmission), the second RX (repeated transmission).

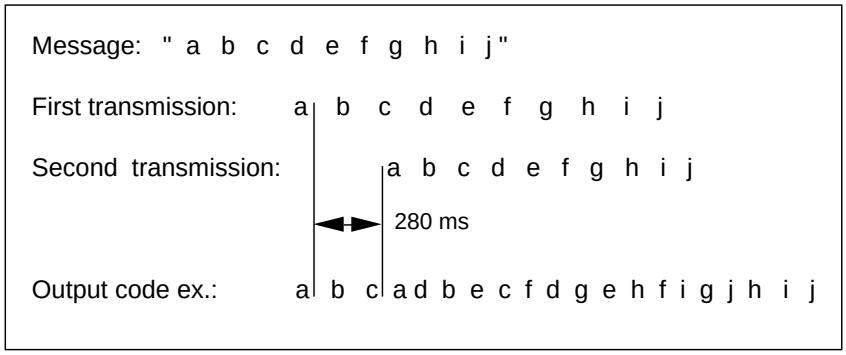


Figure 1-3 FEC mode transmission technique

The receiving station tests the DX and RX characters for adherence to the 4-mark/3-space constant ratio, and prints only unmutilated DX or RX characters, or prints a space if both are mutilated.

Another version of the FEC mode is the FEC-selective mode. This mode uses a call code for selective calling to one or more stations. Only those stations with the correct code will receive the data correctly.

Initiating a Call

When a BSS initiates a broadcast call it transmits synchronizing signals to align phasing of the BRS. Upon detection of this signal the BRS's are switched to the receiving condition and will remain in this condition until the completion of the message. If the mutilated character error rate exceeds a certain percentage, the BRS reverts to standby condition.

Termination of Communication

The sending station sends three consecutive idle signals α immediately after the last transmitted information signal in the DX position.

2. SYSTEM OVERVIEW

2.1 System Configuration

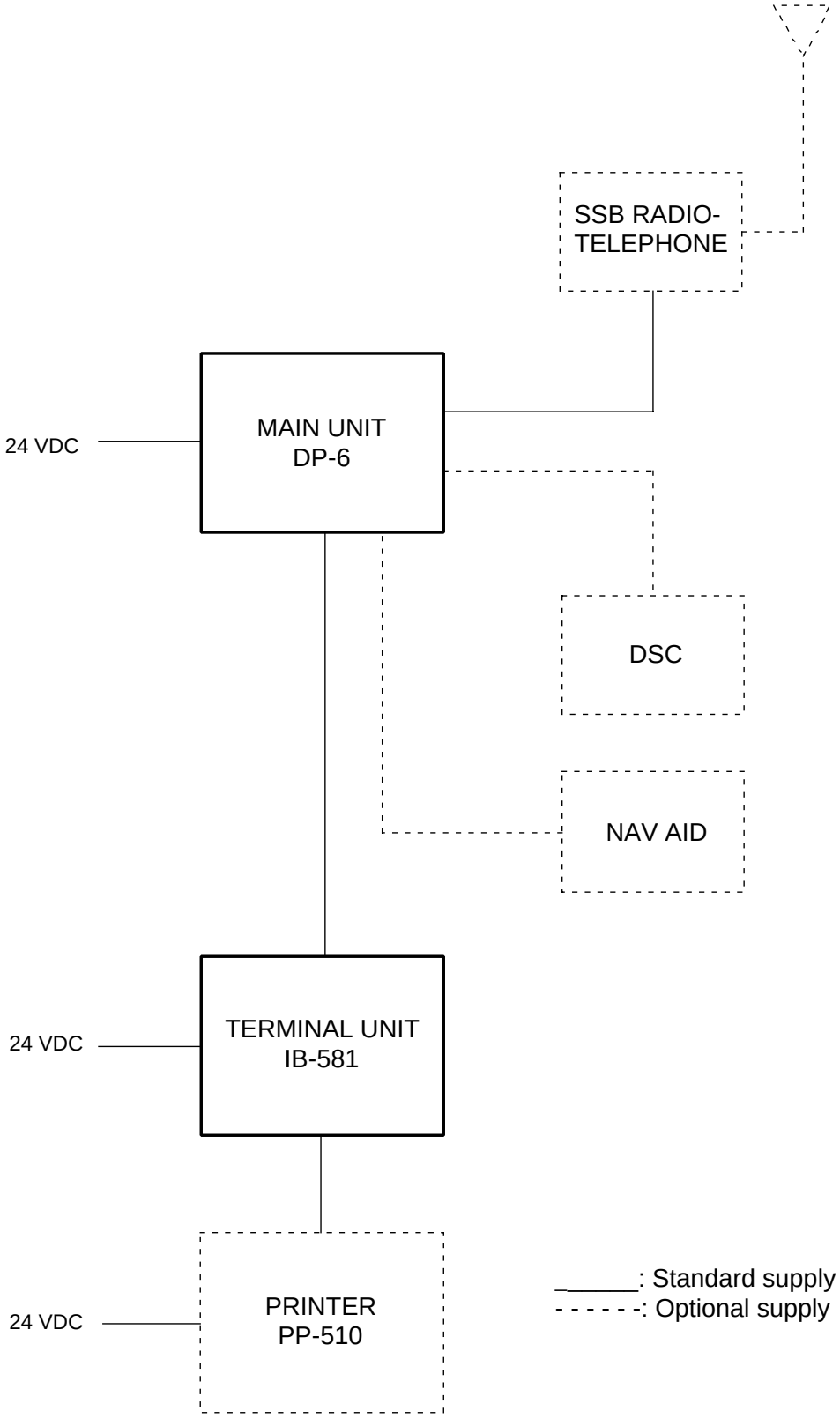


Figure 2-1 System configuration

2.2 Turning on the System

There is no particular order for turning on the units of the system. The figure below shows the location of power switches on the units of the system. Note that it takes about six seconds for the LCD to light after the power is turned on.

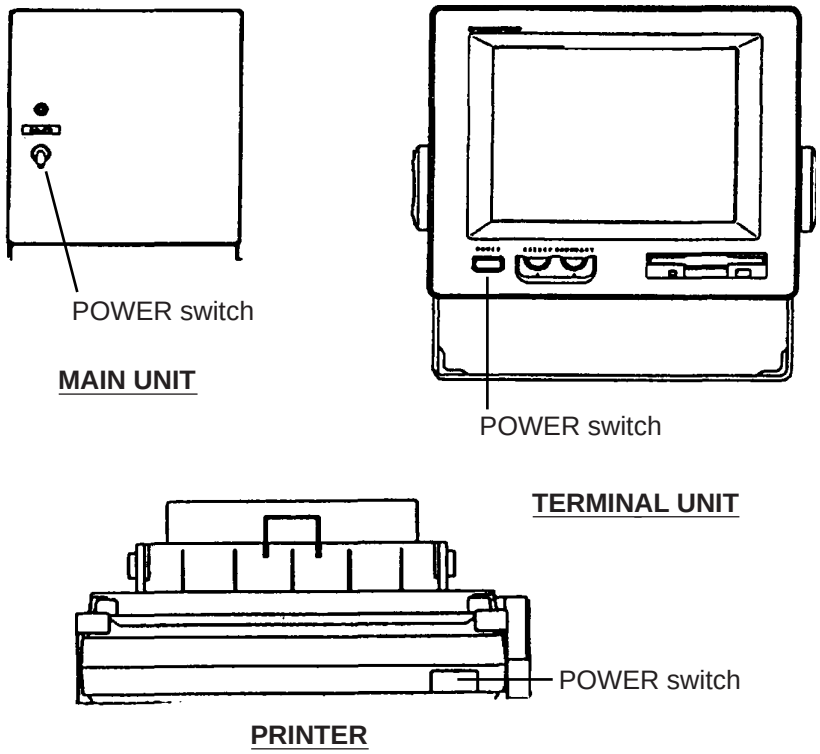


Figure 2-2 Main unit, terminal unit and printer

2.3 Equipment Description

Terminal Unit

The terminal unit consists of a 9" visual display, a floppy disk drive and a keyboard. The floppy disk drive provides for unlimited storage of files on floppy disks. Controls for power and adjustment of display brilliance and contrast are provided on the front panel.

When the terminal unit is turned on the communication status display appears. This is where all phases of communication begin.

```
 1:File 2:Edit 3:Operate 4:Window 5:Station 6:System 7:WRU 8:HR 9:Over 10:Break
------------------------------------------------------------ 1996-11-15 13:26:45:45------Caps- Eng-
  Station Name    :
  Frequency (T/R) :          /        (kHz)  Comm Mode : Auto
  Comm Status     :  Connect Send Lock Error
  Sending Volume  :      (%)   ARQ Error : 0   ARQ Time : 0(sec)
-------------------------------------------------------------------------------------------------
```

Figure 2-3 Communication status display

unit is operated from the keyboard, and is almost 100% keyboard controlled. Operation is simplified by the use of menus which you access by pressing a function key, numbered F1-F10 at the top of the keyboard. The figure below shows the function menus and their corresponding function keys.

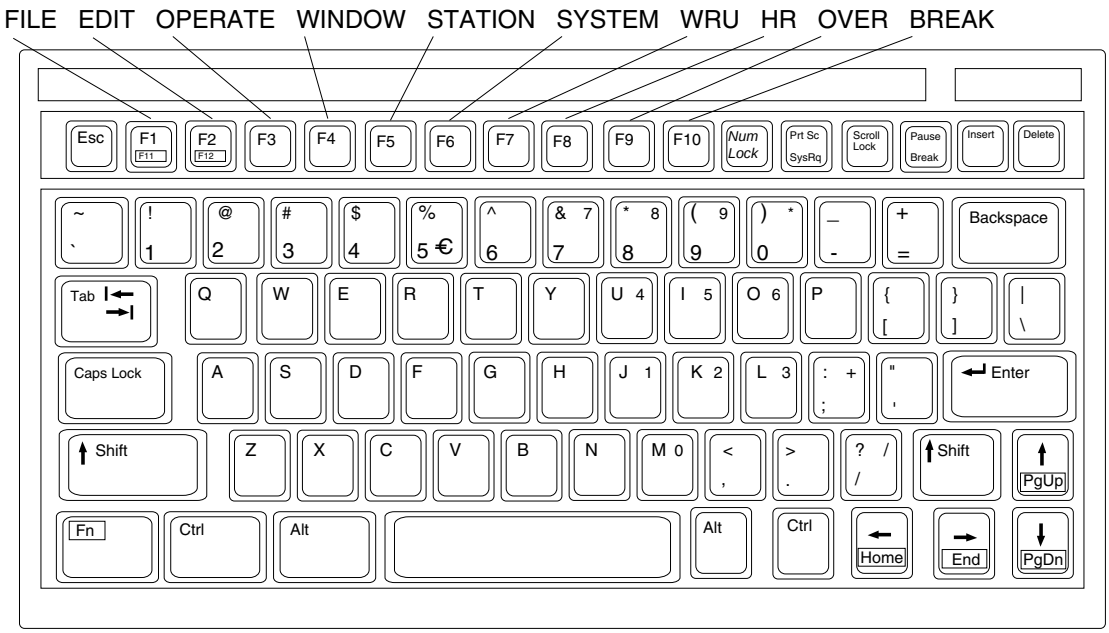


Figure 2-4 Keyboard

Note: € *(Euro mark) on* [% 5 €] *key is not used.*

Main Unit

The main unit mainly acts as the interface between radio equipment, navigator and the terminal unit.

Printer (option)

The printer prints messages. Refer to its operator's manual for operation.

2.4 Function Keys, Menu Operation

The function keys at the top of the keyboard control most operations of this unit through a menu system.

Menu Conventions

Inverse video

As you move the cursor down through a menu, selected item initially shown as white on black, inverses to black on white. This highlighting indicates that it is available for selection.

Underline

The underline shows current selection. In the figure below, for example, the underline is beneath "Receive".

```
                Timer Operation Set Up
Operation       : OP1
Station         : NAGASAKI
Start Time      :  8:35: 0
Stop Time       :  9:10: 0
Receive/Send    : Receive Send
File to send    :
```

Figure 2-5 The auto operation set up screen

Basic Menu Operation

Selecting menus

Press appropriate function key to open a menu. To display the File menu, for example, press function key [F1].

```
                File

1: New
2: Open
3: Close
----------------------------------------
4: Delete
----------------------------------------
5: Rename
----------------------------------------
6: Real Time Printing
7: File to Print
8: Cancel Printing
----------------------------------------
9: Clear Buffer
----------------------------------------
0: Floppy Disk Format
```

Figure 2-6 File menu

Selecting menu items and options

Menu items can be selected by pressing appropriate numeric key or selecting menu desired with the arrow keys and pressing the [Enter] key. Menu options can be selected by operating the [←]/[→] keys. Press the [Enter] key to register selection and close the menu.

Function Key Description

Function key [F1]: File menu

The File menu is where you will create, edit, save and print telex messages.

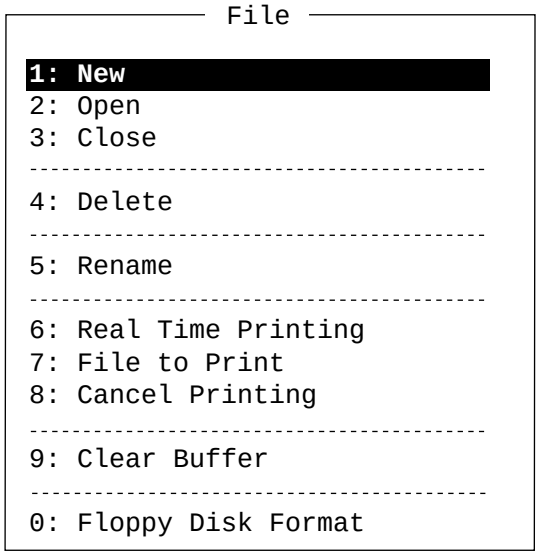


Figure 2-7 File menu

1: New	Opens a new untitled window.
2: Open	Opens files.
3: Close	Closes files
4: Delete	Deletes files.
5: Rename	Renames files.
6: Real Time Printing	Turns real time printing on/off.
7: File to Print	Prints files.
8: Cancel Printing	Stops printing.
9: Clear Buffer	Clears the communication buffer.
0: Floppy Disk Format	Formats a floppy disk.

Function key [F2]: Edit menu

The Edit menu provides a full line of editing features. This menu is only operative while creating a message.

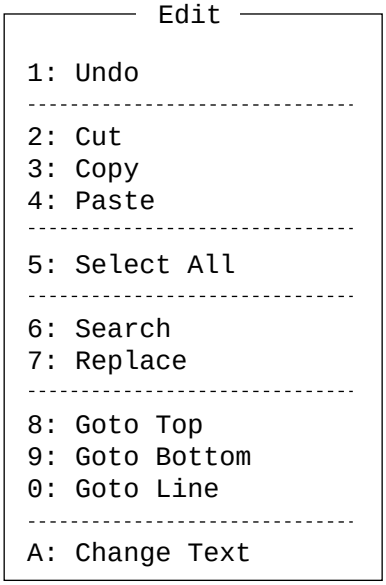


Figure 2-8 Edit menu

1: Undo — Cancels the last change (cut, copy or paste).

2: Cut — Removes the selected text and stores it in the paste buffer. (Previous text in the paste buffer is cleared.)

3: Copy — Copies the selected text and stores in the paste buffer. (Previous text in the paste buffer is cleared.)

4: Paste — Inserts the text stored in the paste buffer at the current location of the cursor.

5: Select All — Selects the entire current file for cut and copy.

6: Search — Searches a file for a character string.

7: Replace — Replaces a word with a different word or character string.

8: Goto Top — Brings the cursor to the top line of the current file.

9: Goto Bottom — Brings the cursor to last line of the current file.

0: Goto Line — Moves the cursor to the desired line in the current file.

A: Change Text — Switches between the display window 1 and 2.

Function key [F3]: Operate menu

The Operate menu controls transmitting and receiving.

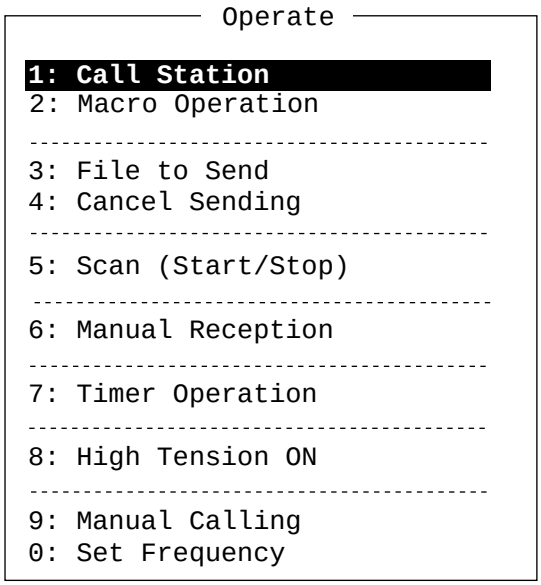


Figure 2-9 Operate menu

1: Call Station	Selects a station from the station list.
2: Macro Operation	Enables fully automatic operation.
3: File to Send	Selects a file (to transmit).
4: Cancel Sending	Stops sending a file.
5: Scan Start/Stop	Starts/stops frequency scanning.
6: Manual Reception	Selects communication mode for reception; AUTO/ARQ/FEC.
7: Timer Operation	Timer programming.
8: High Tension ON/OFF	Turns on/off transmitter high voltage on a FURUNO radio.
9: Manual Calling	Sets Tx mode and subscriber's ID number in manual calling.
0: Set Frequency	Sets Tx and Rx frequencies in manual calling.

Function key [F4]: Window menu

The Window menu displays data together with current screen.

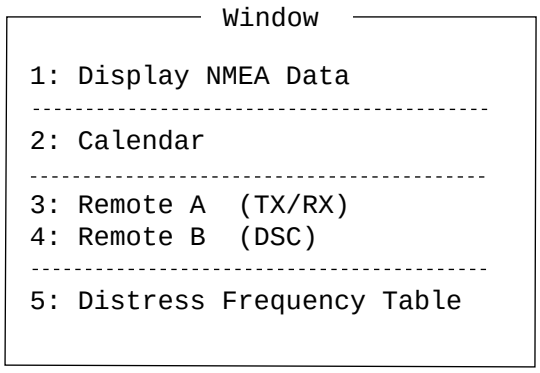


Figure 2-10 Window menu

1: Display NMEA Data Displays NMEA data: position, speed, Heading, water temperature and depth.

2: Calendar Displays desired calendar month and year.

3/4: Remote A/B Entering commands on this screen enables remote control of a FURUNO radio transceiver and DSC terminal connected to Remote A and Remote B terminals.

5: Distress Frequency Table Displays all distress frequencies.

Function key [F5]: Station menu

The Station menu provides for storage of stations, timer programs, channels, and various ID codes.

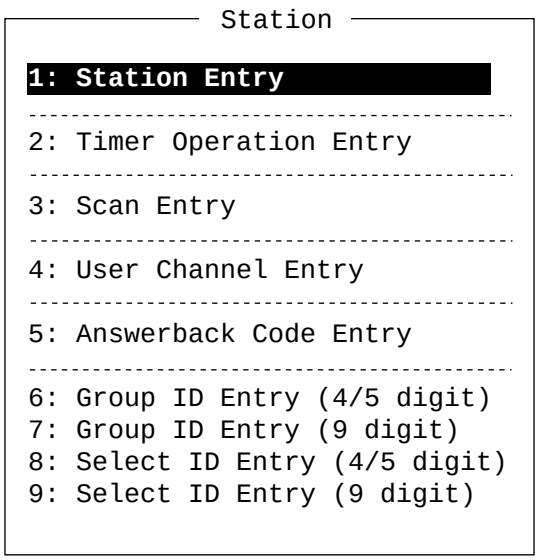


Figure 2-11 Station menu

1: Station Entry Registers stations.

2: Timer Operation Entry Registers timer programs.

3: Scan Entry Creates scan groups for scanning.

4: User Channel Entry Registers user channels.

5: Answerback Code Entry Registers own ship's answerback code.

6: Group ID Entry Registers own ship's group ID codes. (4/5 digit)

7: Group ID Entry Registers own ship's group ID codes. (9 digit)

8: Select ID Entry Registers own ship's selective ID codes. (4/5 digit)

9: Select ID Entry Registers own ship's selective ID codes. (4/5 digit)

Function key [F6]: System menu

The System menu is mainly for use by technicians and includes diagnostic tests (self test). To change settings, select Change on the Setup line and operate arrow keys to select item and option. Press the [Enter] key to register selection and close the menu.

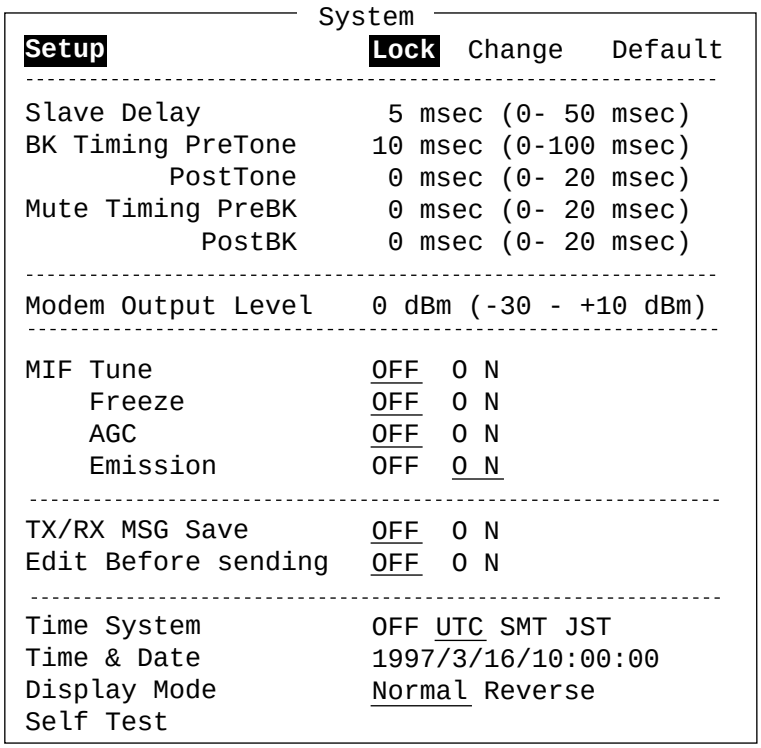


Figure 2-12 System menu

Setup Locks, enables change or restores default system settings.

