AE–1800 Instruction Manual
UM–AE1800–1.0
First Edition January, 2008

ALDEN

NAVTEX RECEIVER

MODEL **AE–1800**

INSTRUCTION MANUAL

WARRANTY

MORCOM International, Inc. (**MORCOM**) warrants the **AE–1800** NAVTEX Receiver and its active antenna **ANT–2000** against defects in materials and workmanship for a period of one year from the date of shipping from the factory, during which time **MORCOM** will, at its option, either repair or replace the products that prove to be defective.

Users shall ship defective products, freight prepaid, back to a specified **MORCOM** dealer for warranty service.

The warranty shall not apply to defects caused by:

- Misuse or incorrect usage
- Static discharges/lightning strikes to the antenna or to the receiver or other types of natural disaster
- RF power from radio transmitters in excess of 30V $_{RMS}$ at the antenna input
- Improper or inadequate maintenance by the user
- Unauthorized service including modification, realignment of the receiver/antenna
- User–supplied software or interfacing
- Operation outside the environmental specifications listed in the manual, or
- Improper installation

The above warranty applies to the original user with a proof of purchase.

Before returning the unit to your **MORCOM** dealer for warranty service, please obtain **MORCOM**'s return authorization.

When shipping the unit to your dealers for service, please be sure to include the following types of information:

- Serial number
- Software release date and revision (REV.) number
- Power supply voltage
- Installation details, including antenna height and surrounding environment
- Detailed description of trouble
- Valid proof of purchase from authorized **MORCOM** dealer

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IMPORTANT NOTES

1. RADIO FREQUENCY INTERFERENCE

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

2. PURPOSE OF THIS MANUAL

The purpose of this manual is to help the user operate and maintain the equipment. The information provided is not to be considered as a contractual specification.

3. USER'S RESPONSIBILITY

The **Alden Model AE–1800** NAVTEX Receiver obtains data transmitted from Government facilities. **MORCOM** International Inc. (**MORCOM**) makes no claim as to the accuracy, completeness or currency of the data since the **AE–1800** only provides a means of receiving the data. Users are completely responsible for verifying the correctness and currency of all data received, and **MORCOM** shall not be liable to users for any loss, damage or liability caused directly or indirectly by such use. Users are solely responsible for action taken or not taken as a result of the reception or non–reception of data.

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< WARNINGS >

1. INSTALLATION & OPERATING ENVIRONMENT

THE DISPLAY CABINET IS IN THE “PROTECTED” EQUIPMENT CATEGORY AS DEFINED UNDER IEC 60945(2002), AND IS NOT WEATHERIZED FOR OUTDOOR INSTALLATION/OPERATION. ANY DAMAGE CAUSED DIRECTLY OR INDIRECTLY THROUGH WATER INTRUSION IS NOT COVERED BY THE MANUFACTURER’S OR DEALER’S WARRANTY.

2. INSTALLATION & OPERATING PROCEDURES

ANY DAMAGE CAUSED BY INSTALLING OR OPERATING THE EQUIPMENT OUTSIDE THE SPECIFICATIONS DESCRIBED IN THIS MANUAL IS NOT COVERED BY THE MANUFACTURER’S OR DEALER’S WARRANTY.

CONTACT YOUR DEALER FOR WARRANTY CONDITIONS.

3. LIABILITY

● OPERATION

NEITHER THE MANUFACTURER NOR ITS DEALER IS RESPONSIBLE FOR ANY LOSS OF LIFE, PERSONAL INJURY OR DAMAGE TO THE PROPERTY RESULTING FROM THE USE OF THIS EQUIPMENT OR FROM BEING, FOR ANY REASON, UNABLE TO EITHER OPERATE THE EQUIPMENT OR RECEIVE INTENDED NAVTEX MESSAGES.

● MANUAL

REASONABLE PRECAUTIONS HAVE BEEN TAKEN TO PREPARE THIS MANUAL. HOWEVER, NEITHER THE MANUFACTURER NOR ITS DEALER ASSUMES ANY RESPONSIBILITY FOR ERRORS OR OMISSIONS.

< CAUTIONS >

1: Operational – Memory Retention Period

Do not leave the equipment switched off for more than 10 days continuously, or all stored messages will be erased, whether they are protected or not. Important messages you wish to preserve should be output to an optional printer or to a PC via an appropriate rear panel interface connector if the unit is to be kept turned off for extended periods of time.

2: Operational – "Memory–Full" Indication

As soon as the equipment has stored a total of 199 messages, the following caution will show up in the bottom command/prompts line along with 3 beeps:

MEMORY FULL ! [CLR] TO ACKNLG.

The oldest message will then be erased from memory automatically after reception of a next new message. As soon as you notice the above warning, be sure to acknowledge each unread message by pressing CLR, and if necessary, press STO MSG to protect important messages you wish to retain for permanent storage.

3: Environmental Safety – Equipment Disposal

The display cabinet and the active antenna unit are considered environmentally safe in their original, assembled forms. However, if either unit is to be discarded for any reason, be sure to follow all relevant local ordinances/regulations, and contact your dealer or the manufacturer (contact information given below) for assistance or instructions before disposing of it. Do not destroy the cabinet or the antenna casing.

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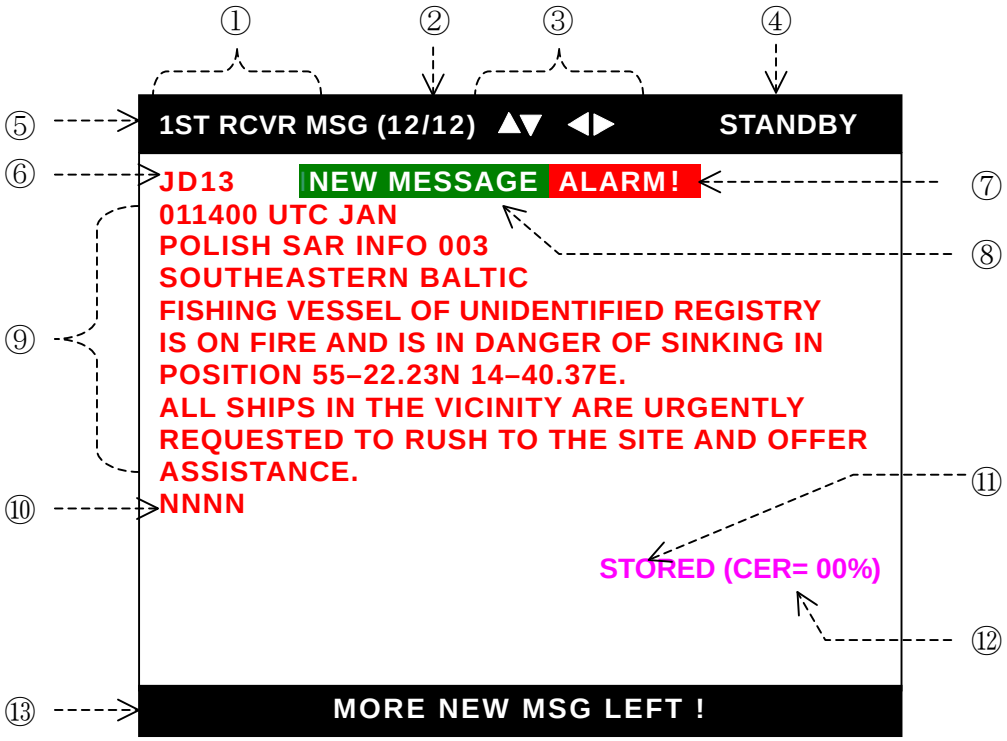
1. Typical NAVTEX Message Screen

1.1. Introduction

The illustration below represents a typical NAVTEX message screen, showing a new message received on the first (518 kHz) receiver. A similar screen will show up when the equipment is switched to receive a second receiver (490 kHz or 4209.5 kHz) message. A brief description of on–screen indications is given below and in the following pages.

Figure 1-1 Typical NAVTEX Message Screen (First Receiver Page)



① Indication of Receiver in Use to Display Current Messages

- **1ST RCVR**: First receiver, 518 kHz
- **2ND RCVR1**: Second receiver, 490 kHz or **2ND RCVR2**: 4209.5 kHz

The two receivers can be switched by pressing PAGE or by means of a software command from an IBS/INS terminal via the rear panel **RS–422** connector (INS port). See paragraph 7.4 for details.

② Message No. and Total No. of Messages Stored

The message number of the currently displayed message along with the total number of stored messages is indicated in the following format:

Examples:

- **12/12**: Message #12 (newest message) of 12 messages stored
- **1/12**: Message #1 (oldest message) of 12 messages stored

(*continued on next page*)

1. Typical NAVTEX Message Screen (*continued – 2/6*)

1.1. Introduction (*continued – 2/5*)

③ Message Scrolling Keys

The keys that can be used to manually scroll messages across the current screen are indicated.

- ▲▼: Line–by–line scrolling by pressing ▲ / ▼
- ◀ ▶: Message–by–message scrolling by pressing ◀ / ▶

NOTE: When a type–D message (SAR, piracy and armed robbery information) is received on either the first or second receiver, automatic scrolling will be disabled until the user acknowledges the message with STOP ALM *or with a software command from an IBS/INS terminal via the rear–panel* ***RS–422*** *connector. See paragraph 7.4 for details.*

④ Receiver Operating Status Indication

The current status of receiver operation is indicated here.

- **ABORTED**: The receiver has failed to lock onto the current transmission, due, for example, to weak signal level or noise interference. No message will be displayed or stored.

  NOTE: Signal propagation conditions change greatly with time. You might not be able to receive a signal in the daytime that can be received at night; this is normal and should not be considered as a sign of receiver malfunction.
- **ACQUIRING**: The receiver is currently in the process of locking onto the start of the current message transmission.
- **LOCKED**: The receiver has locked onto current NAVTEX transmission, allowing a message to be received. As soon as the equipmet starts receiving the message, this indication will be replaced by **RCVNG MSG**.
- **RCVNG MSG**: The receiver is properly receiving a message after locking onto current transmission. This blinking indication will stay until the end–of–message code **NNNN** (⑩) is received.

  NOTE: Whether to display or output the message to external devices depends on the character error rate (**CER**, ⑫) *and on the selection/rejection settings to be made via the procedure in paragraph 4.8.*
- **STANDBY**: The receiver is idling, waiting for a NAVTEX message transmission to begin. Most stations transmit messages every 4 hours.

⑤ Operating Status Line

The current status of receiver operation, text scroll keys, etc. are indicated here.

Examples:

- **1ST RCVR MSG**: Message received on the first receiver is currently displayed.
- **2ND RCVR MSG**: Message received on the second receiver (490 or 4209.5 kHz) is currently displayed.
- ▲▼: Message can be scrolled line by line by pressing ▲ / ▼.
- **STANDBY**: Receiver is idling, waiting for a NAVTEX message transmission. See ④ above for details.

(*continued on next page*)

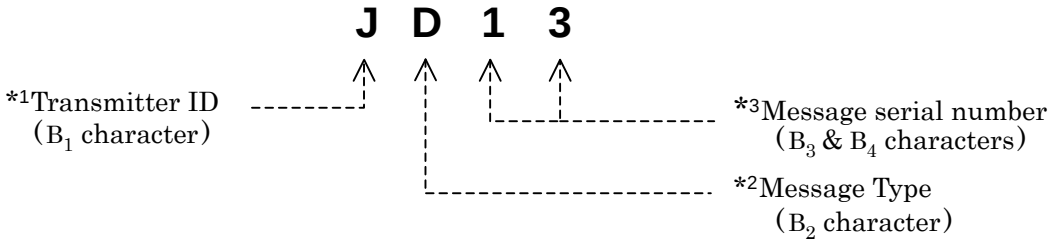
1. Typical NAVTEX Message Screen (*continued – 3/6*)

1.1. Introduction (*continued – 3/5*)

⑥ Message Identification (Message ID)

The ID of the currently displayed message is shown here. A red–colored ID represents a warning message. A message ID consists of the following elements: station ID, message type, and message serial number, as in the following example.

Figure 1-2 NAVTEX Message ID Format – Example



*1: *ID of the transmitter from which the message was received.*

Examples:
J *in NAVAREA I:* *Gislövshammar, Sweden*
F *in NAVAREA IV:* *Cape Cod/Boston, U.S.*
I *in NAVAREA II:* *Las Palmas, Spain*

*2: *Type (category) of this message (subject indicator)*

Examples:
A: *Navigational warnings*
B: *Weather warnings*
D: *Search and rescue, piracy and armed robbery information*

*3: *Serial number of this message*
Each message within the same category group is allocated a serial number between 00 and 99 by each transmitter. A message with number 00 is always received on each transmission regardless of rejection settings, and will be displayed and stored in memory.

⑦ Alarm Tag **ALARM!**

This tag represents a visual alarm and is turned on when a NAVTEX message of one of the following types has been received.

- Type–A Message: Navigational warning (initially disabled)
- Type–B Message: Weather warning (initially disabled)
- Type–D Message: Search and rescue, piracy and armed robbery information. All text characters will be displayed in red to distinguish it from other type alarm messages.
- Type–L Message: Additional navigational warning (initially disabled)

NOTE: When a type–D message has been received, an audible alarm will also be turned on, beeping at approx. 1–second intervals. To silence the alarm sound, press STOP ALM *. A second keypress resets the alarm and removes the alarm tag.*

< CAUTION >

Silencing the audible alarm constitutes your acknowledgement of the current alarm message.

The alarm for the message types A, B and L is initially disabled. It can be enabled via **SYSTEM MENU – 9:TURN ON/OFF MESSAGE ALARM**. See paragraph 4.14 for details.

(*continued on next page*)

1. Typical NAVTEX Message Screen (*continued – 4/6*)

1.1. Introduction (*continued – 4/5*)

⑧ New Message Tag **NEW MESSAGE**

This indication (tag) shows that the currently displayed NAVTEX text is a new message that you have not yet read or acknowledged.

To acknowledge it, simply press NEW MSG or CLR, turning the tag off.

If two or more new messages have been left unread, the following caution message will be displayed at the screen bottom, prompting you to read them. Press NEW MSG again to display, or scroll the text up to, the next one by pressing ▲/▼.

MORE NEW MSG LEFT !

The **NEW MESSAGE** tag for the current message will be automatically removed 24 hours after its reception, if it is left unacknowledged (i.e. if CLR is not pressed).

⑨ NAVTEX Message

If message text exceeds the screen display area, you can scroll it line–by–line by pressing ▲/▼. Holding down either key accelerates the scroll.

To read other messages, press ◀ / ▶ (for message–by–message scrolling). Holding down either key accelerates the scroll.

Type–D messages (SAR, piracy and armed robbery information) will be displayed in red. A new type–D message will remain fixed on screen until:

- it is acknowledged by pressing STOP ALM or by means of a *1software command through an INS/IBS terminal interfaced to the rear panel **RS–422** connector, or
- another new type–D message is received.

*1: *See paragraph 7.4.5 for details.*

NOTE: Forced carriage return ↓

When the number of characters in a line exceeds 40, an internally generated carriage return symbol, shown above, will be automatically inserted in the 40th character position to divide the last word, forcing the rest of the characters in the word to shift to the top of the next line. This symbol will be replaced by an underscore (_) (hex 5F) when it is printed or output to an IBS/INS device via the RS–422 port.

⑩ End–of–Message Indication **NNNN**

The appearance of these four successive **N** characters indicates the end of the currently displayed NAVTEX message.

NOTE: Some messages including those from Chinese stations, end with NN (2 Ns) instead of NNNN (4 Ns), in which case, the equipment will consider that the transmission has not ended properly, and will not, therefore, display and store such a message, or will append it to a new message, if received within a specified period of time, and display the two messages combined. The RS–232C port (printer port) may be set to output such messages. See paragraph 4.9 for setting instructions.

(*continued on next page*)

1. Typical NAVTEX Message Screen (*continued – 5/6*)

1.1. Introduction (*continued – 5/5*)

⑪ Indication of Message Storage Status

This indication shows whether or not the displayed NAVTEX message has been stored in the internal non–volatile memory.

- ***1STORED**: The message has been stored.

When message reception has been completed with a character error rate (**CER**, ⑫) of 33% or less, the received NAVTEX message together with its ID will be displayed and stored in memory, making it possible to recall it onto the screen at a later time.

If the same message is received with a lower **CER** on the next transmission, the previously stored message will be replaced with the new one. However, if the first message was received with a **CER** of 4% or less, message replacement will not take place on subsequent reception with a lower **CER**.

When the **CER** exceeds 33%, the message and its ID will not be displayed and will not be stored in memory, allowing a retransmission of the same message to be displayed and stored.

*1: *If the message selection/rejection settings are made so that a particular message type is rejected from storage, this indication will not be displayed regardless of a* ***CER*** *being smaller than 33%. See paragraph 4.9 for the related setting instructions.*

⑫ Character Error Rate (**CER**) Indication

CER is the percentage ratio of the total number of corrupt characters represented by asterisks (*) to the total number of characters received in a message, including control codes (sync. signal, carriage returns, line feeds, letter/numeral shift, etc.).

If a message is received with a **CER** equal to or greater than 33%, the message will not be displayed and stored in memory, allowing the same message to be received again on its next transmission. No **CER** reading will be available on the current transmission.

See paragraph ⑪ for more information on CER.

⑬ Message Prompt Line

This line indicates the receiver's response for the user's keypress or displays prompts related to reception of new or alarm NAVTEX messages on the first or second receiver, or related to message storage, like the examples below.

- **ALARM MESSAGE RECEIVED ON 2ND RCVR**
- **MORE UNREAD ALARM *2MSG LEFT**
- **2ND *3RCVR RECEIVED NEW MSG**
- **MORE NEW MSG LEFT**
- **STORAGE LIMIT IS REACHED**
- **MEMORY FULL ! *4 [CLR] TO *5 ACKNLG.**

***2 MSG** = **MESSAGE**, ***3 RCVR** = **RECEIVER**

***4 [CLR]** = CLR ***5 ACKNLG = ACKNOWLEDGE**

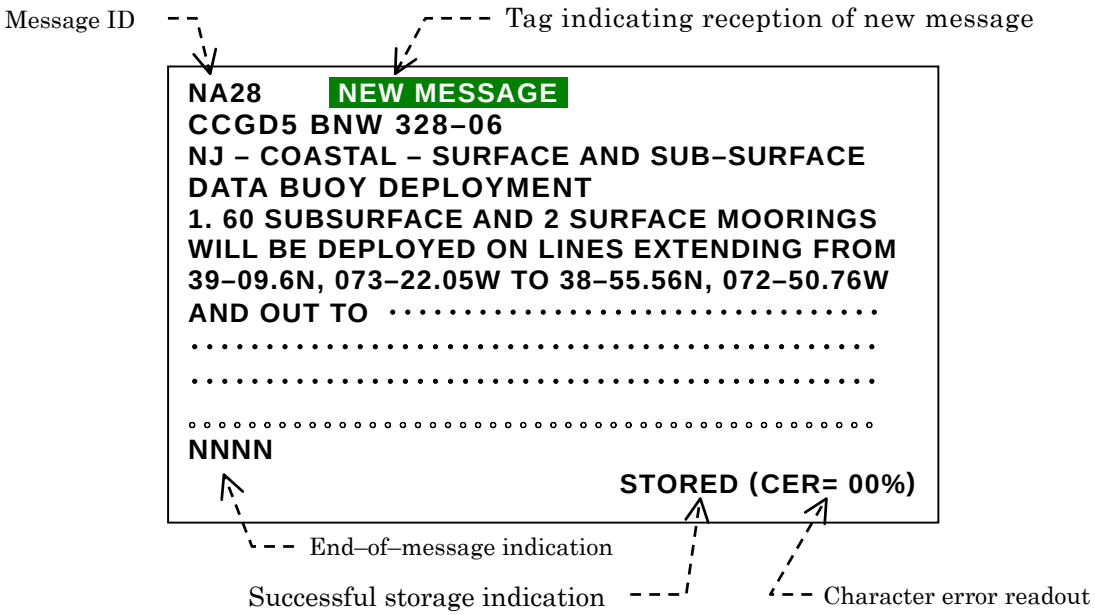
1. Typical NAVTEX Message Screen (*continued – 5/5*)

1.2. Indication of Reception and Storage of New NAVTEX Message

- Indicating Reception of New Message – First Receiver

  The equipment visually indicates the reception of a new NAVTEX message by attaching a tag (**NEW MESSAGE**) to the message ID, as in the example below. The tag will be turned off 24 hours after reception or when you press CLR.

Figure 1-3 First Receiver Receiving New NAVTEX Message – Example



- Indicating Reception of New Message – Second Receiver

  When the first receiver message screen is currently showing, the reception of a new message on the second receiver is indicated with message "**2ND RCVR RECEIVED NEW MSG**" blinking in the prompt line at the screen bottom, as in the example below. To read it, switch to the second receiver page by pressing PAGE.

Figure 1-4 Indication of New Message Reception on Second Receiver – Example

- Indicating Successful Storage of New Message

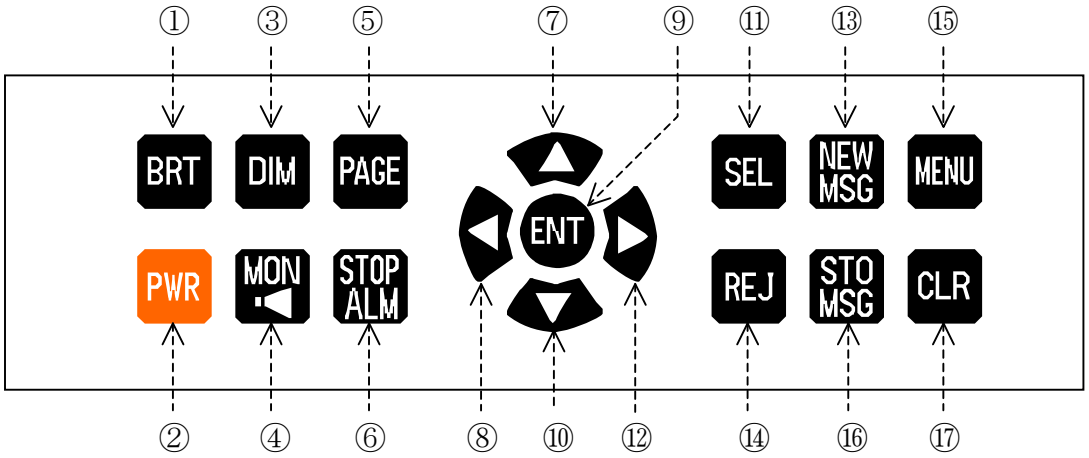
  When a new NAVTEX message has been received with a character error rate (**CER**) of 33% or less, the message will be displayed and stored in non–volatile memory together with its ID; this condition is displayed with indication "**STORED**" at the end of the message together with its **CER** reading, as in the example above.

  If the **CER** exceeds 33%, the currently received message will not be stored and will not be displayed. No **CER** reading will be available.

2. Control Panel Functions

The figure below shows the control panel of the equipment. A summary description of the functions the keys provides is given below and in the following pages.

Figure 2-1 Control Panel



① Screen Brightness Key BRT

Repeated pressing of this key adjusts the screen brightness in a total of 8 steps including a completely dark level. The last used level is stored in memory. The brightness level returns to its maximum on next power–up when the equipment is switched off with the level set to its minimum. See paragraph 4.5 for related information.

② Power Key PWR – 1/2

This key turns the unit on/off. A first keypress turns it on, displaying an opening message like the example at right for approximately five seconds.

Figure 2-2 Opening Message – Example

```
WELCOME TO NAVTEX RECEIVER

SOFTWARE VER. 1.0   REV_1.1A1
DATE OCT 06, 2007
```

Version and date information is an example.

To turn the unit off, press and hold down PWR for 2–3 seconds until a power–off countdown window shows up as illustrated at right, indicating that a power–off sequence has started.

Figure 2-3 Power–Off Countdown Window

```
SHUTTING DOWN NAVTEX RECEIVER
WAIT ! – – – – –
```

Countdown bars

Keep on pressing the key until all five bars have disappeared, and then release it to completely switch the unit off. This delayed action helps prevent an accidental shutoff and resultant loss of data.

Releasing the key with at least one countdown bar showing cancels the power–off sequence.

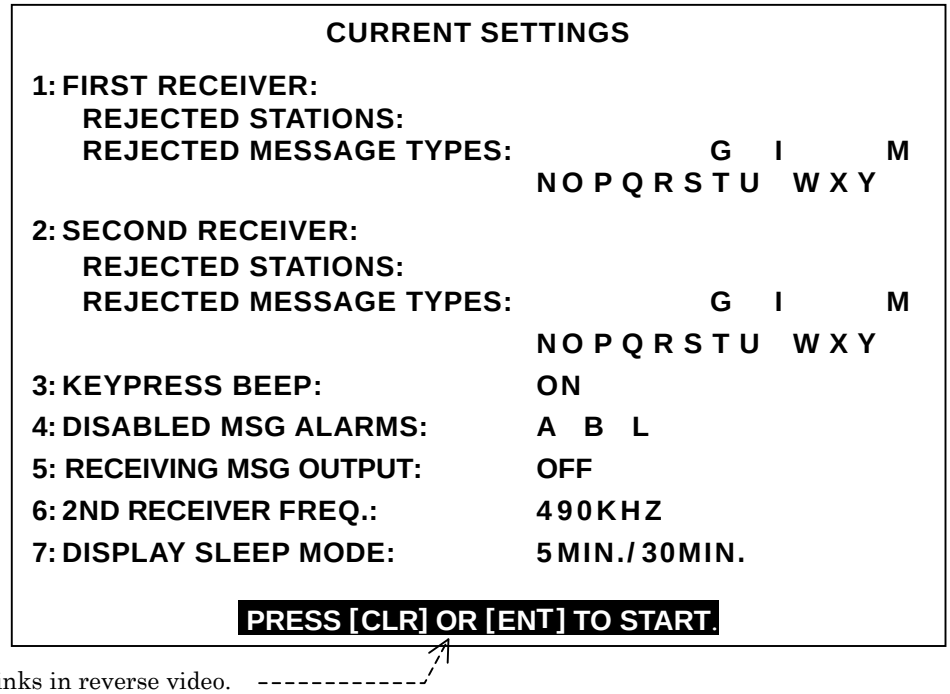
(*continued on next page*)

2. Control Panel Functions (*continued – 2/12*)

② Power Key PWR – 2/2

After the unit is switched on, the opening message window will be replaced with another window listing the current settings of receiver control parameters, as in the example below.

Figure 2-4 Current Settings of Receiver Control Parameters – Example



The above list will stay on for approximately 20 seconds before the message screen shows up, replacing it automatically.

To turn the list off immediately, press CLR or ENT .

③ Keypad Dimmer Key DIM

Pressing this key adjusts the keypad backlighting level in a total of 8 steps including a completely switched–off level.

The last used level will be stored in memory. When the equipment is switched off with the level at its minimum, the keypad will be lit at the highest level at next power–up time.

④ Audible Monitor Key MON

Pressing this key allows you to audibly monitor the reception of a NAVTEX transmission. To monitor the sound continuously, hold down the key. As soon as it is released, the audible output is turned off.

(*continued on next page*)

2. Control Panel Functions (*continued – 3/12*)

⑤ Screen Page Key PAGE

Pressing this key switches the message screen between the first receiver screen page and the second receiver screen page.

For example, if the current screen is currently showing the first receiver page (i.e. 518 kHz NAVTEX message display), a first keypress changes the display to show the second receiver page (i.e. 490 kHz/4209.5 kHz message display). A second press changes it back to the first receiver page. See paragraph 3.5 for more details.

⑥ Alarm Stop Key STOP ALM

The equipment will alarm you audibly through a built–in buzzer and visually by turning on an alarm tag (ALARM!) in reverse video on the message screen upon reception of an important NAVTEX warning (type–D message, for example). A type–D message text will be displayed in red. See paragraph 3.7 for more details.

Pressing this key silences the audible alarm. A second key–press removes the alarm tag, resetting the alarm. Observe the **CAUTION** at right.

< **CAUTION** >

Silencing the audible alarm constitutes your acknowledgement of the current alarm message/condition.

If other types of warning messages (e.g. type–A messages) were received in addition to a D–type message, pressing the key silences the audible alarm for all warnings at a time.

A new type–D message received on either the first receiver or second receiver will remain fixed on screen and will not automatically scroll until:

- this key is pressed *[1]twice to acknowledge it,
- the user remotely *[2]acknowledges it from an IBS/INS terminal connected to the rear–panel **RS–422** connector (INS port), or
- another new type–D message has been received on either receiver.

If more alarm messages are left unread in memory, a next alarm message will be displayed after the above keypress. However, no audible alarm will be available.

*1: *A first keypress turns off the alarm sound only.*

*2: *See paragraph 7.4 for information on the command format.*

⑦ Up Key

- When a NAVTEX message is being displayed, pressing this key scrolls the message screen downward one line at a time, allowing you to view message lines hidden beyond the screen's upper text display limit. When the newest message (e.g. **200/200**) is reached, a further keypress displays the oldest one (e.g. **1/200**).

  Holding down the key accelerates text scrolling.

- When a menu is displayed, pressing this key selects vertically listed options upward. Press ENT after highlighting the desired option.

(*continued on next page*)

2. Control Panel Functions (*continued – 4/12*)

⑧ Left Key 

- When a NAVTEX message is being displayed, a single press of this key scrolls the message text by one message forward timewise, displaying a newer message.
- Holding down the key accelerates the scroll.
  When the screen is showing the newest message (e.g. **200/200**), a further keypress returns you to the oldest message (e.g. **1/200**).
- When a currently displayed menu has horizontally listed options, pressing this key selects (i.e. highlights) those options in a leftward direction. Be sure to press ENT after highlighting the desired option.

⑨ Enter Key ENT

- When a NAVTEX message is being displayed, pressing this key displays the newest message (e.g. **200/200**).
- When a menu is being displayed, pressing this key:
  - completes the selection of a desired option,
  - executes the function selected or,
  - finalizes the current setting.

⑩ Down Key 

- When a NAVTEX message is being displayed, pressing this key scrolls the message screen upward one line at a time, allowing you to view message lines hidden beyond the lower text display limit of the screen.
- When the screen is showing the oldest message (e.g. **1/200**), further keypress returns you to the newest message (e.g. **200/200**).
- Holding down the key accelerates the scrolling.
- When a menu is being displayed, pressing this key selects (highlights) vertically listed options downward. Be sure to press ENT after highlighting the desired option.

(*continued on next page*)

2. Control Panel Functions (*continued – 5/12*)

⑪ Message/Station Selection Key SEL – 1/2

- When the screen is showing a NAVTEX message, pressing this key displays a summary list of the transmitter IDs and message types that are currently selected as in the example below so that the equipment displays and stores messages of the selected types from the selected transmitters.

Figure 2-5 List of Currently Selected Stations and Message Types – Example

```
< FIRST RECEIVER >

 MEM. SELECTED STATIONS:
A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z

 MEM. SELECTED MESSAGES:
A B C D E F    H    J K L
                  V       Z
```

```
< SECOND RECEIVER 1 >

 MEM. SELECTED STATIONS:
A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z

 MEM. SELECTED MESSAGES:
A B C D E F    H    J K L
                  V       Z
```

MEM: to be stored in memory

SECOND RECEIVER 1: **490 kHz**

SECOND RECEIVER 2: **4209.5 kHz**

All transmitters and most of major message types are initially selected so that the equipment will display and store those selected types of messages from all stations in the coverage area.

A particular station or a particular message type can be rejected from display or storage via the menu system. Detailed instructions are given in paragraph 4.8.

MENU → **SYSTEM MENU** → **4:MAKE SEL / REJ SETTING** → **1/2/3** → **1/2** → REJ

To turn off the above lists, press CLR .

NOTE: Message types A (navigational warning), B (meteorological warning), D (SAR, piracy and armed robbery information) and L (additional navigational warning) are always selected for storage in memory and output to the I/O ports, and cannot be rejected due to the relevant IMO resolutions and IEC requirements.

(*continued on next page*)

2. Control Panel Functions (*continued – 6/12*)

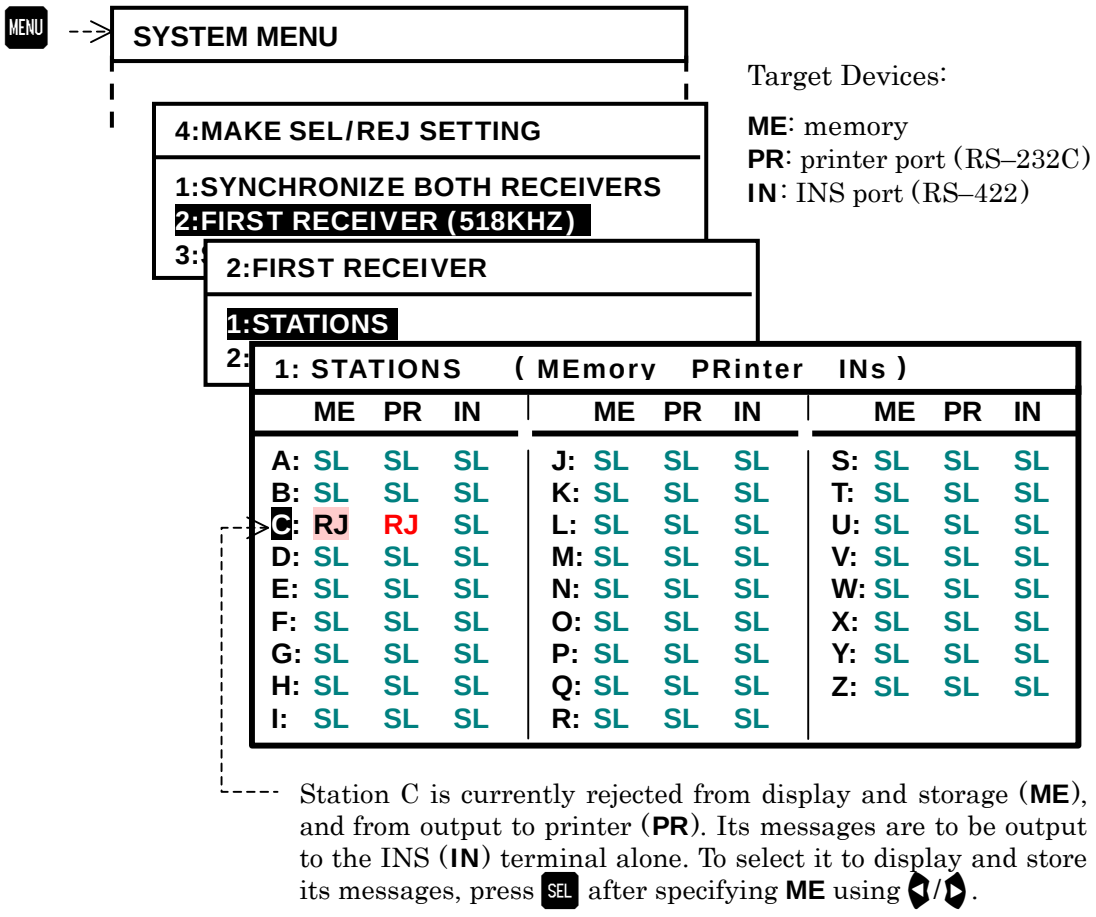
⑪ Selection/Station Key SEL – 2/2

- When option "**4:MAKE SEL/REJ SETTING**" on the **SYSTEM MENU** is currently accessed for selection/rejection settings, this key selects the station or message type you specify for display and storage, and/or output to the I/O ports (**RS–232C**, **RS–422** and **I/O DATA** connectors). An example of station selecting procedure is illustrated below.

