

FURUNO

OPERATOR'S MANUAL

FACSIMILE RECEIVER

MODEL FAX-214



FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

©FURUNO ELECTRIC CO., LTD.

9-52, Ashihara-cho,
Nishinomiya, Japan 662

Telephone: 0798-65-2111
Telefax: 0798-65-4200

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-Your Local Agent/Dealer

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SAFETY INSTRUCTIONS

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



DANGER

This notice indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.



WARNING



This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.





CAUTION

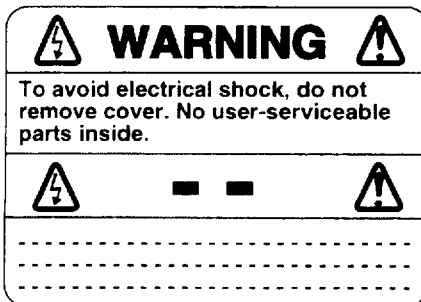
This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or property damage.

SAFETY INFORMATION FOR THE OPERATOR

 WARNING	
	<p>Avoid opening cover of equipment except to replace paper, fuse or printing head.</p> <p>This equipment uses high voltage electricity which can shock.</p>
<p>Do not disassemble or modify the equipment.</p> <p>Fire, electrical shock or serious injury can result.</p>	
<p>Immediately turn off the power at the ship's mains switchboard if water or foreign object falls into the equipment or the equipment is emitting smoke or fire.</p> <p>Continued use of the equipment can cause fire, electrical shock or serious injury.</p>	

 CAUTION	
<p>Do not place liquid-filled containers on the top of the equipment.</p> <p>Fire or electrical shock can result if a liquid spills into the equipment.</p>	
<p>Do not place heater near the equipment.</p> <p>Heat can melt the power cord, which can result in fire or electrical shock.</p>	
<p>Do not operate the unit with wet hands.</p> <p>Electrical shock can result.</p>	
<p>Use the correct fuse.</p> <p>Use of the wrong fuse can cause fire or equipment damage.</p>	
	<p>Do not touch printing head just after printing.</p> <p>Burn can result.</p>

WARNING Label attached



Name : Warning Label (1)
 Type : 86-003-1011-0
 Code No. : 100-236-230



SAFETY INFORMATION FOR THE INSTALLER



WARNING



Only qualified personnel should work inside the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death.

Turn off the power at the ship's mains switchboard before beginning the installation. Post a warning sign near the switchboard to ensure that the power will not be applied while the equipment is being installed.

Serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.



CAUTION



Ground the equipment to prevent electrical shock and mutual interference.

Ungrounded equipment can give off or receive electromagnetic interference or cause electrical shock.

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the equipment.

FOREWORD

Congratulations on your choice of the FURUNO FAX-214 Facsimile Receiver. We are confident that you will enjoy many years of operation with this fine piece of equipment.

For over 40 years Furuno Electric Company has enjoyed an enviable reputation for quality and reliability throughout the world. This dedication to excellence is furthered by our extensive global network of agents and dealers.

The FAX-214 is just one of the many Furuno developments in the field of marine radio equipment. Furuno is the first manufacturer to offer a single stylus facsimile receiver, models FAX-108/143II.

This unit is designed and constructed to ensure the user of many years of trouble-free operation. To obtain full performance from the equipment, however, you should carefully read and follow the recommended procedures for installation, operation and maintenance. No machine can perform its intended function unless it is installed and maintained properly.

Thank you for considering and purchasing Furuno equipment.

FEATURES

The FAX-214 Facsimile Receiver has a wide variety of functions, all contained in a rugged metal case that is compact to fit almost any class of vessel.

All keys respond immediately to the operator's command and each time a control key is pressed an audible "beep" sounds to confirm that the command has been accepted by the unit.

Some of its prominent features are as follows.

- Parallel thermal head recording enables very quiet operation. Odors, fumes, carbon dust, electric noise, etc. are eliminated.
- Thermal paper provides a clear-cut, high-quality picture in eight tones. Cloud analysis picture in the FM mode is presented clearly.
- Programmed with all existing facsimile stations and frequencies, which may be updated by the user. 10 private frequency spaces are reserved additionally for the user.
- Fully automatic reception by the built-in on/off/sleep schedule timer, auto speed/IOC selection, auto phase alignment and intelligent optimum frequency selection facility.
- Menu-driven/dialogue-guided operation enables sophisticated function with simple key sequences--the highest user-friendliness.
- Battery back-up for real-time clock, schedule, channel/frequencies and all user presets.
- Various self-tests available for easy service and maintenance.
- Optional preamp unit available for vessels with limited antenna mounting space, providing stable signal on LF and HF bands with minimum onboard noise.
- Automatic receiving of priority NAVTEX messages, even when a facsimile recording is being received.

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SPECIFICATIONS

The FAX-214 Facsimile Recorder prints facsimile recordings in 8 tones on 14-inch recording paper. A built-in timer allows unattended operation. With the optional NAVTEX kit, NAVTEX signals can be received, in addition to facsimile signals.

RECORDER SECTION

Recording System:	Parallel thermal head recording system
Scanning Speed:	60, 90, 120 and 240 on full scale
Index of Cooperation: (I.O.C.)	576 (fine) and 288 (rough)
Line Density:	5 lines/mm approx.
Gradation:	Eight levels
Recording Controls:	a. Start/stop Automatic by schedule timer and/or WMO remote control signals, or Manual (schedule timer - 16 programs/day) b. Scanning speed Automatic or Manual c. I.O.C. Automatic by WMO start signals or Manual d. Phase matching Automatic by line sync. signal or Manual
External Input Signal:	Black 1500Hz, white 2300Hz FSK signal (signal level; 0 dBm at 600 ohms)
Recording Paper:	Thermal paper TP-1440A, 360mm(W)x40m(L) effective width 337mm

RECEIVER SECTION

Frequency Range:	LF 80kHz to 160kHz and MF/HF 2MHz to 25MHz both in 100Hz steps
Number of Channels:	All existing facsimile stations and frequencies plus 14 private frequencies (both re-programmable by operator)

Frequency Selection:	Automatic channel search for highest signal strength within a selected zone/station Manual selection of zone, station and channel number Manual tuning by frequency up/down keys
Tuning Indication:	Flow-up/flow-down (detuned) and steady (tuned) by three LEDs
Class of Emission:	F3C, J3C (USB/LSB programmable)
Receiving Sensitivity:	LF: better than 10uV at 20dB SINAD MF/HF: better than 2uV at 20dB SINAD
Selectivity:	2.6kHz at -6dB 8kHz at -60dB

GENERAL SPECIFICATIONS

Power Supply:	10 to 40Vdc universal or 85-132VAC/170-264VAC (switchable), ϕ 1, 50/60Hz
Power Consumption:	DC set, Stand-by: less than 15W Recording: less than 27W AC set, Stand-by: less than 20VA Recording: less than 40VA
Dimensions:	500(W) x 285(H) x 145(D) mm approx.
Environmental Condition:	-15°C to +55°C (95%RH at 35°C)

NAVTEX RECEIVER SECTION (Option)

Receiving Frequency:	518kHz
Station and Message Selection:	On/off selection of station and message by keypad
Message Memory Capacity:	7000 characters (8k byte) 30 identification codes
Message Holding Time:	66 hours after reception
Alarm Indication:	Audible and visible (LED) indications for SAR message reception

Minimum Antenna Input: (for message capture)	Less than 2 μ V for 50 ohm antenna or less than 5 μ V for 150pF + 10 ohm reactive antenna
Interference Rejection:	Error rate less than 4% with desired signal of 20dBu and interference signal of 14dBu
Intermodulation:	Better than 70dB for 4% error with desired signal of 20dBu
Spurious Emission:	Less than 1nW
Number of Columns:	79 characters/line
Character Construction:	13 x 9 dot matrix
Character Set:	Letters, numbers and symbols
Print Speed:	27 characters/second
Applicable Standards and Regulations:	Complies with; CCIR rec. 476-3, CCIR rec. 540, CEPT, MTP 1240B

PREAMP UNIT (Active Antenna, Option)

Frequency Range:	80kHz to 30MHz
3rd Order Output Intercept:	+23dBm
Input Protection:	Protected against 30Vrms antenna input for 15 minutes
Output Impedance:	50 ohms

Complete Set

No.	NAME	TYPE	WEIGHT	Q'TY	REMARKS
1	Main Unit	FAX-214	15	1	
2	Accessories	FP08-00300		1 set	
3	Installation Materials	CP08-00700		1 set	
4	Spare Parts	SP08-00700		1 set	
5	Preamp Unit	FAX-5	0.6	(1)	W/15m cable
6	Whip Antenna	04S4176-0	0.5	(1)	2.6m
7	Extension Cable Kit	OP04-2		(1)	10, 20, 30 40, 50m
8	Navtex Board			(1)	

* Items 5 to 9 are optional supply.