Slave Delay Sets the length of the slave delay timing in the ARQ mode.

BK Timing PreTone Sets the timing for the leading edge of the BK signal in the ARQ mode.

BK Timing PostTone Sets the timing for the trailing edge of the BK signal in the ARQ mode.

Mute Timing PreBK Sets the timing for the leading edge of the mute signal in the ARQ mode.

Mute Timing PostBK Sets the timing for the trailing edge of the mute signal in the ARQ mode.

Modem Output Level Sets modem output level.

MIF Tune Turn on to send antenna coupler tuning command. (Requires FURUNO Radio Equpment.)

MIF Freeze	Turn on to send "freeze" command to radio equipment connected. (Requires FURUNO radio equipment.)
MIF AGC	Turn on to automatically control gain in telex mode. (Requires radio equipment which supports AGC command in MIF format.)
MIF Emission	Turn on to automatically change mode at radio equipment to telex. (Requires radio equipment which supports Emission command in MIF format.)
TX/RX MSG Save	Turn on to automatically save incoming and outgoing messages to floppy disk.
Edit Before Sending	"No" transmits keying operation one by one. "Yes" transmits message only when the [Enter] key is pressed after confirming text typed.
Time System	Select Time system. SMT is local time and JST is Japan standard time.
Time & Date	Enter Date and time manually. If a navigation device is connected, the time is automatically set when the power is turned on or whenever the time system is switched. Manual entry takes priority over automatic entry. If there is no the navigation data input, it takes more than extra 10 seconds for automatic initial settings.
Display mode	Select display mode between normal and reverse.

Function key [F7]: WRU (Who Are You?)

In the ARQ mode, requests other station's answerback code.

Function key [F8]: HR (Here Is)

In the ARQ mode, sends your ship's answerback code.

Function key [F9]: OVER

In the ARQ mode, changes the direction of traffic; the information receiving station becomes the information sending station, the information sending station becomes the information receiving station.

Function key [F10]: BREAK

Disconnects the communications line.

3. PREPARATIONS FOR TRANSMISSION AND RECEPTION

This chapter provides the procedures necessary for preparing the DP-6 for transmitting and receiving. For automatic telex, you will need to register the following;

- Your ship's ID and answerback codes
- Stations
- Timer programs
- Scan channel groups
- User channels

3.1 Registering Answerback Code & ID Codes

Enter your ship's answerback code and ID code as follows.

Note: *The answerback and ID codes cannot be changed once entered; be sure to enter the codes correctly.*

Registering Answerback Code

1. Press function key [F5] and then the [5] key. The display should look something like Figure 3-1.

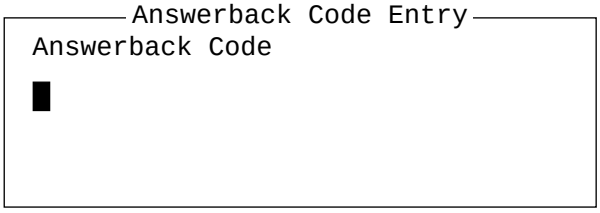


Figure 3-1 Answerback code entry screen

2. Enter your ship's answerback code (max. 20 characters, including spaces) and press the [Enter] key. The prompt OK/CANCEL asks for verification of data. If code is correct, press the [Enter] key again.

   Note: *Example of answerback code 12345789 ABCF X.*

3. For final verification of the data, the Caution shown in Figure 3-2 appears. If code is correct, press the [Enter] key again.

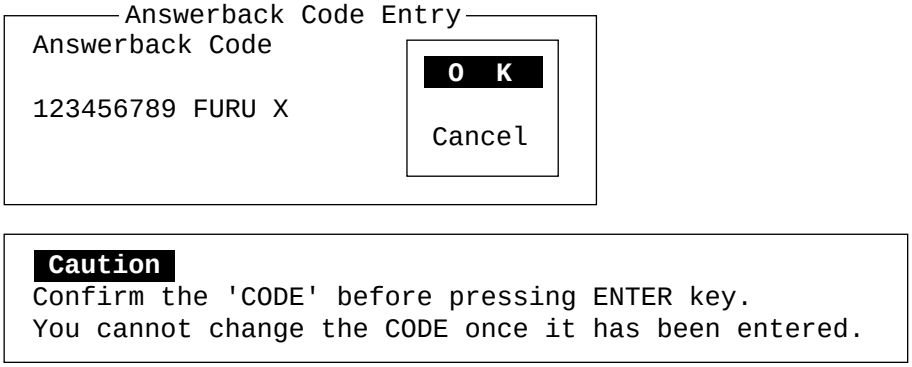


Figure 3-2 Message for confirmation of code entered

Registering ID Codes

1. Press function key [F5] and then the [6], [7], [8] or [9] key to enter the Group ID Code (4 or 5 digits), Group ID Code (9 digits), Select ID Code (4/5 digits) or Select ID Code (9 digits), respectively.

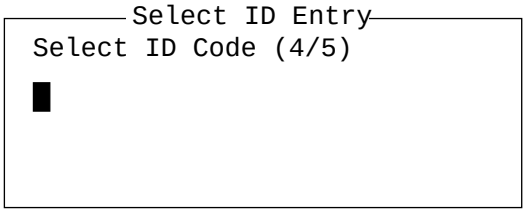


Figure 3-3 ID code screen

2. Enter group ID or select ID and then press the [Enter] key. A prompt asks for verification of data. If ID is correct, press the [Enter] key.

3. For final verification of the data, the Caution shown in Figure 3-4. If ID is correct, press the [Enter] key again.

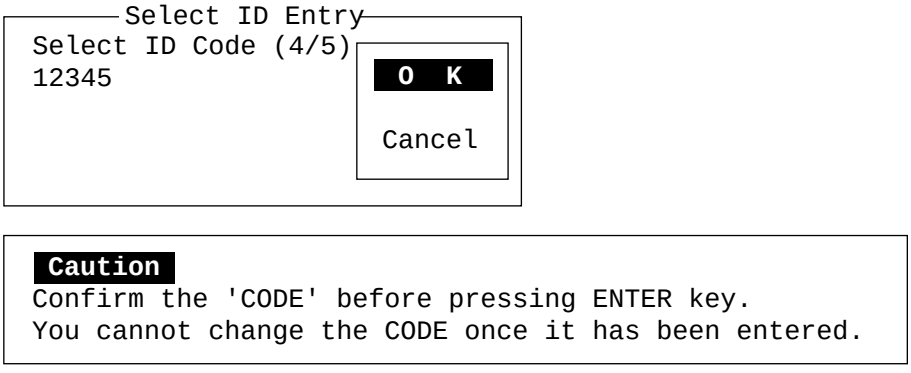


Figure 3-4 Message for confirmation of code entered

3.2 Station List

The station list provides abbreviated dialing with storage for up to 50 stations, one frequency pair (Rx and Tx) per station. For stations which have more than one frequency pair, you might add a suffix to the station name to denote multiple frequency pairs. For example, station name FURUNO followed by -1, -2, -3, etc. for each frequency pair required.

Registering Stations

1. Press function key [F5] followed by the [1] key. The Station Entry screen appears.

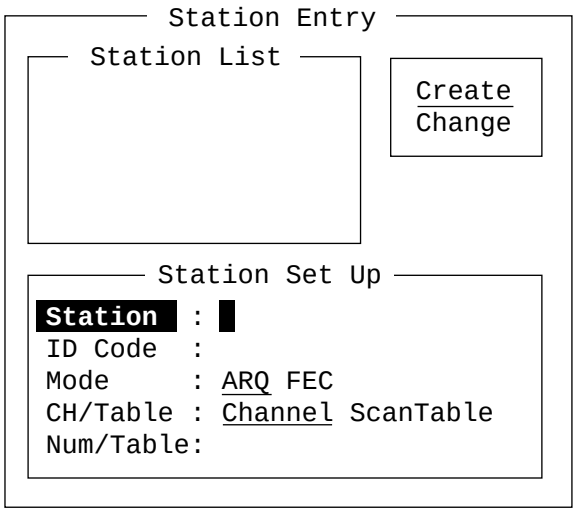


Figure 3-5 Station entry screen

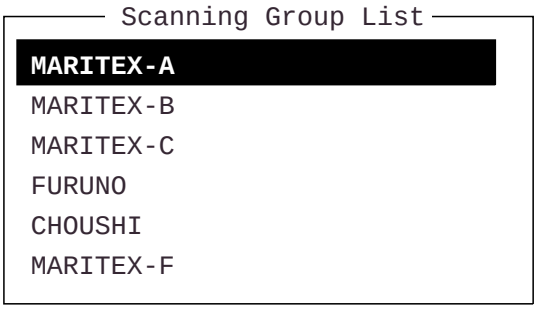
2. On the right-hand side on the screen you should see Create and Change and Create should be underlined. If it is not, underline it by pressing [→], [↑] and the [Enter] key.
3. The cursor is now on the Station line. Enter station name, using up to 18 characters.
4. Press the [↓] key to go to the ID Code line. Enter station ID code.
5. Press the [↓] key to go to the Mode line. Select communication mode among the following;

   ARQ: Automatic Retransmission Request
   FEC: Forward Error Correction

6. Press the [↓] key to go to the CH/Table line. Select ScanTable with [→] or [←] key to choose channel.
7. Press the [↓] key to go to the Num/Table line.

8. If you selected "Channel" enter ITU channel number (see appendix) or User channel number (see page 3-9).

   If you selected the "ScanTable", press the [→] key to show a scan group list registered (see page 3-7). Select a scan group name by using the [↓] or [↑] key followed by pressing the [Enter] key.



9. Press the [Enter] key. The prompt OK/CANCEL asks for verification of data.

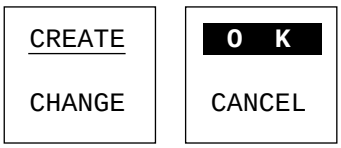


Figure 3-6 OK/CANCEL prompt

10. If the data are correct, press the [Enter] key. (To cancel entry, place cursor on CANCEL by pressing the [↓] key, and then hit the [Enter] key. Data entered are erased.)

To register other stations, select Create again and then press the [Enter] key. Repeat steps 3 – 10.

To confirm the data registered, press the [↓] key to get into the Station Set Up window.

Note: *If you enter a station which exists the indication "Station by that name already exists. Press any key to escape." appears. Press any key to return to the Station List. Check the list.*

Editing/Deleting Stations

1. Press function key [F5] and then the [1] key.
2. Select station from the Station List.
3. Select Change and press the [Enter] key.

4. Do one of the following;

   Edit station: Use [↑], [↓] and the [Backspace] key to make corrections.

   Delete station: Erase station name with the [Backspace] key.

5. Press the [Enter] key twice.

6. Press the [Esc] key.

3.3 Timer Programming

A built-in timer allows you to automatically receive and transmit files. 10 timer programs can be registered.

Registering Timer Programs

1. Press function key [F5]. Press the [2] key to select Timer Operation Entry. The screen should look something like Figure 3-7.

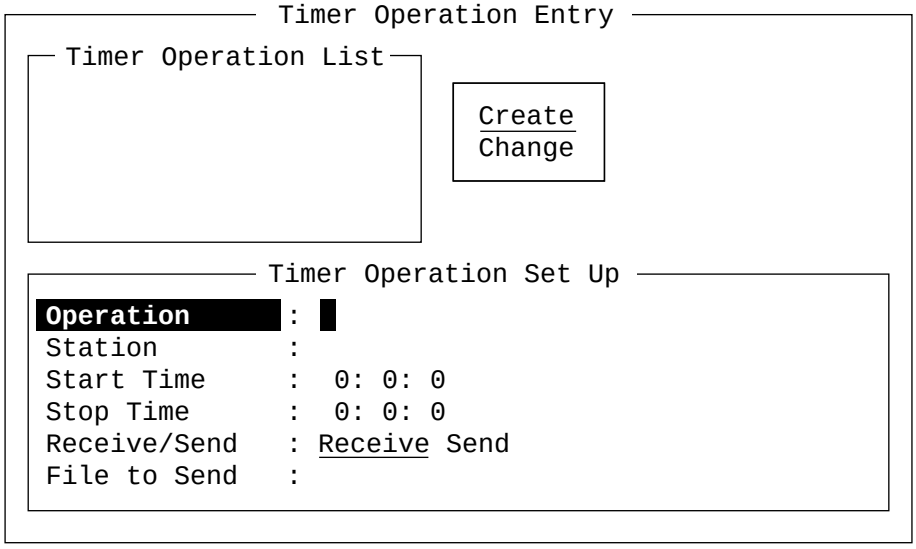


Figure 3-7 Timer operation entry screen

2. If Create is not underlined, press [→], [↑] and the [Enter] key to underline it.

3. Enter a suitable operation name on the Operation line. Any alphanumeric characters may be used. See note 2 on the next page.

4. Place the cursor on the Station line. Press the [→] key to display the Station List. Select a station and press the [Enter] key.

5. Press the [↓] key to advance the cursor to the Start Time line. Enter start time in 24-hour notation. To have the operation start at 8:35, for example, the keying sequence would be;

   [0] [8] [3] [5] [0] [0]

6. Press the [↓] key to advance the cursor to the Stop Time line. Enter stop time.

7. Press the [↓] key to advance the cursor to the Receive/Send line. Select operation category; Receive or Send.

8. For send, insert floppy disk in drive and designate the file to send. Press the [↓] key to advance the cursor to the File to Send line. Press the [→] key to display the file list, select a file, and press the [Enter] key.

9. Press the [Enter] key.

10. Press the [Enter] key. The operation name appears in the Timer Operation List. See note 2 and 3.

Note 1: *To change a timer program, select it on the Timer Operation List, select Change and press the [Enter] key. Enter new data.*

Note 2: *If the operation name entered already exists, the display shows the following message: Operation name already exists. Press any key to escape. Press any key and change the operation name.*

Note 3: *If the station name entered has not been registered, the display shows the following message: Station by that name does not exists. Press any key to escape. Press any key and register the station as shown on page 3-3.*

Editing/Deleting Timer Programs

1. Press function key [F5] and the [2] key.

2. Select timer program from the Timer Program List.

3. Select Change and press the [Enter] key.

4. Do one of the following;

   Edit program: Use [↑], [↓] and the [Backspace] key to make corrections.

   Delete program: Erase operation name with the [Backspace] key.

5. Press the [Enter] key twice.

6. Press the [Esc] key.

3.4 Scan Channel Groups

The DP-6 can automatically control radio equipment through channel scanning. The radio equipment scans a number of channels (according to your selection), stopping when your own ID code is detected in an incoming signal. The transmitter is tuned to the corresponding transmitter frequency, the communication link is established and the traffic is automatically exchanged. Scanning resumes once the link is disconnected.

You may store a maximum of 10 scan groups, 20 channels per group. Note that scanning is only possible in the ARQ and FEC modes.

Registering Scan Channel Groups

1. Press function key [F5] followed by the [3] key to display the Scan Entry screen.

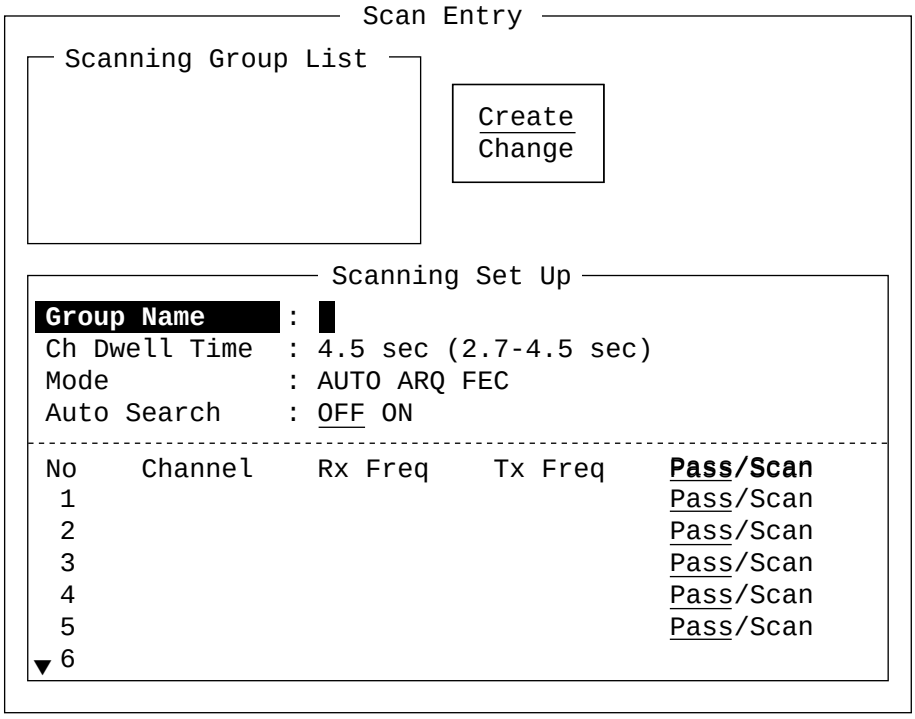


Figure 3-8 Scan entry screen

2. If Create is not underlined, press [→], [↑] and the [Enter] key to underline it.

3. The cursor is on the Group Name line. Enter suitable group name.

4. Press the [↓] key to advance the cursor to the CH Dwell Time line. Enter channel dwell time in seconds. Dwell time is the time in seconds the receiver waits on each channel in a scan group before it selects the next frequency.

5. Press the [↓] key to advance the cursor to Mode, and then select the communication mode; AUTO, ARQ or FEC.

Note: *To register the Scanning Channel Group for ARQ, select ARQ. For FEC, select FEC.*

AUTO is used to register scanning channel group when both ARQ and FEC exist in the same Scanning Channel Group.

When you select scan group by call sration menu, set Mode to FEC (See Page 5-7).

6. Press the [↓] key to advance the cursor to Auto Search. Select Auto Search to ON or OFF.

Auto Search ON: Radio stops scanning when it finds the strongest signal (highest S/N ratio). To find strongest signal, the radio scans all this channel, which may take some time. Therefore, use this setting where signal propagation is poor.

Auto Search OFF: Radio stops scanning on the first signal it finds. We recommend that you set Auto Search to OFF where signal propagation is good.

7. Advance the cursor to line no. 1 in the Scanning Set Up window. Enter channel number (ITU or user channels) and press the [→] key to select "Scan".
8. Press the [↓] key to advance the cursor to line No. 2. Enter channel number.
9. Enter other channel numbers and then press the [Enter] key.
10. Press the [Enter] key again to save the data.

To register another scan group, repeat steps 2 – 9.

Note: *When the scan group memory is full the DP-6 displays "Scan group information full."*

Editing/Deleting Scan Channel Groups

1. Press function key [F5] and the [3] key. Select scan group from the Scanning Group List.
2. Select Change and press the [Enter] key.
3. Place the cursor on the line (channel) to change.

4. Do one of the following;

   Editing channels: Press the [Backspace] key to delete the channel number and then enter new channel number.

   Adding channels: Enter channel number on a blank line.

   Deleting channels: Delete group name with the [Backspace] key.

   Disabling channels temporarily: Press the [←] key to underline Pass.

5. Press the [Enter] key twice.

6. Press the [Esc] key.

3.5 User Channels

The user channel list provides storage for up to 100 user channels, numbered 0 – 99. Note that user channels may be used in channel scanning.

Registering User Channels

1. Press function key [F5] and then the [4] key. The User Channel Entry screen appears.

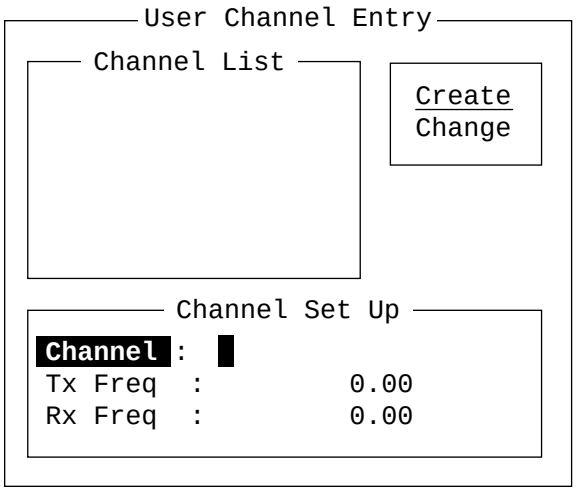


Figure 3-9 User channel entry screen

2. If Create is not underlined, press [→], [↑] and the [Enter] key to underline it.

3. Enter channel number on the Channel line.

4. Advance the cursor to the Tx Freq line. Enter Tx frequency.

5. Advance the cursor to the Rx Freq line. Enter Rx frequency.

6. Press the [Enter] key.
7. Press the [Enter] key. Channel number entered appears in the Channel List.

To register another user channel, repeat steps 2 – 7.

Editing/Deleting User Channels

1. Press function key [F5] and then the [4] key.
2. Select channel from the Channel List.
3. Select Change and press the [Enter] key.
4. Do one of the following;

   Edit channel: Use [↑], [↓] and the [Backspace] key to make corrections.

   Delete channel: Erase channel number with the [Backspace] key.

5. Press the [Enter] key twice.
6. Press the [Esc] key.

4. FILE OPERATIONS

This chapter mainly describes how to create, save, edit and print files. The Edit menu provides a full lineup of editing facilities including search and replace.