  Currently selected stations (**SL**) are shown in green. Rejected stations (**RJ**) are in red.

  Using ▲/▼ and ◀/▶, highlight first the ID of the station of which messages you wish to display, store, and/or output to the I/O ports, and then, specify the target device (**ME** for memory, **PR** for RS–232C & I/O DATA, **IN** for RS–422). To select the currently rejected (**RJ**) setting on each device, press SEL. See paragraph 4.8 for details.

Figure 2-6 Selecting Stations – Example



(*continued on next page*)

2. Control Panel Functions (*continued – 7/12*)

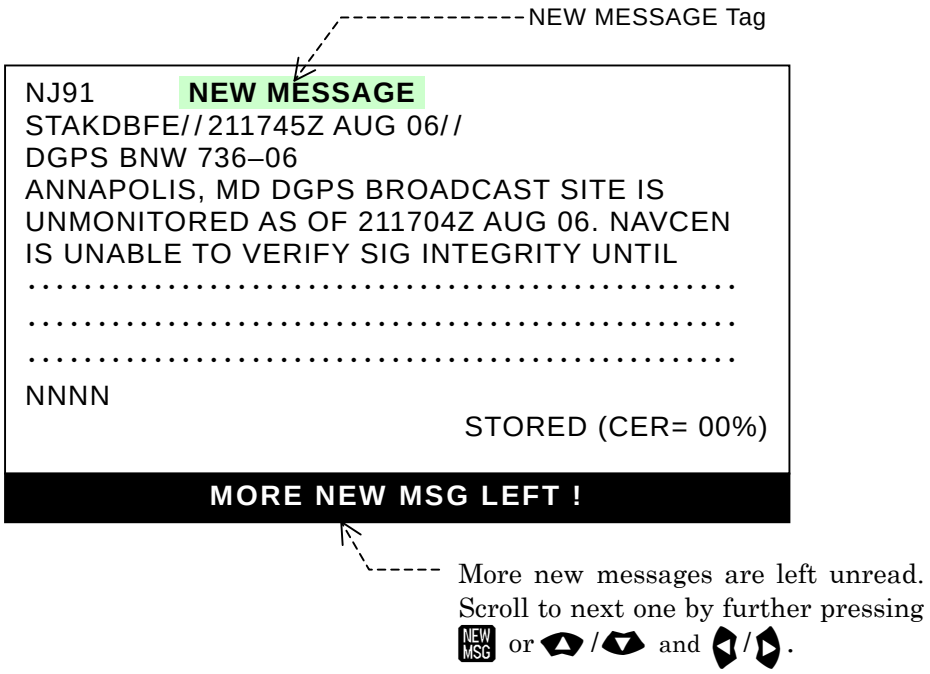
⑫ Right Key

- When a NAVTEX message is being displayed, a single press of this key scrolls the message text by one message backward timewise, displaying an older message. See *NOTE* below.
- When the oldest message (e.g. **1/200**) is currently displayed, further keypress returns you to the newest message (e.g. **200/200**).
- Holding down the key accelerates the scroll.
- When a menu has horizontally listed options, pressing this key selects (highlights) those options in a rightward direction. Be sure to press ENT after highlighting the desired option.

⑬ New Message Key NEW MSG – 1/2

- When a new NAVTEX message has been received and stored, a **NEW MESSAGE** tag is automatically attached to the message ID as in the example below to indicate that the message is new.

Figure 2-7 Indication of Reception of New Message



- Pressing CLR removes the tag from the message ID, meaning that you have acknowledged its reception.

(*continued on next page*)

2. Control Panel Functions (*continued – 8/12*)

⑬ New Message Key NEW MSG – 2/2

- The new message tag will be automatically removed 24 hours after reception of that message, even if you forget to acknowledge it.

< CAUTION >

Removal of the NEW MESSAGE tag constitutes your acknowledgement of the currently displayed new message.

- The above example shows that a number of new messages have been received, as indicated by the bottom line prompt "**MORE NEW MSG LEFT !**." Pressing NEW MSG will recall the next new message onto the screen It can also be displayed by pressing ▲ / ▼ (for line–by–line viewing) or ◀ / ▶ (for message–by–message viewing).

- If no additional new message is left in memory, further keypress will cause the following message to show blinking for a few seconds at the bottom, indicating an operational error.

Figure 2-8 Indication of All New Messages Being Acknowledged

(*continued on next page*)

2. Control Panel Functions (*continued – 9/12*)

⑭ Message/Station Rejection Key [REJ] – 1/2

- When a NAVTEX message text is currently being displayed, pressing this key turns on a summary list of the transmitter IDs and message types that are rejected (deselected) via the *1menu system on both the first and second receivers as in the example below, and not to be displayed and stored.

Figure 2-9 List of Currently Rejected Stations and Message Types – Example

< FIRST RECEIVER >

MEM. REJECTED STATIONS:

MEM. REJECTED MESSAGES:
G I M
N O P Q R S T U W X Y

< SECOND RECEIVER *21 >

MEM. REJECTED STATIONS:

MEM. REJECTED MESSAGES:
G I M
N O P Q R S T U W X Y

MEM: not to be stored in memory
SECOND RECEIVER 1: 490 kHz
SECOND RECEIVER 2: 4209.5 kHz

*1: [MENU] → **SYSTEM MENU** → **4:MAKE SEL/REJ SETTING**

Detailed instructions are given in paragraph 4.8.

*2: **SECOND RECEIVER 1** = 490 kHz, **SECOND RECEIVER 2** = 4209.5 kHz

- The following message types are always selected; they cannot be rejected due to the relevant *3IMO resolutions and *4IEC regulations related to navigational safety:
  - Type A: Navigational Warning
  - Type B: Meteorological Warning
  - Type D: SAR (search and rescue), Piracy and Armed Robbery Information
  - Type L: Additional Navigational Warning

  *3: *IMO Resolution MSC.148(77)* *4: *IEC 61097–6 Ed.2*

- A message with serial number 00 will always be displayed and stored despite rejection settings.

- To turn off the above lists, press either [CLR] or [MENU]. Pressing [MENU] turns the lists off and displays the **SYSTEM MENU** instead.

(*continued on next page*)

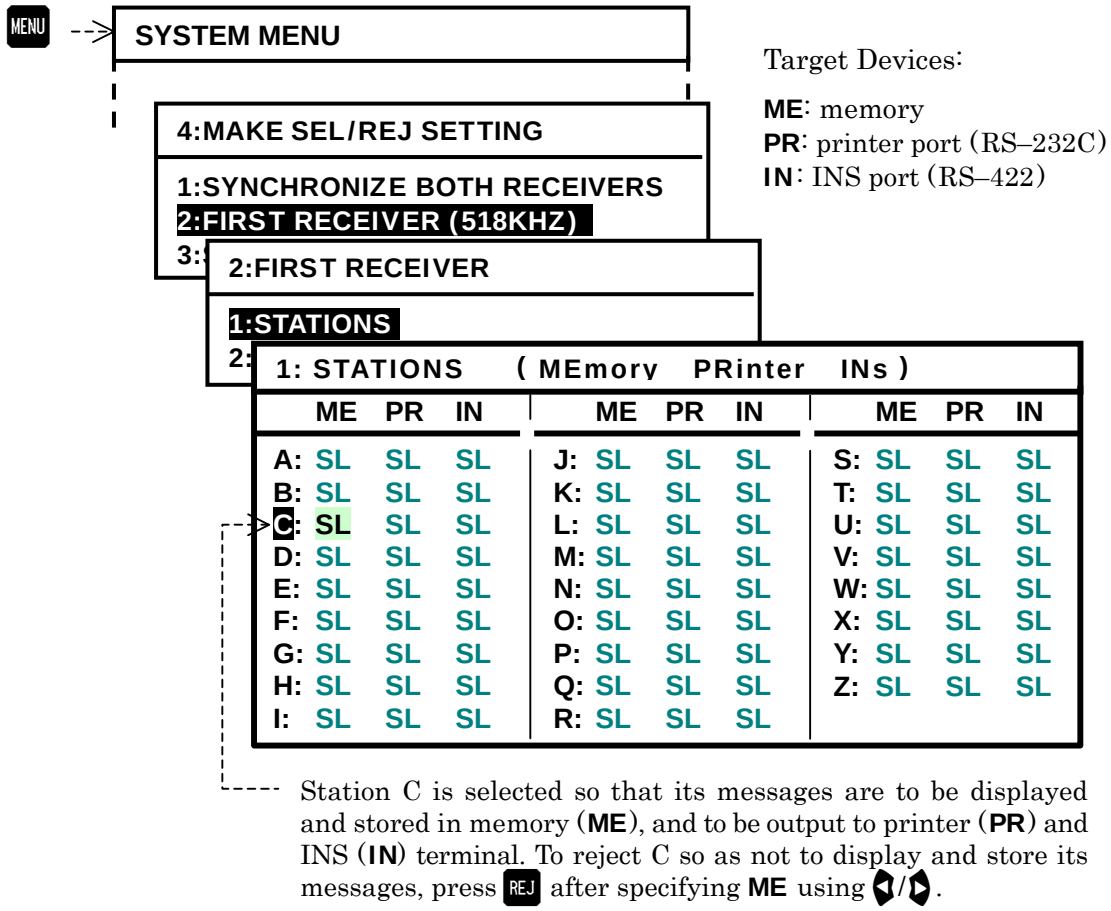
2. Control Panel Functions (*continued – 10/12*)

⑭ Message/Station Rejection Key [REJ] – 2/2

- When option "**4:MAKE SEL/REJ SETTING**" on the **SYSTEM MENU** is currently accessed for selection/rejection settings, this key rejects the user–specified station or message type so that its messages are not to be displayed and stored in memory, not to be output to the printer port (**RS–232C**) or not to be output to the INS port (**RS–422**).

  An example of station rejecting procedure is illustrated below. The status of each target device is either **SL** (selected) or **RJ** (rejected).

Figure 2-10 Rejecting Stations – Example



- Using ▲/▼ and ◁/▷, select the station ID first, specify the target device (**ME**, **PR** or **IN**) to which you do not wish to store or output the station's messages, and then press [REJ]. Make sure that the status of the device changes from **SL** to **RJ**. For instance, when **ME** is set to the **RJ** status, any messages from that station will not be displayed or stored.

- While other menu is being displayed, pressing this key produces three quick beeps to indicate an operational error.

(*continued on next page*)

2. Control Panel Functions (*continued – 11/12*)

⑮ Menu Key MENU

- Pressing this key opens a menu termed "**SYSTEM MENU**," as shown below, to customize the operation to suit your specific needs, to test the receiver performance off–line, or to reset the entire system to the initial settings. See paragraphs in section 4 for greater details.

Figure 2-11 SYSTEM MENU

- To turn the menu off, press MENU again or *1 CLR.
- A desired menu option can be selected by highlighting it with ▲/▼, followed by ENT.

```
SYSTEM MENU

1: MAKE DISPLAY SETTINGS
2: SELECT 2ND RECEIVER FREQUENCIES
3: TURN ON/OFF KEYPRESS BEEP
4: MAKE SEL/REJ SETTINGS
5: SEARCH FOR STORED MESSAGES
6. SELECT OUTPUT MESSAGES
7. SET OUTPUT PORTS
8. START SELF–DIAGNOSTIC TESTS
9: TURN ON/OFF MESSAGE ALARM
0. RESET TO FACTORY DEFAULTS
```

- The functions of each option are summarized below.

1: MAKE DISPLAY SETTINGS:	Selects display background colors, turns on/off screen sleep mode, or selects message font types.
2: SELECT 2ND RECEIVER FREQUENCIES:	Selects 490 or 4209.5 kHz.
3: TURN ON/OFF KEYPRESS BEEP:	Turns on/off keypress beep.
*2 **4: MAKE SEL / REJ SETTINGS**:	Selects or rejects transmitters or message types that are to be displayed and stored. output to RS–232C, I/O DATA and RS–422 ports.
5: SEARCH FOR STORED MESSAGES:	Search stored messages by station and/or message type.
6: SELECT OUTPUT MESSAGES:	Selects messages to be output externally.
7: SET OUTPUT PORTS:	Sets output ports on/off, selects protocols, formats, etc.
8: START SELF–DIAGNOSTIC TESTS:	Executes self–diagnostic tests.
*3 **9: TURN ON/OFF MESSAGE ALARM**:	Turns on/off message alarms.
*4 **0: RESET TO FACTORY DEFAULTS**:	Initializes user–made settings.

*1: *Pressing this key turns the menu off and returns you to the first receiver screen.*
*2: *Types A, B, D and L messages cannot be rejected due to relevant IMO resolutions.*
*3: *Alarm for type–D messages cannot be turned off due to relevant IMO resolutions.*
*4: *Stored messages will not be erased from memory by executing this function.*

Detailed information on each menu option is given in section 4.

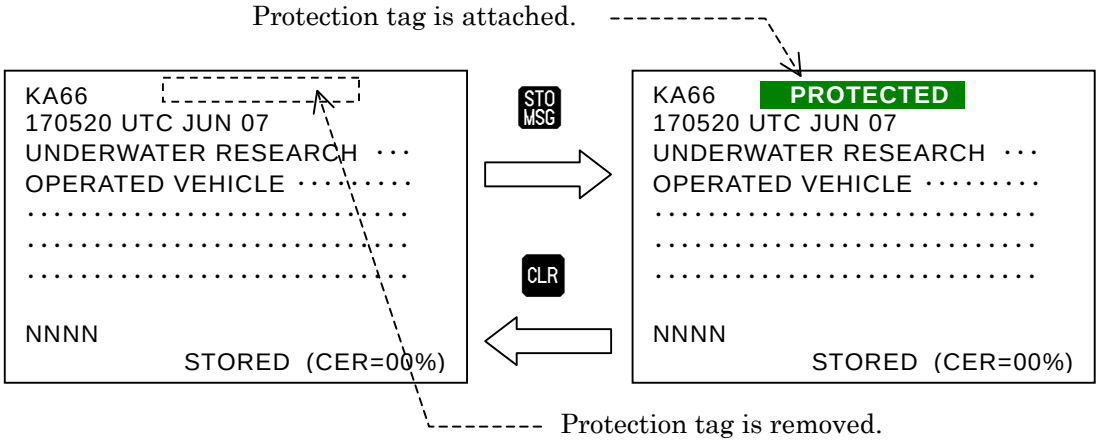
(*continued on next page*)

2. Control Panel Functions (*continued – 12/12*)

⑯ Store Message Key STO MSG

- This key is used to place a specific NAVTEX message in permanent storage, thereby protecting it from being automatically erased from memory after the maximum message storage limit (200 messages for each receiver) is reached.
- Pressing this key attaches a "**PROTECTED**" tag to the ID of the message you wish to protect, and pressing CLR *removes the tag from the message, as in the example below. **User confirmation is required. See ⑰ below.*

Figure 2-12 Attaching/Removing Message Protection Tag – Example



- Up to 50 messages can be protected from automatic erasure (for each of the first and selected second receivers). An attempt to protect messages beyond this limit causes an operational error, turning on the following caution message in the message prompt line (screen's bottom line):

STORAGE LIMIT IS REACHED !

- The message storage capacity will increase by 50 to 250 messages when 50 received messages in each receiver are protected.

⑰ Clear Key CLR

The major functions this key provides are:

- *1 removing message protection tag (PROTECTED) from the currently displayed protected NAVTEX message.
- removing new message tag (NEW MESSAGE) from a new message, and
- turning off all menus at a time, returning to the first receiver message page when making settings via the *2 menu system.

*1: *Removing the message protection tag requires your confirmation, as shown at right.*

Use ▲/▼ to select the desired option and then press ENT .

ARE YOU SURE ?
1: NO (CANCEL)
2: YES (EXECUTE)
[▲] [▼] [ENT]

*2: *See section 4 for more information.*

3. Basic Operating Procedure

3.1. Introduction

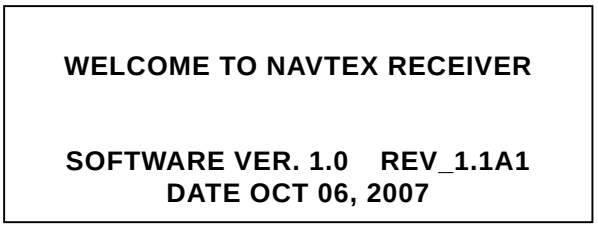
This section describes the basic operating procedure, allowing you to operate your NAVTEX receiver from the front keypad without prior knowledge of the NAVTEX system. The functions that are available from the keypad are summarized in section 2 (Control Panel Functions). It is assumed that a specified antenna and appropriate power supply are connected to the equipment.

3.2. Turning the Equipment On/Off

To turn the equipment on, gently press PWR once.

An opening message like the example at right will show up and stay for approximately five seconds, indicating the model name, software version number and release date. The numbers shown are examples.

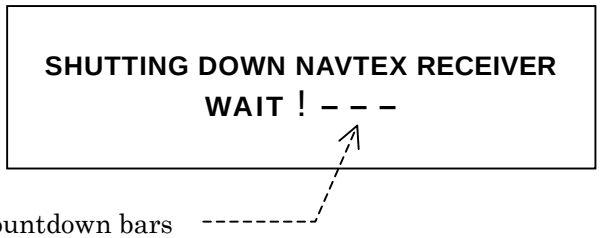
Figure 3-1 Opening Message – Example



Turning Equipment Off

To turn the unit off, press and hold down PWR for two to three seconds until a power–shutdown countdown window shows up as illustrated at right, indicating that a power–off sequence has just started.

Figure 3-2 Power–Shutdown Countdown Window



- Keep on pressing the key until all countdown bars have disappeared, and then release the key to completely switch the unit off. This delayed action avoids an accidental shutoff and loss of message data.
- Releasing the key with at least one countdown bar still showing cancels the power–shutdown sequence.

Turning Opening Message Off

- After the unit is switched on, the opening message window will be replaced with another window listing the current settings of receiver control parameters, as in the example shown in Figure 2–4.
- The above list will stay on for approximately 20 seconds before the NAVTEX message screen shows up, replacing it automatically.
- To turn the list off immediately, press CLR or ENT .

(*continued on next page*)

3. Basic Operating Procedure – *2/7*

3.3. Adjusting Screen Brightness

- The screen brightness level can be changed in a total of eight steps to suit the ambient lighting condition by repeatedly pressing BRT.
- To extend the service life of the LED backlighting lamps, the level can be changed in two steps automatically after a user–preset time period. See paragraph 4.5 for detailed information on the screen sleep mode.
- The screen background is initially white. You can change it to black or blue via the instructions given in paragraph 4.3.

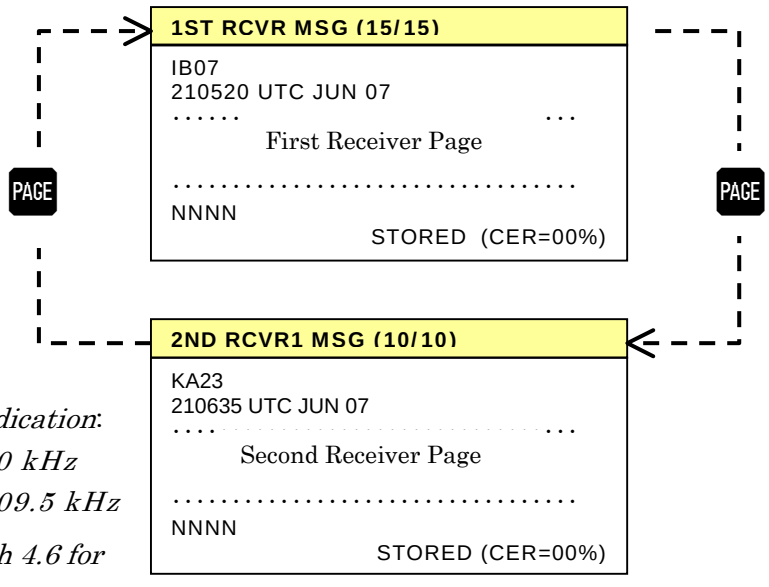
3.4. Adjusting Keypad Backlighting Level

- The keypad backlighting level can be changed in a total of eight steps to suit the ambient lighting condition by repeatedly pressing DIM.
- The last used level will be stored in memory. However, if the minimum level was used last time, it will return to the maximum level on next power–up.

3.5. Switching First and Second Receivers

- The message display initially shows first receiver page, showing the NAVTEX message received on the first (518 kHz) receiver.
- To display the second receiver page to show messages received on the second receiver (*490 kHz or *4209.5 kHz), press PAGE. A second keypress will switch the display back to the first receiver page. To externally switch the second receiver with a command via the RS–422 connector (INS port), see paragraph 7.4.6 for instructions.
- Pressing CLR will also return you to the first receiver page when you are making settings via the menu system.

Figure 3-3 Switching First and Second Receivers



* *Frequency Indication*:

- **RCVR1** = *490 kHz*
- **RCVR2** = *4209.5 kHz*

See paragraph 4.6 for instructions.

(*continued on next page*)

3. Basic Operating Procedure – *3/7*

3.6. Scrolling NAVTEX Messages

The displayed NAVTEX text can be scrolled line by line or down or message by message with the use of the following pairs of keys:

- ▲ / ▼ : Line–by–line scrolling.
  - Pressing ▲ scrolls the text downward, allowing more message lines hidden beyond the lower screen limit to show up. Holding down the key accelerates scrolling.

    When the top line of the newest message (e.g. **13/13**) is reached, further keypress displays the last line of the oldest message (e.g. **1/13**).
  - Pressing ▼ acts in the opposite way, allowing more lines hidden beyond the upper screen limit to show up. Holding down the key accelerates scrolling.

    When the bottom line of the oldest message (e.g. **1/13**) is reached, further keypress displays the top line of the newest message (e.g. **13/13**).

- ◀ / ▶ : Message–by–message scrolling.
  - Pressing ◀ once scrolls the text by one message timewise forward to show a next newer message, as in the example below.

Figure 3-4 Forward Message Scrolling – Example 1

1ST RCVR MSG **129/130** ⇨ 1ST RCVR MSG **130/130**

  - Holding down the key accelerates the scroll speed. After the newest message is reached, further keypress displays the oldest one.

Figure 3-5 Forward Message Scrolling – Example 2

1ST RCVR MSG **130/130** ⇨ 1ST RCVR MSG **1/130**

  - Pressing ▶ once scrolls the text by one message timewise backward to show a next older message, as in the example below.

Figure 3-6 Backward Message Scrolling – Example – 1

1ST RCVR MSG **110/130** ⇨ 1ST RCVR MSG **109/130**

  - Holding down the key accelerates the scroll speed. After the oldest message is reached, further keypress displays the newest one.

Figure 3-7 Backward Message Scrolling – Example – 2

1ST RCVR MSG **1/130** ⇨ 1ST RCVR MSG **130/130**

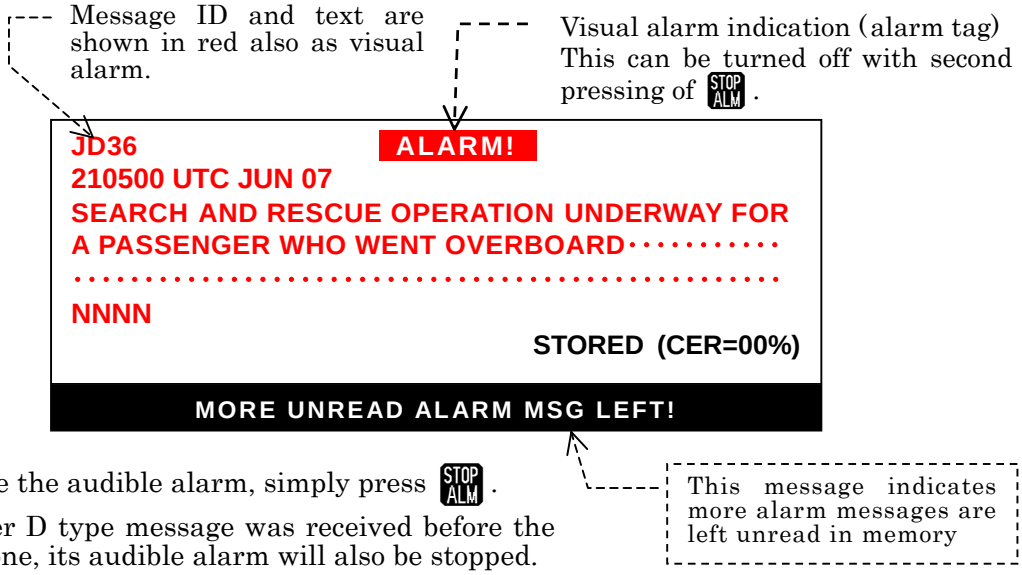
(*continued on next page*)

3. Basic Operating Procedure – *4/7*

3.7. Stopping Audible and Visual Alarm

Your equipment will warn you audibly and visually upon reception of a vital NAVTEX message (type–D message), such as SAR information, piracy, or armed robbery warning. An example type–D alarm message is given below, showing the visual alarm (called the alarm tag) attached to the message ID. The ID and text are also displayed in red to indicate that the message below is a type–D alarm message, distinguishable from other alarm messages (type–A: navigational, type–B: weather, or type–L: other alarm).

Figure 3-8 Visual Alarm Indication for Type–D Message – Example



To silence the audible alarm, simply press STOP ALM.

If another D type message was received before the current one, its audible alarm will also be stopped.

Pressing the key again will turn off the visual alarm indication (ALARM! , alarm tag), resetting the alarm.

A type–D message will remain fixed and will not automatically scroll until it is acknowledged or until another D message is received on either receiver.

NOTE: Each alarm can be acknowledged and reset individually with the appropriate software command via the RS–422 port. See paragraph 7.4.5 for details.

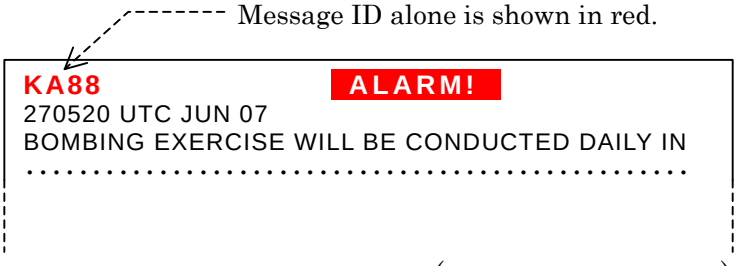
If additional alarm messages are left unread in memory, that condition will be indicated as in the example above. Pressing STOP ALM again will recall the next unread alarm message onto the screen.

< CAUTION >

Silencing the audible alarm constitutes your acknowledgement of the current alarm message.

Figure 3-9 Visual Alarm Indication for Type–A Message – Example

The equipment can also be set to alert you to a navigational warning (type–A message), a weather warning (type–B message) or other warning (type–L message) via the menu system described in paragraph 4.14.



(*continued on next page*)

3. Basic Operating Procedure – *5/7*

3.8. Protecting Messages for Permanent Storage

3.8.1. Introduction

Initially, all stored NAVTEX messages will be automatically erased one by one from memory on a first–in–first–out basis as the equipment continues receiving new messages after the message storage capacity limit (200 messages) is reached. If you wish to protect a specific message for permanent retention in memory, proceed via the steps given below. Up to 50 messages can be protected across each receiver screen, and are saved in a separate area of the non–volatile memory, allowing an additional 50 new messages to be stored in each of the first receiver and the selected second receiver.

3.8.2. Protecting Procedure

Figure 3-10 Protecting a Specific Message from Automatic Erasure – Step 1

(1) Using ◀/▶ and/or ▲/▼, display the message you wish to save. If two or more messages are being shown, the ID of that message should be brought to the top message line, as in the example at right.

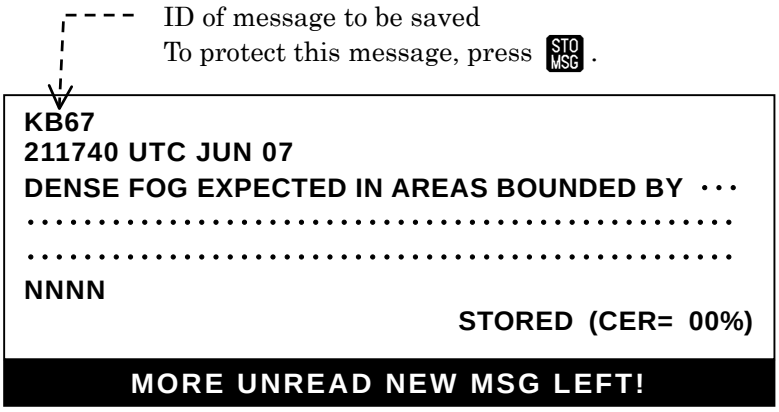
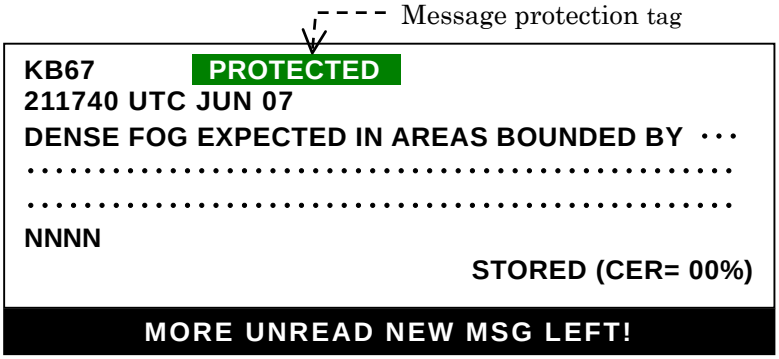


Figure 3-11 Protecting a Specific Message from Automatic Erasure – Step 2

(2) Press STO MSG. This will attach a message protection tag (**PROTECTED** tag) to the message ID as in the example at right, indicating that the message is now protected against automatic erasure.



NOTE: If the message you wish to protect is a new message, the **NEW MESSAGE** *tag will be replaced with the* **PROTECTED** *tag.*

<u>Storage Limit Indication</u>

Attempting to protect messages in excess 50 will cause the following error message to be turned on blinking in the message prompt line for a few seconds.

3. Basic Operating Procedure – *7/7*

3.8.3. Removing Protection Tag

The protection tag on a specific message can be removed via the following steps:

(1) Using ◀/▶ and/or ▲/▼, display the message from which you wish to remove the tag.

(2) Press CLR. This will cause the following caution window to pop up, asking you to confirm your action.

ARE YOU SURE ?
1: NO (CANCEL)
2: YES (EXECUTE)
[▲] [▼] [ENT]

(3) Press ▲ or ▼ to highlight option "**2:YES (EXECUTE)**" and then press ENT.

(4) If there are more messages you wish to remove the protection tag from, repeat the above steps.

4. Customizing Operation via Menu System

4.1. Introduction

The equipment should work normally with the initial factory settings. Some of the settings, such as keypress beep on/off, screen background color, rejection of certain transmitters or message types and alarm on/off, however, may be changed to suit your specific operating needs via the menu system without degrading the performance.

4.2. Accessing the Menu System

The menu system can be accessed by simply pressing MENU . The menu shown at right should then be turned on, indicating that you have activated the menu system.

To turn the menu off, press MENU again or *1 CLR .

*1: *Pressing* CLR *returns you to the first receiver page, if you are operating on the second receiver.*

Figure 4-1 System Menu

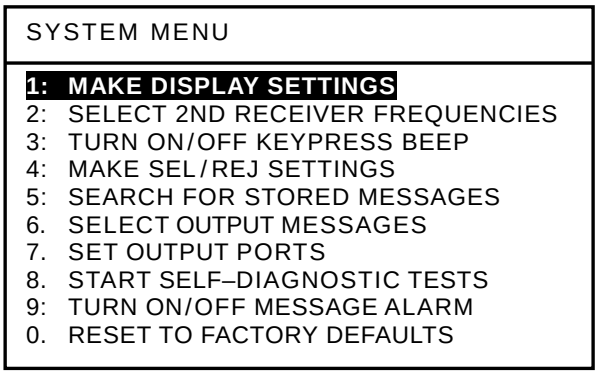
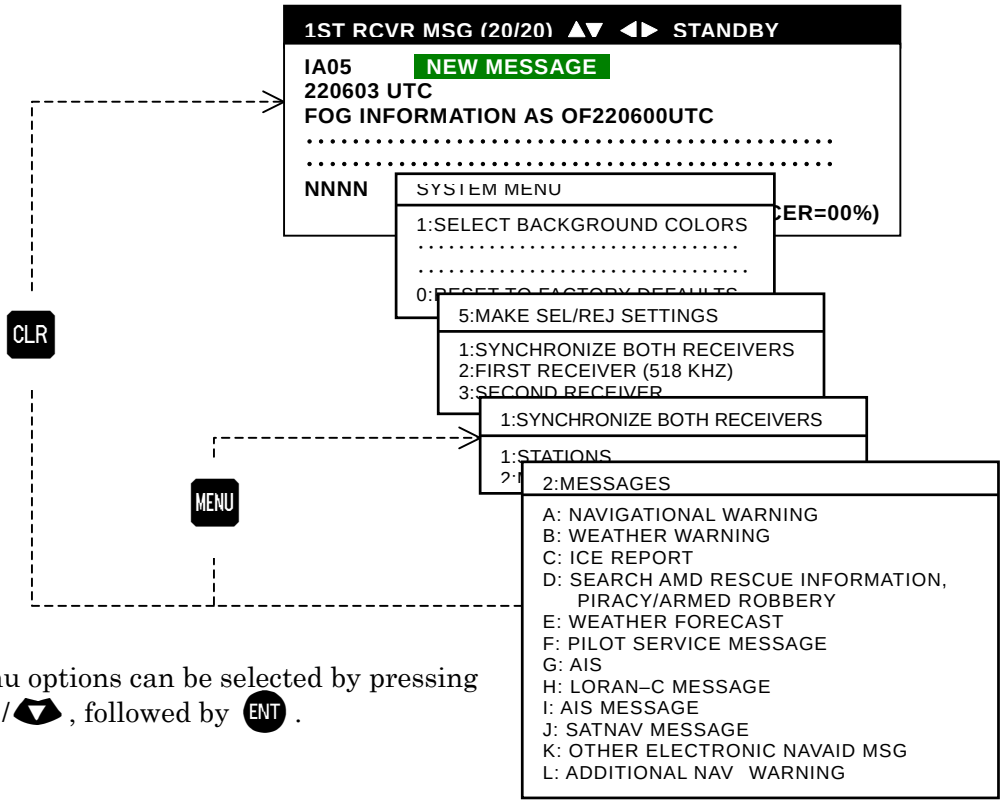


Figure 4-2 Returning to Previous Menu or Directly to Message Screen

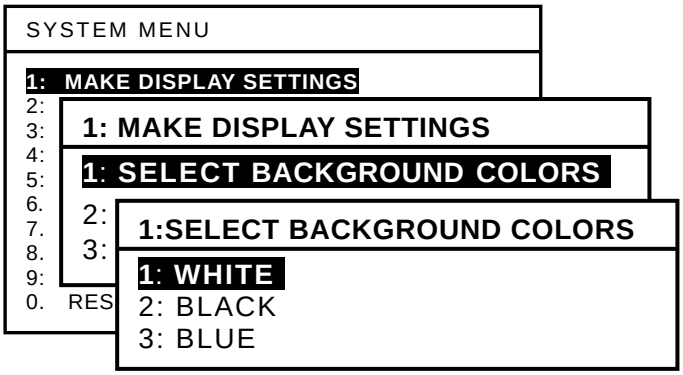


Menu options can be selected by pressing ▲ / ▼ , followed by ENT .