Accessories

No.	NAME	TYPE	CODE No.	Q'TY	REMARKS
1	Paper Real Assy.	FAX-108-F	007-554-560	2	
2	Recording Paper	TP-1440A	000-805-605	2	
3	Test Cable	08S4083-0	000-114-117	1	For Checking
4	Main Unit Cover	08-012-0025	000-801-619	1	

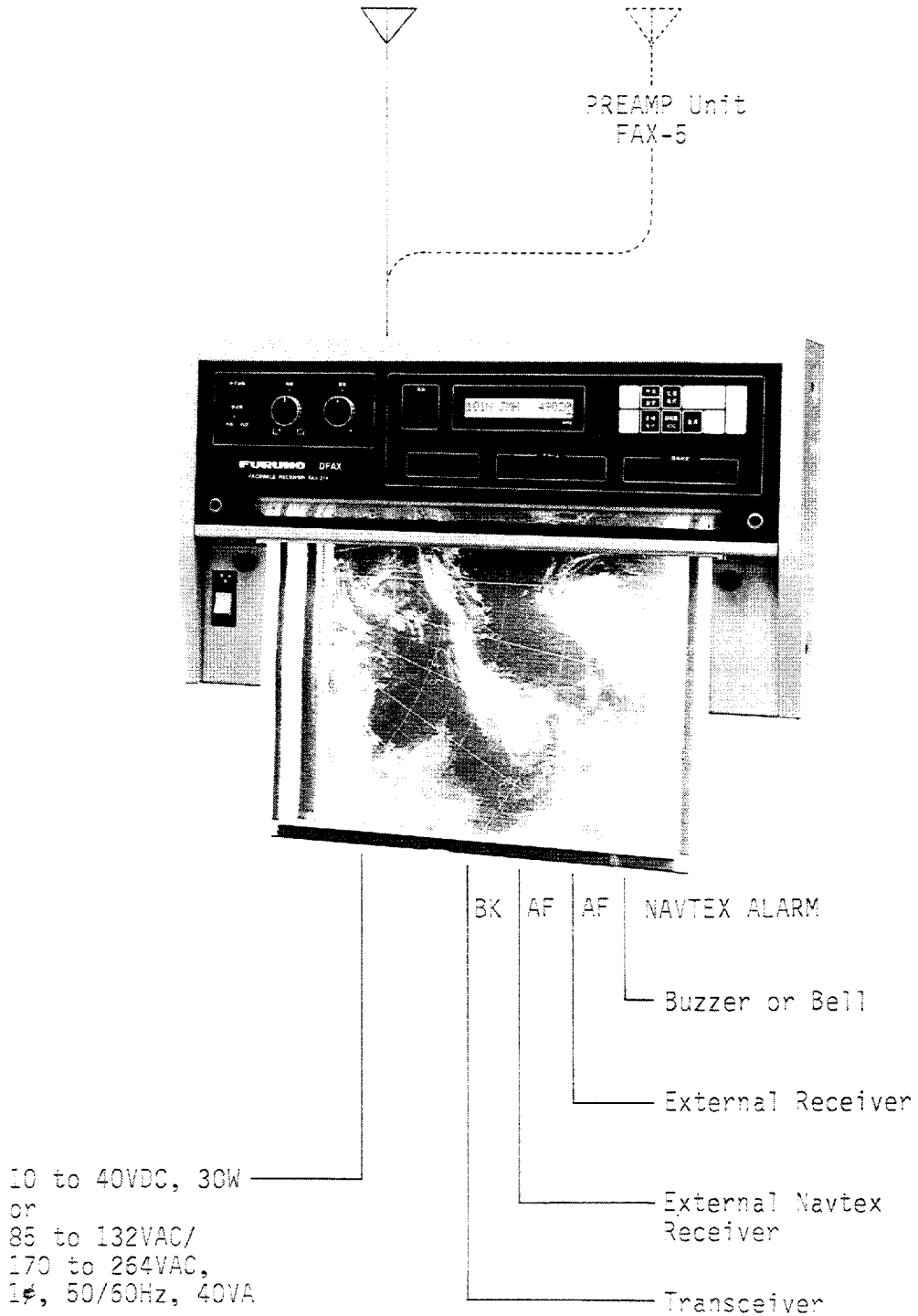
Installation Materials

No.	NAME	TYPE	CODE No.	Q'TY	REMARKS
1	Coax. Plug	FM-MP-7	000-108-859	1	
2	Reducer(S)	MP-M3A	000-108-860	1	
3	Reducer(L)	MP-M5A	000-108-861	1	
4	Tapping Screw	5x20 SUS304	000-800-488	5	
5	Copper Strap	0.3x20x1000mm	000-810-230	1	
6	SC Lock	SCL-6B	000-112-376	3	
7	SC Lock	SCL-10B	000-104-146	2	

Spare Parts

No.	NAME	TYPE	CODE No.	Q'TY	REMARKS
1	Thermal Head Cleaner	OWP-FD-6A1-01	000-115-199	1	
2	Spare Parts Box	F710	000-831-610	1	
3	Fuse(Glass Tube Type)	FGBO-A 3A 125VAC	000-549-063	1	
4	Fuse(Glass Tube Type)	FGBO 2A 250VAC	000-549-020	1	For AC
5	Fuse(Glass Tube Type)	FGBO 7A 125VDC	000-549-013	1	For DC