4.1 Creating Files

1. Press function key [F1] to display the File menu.

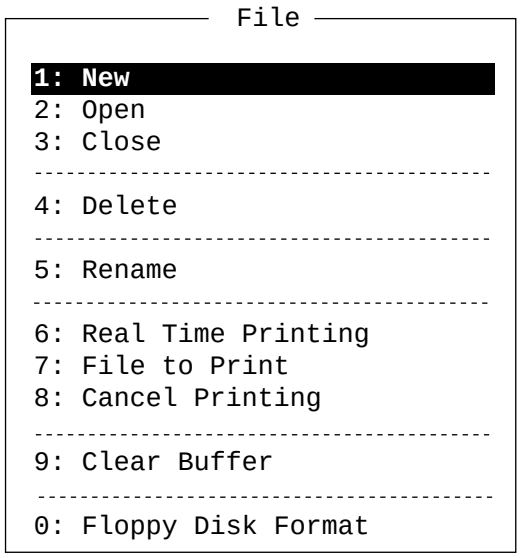


Figure 4-1 File menu

2. Press the [1] key.

3. Type your message.

Note: *Do not use lower case letters, #, &, *, $ or % in telex messages. Also, do not put "$$$" (three successive $s) in the middle of a Tx message, but at the end. The communication line is automatically disconnected when the DP-6 detects this string.*

4.2 Saving a File

Before you can save a file to a floppy disk, the disk must be formatted. 2HD Type is only available.

Formatting Floppy Disks

1. Press function key [F1].
2. Press the [0] key to select "Floppy Disk Format".
3. Press the [↑] key to select "YES".
4. Press the [Enter] key.
5. Insert a new floppy disk and press the [Enter] key.

Saving a File

1. Press function key [F1] to display the File menu.
2. Press the [3] key. The screen should look something like Figure 4-2.

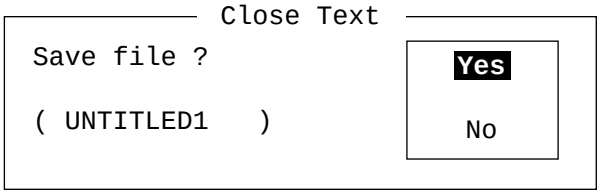


Figure 4-2 Close text screen

3. Press the [Enter] key. Enter file name, using up to eight characters.

   You may use any alphabet or numeric on the keyboard. But you may not use the following punctuation symbols;

   | i : " > < ;

   You may add an extension at the end of the file name, for example, .TXT, to distinguish text file from macro file.

4. Press the [Enter] key.

Note: *When the working area is full, the message "File can't open" appears. Then, you would close a file to clear a working area in order to open the file desired.*

4.3 Editing Files

Cutting and Pasting Text

You can delete, move and copy text by using the Cut, Copy and Paste functions in the Edit menu.

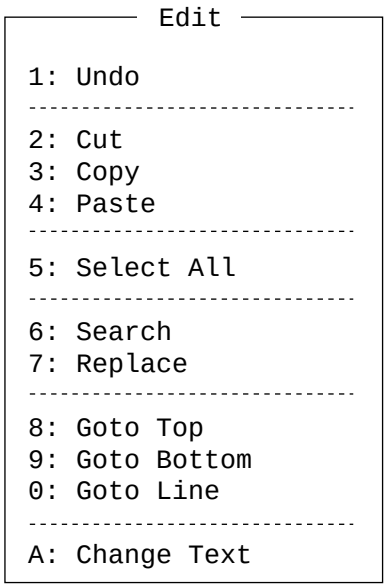


Figure 4-3 Edit menu

Cutting text

1. Place the cursor on the first character of the text to be cut.
2. Highlight the text to be cut by pressing and holding the [Shift] key while pressing the [→]. If you highlight text which you do not want to cut, press the [←] to adjust the highlight.

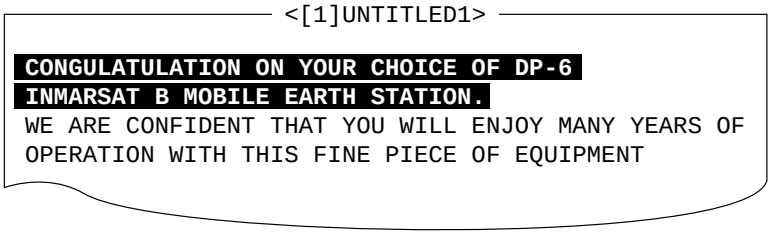


Figure 4-4 The highlight

3. Press function key [F2] and the [2] key. The highlighted text is cut and the remaining text is reformatted.

If a mistake is made, you can restore the text by immediately selecting Undo in the Edit menu.

Pasting text

To paste the cut text to a new location;

1. Place the cursor at the exact spot in the message where the cut text is to start.
2. Press function key [F2] and the [4] key.

Copying and Pasting Text

You may copy a portion of text and paste it elsewhere.

1. Select the text to copy (see the "cutting" procedure above).
2. Press function key [F2] and the [3] key.

   The text selected is copied in the paste buffer memory where the cut or copied text is stored. The display returns to the normal screen.

3. Place the cursor at the exact spot in the message where the copied text is to start.
4. Press function key [F2] and the [4] key.

Clearing the Paste Buffer

Press function key [F1] and the [9] key.

Undo

Use the Undo feature to return the file to its most recent state. For example, you have cut text but want to restore it. Then, you would select Undo in the Edit menu to restore the text to its most recent location.

Select All

The Select All feature lets you select all of the file currently displayed. This feature can be useful when you want to combine files. The procedure below explains how to tack the file loaded in working memory 1 onto the end of the file loaded in working memory 2.

1. Load the file to be copied from a floppy disk in working memory 1.
2. Press function key [F2] and the [5] key. The entire file appears in inverse video.
3. Press function key [F2] and the [3] key. The file is placed in the paste buffer memory.
4. Load the file to be combined in working memory 2.
5. Place the cursor at the exact spot in the message where the text now in the paste buffer memory is to start and press the [Ins] key.

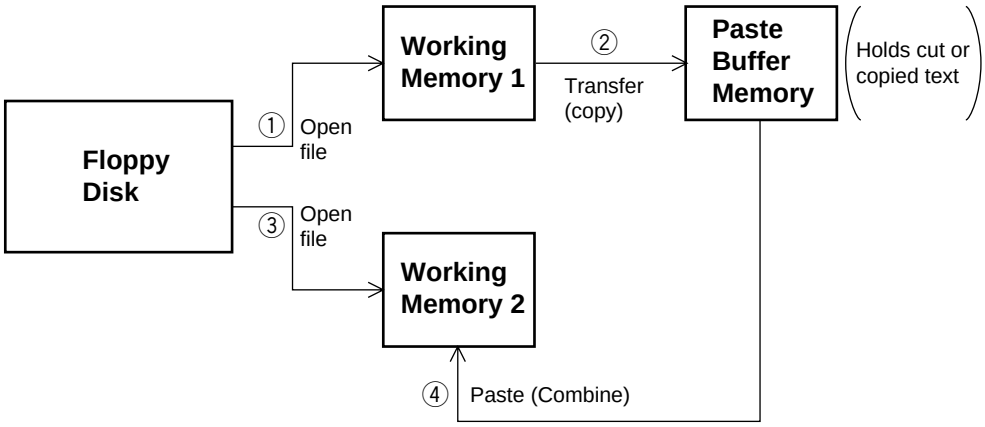


Figure 4-5 Cut and paste flow diagram

Searching Text

The Search feature lets you search for text in a forward or backward direction.

1. Display a text and press function key [F2] and the [6] key. The Search display appears.

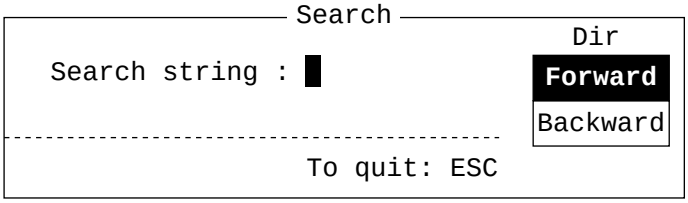


Figure 4-6 Search screen

2. Type the word you want to find. Select Forward or Backward to search the file in a forward or backward direction respectively from the cursor position. Press the [Enter] key to begin the search.

When the unit finds the word, the cursor stops at the first character of the word. Press the [Enter] key to continue the search.

Replacing Text

The Replace feature helps you replace every occurrence of a word or phase with another word or phase in a file.

1. Press function key [F2] and the [7] key. The Replace display appears.

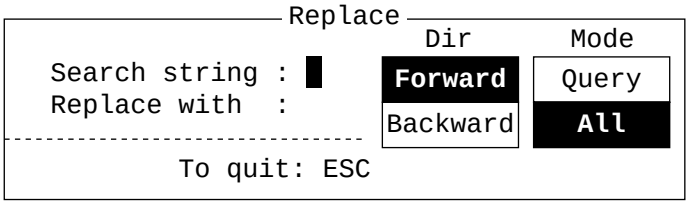


Figure 4-7 Replace screen

2. Type the word you want to replace on the "Search string " line.
3. Press the [↓] to select "Replace with." Type the new word.
4. Select Forward or Backward to search the file in a forward or backward direction respectively from the cursor position.
5. Select whether you want to be queried or not each time the word is found.

   Query: Stop at each occurrence of word to answer yes or no to replacement.

   All: Replace every occurrence of word without stopping to confirm.

6. Press the [Enter] key to start the replacement.

Goto Line

This feature places the cursor at the head of a line desired. Press function key [F2] and the [9] key. The following display appears.

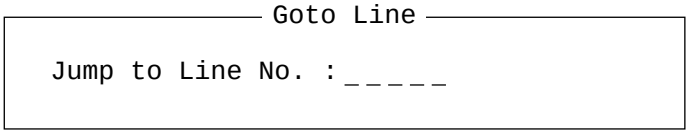


Figure 4-8 Goto line screen

Key in line number and press the [Enter] key. The cursor shifts to the head of the line selected.

4.4 Opening Files

Two working areas (called working area 1 and working area 2) are provided to which you can load a file, and one file may be displayed on the LCD.

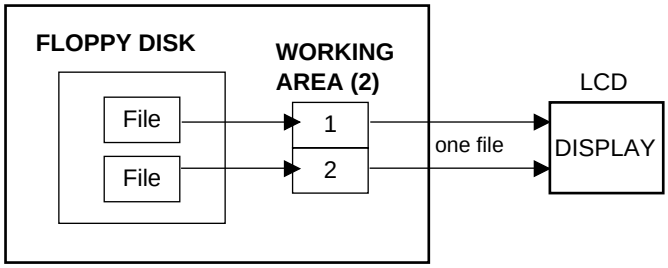


Figure 4-9 Working memories

Opening a File

1. Press function key [F1] to display the File menu.
2. Press the [2] key. A chronological list of files on the floppy disk appears.
3. Select a file. Press the [Enter] key.

The file appears and the title bar shows the file name. You may repeat this procedure to load another file into a working area.

Switching Between Files

Two files can be opened and one displayed on the LCD. To switch between files do the following;

1. Press function key [F2].
2. Press the [A] key to switch files.

4.5 Renaming Files

To rename a file;

1. Press function key [F1].
2. Press the [5] key.
3. Select file and press the [Enter] key.
4. Enter new name.
5. Press the [Enter] key.

4.6 Saving a File Under a New Name

You may save a file under a new name as follows;

1. Open a file.
2. Edit the file as necessary.
3. Press function key [F1].
4. Press the [3] key to clear the screen.
5. Press the [Y] key.
6. Press the [Backspace] key to erase the original name and then enter a new name.
7. Press the [Enter] key.

4.7 Deleting Files

1. Press function key [F1].
2. Press the [4] key.
3. Select file to delete and then press the [Enter] key.
4. Press the [Enter] key again. (To cancel, press the [↓] key followed by the [Enter] key.)

4.8 Real Time Printing

An incoming or outgoing message can be printed out while it is being received or transmitted.

1. Press function key [F1] to display the File menu.
2. Press the [6] key to turn real time printing on/off.

PRINT appears in inverse video when real time printing is on.

4.9 Printing Files

You can print a file as follows;

1. Press function key [F1].
2. Press the [7] key.
3. Select file and press the [Enter] key.
4. Press the [Y] key.

If the file could not be printed, "Cannot print. Check connection between printer and terminal. Press any key to escape." is displayed.

4.10 Communications Log

Transmission/Reception date and time, ID, mode, Tx/Rx frequencies and station name are recorded for each message received or transmitted. ("TX/RX MSG Save" must be ON in the System menu to automatically save Tx and Rx messages.)

Displaying the Communications Log (Log File)

1. Press function key [F1] and then the [2] key.
2. Select Log File and press the [Enter] key. A list of Tx and Rx messages appears. See Figure 4-10.

Note: *The Log File can store about 230 communication files. When it becomes full, an error message appears to alert you. If this occurs, delete all log files.*

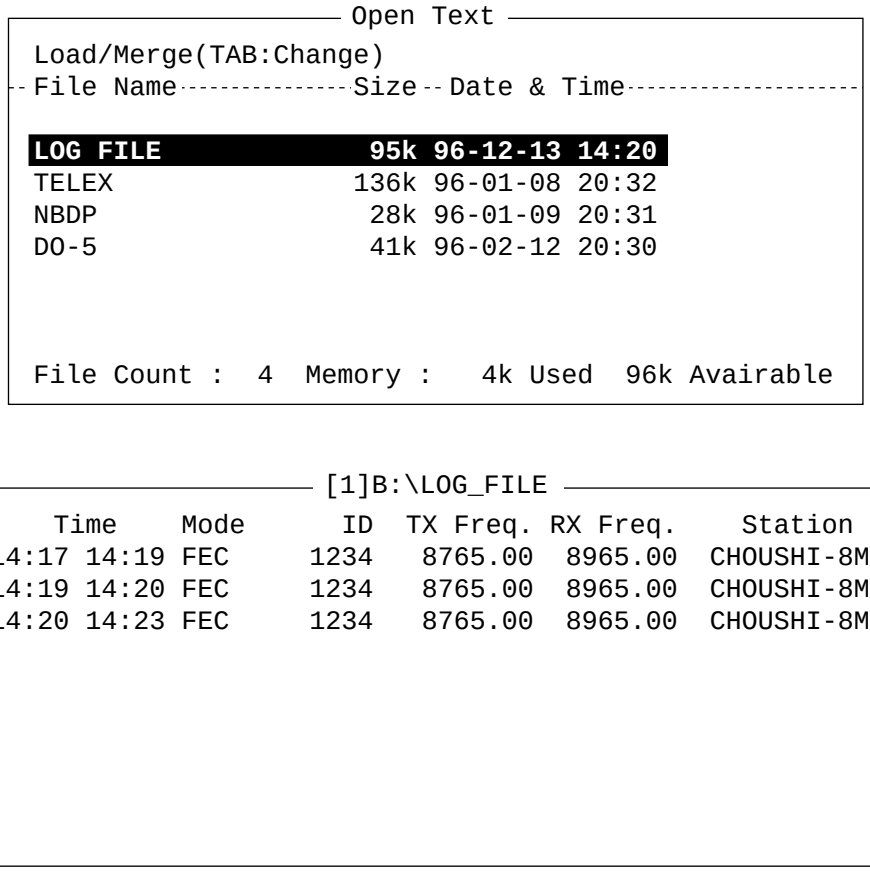


Figure 4-10 Log file

Printing the Log File

1. Press function key [F1] and then the [7] key.
2. Select Log File and press the [Enter] key.
3. Press the [Y] key.

5. TRANSMISSION, RECEPTION

This chapter shows you how to transmit and receive Telex messages. Also included are the procedures for frequency scanning, and automatic operation.

5.1 Manual Calling

The simplest way to communicate with a Telex subscriber is Manual Calling. For the ARQ mode, you may display beforehand the message to send or type message manually.

1. Press function key [F3] to display the Operate menu.

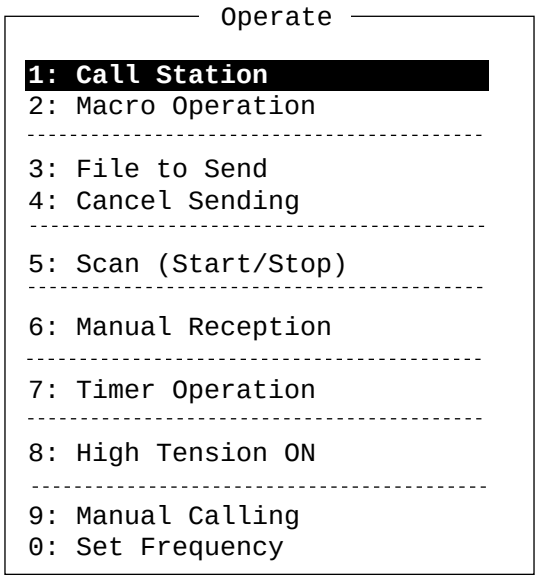


Figure 5-1 Operate menu

2. Press the [0] key. The Set Frequency screen appears.

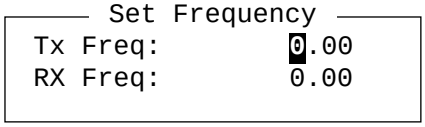


Figure 5-2 Set frequency screen

3. Input frequency pair. This can only be done with FURUNO transceivers.

   For other makes of transceiver, set a frequency pair at the transceiver. Omit steps 1, 2 and 3.

4. Press the [Enter] key.

5. Press function key [F3] again and then the [9] key. The following screen appears.

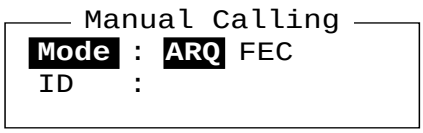


Figure 5-3 Manual calling screen

6. Select communication mode.

7. Press the [↓] key and input party's ID number.

8. Press the [Enter] key to connect the communication line. Then, the line will be connected a short while.

   For ARQ mode, follow the next procedure. For FEC mode, type your message and go to step 13.

9. Press function key [F7] (WRU). The party's answerback code appears on the screen.

   Note: *Step 9 and 10 are needed for ship to ship calling only.*

10. Press function key [F8] (HR). You ship's answerback code is sent to the party.

11. Press the [Enter] key and type your message.

12. If you want to the party's response, press function key [F9] (Over).

13. Press function key [F10] to disconnect the line.

5.2 Calling a Station

1. Press function key [F3] to display the Operate menu.

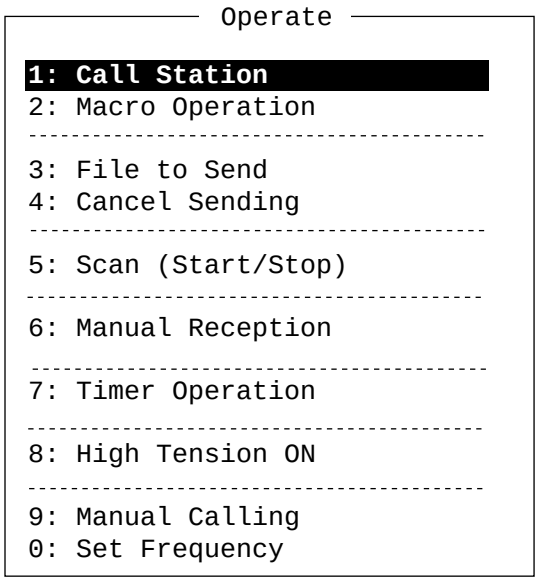


Figure 5-4 Operate menu

2. Press the [1] key to display the Station List.
3. Select the station you wish to call.
4. Press the [Enter] key to establish connection with the station.

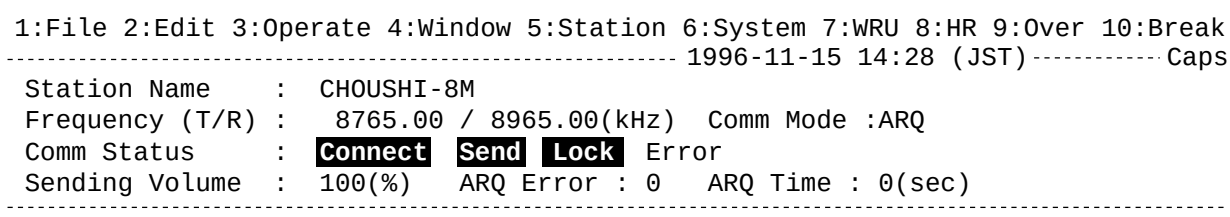


Figure 5-5 Communication status display

"Connect" appears in inverse video on the Comm Status line when an acknowledge signal from the station called is detected. (In the ARQ mode connection may be delayed due to signal condition. In the FEC mode, however, "Connect" appears in inverse video a few seconds later since the acknowledge signal is not required.)

5.3 Transmitting a File from a Floppy Disk or the Text Screen

You may send a file from a floppy disk or the Text Screen as follows after calling a station.

From a Floppy Disk

1. Press function key [F3] and then the [3] key.
2. The Send screen appears.

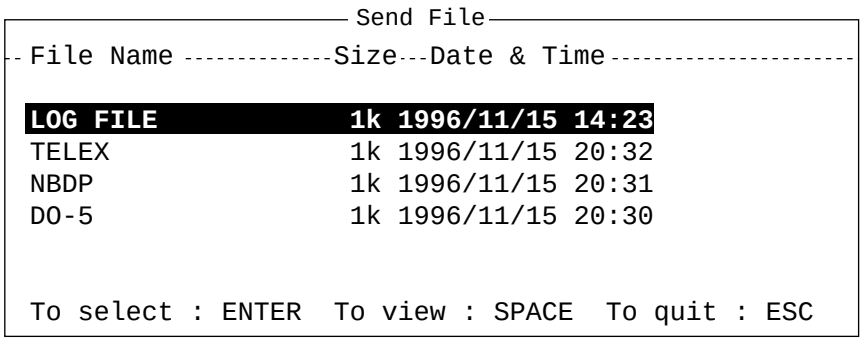


Figure 5-6 Send file screen

3. Select the file you wish to send. Then, press the [Enter] key to transmit the file.

From the text screen 1 or 2

1. Prepare a message at the text screen 1 or 2 (working area 1 or 2).
2. Press function key [F3] and then the [3] key.
3. Press the [Enter] key to transmit the file.

Stopping Transmission

1. Press function key [F3] and then the [4] key.
2. Send Canceled appears on the screen. Transmission is stopped but the line is still connected.