(*continued on next page*)

4.3. Selecting Screen Background Colors

Figure 4-3 Selecting Screen Background Colors



Three different colors (white, black and blue) are selectable for the text screen background. Initially the background is set to white.

The two others can be selected via the following steps:

(1) Highlight option "**1:MAKE DISPLAY SETTINGS**" by pressing ▲ / ▼, followed by ENT.

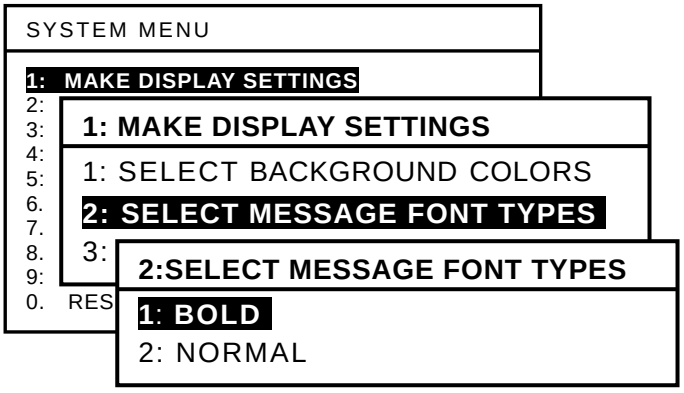
(2) Select option "**1:SELECT BACKGROUND COLORS**" in the same manner.

(3) Highlight the desired option with ▲ / ▼ again, and then press ENT.

(4) Press CLR or MENU to return to the text screen.

4.4. Selecting Message Font Types

Figure 4-4 Selecting Message Font Types



NAVTEX messages are initially displayed in a bold font for ease of reading from a distance (2–3 meters away).

A thinner type (normal) font can be selected via the following steps.

(1) Highlight option "**1:MAKE DISPLAY SETTINGS**" by pressing ▲ / ▼ and then ENT.

(2) Select "**2:SELECT MESSAGE FONT TYPES**" in the same manner.

(3) Highlight "**2:NORMAL**" with ▲ / ▼ again, and then press ENT.

(4) Press CLR or MENU to return to the text screen.

4.5. Turning on/off Screen Sleep Mode

4.5.1. Introduction

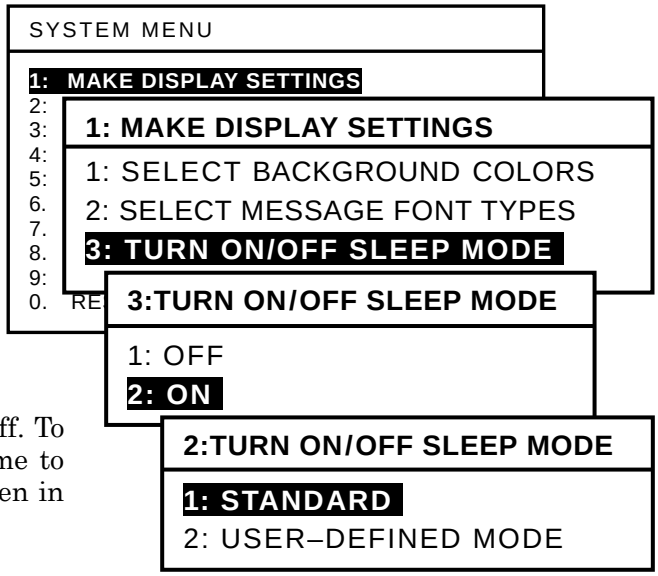
The screen brightness initially remains at the level set by pressing BRT .

To extend the service life of the backlighting lamps (white *1LED lamps), a screen sleep mode can be activated, which automatically reduces the brightness level in two steps when no key is pressed for a time period defined by the user.

The sleep mode is initially turned off. To activate its function and set the time to the sleep mode, follow the steps given in the following paragraphs.

*1: *Light–Emitting Diode*

Figure 4-5 Turning Screen Sleep Mode on



4.5.2. Turning Sleep Mode on

(1) Highlight option "**1:MAKE DISPLAY SETTINGS**" by pressing ▲/▼, followed by ENT.

(2) Select "**2:TURN ON/OFF SLEEP MODE**" in the same manner.

(3) Select "**2: ON**" in the same manner.

The following options are now selectable:

1:STANDARD: 1 minute to reduced level 1, 15 minutes to reduced level 2

2:USER–DEFINED MODE: times to reduced levels 1 and 2 are selectable in 1–minute steps. See *NOTE* below.

NOTE:
Reduced level 1 = approx. half maximum brightness level
Reduced level 2 = backlighting switched off

(4) Select the desired option, and press ENT.

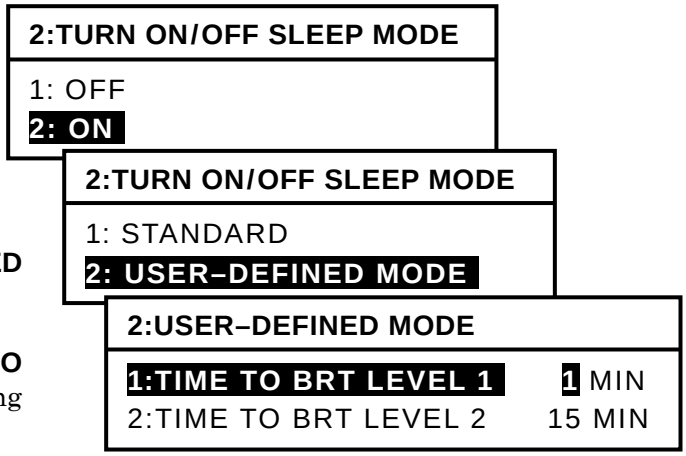
(5) If you selected "**USER–DEFINED MODE**" at the above step, proceed to the next paragraph (4.5.3) for the setting instructions.

(6) Press CLR or MENU to return to the text screen.

4.5.3. Setting Times to Reduced Brightness Levels

Figure 4-6 Setting Times to Reduced Brightness Levels

If you wish to set the times to the reduced brightness levels, follow the steps given below.



(1) Select option "**2:ON**."

(2) Select option "**USER–DEFINED MODE**."

(3) Highlight option "**1:TIME TO BRT LEVEL 1**" by pressing ▲/▼.

(4) Select the desired time period in one–minute steps by pressing ◀/▶.

(5) Highlight option "**2:TIME TO BRT LEVEL 2**" by pressing ▲/▼.

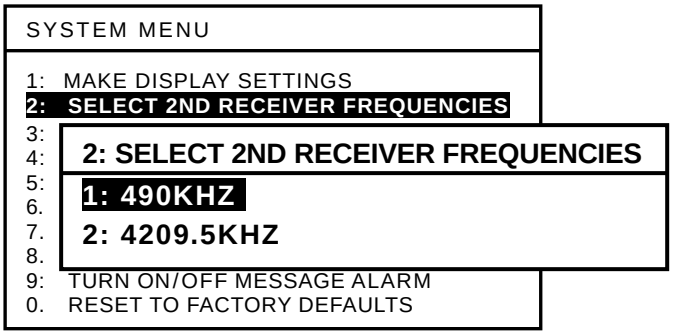
(6) Select the desired time period in one–minute steps in the same manner.

4.6. Selecting Frequencies for Second Receiver

Figure 4-7 Selecting Second Receiver Frequencies

The following two frequencies are selectable for the second receiver's operation:

- 490 kHz
- 4209.5 kHz



Initially the second receiver is set to 490 kHz. Several countries, including Canada, France, Portugal and U.K., are currently broadcasting national language messages on this channel, catering mainly for local users. The NAVTEX service on 4209.5 kHz is primarily intended for users in tropical regions. This shortwave frequency can be chosen via the following steps:

(1) Highlight option "**2:SELECT 2ND RECEIVER FREQUENCIES**" by pressing ▲/▼, followed by ENT.

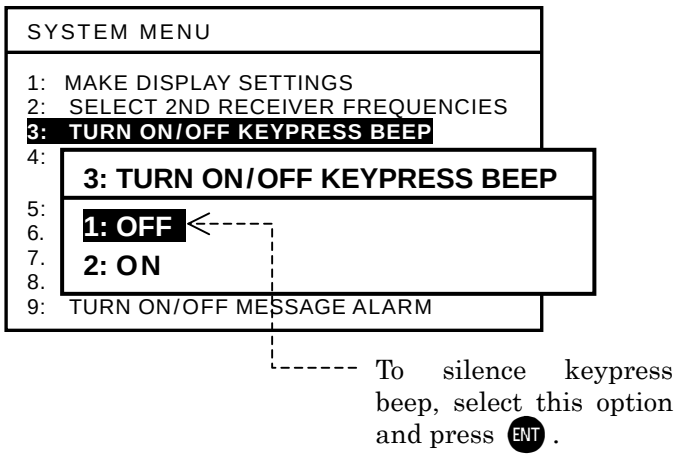
(2) Highlight option "**2: 4209.5KHZ**,"and then press ENT.

(3) Press CLR or MENU to return to the text screen.

The above setting will be remembered until the system is reset.

4.7. Turning on/off Keypress Beep

Figure 4-8 Turning on/off Keypress Beep



Pressing a front panel key causes the equipment to beep, indicating proper actuation of that key; this is the initial setting.

If you wish to turn off the keypress beep, follow the steps given below.

(1) Highlight option "**2: OFF**" by pressing ▲/▼, followed by ENT.

(2) Press CLR or MENU to return to the previous NAVTEX text screen.

The above setting will be remembered until the system is reset.

4.8. Selecting and Rejecting Transmitters

4.8.1. Introduction

Initially the equipment is set to *1display NAVTEX messages from all stations on the air within the coverage area, *1store those messages in memory and output them to the printer port (**RS–232C**), *2**I/O DATA** port and INS port (**RS–422**). There may be cases where you do not wish to display, store, or output future messages from specific transmitters that are not of your concern to your navigational needs. Carrying out the following procedure allows you to select or reject transmitters independently for message display and storage in memory, for message output to the printer port, and message for output to the INS port.

A list of the transmitters that are currently rejected from display and storage can be checked by pressing REJ with the message screen showing.

*1: *A message will be displayed and stored in memory unless its character error rate (CER) exceeds 33%. CER is the ratio of the number of the correctly received characters to the number of corrupt characters per message.*

*2: *The I/O DATA port* (**I/O DATA**) *outputs the same message output as the printer port.*

4.8.2. Setting Procedure

To reject a specific station, execute the following step–by–step instructions:

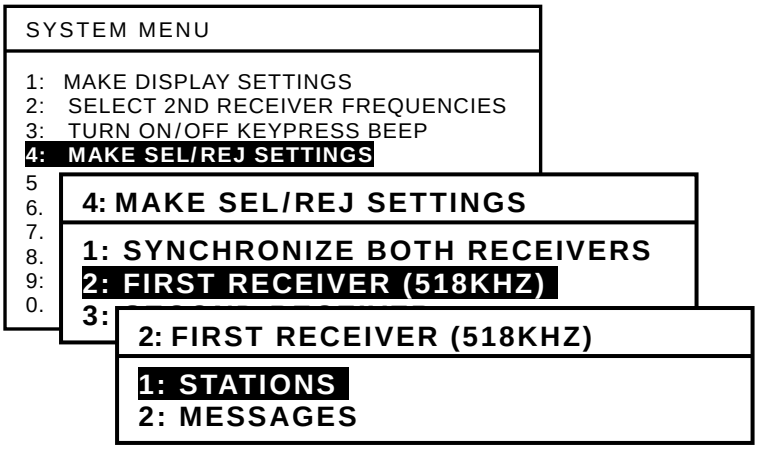
(1) Highlight option "**4: MAKE SEL/REJ SETTINGS**" by pressing ▲/▼, and then ENT. This opens a submenu as shown below with the following options:

1: SYNCHRONIZE BOTH RECEIVERS:	Applies same settings to both receivers.
2: FIRST RECEIVER (518KHZ):	Makes settings for first receiver alone.
3: SECOND RECEIVER:	Makes settings for second receiver alone.

< CAUTION >

There are NAVAREAs where the same ID is shared by two transmitters, one on 518 kHz and the other on 490 or 4209.5 kHz, located in two different countries in the same service area. In such cases, choosing option "**1:SYNCHRONIZE BOTH RECEIVERS**" will result in unintended rejection settings on either frequency.

Figure 4-9 Making Settings for First Receiver – Step 1



(*continued on next page*)

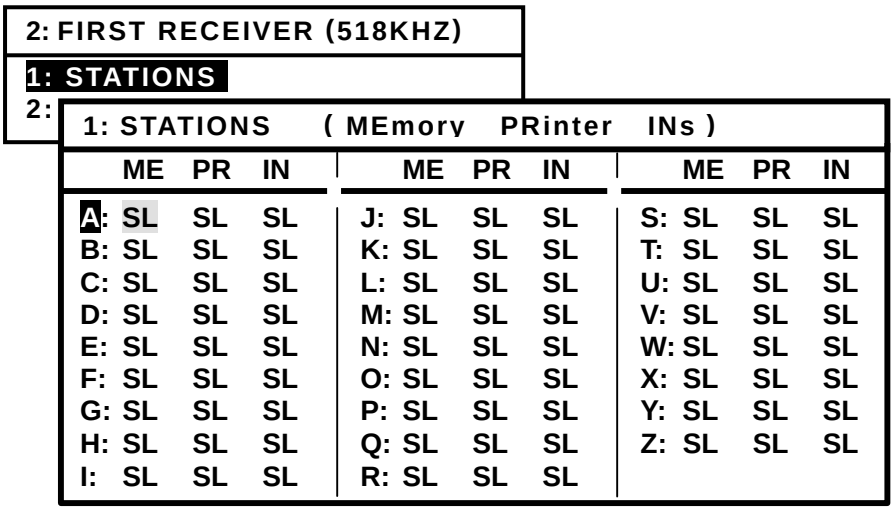
4.8.2. Setting Procedure – *2/3*

(2) Highlight the desired option, and then press ENT. The above example shows that you selected option "**2: FIRST RECEIVER**" to make settings to the first receiver alone. Another submenu will then open with the following options:

1: STATIONS: Selects or rejects transmitters.
2: MESSAGES: Selects or rejects message types.

(3) Select "**1:STATIONS**" and then press ENT. This will open a table listing the station IDs, their memory (**ME**) storage statuses, printer (**PR**) and INS (**IN**) port output statuses, as in the example below. The status indication is either **SL** (selected) or **RJ** (rejected). Initially all stations are in the **SL** status (i.e. selected) and messages from every station will be displayed and stored in memory, output to the printer port (**RS–232C** connector) and output to the INS port (**RS–422** connector).

Figure 4-10 Making Settings for First Receiver – Step 2



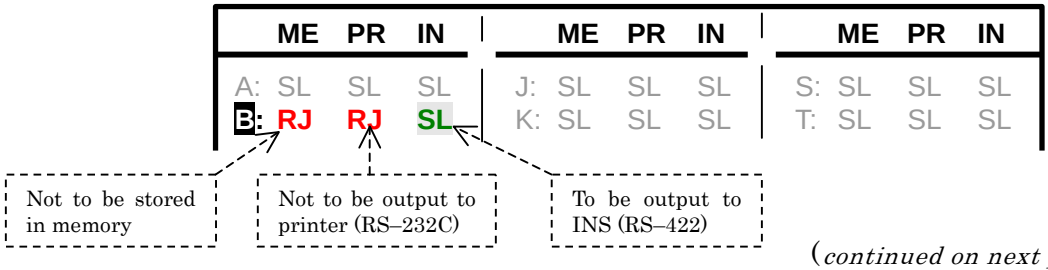
(4) Using ▲ / ▼, highlight the station whose NAVTEX messages you wish to display and store in memory, to output to the printer port or to output to the INS port.

(5) With ◀ / ▶, highlight the status indication (**SL** or **RJ**) of the target device (**ME**, **PR** or **IN**).

(6) To change the status to **RJ**, press REJ and to change it back to **SL**, press SEL.

The example below shows that you wish to output the messages from station **B** to the INS port alone, while preventing them from being displayed and stored in memory or from being output to the printer port.

Figure 4-11 Making Settings for First Receiver – Step 3



(*continued on next page*)

4.8.2. Setting Procedure – *3/3*

(7) Likewise, repeat steps (4), (5) and (6) to make the desired **RJ/SL** settings for other transmitter IDs.
Do not press ENT after setting the status with ◀ / ▶.

(8) Press MENU to return to the previous menu, or CLR to close all menus to return to the previous text message screen.

This completes the procedure for changing the display and memory storage status, printer port output status and INS port output status.

NOTE: Those settings can be externally controlled via the INS port with appropriate commands from a PC or IBS/INS device. See paragraph 7.4 for details.

4.9. Selecting and Rejecting Message Types

4.9.1. Introduction

Initially all message types are to be displayed and stored in memory, to be output to the printer port (**RS–232C**), I/O DATA port (**I/O DATA**) and to the INS port (**RS–422**), except for the following types:

Figure 4-12 Initially Rejected Message Types

G I M N O P Q R S T U W X Y

If you wish to select some of these types for display and storage in memory or for output to the printer/INS ports, or to prevent other messages types from being stored, or from being output to the ports, follow the procedure outlined below.

NOTES:

*(1) Message types **A** (Navigational warning), **B** (Meteorological warning), **D** (SAR, piracy and armed robbery information) and **L** (Additional navigational warning) are always selected for storage in memory, output to the printer, I/O DATA and INS ports; these types cannot be rejected (i.e. cannot be set to the "**RJ**" status).*

(2) A message with serial number 00 will always be displayed and stored regardless of storage rejection settings.

(3) Those settings can be externally controlled via the INS port with appropriate commands from a PC or IBS/INS device. See paragraph 7.4 for details.

4.9.2. Setting Procedure

To select some of the above initially rejected message types (e.g. type **G**: AIS messages) or to reject additional message types, execute the following step–by–step instructions. It is assumed that the **SYSTEM MENU** is currently being displayed.

(1) Highlight option "**4: MAKE SEL/REJ SETTINGS**" by pressing ▲/▼, and then ENT. This opens a submenu as shown below with the following options:

1: SYNCHRONIZE BOTH RECEIVERS:	Applies same settings to both receivers.
2: FIRST RECEIVER (518KHZ):	Makes settings for first receiver alone.
3: SECOND RECEIVER:	Makes settings for second receiver alone.

(*continued on next page*)

4.9.2. Setting Procedure – *2/3*

(2) Highlight the desired option, and then press ENT. The example below shows that you selected option "**1: SYNCHRONIZE BOTH RECEIVERS**" to make the same settings for the first and second receivers simultaneously. Another submenu will then open with the following options:

1: STATIONS: Selects or rejects transmitters.
2: MESSAGES: Selects or rejects message types.

(3) Select "**2:MESSAGES**" and then press ENT.

This will open a table listing the message types and titles, their memory (**ME**) storage statuses, printer (**PR**) and INS (**IN**) port output statuses, as in the example below. The status indication is either **SL** (selected) or **RJ** (rejected).

The statuses of the rest of the message types (**M** through **Z**) will show up one by one with repeatedly pressing of ▼, as in the example in Figure 4–14.

Figure 4-13 Making Same Settings for First and Second Receivers – Step 1

SYSTEM MENU

1: MAKE DISPLAY SETTINGS
2: SELECT 2ND RECEIVER FREQUENCIES
3: TURN ON/OFF KEYPRESS BEEP
4: MAKE SEL/REJ SETTINGS
5
6.
7.
8.
9:
0.

4: MAKE SEL/REJ SETTINGS

1: SYNCHRONIZE BOTH RECEIVERS
2: FIRST RECEIVER (518KHZ)
3:

1: SYNCHRONIZE BOTH RECEIVERS

1: STATIONS
2: MESSAGES

2: MESSAGES (MEmory PRinter INs)	ME	PR	IN
A: NAVIGATIONAL WARNING	SL	SL	SL
B: METEOROLOGICAL WARNING	SL	SL	SL
C: ICE REPORT	SL	SL	SL
D: SEARCH AND RESCUE INFORMA– TION/PIRACY AND ARMED ROBBERY	SL	SL	SL
E: METEOROLOGICAL FORECAST	SL	SL	SL
F: PILOT SERVICE MESSAGE	SL	SL	SL
G: AIS	RJ	RJ	RJ
H: LORAN–C MESSAGE	SL	SL	SL
I: PRESENTLY NOT USED	RJ	RJ	RJ
J: SATNAV MESSAGE	SL	SL	SL
K: OTHER ELECTRONIC NAVAID MSG.	SL	SL	SL
L: ADDITIONAL NAV. WARNING	SL	SL	SL

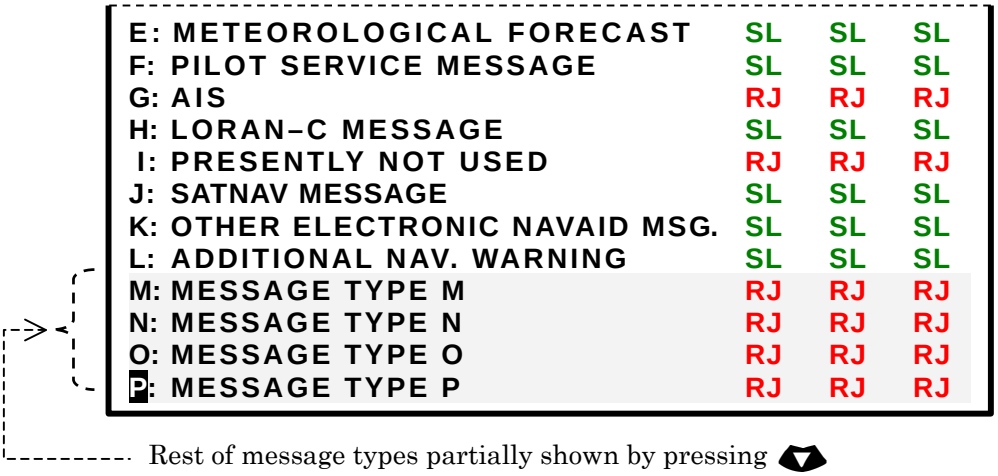
*NOTE: The settings for **PR** apply also to the **I/O DATA** port.*

- Destination Devices: **ME**: memory **PR**: printer port (**RS–232C**) **IN**: INS port (**RS–422**)
- Status: **SL**: selected **RJ**: rejected

(*continued on next page*)

4.9.2. Setting Procedure – *3/3*

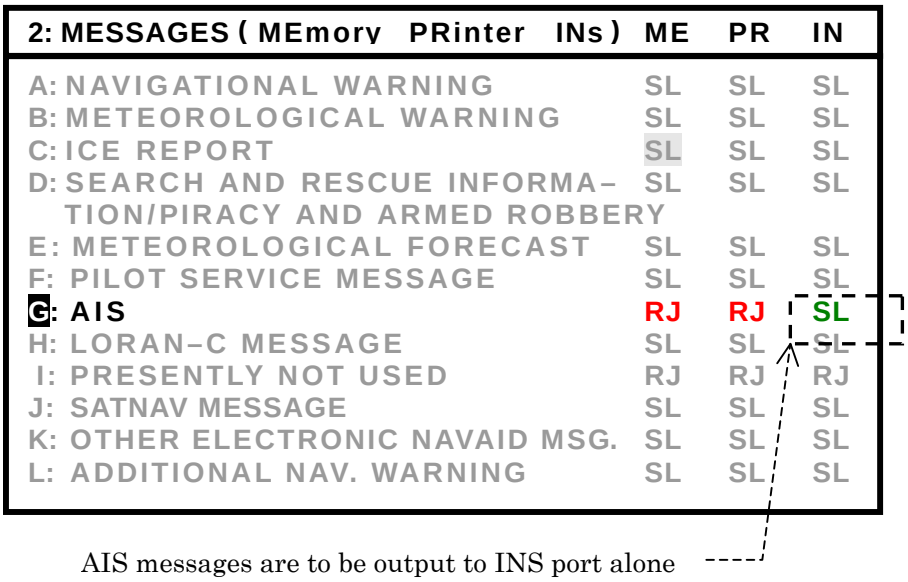
Figure 4-14 Checking Statuses of Other Message Types – Example



(4) Using ▲ / ▼, highlight the message type that you wish, or do not wish, to store in memory (**ME**), to output to the printer port (**PR**) or to output to the INS port (**IN**). Types **A**, **B**, **D** and **L** cannot be selected at any time, and will be skipped.

(5) With ◀ / ▶, highlight the status indication (**SL** or **RJ**) of the target device (**ME**, **PR** or **IN**). To change the status to **RJ**, press REJ and to change it back to **SL**, press SEL . The example below shows that you wish to output type **G** messages (**AIS**) to the INS port alone, while preventing them from being stored in memory or from being output to the printer port.

Figure 4-15 Making Same Settings for First and Second Receivers – Step 2



(6) Likewise, repeat steps (4) and (5) to make the desired **RJ/SL** settings for other message types. Do not press ENT after setting the status with ◀ / ▶.

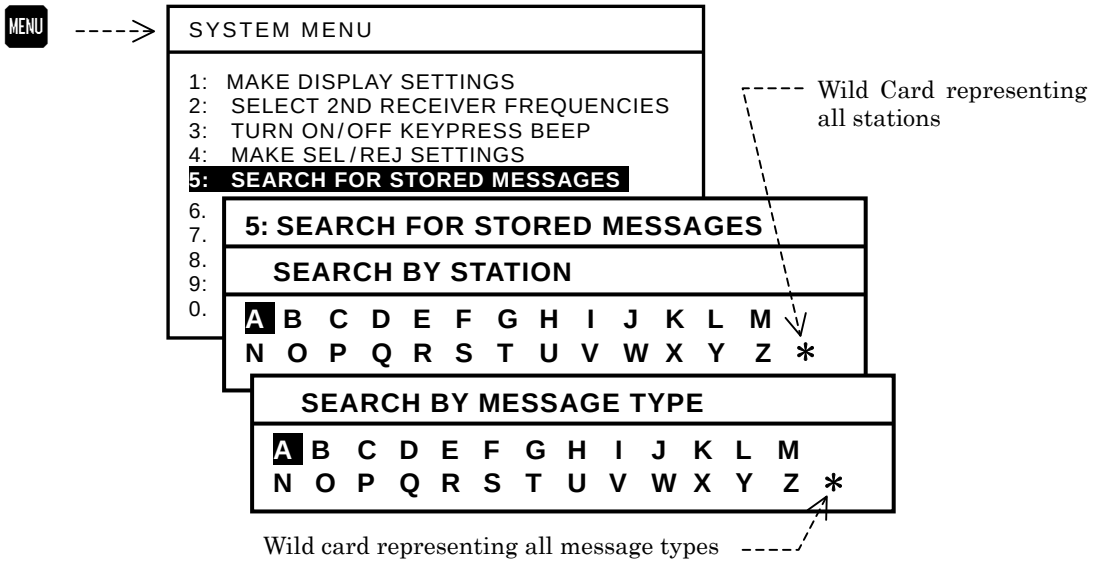
(7) Press CLR to close all menus to return to the previous text message screen.

4.10. Searching Memory for Stored Messages

NAVTEX messages stored in non–volatile memory are searchable by station and/or message type via the following steps.

(1) Highlight option "**5: SEARCH FOR STORED MESSAGES** " by pressing ▲ / ▼, followed by ENT **.** This opens a submenu with a list of all station IDs, as shown below. The wild card character (∗) represents all station IDs.

Figure 4-16 Searching for Stored Messages



(2) Using ▲ / ▼ / ◀ / ▶, select the station of which messages you wish to search for.

For example, if you wish to search for all stored messages sent from station A, highlight **A** . If you wish to search for messages of a specific type from all stations, highlight the wild card character (∗) which represents all transmitter IDs.

(3) Press ENT . This opens a menu listing all the message types. The wild card (∗) represents all message types.

(4) Using ▲ / ▼ / ◀ / ▶, select the desired message type. If you wish to specify all message types from the station selected at step (2), highlight ∗.

(5) Press ENT . This allows all messages to be displayed that meet the conditions you set at above steps (2) and (4).

The displayed messages can be scrolled across the screen line–by–line by pressing ▲ / ▼ or message–by–message by pressing ◀ / ▶.

To return to the menu, press CLR . To return to the previous NAVTEX text screen, press it once again.

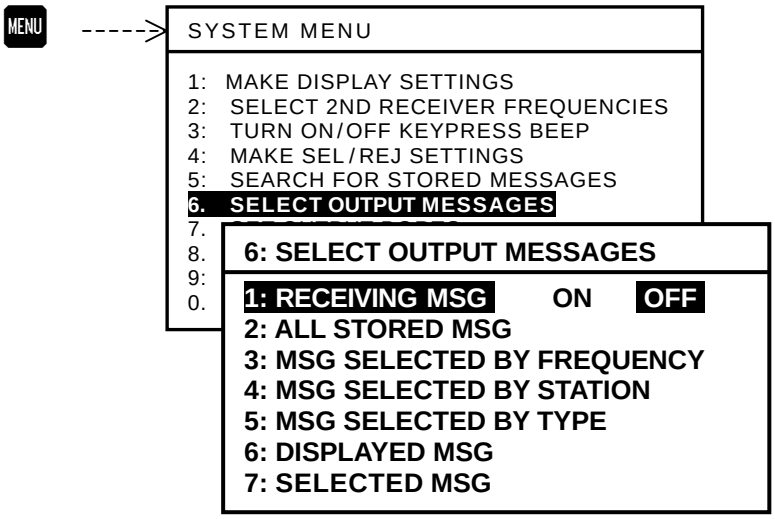
4.11. Selecting Output Messages

4.11.1. Introduction

The NAVTEX message that is currently being received or previously received messages stored in memory can be output to external devices (e.g., a printer, an INS/IBS device) via the rear panel interface connectors (I/O ports, i.e. **RS–232C**, **RS–422**, **I/O DATA**). The execution of the following instructions allows you to selectively output the desired messages by specifying various parameters, such as live (on–line) or recall–from–storage mode, receiver type, transmitter ID and message type.

(1) Press MENU, opening the **SYSTEM MENU**.

Figure 4-17 Accessing Output Selection Menu



(2) Highlight "**6: SELECT OUTPUT MESSAGES**" by pressing ▲/▼, followed by ENT. This opens a submenu as illustrated above, with the following output mode options:

1: RECEIVING MSG:	Message currently being received
2: ALL STORED MSG:	All stored messages
3: MSG SELECTED BY FREQUENCY:	Messages selected by specifying receiver
4: MSG SELECTED BY STATION:	Messages selected by specifying transmitter
5: MSG SELECTED BY TYPE:	Messages selected by specifying message type
6: DISPLAYED MSG:	All messages currently displayed
7: SELECTED MSG:	Individual messages selected from those appearing on display

Before the desired output can be obtained, the target output connector (output port) must be enabled (set to **ON**) via the instructions in paragraph 4.12. Note that all ports are initially enabled unless set otherwise previously by your dealer.

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

4.11.2. Outputting Live NAVTEX Messages

This output mode is to be activated when an optional printer is plugged in for realtime, on–line message printing or when a live NAVTEX output is required for other onboard applications.

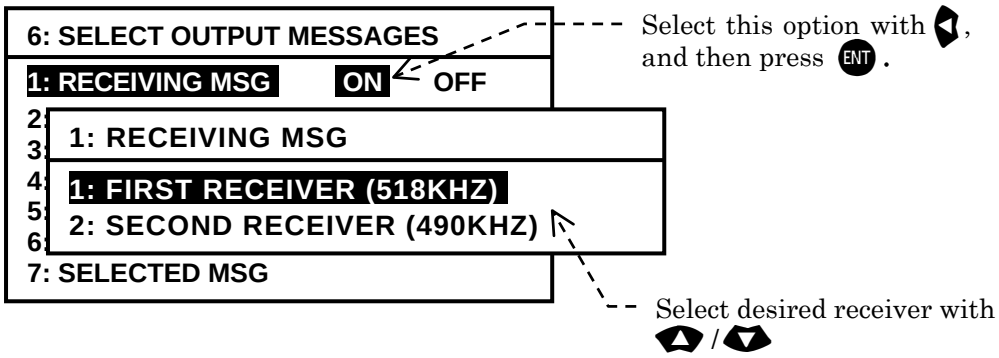
To output live messages as they are received, follow the steps given below. Be sure to set the printer (e.g. *[1]**PR–900**) or other receiving device properly.

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight option "**1:RECEIVING MSG**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT.

(2) Press ◀ to highlight "*[2]**ON**," and then press ENT. Another submenu will then show up, allowing you to select the first or second receiver, as illustrated below.

Figure 4-18 Outputting Live NAVTEX Message



(3) Using ▲/▼, select the desired receiver, and then press ENT. The equipment will then start outputting live messages from the receiver selected.

The settings you made via the above steps will be stored in memory.

(4) Press MENU to return to the previous menu or CLR to return to the first receiver message screen.

*1: *Before the printer can be used, the data transfer speed through the RS–232C port must be set to 110 baud (**BIT RATE: 0.11**) via the instructions given in 4.12.4.2.*

*2: *This setting is remembered in memory. It will return to "**OFF**" when you execute the system reset via the instructions in paragraph 4.15.*

4.11.3. Outputting All Stored Messages

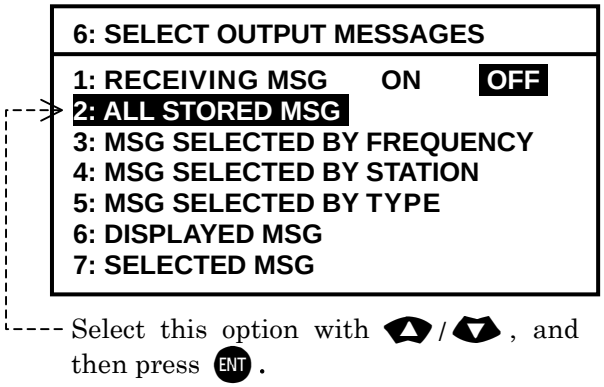
To output all the messages stored in memory, follow the steps given below.

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight "**2: ALL STORED MSG**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT.