SYSTEM CONFIGURATION

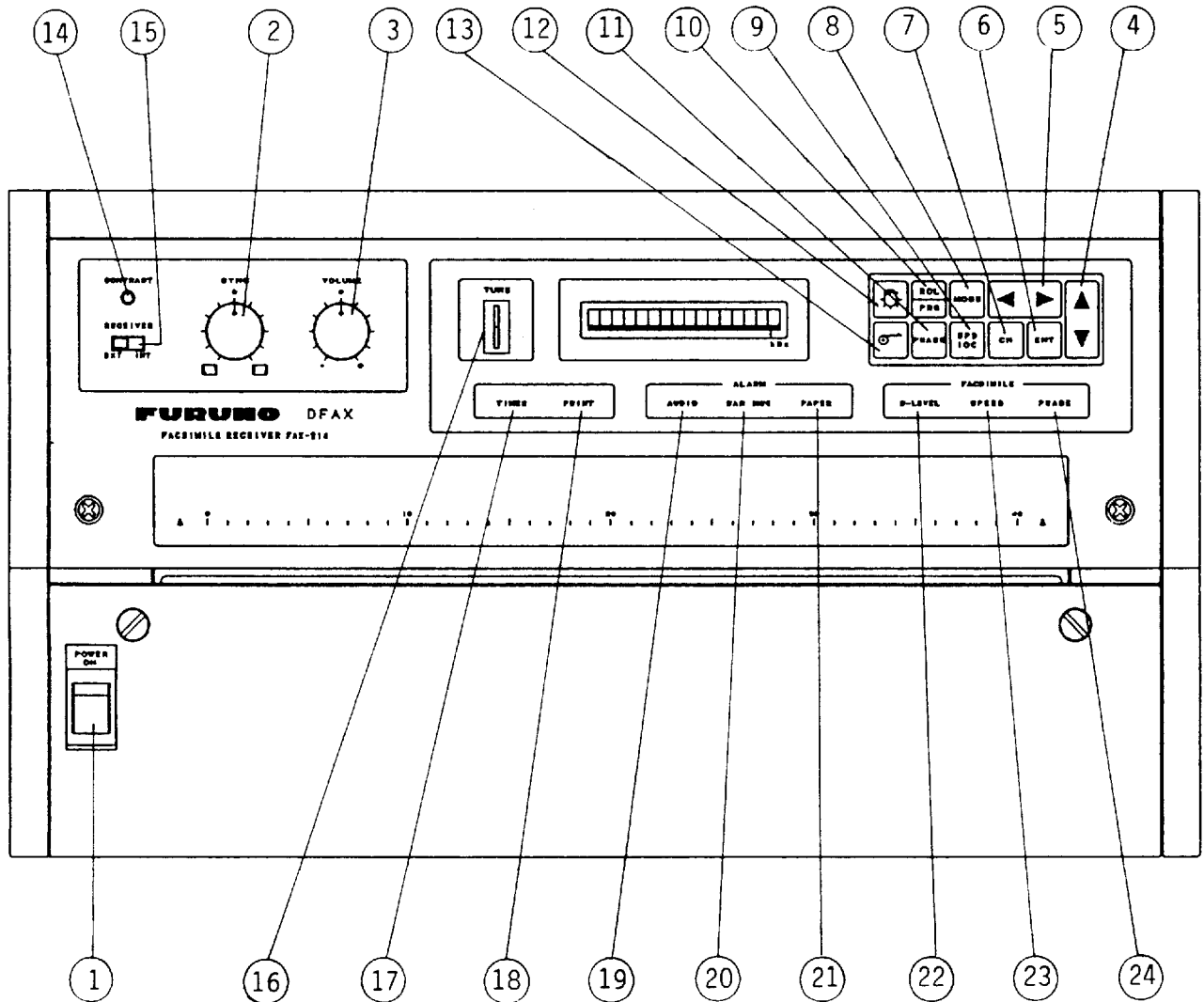


CHAPTER 1 OPERATIONAL OVERVIEW
















The FAX-214 is a rather simple unit to operate, although at first glance it may be a little intimidating to someone who has never used a facsimile receiver before. However once you get to know what the various abbreviations mean, the simplicity and the logic behind the panel layout will become more apparent.

The front panel is divided roughly into two blocks; keys, delineated by different color schemes, the LCD display composed of 16 characters on the upper side, and the printer on the lower side. Just below the keys and the LCD display are various annunciator LEDs which light when the paper is out, the signal is too weak, etc. Each time a key pressed an audible beep is generated to signal the operator that the unit has received his command.

Front panel layout and a brief explanation of the function of each control and LED are given on the next page.



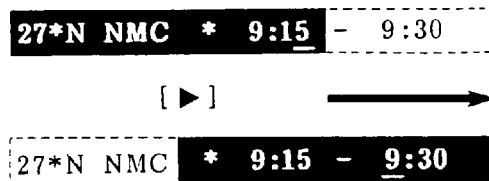
FAX-214, FRONT PANEL CONTROLS & LEDS

CONTROLS AND KEYS			ANNUNCIATOR LEDs		
1		Turns on/off the unit.	16	Tune	The tuning bar runs upward or downward when the programmed frequency differs from the actual receiving frequency.
2		Equalizes picture synchronization to align with the paper feed direction.			
3		Adjusts audio level of the monitor speaker.	17	Timer	Lights when the timer mode is operating.
4		Used to scroll a number or message upward or downward.	18	Print	Lights while the picture is being printed.
5		Used to move the cursor or data sideways.	19	Audio	Lights when the alarm mode is activated.
6		Used to enter data or activate a function.	20	SAR MSG	Lights when receiving the search and rescue message of NAVTEX signal.
7		Used to call up station and frequency data.	21	Paper	Lights when the recording paper runs out completely.
8		Used to control operation of the printer.	22	S-level	Lights when the signal is too weak to receive.
9		Selects speed and IOC numbers.	23	Speed	Lights when the scanning speed is incorrectly set.
10		Used to recall data stored in the memory, or used to program data.	24	Phase	Lights when the picture is out of phase.
11		Adjusts picture phase.			
12		Used to vary the level of backlighting of the LCD display and LED intensity.			
13		Used to feed paper.			
14		Adjusts the contrast of the LCD display.			
15		Selects internal or external receiver.			