If the receiving station (IRS) reverses the communications direction while the sending station is transmitting a file, as many as six characters from the end of the message may not be transmitted, although they are displayed on the sending station's LCD.

5.4 Selecting Receive Mode

1. Press function key [F3] and then the [6] key.
2. Select receive mode;

   AUTO: Automatic operation in ARQ and FEC

   ARQ: International radiotelex ARQ mode

   FEC: International radiotelex FEC mode

3. Press the [Enter] key. The reception mode appears on the screen.

All received (and transmitted) messages are saved to a floppy disk when "Tx/Rx Msg Save" is ON in the System menu. The file is named as follows.

96 12 13 0 0. X X X

Year month date — Serial number from 000

When "Tx/Rx Msg Save" is OFF in the System menu, all messages are displayed on the screen. To scroll the display, press [Pg Up] or [Pg Dn] while pressing down the [Fn] key. These message disappear when the power turns off.

5.5 ARQ Mode Operation

In ARQ operation one station (information sending station) sends data to another in block by block, then listens the acknowledge signal between blocks from the information receiving station which requests either the next block or retransmission of the last block if there is error. The request may be repeated up to 32 times, until the complete block is received free of error.

1. Press function key [F3] followed by the [1] key. The Call Station menu appears.

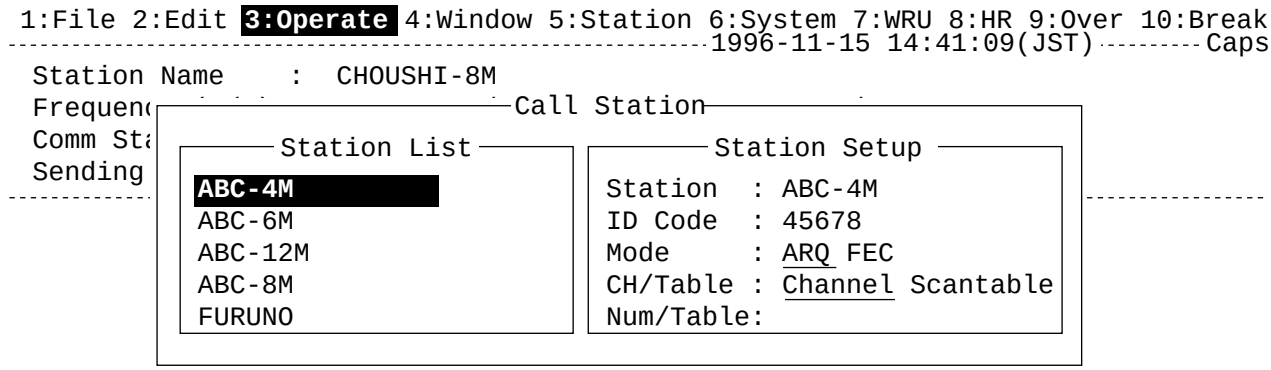


Figure 5-7 Call Station menu

2. Select a station. (Station must be registered for the ARQ mode). Press the [Enter] key. The message "Calling Station" appears.

   If the message "Station calling suspended. Check radio and interconnections. Press any key to escape." appears, check both radio's power and interconnections between the radio and the DP-6.

3. When an acknowledge signal is detected, "Connect" appears in inverse video on the communication status display (see next page).

   Note: *If signal conditions are poor, connection may take a while. If the line could not be connected in one minute, calling stops and "Calling failed" appears. Try step 2 again one minute later. Should signal conditions worsen during message transmission, "Error" appears in inverse video and 30 seconds later the line is disconnected.*

4. Transmit message by one of the following methods;

   Send a file from a floppy disk

   a) Press function key [F7] (WRU) to receive the answerback code of the other station. Verify that the code from the station called is correct.

   b) Press function key [F8] (HR) to transmit your own identity (answerback code).

   c) Press function key [F3] and then the [3] key to display the Send screen. Select file to send and press the [Enter] key. Send appears in inverse video while the file is being transmitted.

```
                    Send File

------ Filename ---------Size--------Data & Time---------
  <Parent Directory>        96-11-15 12:24
  00FOX    .MES          95  96-11-15 08:07
  ASCII    .TXT         613  96-11-15 16:15
  BEEP     .EXE       28854  96-11-15 10:36
  DPX      .AUT        1830  96-11-15 10:02
  DPX      .BAT         349  96-11-15 13:54
  DPX      .BSC       28000  96-11-15 17:11
  DPX      .CNL        1000  96-11-15 10:02
   29 Files exist      247271424 bytes free
 ------------------------------------------------------------
 To select:ENTER   To view:SPACE   To quit:ESC
```

Figure 5-8 Send file screen

   Sending volume (percentage of message transmitted, counts upward as the message is being transmitted), ARQ error count and ARQ transmission time appear on the display.

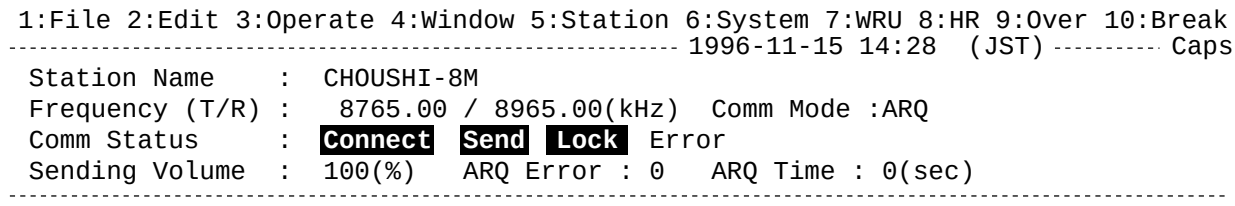


Figure 5-9 Communication status display

Type a message from keyboard

After exchanging answerback code by the function key [F7] (WRU) and [F8] (HR), type your message directly from the keyboard.

5. To change direction of traffic, press either function key [F9] (OVER), or [+] and [?]. Then, the other station becomes the information sending station, your station the information receiving station.
6. Receive a message from the sending station, if any.
7. After completion of communication, press function key [F7] (WRU) key to receive the answerback code of the other station and then press function key [F8] (HR) key to transmit your own answerback code.
8. Press function key [F10] (BREAK) to disconnect the line.

5.6 FEC Mode Operation

The FEC method of error correction is used when there is more than one receiving station, and no replies are required by the other station. Each message is sent twice, the characters of the first message interleaved with those of the second. The receiving station thus has two chances to receive each character correctly. If both characters are in error, an asterisk (*) is printed.

1. Press function key [F3].
2. Press the [1] key to display the Call Station menu.

   You can select scan group by scan table.

3. Select a station which is registered for the FEC mode. Press the [Enter] key. CONNECT lights in inverse video.
4. Transmit message from a floppy disk as follows.

   Press function key [F3] and the [2] key to open the Send screen. Select file to send and press the [Enter] key.

5. After the message is transmitted, press function key [F10] (BREAK) to disconnect the line.

5.7 Communication Example

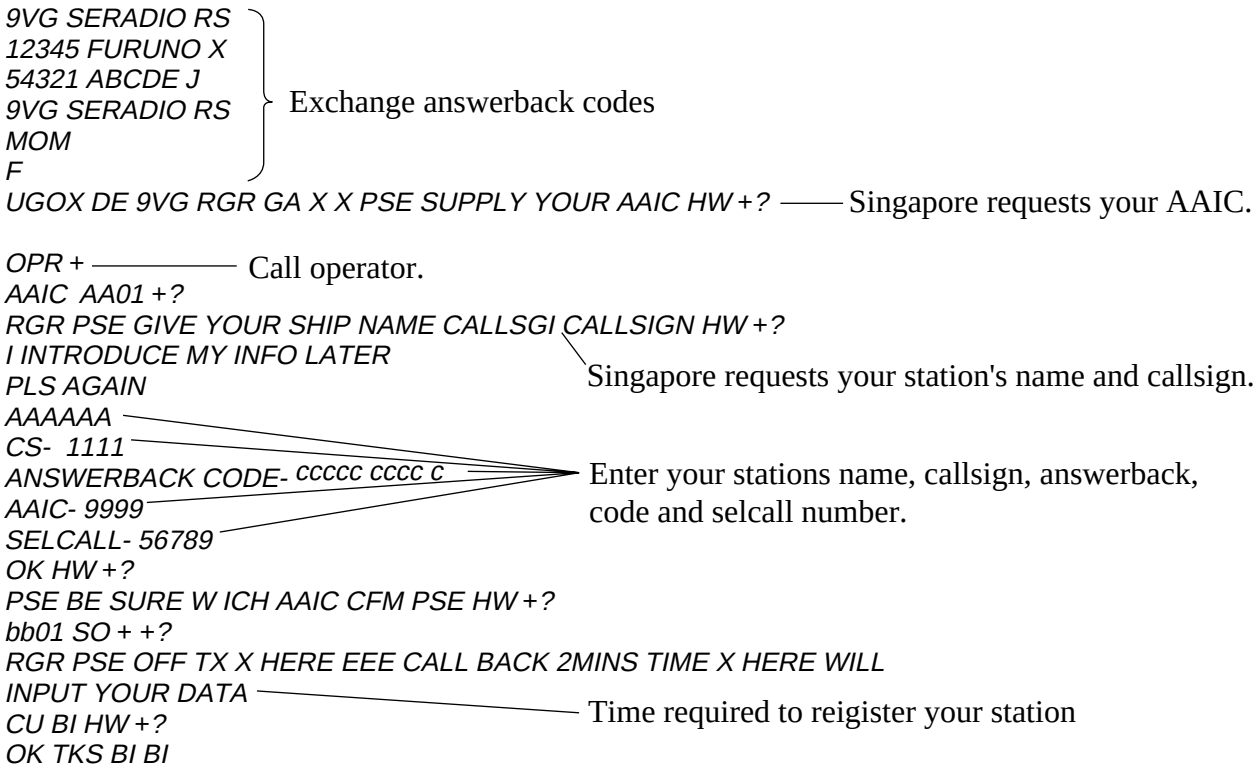
This section shows how to register your station with a coast station (Singapore), in order to connect with a land line and send messages to other stations.

Contact the coast station following the procedure on page 5-3. Then, register your station's name, call sign, answerback code and selcall number and AAIC (Accounting Authority Identification Code) with the coast station.

You can call the Singapore coast station on ITU channels 809, 821 or 1201 (other channels may also be used). Use communication mode ARQ. The Singapore coast station ID no. is 4620.

Registration procedure

1. Call Singapore coast station following the procedure on page 5-3.
2. Singapore requests your AAIC.
3. Type your AAIC.
4. Singapore asks for your callsign. Send your station's name, callsign, answerback code and selcall number.
5. Singapore sends time required to register your station.
6. Transmit end code.



Transmitting message directly (DIRTLX)

The procedure which follows shows how to transmit a Telex message directly to a station.

1. Execute "Calling a Station" on page 5-3.
2. After GA+ and DIRTLX appear on your display, type Receiving station's Telex number.
3. Singapore coast station sends its Telex number. Type receiving station's answerback code.
4. Type MSG+?
5. Type your message.
6. Type WRU. Receiving station and your station mutually exchange answerback codes automatically.
7. Type KKKK (end code) at end of message. Your answerback code, receiving station's Telex number and communication time appear on your display.
8. Receiving station sends GA+?.

To send another message by DIRTLX, start at step 2. To finish, type BRK+

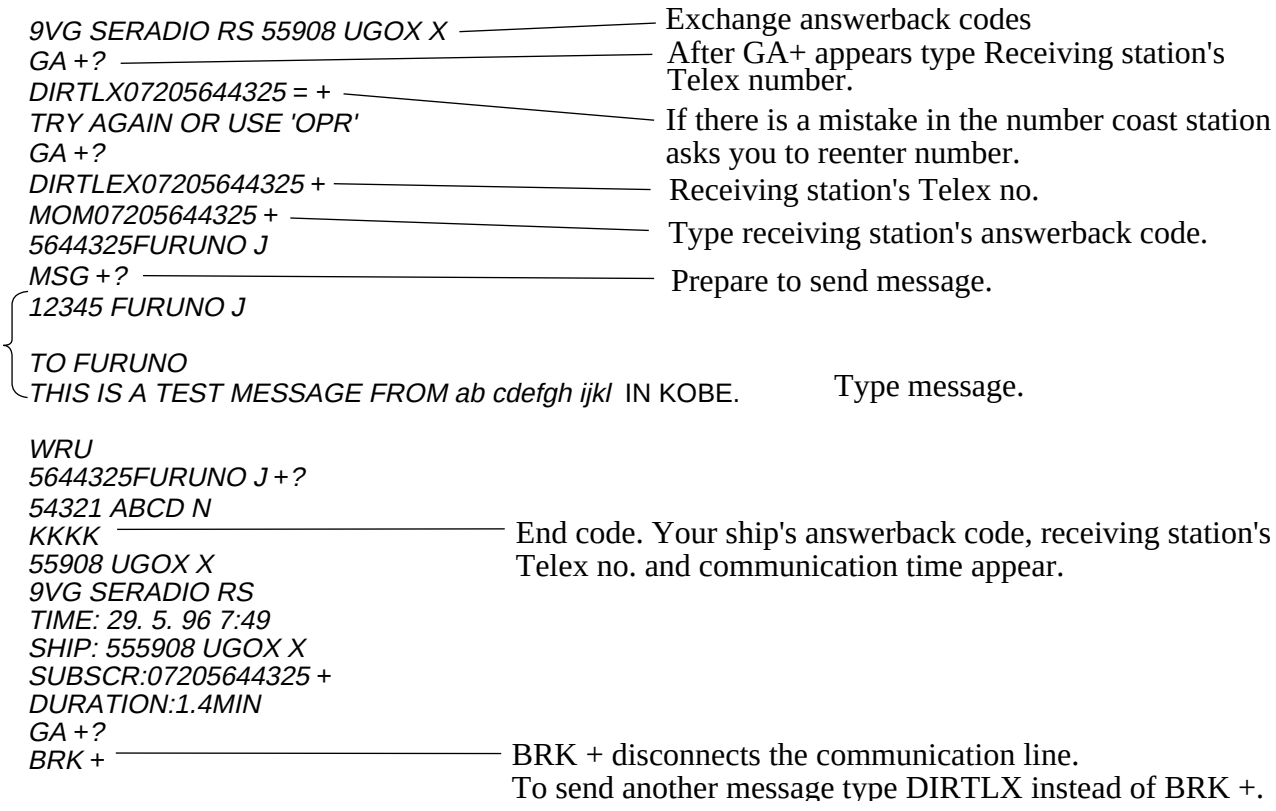


Table of Abbreviations

Abbreviation	Question	Answer or Advice
QRA	What is the name your station?	The name of my station is · · · · .
QRC	By what private enterprise are the accounts for charges for your station settled?	The accounts for my station are settled by the private enterprise · · · · .
QRU	Have you any thing for me?	I have nothing for you.
QRV	Are you ready?	I am ready.
QRX	When will you call me again?	I will call you again at · · · · hours [on · · · · kHz].
QSJ	What is the charge to be collected to · · · · including your internal charge?	The charge to be collected to · · · · including my internal charge is · · · · frans · · · · .
QSL	Can you acknowledge receipt?	I can acknowledge receipt.
QSX	Will you listen to · · · · [call sign] on · · · · kHz?	I am listening to · · · · [call sign] on · · · · kHz.
QTA	Shall I cancel message number · · · · ?	Cancel message number · · · ·
QTC	How many messages have you to send?	I have · · · · message for you.
QTU	What are the hours your station is open?	My station is open from · · · · to · · · · hours.

Abbreviation	Definition
BK	Signal used to interrupt a transmission progress.
CFM	Confirm
DE	"From · · · · "
K	Invitation to transmit.
NIL	I have nothing to send to you.
NW	Now
PSE	Please
R	Received
REF	Reference to · · · · .
SVC	Prefix indicating a service telegram.

Command an Abbreviation

Command	Function
TGM+	To indicate that the following message is a radiotelegram.
MSG+	To indicate that the ship station needs to be connected immediately any message held.
OPR+	Call operator.
URG+	Safety, urgency and distress message.
MED+	Request medical advice.
TEST+	Request coast station to send a test message for checking the ship station.
BRK+	To clear the connection with the coast station.
Abbreviation	
GA+	I am ready. Transmit your command.
MOM	Wait a moment.
MSG+	Request pending messages from the shore.
KKKK or NNNN	Terminate a message.

5.8 Timer Operation

A built-in timer permits automatic transmission and reception of telex messages.

Enabling Timer Operation

1. Press function key [F3] to display the Operate menu.
2. Press the [7] key to display the Timer Operation List.
3. Select the operation (name) you wish to execute. Press the [Enter] key. An asterisk appears beside the operation selected and "T. Op" appears in inverse video on the communication status display. If a file from a floppy disk is to be sent, be sure the floppy disk containing the file is inserted in the drive.

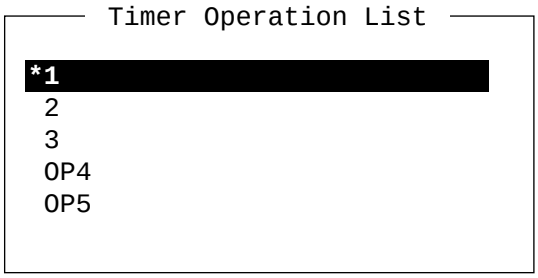


Figure 5-10 Timer operation list

4. Select another operation (name) if desired.
5. Press the [Esc] key.

When the predetermined time comes, the DP-6 automatically sends or receives messages. The results of timer operation are displayed as either OK or NG (No Good) on the Timer Operation List.

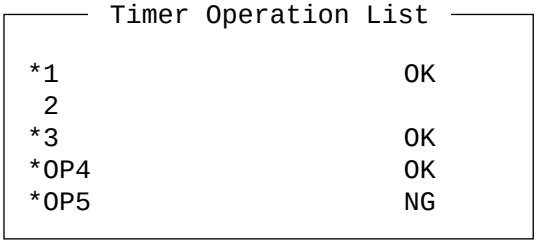


Figure 5-11 Timer operation list

Stopping Timer Operation

1. Press function key [F3].
2. Press the [7] key.
3. Select the operation (name) which has asterisk attached to it and then press the [Enter] key. Remove all asterisks to cancel all timer programs.

5.9 Scanning

Radio equipment scans a group of operator-selected frequencies (channels), and stops scanning when an incoming signal is received.

1. Press function key [F3] and then the [5] key. The Scanning Group List appears on the screen. You can confirm the scan channel by [↑] key or [↓] key while pressing the [Shift] key.

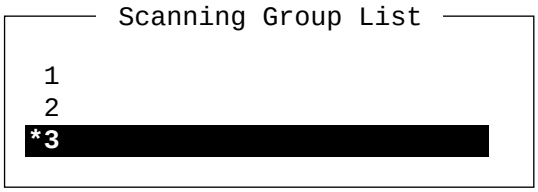


Figure 5-12 Scanning group list

2. Select a scan group and press the [Enter] key.
3. The scanning starts and the indication "Scan" appears in inverse video on the communication status display. (The name of the scan group appears at the "Station Name".)

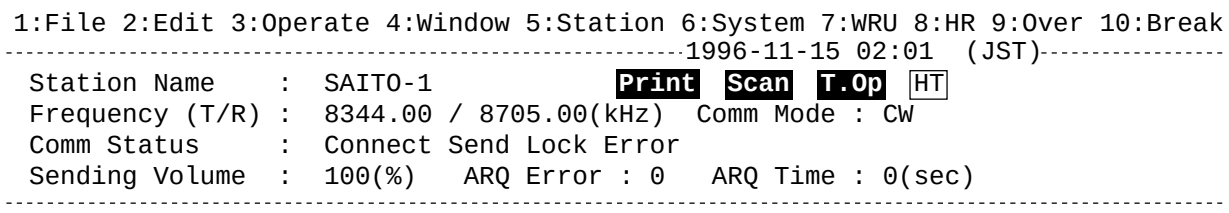


Figure 5-13 Communication status display

4. To stop scanning, press function key [F3] and then the [5] key.

5.10 Communication Buffer

The communication buffer is a temporal memory which stores transmitting messages or receiving messages. To display the contents of the comunication buffer;

1. Escape from the communication display.
2. Press the [PgDn] or [PgUp] key. The contens of the communication buffer are displayed.

To print them, press [Ctrl] and [P] keys simultaneously. To erase them from the screen, press [PgDn] key again.

6. WINDOW MENU

The Window menu allows you to display one of the following together with the current screen:

1) Navigation data

2) Calendar

3) Remote controller screen (Remote A or Remote B)

4) Distress frequencies

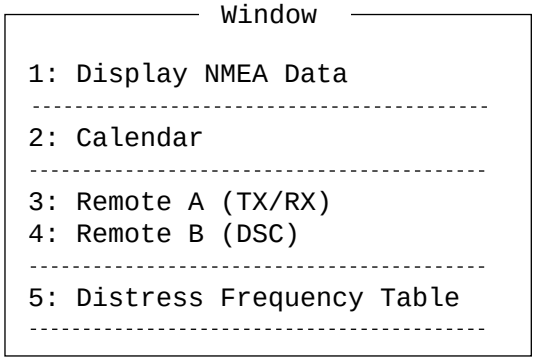


Figure 6-1 Window menu

6.1 Window Menu Description

Display NMEA Data

With connection of a navaid and appropriate sensors which output nav data in IEC1162 (NMEA0183) format, position, speed, water temperature, depth and heading can be displayed. Press function key [F4] and the [1] key. Asterisks appear where there is no data.