The stored messages will then be output one by one.

Figure 4-19 Outputting All Stored Messages



The following window will pop up to indicate the outputting action in progress.

The window will be turned off automatically upon completion of outputting.

To cancel the action, press CLR.

(2) Press MENU to return to the previous menu or CLR to return to the first receiver message screen.

4.11.4. Outputting NAVTEX Messages of Specific Receiver

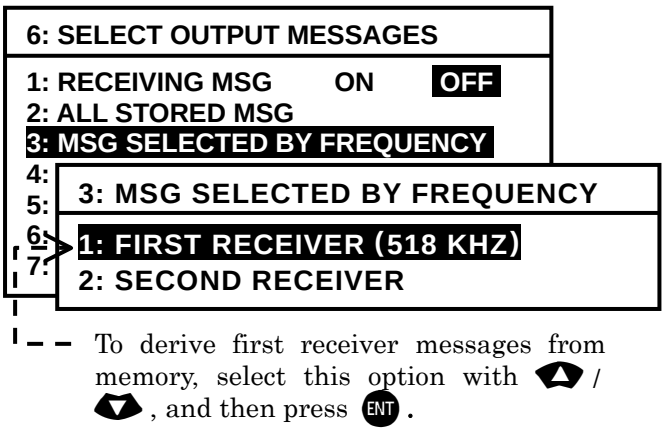
If you wish to output all NAVTEX messages received from either receiver (first or second receiver) alone, carry out the following step–by–step procedure:

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight option "**3:MSG SELECTED BY FREQUENCY**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT. This turns on another submenu with the following options, enabling you to select the desired receiver, as in the example illustrated below:

1: FIRST RECEIVER (518 KHZ): Outputs first receiver messages.
2: SECOND RECEIVER: Outputs second receiver messages.

Figure 4-20 Outputting Stored Messages of First Receiver – Example



(2) Highlight the desired option, and then press ENT. The following window will pop up to indicate the outputting action in progress.

The window will be turned off automatically upon completion of outputting.

To cancel the action, press CLR.

(3) Press MENU to return to the previous menu or CLR to return to the first receiver message screen.

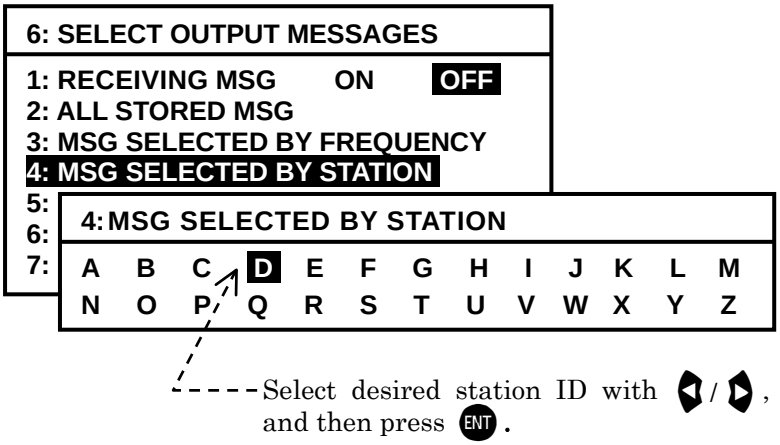
4.11.5. Outputting NAVTEX Messages of Specific Station

If you wish to output all messages received from a specific NAVTEX transmitting station, carry out the following step–by–step procedure:

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight option "**4:MSG SELECTED BY STATION**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT. This turns on another submenu with a list of station IDs, enabling you to select the desired transmitter, as in the example illustrated below:

Figure 4-21 Outputting Stored Messages Received from Station D – Example



(2) Using ◀ / ▶, highlight the desired ID, and then press ENT. The following window will pop up to indicate the outputting action in progress.

```
OUTPUTTING STORED MESSAGES.
TO CANCEL, PRESS [CLR].
```

The window will be turned off automatically upon completion of outputting.

To cancel the action, press CLR.

(3) Press MENU to return to the previous menu or CLR to return to the first receiver message screen.

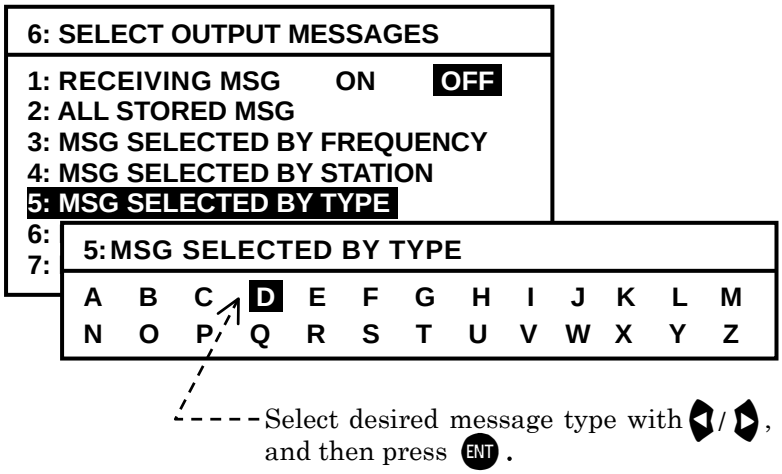
4.11.6. Outputting NAVTEX Messages of Specific Message Type

If you wish to output all messages of a specific message type, carry out the following step–by–step instructions:

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight option "**5: MSG SELECTED BY TYPE**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT. This turns on another submenu with a list of message types, enabling you to select the desired message type, as in the example illustrated below:

Figure 4-22 Outputting Stored Messages of Message Type D – Example



(2) Using ◀ / ▶, highlight the desired message type, and then press ENT. The following window will pop up to indicate the outputting action in progress.

The window will be turned off automatically upon completion of outputting.

To cancel the action, press CLR.

(3) Press MENU to return to the previous menu or CLR to return to the first receiver message screen.

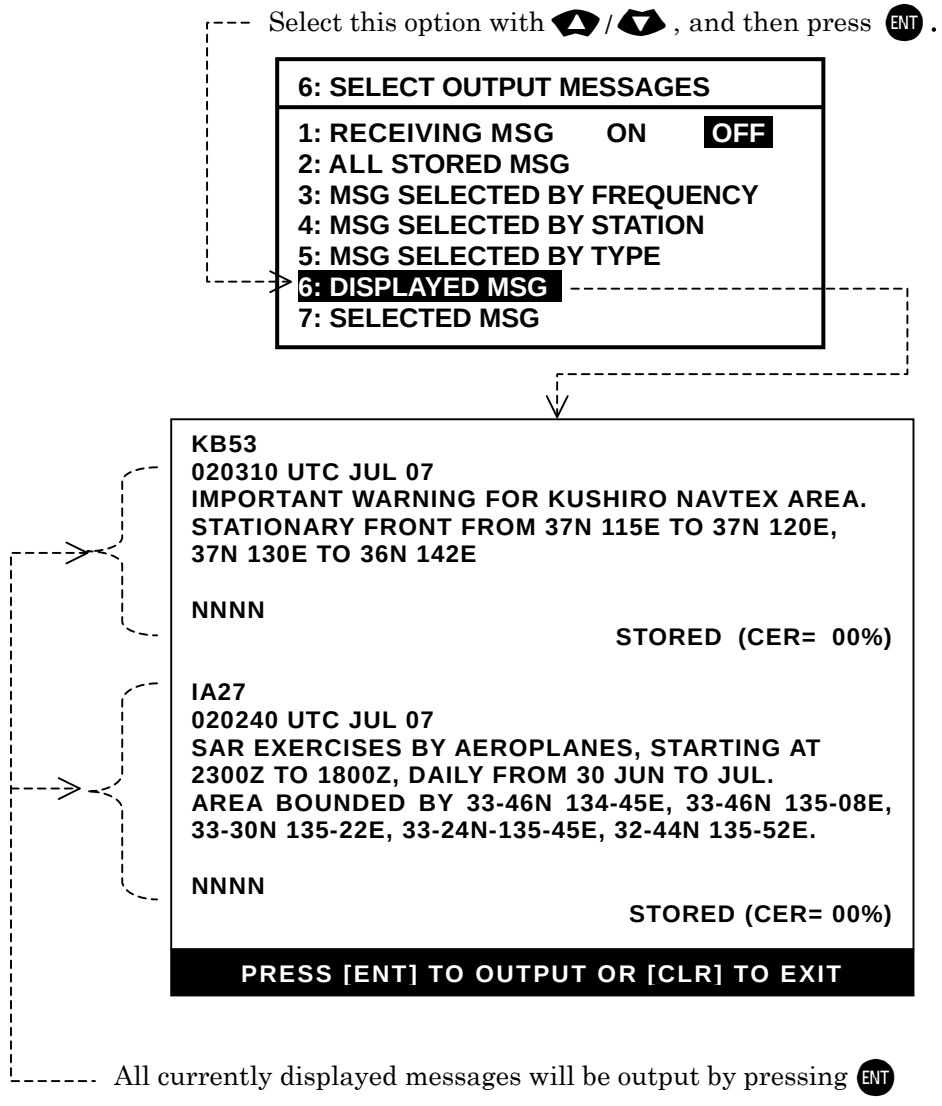
4.11.7. Outputting All Displayed NAVTEX Messages

If you wish to output all messages currently displayed, follow the steps given below.

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight "**6:DISPLAYED MSG**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT. This turns all menus off, showing the current message screen, as in the example illustrated below.

Figure 4-23 Outputting All Currently Displayed Messages – Example



(2) Press ENT to output all the displayed messages, or CLR to cancel the function.

The previous message screen will return automatically upon completion of the output.

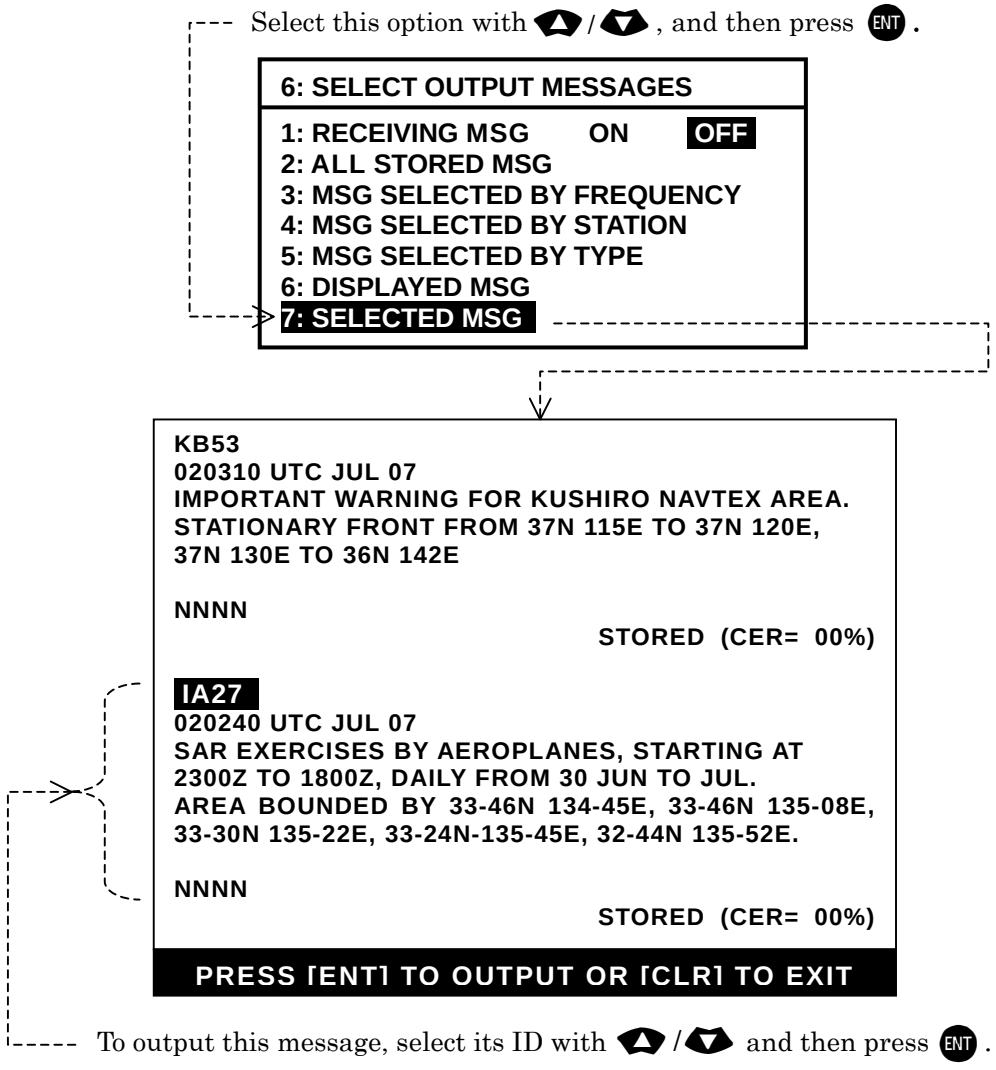
4.11.8. Outputting Specific NAVTEX Message

If you wish to output a specific message out of all currently displayed messages, carry out the following procedure:

NOTE: A forced carriage return (↓) will be replaced by an underscore (_) (hex 5F) when it is output to an IBS/INS terminal or a printer.

(1) Highlight "**7:SELECTED MSG**" on the **SELECT OUTPUT MESSAGES** submenu, and then press ENT. This turns all menus off, showing the current message screen, as in the example illustrated below.

Figure 4-24 Outputting Specific Message – Example



(2) Using ▲/▼, highlight the ID of the desired message as in the example above, and then press ENT.

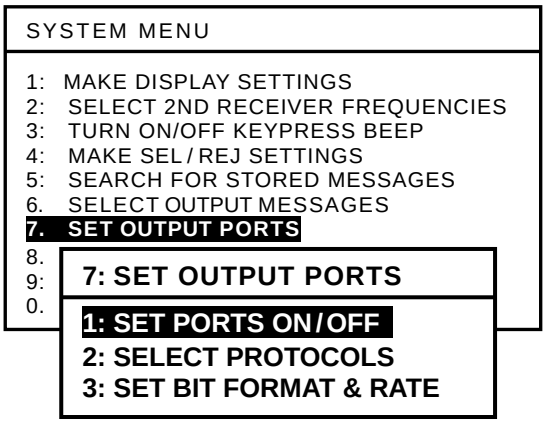
To cancel the function, press CLR instead of ENT.

4.12. Setting Output Ports

4.12.1. Introduction

In order for external devices (e.g. printer, IBS/INS component) to receive live or stored NAVTEX messages properly through the desired rear panel I/O connector (**RS–232C**, **RS–422** or **I/O DATA** connector), it is necessary to set the following parameters to the port selected.

Figure 4-25 Opening Submenu for Setting Output Ports



Output Port Parameters:

- Status (enabled or disabled)
- Communications Protocol
- Bit Format and Output Rate

The following instructions allow you to set these parameters as required by the data–receiving device plugged into the desired connector.

(1) Press MENU, opening the **SYSTEM MENU**.

(2) Highlight "**7: SET OUTPUT PORTS**" by pressing ▲/▼, followed by ENT. This opens a submenu as illustrated above, with the following output options:

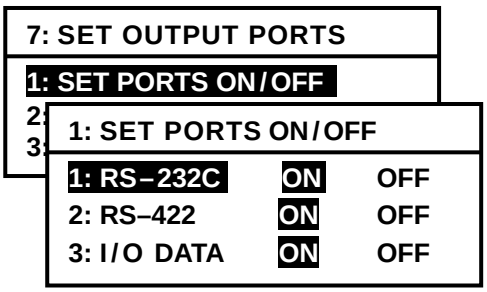
1: SET PORTS ON/OFF: Enables or disables desired port.
2: SELECT PROTOCOLS: Selects protocols for desired port.
3: SET BIT FORMAT & RATE: Sets correct bit format and data rate.

4.12.2. Enabling/Disabling I/O Ports

4.12.2.1. **RS–232C** Port

The **RS–232C** port is mainly intended as a printer interface, and is initially enabled so that the message types selected in paragraphs 4.11.2 through 4.11.8 will be output via this port. If, for any reason, you wish to disable it, follow the steps given below.

Figure 4-26 Selecting Output Ports for Enable/Disable Settings – 1



(1) Highlight "**1:RS–232C**" and press ENT.

(2) Using ◀/▶, highlight "**OFF**."

(3) Press ENT to complete or CLR to cancel.

(4) Press MENU to return to the previous submenu or CLR to return to the first receiver text page.

4.12.2.2. **RS–422** Port

The **RS–432** port, designed as an interface with an IBS/INS system, is also initially enabled so that the NAVTEX message types selected in paragraphs 4.11.2 through 4.11.8 will be output via this port. If, for any reason, you wish to disable it, follow the steps given below.

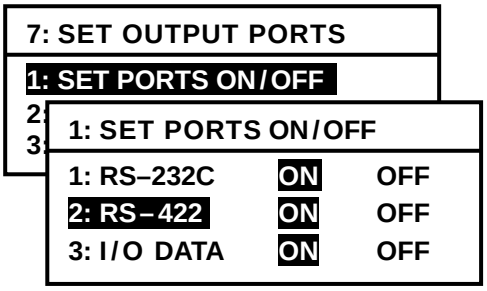
Figure 4-27 Selecting Output Ports for Enable/Disable Settings – 2

(1) Highlight "**2:RS–422**" and press ENT .

(2) Using ◀ / ▶ , highlight "**OFF**."

(3) Press ENT to complete, or CLR to cancel.

(4) Press MENU to return to the previous submenu or CLR to return to the first receiver text page.



NOTE: The input lines to the RS–422 connector are insulated from the ship's ground by opto–isolators.

4.12.2.3. **I/O DATA** Port

The **I/O DATA** port is also initially enabled so that the message types selected in paragraphs 4.11.2 through 4.11.8 will be output via this port. If, for any reason, you wish to disable it, carry out the following step–by–step instructions:

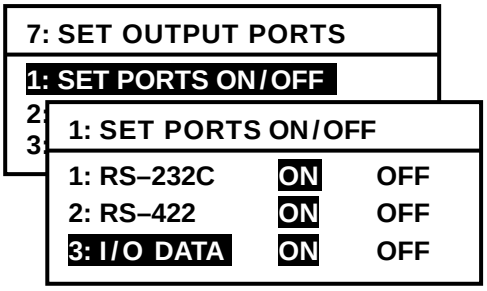
Figure 4-28 Selecting Output Ports for Enable/Disable Settings – 3

(1) Highlight "**3:I/O DATA**" and press ENT .

(2) Using ◀ / ▶ , highlight "**OFF**."

(3) Press ENT to complete or CLR to cancel.

(4) Press MENU to return to the previous submenu or CLR to return to the first receiver text page.



*NOTE: The message outputs available from the **I/O DATA** port are the same as those from the printer port (**RS–232C**).*

4.12.3. Selecting Communications Protocols

The following communications protocols are initially assigned to the three output ports described in paragraph 4.12.

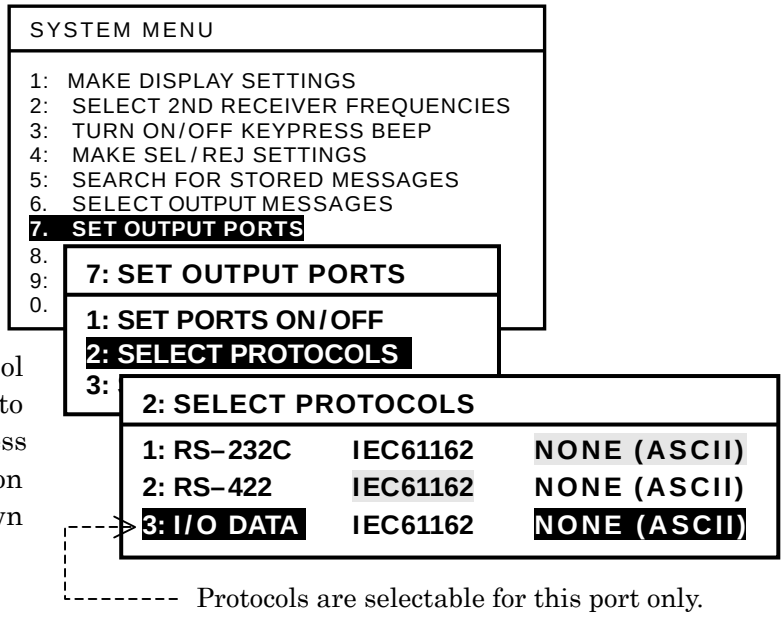
- IEC 61162–1 (NMEA–0183 Ver. 2.0 & greater): **RS–422** Port
- Asynchronous non–handshaking: **RS–232** Port and **I/O DATA** Port

Of the three ports, only the **I/O DATA** port can select either the IEC 61162–1 or the asynchronous non–handshaking transfer mode. If your application using that port requires the IEC 61162–1 as its protocol, follow the steps given below.

*NOTE: If you wish to connect a serial printer other than the **PR–900** to the **RS–232C** or the **I/O DATA** port, be sure to turn off its hardware flow control and set it to "X–ON/X–OFF," if available, or an erratic printout can result.*

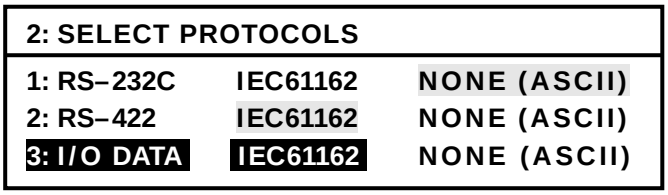
(1) Highlight option "**2:SELECT PROTOCOLS**" on the **SET OUTPUT PORTS** submenu, and press ENT . This turns on another submenu for selection of the protocols, as illustrated below.

Figure 4-29 Accessing Submenu for Selection of Protocols for **I/O DATA** Port



(2) To change the protocol for the **I/O DATA** port to the IEC 61162–1, press ◀, highlighting option **IEC61162**, as shown below.

Figure 4-30 Selecting Protocol for **I/O DATA** Port



(3) Press ENT to complete the selection.

(4) Press MENU to return to the previous submenu or CLR to return to the first receiver text page.

4.12.4. Selecting Bit Formats and Data Transfer Rates

4.12.4.1. Introduction

The following instructions allow you to select the correct bit format (number of data bits, stop bits, parity bit status) and bit rate (baud rate: 110, 4800, 9600 etc.) that are required by the application using each I/O port for correct data transfer.

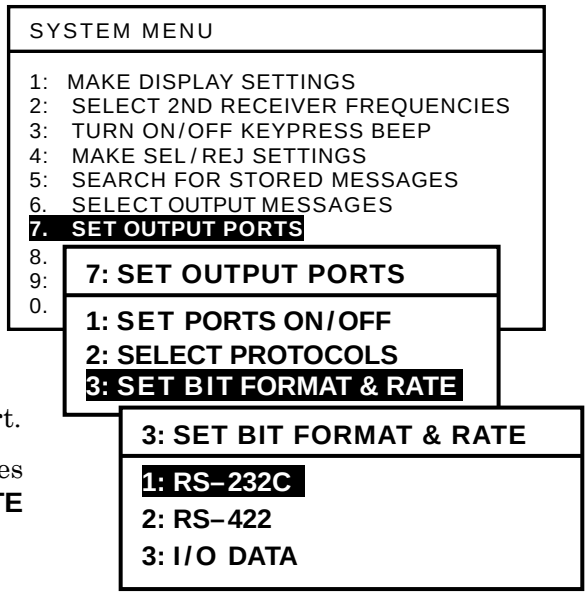
Figure 4-31 Accessing Submenu for Selection of Bit Formats and Rates

(1) Highlight option "**3:SET BIT FORMAT & RATE**" on the **SET OUTPUT PORTS** submenu, and then press ENT.

Another submenu (**SET BIT FORMAT & RATE**) will then be turned on as shown at right to specify the port for which you wish to select those parameters.

(2) Using ▲/▼, select the desired port.

The procedure given below assumes that the **SET BIT FORMAT & RATE** submenu is currently displayed.



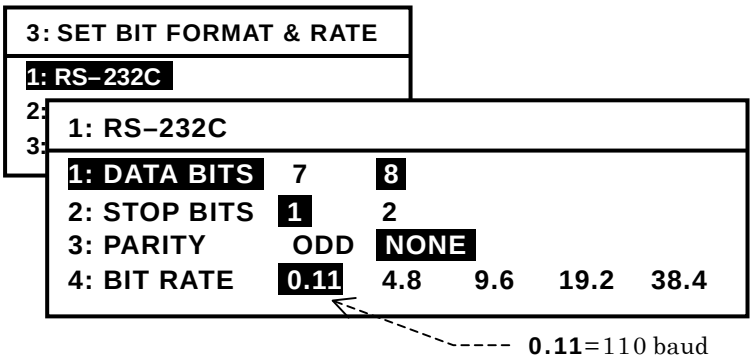
4.12.4.2. Selecting Parameters for RS–232C Port

The parameters for the **RS–232C** port are initially set as follows:

- Data Bits: 8 bits
- Stop Bits: 1 bit
- Parity: None
- Bit Rate: 110 baud

The current parameter values can be checked by selecting "**1:RS–232C**" as shown at right.

Figure 4-32 Checking Current Parameters for RS–232C



NOTES:

*(1) If an optional **PR–900** printer is plugged into the **RS–232C** port, be sure to select the following parameters before it can be used to print messages correctly:*

DATA BITS = 8, STOP BITS = 1, PARITY = NONE, BIT RATE = 0.11 (110 baud)

*(2) If you wish to connect a serial printer other than the **PR–900** to the **RS–232C** port, be sure to turn off its hardware flow control and set it to "X–ON/X–OFF," if available, or an erratic printout can result.*

(continued on next page)

4.12.4.2. **Selecting Parameters for RS–232C** Port (*continued – 2/2*)

If your RS–232C application requires a different set of parameters, select the appropriate values by following the steps given below:

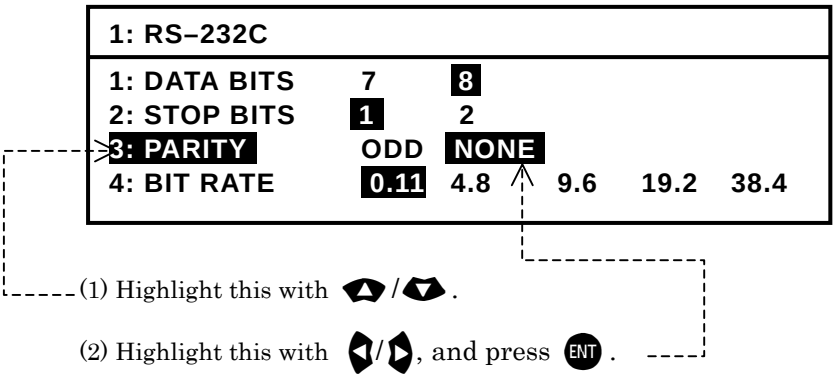
(1) Press ▲/▼ to highlight the desired parameter.

For example, to change the parity bit status to non–parity, highlight "**3:PARITY**."

(2) Press ◀/▶ to highlight the desired value, and then press ENT.

For example, highlight "**NONE**" and press ENT.

Figure 4-33 Changing Parity Bit Status Parameter – Example



(3) Press MENU to return to the previous submenu or CLR to return to the first receiver text page.

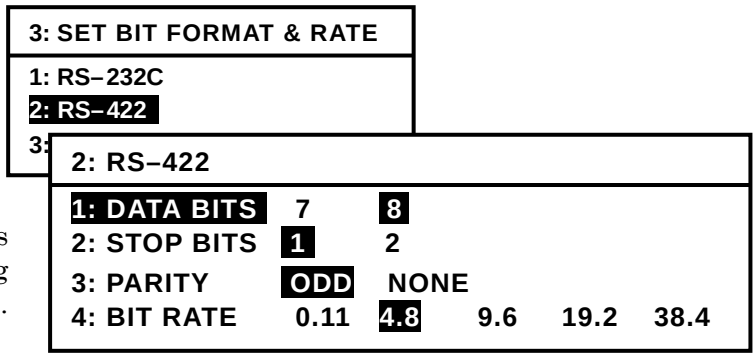
4.12.4.3. **Selecting Parameters for RS–422** Port

The parameters for the **RS–422** port are initially set as follows:

Figure 4-34 Checking Current Parameters for RS–422

- Data Bits: 8 bits
- Stop Bits: 1 bit
- Parity: Odd parity
- Bit Rate: 4800 baud

The current parameter values can be checked by selecting "**2:RS–422**" as shown at right.



Each parameter can be changed in the same manner as in the example given above (paragraph 4.12.4.2). Be sure to press ENT after selecting the desired value.

(*continued on next page*)

4.12.4.4. **Selecting Parameters for I/O DATA** Port

The parameters for the **I/O DATA** port are initially set as follows:

- Data Bits: 8 bits
- Stop Bits: 1 bit
- Parity: Odd parity
- Bit Rate: 4800 baud

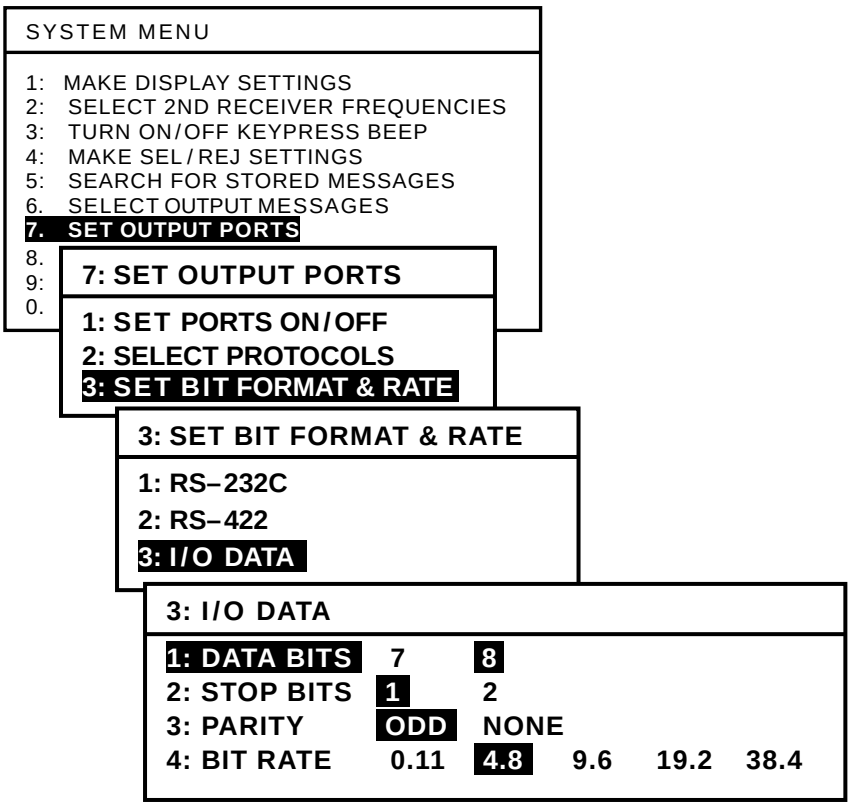
NOTES:

*(1) The message outputs available from the **I/O DATA** port are the same as those from the printer port (**RS–232C**).*

*(2) If you wish to connect a serial printer other than the **PR–900** to the **I/O DATA** port, be sure to turn off its hardware flow control and set it to "X–ON/X–OFF," if available, or an erratic printout can result.*

The current parameter values can be checked by selecting "**3:I/O DATA**" on the **SET BIT FORMAT & RATE** submenu, as shown below.

Figure 4-35 Checking Current Parameters for **I/O DATA** Port



Each parameter value can be changed using ▲/▼ and ◀/▶ in the same manner as in the example given in paragraph 4.12.4.2.

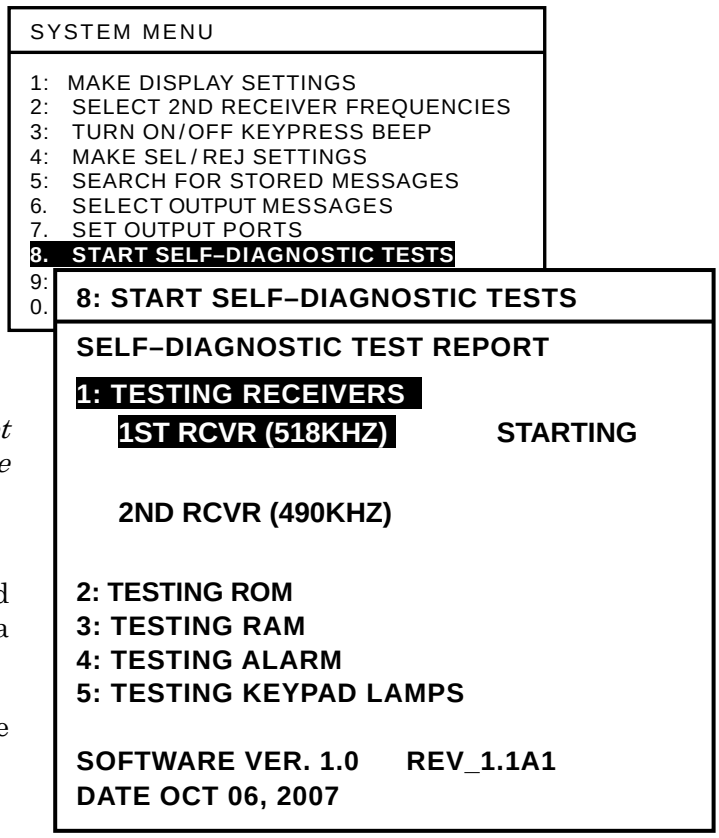
Be sure to press ENT after selecting the desired value.

4.13. Performing Self–Diagnostic Tests

4.13.1. Introduction

Selecting option "**8: START SELF–DIAGNOSTIC TESTS**" opens a test report window as shown at right and at the same time initiates automatically the built–in function of self–diagnostic tests to check the integrity of important hardware components of the equipment.

Figure 4-36 Starting Self–Diagnostic Test



NOTE: The test functions cannot be executed during live message reception.

The self–diagnostic tests should be conducted once a year as a part of regular maintenance.

The following components will be checked:

- First Receiver (518 kHz)
- Second Receiver (490 kHz or 4209.5 kHz, currently selected)
- ROM (flash memory embedded in CPU chip, for software storage)
- RAM (DRAM embedded in CPU chip, for software execution) and (SRAM mounted on CPU PCB, capacitor–backed, for message/ID storage)
- Alarm (audible)
- Keypad dimmer lamps

4.13.2. Activating Self–Diagnostic Test Function

(1) Allow the equipment to warm up for **at least 30 minutes** before activating the test function if the unit was switched off before the test.

(2) Press MENU to open the system menu, highlight "**8: START SELF–DIAGNOSTIC TESTS**" and press ENT. A test report window will show up as in the example above, and the tests will start automatically. To cancel the execution, press CLR. If reception of a NAVTEX message is already in progress, the function cannot be activated, and the following caution will be turned on, blinking in reverse video.

WAIT FOR MESSAGE RECEPTION TO END!