CONTROLS

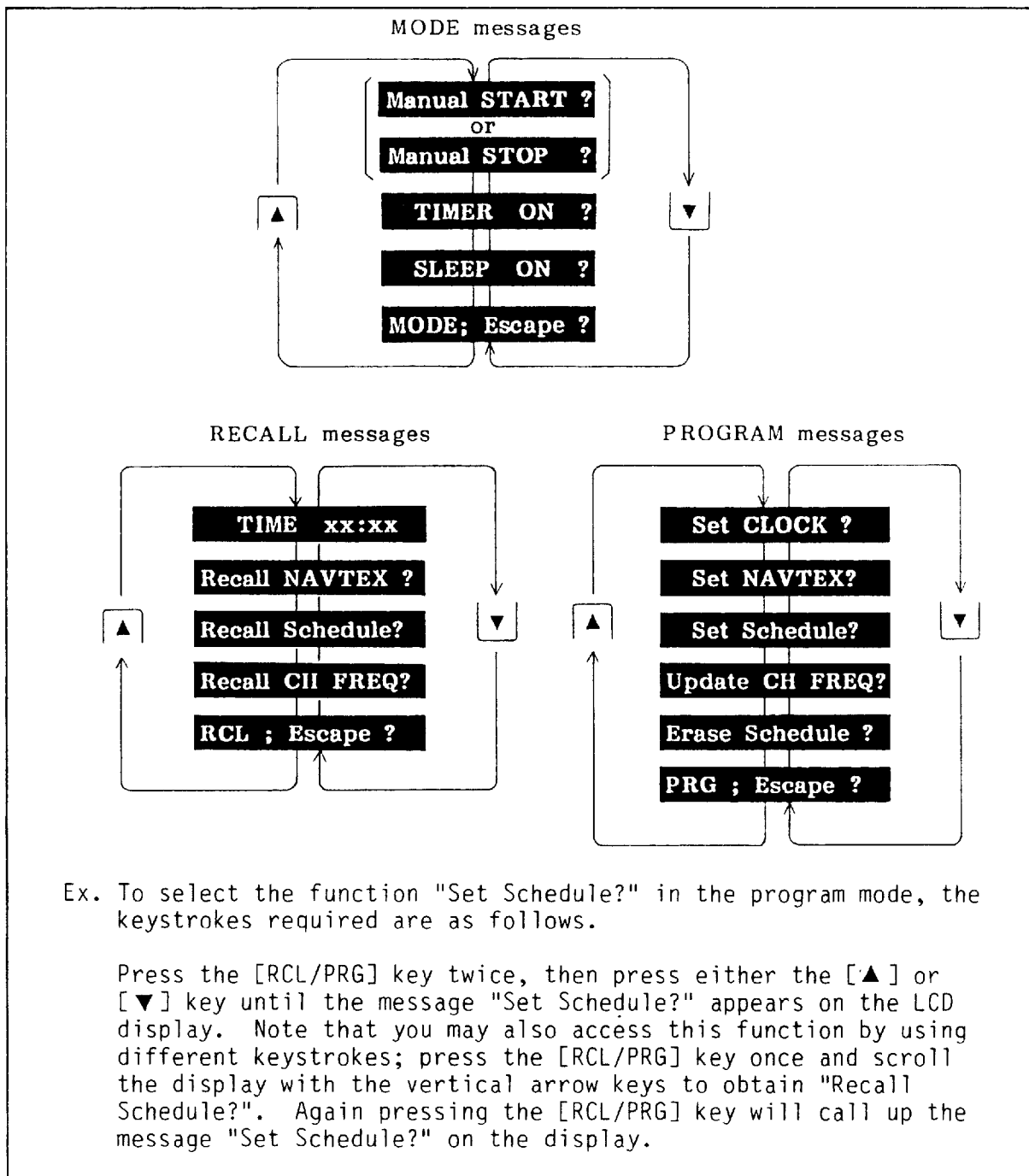
ARROW KEYS

You may notice that there are no numeric keys on the panel, unlike other equipment which employ numeric keys to enter data. It means that entry of the numeric data or selection of the operating mode is performed by scrolling the number or message displayed on the LCD window. The vertical arrow keys [▲] and [▼] are used to scroll the menu upward or downward, respectively. On the contrary the horizontal arrow keys [◀] and [▶] are for moving the cursor for data entry (or recall) leftward or rightward. In some modes, however, these keys are also used to scroll the display sideways. Pressing the [▶] key when the cursor is located at the right-hand edge of the LCD display will scroll the window rightward. Similarly when the cursor is at the far left end, the [◀] key will scroll the window leftward. The figure below shows an example of sideways scrolling in the program timer mode.



FUNCTION KEYS

The [MODE] and the [RCL/PRG] keys deal with several operating modes. The [MODE] key is used to turn on/off the printer in the manual recording mode, or to activate the timer/sleep modes. The [RCL/PRG] key stands for RECALL/PROGRAM, and is used to display or update the current time data, frequency data, timer program, NAVTEX station and message data (optional NAVTEX board required), etc. The first pressing of the [RCL/PRG] key selects the Recall function, then pressing the same key again will call up the Program function. When you press the [RCL/PRG] key once, the function "Time" is selected first since it is a default setting. Other functions may be selected by scrolling the display with the [▲] or [▼] key as shown in page 1-4. To activate the function selected, press the [ENT] key. If you accidentally type in the [MODE] or [RCL/PRG] key, select the escape message of each menu and hit the [ENT] key to restore the unit to the normal operation.



Note that if you select a desired function in the recall mode, pressing the [RCL/PRG] key again will call up the same function in the program mode.

OTHER KEYS

The symbols or abbreviations printed on the [☉], [☼], [PHASE], [SPD/IOC] and [CH] keys directly represent their functions. For instance, the [☉] key is used to feed the paper and the [☼] key is for varying the backlighting of the LCD display. The name and function of each control and key (including annunciator LEDs) are recapitulated on page 1-2.

MANUAL RECORDING

As is described in the FEATURES section, the FAX-214 employs a unique timer which enables automatic recording of facsimile signals up to 16 programs according to a preset schedule. In most cases this may be the only operating mode you will use. However, should you desire to record a program already in progress, or if the transmitting station does not use start and stop signals, you will have to receive the program manually. In this section the basic operating procedure for manual recording is explained step by step. The operating procedure for Timer Recording is explained later on.

Before you do start operation, obtain a radio facsimile frequency list for your area. The Facsimile Station List attached to the appendix of this manual (B-1 through B-3) may be useful to quickly find out the call sign and frequency in your area, since it is arranged in alphabetical order according to country. Make sure that the recording paper is properly loaded, referring to page 1-24.

POWER ON/OFF

Power on/off of the unit is made using the POWER button located on the lower left of the front panel. Press the POWER button and you will see the time displayed on the window for several seconds. Then, the display will change to channel data: zone, station and channel numbers plus picture mode (refer to page 1-14 for details of the picture mode), followed by a call sign and frequency in this order. When a specific function is completed by the action of keystrokes, the unit returns to the normal display, indicating the channel data previously selected.

The very first time you turn on your unit, don't worry about the stray data displayed on the window (the time may be inconsistent with the local time in your area and the call sign may be unknown to you), since these were factory-set.

To turn off the power press the POWER button again.

POWER
ON



FURUNO <DFAX>

TIME 12:34

100N JMH 32665

Freq.

Call sign

Zone, Station, Channel numbers and Picture mode

[Normal Display]

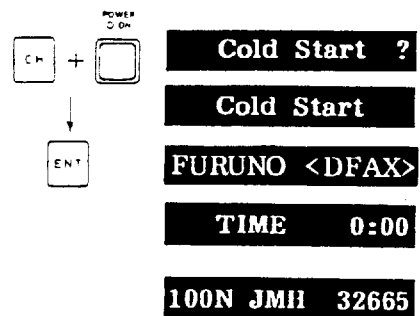
CAUTION

Never turn the power off during recording. The printing head remains in contact with the recording paper (roller), applying harmful pressure to the printing head.

Initialization of the unit (Cold Start)

The FAX-214 is designed to retain in memory all information entered by the user (such as time, programmed schedules, etc.) whether it is turned on or off. An internal "Keep-alive" battery, of which the estimated life is five years, performs this function. However, data in the memory may become jumbled due to a dead battery or accidental loosening of the plugs connecting the pc boards. In either case, you have to clear the memory to ensure that no stray data is stored there. Upon clearing the memory, the unit is reset to the following default value.

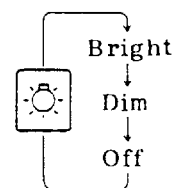
In order to initialize the unit, turn off the unit first, then hold down the [CH] key while pressing the POWER button. The message "Cold Start?" will appear on the display. Hit the [ENT] key and the message will change to "TIME 0:00," notifying the operator that the unit is now defaulted. Note that the channel and frequency data preprogrammed at the factory cannot be erased, since these are exclusively stored in the ROM, of which the contents are not retained by the battery.



ADJUSTMENT OF LCD CONTRAST AND DIMMER

Because of its polarized characteristics, the intensity of the LCD (Liquid Crystal Display) varies with not only the viewing angle of the operator, but also the environmental temperature. The CONTRAST control located at the left-side panel of the unit is provided to equalize the degree of the polarization. Be aware that too clockwise a setting may result in blackening of the entire LCD.

The [☀] key is used to vary the level of backlighting of the LCD display and the brightness of the annunciator LEDs for nighttime operation, in three steps of bright, dim and off. Each time the key is depressed, the level will change in the above sequence. Note that the annunciator LEDs will not light up at the "off" setting.



SELECTION OF FACSIMILE STATION AND FREQUENCY

The facsimile station will usually transmit signals at several different frequencies on the HF band (a few stations also transmit on the LF band) for convenience that the probable frequency for a quality recording may be selected at the receiver side. In choosing a receiving frequency, the general rule of thumb is that the highest probable frequency band must be selected for the initial attempt, then move to a low band if the picture is not reproduced satisfactorily.

Since the receiving condition on the HF band is, in practice, greatly affected by the phenomenon of nature (year, season, time, etc., as is

explained in the appendix of this manual) as well as the distance between the transmitting station and receiver, selection of the probable frequency is required whenever you want to receive a facsimile signal.

To overcome this inconvenience, the FAX-214 employs a scan function which automatically searches the frequencies assigned to a station and locks onto the frequency of which the signal strength is the highest.

1. If the signal level of more than two channels are the same, the higher frequency takes priority over others.
2. When an LF channel having a certain level is detected, the receiver exclusively locks onto the LF channel irrespective of the signal level of other channel.
3. The receiver recommences scanning if the signal level of the locked channel becomes weak.