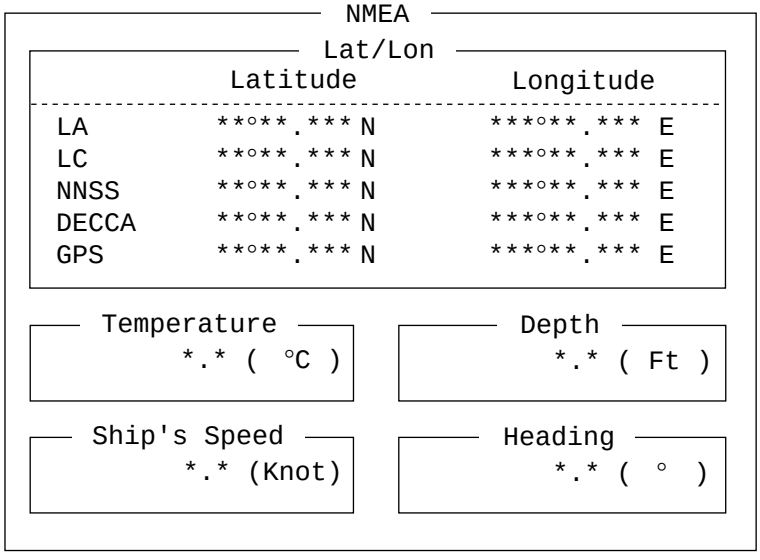


Figure 6-2 NMEA data display

Calendar

The Calendar menu displays the calendar of any combination of month and year you desire. Press function key [F4] and the [2] key. To change year or month, select it by the [↑]/[↓] keys and change by the [←]/[→] keys.

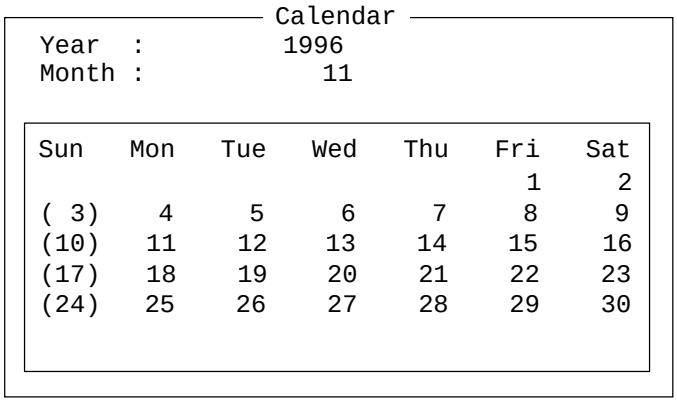


Figure 6-3 Calendar

Remote A, Remote B

This menu permits remote control of a FURUNO transceiver, receiver or transmitter connected to Remote A or Remote B terminal. Press function key [F4] and the [3] key (Remote A) or the [4] key (Remote B).

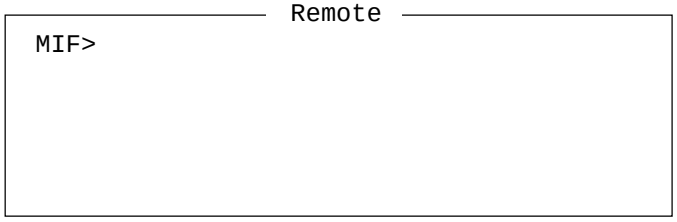


Figure 6-4 Remote screen

Distress Frequency Table

This menu displays all current distress frequencies. Press function key [F4] and the [5] key.

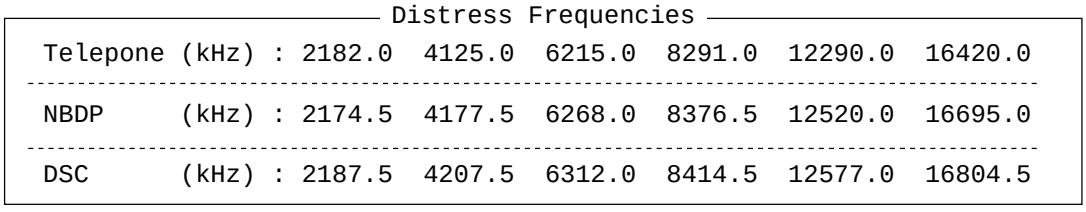


Figure 6-5 Distress frequency table

7. MARITEX OPERATION

This chapter provides an overview to the MARITEX system. For detailed information, consult your MARITEX Traffic Manual.

7.1 What is MARITEX?

MARITEX, an acronym meaning MARItime TEleX, is a world-wide, round-the-clock, fully automatic and computerized network for maritime radiotelex. The MARITEX system is operated jointly by the Telecom Administrations of Denmark, Finland, Iceland, Norway, and Sweden. The system consists of the Central Computer System in Gothenburg, Sweden, run with two high technology computers, and sub-stations in Scandinavia, Panama, Manila, and Argentina. The Central System does all the message switching and co-ordinates the sub-station resources.

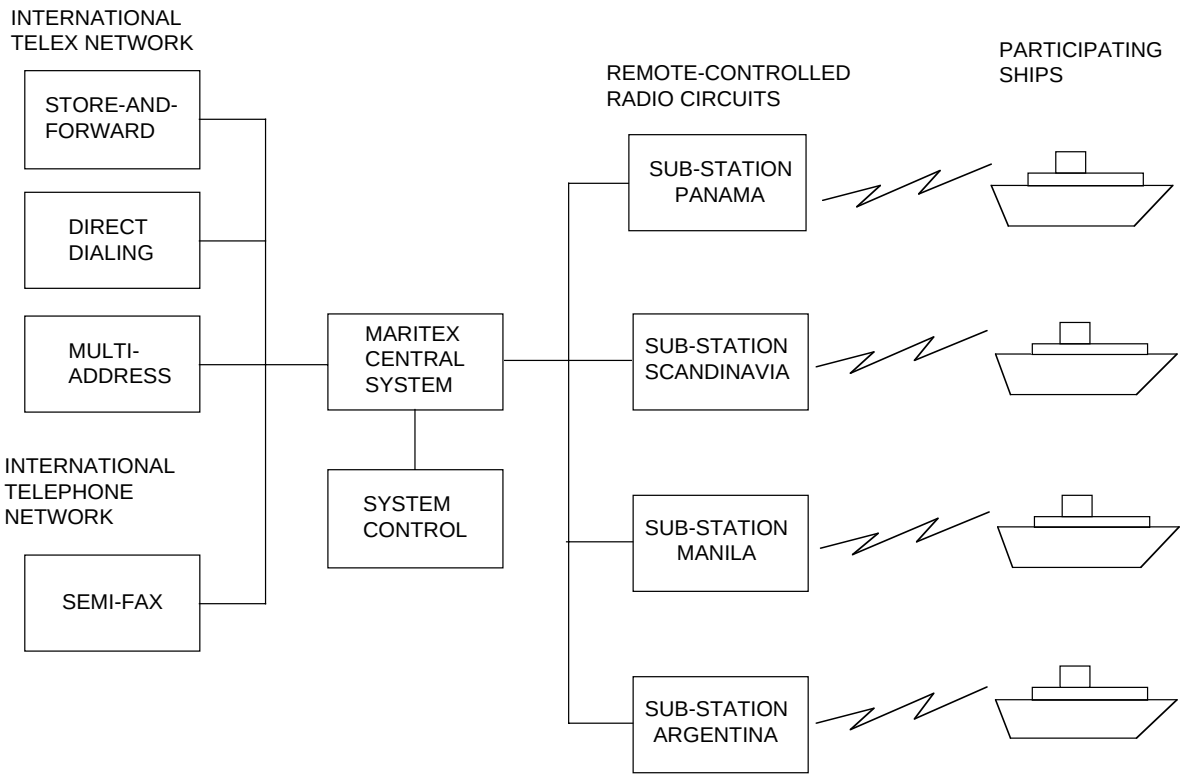


Figure 7-1 MARITEX system and services

MARITEX Services

MARITEX provides four main services to MARITEX subscribers:

- Store-and-forward telex
- Direct dialing
- Multi address
- Semi-fax

Note: *MARITEX provides both shore-to-ship and ship-to-shore services. This manual, however, describes only the ship-to-shore communication procedures.*

7.2 Preparations for Transmission

To transmit a message in the MARITEX system, you will need to register three items:

- Answerback code
- Scan groups
- Station names

Registering Answerback Code

MARITEX assigns a Telex number to all MARITEX subscribers. This number functions as an answerback code. An answerback code contains the following:

OOOOO SHIP X

OOOOO: MARITEX-assigned five-digit Telex code
SHIP: Ship name
X: For shipboard station, normally X is entered.

The procedure for registering answerback code is the same as which appears on page 3-1. If an answerback code was registered before the commissioning of the MARITEX station a new answerback code must be entered. To enter new answerback code, contact FURUNO or authorized FURUNO agent or dealer.

Registering Scan Groups

The Central System emits a free-signal to indicate a MARITEX radio channel is in idle condition and available for ship-to-shore calls. The free-signal is detected and recognized by the shipboard equipment as a permission to start the transmission. Then, the shipboard operator initiates a call.

You can scan search for the free-signal automatically by registering MARITEX radio channels in scan group(s). The procedure for registering scan groups for MARITEX use is the same as that which appears on page 3-7.

1. Press function key [F5] to display the Station menu.
2. Press the [3] key to select Scan Entry. The screen should look something like Figure 7-2.

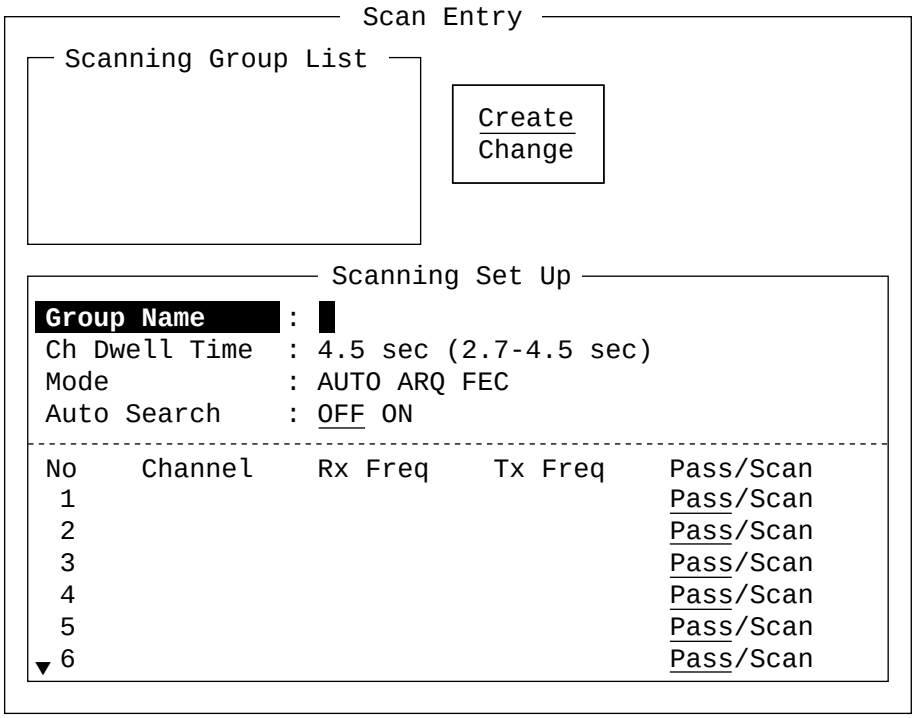


Figure 7-2 Scan entry screen

3. If Create is not underlined, press [→], [↑] and the [Enter] key to underline it.
4. Group Name appears in inverse video, meaning you can enter scan group name. Enter scan group name; for example, MARITEX-A.
5. Press the [↓] key to advance the cursor to Ch Dwell Time. The dwell times is the time in seconds the receiver waits on each channel before it selects the next channel. The default setting is 2.7 seconds. Change the setting if necessary.

6. Press the [↓] key to advance the cursor to Mode. Select the communication mode, AUTO, ARQ or FEC.

7. Press the [↓] key to advance the cursor to Auto Search. Turn Auto Search ON or OFF;

   Auto Search ON: Radio stops scanning when it finds the strongest (S/N ratio) free-signal frequency. Use it where signal propagation in poor.

   Auto Search OFF: Scanning starts and stops with the first-received free-signal frequency. Normally, use this position.

8. Press [↓] to place the cursor on the No. 1 line. Enter channel or user channel. See the table on the next page for MARITEX radio channel information. Then, press the [→] key to select "Scan".

9. Press [↓] to advance the cursor to the No. 2 line. Enter channel number. Repeat this procedure for other channels, up to 20.

10. Press the [Enter] key.

11. Press the [Enter] key again to register scan group.

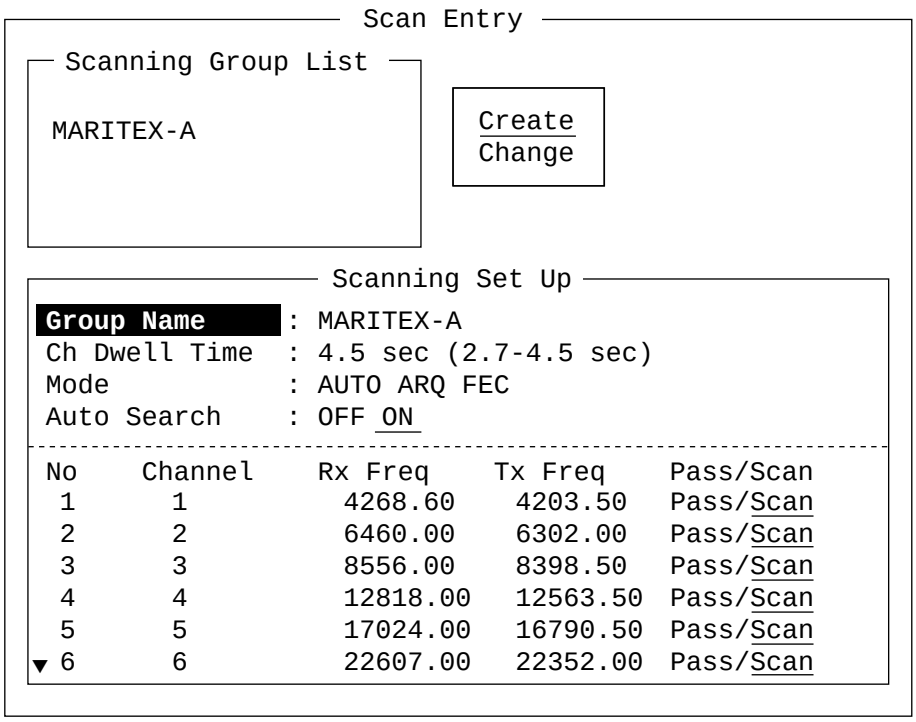


Figure 7-3 Scan entry screen

To enter another scan group, select Create and then press the [Enter] key. Repeat steps 3 – 9.

Table 7-1 MARITEX Channel

ITU Channel	MARITEX No.	Coast Station TX (kHz)	Ship Station Tx (kHz)	Location
UP	A7	2423.5	3267.5	SWEDEN
UP	B7	2716.0	2477.0	SWEDEN
UP	D7	1905.0	2222.0	SWEDEN
UP	A1	4268.6	4203.5	SWEDEN
4009	B1	4214.5	4176.5	SWEDEN
4014	C1	4216.5	4179.0	SWEDEN
UP	A2	6460.0	6302.0	SWEDEN
6001	B2	6314.5	6263.0	SWEDEN
6019	C2	6323.0	6272.0	SWEDEN
UP	A3	8556.0	8398.5	SWEDEN
8007	B3	8419.5	8379.5	SWEDEN
8024	C3	8428.0	8388.0	SWEDEN
UP	A4	12818.0	12563.5	SWEDEN
12006	B4	12582.0	12479.5	SWEDEN
12024	C4	12591.0	12488.5	SWEDEN
UP	A5	17024.0	16790.5	SWEDEN
16014	B5	16813.5	16690.0	SWEDEN
16064	C5	16838.0	16715.0	SWEDEN
16057	C7	16834.5	16711.5	SWEDEN
UP	A6	22607.3	22352.0	SWEDEN
22007	B6	22379.5	22287.5	SWEDEN
22032	C6	22392.0	22300.0	SWEDEN
8017	D3	8424.5	8384.5	PANAMA
12008	D4	12583.0	12480.5	PANAMA
16033	D5	16822.5	16699.5	PANAMA
22031	D6	22391.5	22299.5	PANAMA
4006	F1	4213.0	4175.0	ARGENTINA
8040	F3	8436.0	8396.0	ARGENTINA
12050	F4	12604.0	12501.5	ARGENTINA
16188	F5	16900.0	16782.0	ARGENTINA
22040	F6	22396.0	22304.0	ARGENTINA
16164	F7	16888.0	16770.0	ARGENTINA
6001	G3	6314.5	6263.0	SAN FRANCISCO
8028	G4	8430.0	8390.0	SAN FRANCISCO
12028	G5	12593.0	12490.5	SAN FRANCISCO
16028	G6	16820.0	16697.0	SAN FRANCISCO
8027	G1	8429.5	8389.5	NEW ORLEANS
12067	G2	12612.5	12510.0	NEW ORLEANS
4019		4219.0	4181.5	CHINA/GUANGZHOU
6031		6329.0	6283.0	CHINA/GUANGZHOU
8030		8431.0	8391.0	CHINA/GUANGZHOU
12088		12622.5	12520.5	CHINA/GUANGZHOU
16096		16854.0	16731.0	CHINA/GUANGZHOU

Valid on 1997.

UP means no ITU channel assigned. You can use register these as user channels.

Registering Stations

The next step is to enter station name. The procedure is the same as the procedure shown on page 3-3. The station list provides abbreviated dialing with storage for up to 50 stations.

1. Press function key [F5] and the [1] key. The Station Entry screen appears.

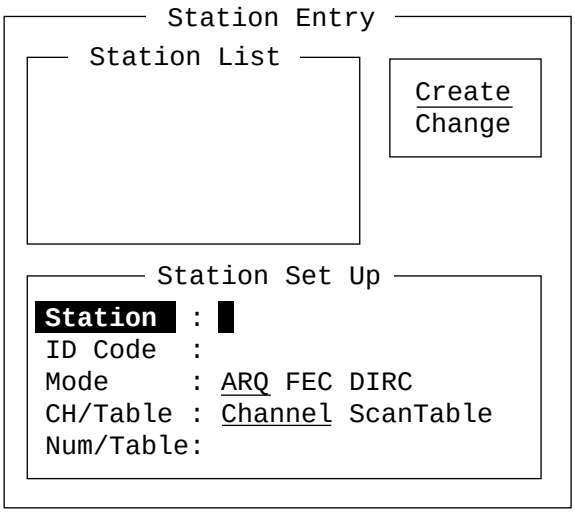


Figure 7-4 Station entry screen

2. If Create is not underlined, press [→], [↑] and the [Enter] key to underline it.
3. The cursor is on the Station line. Enter station name, using up to 20 characters.
4. Press the [↓] key to go to the ID Code line. Enter station ID code; the coast station selective call number common to all stations is 2950.
5. Press the [↓] key to go to the Mode line. The MARITEX system uses the ARQ mode.
6. Select ScanTable on the CH/Table line.
7. Press [↓] to go to Num/Table.

8. Press the [→] key to display the Scanning Group List.

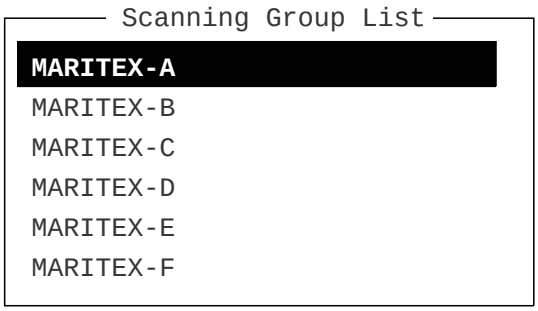


Figure 7-5 Scanning group list (example)

9. Select scan group.

10. Press the [Enter] key. To enter another station name, repeat the above procedure from step 2.

Note: *To establish the connection with a MARITEX station, the receiving frequencies in the scan group registered are scanned to detect a free signal from the station. If the free signal is detected, a message will be automatically transmitted to the station.*

7.3 Preparing Programs for Automatic Message Transmission

This section shows you how to prepare the programs necessary for automatic message transmission. The programs, which you can save to a floppy disk for future use, enable unattended automatic transmission.

The program for automatic transmission is called a macrofile. You will need several types of macrofiles depending on the MARITEX service to be utilized.

Commands

The tables which follow describe the commands for automatic transmission.

Table 7-2 describes the commands processed by the DP-6.

Table 7-2 Commands processed by the DP-6

Command (prefixed with @)	**Parameter**	**Content**
CALL	S: Station Name I: ID	Calling station name and ID on assigned parameter
FREE (support command for CALL)	Two digits 0?99 min.	Free-signal searching time according to assigned parameter (default setting: 10 min.)
RETRY (support command for CALL)	Two digits 0?99 min.	Calling according to assigned parameter (default setting: 10 min.)
CASE	Text	For receving a message (designanted by parameter) transmitted by coast station
TIMEOUT (support command for CASE)	Two digits 0?99 min.	Time alloted for reception of message by CASE command
SEND	Text	Text transmitted according to assigned parameters
	B:file name	Send a file from floppy disk
WRU HR OVER BREAK	None	Function keys [F7] ? [F10]
DISPLAY	Text	Text of message appears
INPUT	None	Waiting for keyboard input Transmit keyboard input message

After reception of GA+?, enter appropriate short-code command. Table 7-3 shows the commands processed by MARITEX stations.

Table 7-3 MARITEX short-code commands

Command	Use
TLX ..... +	Store-and-forward Telex
DIRTLX ..... +	Direct dialing Telex
MULTI ..... +	Multi-address
FAX ..... +	Semi-fax
MSG+	Request pending messages from shore
NNNN+	Terminate message
BRK+	Clear the radio circuit

Other MARITEX short-code commands are as below.

Table 7-4 Other MARITEX short-code commands

Command	Use
POS+	Transmission of ship position reports
URG+	Safety, urgency and distress messages
MED+	Request medical advice
LTR+	For MARITEX letters mailed from the Operations Center to destinations worldwide
TST+	Request to MARITEX to send a test message consisting of all Telex characters
MRK+	Request to MARITEX to send a continuous mark tone for one minute

Note: *For other supporting and facility commands, consult the MARITEX Traffic Manual.*

Store-and-Forward Telex

The following is the sequence of events in transmission of Telex message in MARITEX.

1. Shipboard station sends message to MARITEX coast station.
2. MARITEX coast station stores message in memory buffer.
3. Shipboard station and MARITEX coast station clear the radio circuit.
4. MARITEX station sends message to subscriber designated.