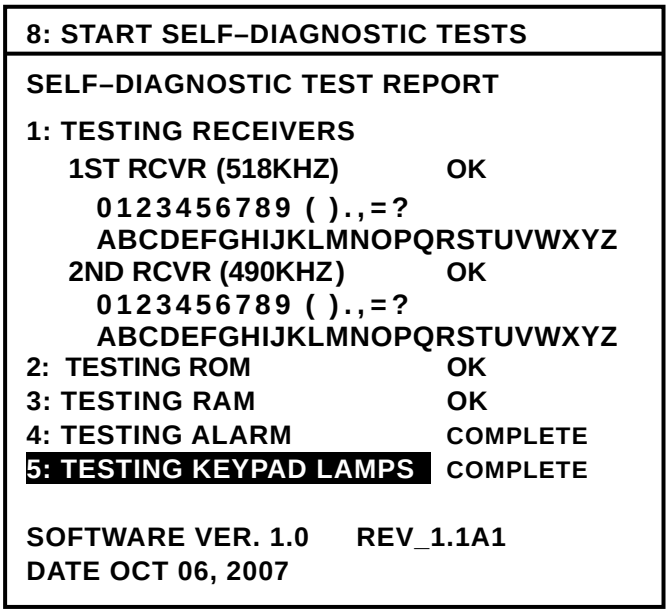
Press CLR to turn it off, returning to the text screen.

(*continued on next page*)

4.13.3. Checking Test Results

Figure 4-37 Results of Self–Diagnostic Test – Example

The function will be terminated automatically just after completion of the keypad dimmer lamp test (**TESTING KEYPAD LAMPS** on the test report). The test report window will remain to allow the user to check the tests results. The figure at right shows an example of the test report showing the results of the self–diagnostic tests.



The result of each check will be available in one of the following indications:

- **OK**: Tested hardware is functioning normally (for test items 1, 2 and 3).
- **FAILED**: Malfunction of tested hardware is detected (for test items 1, 2 and 3). If this indication shows up, see section 5 (User–Level Trouble–shooting) for actions to be taken, or contact your dealer for assistance.

  *NOTE: If the receiver test result is "**FAILED**," check to be sure that the unit has been turned on for at least 30 minutes before starting the test. This warm–up period is necessary for the internal test oscillators to become stable. The "**FAILED**" indication should not be immediately interpreted as a sign of receiver malfunction if the unit was tested shortly after power–up.*
- **COMPLETE**: Test is completed (for test items 4 and 5). The user should check whether the tested hardware component functioned correctly.

(1) Result of Audible Alarm Test

Execution of the test "**4:TESTING ALARM**" checks the buzzer function of the audible alarm circuit. On successful completion of the test, the buzzer should sound three slow beeps. If no sound is heard, see section 5 (User–Level Troubleshooting) for actions to be taken, or contact your dealer for assistance.

(2) Result of Keypad Backlighting Lamp Test

Execution of the test "**5:TESTING KEYPAD LAMPS**" checks the light–emitting diodes (LEDs) that illuminate the keys and their control circuit. All keys should be lit blinking at the maximum level during the test. If no key is lit or if some of the keys remain extinguished, see section 5 (User–Level Troubleshooting) for actions to be taken, or contact your dealer for assistance.

This test result should be checked in a dark environment for ease of checking.

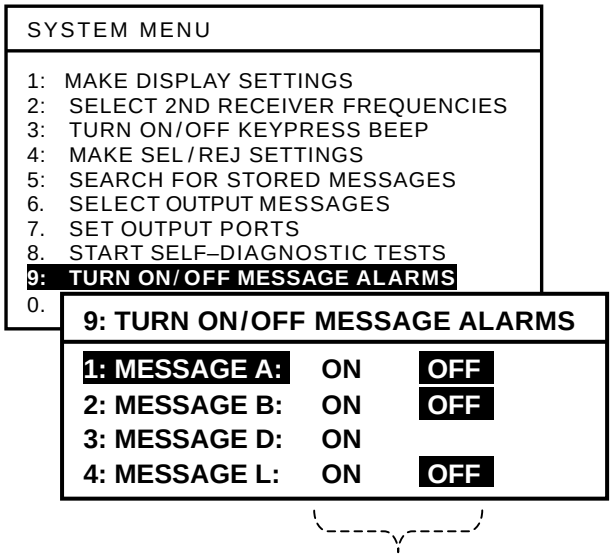
4.14. Turning on/off Message Alarms

The alarm function for types A (navigational warning), B (meteorological warning) and L (additional navigational warning) messages is initially disabled unless it was already set otherwise by your dealer. If you wish to enable some or all of the message alarms, follow the steps given below. The alarm for type–D messages (SAR, piracy and armed robbery information) cannot be disabled due to the relevant IMO resolutions.

(1) Press MENU, opening the system menu.

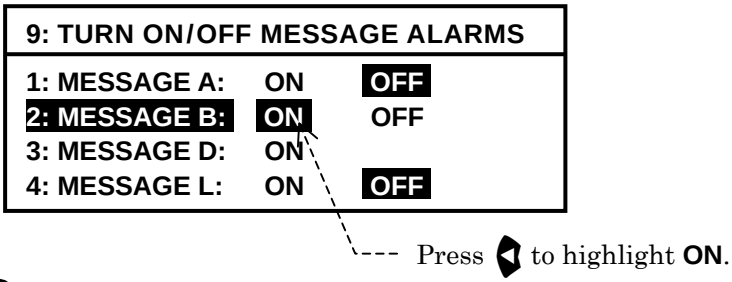
(2) Using ▲ / ▼, highlight "**9: TURN ON/OFF MESSAGE ALARMS**" and then press ENT. The current alarm **ON**/**OFF** status will then be displayed on a submenu as in the example below.

Figure 4-38 Initial Alarm Status



(3) Highlight the desired message type with ▲ / ▼, and then highlight status indication "**ON**" by pressing ◀, as in the example below.

Figure 4-39 Enabling Alarm for Type–B Messages



Be sure to press ENT after selecting the desired setting.

(4) Press MENU to return to the previous submenu or CLR to return to the first receiver text page.

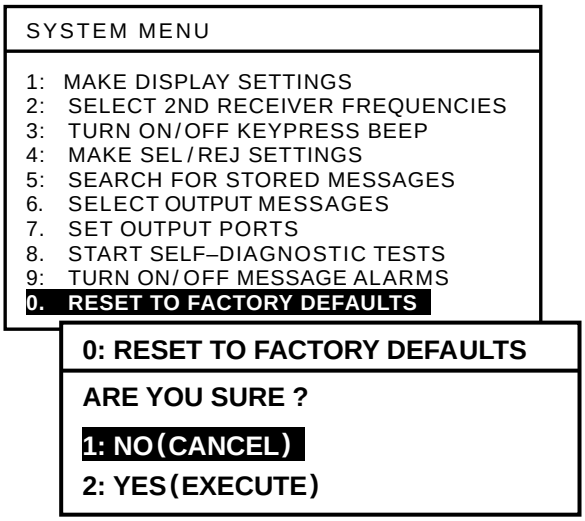
4.15. Resetting the System

If, for any reason, you wish to reset the system to return all current operational settings to the initial factory settings, follow the steps given below. Initialization of the settings does not affect the message storage; all stored messages will be retained.

(1) Press MENU, opening the system menu.

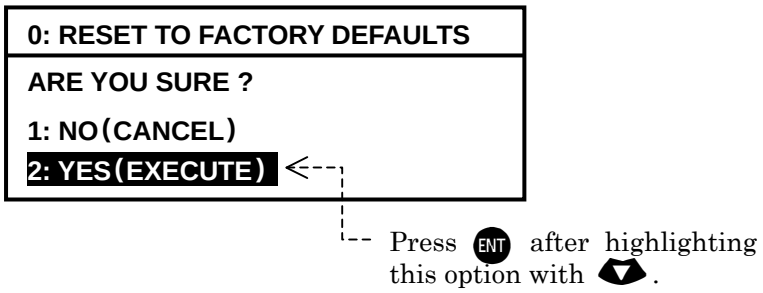
(2) By pressing ▲ / ▼, highlight "**0:RESET TO FACTORY DEFAULTS**" and then press ENT. This opens a submenu, asking you to confirm whether to reset the system, as illustrated at right.

Figure 4-40 Resetting the System – Step 1



(3) Press ▼ to highlight "**2: YES (EXECUTE)**" as shown below.

Figure 4-41 Resetting the System – Step 2



(4) Press ENT. This will reset the system and initialize all the settings you have made, and then return you automatically to the first receiver text page.

Attention to NAVTEX Printer Users

If you are using an optional **PR–900** printer or other serial printer plugged into the **RS–232C** connector to print NAVTEX messages on–line, be sure to set the menu option **RECEIVING MSG** on the **SELECT OUTPUT MESSAGES** submenu to "**ON**" again via the instructions in paragraph 4.11.2 on completion of the resetting. No printout will result if the above menu option is set to "**OFF**,**"** which is the default setting.

5. User–Level Troubleshooting

A list of common troubles the user may experience while operating the equipment is given below along with recommended remedies for such troubles. If a problem persists, contact your dealer for assistance, giving as much information as possible about the symptom, self–diagnostic tests results (paragraph 4.13), power supply voltage, antenna configuration, operating frequency, control and menu settings used, serial number of, and *1 software version (**VER**.) and revision (**REV**.) numbers of, your equipment.

*1 *The software version and revision numbers are displayed in the opening message window that appears briefly at power–up. Those data will also be displayed when the self–diagnostic tests are conducted (paragraph 4.13).*

< WARNING >

NO USER–SERVICEABLE PARTS ARE INSIDE THE CABINET. QUALIFIED PERSONNEL SHOULD MAKE IT SURE TO SWITCH THE EQUIPMENT OFF AND UNPLUG THE POWER CORD BEFORE OPENING THE CABINET FOR INSPECTION OR REPAIRS.

5.1. Power–Up Problems

The following description of the symptoms assumes that the equipment was working correctly for some time after its initial installation.

Symptom	Suggested Solution
The equipment cannot be turned on.	1. Check if the power cord is plugged into the three–pin rear panel connector (**POWER**). 2. Check if the power cord is connected to the ship's DC power source with the correct polarity. *NOTE: Reversing the power cord polarity causes the fuse (3A) to blow.* 3. Check the voltage of the power source. *NOTE: The nominal power supply voltage is 24 VDC. The equipment works safely over the voltage range from 11 to 36 VDC.* 4. Check the fuse inside the rear panel fuse holder. If it is found blown, replace it with a correct replacement (3A, 5.2X20mm). 5. If it blows again, unplug the active antenna cable from the rear panel connector, and then check if the problem persists. If it does not, suspect that the antenna amplifier or the cable developed a short. Replace the antenna and cable. 6. If replacing the antenna still does not correct the problem, suspect that the Main PCB has become defective. Ask your dealer/qualified engineer to check each board by replacement. 7. If all attempts above fail, ask your dealer/qualified service engineer to replace the CPU PCB.

5.2. No Message Reception

The following description of the symptoms assumes that NAVTEX messages were properly received for some time after initial installation.

Symptom	Suggested Solution
No messages can be displayed except for warning messages. *No NAVTEX messages can be received, except for navigational warnings, weather warnings, SAR/piracy/armed robbery warnings or other warnings.*	1. Check the current message rejection (**RJ**) settings by pressing REJ . 2. Select all desired message types for display and memory storage, via the steps given in paragraph 4.9.
No messages can be displayed from desired transmitters. *No NAVTEX messages can be displayed from some transmitters at any time even if you are within the coverage areas.*	1. Check the current station rejection (**RJ**) settings by pressing REJ . 2. Select the IDs of all desired transmitters for display and storage in memory, via the steps given in paragraph 4.8.
No messages can be displayed despite correct selection settings and appearance of "RCVNG MSG." *No NAVTEX messages can be displayed regardless of the correct display and storage selection (**SL**) settings for all desired messages or transmitters, or regardless of the "RCVNG MSG" status indication during reception.*	1. The same message was received before or the currently receiving message has a character error rate (CER) > 33%. See subparagraphs ④, ⑪ and ⑫ in paragraph 1.1 for details. 2. Run the self–diagnostic tests via the steps given in paragraph 4.13, and check if the receiver test result is "**OK**." If the test result indication shows "**FAILED**," suspect that the receiver PCB has become defective. Ask your dealer or qualified engineer to check all wiring harnesses to/from the PCB and to replace the PCB if necessary. The chance of any receiver being out of tune is very small in normal usage. 3. Check if you are located within the service area covered by the ground wave of the desired station. The ground wave coverage normally extends to 200 – 400 nautical miles from each station during daytime hours. 4. Check the broadcast schedule of the desired station. Each station usually transmits messages for 5 to 10 minutes at intervals of 4 hours. 5. Check the active antenna unit and/or cabling by replacement.

(*continued on next page*)

5.2. No Message Reception – *2/3*

Symptom	Suggested Solution
No messages can be received in the daytime. *No NAVTEX messages can be received on 518 kHz or 490 kHz during daytime hours despite appropriate station and message type selection (**SL**) settings.*	1. Check if you are located within the service area covered by the ground wave of the desired station. The area is normally 200 to 400 nautical miles from each station during daytime hours. At night, MF NAVTEX signals (518/490 kHz) can travel distances in excess of 1000 nautical miles depending on the season and ionospheric conditions. Nighttime signal propagation changes greatly with the season. 2. Check the broadcast schedule of the desired station. Each station usually transmits for 5 to 10 minutes at intervals of 4 hours. Currently transmitting stations may be outside the coverage area.
No messages can be received even during a broadcasting time and while in the service area. *No NAVTEX messages can be received regardless of being in the service area of a currently transmitting station and of appropriate message type and station selection settings.*	1. Check if the antenna cable is correctly plugged into the rear panel BNC connector receptacle. 2. Check if the BNC plug is properly installed onto the cable. Check also the coupling connectors, if used for cable extension. 3. Check by replacing the active antenna. The antenna preamplifier unit may have been destroyed by static discharges. If a correct replacement is not available, run at least 5 meters of insulated wire from the BNC connector's center conductor as a temporary long wire antenna, and place it as high as possible from the ground level. **< WARNING > DO NOT SHORT THE OTHER END OF THE WIRE ANTENNA TO GROUND, OR DAMAGE TO THE UNIT'S POWER SUPPLY WILL RESULT.** 4. If replacing the antenna still does not solve the problem, check the voltage at the center conductor of the antenna connector. It should be 8V+ at 490 and 518 kHz, and 12V+ at 4209.5 kHz. If no voltage is present or if it is extremely low, ask your dealer/qualified engineer to check the wiring to/from the Main PCB first and to replace the PCB, if necessary. 5. If all attempts above fail to correct the problem, ask your dealer/qualified engineer to check the related connections to/from the Main PCB first and to replace the PCB, if necessary.

(*continued on next page*)

5.2. No Message Reception – *3/3*

Symptom	Suggested Solution
No messages can be received at any time on the first or the second receiver with a good replacement antenna plugged in, but the results of the self–diagnostic tests are "OK" for both receivers. *No NAVTEX messages can be received at any time and anywhere on either the first or the second receiver after the antenna is replaced with one known to be good. The self–diagnostic tests (paragraph 4.13) show that both receivers are working properly.*	The symptom is an indication that the antenna circuit has become defective. 1. Replace it with one known to be good. 2. If a correct replacement antenna is not available, run approx. 5 meters of insulated wire from the center conductor of the appropriate connector as a temporary long wire antenna, and place it as high as possible from the ground level. **< WARNING >** **DO NOT SHORT THE OTHER END OF THE WIRE ANTENNA TO GROUND, OR DAMAGE TO THE UNIT'S POWER SUPPLY WILL RESULT.** 3. If replacing the antenna still does not solve the problem, ask your dealer/ qualified engineer to check the antenna coupler/selector circuit inside the rear apron for faulty or broken connections.
No messages can be received at any time on the first or the second receiver with a good replacement antenna plugged in, and the results of the *self–diagnostic tests are "FAILED" for both receivers. * *30 minute warm–up period required before test.*	1. The symptom suggests that either receiver has got out of alignment. Ask your dealer/qualified engineer to check the connections to/from the receiver PCB and/or replace the PCB. 2: The Main PCB has also become defective and/or some of the internal connections to the PCB have become faulty or broken. Ask your dealer/ qualified engineer to check the related wiring harnesses to/ from the CPU PCB first and to replace the PCB, if necessary.

5.3. Message Storage Problems

Symptom	Suggested Solution
Some stored messages disappear from memory after some time.	Messages will be erased from memory after 60 hours, unless they are protected from automatic erasure. Put the "**PROTECTED**" tag to each desired message via the steps in paragraph 3.8.
None of the received messages is stored after power–off.	The symptom indicates that the memory backup circuit on the CPU PCB is failing. Ask your dealer or qualified engineer to replace the CPU PCB.
All messages disappear from memory after continued power–off for some time.	The memory retains stored messages for at least 10 days after power–off. Print out desired messages using an optional printer before switching the unit off for extended periods of time continuously.

5.4. Poor Reception

The following description of the symptoms assumes that NAVTEX messages were properly received for some time after initial installation time, and all message types and transmitter IDs you wish to receive are selected (via the steps in paragraphs 4.8 & 4.9).

Symptom	Suggested Solution
Messages can be received in the daytime, but with many error characters (*) at all times. *NAVTEX messages can be received but with many error characters (asterisks) and often cannot be stored.*	1. Check if you are located within the service area covered by the ground wave of the desired station. The area is normally 200 to 400 nautical miles from each station during daytime hours. At night, NAVTEX signals can travel distances in excess of 1000 nautical miles depending on the season and ionospheric conditions. 2. Run the self–diagnostic tests as per paragraph 4.13, and check the receiver test results. If the result for the receiver in question is "**FAILED**," ask your dealer/qualified service engineer to check the related wiring harnesses to/from the receiver PCB or replace the PCB. 3. Check if you have recently installed an electronic device near the receiver cabinet receiver or near the antenna. Turn off or relocate such equipment away from the NAVTEX receiver, and see if any improvement can be obtained. 4. Unplug the antenna cable from the rear panel BNC connector, and check the voltage at the center conductor. It should be 8V+ on the **ACTIVE ANT** and **518 kHz** connectors, and 12V+ on the **490/4209.5 kHz** connector. If no voltage is present or the voltage is extremely low, ask your dealer/qualified service engineer to check the related connections to/from the Main PCB first and to replace the PCB, if necessary. 5. Suspect that the preamplifier in the active antenna unit is failing or water intruded into the cable via the junction. Check by replacing the amplifier unit and/or the cable. If a correct replacement antenna is not available, run at least 5 meters of insulated wire from the center conductor of the appropriate connector as a temporary long wire antenna, and place it as high as possible from the ground level. **< WARNING>** **DO NOT SHORT THE OTHER END OF THE WIRE ANTENNA TO GROUND, OR DAMAGE TO THE UNIT'S POWER SUPPLY WILL RESULT.**

5.5. Blank Message Screen

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
The NAVTEX receiver can be turned on but the message screen remains blank.	1. Check to be sure that the power source voltage is within the 11–36V range. 2. Repeatedly press BRT to check if the normal brightness returns. 3. Suspect that the LCD module or Main PCB has become defective. Ask your dealer/qualified service engineer to check the related connections to/from the module and the Main PCB, and replace the module and/or the PCB. 4. Suspect that the Main PCB has become defective. Ask your dealer/qualified engineer first to check the related connections to/from the PCB, and to replace the PCB, if necessary.

5.6. Uncontrollable Screen Brightness

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
The NAVTEX receiver can be turned on but the message screen brightness cannot be controlled. *The brightness level does not change by pressing* BRT .	1. Check to be sure that the power source voltage is within the 11–36V range. 2. Suspect that the Main PCB has become defective. Ask your dealer/qualified engineer to check the wiring harnesses to/from the PCB first and to replace the PCB, if necessary.

5.7. No Beep from Keypress

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
No keypress beep is heard.	1. Check if the keypress beep function is disabled. Refer to paragraph 4.7 for instructions. 2. Ask your dealer/qualified engineer to check the related wiring to/from the keypress buzzer.

5.8. No Response from Keypress

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
The NAVTEX receiver can be turned on but does not respond to any keypress.	1. Check to be sure that the power source voltage is within the 11–36V range. 2. Reset the system, returning all settings to the factory's initial settings via the procedure given in paragraph 4.15. 3. Suspect that the Main PCB or the Keypad PCB has become defective. Run the self–diagnostic tests (as per paragraph 4.13), and check the result of the RAM and ROM tests. If the either test result is "**FAILED**," ask your dealer/qualified service engineer to check the related connections to/from these PCBs first, and to replace either or both PCBs, if necessary.

5.9. No Message Alarm Indication

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
No audible or visual alarm indication is available when navigational warnings (type–A messages) or meteorological warnings (type–B messages) are received.	The alarm function for type–A and type–B messages are initially disabled. To turn it on, refer to paragraph 4.14 for instructions.
No audible alarm indication is available when a Search & Rescue (SAR) or distress message is received.	1. Run the self–diagnostic tests as per the steps given in paragraph 4.13, and check the result of the alarm test. If no beep is heard on completion of the tests, suspect that a fault has developed in the wiring harness to/from the message buzzer or the buzzer has become defective. Ask your dealer/qualified engineer to check the related wiring harnesses and the buzzer. 2. Suspect that the Main PCB has become faulty. Run the self–diagnostic tests and check the result of the RAM and ROM tests. If the result is "**FAILED**," ask your dealer/qualified engineer to check the PCB by replacing.

5.10. No Message Alarm Output

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
No alarm output is available from the rear panel ALARM connector.	1. The alarm function for type–A and type–B messages are initially disabled. To turn it on, refer to paragraph 4.14. 2. Run the self–diagnostic tests via the steps in paragraph 4.13, and check the results of the RAM and ROM tests. If the test result is "**FAILED**," suspect that the Main PCB has become faulty. Ask your dealer/qualified engineer to check the PCB by replacing. 3. Suspect that some of the connections to/from the connector have loosened or the Main PCB has become faulty. Ask your dealer/qualified engineer to check the related wiring harness terminations.

5.11. No External Outputs

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
No messages can be output from the memory to the printer or I/O DATA port or to the INS port despite correct connections to the appropriate rear panel connector.	1. Check to be sure that all ports are enabled (set to **ON**) and that the communications protocol of your application matches that of the port (rear panel connector) in use. See paragraph 4.12. 2. Press SEL and then check that the memory storage (**ME**), printer port output (**PR**) and INS port output (**IN**) settings are set to the "**SL**" status. See paragraphs 4.8 and 4.9 for details. 3. Suspect that some of the connections to/from the connectors have become loosened or broken. Ask your dealer/ qualified engineer to check for faulty wiring harness terminations. 4. Suspect that the Main PCB has become defective. Ask your dealer/qualified engineer to check the PCB first and replace it if necessary.

5.12. External Control Problem

The following description of the symptom assumes that your NAVTEX receiver was properly working for some time after initial installation time.

Symptom	Suggested Solution
Alarm acknowledgement cannot be controlled remotely from IBS/INS terminals despite correct connections to the INS port (RS–422 connector).	1. Check to be sure that the **RS–422** (INS) port is enabled (set to **ON**). See paragraphs 4.12.1 through 4.12.4 for details. 2. Check to be sure that the communications protocol of your application matches that of the **RS–422** (INS) port. See paragraph 4.12.2.2 for details. 3. Check the bit format and baud rate of your application match those of the **RS–422** port parameters. See paragraph 4.12.4 for details. 4. Suspect that some of the internal connections to/from the connectors have become loosened or broken. Ask your dealer/qualified engineer to check for faulty wiring harness terminations. 5. Run the self–diagnostic tests as per paragraph 4.13, and check the results of the RAM and ROM tests. If the indication of either result is "**FAILED**," suspect that the Main PCB has become defective. Ask your dealer/ qualified engineer to check the PCB and related wiring harnesses first and to replace it if necessary.

6. User–Level Maintenance Instructions

To ensure long–term trouble–free operation, the user should regularly follow the maintenance instructions described in this section.

6.1. Maintenance on the Equipment Cabinet

Keep the equipment, away from sea splashes, direct sunlight and other heat–generating sources, and make sure that air around the cabinet is circulating freely. If the equipment is not going to be used for extended periods of time, dismount the cabinet from the vessel and place them in dry storage. Be sure to switch the equipment off before removing electrical connections from the rear panel.

< WARNINGS >

1. **BE SURE TO TURN IF OFF AND UNPLUG THE POWER CABLE BEFORE OPENING THE CABINET FOR INSPECTION.**
2. **CHEMICAL SOLVENTS, SUCH AS PAINT THINNERS AND BENZENES, MUST NOT BE USED TO CLEAN THE CABINET OR SCREEN FILTER, OR PERMANENT DAMAGE TO THOSE PARTS WILL RESULT.**
3. **ALL MESSAGES STORED IN MEMORY, INCLUDING PROTECTED ONES, WILL BE ERASED IF THE UNIT IS TO BE TURNED OFF CONTINUOUSLY IN EXCESS OF 10 DAYS. IMPORTANT MESSAGES SHOULD BE PRINTED OUT OR SAVED INTO APPROPRIATE STORAGE MEDIA VIA A PC CONNECTED TO THE RS–422 PORT.**

To clean the cabinet surface, a neutral type household detergent intended for office equipment is recommended. Cleaning the acrylic filter on the LCD screen should be a maintenance routine to avoid using a high brightness level. To clean the screen filter, use a piece of slightly wet cloth. If stains persist, the cloth may be moistened with a neutral type household detergent.

<u>To prolong LCD Screen's Service Life</u>

To increase the service life of the LCD screen (life of the white LED lamps for backlighting), it is recommended that the screen sleep mode be activated as per the instructions in paragraph 4.5.

6.2. Maintenance on Electrical Connections

The high humidity marine environment can cause electrical contacts in the rear panel connectors to corrode over time. Vibrations and shocks normally encountered on the vessel in motion can cause the electrical contacts to become loosened. Corroded or loose contacts will become responsible for erratic, intermittent operation or performance degradation. To avoid such possible problems, conduct the following maintenance operations at least once a year:

- Unplug all the cables from the rear panel, and check to be sure that contact surfaces, including the pins in the rear–panel mounted receptacles are free from corrosion.
- Check the connections at the ship's DC power source for freedom from any sort of corrosion.
- Correct any problem using a high quality contact–cleaning agent (contact rejuvenator).

< WARNINGS >

1. **BE SURE TO TURN THE EQUIPMENT OFF BEFORE REMOVING / INSTALLING THE CONNECTIONS FROM / TO THE REAR PANEL CONNECTORS.**
2. **SANDPAPER WILL DAMAGE THE CONTACT SURFACE AND MUST NOT BE USED.**

6.3. Maintenance on The Active Antenna Unit

The **ANT–2000M** active antenna or an optional active antenna unit (e.g. **ANT–900**, all consisting of a 1.2m fiberglass whip, a preamplifier housing and coaxial cabling), requires maintenance at least once every six months:

1. Whip Section
   - Clean the surface with a piece of soft cloth moistened with neutral household detergent, while checking for any sign of damage.
   - Check to be sure that the whip is tightly screwed into the socket on the preamplifier case, and that the set screw (hex socket head type) is tightened.
   - Check to be sure that the knurled metallic base is free from damage or corrosion.

     Corrosion may be removed with a piece of wood, and then coated with water–proofing paint. A metallic tool can damage the surface and should not be used

2. Preamplifier Housing
   - Clean the surface with a piece of soft cloth moistened with neutral household detergent, while checking for any sign of damage.
   - Check to be sure that the housing is securely screwed onto the pole (if installed on a marine mount) or the mounting hardware is properly secured to the mast (if user– or dockyard–supplied hardware is used). *Do not open the housing*; *no user–serviceable parts are inside.*

3. Cabling
   - Clean the exposed section with a soft cloth moistened with neutral household detergent, while checking to be sure that the surface is free from any sign of damage.
   - If the installation uses a double–ended female coaxial coupler for cable extension, check to be sure that the jointed section is properly protected with self–bonding taping and there is no sign of damage.

< WARNING >

THE CENTER CONDUCTOR OF THE COAXIAL CABLE IS AT +8/+12VDC WHEN THE EQUIPMENT IS SWITCHED ON. DO NOT SHORT THE CENTER CONDUCTOR TO GROUND, OR DAMAGE TO THE INTERNAL POWER SUPPLY CIRCUIT CAN RESULT.

6.4. Self–Diagnostic Tests

Once every 12 months, conduct the self–diagnostic tests as per the procedure described in paragraph 4.13, and consult your dealer/qualified service engineer for advice if the result indication of any tested item shows "**FAILED**." repeatedly.

6.5. Recommended Spare Parts

A list of the spare parts recommended for the maintenance and servicing for three to five years is given below. Replacing parts, except for the active antenna unit, should be done by your dealer or a qualified service engineer. The user should not open the receiver cabinet for inspection or replacing suspected parts. The part number of each product may change depending on its production lot or its availability. If ordered parts are not available, equivalent substitutes will be supplied.

Table 6-1 Recommended Spare Parts

Part Name	Part Number	Quantity
Fuse	3A/5.2X20mm	10
Plugs:		
Coaxial Cable Plug (Antenna Plug)	BNC–58/U	2
Power Cable Plug	14–P3F	1
*1 **I/O DATA** Plug	CP111–8P	1
*2 **RS–422/232C** Plug	HDEB–9S	1
*3 Coaxial Cable Plug (Extension)	PL–259	1
Active Antenna Unit:	ANT–2000M	
Preamplifier Unit	ANT–2KM–BASE	2
Whip Element (1.2m)	ANT–2K–RODE	1
Printed Circuit Boards (PCBs):		
Receiver PCB	S602–RCV–X*4	1
Main PCB	M613–MAIN–X*4	1
Keypad PCB	M401–KEY–X*4	1

*1 *Not needed unless the I/O DATA port is used in your applications.*
*2 *Not needed unless RS–232C/RS–422 port is used in your applications.*
*3 *Dealer–supplied. Not needed unless the cable is extended with a PL–258 connector.*
*4 *The suffix (last digit) will change depending on production lot.*

Table 6-2 Other Parts Available As Replacements

Part Name	Part Number
TFT LCD Module (LCD display panel)	LQ057AC111

7. Installation

7.1. Receiver Cabinet Installation

7.1.1. General Precautions

The receiver cabinet is constructed to withstand the humid and corrosive marine environment, but is designed to be installed or operated inside the wheelhouse or chartroom. The cabinet is a "protected" category product under the IEC 60945–2002 standard, and is not waterproof. Serious damage will result to the electronics inside the cabinet when it is exposed to salt water spray or splash.

Additional Requirements:

(1) For long term trouble–free service, the proposed site for installation should be:

- dry, well–ventilated and free as much as possible from shocks and engine vibrations.
- away as much as possible from high temperature outlets (such as exhaust fans and heaters), and as much as possible from areas where the unit is likely to be constantly exposed to direct sunlight.

(2) To prevent reception of weak NAVTEX signals from being interfered with, the unit should also be located away as much as possible from other onboard electronics, especially those emitting pulsed signals, such as echo sounders and radars.

7.1.2. Mounting the Receiver Cabinet

The receiver cabinet is primarily designed to be mounted on a tabletop with the mounting bracket supplied and weights approximately 2.3 kg in total. The dimensions necessary for installation are given in Figure 7–1. Provide sufficient clearance behind the cabinet for cabling termination and maintenance checks.

Using a total of four appropriate wood screws or bolt/nut combinations through its four mounting holes (9 mm in diameter each), secure the bracket to the selected site.

Make sure that the mounting surface is strong enough to support the unit against shocks or vibrations that are likely to be encountered with the ship in motion.

Compass Safe Distances (in energized condition):

- Receiver Cabinet alone: 0.45m (standard), 0.30m (steering)
- Cabinet with Bracket: 0.60m (standard), 0.35m (steering)

< WARNINGS >

1. DO NOT PLACE THE UNIT IN AN UNVENTILATED, SEALED ENCLOSURE, SUCH AS A THEFT–DETERRENT CABINET, OR OVERHEATING AND MALFUNCTION WILL RESULT.

2. DAMAGE CAUSED BY EXPOSURE TO WATER SPRAY OR TO DIRECT SUNLIGHT WILL NOT BE COVERED BY THE MANUFACTURER'S WARRANTY.

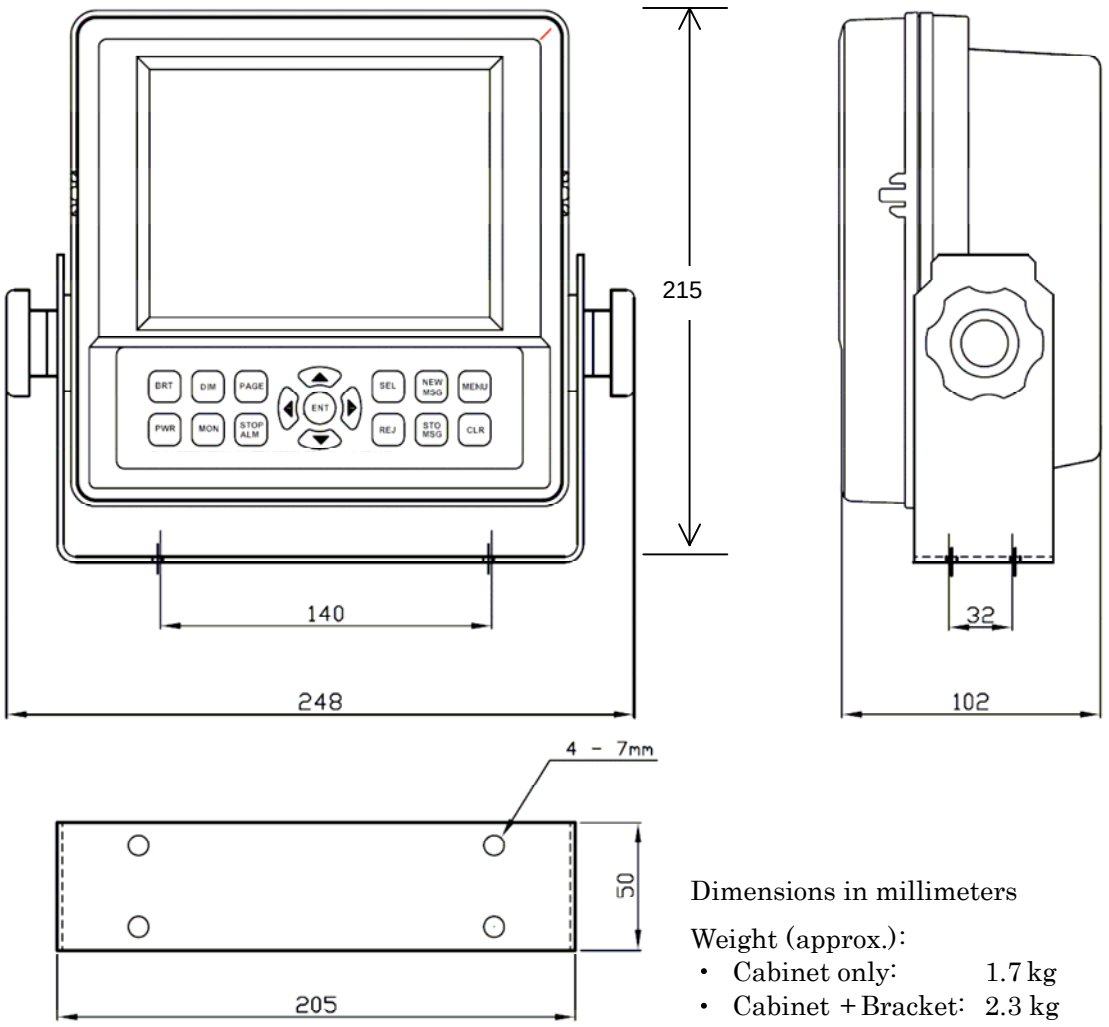
(*continued on next page*)

7.1.2. Mounting the Display Cabinet (*continued – 2/2*)

Be sure to attach a serrated plastic washer to the inside of each arm before placing the cabinet in the bracket. This pair of washers is supplied separately in the plastic bag that contains the power cable, fuses, plugs, etc., and prevents the cabinet from leaning forward or backward with the clamping knobs tightened.