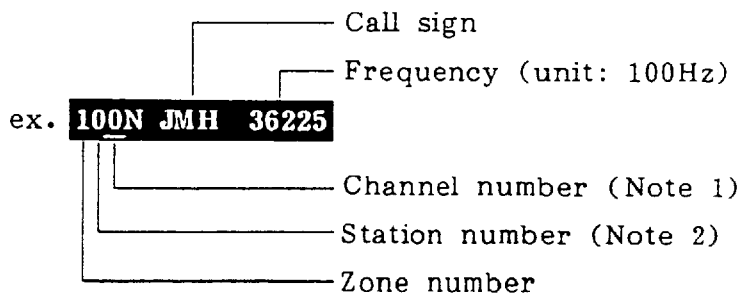
Of course, a commonly-used monitor function for judging signal strength with a built-in speaker is also available. The sequence of keystrokes to select a desired station would be:

Pressing the [CH] key, the station and frequency data appear on the display. The character where the data entry cursor is placed will be blinking to indicate that the unit is ready to accept the operator's command.



100N JMH 36225

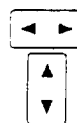
Arrangement of station and frequency data



Note 1. To activate the scan function, select the asterisk mark "*" instead of a number.

Note 2. The station number is fixed to zero when selecting the zone number to zero (private channel).

Select the zone number of the desired station by scrolling the numbers on the window with the [▲] or [▼] key. Hit the [▶] key to move the cursor to the next data column and set the station number. In the same manner, get into the scan mode by selecting the asterisk "*" on the column of the channel number. If a specific frequency is always received stably in your area, enter the channel number instead of "*".



100N JMH

27* NMC

On completion of the data entry, press the [ENT] key and the unit starts scanning the frequencies allocated. The display will show the message "...* ...SCAN" while scanning, then will indicate the frequency which the receiver has locked onto.



27* NMC SCAN

27*N NMC 127300

TUNING

There are rare occurrences, where the actual receiving frequency slightly deviates from the nominal transmitting frequency. The TUNE indicator, composed of three LEDs, will "flow" upward or downward when the receiving frequency is lower or higher than the preprogrammed frequency data. Press and hold the [▲] key until the indicator stops flowing and only the center LED lights stably. On the contrary, press the [▼] key if the indicator flows downward.

NOTE 1: Tuning is inoperative when selecting the scan mode.

2: The indicator will always flow for a signal in the LF band or for a picture of which the greater part is occupied by the black signal, irrespective of frequency deviation.

SETTING THE INTERNAL CLOCK

It is necessary to set the built-in clock to the local time in your area or GMT (Greenwich Mean Time) to properly operate the sleep mode and timer recording. The meaning of the sleep mode and timer recording are described later on.

Press the [RCL/PRG] key and the time is displayed on the window.

Again press [RCL/PRG], then [ENT]. You will see the message "Set CLOCK?" followed by "Set CLOCK xx:xx" on the display.

Set the time to the incoming time signal by using the arrow keys and press the [ENT] key at the exact moment the time signal is released for the start of a new minute/hour.



TME 12:34



Set CLOCK ?



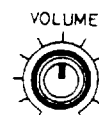
Set CLOCK 12:34



Set CLOCK 11:50

SETTING MONITOR VOLUME

The unit incorporates a speaker for monitoring the received signal. The MONITOR control located on the left-hand of the panel adjusts the audio output level from the speaker. Push in and release the control to bring it out.



SETTING SPD/IOC

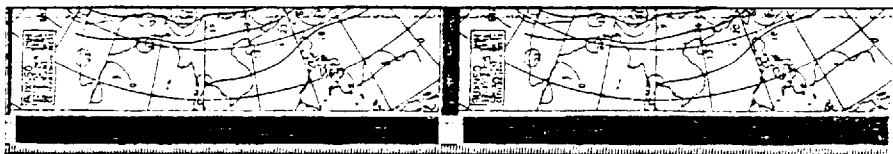
Next, you may have to set the correct SPD/IOC number depending on the facsimile station. SPD and IOC stands for scanning speed and index of corporation, respectively. These are a kind of synchro code to reproduce an exact copy of the picture transmitted from the facsimile station, and are listed on the Facsimile Schedule Book. If the SPD is incorrectly set, a portion of the picture will be overlapped or a multiple picture will be recorded. You will also be notified of a wrong SPD setting by the lighting of the SPD annunciator LED.

Similarly, the picture is foreshortened or expanded to the paper feed direction if the IOC is set incorrectly. Four SPDs and two IOCs are available to meet the requirements of WMO and ITU: 60, 90, 120, and 240 for SPD, and 288 and 576 for IOC. Find the appropriate SPD and IOC of the desired station from the Facsimile Schedule Book and set them following the procedure below.

Incorrect setting of the SPD/IOC numbers

Two pictures

Wrong selection of the SPEED number ("60" is selected instead of "120".)



Overlapped recording

Wrong selection of the SPEED number ("120" is selected instead of "60".)

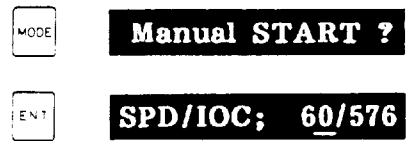


Expanded or foreshortened recording

Wrong selection of the IOC number. When "288 (576)" is selected for transmission with the IOC of "576 (288)", the recording will be extended (foreshortened) in the paper feeding direction.

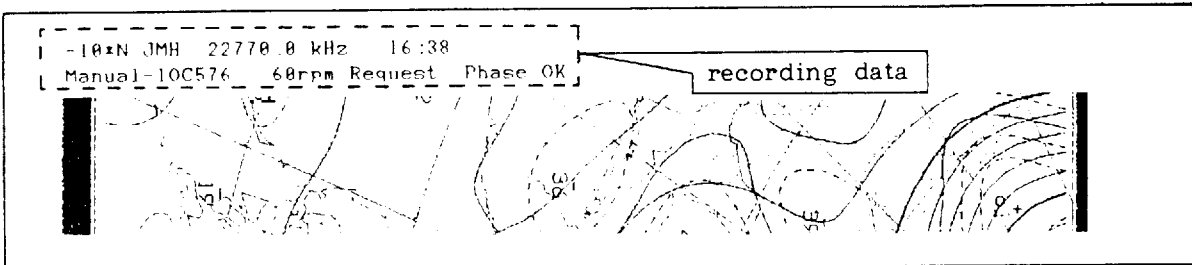


Hit the [MODE] key, and the message "Manual START?" will come up on the display. With the [ENT] key pressed, the message will change to "SPD/IOC xxx/xxx".

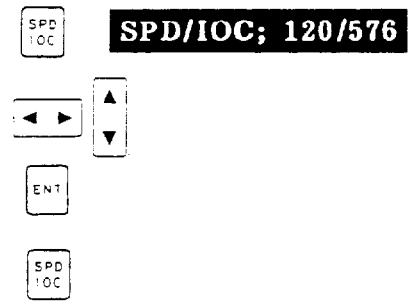


Scroll the number with the [▲] or [▼] key until the proper SPD number appears on the display. Hit the [▶] key to shift the cursor to the data column for IOC and select the proper IOC in the same manner as SPD selection.

On completion of SPD/IOC settings, press the [ENT] key. Now the printer plots the recording data followed by a picture as shown below.