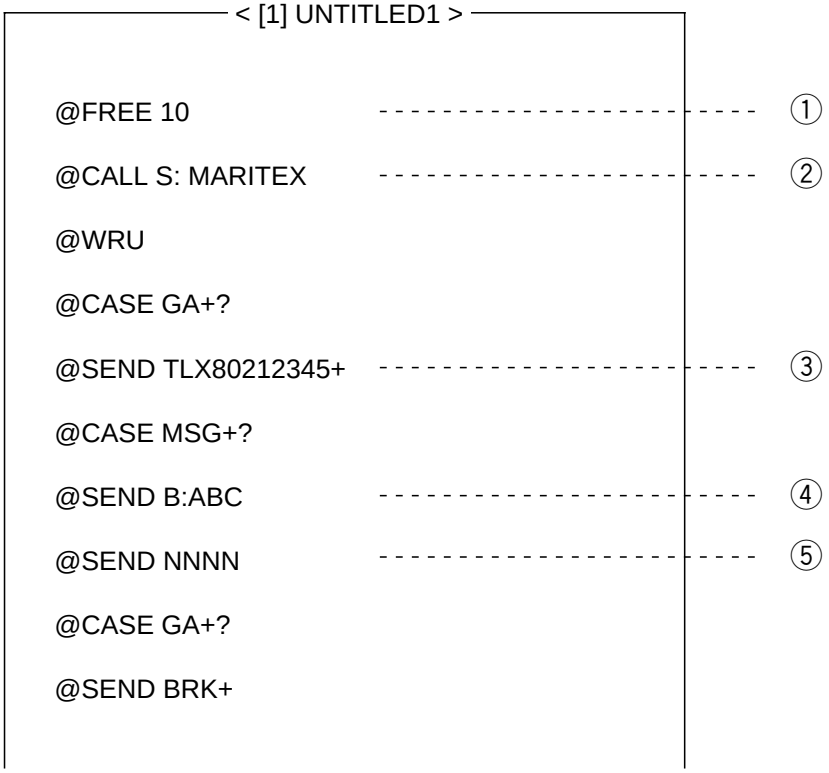
No.	Procedure	Display	Remarks
1	Call MARITEX.	CONNECT appears in inverse video (and bell sounds).	Free-signal found; radio circuit ready.
2	Transmit WRU signal.	MARITEX X 26 X X X SHIP X GA+?	Initial identity exchange between coast station and shipboard station
3	Key in subscriber's Telex number. Example: (Hong Kong) 12345		
	TLX80212345+	MSG+?	Request to start message transmission
4	Transmit file.		Message transmission
5	When transmission is completed, type NNNN.	26 X X X SHIP X MARITEX S DURATION DATE GA+?	Transmit your answerback code. Receive MARITEX station's answerback code. Tx time and date appear on DP-6.
6	Transmit BREAK command to clear radio circuit.		

Preparing a macrofile for store-and-forward Telex

You will need a macrofile to enable automatic message transmission on store-and-forward Telex. After preparing it, save it to the hard disk or a floppy disk for future use.

1. Press function key [F1] to display the File menu.
2. Press the [1] key.
3. Prepare macrofile.

The figure below shows the minimum information required to send a store-and-forward Telex message in MARITEX.



① Free-signal search time (10 minutes
② Station name (Example: MARITEX)
Who are you?
Station identity exchange
③ Subscriber's Telex number (in example, 802 is country code of Hong Kong) for store-and-forward Telex
④ Location and name of file message
⑤ Request for termination of message

Figure 7-6 Example macrofile for store-and-forward Telex

4. Press function key [F1] to display the File menu.

5. Press the [5] key. The Save prompt appears on the display.

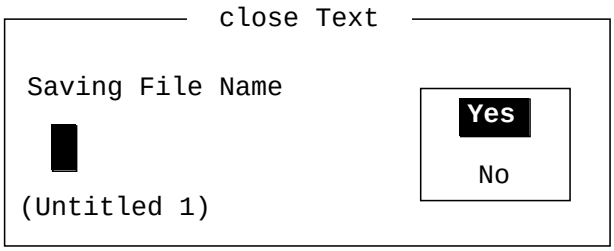


Figure 7-7 Save prompt

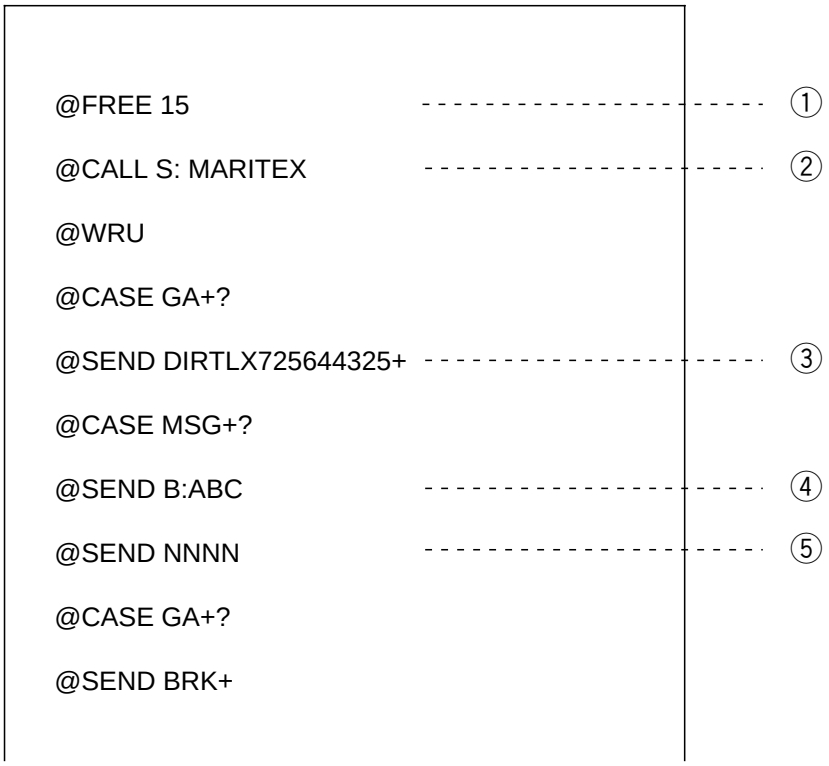
6. Press the [Enter] key and enter a file name as follows.

   OOOOOOOO.MCR
   ↑ ↑
   File Name (max. 8 characters) Extension Name

7. Press the [Enter] key.

Macrofile for Direct Dialing

The direct dialing features allows you to contact a land subscriber via MARITEX. Below is an example of a macrofile for direct dialing



① Free-signal search time (15 minutes
② Station name (Example: MARITEX)
Who are you?
Station identity exchange
③ Subscriber's Telex number (in example, 72 is country code of JAPAN) for direct dialing mode
④ Location and name of file message
⑤ Request for termination of message

Figure 7-8 Example macrofile for direct dialing

Procedure for direct dialing

No.	Procedure	Display	Remarks
1	Call MARITEX.	CONNECT appears in inverse video (and bell sounds).	Free-signal found; radio circuit ready.
2	Transmit WRU signal.	MARITEX X 26 X X X SHIP X GA+?	Initial identity exchange between coast station and shipboard station
3	Key in subscriber's Telex number. Example: (Japan) 725644325		
	DIRTLX725644325+	12:20 MOM 5644325 FURUNO J MSG+?	Request to start message transmission
4	Transmit prepared file or input message manually through keyboard.		Message transmission
5	When transmission is completed, type NNNN.	26 X X X SHIP X 5644325 FURUNO J DURATION DATE GA+?	Transmit your answerback code. Receive MARITEX station's answerback code. Tx time and date appear on DP-6.
6	Transmit BREAK command to clear radio circuit.		

Macrofile for Multi Address

The figure which follows shows an example of a macrofile for multi address use.

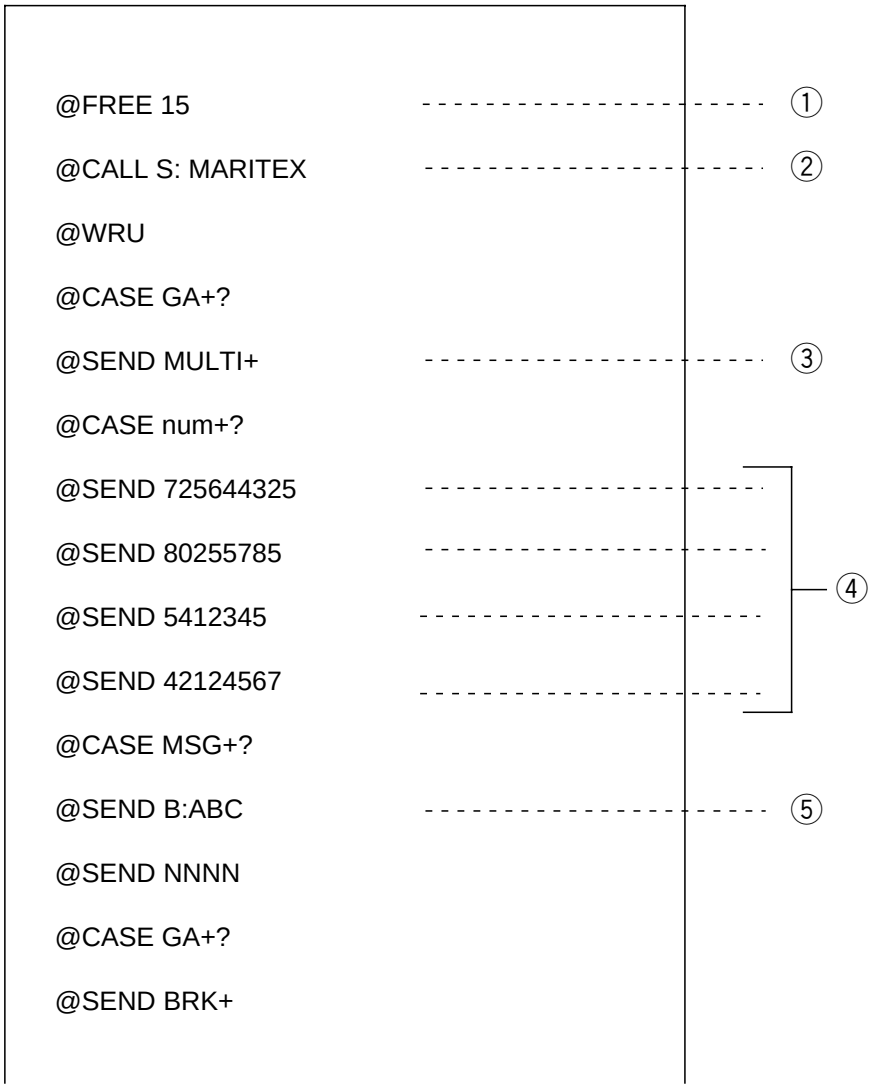


Figure 7-9 Example of macrofile for use in multi address

Macrofile for Semi-fax

In the Semi-fax option, MARITEX converts ship-to-shore direction telex message to facsimile and retransmits it via the telephone network.

The figure below shows an example of a macrofile for Semi-fax. The macrofile for Semi-fax is the same as the macrofile for store-and-forward and direct dialing except for the FAX command.

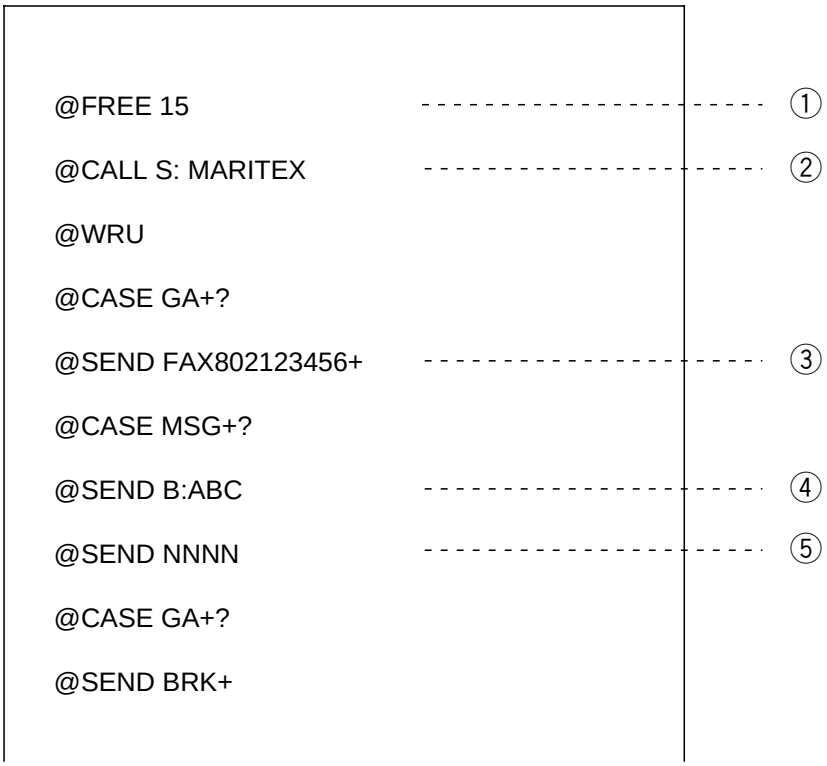


Figure 7-10 Example of macrofile for semi-fax

7.4 Transmitting in MARITEX System

This section describes how to transmit a Telex message in MARITEX.

Basic Procedure

1. Register answerback code (Telex number assigned by MARITEX).
2. Register MARITEX frequency and channel to scan group.
3. Register station name including scan group name.
4. Retrieve appropriate macrofile. Include station name and message file name. Type message and save file to memory.
5. Open macro operation menu and select macrofile. (See next page for details.) Your message will be transmitted automatically. Below is the sequence of automatic message transmission in MARITEX.

   1) Search for free-signal

   2) Call MARITEX station on MARITEX radio channel.

   3) After connection is established, identity exchange

   4) Transmission of service category and subscriber's address

   5) Transmission of message

   6) Transmission of termination of message signal

   7) Identity exchange

   8) Clearing of radio circuit

Actual Transmission

1. Press function key [F3] to display the Operate menu.

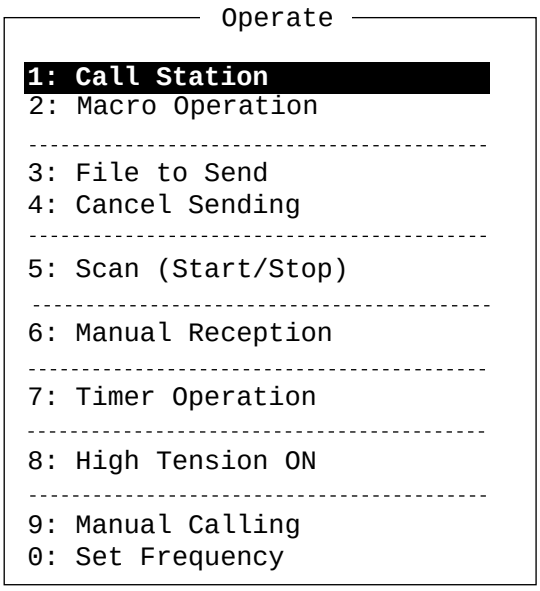


Figure 7-11 Operate menu

2. Press the [2] key. The Call Macro screen appears.

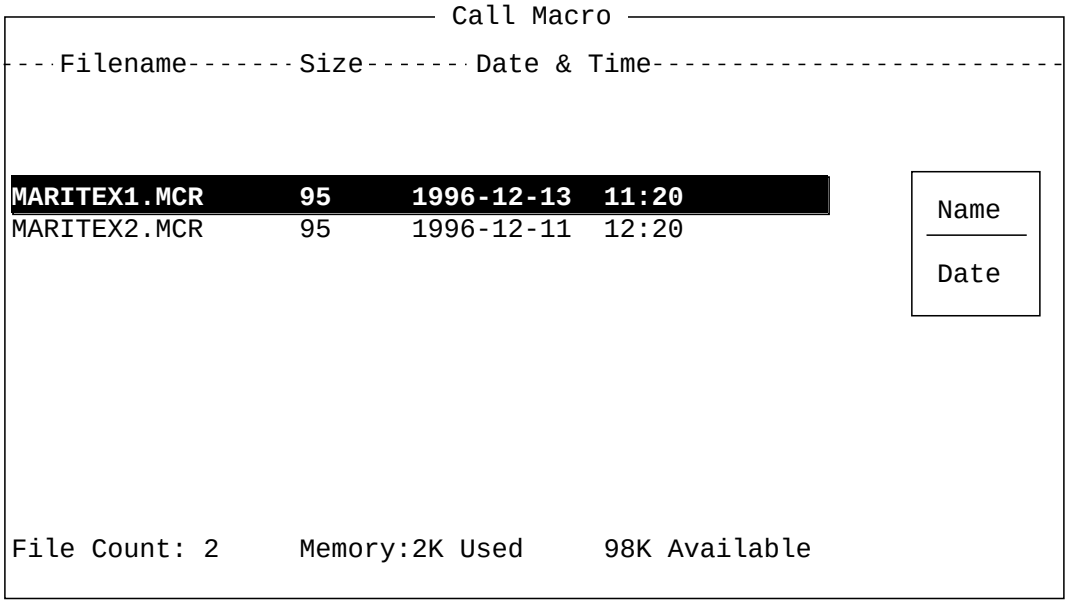


Figure 7-12 Call macro screen

3. Select desired macrofile and press the [Enter] key.

4. Press the [Enter] key to confirm the macrofile selected. The Wait for Free Signal indication appears. Your message will be transmitted automatically.

8. MAINTENANCE AND TROUBLESHOOTING

⚠ WARNING

Do not work inside the equipment unless totally familiar with electrical circuits.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment.

8.1 Maintenance

Regular maintenance is important for good performance. A regular maintenance program should be established and should at least include the following:

Cleaning the Equipment

Wipe of accumulated dust from the equipment with a soft cloth. An anti-static cleaner may be used to clean the screen of the terminal unit. Do not use commercial cleaners to clean the equipment. They can remove paint and markings.

Connectors and Earth Connection

Periodically check the connectors for proper seating and the earth connection for rust. Remove rust to maintain a good ground system.

Floppy Disk Drive

Clean the floppy disk drive head regularly to prevent erasure of information stored on disks.

8.2 Simple Troubleshooting

Power Supply

If the power cannot be applied (power lamp on the main unit does not light):

- Check for loosened power cable connector on the rear or bottom of units. Check that the ship's mains main switch is turned on. Confirm that power is present at the connector (pin #1:(+), pin #2: (-)).

Unit	Input Voltage
Main unit	24 VDC
Terminal unit	24 VDC

- Check if the breaker on the rear panel of the terminal unit has tripped. If it has tripped, push it in to reset the equipment.

8.3 Diagnostic Tests

Self Test

1. Press function key [F6] to display the System menu.

```
                        System
Setup                    Lock  Change   Default
------------------------------------------------------------
Slave Delay              5 msec (0- 50 msec)
BK Timing PreTone       10 msec (0-100 msec)
          PostTone       0 msec (0- 20 msec)
Mute Timing PreBK        0 msec (0- 20 msec)
            PostBK       0 msec (0- 20 msec)
------------------------------------------------------------
Modem Output Level      0 dBm (-30 - +10 dBm)
------------------------------------------------------------
MIF Tune                OFF  O N
    Freeze              OFF  O N
    AGC                 OFF  O N
    Emission            OFF  O N
------------------------------------------------------------
TX/RX MSG Save          OFF  O N
Edit Before sending     OFF  O N
------------------------------------------------------------
Time System             OFF UTC SMT JST
Time & Date             1997/1/1/12:34:56
Display Mode            Normal Reverse
Self Test
```

Figure 8-1 System menu

2. Select Change on the Setup line.

3. Select Self Test.

4. Press the [Enter] key. The results of the self test are displayed a short time later.

```
Self Test

Terminal Unit Test : ver. 1.20          :OK
Main Unit Test     : ver. 1.17          :OK
Modem Unit Test    : ver. 1.18          :OK
Radio Unit Test    : ID xxxx*1          :OK
DSC Unit Test      : ID xxxx*1          :OK
Printer Unit Test*2: Printer not Ready  :NG
```

*1: Actual ID numbers appears.
*2: OK replaces NG when printer is turned on and normal.

Figure 8-2 Self test results

If NG appears for any unit checked, try the self test again. If it appears again, call for service.

Tone Test

1. Select Self Test on the System menu.
2. While pressing and holding down the [Shift] key, press the [↓] key.

```
Tone Test

1: Tone Test 1 (All Char)
2: Tone Test 2 (Fox)
3: Tone Test 3 (Beta)
4: Tone Test 4 (Mark)
5: Tone Test 5 (Space)
6: Tone Test 6 (BY)
```

Figure 8-3 Tone test

3. Select test and press the [Enter] key. You may stop a test at anytime by pressing the [Enter] key.

Tone test 1 (All characters)

This test (continuously) checks for proper transmission of all figures, letters and codes. To conduct the test, call a station in the ARQ or FEC modes. Execute the test, confirming that all characters are transmitted correctly. "Now testing Tone Test 1" appears during the testing. Since the test is conducted continuously, you may press [Esc] twice and [F10] key to stop the test and return to the tone test menu.