After tilting the cabinet to a desired viewing angle, tighten each knob firmly.

Figure 7-1 Installation Dimensions



Dimensions in millimeters

Weight (approx.):
- Cabinet only: 1.7 kg
- Cabinet + Bracket: 2.3 kg

Compass Safe Distances:
- Cabinet only:
  45 cm (STD), 30 cm (STG)
- Cabinet + Bracket:
  60 cm (STD), 35 cm (STG)

7.2. Antenna Installation

The dimensions of the active antenna unit (**ANT–2000M**) is given in Figure 7–2.. The equipment does not support the use of a wire antenna. The receiver input is low impedance and is not suitable for wire antenna connection.

7.2.1. Installation Site Requirements

For best results and a prolonged service life, the active antenna unit should be installed:

- at a site free from continuous heavy shocks and vibrations,
- away as much as possible from the feedpoint or radiating elements of HF/MF communications antennas, radar scanners and INMARSAT antennas, and
- away as much as possible from, and above, any metallic obstructions.

< WARNING >

LOCATING THE ACTIVE ANTENNA CLOSE TO THE FEED POINT OR RADIATING ELEMENTS OF AN HF/MF TRANSMITTING ANTENNA CAN DESTROY THE PREAMPLIFIER IN THE CYLINDRICAL HOUSING.

7.2.2. Precautions for Cabling

- To minimize the effect of interference from other onboard electronics, the coaxial cable from the antenna unit should not be run close to, and in parallel with, transmit antenna feed lines, radar waveguides, echo sounder transducer cables, control cables, power cables, etc. from such equipment. The same requirements apply to the routing of the long wire antenna.

- If the cable is extended with coaxial connectors (e.g. PL–258/PL–259 pairs), be sure to make the junctions waterproof using self–bonding tape or other appropriate sealant.

< WARNING >

THE CENTER CONDUCTOR OF THE COAXIAL CABLE IS AT +8 VDC (OR AT +12V WITH THE SECOND OPERATING AT 4209.5 KHZ) WITH THE EQUIPMENT SWITCHED ON. DO NOT SHORT THE CENTER CONDUCTOR TO GROUND OR DAMAGE TO THE INTERNAL CIRCUITRY CAN RESULT.

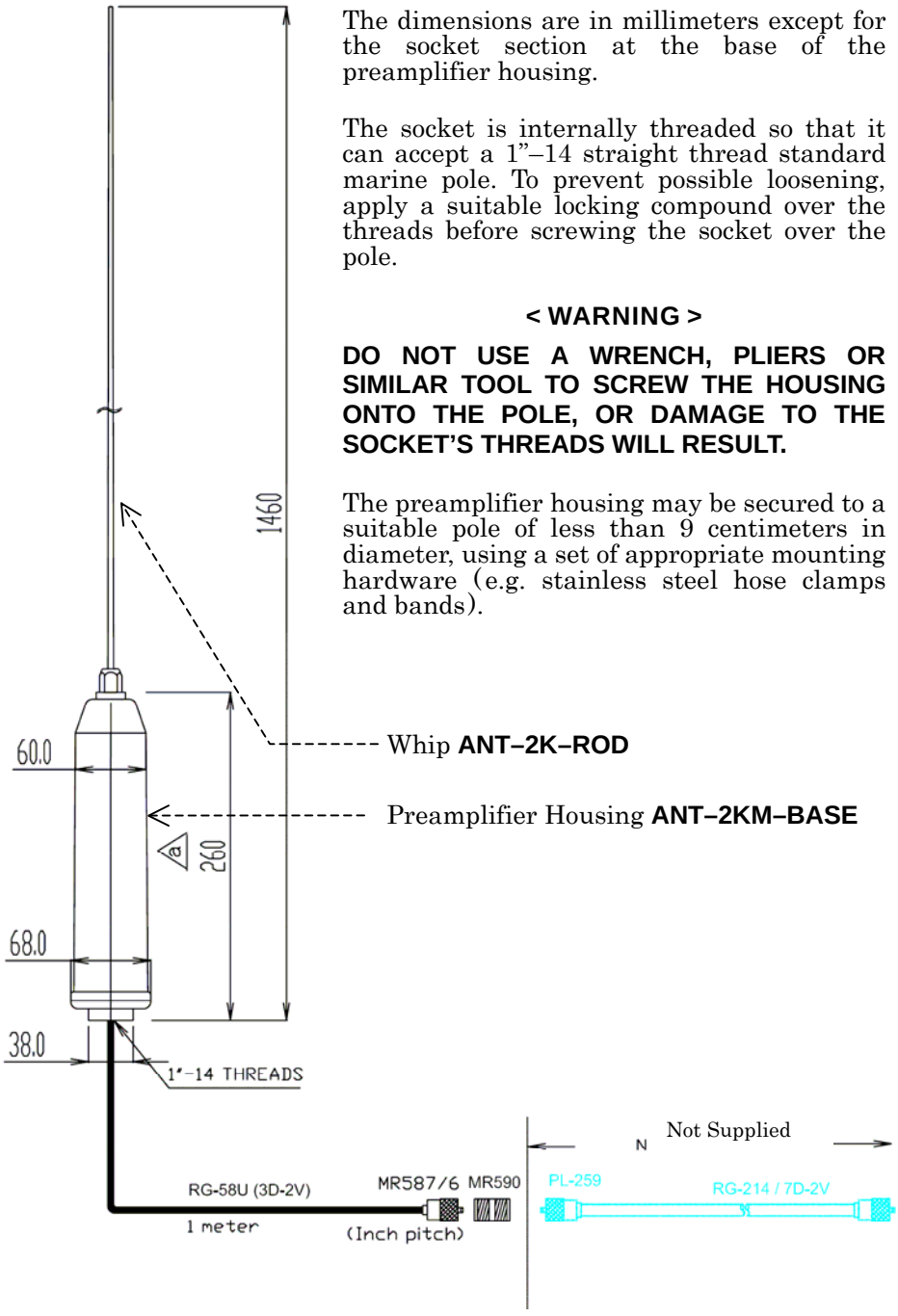
< CAUTION >

Water intrusion into the coax cable will electrically damage the cable, making it impossible to use it as a feeder any longer. A serious drop in sensitivity will result.

(*continued on next page*)

7.2.2. Precautions for Cabling (*continued –2/2*)

Figure 7-2 **ANT–2000M** Active Antenna Unit Dimensions



The dimensions are in millimeters except for the socket section at the base of the preamplifier housing.

The socket is internally threaded so that it can accept a 1"–14 straight thread standard marine pole. To prevent possible loosening, apply a suitable locking compound over the threads before screwing the socket over the pole.

< WARNING >

DO NOT USE A WRENCH, PLIERS OR SIMILAR TOOL TO SCREW THE HOUSING ONTO THE POLE, OR DAMAGE TO THE SOCKET'S THREADS WILL RESULT.

The preamplifier housing may be secured to a suitable pole of less than 9 centimeters in diameter, using a set of appropriate mounting hardware (e.g. stainless steel hose clamps and bands).

7.3. Electrical Connections

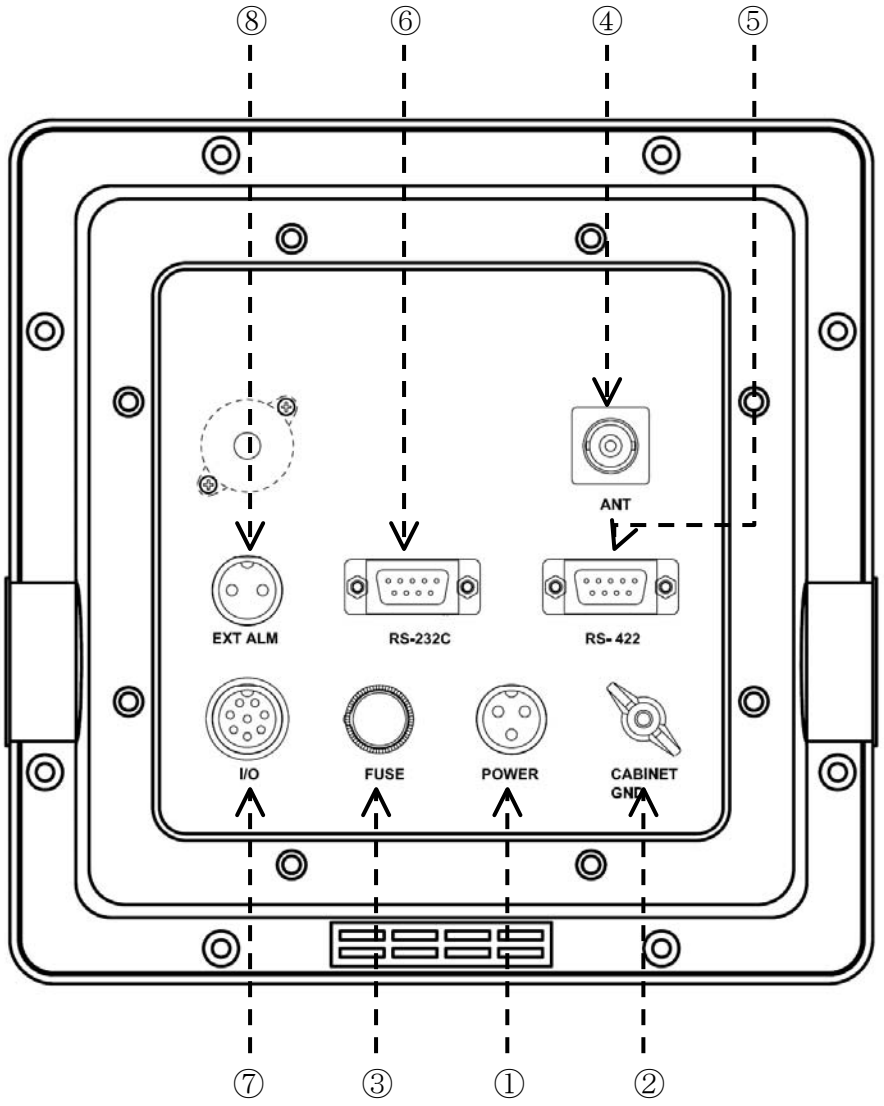
7.3.1. Introduction

All electrical connections to the equipment are to be made via the connector receptacles and terminal installed on the rear panel and the rear apron. The figure below shows the rear view of the equipment. Overall connections are illustrated in Figure 7–4. A summary description of the necessary connections to each component is given in the next paragraphs.

< CAUTIONS >

1. **All cables should be plugged in with the equipment switched off.**
2. **Power cables specified for use with the F–2000/F–3000 or DEBEG 4620/DEBEG 4630 Navigation Sounders cannot be used as alternative cables.**

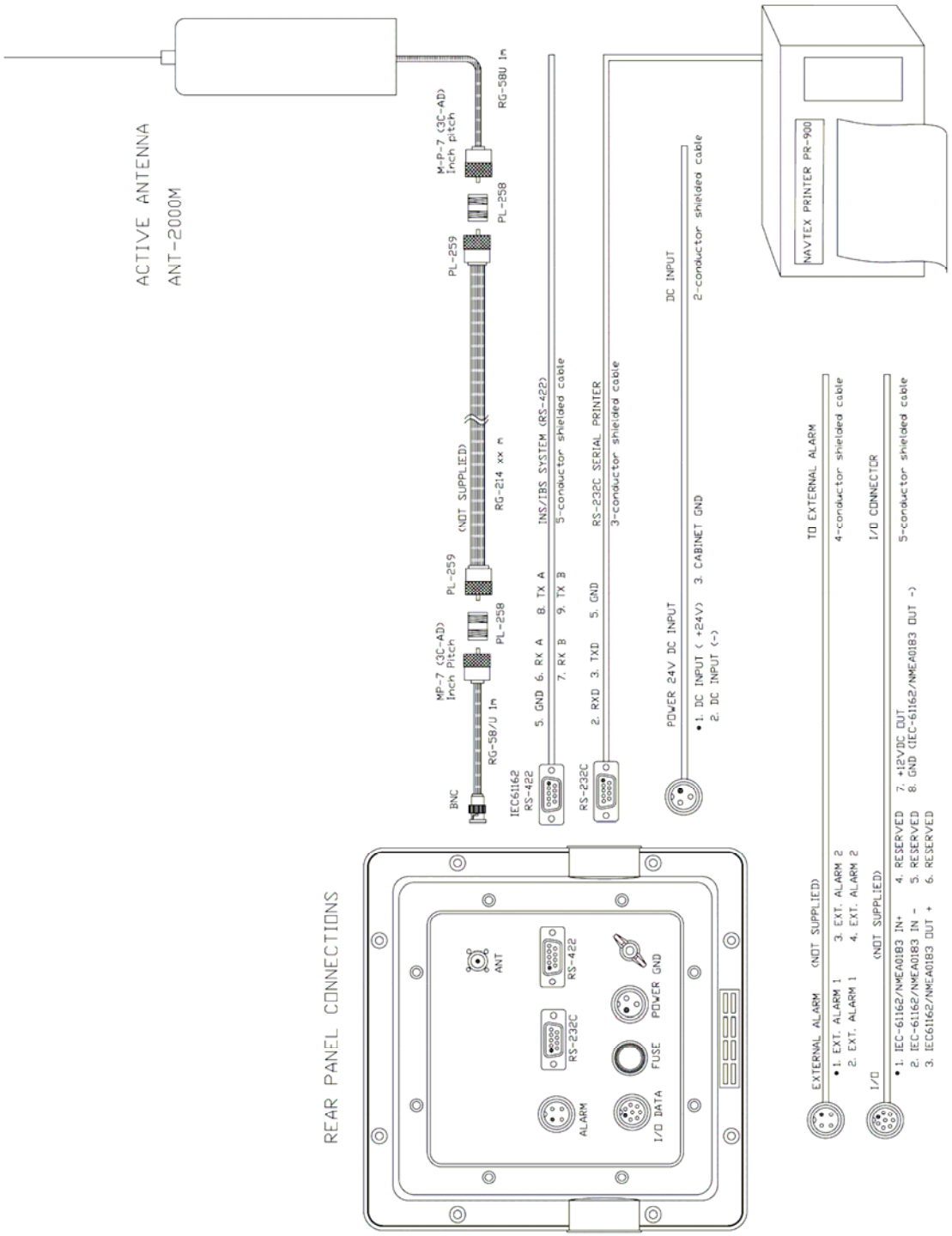
Figure 7-3 Rear View



(*continued on next page*)

7.3.1. Introduction (*continued –2/2*)

Figure 7-4 Overall Connections

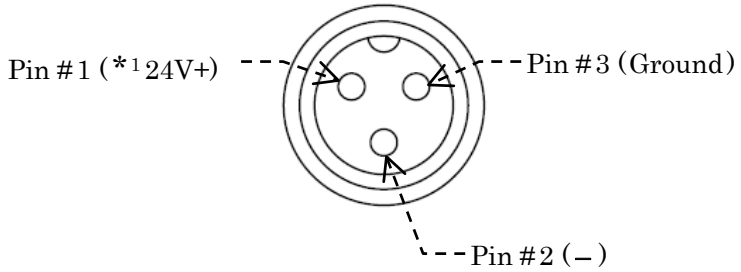


7.3.2. Connector Pin Assignments and Connections

The pin assignments of the connectors and connections to the pins are illustrated below.

① Power Supply Receptacle

Figure 7-5 Power Supply Receptacle (Front View)



- Mating Female Type Plug: **14–P3F**

The power cable supplied is approx. 3 meters long and is of two–wire shielded type, normally terminated in a 3–hole female type plug at one end, with 3 conductors open–ended each at the other end. Exercise **CAUTIONS 1** below.

After pushing the plug into the above receptacle and tightening its coupling ring, connect the three conductors as follows:

- Black conductor: to negative (–) terminal of ship's power source
- White conductor: to positive (+) terminal of ship's power source (*1 24 VDC)
- Shield (braid): to ship's earth ground

*1 *Nominal input voltage. The equipment operates safely over the 11–to–40V range.*

< CAUTIONS >

1. **The DC power cable specified for use with the F–2000/F–3000W or DEBEG 4620/DEBEG 4630 cannot be plugged into the above receptacle.**
2. **Reversing the power cable polarity (black and white connections) causes the fuse to blow.**

② Cabinet Ground Terminal

Figure 7-6 Cabinet Ground Terminal

The receiver cabinet, which is electrostatically coated inside, can be grounded to the vessel's earth ground without grounding the negative line of the ship's power source. In situations where it is required, or desirable, to ground the cabinet for safety reasons or *2EMC compliance, connect from this terminal to an appropriate earth ground in the vessel using a thick wire. The ground wire should be as short as possible to reduce the chance of picking up interference from other onboard electronics.

*2 *EMC = electromagnetic compatibility*

(*continued on next page*)

7.3.2. Connector Pin Assignments and Connections (*continued – 2/8*)

③ Fuse Holder

Figure 7-7 Fuse Holder

A 3–ampere (3A) cartridge fuse (5.2X20 mm, slow–blow type) is inserted in the holder.

Reversing the power cable polarity causes the fuse to blow.

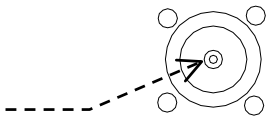
< WARNING >

AN INCORRECTLY RATED FUSE OR INCORRECT TYPE FUSE WILL BLOW AT POWER–UP OR WILL NOT PROTECT THE EQUIPMENT IN THE REMOTE EVENT OF A TROUBLE OVERLOADING ITS POWER SUPPLY.

④ Antenna Receptacle (BNC) for Active Antenna **ANT–2000M**

Figure 7-8 Antenna Connector for **ANT–2000M**

Plug the **ANT–2000M** three–frequency active antenna into this connector receptacle.



- Mating Plug: **BNC–58/U** or equivalent

< WARNING >

THE CENTER CONDUCTOR OF THE BNC RECEPTACLE IS AT 8V/12V+ WHEN THE EQUIPMENT IS TURNED ON. DO NOT SHORT THE CENTER CONDUCTOR TO GROUND OR DAMAGE TO INTERNAL PARTS MAY RESULT.

NOTE: Use of Long Wire Antenna

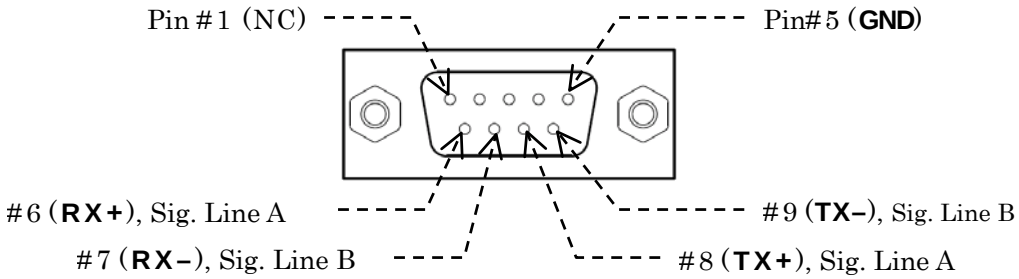
Since this input connector is designed to impedance–match the active antenna unit (50Ω nominal), it is not suitable for connection to a wire antenna that requires a high input impedance for good results. However, if you wish to use a long wire antenna as an emergency backup, be sure to insulate the other end of the wire to avoid short–circuiting the preamplifier power supply (8V or 12V) to ground.

7.3.2. Connector Pin Assignments and Connections (*continued – 3/8*)

⑤ **RS–422** Connector

Connections from an IBS/INS device are to be plugged into this receptacle. A D–Sub 9 female type plug mates with this connector. The pin assignments are illustrated below.

Figure 7-9 **RS–422** Connector Pin Assignments (Front View)



NOTES:

(1) This interface consists of a MAX3490 RS–422 transceiver. Brief specs. are given below. For details, see the parts manufacturer's (MAXIM) data sheets.

- *Input High Voltage : 2V (min.), Input Low Voltage : 0.8V (max.)*
- *Input Current (signal lines A & B) : 1.0 mA @12V, –0.8 mA@–7V*
- *Receiver Input Impedance: 12 kΩ*

*(2) Pins #1, #2, #3 and #4 : No internal connections (**NC**)*

(3) Input lines (pins #6 and #7) are insulated from ship's ground by opto–isolators.

• Mating Plug: **HDEB–9S** (supplied) or equivalent

After making connections, check to be sure that the **RS–422** port is enabled (as per paragraph 4.12.2) and that a correct set of parameters is selected (as per paragraphs 4.12.3 and 4.12.4) for your applications.

The command formats used to control communications with an INS/IBS device are given in paragraph 7.4.

(*continued on next page*)

7.3.2. Connector Pin Assignments and Connections (*continued – 4/8*)

RS–422 Transceiver Data Sheet – 1/3

3.3V-Powered, 10Mbps and Slew-Rate-Limited True RS-485/RS-422 Transceivers

General Description

The MAX3483, MAX3485, MAX3486, MAX3488, MAX3490, and MAX3491 are 3.3V, low-power transceivers for RS-485 and RS-422 communication. Each part contains one driver and one receiver. The MAX3483 and MAX3488 feature slew-rate-limited drivers that minimize EMI and reduce reflections caused by improperly terminated cables, allowing error-free data transmission at data rates up to 250kbps. The partially slew-rate-limited MAX3486 transmits up to 2.5Mbps. The MAX3485, MAX3490, and MAX3491 transmit at up to 10Mbps.

Drivers are short-circuit current limited and are protected against excessive power dissipation by thermal shutdown circuitry that places the driver outputs into a high-impedance state. The receiver input has a fail-safe feature that guarantees a logic-high output if both inputs are open circuit.

The MAX3488, MAX3490, and MAX3491 feature full-duplex communication, while the MAX3483, MAX3485, and MAX3486 are designed for half-duplex communication.

Applications

Low-Power RS-485/RS-422 Transceivers
Telecommunications
Transceivers for EMI-Sensitive Applications
Industrial-Control Local Area Networks

Features

- **Operate from a Single 3.3V Supply—No Charge Pump!**
- **Interoperable with +5V Logic**
- **8ns Max Skew (MAX3485/MAX3490/MAX3491)**
- **Slew-Rate Limited for Errorless Data Transmission (MAX3483/MAX3488)**
- **2nA Low-Current Shutdown Mode (MAX3483/MAX3485/MAX3486/MAX3491)**
- **-7V to +12V Common-Mode Input Voltage Range**
- **Allows up to 32 Transceivers on the Bus**
- **Full-Duplex and Half-Duplex Versions Available**
- **Industry Standard 75176 Pinout (MAX3483/MAX3485/MAX3486)**
- **Current-Limiting and Thermal Shutdown for Driver Overload Protection**

Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX3483CPA	0°C to +70°C	8 Plastic DIP
MAX3483CSA	0°C to +70°C	8 SO
MAX3483C/D	0°C to +70°C	Dice*
MAX3483EPA	-40°C to +85°C	8 Plastic DIP
MAX3483ESA	-40°C to +85°C	8 SO
MAX3485CPA	0°C to +70°C	8 Plastic DIP
MAX3485CSA	0°C to +70°C	8 SO
MAX3485C/D	0°C to +70°C	Dice*
MAX3485EPA	-40°C to +85°C	8 Plastic DIP
MAX3485ESA	-40°C to +85°C	8 SO

Ordering Information continued at end of data sheet.
** Contact factory for for dice specifications.*

Selection Table

PART NUMBER	GUARANTEED DATA RATE (Mbps)	SUPPLY VOLTAGE (V)	HALF/FULL DUPLEX	SLEW-RATE LIMITED	DRIVER/ RECEIVER ENABLE	SHUTDOWN CURRENT (nA)	PIN COUNT
MAX3483	0.25	3.0 to 3.6	Half	Yes	Yes	2	8
MAX3485	10		Half	No	Yes	2	8
MAX3486	2.5		Half	Yes	Yes	2	8
MAX3488	0.25		Full	Yes	No	—	8
MAX3490	10		Full	No	No	—	8
MAX3491	10		Full	No	Yes	2	14

7.3.2. Connector Pin Assignments and Connections (*continued – 5/8*)

RS–422 Transceiver Data Sheet – 2/3

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 7V
Control Input Voltage ($\overline{RE}$, DE) ..... -0.3V to 7V
Driver Input Voltage (DI) ..... -0.3V to 7V
Driver Output Voltage (A, B, Y, Z) ..... -7.5V to 12.5V
Receiver Input Voltage (A, B) ..... -7.5V to 12.5V
Receiver Output Voltage (RO) ..... -0.3V to (V_{CC} + 0.3V)
Continuous Power Dissipation (T_A = +70°C)
8-Pin Plastic DIP (derate 9.09mW/°C above +70°C) 727mW
8-Pin SO (derate 5.88mW/°C above +70°C) 471mW
14-Pin Plastic DIP (derate 10mW/°C above +70°C) 800mW
14-Pin SO (derate 8.33mW/°C above +70°C) 667mW
Operating Temperature Ranges
MAX34_ _C_ _ ..... 0°C to +70°C
MAX34_ _E_ _ ..... -40°C to +85°C
Storage Temperature Range ..... -65°C to +160°C
Lead Temperature (soldering, 10sec) ..... +300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = 3.3V ±0.3V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Differential Driver Output	V_{OD}	R_L = 100Ω (RS-422), Figure 4		2.0			V
		R_L = 54Ω (RS-485), Figure 4		1.5			
		R_L = 60Ω (RS-485), V_{CC} = 3.3V, Figure 5		1.5			
Change in Magnitude of Driver Differential Output Voltage for Complementary Output States (Note 1)	ΔV_{OD}	R_L = 54Ω or 100Ω, Figure 4				0.2	V
Driver Common-Mode Output Voltage	V_{OC}	R_L = 54Ω or 100Ω, Figure 4				3	V
Change in Magnitude of Common-Mode Output Voltage (Note 1)	ΔV_{OC}	R_L = 54Ω or 100Ω, Figure 4				0.2	V
Input High Voltage	V_{IH}	DE, DI, $\overline{RE}$		2.0			V
Input Low Voltage	V_{IL}	DE, DI, $\overline{RE}$				0.8	V
Logic Input Current	I_{IN1}	DE, DI, $\overline{RE}$				±2	µA
Input Current (A, B)	I_{IN2}	DE = 0V, V_{CC} = 0V or 3.6V	V_{IN} = 12V			1.0	mA
			V_{IN} = -7V			-0.8	
Output Leakage (Y, Z)	I_O	DE = 0V, $\overline{RE}$ = 0V, V_{CC} = 0V or 3.6V, MAX3491	V_{OUT} = 12V			20	µA
			V_{OUT} = -7V			-20	
Output Leakage (Y, Z) in Shutdown Mode	I_O	DE = 0V, $\overline{RE}$ = V_{CC}, V_{CC} = 0V or 3.6V, MAX3491	V_{OUT} = 12V			1	µA
			V_{OUT} = -7V			-1	
Receiver Differential Threshold Voltage	V_{TH}	-7V ≤ V_{CM} ≤ 12V		-0.2		0.2	V
Receiver Input Hysteresis	ΔV_{TH}	V_{CM} = 0V			50		mV
Receiver Output High Voltage	V_{OH}	I_{OUT} = -1.5mA, V_{ID} = 200mV, Figure 6		V_{CC} - 0.4			V
Receiver Output Low Voltage	V_{OL}	I_{OUT} = 2.5mA, V_{ID} = 200mV, Figure 6				0.4	V
Three-State (High Impedance) Output Current at Receiver	I_{OZR}	V_{CC} = 3.6V, 0V ≤ V_{OUT} ≤ V_{CC}				±1	µA
Receiver Input Resistance	R_{IN}	-7V ≤ V_{CM} ≤ 12V		12			kΩ

7.3.2. Connector Pin Assignments and Connections (*continued – 6/8*)

RS–422 Transceiver Data Sheet – 3/3

DC ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 3.3V ±0.3V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Supply Current	I_{CC}	No load, DI = 0V or V_{CC}	$\overline{DE}$ = V_{CC}, $\overline{RE}$ = 0V or V_{CC}		1.1	2.2	mA
			DE = 0V, $\overline{RE}$ = 0V		0.95	1.9	
Supply Current in Shutdown Mode	I_{SHDN}	DE = 0V, $\overline{RE}$ = V_{CC}, DI = V_{CC} or 0V			0.002	1	µA
Driver Short-Circuit Output Current	I_{OSD}	V_{OUT} = -7V				-250	mA
		V_{OUT} = 12V				250	
Receiver Short-Circuit Output Current	I_{OSR}	0V ≤ V_{RO} ≤ V_{CC}		±8		±60	mA

DRIVER SWITCHING CHARACTERISTICS—MAX3485, MAX3490, and MAX3491

(V_{CC} = 3.3V, T_A = +25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Differential Output Delay	t_{DD}	R_L = 60Ω, Figure 7	1	22	35	ns
Driver Differential Output Transition Time	t_{TD}	R_L = 60Ω, Figure 7	3	8	25	ns
Driver Propagation Delay, Low-to-High Level	t_{PLH}	R_L = 27Ω, Figure 8	7	22	35	ns
Driver Propagation Delay, High-to-Low Level	t_{PHL}	R_L = 27Ω, Figure 8	7	22	35	ns
$\lvert t_{PLH} - t_{PHL} \rvert$ Driver Propagation Delay Skew (Note 2)	t_{PDS}	R_L = 27Ω, Figure 8			8	ns
DRIVER OUTPUT ENABLE/DISABLE TIMES (MAX3485/MAX3491 only)						
Driver Output Enable Time to Low Level	t_{PZL}	R_L = 110Ω, Figure 10		45	90	ns
Driver Output Enable Time to High Level	t_{PZH}	R_L = 110Ω, Figure 9		45	90	ns
Driver Output Disable Time from High Level	t_{PHZ}	R_L = 110Ω, Figure 9		40	80	ns
Driver Output Disable Time from Low Level	t_{PLZ}	R_L = 110Ω, Figure 10		40	80	ns
Driver Output Enable Time from Shutdown to Low Level	t_{PSL}	R_L = 110Ω, Figure 10		650	900	ns
Driver Output Enable Time from Shutdown to High Level	t_{PSH}	R_L = 110Ω, Figure 9		650	900	ns

DRIVER SWITCHING CHARACTERISTICS—MAX3486

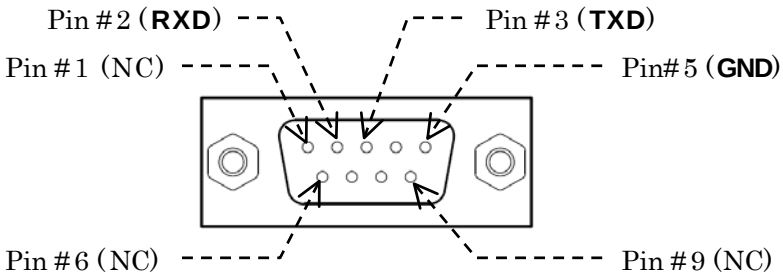
(V_{CC} = 3.3V, T_A = +25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Differential Output Delay	t_{DD}	R_L = 60Ω, Figure 7	24	48	70	ns
Driver Differential Output Transition Time	t_{TD}	R_L = 60Ω, Figure 7	15	35	60	ns
Driver Propagation Delay, Low-to-High Level	t_{PLH}	R_L = 27Ω, Figure 8	20	48	70	ns
Driver Propagation Delay, High-to-Low Level	t_{PHL}	R_L = 27Ω, Figure 8	20	48	70	ns
$\lvert t_{PLH} - t_{PHL} \rvert$ Driver Propagation Delay Skew (Note 2)	t_{PDS}	R_L = 27Ω, Figure 8			11	ns
Driver Output Enable Time to Low Level	t_{PZL}	R_L = 110Ω, Figure 10		55	100	ns
Driver Output Enable Time to High Level	t_{PZH}	R_L = 110Ω, Figure 9		55	100	ns
Driver Output Disable Time from High Level	t_{PHZ}	R_L = 110Ω, Figure 9		45	80	ns
Driver Output Disable Time from Low Level	t_{PLZ}	R_L = 110Ω, Figure 10		45	80	ns
Driver Output Enable Time from Shutdown to Low Level	t_{PSL}	R_L = 110Ω, Figure 10		700	1000	ns
Driver Output Enable Time from Shutdown to High Level	t_{PSH}	R_L = 110Ω, Figure 9		700	1000	ns

7.3.2. Connector Pin Assignments and Connections (*continued – 7/8*)

⑥ **RS–232C** Connector
An optional serial printer (**PR–900**) is to be plugged into this receptacle. A D–Sub 9 female type plug mates with this connector. The pin assignments are illustrated below.

Figure 7-10 **RS–232C** Connector Pin Assignments (Front View)



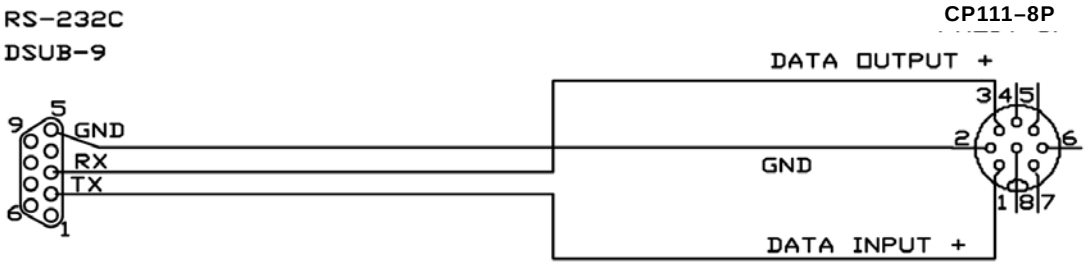
*NOTE: Pins #1, #4, #5, #6, #7, #8 and #9 : No internal connections (**NC**)*

- Mating Plug: **HDEB–9S** (supplied) or equivalent

After making connections, check to be sure that the **RS–232C** port is enabled (as per paragraph 4.12.2) and that a correct set of parameters is selected (as per paragraphs 4.12.3 and 4.12.4) for your applications.