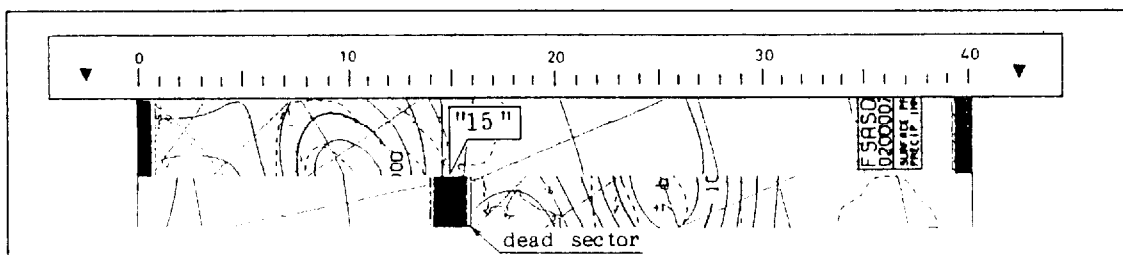
If you cannot find the correct SPD and IOC for the desired station, try recording at any setting of SPD and IOC. After several inches of printed paper comes out from the unit, check whether the picture is printed normally or not. If not, hit the [SPD/IOC] key, change the value with the arrow keys, and press the [ENT] key.



To escape from this mode, press the [SPD/IOC] key. Note that the selection of SPD/IOC by using the [SPD/IOC] key is effective only while the printer is operative.

PHASE MATCHING

When the printer starts recording after the phase signal (see page A-2) has been transmitted, or when the received signal is too weak to detect the phase signal, the recording may be split into two parts by a thick white (or black) gap called a dead sector as illustrated. The [PHASE] key is provided to compensate for the phase mis-matching, shifting the dead sector to the left edge of the recording paper. Should this occur, the PHASE annunciator LED will light up and the message "Phase NG" (Phase No Good) will be printed out as the recording data.



Press the [PHASE] key and the message "Set PHASE 00" appears on the display.



Set PHASE ; 00

Read the scale at the center of the dead sector and enter the value in the data column by using the [▲] or [▼] key. The value to be corrected will range between 0 and 40.



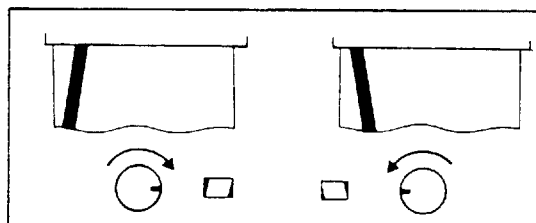
Set PHASE ; 15

Hit the [ENT] key and the dead sector is shifted to the left edge of the recording paper. Note that the [PHASE] key is also effective only while the printer is operative.



SIGNAL SYNCHRONIZATION

The SYNC control is used to fine tune phase matching. If the dead sector is plotted askew even when the PHASE is properly selected, turn the SYNC control to correct it as illustrated.



STOPPING PICTURE RECORDING

In the manual recording mode, the printer continues to operate even after the picture is printed since the unit doesn't detect the "remote control signal" (start and stop signal of the picture) in this mode. The key sequences to manually stop printing are as follows.

Press the [MODE] key and the display will indicate the message "MANUAL STOP?" for verification. Hit the [ENT] key. Now the printer stops recording and the unit is restored to the normal mode, indicating the channel data.



Manual STOP ?



Manual STOP

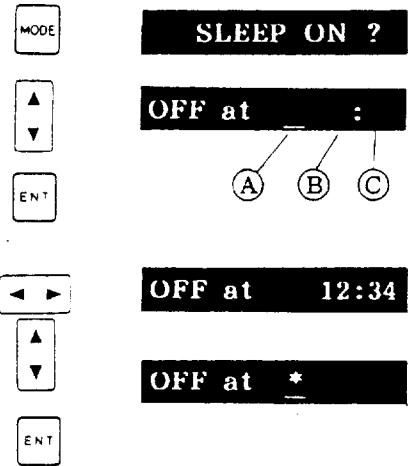
SLEEP MODE

As noted in the above section, the manual mode requires that you manually stop the printer after a picture is received, which can be quite a nuisance if you are preoccupied with other tasks. To free the operator from this inconvenience and to minimize recording paper consumption, an automatic stop of the recording is available.

There are two ways in which the "time to stop recording" may be selected; "timer sleep" and "remote sleep." In "timer sleep," the printer stops recording at the time designated by the operator, while "remote sleep" operates by detecting the "remote control signal." Note that once the printer ceases operation, indicating only the message "OFF Facsimile," the unit is inoperative just as if it were turned off. To restore normal operation, press the [MODE] key. The key sequences to operate the sleep mode are as follows:

Press the [MODE] key, then scroll the menu with the vertical arrow keys to display the message "SLEEP ON?". Hit [ENT] and the message will change to "OFF at _ : ". If the [ENT] key is pressed again while the data columns remain blank, the printer stops immediately and enters sleep mode.

To activate the "timer sleep" function, enter the desired time into data columns (B) and (C) . The "remote sleep" function is activated by setting the asterisk "*" on data column (A) by using the vertical arrow keys. After completing the setting, press [ENT] key to set the unit to sleep mode.



NOTE

A priority NAVTEX message takes precedence over a facsimile recording. If a priority NAVTEX message is received during the printing out of a facsimile recording, the facsimile recording is interrupted, the NAVTEX message is printed out, and then the remainder of the facsimile recording is printed out.

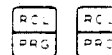
TIMER RECORDING

Most of the LF to HF facsimile broadcasts all over the world are regularly serviced according to a schedule issued by the meteorological observatory in each country. Therefore, if you wish to receive a certain facsimile broadcast on a daily basis, the timer recording mode will virtually allow you "hands-off" automatic operation (self start and stop of the printing) once it has been preprogrammed.

ENTRY OF PROGRAM TIME

You may preset up to 16 programs for timer recording. Prepare the Facsimile Schedule Book including the time table for your area and record the broadcasting start and end time of the desired stations onto a notebook for reference.

1. Press the [RCL/PRG] key twice, then scroll the menu with the [▲] or [▼] key until the message "Set Schedule?" appears on the display.



Set Schedule?

2. Hit the [ENT] key and the message will change to the data entry display for the program timer, of which the data columns are arranged as shown below. In order to call up the data column for the program end time, scroll the display leftward by using the [▶] key.

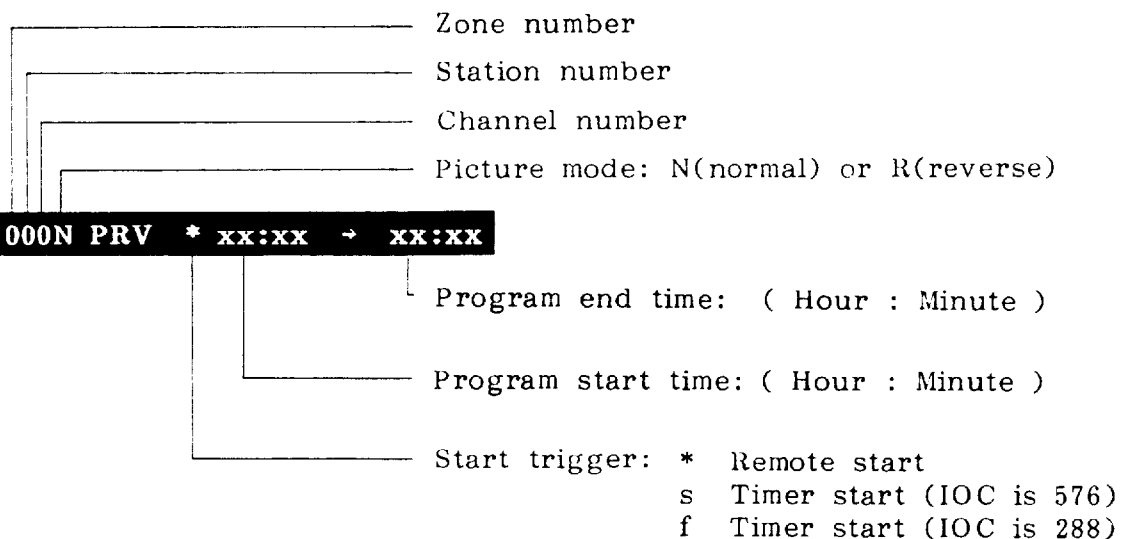


000N PRV * 0:00

If the timer programs has been preset in full, the message "Schedule Full!" will appear instead of the data entry display and the unit reverts to the normal mode.