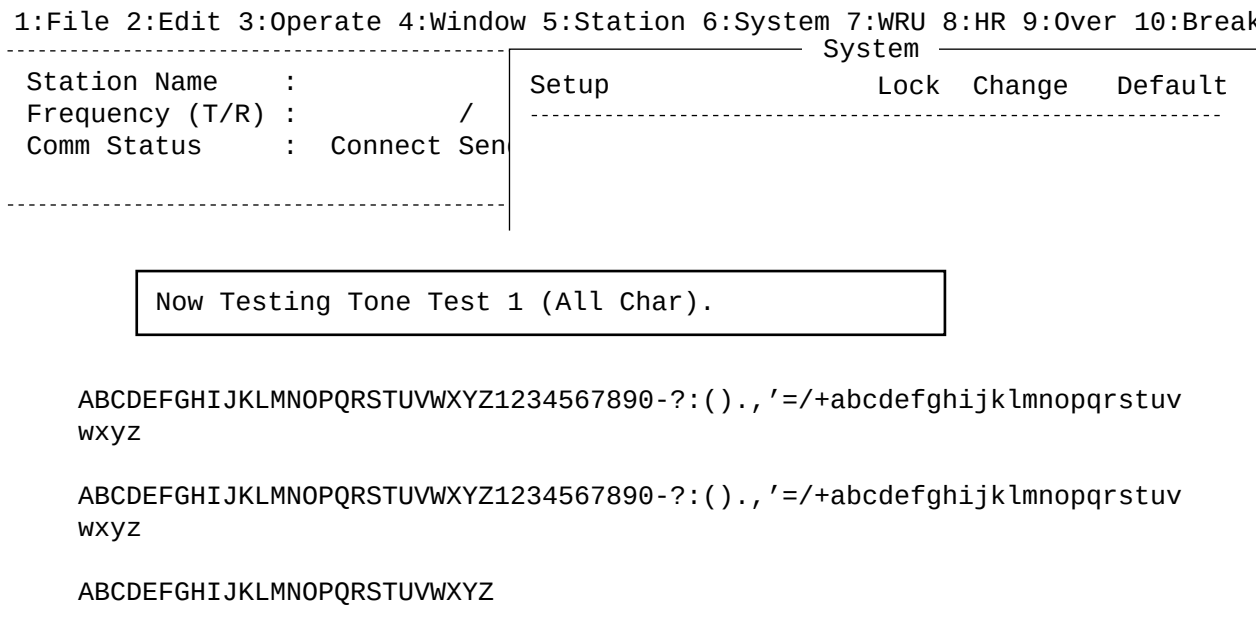


Figure 8-4 All characters test screen

Tone test 2 (Fox)

This test (continuously) checks for proper transmission of the test message THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 0123456789. In order to conduct the test call a station over the ARQ or FEC mode.

Tone test 3 (Beta)

You may check for proper transmission of the idle signal β. Call up a station using the ARQ mode.

Tone test 4 (Mark)

This test outputs the mark signal through the LINE OUT terminal, where a frequency counter may be connected, to confirm its frequency (1615 Hz).

Tone test 5 (Space)

Tone test 5 verifies the space signal frequency (1785 Hz).

Tone test 6 (BY)

This test verifies the frequency of the space B (1785 Hz) and mark Y (1615 Hz), using a spectrum analyzer.

APPENDIX 1 ITU TELEX CHANNELS/ FREQUENCY LIST

ITU TELEX FREQUENCY TABLE (1/4)

FURUNO

4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND		
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX
4001	4172.5	4210.5	6001	6263.0	6314.5	8001	8376.5	8376.5	12001	12477.0	12579.5	16001	16683.5	16807.0	18001	18870.5	19681.0	22001	22284.5	22376.5	25001	25173.0	26101.0
4002	4173.0	4211.0	6002	6263.5	6315.0	8002	8377.0	8417.0	12002	12477.5	12580.0	16002	16684.0	16807.5	18002	18871.0	19681.5	22002	22285.0	22377.0	25002	25173.5	26101.5
4003	4173.5	4211.5	6003	6264.0	6315.5	8003	8377.5	8417.5	12003	12478.0	12580.5	16003	16684.5	16808.0	18003	18871.5	19682.0	22003	22285.5	22377.5	25003	25174.0	26102.0
4004	4174.0	4212.0	6004	6264.5	6316.0	8004	8378.0	8418.0	12004	12478.5	12581.0	16004	16685.0	16808.5	18004	18872.0	19682.5	22004	22286.0	22378.0	25004	25174.5	26102.5
4005	4174.5	4212.5	6005	6265.0	6316.5	8005	8378.5	8418.5	12005	12479.0	12581.5	16005	16685.5	16809.0	18005	18872.5	19683.0	22005	22286.5	22378.5	25005	25175.0	26103.0
4006	4175.0	4213.0	6006	6265.5	6317.0	8006	8379.0	8419.0	12006	12479.5	12582.0	16006	16686.0	16809.5	18006	18873.0	19683.5	22006	22287.0	22379.0	25006	25175.5	26103.5
4007	4175.5	4213.5	6007	6266.0	6317.5	8007	8379.5	8419.5	12007	12480.0	12582.5	16007	16686.5	16810.0	18007	18873.5	19684.0	22007	22287.5	22379.5	25007	25176.0	26104.0
4008	4176.0	4214.0	6008	6266.5	6318.0	8008	8380.0	8420.0	12008	12480.5	12583.0	16008	16687.0	16810.5	18008	18874.0	19684.5	22008	22288.0	22380.0	25008	25176.5	26104.5
4009	4176.5	4214.5	6009	6267.0	6318.5	8009	8380.5	8420.5	12009	12481.0	12583.5	16009	16687.5	16811.0	18009	18874.5	19685.0	22009	22288.5	22380.5	25009	25177.0	26105.0
4010	4177.0	4215.0	6010	6267.5	6319.0	8010	8381.0	8421.0	12010	12481.5	12584.0	16010	16688.0	16811.5	18010	18875.0	19685.5	22010	22289.0	22381.0	25010	25177.5	26105.5
4011	4177.5	4215.5	6011	6268.0	6319.5	8011	8381.5	8421.5	12011	12482.0	12584.5	16011	16688.5	16812.0	18011	18875.5	19686.0	22011	22289.5	22381.5	25011	25178.0	26106.0
4012	4178.0	4216.0	6012	6268.5	6319.5	8012	8382.0	8422.0	12012	12482.5	12585.0	16012	16689.0	16812.5	18012	18876.0	19686.5	22012	22290.0	22382.0	25012	25178.5	26106.5
4013	4178.5	4216.5	6013	6269.0	6320.0	8013	8382.5	8422.5	12013	12483.0	12585.5	16013	16689.5	16813.0	18013	18876.5	19687.0	22013	22290.5	22382.5	25013	25179.0	26107.0
4014	4179.0	4216.5	6014	6269.5	6320.5	8014	8383.0	8423.0	12014	12483.5	12586.0	16014	16690.0	16813.5	18014	18877.0	19687.5	22014	22291.0	22383.0	25014	25179.5	26107.5
4015	4179.5	4217.0	6015	6270.0	6321.0	8015	8383.5	8423.5	12015	12484.0	12586.5	16015	16690.5	16814.0	18015	18877.5	19688.0	22015	22291.5	22383.5	25015	25180.0	26108.0
4016	4180.0	4217.5	6016	6270.5	6321.5	8016	8384.0	8424.0	12016	12484.5	12587.0	16016	16691.0	16814.5	18016	18878.0	19688.5	22016	22292.0	22384.0	25016	25180.5	26108.5
4017	4180.5	4218.0	6017	6271.0	6322.0	8017	8384.5	8424.5	12017	12485.0	12587.5	16017	16691.5	16815.0	18017	18878.5	19689.0	22017	22292.5	22384.5	25017	25181.0	26109.0
4018	4181.0	4218.5	6018	6271.5	6322.5	8018	8385.0	8425.0	12018	12485.5	12588.0	16018	16692.0	16815.5	18018	18879.0	19689.5	22018	22293.0	22385.0	25018	25181.5	26109.5
4019	4181.5	4219.0	6019	6272.0	6323.0	8019	8385.5	8425.5	12019	12486.0	12588.5	16019	16692.5	16816.0	18019	18879.5	19690.0	22019	22293.5	22385.5	25019	25182.0	26110.0
4020	4202.5	4202.5	6020	6272.5	6323.5	8020	8386.0	8426.0	12020	12486.5	12589.0	16020	16693.0	16816.5	18020	18880.0	19690.5	22020	22294.0	22386.0	25020	25182.5	26110.5
4021	4203.0	4203.0	6021	6273.0	6324.0	8021	8386.5	8426.5	12021	12487.0	12589.5	16021	16693.5	16817.0	18021	18880.5	19691.0	22021	22294.5	22386.5	25021	25183.0	26111.0
4022	4203.5	4203.5	6022	6273.5	6324.5	8022	8387.0	8427.0	12022	12487.5	12590.0	16022	16694.0	16817.5	18022	18881.0	19691.5	22022	22295.0	22387.0	25022	25183.5	26111.5
4023	4204.0	4204.0	6023	6274.0	6325.0	8023	8387.5	8427.5	12023	12488.0	12590.5	16023	16694.5	16818.0	18023	18881.5	19692.0	22023	22295.5	22387.5	25023	25184.0	26112.0
4024	4204.5	4204.5	6024	6274.5	6325.5	8024	8388.0	8428.0	12024	12488.5	12591.0	16024	16695.0	16818.5	18024	18882.0	19692.5	22024	22296.0	22388.0	25024	25184.5	26112.5
4025	4205.0	4205.0	6025	6275.0	6326.0	8025	8388.5	8428.5	12025	12489.0	12591.5	16025	16695.5	16818.5	18025	18882.5	19693.0	22025	22296.5	22388.5	25025	25185.0	26113.0
4026	4205.5	4205.5	6026	6275.5	6326.5	8026	8389.0	8429.0	12026	12489.5	12592.0	12026	16696.0	16919.0	18026	18883.0	19693.5	22026	22297.0	22389.0	25026	25185.5	26113.5
4027	4206.0	4206.0	6027	6281.0	6327.0	8027	8389.5	8429.5	12027	12490.0	12592.5	16027	16696.5	16819.5	18027	18883.5	19694.0	22027	22297.5	22389.5	25027	28186.0	26114.0
4028	4206.5	4206.5	6028	6281.5	6327.5	8028	8390.0	8430.0	12028	12490.5	12593.0	16028	16697.0	16820.0	18028	18884.0	19694.5	22028	22298.0	22390.0	25028	25186.5	26114.5
4029	4207.0	4207.0	6029	6282.0	6328.0	8029	8390.5	8430.5	12029	12491.0	12593.5	16029	16697.5	16820.5	18029	18884.5	19695.0	22029	22298.5	22390.5	25029	25187.0	26115.0
4030	4207.5	4207.5	6030	6282.5	6328.5	8030	8391.0	8431.0	12030	12491.5	12594.0	16030	16698.0	16821.0	18030	18885.0	19695.5	22030	22299.0	22391.0	25030	25187.5	26115.5
4031	4208.0	4219.5	6031	6283.0	6329.0	8031	8391.5	8431.5	12031	12492.0	12594.5	16031	16698.5	16821.5	18031	18885.5	19696.0	22031	22299.5	22391.5	25031	25188.0	26116.0
4032	4208.5	4220.0	6032	6283.5	6329.5	8032	8392.0	8432.0	12032	12492.5	12595.0	16032	16999.0	16822.0	18032	18886.0	19696.5	22032	22300.0	22392.0	25032	25188.5	26116.5
4033	4209.0	4220.5	6033	6284.0	6330.0	8033	8392.5	8432.5	12033	12493.0	12595.5	16033	16999.5	16822.5	18033	18886.5	19697.0	22033	22300.5	22392.5	25033	25189.0	26117.0
			6034	6284.5	6330.5	8034	8393.0	8433.0	12034	12493.5	12596.0	16034	16700.0	16823.0	18034	18887.0	19697.5	22034	22301.0	22393.0	25034	25189.5	26117.5
			6035	6300.5	6300.5	8035	8393.5	8433.5	12035	12494.0	12596.5	16035	16700.5	16823.5	18035	18887.5	19698.0	22035	22301.5	22393.5	25035	25190.0	26118.0
			6036	6301.0	6301.0	8036	8394.0	8434.0	12036	12494.5	12597.0	16036	16701.0	16824.0	18036	18888.0	19698.5	22036	22302.0	22394.0	25036	25190.5	26118.5
			6037	6301.5	6302.0	8037	8394.5	8434.5	12037	12495.0	12597.5	16037	16701.5	16824.5	18037	18888.5	19699.0	22037	22302.5	22394.5	25037	25191.0	26119.0
			6038	6302.0	6302.5	8038	8395.0	8435.0	12038	12495.5	12598.0	16038	16702.0	16825.0	18038	18889.0	19699.5	22038	22303.0	22395.0	25038	25191.5	26119.5
			6039	6302.5	6303.0	8039	8395.5	8435.5	12039	12496.0	12598.5	16039	16702.5	16825.5	18039	18889.5	19700.0	22039	22303.5	22395.5	25039	25192.0	26120.0
			6040	6303.0	6303.0	8040	8396.0	8436.0	12040	12496.5	12599.0	16040	16703.0	16826.0	18040	18890.0	19700.5	22040	22304.0	22396.0	25040	25192.5	26120.5
			6041	6303.5	6303.5	8041	8396.5	8396.5	12041	12497.0	12599.5	16041	16703.5	16826.5	18041	18890.5	19701.0	22041	22304.5	22396.5	25041	25193.0	25193.0
			6042	6304.0	6304.0	8042	8397.0	8397.0	12042	12497.5	12600.0	16042	16704.0	16827.0	18042	18891.0	19701.5	22042	22305.0	22397.0	25042	25193.5	25193.5
			6043	6304.5	6304.5	8043	8397.5	8397.5	12043	12498.0	12600.5	16043	16704.5	16827.5	18043	18891.5	19702.0	22043	22305.5	22397.5	25043	25194.0	25194.0
			6044	6305.0	6305.0	8044	8398.0	8398.0	12044	12498.5	12601.0	16044	16705.0	16828.0	18044	18892.0	19702.5	22044	22306.0	22398.0	25044	25194.5	25194.5
			6045	6305.5	6305.5	8045	8398.5	8398.5	12045	12499.0	12601.5	16045	16705.5	16828.5	18045	18892.5	19703.0	22045	22306.5	22398.5	25045	25195.0	25195.0
			6046	6306.0	6306.0	8046	8399.0	8399.0	12046	12499.5	12602.0	16046	16706.0	16829.0	18046	18893.0	18893.0	22046	22307.0	22399.0	25046	25195.5	25195.5
			6047	6306.5	6306.5	8047	8399.5	8399.5	12047	12500.0	12602.5	16047	16706.5	16829.5	18047	18893.5	18893.5	22047	22307.5	22399.5	25047	25196.0	25196.0
			6048	6307.0	6307.0	8048	8400.0	8400.0	12048	12500.5	12603.0	16048	16707.0	16830.0	18048	18894.0	18894.0	22048	22308.0	22400.0	25048	25196.5	25196.5
			6049	6307.5	6307.5	8049	8400.5	8400.5	12049	12501.0	12603.5	16049	16707.5	16830.5	18049	18894.5	18894.5	22049	22308.5	22400.5	25049	25197.0	25197.0
			6050	6308.0	6308.0	8050	8401.0	8401.0	12050	12501.5	12604.0	16050	16708.0	16831.0	18050	18895.0	18895.0	22050	22309.0	22401.0	25050	25197.5	25197.5
			6051	6308.5	6308.5	8051	8401.5	8401.5	12051	12502.0	12604.5	16051	16708.5	16831.5	18051	18895.5	18895.5	22051	22309.5	22401.5	25051	25198.0	25198.0
			6052	6309.0	6309.0	8052	8402.0	8402.0	12052	12502.5	12605.0	16052	16709.0	16832.0	18052	18896.0	18896.0	22052	22310.0	22402.0	25052	25198.5	25198.5
			6053	6309.5	6309.5	8053	8402.5	8402.5	12053	12503.0	12605.5	16053	16709.5	16832.5	18053	18896.5	18896.5	22053	22310.5	22402.5	25053	25199.0	25199.0
			6054	6310.0	6310.0	8054	8403.0	8403.0	12054	12503.5	12606.0	16054	16710.0	16833.0	18054	18897.0	18897.0	22054	22311.0	22403.0	25054	25199.5	25199.5
			6055	6310.5	6310.5	8055	8403.5	8403.5	12055	12504.0	12606.5	16055	16710.5	16833.5	18055	18897.5	18897.5	22055	22311.5	22403.5	25055	25200.0	25200.0
			6056	6311.0	6311.0	8056	8404.0	8404.0	12056	12504.5	12607.0	16056	16711.0	16834.0	18056	18898.0	18898.0	22056	22312.0	22404.0	25056	25200.5	25200.5
			6057	6311.5	6311.5	8057	8404.5	8404.5	12057	12505.0	12607.5	16057	16711.5	16834.5	18057	18898.5	18898.5	22057	22312.5	22404.5	25057	25201.0	25201.0
			6058	6312.0	6312.0	8058	8405.0	8405.0	12058	12505.5	12608.0	16058	16712.0	16835.0	18058	18899.0	18899.0	22058	22313.0	22405.0	25058	25201.5	25201.5
			6059	6312.5	6312.5	8059	8405.5	8405.5	12059	12506.0	12608.5	16059	16712.5	16835.5	18059	18899.5	19704.5	22059	22313.5	22405.5	25059	25202.0	25202.0
			6060	6313.0	6313.0	8060	8406.0	8406.0	12060	12506.5	12609.0	16060	16713.0	16836.0				22060	22314.0	22406.0	25060	25202.5	25202.5
			6061	6313.5	6332.0	8061	8406.5	8406.5	12061	12507.0	12609.5	16061	16713.5	16836.5				22061	22314.5	22406.5	25061	25203.0	25203.0
						8062	8407.0	8407.0	12062	12507.5	12610.0	16062	16714.0	16837.0				22062	22315.0	22407.0	25062	25203.5	25203.5
						8063	8407.5	8407.5	12063	12508.0	12610.5	16063	16714.5	16837.5				22063	22315.5	22407.5	25063	25204.0	25204.0
						8064	8408.0	8408.0	12064	12508.5	12611.0	16064	16715.0	16838.0				22064	22316.0	22408.0	25064	25204.5	25204.5
						8065	8408.5	8408.5	12065	12509.0	12611.5	16065	16715.5	16838.5				22065	22316.5	22408.5	25065	25205.0	25205.0

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ITU TELEX FREQUENCY TABLE (2/4)

4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND		
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX
						8066	8409.0	8409.0	12066	12509.5	12612.0	16066	16716.0	16839.0				22066	22317.0	22409.0	25066	25205.5	25205.5
						8067	8409.5	8409.5	12067	12510.0	12612.5	16067	16716.5	16839.5				22067	22317.5	22490.5	25067	25206.0	25206.0
						8068	8410.0	8410.0	12068	12510.5	12613.0	16068	16717.0	16840.0				22068	22318.0	22410.0	25068	25206.5	25206.5
						8069	8410.5	8410.5	12069	12511.0	12613.5	16069	16717.5	16840.5				22069	22318.5	22410.5	25069	25207.0	25207.0
						8070	8411.0	8411.0	12070	12511.5	12614.0	16070	16718.0	16841.0				22070	22319.0	22411.0	25070	25207.5	25207.5
						8071	8411.5	8411.5	12071	12512.0	12614.5	16071	16718.5	16841.5				22071	22319.5	22411.5	25071	25208.0	25208.0
						8072	8412.0	8412.0	12072	12512.5	12615.0	16072	16719.0	16842.0				22072	22320.0	22412.0	25072	25208.5	26121.0
						8073	8412.5	8412.5	12073	12513.0	12615.5	16073	16719.5	16842.5				20073	22320.5	22412.5	25073	25209.0	26121.5
						7074	8413.0	8413.0	12074	12513.5	12616.0	16074	16720.0	16843.0				22074	22321.0	22413.0	25074	25209.5	26122.0
						8075	8413.5	8413.5	12075	12514.0	12616.5	16075	16720.5	16843.5				22075	22321.5	22413.5			
						8076	8414.0	8414.0	12076	12514.5	12617.0	16076	16721.0	16844.0				22076	22322.0	22414.0			
						8077	8414.5	8414.5	12077	12515.0	12617.5	16077	16721.5	16844.5				22077	22322.5	22414.5			
						8078	8415.0	8436.5	12078	12515.5	12618.0	16078	16722.0	16845.0				22078	22323.0	22415.0			
						8079	8415.5	8437.0	12079	12516.0	12618.5	16079	16722.5	16845.5				22079	22323.5	22415.5			
						8080	8416.0	8437.5	12080	12516.5	12619.0	16080	16723.0	16846.0				22080	22324.0	22416.0			
									12081	12517.0	12619.5	16081	16723.5	16846.5				22081	22324.5	22416.5			
									12082	12517.5	12620.0	16082	16724.0	16847.0				22082	22325.0	22417.0			
									12083	12518.0	12620.5	16083	16724.5	16847.5				22083	22325.5	22417.5			
									12084	12518.5	12621.0	16084	16725.0	16848.0				22084	22326.0	22418.0			
									12085	12519.0	12621.5	16085	16725.5	16848.5				22085	22326.5	22418.5			
									12086	12519.5	12622.0	16086	16726.0	16849.0				22086	22327.0	22419.0			
									12087	12520.0	12520.0	16087	16726.5	16849.5				22087	22327.5	22419.5			
									12088	12520.5	12622.5	16088	16727.0	16850.0				22088	22328.0	22420.0			
									12089	12521.0	12623.0	16089	16727.5	16850.5				22089	22328.5	22420.5			
									12090	12521.5	12623.5	16090	16728.0	16851.0				22090	22329.0	22421.0			
									12091	12522.0	12624.0	16091	16728.5	16851.5				22091	22329.5	22421.5			
									12092	12522.5	12624.5	16092	16729.0	16852.0				22092	22330.0	22422.0			
									12093	12523.0	12625.0	16093	16729.5	16852.5				22093	22330.5	22422.5			
									12094	12523.5	12625.5	16094	16730.0	16853.0				22094	22331.0	22423.0			
									12095	12524.0	12626.0	16095	16730.5	16853.5				22095	22331.5	22423.5			
									12096	12524.5	12626.5	19096	16731.0	16854.0				22096	22332.0	22424.0			
									12097	12525.0	12627.0	16097	16731.5	16854.5				22097	22332.5	22424.5			
									12098	12525.5	12627.5	16098	16732.0	16855.0				22098	22333.0	22425.0			
									12099	12526.0	12628.0	16099	16732.5	16855.5				22099	22333.5	22425.5			
									12100	12526.5	12628.5	16100	16733.0	16856.0				22100	22334.0	22426.0			
									12101	12527.0	12629.0	16101	16733.5	16856.5				22101	22334.5	22426.5			
									12102	12527.5	12629.5	16102	16739.0	16857.0				22102	22335.0	22427.0			
									12103	12528.0	12630.0	16103	16739.5	16857.5				22103	22335.5	22427.5			
									12104	12528.5	12630.5	16104	16740.0	16858.0				22104	22336.0	22428.0			
									12105	12529.0	12631.0	16105	16740.5	16858.5				22105	22336.5	22428.5			
									12106	12529.5	12631.5	16106	16741.0	16859.0				22106	22337.0	22429.0			
									12107	12530.0	12632.0	16107	16741.5	16859.5				22107	22337.5	22429.5			
									12108	12530.5	12632.5	16108	16742.0	16860.0				22108	22338.0	22430.0			
									12109	12531.0	12633.0	16109	16742.5	16860.5				22109	22338.5	22430.5			
									12110	12531.5	12633.5	16110	16743.0	16861.0				22110	22339.0	22431.0			
									12111	12532.0	12634.0	16111	16743.5	16861.5				22111	22339.5	22431.5			
									12112	12532.5	12634.5	16112	16744.0	16862.0				22112	22340.0	22432.0			
									12113	12533.0	12635.0	16113	16744.5	16862.5				22113	22340.5	22432.5			
									12114	12533.5	12635.5	16114	16745.0	16863.0				22114	22341.0	22433.0			
									12115	12534.0	12636.0	16115	16745.5	16863.5				22115	22341.5	22433.5			
									12116	12534.5	12636.5	16116	16746.0	16864.0				22116	22342.0	22434.0			
									12117	12535.0	12637.0	16117	16746.5	16864.5				22117	22342.5	22434.5			
									12118	12535.5	12637.5	16118	16747.0	16865.0				22118	22343.0	22435.0			
									12119	12536.0	12638.0	16119	16747.5	16865.5				22119	22343.5	22435.5			
									12120	12536.5	12638.5	16120	16748.0	16866.0				22120	22344.0	22436.0			
									12121	12537.0	12639.0	16121	16748.5	16866.5				22121	22344.5	22436.5			
									12122	12537.5	12639.5	16122	16749.0	16867.0				22122	22345.0	22437.0			
									12123	12538.0	12640.0	16123	16749.5	16867.5				22123	22345.5	22437.5			
									12124	12538.5	12640.5	16124	16750.0	16868.0				22124	22346.0	22438.0			
									12125	12539.0	12641.0	16125	16750.5	16868.5				22125	22346.5	22438.5			
									12126	12539.5	12641.5	16126	16751.0	16869.0				22126	22347.0	22439.0			
									12127	12540.0	12642.0	16127	16751.5	16869.5				22127	22347.5	22439.5			
									12128	12540.5	12642.5	16128	16752.0	16870.0				22128	22348.0	22440.0			
									12129	12541.0	12643.0	16129	16752.5	16870.5				22129	22348.5	22440.5			
									12130	12541.5	12643.5	16130	16753.0	16871.0				22130	22349.0	22441.0			