Connections to **PR–900**
The connections from the **RS–232C** port to the **PR–900** serial printer are illustrated below. A 2–meter cable, terminated in appropriate mating plugs at both ends is normally supplied with each printer.

Figure 7-11 Connections between RS–232C Port and **PR–900**



Port Parameter Settings for **PR–900**
The **PR–900** requires the following parameter settings for the RS–232C port:

- **DATA BITS: 8**
- **STOP BITS: 1**
- **PARITY: NONE**
- **BIT RATE**: **0.11** (=110 baud)

See paragraph 4.12 for detailed instructions.

Flow Control for Other Brand Printers
If other brand serial printer (e.g. SEIKOSHA **DPU–414**) is to be connected, be sure to disable its hardware flow control, and set the flow control to "X–ON/X–OFF." The **AE–1800** does not support a handshaking protocol.

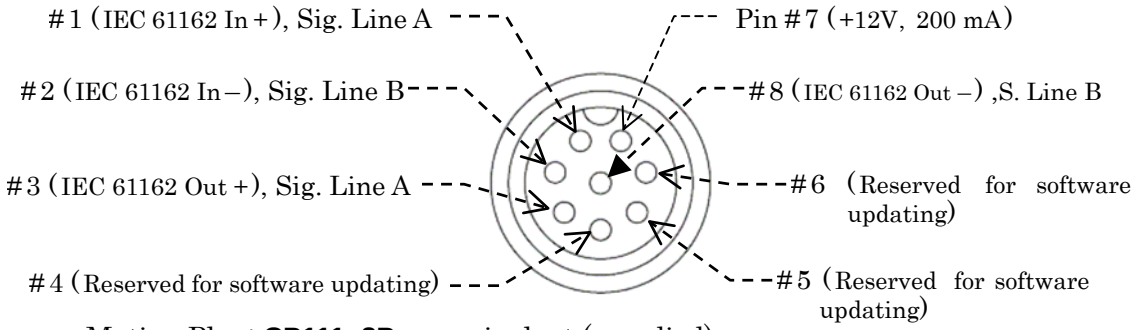
(*continued on next page*)

7.3.2. Connector Pin Assignments and Connections (*continued – 8/8*)

⑦ **I/O DATA** Connector

The **I/O DATA** port is primarily for data communications with other onboard devices using IEC 61162–1 (NMEA–0183) as the interface. It also provides a port (comprising pins #4, #5 and #6) for software updating, and a regulated 12V DC 200 mA output for powering light–duty applications.

Figure 7-12 **I/O DATA** Connector Pin Assignments (Front View)



- Mating Plug: **CP111–8P** or equivalent (supplied)

< WARNINGS >

1. PINS #4, #5 AND #6 ARE TO BE USED EXCLUSIVELY FOR THE SPECIFIED PROGRAMMING TOOL. CONNECTING ANY OTHER DEVICE TO THESE PINS CAUSES THE EQUIPMENT TO BE LOCKED UP.

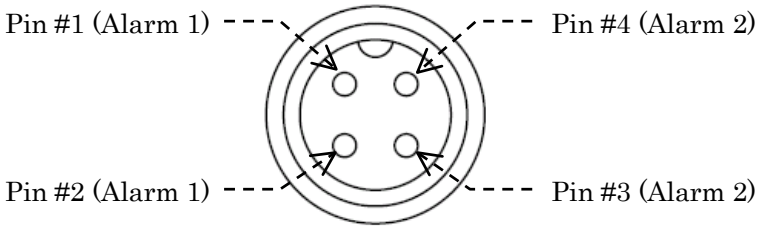
2. CURRENT DRAIN FROM PIN # 7 MUST NOT EXCEED 200 MILLIAMPS.

⑧ **ALARM** Output Connector

The ALARM output connector provides an open/close (make/break) switch simultaneously via two pairs of replay contacts, electrically isolated from each other and from the equipment circuitry, when the message alarm is activated. This connector is to be used to activate an alarm sounder mounted at a remote location. The pin assignments are given below.

To connect an external alarm device, use pins #1–#2 pair or pins #3–#4 pair.

Figure 7-13 **ALARM** Output Connector Pin Assignments (Front View)



- Mating Plug: **CP111–4P** or equivalent (supplied)

NOTE: Alarm messages compliant with IEC 61162–1 $CRARL sentence format are available from the RS–422 (INS) port, and not from this connector.

7.4. INS Port Data and Command Sentences

The equipment supports the following IEC 61162–1 data sentence formats for communications with an INS/IBS system via the RS–422 port. It is assumed that the port is set to "**ON**" via the procedure given in paragraph 4.12.2.2.

7.4.1. Received NAVTEX Sentence Format

The first line of a NAVTEX message text will be output in the following format:

$CRNRX,XXX,XXX,XX,aaXX,X,,,,,X.X,X.X,A,c- - - - - c*hh<CR><LF>
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① Number of sentences 001 – 999
② Sentence number 001 – 999
③ Sequential message number 00 – 99 (used to uniquely identify messages of same ID)
④ NAVTEX message ID characters (B_1, B_2, B_3, B_4)
⑤ Frequency index: 0 = not received over air, 1 = 490 kHz, 2 = 518 kHz, 3 = 4209.5 kHz
⑥ Null fields (UTC, day, month and year data characters not available. See *NOTE 1.*)
⑦ Total number of characters in this series of NRX sentences
⑧ Total number of bad characters
⑨ Status indication:
- Status "A" = reception of NAVTEX message in correct format
- Status "V" = reception of NAVTEX message in incorrect format

⑩ Message body (first line of message text characters). A forced carriage return (↓) on screen will be replaced with an underscore (_) (hex 5F) when it is output. See *NOTE 2* for information on the output format for undefined ASCII characters (IEC 61162–1, paragraph 5.1.3)

The data characters in fields ④, ⑤, ⑥, ⑦, ⑧ and ⑨ are output in the first message line only; they are null fields in the subsequent message lines, as shown below.

$CRNRX,XXX,XXX,XX,,,,,,,,,,c- - - - - c*hh <CR><LF>

NOTES:

1: The equipment does not have a built–in realtime clock (RTC) and does not interface with a GPS sensor. Therefore, the UTC, day, month and year data characters are output as null fields. To check message aging, an internal time reference derived from the CPU clock (24.00 MHz) by frequency division is used.

2: Undefined characters used in a displayed/stored NAVTEX message are communicated to the INS port in hexadecimal form using code delimiter (^, hex 5E) as follows:

- *[*1] Comma* (,): *^2C*
- *[*2] Error character asterisk* (*): *^2A*
- *Carriage return* <CR> *and line feed* <LF>: *^0D ^0A*

*[*1]: To discriminate from field delimiter*
*[*2]: To discriminate from checksum field delimiter*

An example INS output of a NAVTEX message is given below.

(*continued on next page*)

7.4.1. Received NAVTEX Sentence Format (*continued –2/2*)

An example 518 kHz NAVTEX message text is given below.

IB45
260909 UTC MAR 07
WWJP83 RJTD 260600
VITAL WARNING FOR YOKOHAMA NAVTEX AREA
260600UTC ISSUED AT 260900UTC
COLD FRONT FROM 48N 157E TO 42N 156E 36N
151E 30N 147E 25N 140E
GALE WARNING WESTERN SEA OFF SANRIKU
WITH MAX WINDS 35 KNOTS
WARNING(NEAR GALE) EASTERN SEA OFF
SANRIKU, NORTHERN SEA OFF KANTO,
SOUTHERN SEA OFF KANTO, EASTERN SEA OFF
TOKAI
NEXT WARNING WILL BE ISSUED BEFORE
261500UTC
=

NNNN

The INS port output from the above message consists of 11 NRM sentences, numbered 001 through 011, (message ID=IB45, *1total characters=426 with no corrupt characters) as follows:

$CRNRX,011,001,15,IB45,2,,,,,426,0,A,IB45^0D^0A260909 UTC MAR 07^0D^0AWWJP83 *02
$CRNRX,011,002,15,,,,,,,,,,RJTD 260600^0D^0AVITAL WARNING FOR YOKOHAMA NAVTEX*03
$CRNRX,011,003,15,,,,,,,,,, AREA^0D^0A260600UTC ISSUED AT 260900UTC^0D^0ACOLD*69
$CRNRX,011,004,15,,,,,,,,,, FRONT FROM 48N 157E TO 42N 156E 36N^0D^0A 151E 30*1F
$CRNRX,011,005,15,,,,,,,,,,N 147E 25N 140E^0D^0AGALE WARNING WESTERN SEA OFF *70
$CRNRX,011,006,15,,,,,,,,,,SANRIKU ^0D^0AWITH MAX WINDS 35 KNOTS^0D^0AWARNING*0E
$CRNRX,011,007,15,,,,,,,,,,(NEAR GALE) EASTERN SEA OFF ^0D^0ASANRIKU^2C NORTH*0E
$CRNRX,011,008,15,,,,,,,,,,ERN SEA OFF KANTO^2C^0D^0ASOUTHERN SEA OFF KANTO*16
$CRNRX,011,009,15,,,,,,,,,,^2C EASTERN SEA OFF ^0D^0ATOKAI^0D^0ANEXT WARNING *10
$CRNRX,011,010,15,,,,,,,,,,WILL BE ISSUED BEFORE ^0D^0A261500UTC^0D^0A=^0D^0A*07
$CRNRX,011,011,15,,,,,,,,,,^0D^0ANNNN^0D^0A *41

*1: *Total characters include carriage return (CR) and line feed (LF) codes.*

7.4.2. Controlling Receiver Operation via INS (RS–422) Port

To externally control receiver operation via the **RS–422** port, the equipment supports the following command sentence (IEC 61162–1 format). Up to 10 commands will be stacked and executed sequentially. Using the transmitter mask and message mask, the user can select the station IDs and message types for message storage in the non–volatile memory, for message output to the **RS–422** port (INS port) or to the **RS–232C** port (printer port). Message types A, B, D and L, however, cannot be rejected. Previous selection/rejection settings manually entered via the keypad will be changed accordingly.

$--NRM,X,X,hhhhhhhh,hhhhhhhh*hh <CR><LF>
① ② ③ ④ ⑤ ⑥

① Device identifier (e.g. IN=INS device, AI=AIS)

② Function code: 0 to 9
0 = request messages, 1 = set/report storage mask, 2 = set/report printer mask
3 = set/report INS mask, 4 to 9 = reserved

③ Frequency index: 1 to 9
1 = 490 kHz, 2 = 518 kHz, 3 = 4209.5 kHz, 4 to 9 = reserved
CAUTION: If the index for the second receiver that is not currently selected is specified, the command will be ignored.

④ Transmitter ID mask in hex (32 bits in total)

LSB = station A, bit 1 = station B, bit 25 = station Z, bits 26 to 32 = reserved

To select a station, its corresponding bit should be set to "1." To reject a station, its corresponding bit should be set to "0."

For example, to select only stations E, J, M and T for storage, or output to the INS or printer port, set the transmitter ID masks as follows:

00081210 hex

0	**0**	**0**	**8**	**1**	**2**	**1**	**0**	(hex)
0000	0000	0000	1000	0001	0010	0001	0000	(binary)
	ZY	XWVU	**T**SRQ	PON**M**	LK**J**I	HGF**E**	DCBA	(station)

⑤ Message type mask in hex (32 bits in total):

LSB = type A, bit 1= type B, bit 25 = type Z, bits 26 to 32 = reserved

To select message types only A, B, D, F and L for storage or output to the INS or printer port, set the message ID masks as follows:

0000082B hex

0	**0**	**0**	**0**	**0**	**8**	**2**	**B**	(hex)
0000	0000	0000	0000	0000	1000	0010	1011	(binary)
	ZY	XWVU	TSRQ	PONM	**L**KJI	HG**F**E	**D**C**BA**	(type)

NOTE: Message types A, B, D and L must always be selected due to the relevant IMO resolution, and their corresponding bits cannot be set to "0."

⑥ Checksum in hex

The checksum value must be calculated by the user.

The current settings can be checked by a query command described in next paragraph.

7.4.3. Checking Current Settings via INS (RS–422) Port

The equipment accepts the following query command sentence via the **RS–422** port (INS port), and reports to the user the current B_1B_2 mask settings, indicating the status of message storage in the non–volatile memory, and message output to the INS port and the **RS–232C** port (printer port) for all frequencies.

$ - - CRQ,NRM*hh<CR><LF>
① ②

① Device identifier (e.g. IN=INS device, AI=AIS)

② Checksum in hex

Example: Device identifier = IN (INS device), checksum = 3A hex

$ INCRQ,NRM*3A<CR><LF>

A total of nine output sentences will then be sent back to the INS device like the examples below.

$CRNRM,1,1,03FFFFFF,02200EBF*32: Settings for 490 kHz, to non–volatile memory
$CRNRM,2,1,03FFFFFF,02200EBF*31: Settings for 490 kHz, to printer port
$CRNRM,3,1,03FFFFFF,02200EBF*30: Settings for 490 kHz, to INS port
$CRNRM,1,2,03FFFFFF,02200EBF*31: Settings for 518 kHz, to non–volatile memory
$CRNRM,2,2,03FFFFFF,02200EBF*32: Settings for 518 kHz, to printer port
$CRNRM,3,2,03FFFFFF,02200EBF*33: Settings for 518 kHz, to INS port
$CRNRM,1,3,03FFFFFF,02200EBF*30: Settings for 4209.5 kHz, to non–volatile memory
$CRNRM,2,3,03FFFFFF,02200EBF*33: Settings for 4209.5 kHz, to printer port
$CRNRM,3,3,03FFFFFF,02200EBF*32: Settings for 4209.5 kHz, to INS port

NOTE: The above examples represent the default mask settings.

7.4.4. Alarm Output Sentence Formats

7.4.4.1. Output Format for Alarm Being Activated

An alarm output sentence like the example below will be output to the **RS–422** (INS) port when the equipment receives an alarm NAVTEX message or if the equipment develops a failure or malfunction. The output will be repeatedly available at 30–second intervals until the alarm condition is acknowledged and reset manually by pressing STOP ALM twice*1 on the equipment or until the appropriate acknowledgement command (paragraph 7.4.5) is fed via the port from the INS terminal.

$CRALR,,003,A,V,NAVTEX:Search and Rescue information*72<CR><LF>
① ② ③ ④ ⑤

NOTE: The equipment does not use UTC as the time source, and therefore sends a null field in place of the time–of–alarm–condition–change field.

① Local alarm number:
001 = Navigational warning (type–A message)
002 = Meteorological warning (type–B message)
003 = SAR, piracy, armed robbery information (type–D message)
004 = Receiver malfunction
005 = Self–diagnostic test failure
006 = General failure

② Alarm conditions:
A= threshold exceeded (i.e. alarm condition exists)
V= threshold not exceeded (i.e. alarm condition is non–existent)

③ Alarm acknowledgement status
A= acknowledged
V= unacknowledged

④ Alarm description text

⑤ Checksum
03 = Navigational warning
0F = Meteorological warning
72 = SAR, piracy and armed robbery information

The other alarm output sentences are as follows:

$CRALR,,001,A,V,NAVTEX:Navigational warning*03<CR><LF>
$CRALR,,002,A,V,NAVTEX:Meteorological warning*0F<CR><LF>

*1: *Pressing the key once silences the audible indication alone, allowing the output sentence to continue every 30 seconds. A second keypress resets all the currently active alarms.*

7.4.4.2. Output Format for Alarm Being Acknowledged

When active alarms are acknowledged, the following sentences will be output once:

$CRALR,,001,V,A,NAVTEX:Navigational warning*03<CR><LF>
$CRALR,,002,V,A,NAVTEX:Meteorological warning*0F<CR><LF>
$CRALR,,003,V,A,NAVTEX:Search and Rescue information*72<CR><LF>

7.4.4.3. **Output Format After Alarm Being Acknowledged**

Within one minute after the issuance of the above sentences or after the STOP ALM key is pressed twice, the following outputs will be repeated at one–minute intervals. This condition will continue until another alarm message is received.

$CRALR,,001,V,V,NAVTEX:Navigational warning*14<CR><LF>
$CRALR,,002,V,V,NAVTEX:Meteorological warning*18<CR><LF>
$CRALR,,003,V,V,NAVTEX:Search and Rescue information*65<CR><LF>

7.4.5. Alarm Acknowledgement

The following command format is supported to acknowledge and reset the current alarm condition via the **RS–422** (INS) port:

$––ACK,003*hh<CR><LF>
① ② ③

① Device identifier (e.g. IN=INS device, AI=AIS)

② Local alarm number
001 = Navigational warning
002 = Meteorological warning
003 = Search and rescue (SAR) information

③ Checksum:
If the device identifier is IN (INS device), for example, the above command format for each alarm is as follows:

$INACK,001*53<CR><LF>: to acknowledge Navigational warning
$INACK,002*50<CR><LF>: to acknowledge Meteorological warning
$INACK,003*51<CR><LF>: to acknowledge SAR information

7.4.6. Proprietary Sentence (Switching 2nd Receiver Frequency)

The following command (IEC 61162–1proprietary format sentence) is used to externally switch the second receiver frequency between 490 kHz and 4209.5 kHz:

$PJMCR, 0, 1 *hh <CR> <LF>
① ② ③

① Receiver index:
0 = Second receiver
1 to 9 = Reserved

② Receive frequency index:
1 = 490 kHz
2 = Not assigned
3 = 4209.5 kHz

③ Checksum:
See the examples below.

Examples:
To switch the frequency, an INS device should send the following command sentences to the equipment via the **RS–422** port:

- Switching to 490 kHz: $PJMCR,0,1*47<CR><LF>
- Switching to 4209.5 kHz: $PJMCR,0,3*45<CR><LF>

8. Summarized Theory of Operation

8.1. What is NAVTEX?

NAVTEX, a system of broadcast and automatic reception of global maritime safety information by means of direct display/printing telegraphy, is part of the *1GMDSS infrastructure, defined by *2IMO Assembly resolution A.706 (17). Broadcasting is accomplished by a worldwide network of dedicated coastal stations regularly sending weather information, navigational warnings, search–and–rescue (SAR) information and other related messages, all in an easy–to–read text format, to mariners free of charges.

8.2. Operating Frequencies

At present three frequencies are officially allocated by the *3ITU for NAVTEX broadcasting service: 518 kHz, 490 kHz and 4209.5 kHz. All *4SOLAS convention vessels are required to carry a receiver dedicated to receiving NAVTEX transmissions automatically on all the above frequencies.

Transmissions on 518 kHz are in English and of general interest to vessels navigating international waters, while the 490 kHz service is primarily targeted at those working most of the time in areas close to transmitting stations, providing more localized information in national languages. Some stations also broadcast information to local users on 4209.5 kHz. Stations on each frequency transmit NAVTEX messages usually for a period of 10 minutes on a time–sharing basis to avoid cross–station interference.

8.3. Service Area

The coverage area of a 518 kHz station is normally 200 to 400 nautical miles in daytime hours, depending on the transmitting power level, and a signal travels along the surface. At night some of the signal often travels more than double the daytime coverage by being reflected a number of times between the surface and the ionosphere, a band of ionized atmospheric layers 50 to 400 km above the surface. The 490 kHz service area is less than the 518 kHz coverage due to lower transmit power levels, but the nighttime coverage often extends greatly due to ionospheric reflections. The 4209.5 kHz broadcast, though catering mainly for inshore users and covering much less areas in the daytime, can be received from more than 1000 miles away during hours of darkness.

8.4. Error Correction

Signal propagation conditions constantly vary with time of the day and also with the season. The signal arriving at the receiver can be corrupted or distorted at any time by static discharges, natural noise, abnormal solar activity, unstable ionospheric conditions, interference between the signal coming directly from the transmitter and the one reflected from the ionosphere, etc. It is therefore likely that a vital NAVTEX message can be missed due to signal corruption or distortion at the receiving end.

In order to ensure that each message is properly received within its intended area of coverage, a station sends out the same message twice, some hours apart, each with its identification code (known as B_1 character), message type code (B_2 character) and a two–digit serial number (B_3B_4, ranging 00 to 99). In addition, the system employs a mode of transmission called forward error correction (FEC), transmitting each alphanumeric character in the message twice at very short intervals. If the same character is received twice, the receiver considers it to be a true character. If either of the received characters is different or corrupted, the receiver treats it as an invalid letter, and displays or prints an asterisk (*) in its place, thereby securing the reliability of a received message.

(*continued on next page*)

8. Summarized Theory of Operation (*continued – 2/10*)

8.5. NAVTEX Receiver – General

A NAVTEX receiver that complies with the relevant IMO resolutions and regulations for wheel mark certification is programmed to automatically receive and display/print a message, and avoids a repeated reception of the same message by checking the ID and numbering of each message. Using the ID and message type data attached to each message, the user can also program the receiver to reject certain transmissions and message types that are not of importance while in the current area, except for SAR and other urgent warning messages classified as type D messages.

An audible and visual alarms are automatically triggered upon reception of such a message. To silence the alarm, the user must manually, or via an appropriate command from an INS terminal, acknowledge the message arrival. Received messages are either printed on paper (for a receiver with a built–in printer) or displayed on a screen with memory for storage and retrieval (for a receiver with an integral LCD screen).

8.6. The AE–1800 NAVTEX Receiver

The **AE–1800** receiver has two built–in receivers on the same receiver board, with the first receiver devoted to receiving 518 kHz broadcast at all times and the second receiver receiving either 490 kHz or 4209.5 kHz signal as selected by the user through the menu system. Received messages are displayed across an 8–inch liquid crystal display (LCD) and stored permanently or temporarily as specified by the user.

Up to 200 messages, each with an average of 500 characters, received on the first and second receivers are separately stored and then automatically erased from memory 60 hours after the time of reception on a first–in–first–out basis. However, up to 25 messages can be protected against automatic erasure, and are stored in a separate area of the non–volatile message memory, in which case an additional 50 new messages can be stored in memory for each receiver.

When a transmission occurs on the first and second receiver frequencies at the same time, the equipment receives both signals, displaying the first receiver message while storing the second receiver message in memory for later retrieval. An appropriate caution message shows up in the screen bottom prompt line to indicate the reception of a new NAVTEX message on the second receiver.

Reception of a type–D message (SAR, piracy and armed robbery information) activates the audible and visual alarms. The received message text then is shown in red, making it easy to discriminate it from navigational (type–A) and weather (type–B) warnings. The audible alarm also sounds differently to indicate that a type–D message has been received. The alarm can be acknowledged remotely by an IBS/INS terminal connected to the RS–422 port on the rear panel. When a type–D message is received on the second receiver alone, the display automatically switches to the second receiver page, showing its message in red while sounding the alarm in the same manner as on the first receiver.

The stored messages can be output via three interface ports mounted on the rear panel for IBS/INS or other onboard applications The user can specify the ID, frequency and type of the messages you wish to output. An optional printer can also be plugged in to print the current message in real time or those recalled from the non–volatile memory.

*1: Global Maritime Distress and Safety System, *2: International Maritime Organization

*3: International Telecommunications Union, *4: Safety of Life at Sea

(*continued on next page*)

8. Summarized Theory of Operation (*continued – 3/10*)

8.7. Operating Principle of AE–1800

Figure 8–1 shows interconnections between the printed circuit boards (PCBs) comprising the **AE–1800** system and interface connections from the PCBs to data input/output ports and peripheral devices. A functional block diagram of the receiver PCB is given in Figure 8–2..

To follow the circuit description below, see also the block diagram and schematics of the receiver PCB and Main PCB attached.

Receiver Circuit

To receive the three NAVTEX frequencies (518 kHz, 490 kHz and 4209.5 kHz), the system incorporates two independent receivers (first and second receivers) plus a local oscillator that is switched into operation when the second receiver frequency is changed to 4209.5 kHz. All receivers are mounted on the receiver PCB (S602–RCV–A).

Both 518 and 490 kHz signals picked up at the *active antenna's preamplifier pass through a bandpass filter (L4, L19) and are then amplified by a common RF amplifier (Q4).

**The active antenna contains three passband filters, independently tuned to the three frequencies, each followed by a single stage preamplifier. The 490 kHz filter and 4209.5 kHz filter are switched by a relay when the second receiver frequency is changed.*

The amplified signals are then separately filtered by crystal filters (F1 for 518 kHz, F2 for 490 kHz) to avoid cross–channel interference and reject interference adjacent to each frequency.

A 4209.5 kHz signal goes through its devoted bandpass filter (L3, L6). After being amplified by RF amplifier Q5, it is fed to a diode mixer (D3, D4), which converts the 4209.5 kHz signal into a 490 kHz signal through heterodyne action using a local oscillator output (3719.5 kHz) derived from crystal oscillator U3 (29.756 MHz) through a divide–by–8 frequency divider (embedded in U3's package). The 490 kHz output is then fed to the 490 kHz crystal filter F2 through a switch (U1, Q6).

After passing through the appropriate crystal filter, each signal is again amplified (by Q10 for 518 kHz, Q11 for 490 kHz) and then fed to an FM detector (U9 for 518 kHz, U10 for 490 kHz), which demodulates a frequency–shifted (carrier±85 Hz) RF NAVTEX signal into a stream of baseband pulses at 100 baud using quadrature detection technique. The detected output is then fed to the CPU via a lowpass filter and comparator chain (U11 for 518 kHz, U12 for 490 kHz) and an opto–isolator (K7 for 518 kHz, K8 for 490 kHz).

To test whether each receiver is functioning properly, two NAVTEX signal generators are provided on the same PCB, each consisting of crystal–controlled oscillator (U5 for first receiver, U4 for second receiver) and common divide–by–16 frequency divider U2. When the self–diagnostic test function is activated via the menu, each generated signal will be mixed by diode mixer D5 with the 3719.5 kHz output from local oscillator U3, producing test signals at 518 kHz and 490 kHz. They will then be fed to their respective amplifiers in the same manner as live NAVTEX signals are processed.

(*continued on next page*)

8. Summarized Theory of Operation (*continued – 4/10*)

8.7. Operating Principle of AE–1800 (*continued –2/2*)

CPU Circuit

The Main PCB (M613–MAIN–X) carries a CPU circuit and a power supply circuit. The CPU is a 16–bit single–chip microcomputer (U10) clocked at 24 MHz by crystal–controlled oscillator X1, and on–chip flash ROM for program software and on–chip RAM providing memory space for data processing of the demodulated signals.

An external static RAM (SRAM) chip (U5, 512 kB) is mounted for the storage of messages and IDs, and is backed up by large capacity capacitor C6 (1.0 farad) for approx. 10 days in the event the unit is placed in a continuous power–off condition. A portion of the memory capacity is allocated as a video RAM (VRAM) to hold text for display on the LCD screen.

U3 is factory–programmed to act as a display controller to perform various display control functions and text scrolling. The input/output interface between the CPU and externally connected devices consists of three external ports: U4 for the **RS–232C** and **I/O DATA** ports, U12 for the **RS–422** port.

Power Supply Circuit

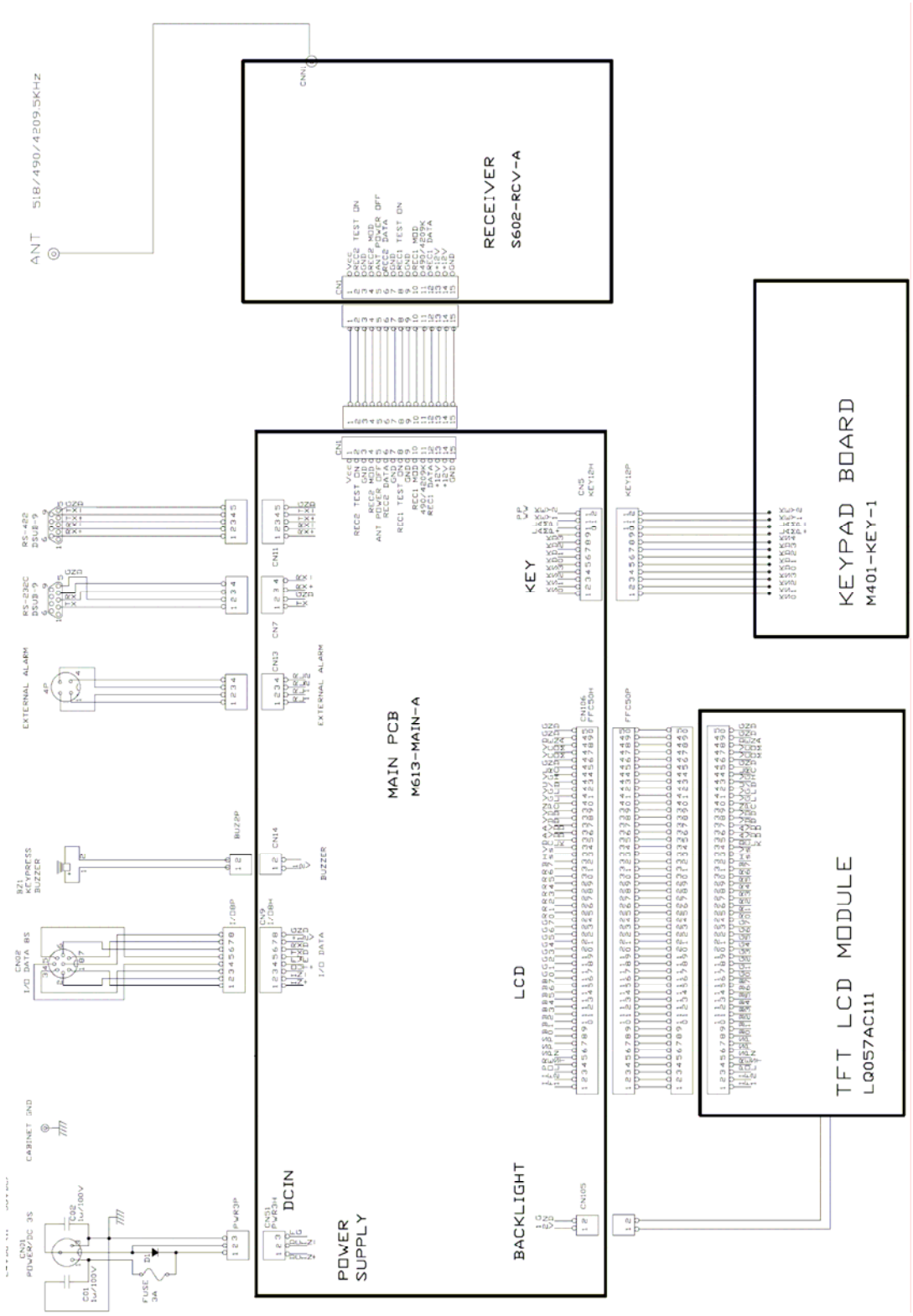
The power supply circuit consists mainly of a switch–mode voltage regulator (U55), a power transformer (T51), a DC–to–DC converter (U52) (or U57 3–terminal voltage regulator) and a 3–terminal voltage regulator (U56), producing various regulated outputs (3.3V for IC chips, ±12V for RS–232C port, +12V for the receiver PCB, +5V for RS–422 port, etc.) required for operation of the entire Main PCB circuitry.

The voltages (+8V and +5V) required for receiver operation are derived from the +12V output through 3–terminal regulators (U7 and U8) on the receiver board.

Should the power line polarity be reversed accidentally, diode D51 will cause the fuse F1 (3A) to blow, thereby protecting the input circuit from possible damage. A varistor (VA51) is placed across the DC input line to protect the power supply circuit from possible damage in the event voltage transients on the ship's power line voltage exceed 40V.