Schedule Full!

The data column is arranged as follows.



Picture mode: Some facsimile broadcast stations transmit a "reverse picture," white characters on a black background. The method which each station broadcasts the picture has been programmed into the memory. However, if a newly established station transmits a reverse picture, you should designate the picture mode as "R" to receive it in the normal manner.

Start trigger: Two trigger modes are selectable; remote start or timer start.

[Remote Start] In the "remote start mode," the printer operates in response to the "remote control signal" (start and stop signals of a picture) transmitted from the station. The IOC number is also correctly chosen by the remote control signal.

[Timer start] In the "timer start mode," the printer operates in accordance with the programmed timer irrespective of the presence or absence of the facsimile signal. The proper IOC (576 or 288) must be chosen by the operator in this mode. Note that the timer start will not operate for a signal having a white dead sector.

Since in practice most of the facsimile stations transmit the "remote control signal" according to the WMO standard, it is recommended to select the "remote start mode" to ensure reception of the entire picture and to minimize paper consumption.

For example, suppose that you want to receive the facsimile signal transmitted from station NAM in Norfolk, Virginia, U.S.A. by the "remote start mode."

Zone: 5, Station: 3, Frequency: Scan mode, Start trigger: * ,
Receiving Time: 13:20 to 13:45

3. Move the cursor to the bottom of the zone column with the [◀] key and scroll the number to obtain "5" by using [▲] or [▼] key. Enter the station, frequency, start trigger and program start time.

500N * 0:00
◀▶ ▲▼ 53*N NAM *13:20

4. With the [▶] key pressed when the cursor is located at the far right side of the data column, the data entry display is scrolled leftward and the cursor jumps to the data column of the program end time. Enter "13:45".

▶ *13:20 - 13:45

5. When data entry is completed, press the [ENT] key. The message "SET" will appear for about two seconds to notify the operator that the unit has accepted his command.

ENT SET

6. Repeat steps 1 through 6 to enter other scheduled programs.

7. To activate the timer function, hit the [MODE] key, scroll the message in order to display "TIMER ON" on the LCD window, then press the [ENT] key. Now the display will be changed to the programmed schedule most closest to the present time. If no schedule is programmed, the message "No Schedule !" will be displayed.

MODE

TIMER ON ?

ENT

No Schedule !

8. In timer mode, all keys except dimmer, paper feed and [MODE] keys become inoperative. To escape from timer mode, press [MODE] key. Display returns to normal.

Caution on Programming Timer

- When two programs overlap each other, the latter program becomes invalid. For instance, if the start/stop time of the program A and B are set to 2:00 -- 2:30 and 2:15 -- 2:40 respectively, the program B will not be recorded.
- When selecting the remote start mode, the program start time should be set at least one minute earlier than the actual broadcasting time in order to acquire the remote control signal without error.

REVISION OF PROGRAM TIME

If you want to partially change the programmed schedules, for instance, the broadcasting time of a specific station has been changed, perform the following keystrokes to quickly call up and update the time data.

Press the [RCL/PRG] key once, scroll the message in order to obtain "Recall Schedule?" with the [▲] or [▼] key, then hit [ENT].

RCL
PRG

Recall Schedule?

▲
▼

Of the preprogrammed schedules, the one of which the program start time is the earliest will appear on the window. Scroll the display with the vertical arrow keys until the schedule to be revised appears on the window; pressing the [▲] key calls up the schedule from an earlier time setting and the [▼] key, from a later time setting.

ENT

53* NAM * 2:10

▲
▼

52* WLO *17:25

Press [RCL/PRG] again to get into the timer program mode. Update the schedule in the same manner as the "Entry of Program Time." See page 1-13.

RCL
PRG

52* WLO *17:25

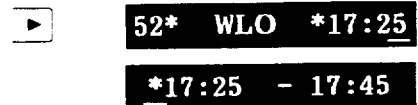
ERASING PROGRAMMED SCHEDULE

If necessary, the programmed schedule can be erased partially or totally by using the following keystrokes.

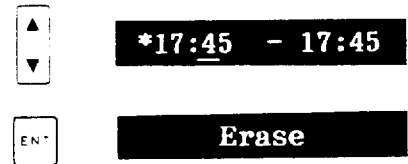
Partial Erasure

Perform the same keystrokes as "Revision of Program Time" to get the program schedule.

Press and hold the [▶] key to scroll the display leftward until the program end time appears on the window.



Change the program start time to the same time as the program end time (or vice versa) with the [▲] or [▼] keys, then press [ENT]. After displaying the message "Erase" for about two seconds, the unit reverts to the normal display.



Complete Erasure

Press the [RCL/PRG] key twice, then scroll the message with the [▲] or [▼] key in order to display the message "Erase Schedule?".



Hit the [ENT] key and the message will change to "Erase OK? (Y/N)", verifying your command to avoid inadvertently erasing the programmed schedule by accidentally pressing the [ENT] key. Place the cursor under the character "Y", then hit the [ENT] key. After indicating the message "Erase" for about two seconds, the unit reverts to the normal display.



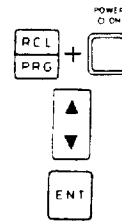
If the unit gets into this mode by mis-operation, move the cursor to the character "N" and press the [ENT] key. The display will show the message "Escape" and the unit will return to the normal display.



PRINTING SCHEDULED PROGRAM

The scheduled programs can be printed out for reference.

Turn off the unit then hold the [RCL/PRG] key while pressing the POWER button. Scroll the menu by using the [▲] or [▼] key to display the message "Print Schedule?". With the [ENT] key pressed, the printer will plot the program as shown below.



Print Schedule ?

*** Schedule ***			
27*	NMC	*15:03	- 15:13
27*	NMC	*17:18	- 17:30
26*	CKN	*21:48	- 22:10

→ Start Trigger
(Remote Start)

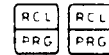
UPDATING PREPROGRAMMED STATION/FREQUENCY

All frequency data for existing facsimile stations are factory-preprogrammed in the built-in memory. However, if the transmitting frequency of a specific station is changed or a facsimile station is newly established, it is necessary to update the contents of the memory following the procedure shown below.

CHANGING PREPROGRAMMED FREQUENCY DATA

For example, assuming that the Kodiak, Alaska station will change the frequency in channel number 4 from 17192kHz to 17183kHz, perform the following keystrokes.

To call up the updating mode, press the [RCL/PRG] key twice and the message "Update CH FREQ?" will appear on the display.



Update CH FREQ?

Hit the [ENT] key and the data entry display "000N PRV 799" appears on the window.



000N PRV 799

Place the cursor on the zone column by using the horizontal arrow key and select the number 2 with the [▲] key. Similarly, set the station and channel number to 5 and 4, respectively.



254N NOJ 17192

Move the cursor to the frequency column and select the numbers 1, 7, 1, 8 and 3 with the arrow keys.



254N NOJ 17183

After verifying that the proper frequency data is selected, press the [ENT] key to store it in the memory. To get back to the normal display, press the [RCL/PRG] key again.



100N JMH 32665

ADDING A NEW FREQUENCY

A new frequency may be added into the extra memory area (up to 14 channels) allocated in the zones tabulated on the next page. You may enter the frequency data into any channel of these zones. However, for convenience sake, it is recommended to select the zone in which you are fishing, sailing, etc. If you want to distinguish the data newly entered from the programmed one, zone "0" should be selected since it is exclusively allocated as a private channels. The operating procedure is the same as the above section "Changing Preprogrammed Frequency Data."

Note: The call signs (PRV, AUX) assigned to these zones cannot be changed.

The frequency data updated by the user may be erased when initializing the unit as described on page 1-6.