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ITU TELEX FREQUENCY TABLE (3/4)

4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND		
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX
									12131	12542.0	12644.0	16131	16753.5	16871.5				22131	22349.5	22441.5			
									12132	12542.5	12644.5	16132	16754.0	16872.0				22132	22350.0	22442.0			
									12133	12543.0	12645.0	16133	16754.5	16872.5				22133	22350.5	22442.5			
									12134	12543.5	12645.5	16134	16755.0	16873.0				22134	22351.0	22443.0			
									12135	12544.0	12646.0	16135	16755.5	16873.5				22135	22351.5	22443.5			
									12136	12544.5	12646.5	16136	16756.0	16874.0				22136	22352.0	22352.0			
									12137	12545.0	12647.0	16137	16756.5	16874.5				22137	22352.5	22352.5			
									12138	12545.5	12647.5	16138	16757.0	16875.0				22138	22353.0	22353.0			
									12139	12546.0	12648.0	16139	16757.5	16875.5				22139	22353.5	22353.5			
									12140	12546.5	12648.5	16140	16758.0	16876.0				22140	22354.0	22354.0			
									12141	12547.0	12649.0	16141	16758.5	16876.5				22141	22354.5	22354.5			
									12142	12547.5	12649.5	16142	16759.0	16877.0				22142	22355.0	22355.0			
									12143	12548.0	12650.0	16143	16759.5	16877.5				22143	22355.5	22355.5			
									12144	12548.5	12650.5	16144	16760.0	16878.0				22144	22356.0	22356.0			
									12145	12549.0	12651.0	16145	16760.5	16878.5				22145	22356.5	22356.5			
									12146	12549.5	12651.5	16146	16761.0	16879.0				22146	22357.0	22357.0			
									12147	12555.0	12652.0	16147	16761.5	16879.5				22147	22357.5	22357.5			
									12148	12555.5	12652.5	16148	16762.0	16880.0				22148	22358.0	22358.0			
									12149	12556.0	12653.0	16149	16762.5	16880.5				22149	22358.5	22358.5			
									12150	12556.5	12653.5	16150	16763.0	16881.0				22150	22359.0	22359.0			
									12151	12557.0	12654.0	16151	16763.5	16881.5				22151	22359.5	22359.5			
									12152	12557.5	12654.5	16152	16764.0	16882.0				22152	22360.0	22360.0			
									12153	12558.0	12655.0	16153	16764.5	16882.5				22153	22360.5	22360.5			
									12154	12558.5	12655.5	16154	16765.0	16883.0				22154	22361.0	22361.0			
									12155	12559.0	12656.0	16155	16765.5	16883.5				22155	22361.5	22361.5			
									12156	12559.5	12656.5	16156	16766.0	16884.0				22156	22362.0	22362.0			
									12157	12560.0	12560.0	16157	16766.5	16884.5				22157	22362.5	22362.5			
									12158	12560.5	12560.5	16158	16767.0	16885.0				22158	22363.0	22363.0			
									12159	12561.0	12561.0	16159	16767.5	16885.5				22159	22363.5	22363.5			
									12160	12561.5	12561.5	16160	16768.0	16886.0				22160	22364.0	22364.0			
									12161	12562.0	12562.0	16161	16768.5	16886.5				22161	22364.5	22364.5			
									12162	12562.5	12562.5	16162	16769.0	16887.0				22162	22365.0	22365.0			
									12163	12563.0	12563.0	16163	16769.5	16887.5				22163	22365.5	22365.5			
									12164	12563.5	12563.5	16164	16770.0	16888.0				22164	22366.0	22366.0			
									12165	12564.0	12564.0	16165	16770.5	16888.5				22165	22366.5	22366.5			
									12166	12564.5	12564.5	16166	16771.0	16889.0				22166	22367.0	22367.0			
									12167	12565.0	12565.0	16167	16771.5	16889.5				22167	22367.5	22367.5			
									12168	12565.5	12565.5	16168	16772.0	16890.0				22168	22368.0	22368.0			
									12169	12566.0	12566.0	16169	16772.5	16890.5				22169	22368.5	22368.5			
									12170	12566.5	12566.5	16170	16773.0	16891.0				22170	22369.0	22369.0			
									12171	12567.0	12567.0	16171	16773.5	16891.5				22171	22369.5	22369.5			
									12172	12567.5	12567.5	16172	16774.0	16892.0				22172	22370.0	22370.0			
									12173	12568.0	12568.0	16173	16774.5	16892.5				22173	22370.5	22370.5			
									12174	12568.5	12568.5	16174	16775.0	16893.0				22174	22371.0	22371.0			
									12175	12569.0	12569.0	16175	16775.5	16893.5				22175	22371.5	22371.5			
									12176	12569.5	12569.5	16176	16776.0	16894.0				22176	22372.0	22372.0			
									12177	12570.0	12570.0	16177	16776.5	16894.5				22177	22372.5	22372.5			
									12178	12570.5	12570.5	16178	16777.0	16895.0				22178	22373.0	22373.0			
									12179	12571.0	12571.0	16179	16777.5	16895.5				22179	22373.5	22373.5			
									12180	12571.5	12571.5	16180	16778.0	16896.0				22180	22374.0	22374.0			
									12181	12572.0	12572.0	16181	16778.5	16896.5				22181	22374.5	22444.0			
									12182	12572.5	12572.5	16182	16779.0	16897.0				22182	22375.0	22444.5			
									12183	12573.0	12573.0	16183	16779.5	16897.5				22183	22375.5	22445.0			
									12184	12573.5	12573.5	16184	16780.0	16898.0									
									12185	12574.0	12574.0	16185	16780.5	16898.5									
									12186	12574.5	12574.5	16186	16781.0	16899.0									
									12187	12575.0	12575.0	16187	16781.5	16899.5									
									12188	12575.5	12575.5	16188	16782.0	16900.0									
									12189	12576.0	12576.0	16189	16782.5	16900.5									
									12190	12576.5	12576.5	16190	16783.0	16901.0									
									12191	12577.0	12577.0	16191	16783.5	16901.5									
									12192	12577.5	12657.0	16192	16784.0	16902.0									
									12193	12578.0	12657.5	16193	16784.5	16902.5									
									12194	12578.5	12658.0	16194	16785.0	16785.0									
												16195	16785.5	16785.5									

FURUNO

ITU TELEX FREQUENCY TABLE (4/4)

4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND		
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX
												16196	16786.0	16786.0									
												16197	16786.5	16786.5									
												16198	16787.0	16787.0									
												16199	16787.5	16787.5									
												16200	16788.0	16788.0									
												16201	16788.5	16788.5									
												16202	16789.0	16789.0									
												16203	16789.5	16789.5									
												16204	16790.0	16790.0									
												16205	16790.5	16790.5									
												16206	16791.0	16791.0									
												16207	16791.5	16791.5									
												16208	16792.0	16792.0									
												16209	16792.5	16792.5									
												16210	16793.0	16793.0									
												16211	16793.5	16793.5									
												16212	16794.0	16794.0									
												16213	16794.5	16794.5									
												16214	16795.0	16795.0									
												16215	16795.5	16795.5									
												16216	16796.0	16796.0									
												16217	16796.5	16796.5									
												16218	16797.0	16797.0									
												16219	16797.5	16797.5									
												19220	16798.0	16798.0									
												16221	16798.5	16798.5									
												16222	16799.0	16799.0									
												16223	16799.5	16799.5									
												16224	16800.0	16800.0									
												16225	16800.5	16800.5									
												16226	16801.0	16801.0									
												16227	16801.5	16801.5									
												16228	16802.0	16802.0									
												16229	16802.5	16802.5									
												16230	16803.0	16803.0									
												16231	16803.5	16803.5									
												16232	16804.0	16804.0									
												16233	16804.5	16804.5									
												16234	16805.0	16903.0									
												16235	16805.5	16903.5									
												16236	16806.0	16904.0									

APPENDIX 2 INTERNATIONAL TELEX ABBREVIATIONS

Abbreviation	Meaning
ADV	Advise
ACK	Acknowledge
AGN	Again
BI (GS)	Good bye
BK	I cut off.
CFM	Confirm
COL	Collation
CRV	How do you receive?
DER	Out of order
DWN	Down
EEE	Error
FM	From
GA	Go ahead.
MNS	Minutes
MOM	Wait (Waiting)
MUTI	Mutilated
NA	Correspondence to this subscriber is not admitted.
NC	No circuits
NCH	Subscriber's number has been changed.
NP	The called party is not or no longer is a subscriber.
NR	Indicate your call number.
OCC	Subscriber is engaged.
OK	Agreed.
P (or 0)	Stop your transmission.
PLS (PSE)	Please
PPR	Paper
R (RCD)	Received
RAP	I will call you again.
RD	Read
RE	Referrring to
RPT	Repeat
SRY	Sorry
SVP	Please
TAX	What is the charge?
TEST MSG	Please send a test message?
THRU	You are in communication with telex position
TKS (TNX)	Thanks
TLX	Telex

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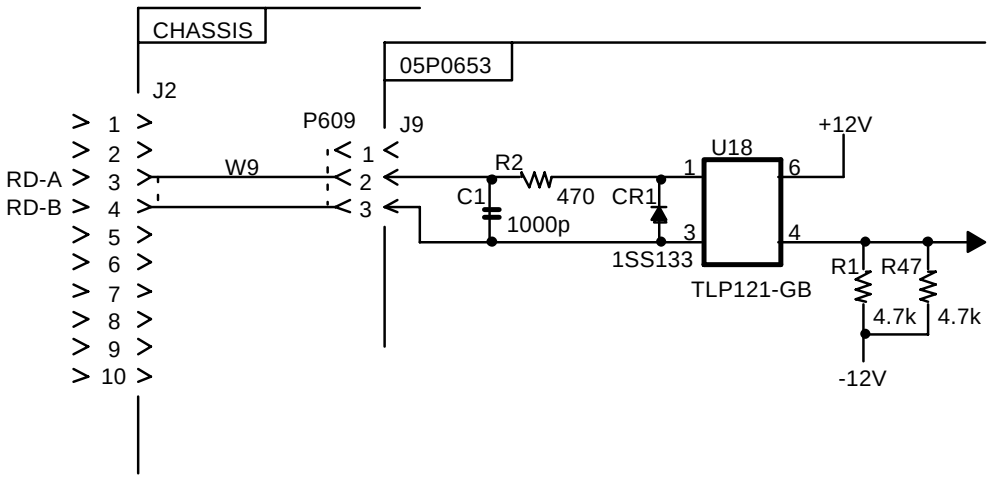
APPENDIX 3 Digital Interface (IEC 61162-1 Edition 2)

Input sentences

GLL, RMA, RMC

Schematic diagram

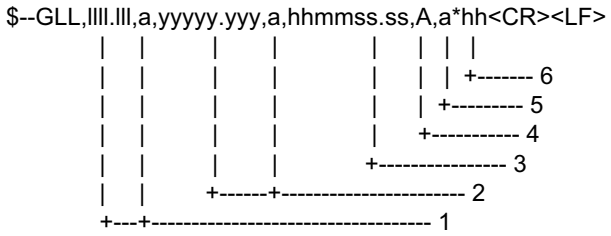
IEC1162 (NMEA)



Load requirements as listner

Isolation	Optocoupler
Input impedance	470 ohms
Max. Voltage	± 15V
Threshold	4 mA

GLL - Geographic position - latitude and longitude



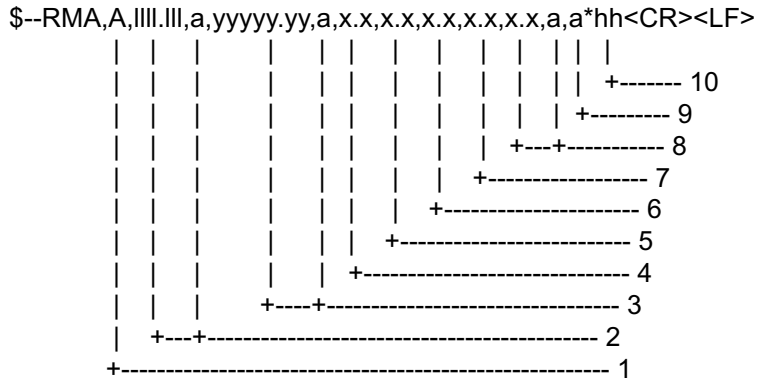
1. Latitude, N/S
2. Longitude, E/W
3. UTC of position
4. Status: A=data valid, V=data invalid
5. Mode indicator(see note)
6. Checksum

NOTE Positioning system Mode indicator:

A = Autonomous
D = Differential
E = Estimated (dead reckoning)
M = Manual input
S = Simulator
N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

RMA - Recommended minimum navigation information - Loran C data



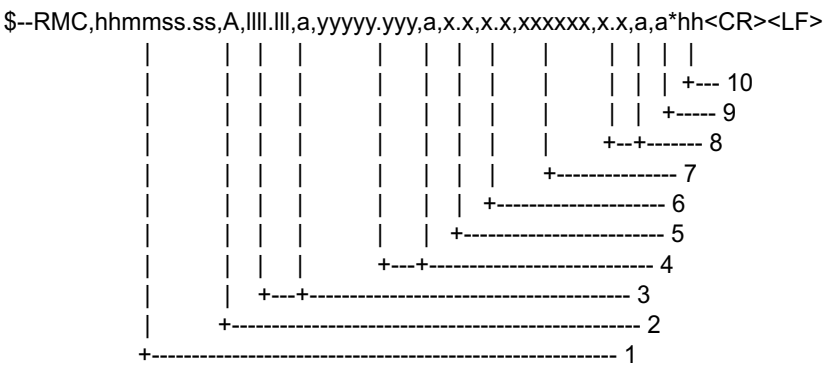
1. Status: A=data valid, V=blink, cycle or SNR warning
2. Latitude, degrees N/S
3. Longitude, degrees E/W
4. Time difference A, microseconds
5. Time difference B, microseconds
6. Speed over ground, knots
7. Course over ground, degrees true
8. Magnetic variation(see note 1),degree E/W
9. Mode indicator(see note 2)
10. Checksum

NOTE 1 - Easterly variation(E) subtracts from true course
Westerly variation(W) adds to true course

NOTE 2 Positioning system Mode indicator:
A = Autonomous
D = Differential
E = Estimated (dead reckoning)
M = Manual input
S = Simulator
N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

RMC - Recommended minimum specific GPS/ TRANSIT data



1. UTC of position fix
2. Status: A=data valid, V=navigation receiver warning
3. Latitude, N/S
4. Longitude, E/W
5. Speed over ground, knots
6. Course over ground, degrees true
7. Date: dd/mm/yy
8. magnetic variation, degrees E/W
9. Mode indicator(see note)
10. Checksum

NOTE Positioning system Mode indicator:

A = Autonomous
D = Differential
E = Estimated (dead reckoning)
M = Manual input
S = Simulator
N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

SPECIFICATIONS OF NBDP TERMINAL DP-6

1. COMMUNICATIONS

(1)	Communication Mode	ARQ, FEC
(2)	Communication Protocol	ITU-R Rec. M.625-3, M.490, M.491-1
(3)	ID Code	4, 5 and 9 digits
(4)	Line Code	4B/3Y fixed mark (International)
(5)	Modulation	AFSK
(6)	Tone Frequency (mark/space)	1615/1785 Hz, 1415/1585Hz, 1815/1985 Hz (±0.5Hz)
(7)	Tone Frequency Tracking Range	80Hz
(8)	Line Input/Output	-30 dBm to +10 dBm, 600 ohms balanced

2. COMMUNICATION FEATURES

Automatic transmission and receiving (maximum 10 stations)
Scramble operation (maximum 5 different code sets)
Frequency scanning (maximum 10 groups, 20 channels/group)
Morse code conversion (transmit only)
Storage for up to 100 user channels
Applicable to MARITEX.

3. TERMINAL UNIT (IB-581)

(1)	Display	Monochrome 9.5" LCD
(2)	Microprocessor	ALI M6117, 33 MHz
(3)	Memory	Flash EPROM: 2 MB, DRAM: 2MB
(4)	Disk Drive	720kB or 1.44kB 3.5" FDD
(5)	Keyboard	enhanced 82-key keyboard emulates the IBM PS/2 keyboard and includes embedded numeric and cursor control overlay and dedicated cursor control keys.

4. OTHER FEATURES

Text editing screen
Floppy disk management
Nav data input and display
Remote control of transceiver
Printing
Self-test

5. ENVIRONMENTAL CONDITIONS

(1)	Temperature	-15ºC to +55 ºC
(2)	Relative Humidity	93% (at 40 ºC)

6. POWER SUPPLY

(1)	Main Unit:	24 VDC: 0.84 A max.
(2)	Terminal Unit:	24 VDC: 0.75 A max.

7. COATING COLOR

(1)	Main Unit:	Munsell 2.5GY5/1.5
(2)	Terminal Unit	Panel: Munsell N3.0 (not changed)
		Cover: Munsell 2.5GY5/1.5

8. PRINTER (PP-510)

(3)	Printing Paper	Plain, impact dot, 216mm wide, 80 characters/line
(4)	Power Supply	24 VDC: 1.5 A max.
(5)	Environmental Condition	
	Ambient Temperature	5 to +35 ºC
	Relative Humidity	20 to 85% (non-condensing)

FURUNO ELECTRIC CO., LTD.
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Tel: +81 798-65-2111 Fax: +81 798-65-4200

Pub NO. DOC-466

Declaration of conformity 0560

We FURUNO ELECTRIC CO., LTD.

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

hereby declare under our sole responsibility that the product

NBDP terminal model DP-6 consisting of Main unit DP-6 and Terminal Unit IB-581

(Model names, type numbers)

to which this declaration relates conforms to the following standard(s) or normative document(s)

Standards	Test Standards
IMO Resolution MSC.36(63)	
IMO Resolutions A.699(17), A.700(17), A.806(19)	ETS 300 067: 1998-11 Amendment 1
IMO Resolution A.694(17)	EN 60945: 1997-01 (IEC 60945 Ed.03: 1996-11)
	IEC 61162-1: 2000-07
ITU-R Recommendations M.491-1, M.492-6, M.540-2, M.625-3, M.688	

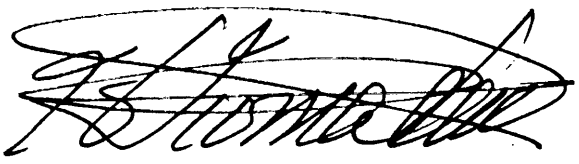
(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

- EC type-examination certificate N°: 99212004/AA/01 of 8 May 2002 issued by Telefication, The Netherlands
- Test report 963286(00) of 18 April 1997 and 963286(01) of 18 April 1997 issued by Telefication, The Netherlands

This declaration is issued according to the provisions of European Council Directive 96/98/EC on marine equipment modified by Commission Directive 2001/53/EC.

On behalf of Furuno Electric Co., Ltd.



Hiroaki Komatsu
Manager,
International Rules and Regulations

Nishinomiya City, Japan
June 17, 2002

(Place and date of issue)

(name and signature or equivalent marking of authorized person)