8. Summarized Theory of Operation (*continued – 5/10*)

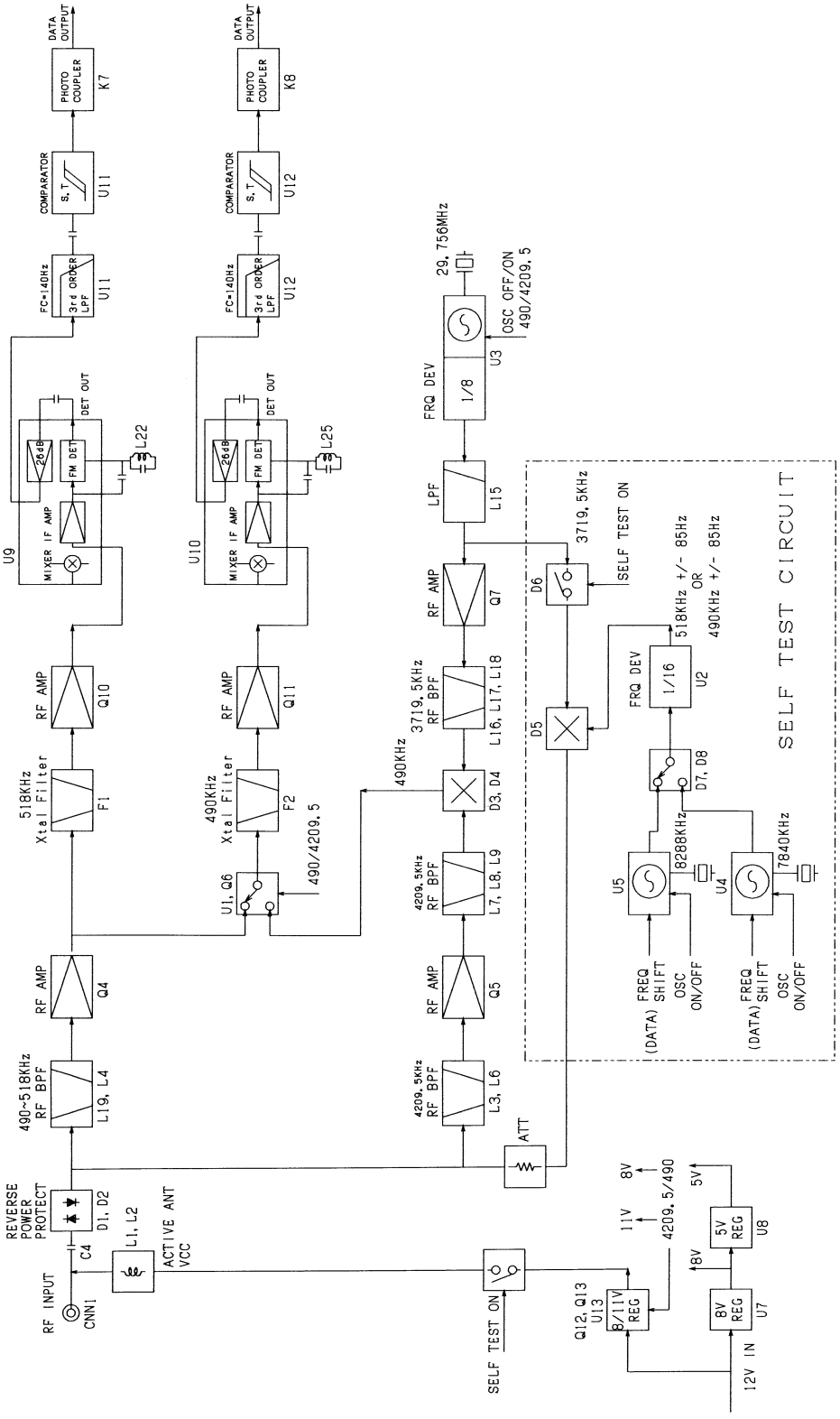
Figure 8-1 Interconnections



(*continued on next page*)

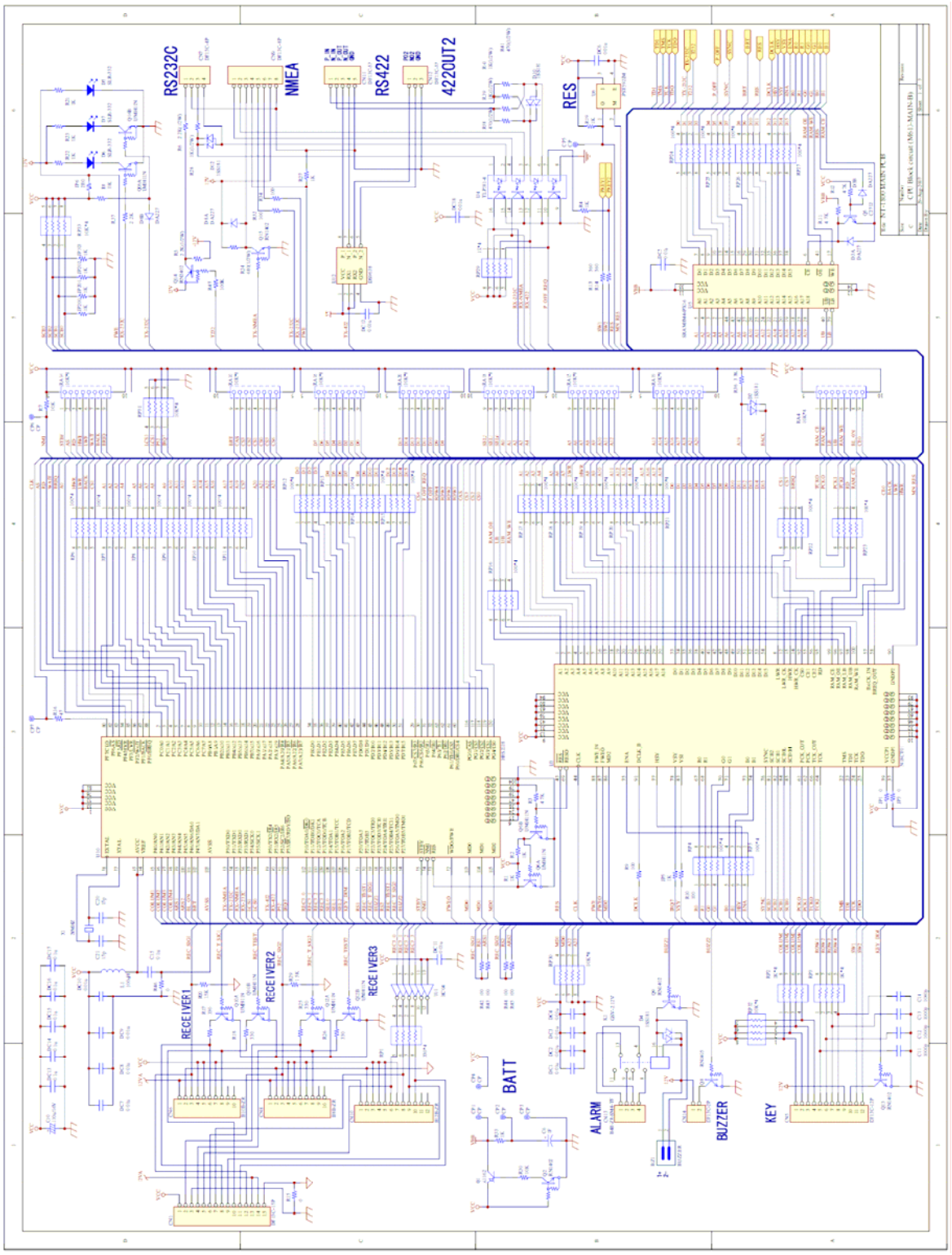
8. Summarized Theory of Operation (*continued – 6/10*)

Figure 8-2 Functional Block Diagram – Receiver Board



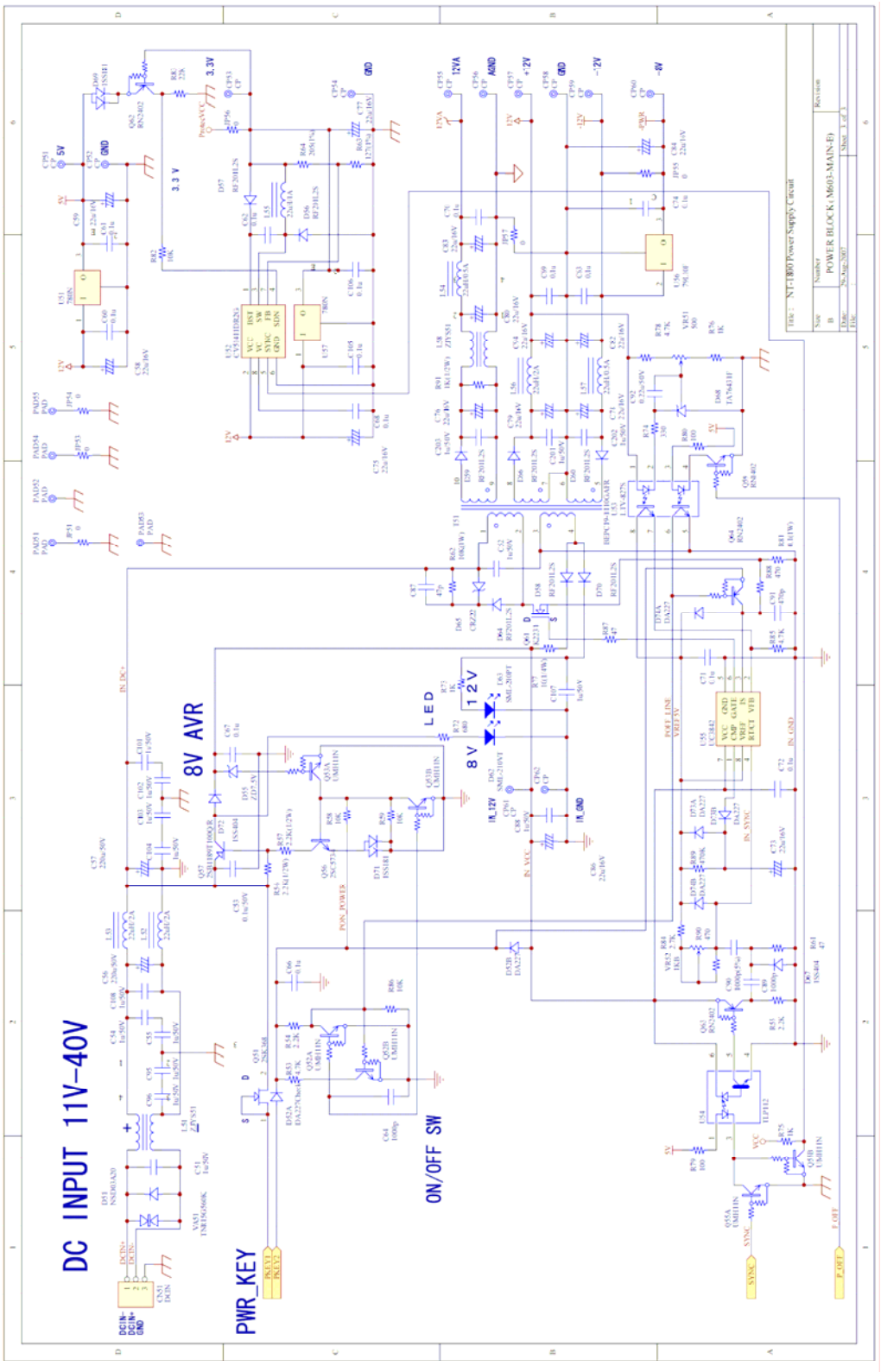
8. Summarized Theory of Operation (*continued – 7/10*)

Figure 8-3 CPU Circuit – Main Board



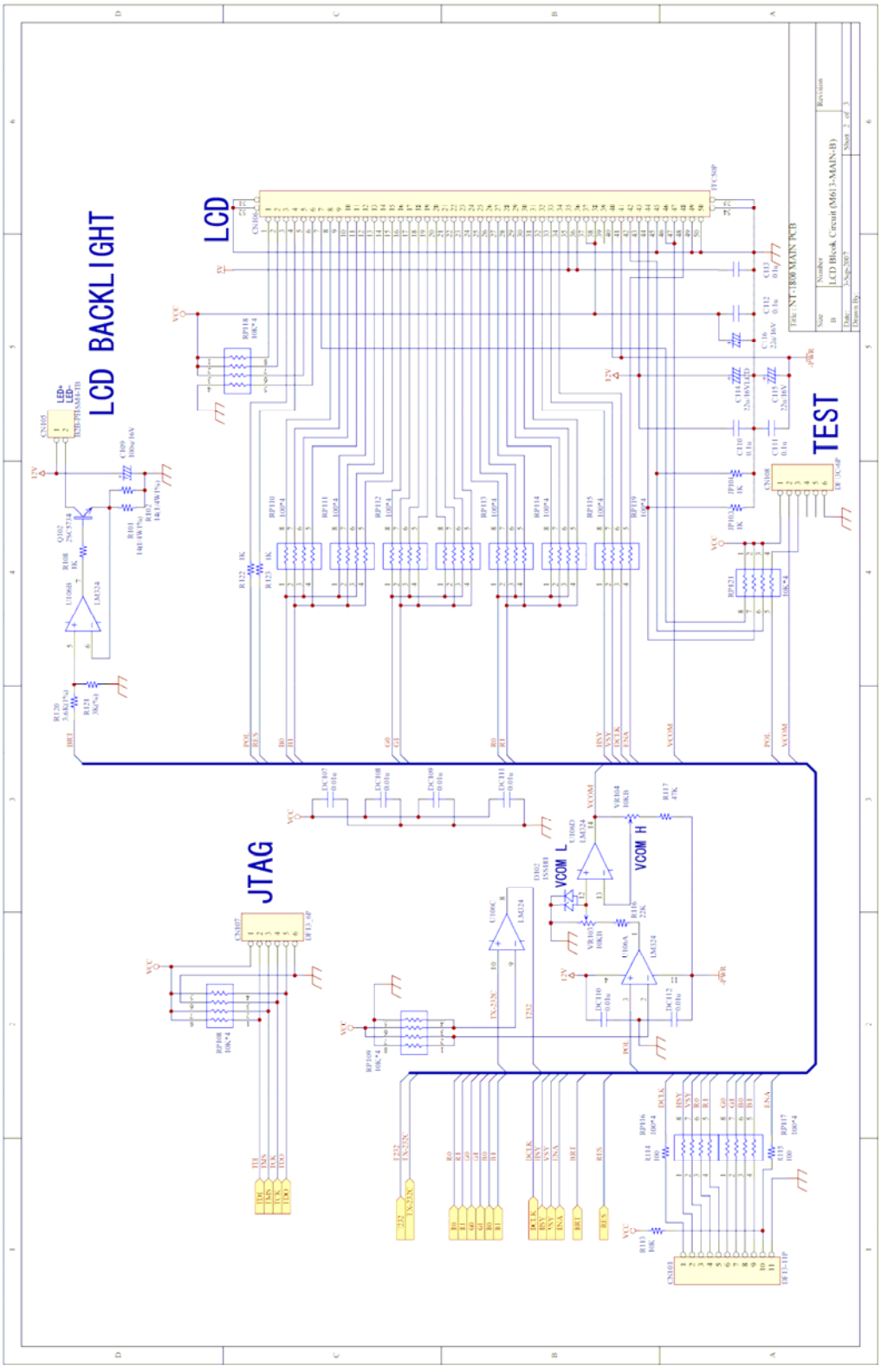
8. Summarized Theory of Operation (*continued – 8/10*)

Figure 8-4 Power Supply Circuit – Main Board



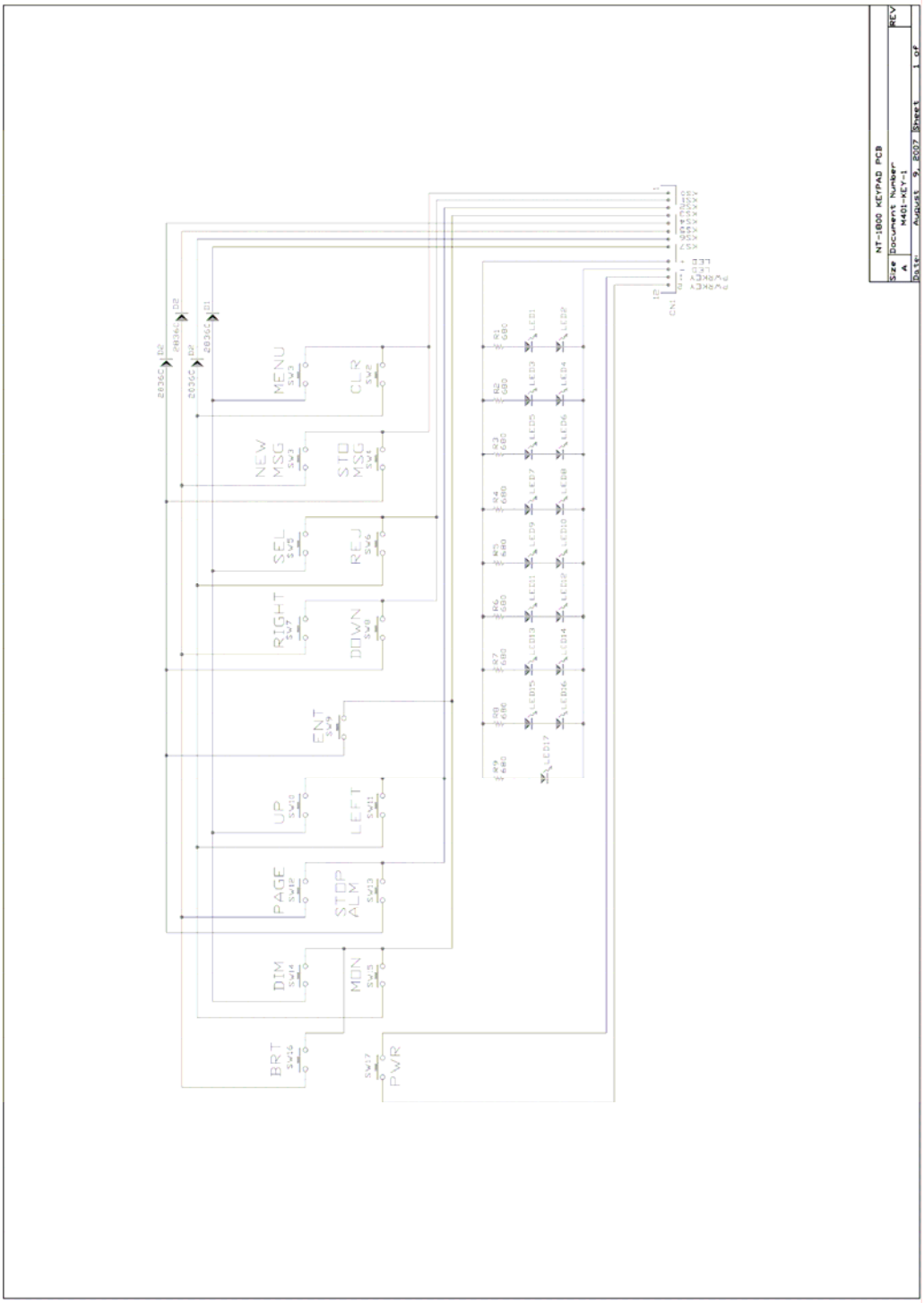
8. Summarized Theory of Operation (*continued – 9/10*)

Figure 8-5 LCD Backlight Control Circuit – Main PCB



8. Summarized Theory of Operation (*continued – 10/10*)

Figure 8-6 Keypad Board



9. Specifications

(1) IEC 60945–2002 Equipment Category:
- Receiver Cabinet: Protected
- Active Antenna Unit: Exposed

(2) Receive Frequencies:
- First Receiver: 518 kHz
- Second Receiver: 490 kHz and 4209.5 kHz, front panel–selectable or by *1proprietary command sentence via RS–422 port

(3) Type of Receiver:
- First Receiver: 518 kHz straight amplifier
- Second Receiver:
  - 490 kHz: 490 kHz straight amplifier
  - 4209.5 kHz: Down–conversion to 490 kHz

(4) Antenna Input: Coaxial: 50 Ω (nominal), matched with **ANT–2000M** active antenna

(5) Input Protection: 30 V_{RMS} for 15 minutes over 100 kHz–28 MHz range

(6) Active Antennas:
- Standard: Preamplified 1.2m glass–fiber whip (**ANT–2000M**) for reception of 518 kHz, 490 kHz and 4209.5 kHz, with 1–meter RG–58/U coaxial cable attached, terminated in BNC and PL–259 plugs for cable extension.

(7) Message Display: 5.7" (diagonal) color TFT, QVGA (320X240 pixels)

(8). Receiver Sensitivity: Better than the following value for message reception with character error rate (CER) of less than 4%:
- 1 μV e.m.f. to coaxial input

(9) Demodulator: Quadrature detector, crystal–controlled

(10) Mode of Reception: F1B with forward error correction (Annex II to ITU–R REC. 476–3, M.540–2 and 625 B–mode)
- Single Frequency: Automatic reception and display of message transmitted on 518 kHz or on user–selected second receiver frequency (490 kHz or 4209.5 kHz)
- Dual Frequency: Automatic, simultaneous reception of 518 kHz and user–selected second receiver frequency (490 kHz or 4209.5 kHz), with automatic display of first receiver's live messages while storing second receiver messages in memory when NAVTEX broadcasts occur at both frequencies simultaneously.

(11) Second Receiver Selection: 490 kHz or 4209.5 kHz selectable via menu system or *1proprietary command sentence via RS–422 port

*1:*See paragraph 7.4.6 for detail.*

(12) Source of Time: Derived from CPU clock 24.00 MHz for calculation of time passage to handle message aging. No real time clock (RTC) is used.

(13) User Interface Language: English (menus, status, prompts, cautions)

(*continued on next page*)

9. Specifications (*continued – 2/4*)

(14) Text Display:

- NAVTEX Messages: 40 characters per line, 18 lines per screen. A forced carriage return symbol *[2](↓) divides the last word at 40th character position if the number of character in a line exceeds 40.

  Maximum capacity of characters/line: 4096

  *[2] *Hex 5F (_) is output to RS–232C or RS–422 port.*

- Statuses & Prompts: 1 line (40 characters maximum) at screen's upper and lower edges

(15) Indication of Message Reception and Storage

- Message Reception: Tag **NEW MESSAGE** is attached to message ID.
- Storage: Indication "**STORED**" is turned on at the end of each satisfactorily received message together with a character error rate (**CER** = XX%) readout

(16) Message Scrolling:

- Live Messages: Automatic, except for new SAR messages
- Stored Messages: Manual, line–by–line or page–by–page scrolling

(17) Message Storage:

- Capacity: 200 messages (average 500 characters per message) for each of 518 kHz, 490 kHz and 4209.5 kHz receivers. Up to an additional 50 messages can be stored (for 518 kHz and 490 kHz or 4209.5 kHz) if stored messages are protected.

  Maximum storage of characters: 106,496/frequency
  Maximum characters/message: More than 8000

  If the equipment receives a message with a character error rate (CER) of > 4% and ≦ 33%, it will store the message but will receive the same message to be transmitted subsequently. If the subsequent message has a lower CER, it will automatically replace the previously stored one. If a message is received with a CER > 33%, it will not be stored.

- Duration: 60 hours 20 minutes from successful reception of each message, or until the storage limit is reached, after which old messages will be automatically erased from memory on a first–in–first–out basis except for user–protected messages that cannot be erased from memory until their protection tags are removed manually. Time source is derived from the CPU clock (24.00 MHz) to compute message aging.

- Storage without Power: Protected messages are stored for at least 10 days after power is removed continuously.

(18) Message Protection: Up to 50 messages on each receiver screen can be protected against automatic erasure, and are saved in a separate area of the non–volatile message memory. Protection of a user–selected message can be cancelled to allow automatic erasure after a 60–hour time passage.

Protected messages are indicated with *[3] tag **PROTECTED** attached to the message ID.

*[3] *Removing the tag requires user confirmation.*

(*continued on next page*)

9. Specifications (*continued – 3/4*)

(19) Message ID Storage:

- Capacity: 200 IDs of successfully received messages (with CER ≦33%) on each of 518 kHz, 490 kHz and 4209.5 kHz
- Duration: 60 hours 20 minutes after receipt or until the storage limit (200 for each frequency) is reached.

(20) Stored Message Outputs: The following messages can be selectively output via the **RS–422**, **RS–232C** and **I/O DATA** ports manually through the menu system or externally with station and message ID mask settings from an INS terminal:

- All currently displayed messages or currently displayed messages of user's choice
- All stored messages
- Stored messages of user's choice by specifying frequency, transmitter or message type

(21) External I/O Interfaces:

- Printer Interface: **RS–232C** port (***MAX3232*** transceiver)
- IBS/INS: **RS–422** port (***MAX3490*** transceiver) with input lines optically isolated
- NMEA–0183/IEC 61162–1: 8–pin connector (**I/O DATA** port)
- Alarm Activation Output: 2 isolated pairs of relay contacts (**ALARM** port)
- Control Commands: IEC 61162–1 formatted sentences. Up to 10 commands can be stacked for sequential execution.

(22) Message Alarm Specifications:

- Audible Indication: Beeping from front–facing piezoelectric buzzer
  - 1–second intervals: Type D messages
  - 3–second intervals: Types, A, B and L messages
- Visual Indication: Red tag **ALARM!** attached to ID

  ID and message text displayed in red color for type–D messages.
- Acknowledgement/Muting: Manually with front panel button or by means of IEC 61162–1 format command ($--ACK command) via **RS–422** input port.
- Alarm Conditions Output: IEC 61162–1–compliant $CRALR sentences containing local alarm number and alarm text via **RS–422** output port. See paragraph 7.4.4 for details.

NOTE: See section 10 (List of Alarms) for additional information on alarms.

(23) Power Requirements: 24 VDC (nominal), approx. 11W. Floating ground. The unit operates safely over a 11–to–40V range.

(24) Cabinet Size & Weight: 238/196 (W) X 217/196 (H) X 194 (D) mm
Approx. 2.3 kg with mounting bracket attached

(*continued on next page*)

9. Specifications (*continued – 4/4*)

(25) Compass Safe Distances (in Energized Condition):

- Cabinet with Bracket: 60 cm (standard), 35 cm (steering)
- Cabinet only: 45 cm (standard), 30 cm (steering)

(26) Ambient Temperatures: –15 to 55°C (cabinet, operating)
–40*1 to 70°C (cabinet, storage)
–25 to 55°C (active antenna, operating)
–40*2 to 70°C (active antenna, storage)

(27) Compliance Standards: IMO Resolution MSC.148(77
IMO Resolution A.694(17)
IEC 61097–6 Ed.2
IEC 60945 Ed.4 (2002)
IEC 61162–1, IEC 61162–2
ITU–R 540–2
ITU–R 625–3
EN 300 065V 1.1.3
EN 301 011V 1.1.1

*1: *The temperature must be returned to, and left at –15°C and above for at least 1 hour, before the equipment can be switched on.*

*2: *The temperature must be returned to, and left at –25°C and above for at least 1 hour, before the equipment can be switched on.*

NOTE: Specifications, other than those specified under the above standards, are subject to change without notice or obligation.

10. List of Alarms

10.1. Message Alarms

- Alarm for D–Type Message
  - Enabled/Disabled Status: Enabled at all times.
  - Triggering Condition: To be triggered upon reception of a D–type message.
  - User Interface:
    - Audible: Beeping at approx. 1–sec. intervals by alarm buzzer.
    - Visual: Attaching **ALARM!** tag to message ID and displaying both message ID and text in red.

- Alarm for A–, B–, and L–Type Messages
  - Enabled/Disabled Status: Initially disabled, and can be individually enabled by the user. See paragraph 4.13 for instructions.
  - Triggering Condition: To be triggered upon reception of an A–, B– or L–type message.
  - User Interface:
    - Audible: Beeping at approx. 3–sec. intervals by alarm buzzer.
    - Visual: Attaching **ALARM!** tag to message ID and displaying message ID in red.

10.2. Operational Alarms

- Storage Limit Alarm:
  - Enabled/Disabled Status: Enabled at all times.
  - Triggering Condition: To be triggered at time of trying to protect NAVTEX messages for permanent storage in excess of 50.
  - User Interface:
    - Audible: Beeping 3 times in quick succession by small buzzer.
    - Visual: Displaying warning "**STORAGE LIMIT IS REACHED !**" in prompt line at screen's bottom.

- Memory–Full Alarm:
  - Enabled/Disabled Status: Enabled at all times.
  - Triggering Condition: To be triggered on reception of additional new NAVTEX message with 199 messages already stored.
  - User Interface:
    - Audible: Beeping 3 times in quick succession by small buzzer.
    - Visual: Displaying warning "**MEMORY FULL ! [CLR] TO ACKNLG.**" in prompt line at screen's bottom.

- Invalid Keypress Alarm:
  - Enabled/Disabled Status: Enabled at all times.
  - Triggering Condition: To be triggered when any key not valid for current operation is pressed.
  - User Interface:
    - Audible: Beeping 3 times in quick succession by small buzzer.
    - Visual: Displaying warning "**INVALID KEYPRESS**," blinking.

11. List of Abbreviations

The abbreviations used in this manual and menus, on screen, control panel and rear panel are listed below.

A:	amperes
ACKNLG:	Acknowledge
AI:	Automatic identification system (typical device identifier of AIS equipment)
AIS:	Automatic identification system
ALM:	Alarm
ALR:	Alarm (header of alarm output sentence from INS port)
ANT:	Antenna
BNC:	Type of coaxial connector
BRT:	Brightness control key
BSH:	Bundesamt für Seeschiffahrt und Hydrographie (Federal Maritime and Hydrographic Agency, Germany)
BV:	Bureau Veritas (France), EU notified body
CER:	Character Error Rate (ratio of asterisks to total number of characters)
CH:	Operating channel (receiver currently in use)
CLR:	Clear key
CPU:	Central Processing Unit (core of single–chip microcomputer on CPU PCB)
CR:	Communications receiver (device identifier of NAVTEX receiver)
CR:	Carriage Return code (0D in hexadecimal notation, unprintable)
D:	Depth (part of cabinet dimensions)
dB:	decibels (unit of relative power strength)
DC/AC:	DC–to–AC (DC–to–AC voltage inverter for screen backlighting lamp)
DIM:	Dimmer key (for keypad backlighting)
DOS/V:	Disk Operating System/V (PC operating system for IBM–compatibles)
DRAM:	Dynamic Random Access Memory
EMC:	Electromagnetic Compatibility
EN:	Europäische Norm (=European Standards)
ENT:	Entry key
F:	Frequency
FEC:	Forward Error Correction (error–correcting protocol in NAVTEX system)
FL:	Fluorescent Lamp (screen backlighting lamp)
FM:	Frequency Modulation
FREQ:	Frequency
FSK:	Frequency Shift Keying (modulation technique for NAVTEX transmission)
FWE:	Flash–memory Write Enable (CPU–embedded flash memory programming)
F/C:	Frequency Converter (used to receive 4209.5 kHz on second receiver)
GMDSS:	Global Maritime Distress and Safety System
GND:	Ground
GPS:	Global Positioning System, GPS receiver/sensor
H:	Height (part of cabinet dimensions)
HF:	High frequency band (including 4209.5 kHz second receiver frequency)
ID:	Identification code (identification of transmitter)
IEC:	International Electrotechnical Commission
IMO:	International Maritime Organization
IN:	Integrated Navigation (device identifier of INS equipment)
INS/IBS:	Integrated Navigation System/Integrated Bridge System
ISO:	International Standardization Organization
I/O:	Input/Output
kB:	kilobytes
kg:	kilograms
LED:	Light–Emitting Diode
LSB:	Least Significant Bit
LST:	Local Standard Time
LAT/LON:	Latitude/Longitude coordinates
LCD:	Liquid Crystal Display
LF:	Line Feed code (0A in hexadecimal notation, unprintable)

(*continued on next page*)

11. List of Abbreviations (*continued – 2/2*)

m:	meters
mA:	milliamperes
min:	minutes
mm:	millimeters
ME or MEM:	Memory (non–volatile memory for message storage)
MF:	Medium frequency broadcast band (including 490 kHz and 518 kHz)
MON:	Monitor (audible monitor)
MSG:	Message (NAVTEX message)
MPU:	Microprocessing Unit
NC:	No connection (no internal connection)
NMEA:	U.S. National Marine Electronics Association
NNNN:	End–of–message indication (specified under IMO/IEC regulations)
NRX:	NAVTEX receiver (header of message output from INS port)
para.:	paragraph
PC:	Personal Computer
PCB:	Printed Circuit Board
PR:	Printer
PWR:	Power
QVGA:	Quarter VGA (screen resolution, 320X240 pixels)
RAM:	Random Access Memory (embedded in CPU chip)
RCVNG:	Receiving
RCVR:	Receiver
REC:	Recommendation (ITU Recommendation)
REF:	Reference
REJ:	Reject, rejected
REV:	Revision (software revision number)
RH:	Relative Humidity
RJ:	Reject, rejected
ROM:	Read–Only Memory (embedded in CPU chip)
RTC:	Real Time Clock
RX:	Receive, receiver
RMRS:	Russian Maritime Register of Shipping
S:	Signal
SAR:	Search And Rescue
SEL:	Select, selected
SIG:	Signal
SL:	Select, selected
SOLAS:	Safety of Life at Sea
SRAM:	Static RAM (non–volatile memory for message storage)
STD:	Standard compass
STG:	Steering compass
STO:	Store
TFT:	Thin–Film Transistor (technology of color LCD)
TX:	Transmit, transmitter
TXD:	Transmit data (Send data)
UTC:	Universal Time Coordinated (=GMT in common usage)
V:	volts
Vcc:	Operating voltage of IC chips used
VDC:	Volts DC
VER:	Version (software version)
VGA:	Video Graphics Array (screen resolution, 640×480 pixels)
W:	Width (part of cabinet dimensions)
W:	watts
WX:	Weather
XTAL:	Crystal (quartz crystal oscillator)
Z:	GMT (Greenwich Mean Time)

12. User Settings To Be Stored in Non–Volatile Memory

The following user–made settings will be stored in the non–volatile memory. Settings indicated in Italic type fonts are factory defaults.

- Screen Brightness Level: Last used level
- Keypad Dimmer Level: Last used level
- Settings via Menu System
  - Background Color: ***WHITE***, BLACK, BLUE
  - Message Font Type: NORMAL, ***BOLD***
  - Screen Sleep Mode
    - On/Off Status: ON, ***OFF***
    - On/Off Time Period: ***STANDARD***, USER–DEFINED MODE
  - *[1]Second Receiver Frequency: ***490 KHZ***, 4209.5 KHZ
  - Keypress Beep: ***ON***, OFF
  - *[2]Station Selection/Rejection Settings (common to first and second receivers)
    - Storage in Memory:
      Selected Stations: ***A*** to ***Z*** (all stations)
      Rejected Stations: None
    - Output to Printer Port (RS–232C) and I/O DATA port:
      Selected Stations: ***A*** to ***Z*** (all stations)
      Rejected Stations: None
    - Output to INS Port (RS–422):
      Selected Stations: ***A*** to ***Z*** (all stations)
      Rejected Stations: None
  - *[2]Message Type Selection/Rejection (common to first and second receivers)
    - Storage in Memory:
      Selected Types: ***A, B, C, D, E, F, H, J, K, L, V, Z***
      Rejected Types: ***G, I, M, N, O, P, Q, R, S, T, U, W, X, Y***
    - Output to Printer Port (RS–232C) and I/O DATA port:
      Selected Types: ***A, B, C, D, E, F, H, J, K, L, V, Z***
      Rejected Types: ***G, I, M, N, O, P, Q, R, S, T, U, W, X, Y***
    - Output to INS Port (RS–422):
      Selected Types: ***A, B, C, D, E, F, H, J, K, L, V, Z***
      Rejected Types: ***G, I, M, N, O, P, Q, R, S, T, U, W, X, Y***
  - Output Port Settings (On/Off, Protocol, Bit Format, Baud Rate):
    - RS–232C and I/O DATA: ***ON, NONE, 8 DATA BITS, 1 STOP BIT, ODD, 0.11***
    - RS–422: ***ON, IEC61162, 8 DATA BITS, 1 STOP BIT, ODD, 4.8***
    - I/O DATA: ***ON, NONE, 8 DATA BITS, 1 STOP BIT, ODD, 4.8***

(*continued on next page*)

12. User Settings To Be Stored in Non–Volatile Memory (*continued –2/2*)

- Message Output (for printing live messages on–line)
  - **RECEIVING MSG**: ***ON***, OFF

- *3Message Alarms On/Off
  - Type A Message: ON, ***OFF***
  - Type B Message: ON, ***OFF***
  - Type D Message: **ON**
  - Type L Message: ON, ***OFF***

*1: *Can be controlled via RS–422 port with IEC 61162–1 proprietary command. Last setting is stored in memory.*

*2: *Can be controlled via RS–422 port with IEC 61162–1 $CRNRM command. Last settings are stored in memory. Message types A, B, D and L cannot be rejected.*

*3: *Type D message alarm is always set to ON; the user cannot change the status.*

13. List of Components To Be Shipped

The following set of components is usually shipped by the manufacturer, either as standard or optionally. The same information is usually given in the shipping documents (INVOICE, PACKING LIST, etc. as requested by the user) to be attached to the shipment. If your equipment is purchased from one of **MORCOM**–authorized dealers, a different set of components may be delivered. Contact your dealer for details.

- Receiver Console (Cabinet), **AE–1800**: Standard 1 set
- Active Antenna Assembly, **ANT–2000M**: Standard 1 set
  - Preamplifier with *1 10m coax cable terminated in BNC plug
  - Whip, 1.2m
- Receiver Mounting Bracket: Standard 1 pc
- Cabinet Clamping Knob, M8X15: Standard 2 pcs
- Power Supply Cable: Standard 1 set
  3m, 2–conductor shielded, terminated in type **14–P3F** plug
- *2 Plugs:
  - CP111–4P (**ALARM** port): Standard 1 pc
  - CP111–8P (**I/O DATA** port): Standard 1 pc
  - HDEB–9S (**RS–232C**, **RS–422** ports): Standard 2 pcs
- Fuse (3A, 125V, 5.2X20 mm): Standard 2 pcs
- Reference Manual, *3 **UM–AE1800–1.0**: Standard 1 copy

*1 *OEM models are supplied with 1m RG58/U coax cable terminated in a PL–259.*

*2: *Equivalent substitutes may be supplied.*

*3: *Edition number may change depending on delivery time.*

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