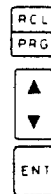
Zone No.	Station ID	Call Sign	Channel No.
0	0	PRV	0 to 9
2	9	AUX	0
6	9	AUX	0
7	9	AUX	0
8	9	AUX	0

RECALLING/PRINTING FREQUENCY DATA

All frequency data stored in the memory (including the one entered by the user) can be recalled on the display or printed on the recording paper for reference.

Recalling

Hit [RCL/PRG] followed by [▲] or [▼] to obtain the message "Recall CH FREQ ?" on the display. Press the [ENT] key and the display will show the channel data previously selected.



Recall CH FREQ ?

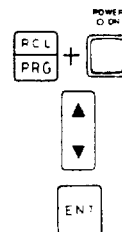
By using the arrow keys, select the desired station and frequency number.

In order to escape from this mode and to return to the normal display, press the [ENT] key.



Printing

In order to print the frequency data turn off the unit, then hold the [RCL/PRG] key while pressing the POWER button. Scroll the display with the vertical arrow keys to obtain the message "Print FREQ ?", then hit the [ENT] key. When the printing is completed, turn off the unit to escape from this mode.



Print CH FREQ ?

*** Channel Frequency ***						
----- Zone No.0 -----						
Station - 0	PRV					
799	799	799	799	799	799	
----- Zone No.1 -----						
Station	0	JMH				
36225	49020	73050	99700	135970	182200	227700
Station	1	JMJ				
13650	54050	94380	146925	181300		
Station	2	JJC				
19150	86190	127455	160		162700	238644

The channel frequency is shown in 100Hz.
ex. 182200: 18220.0kHz

SELECTION OF NAVTEX STATION AND MESSAGE

This section describes the operating procedure according to selection of the NAVTEX station and the designation of the message to be received.

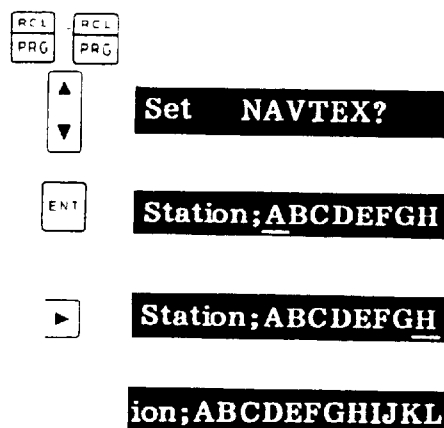
As stated in detail in Appendix A of this manual, the header code of all messages are prefixed by a four character group; the first character denotes the identity of the transmitting station, the second specifies the category of message and the next two give serial numbers between 00 and 99 in transmitting order. It should be noted that serial number 00 is exclusively assigned to an important emergency message. The list below shows the category of each message. As for the station list, refer to page B-5.

- | | |
|---------------------------------|--|
| A. Coastal navigational warning | H. Loran C message |
| B. Meteorological warning | I. Omega message |
| C. Ice report | J. Differential Omega message |
| D. Search and Rescue Alert | K. Other electronic Navaid system messages |
| E. Meteorological forecast | L. Navarea warnings |
| F. Pilot message | M-Y. No category allocated |
| G. Decca message | Z. QRU (no message on hand) |

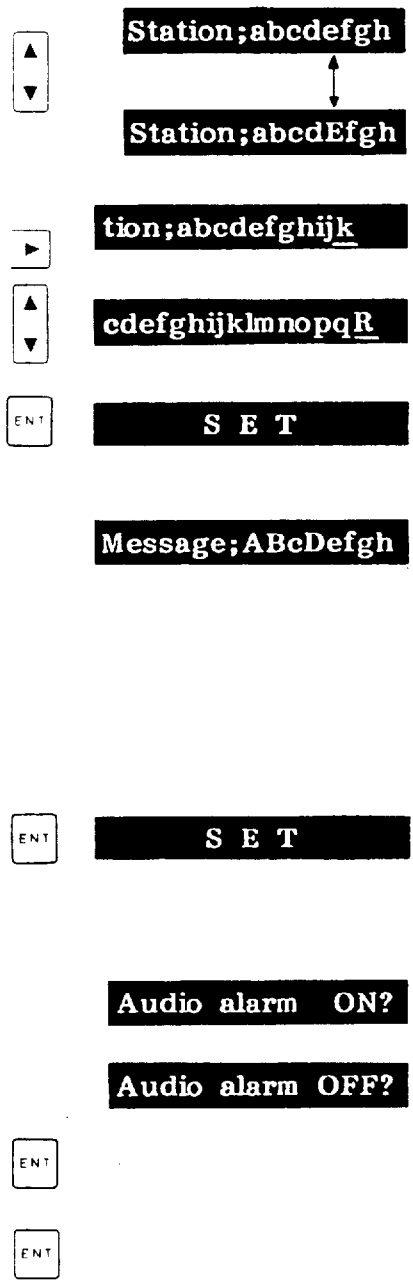
Any category from the above list may be selected. However, all NAVTEX receivers are required to print out messages A, B and D, which are considered essential for warning of hazards or other information of concern to the oceangoing navigator. When the NAVTEX signal is received during reception of a facsimile reception signal, the NAVTEX message is stored in the memory and is printed when the facsimile is completed. Note that a message type D will be printed immediately even when facsimile recording is in progress. If required, the FAX-214 can sound an audio alarm when receiving a D type message, in addition to the lighting of the SAR MSG (Search And Rescue Message) annunciator LED.

SELECTION OF STATION AND MESSAGE

1. Press the [RCL/PRG] key twice, then scroll the menu by using the [▲] and [▼] keys in order to display the message "Set NAVTEX?".
2. Hit the [ENT] key, and the NAVTEX stations will be displayed with their identification letters A to H in alphabetical order. The remaining letters I to Z may be called up by scrolling the data column leftward with the [▶] key; place the data select cursor to the far right side of the data column by using [▶], then further pressing of [▶] will scroll a series of letters from right to left.



3. Registration of the NAVTEX station is made by setting the identification character in capital letters. Pressing the [▲] or [▼] key alternately selects a capital or small letter where the cursor is placed.
4. For example, assume that you want to select Reykjavik, Iceland, of which the identification letter is R. Press and hold the [▶] key until the data cursor is placed under the letter "r", then hit either the [▲] or [▼] key to change "r" to "R", followed by [ENT]. Now the registration of the NAVTEX station is completed and the message "SET" will appear for a while on the LCD display.
5. Next, the NAVTEX message will come up on the window. In the same manner as the station selection, set the code of the message desired in capital letters. Note that, as mentioned before, watch on messages A, B and D is mandatory, thus these will remain in capital letters irrespective of hitting the [▲] or [▼] key.
6. Again press the [ENT] key. Now the unit will proceed into the alarm mode after indicating the message "SET" for about two seconds.
7. In the alarm mode, either the message "Audio Alarm ON?" or "Audio Alarm OFF?" is displayed on the LCD window. These messages may alternately be selected with the [▲] or [▼] key. To have the alarm under the above circumstances, select "Audio Alarm ON?", then press [ENT].
8. In order to turn off the alarm sound, press the [ENT] key.



The figure below shows an example of the NAVTEX message. The message always starts with the four characters "ZCZC" plus space, followed by the header code, then the main text and concludes with "NNNN".

```

ZCZC GA45
WZ 884
DOVER STRAIT
CABLE LAYING OPERATIONS IN PROGRESS BETWEEN FOLKESTONE AND SANGATTE
CABLE VESSELS LOCATED IN ENGLISH AND FRENCH INSHORE TRAFFIC ZONES
DETAILS IN REGULAR BROADCASTS BY CHANNEL NAVIGATION INFORMATION
SERVICE VHF10 DOVER VHF11 GRIS NEZ
CANCEL WZ 876 (GA41)
NNNN
    
```

If any character in the header code is missing because the receiving condition is marginal, the printer will type an asterisk "*" onto the column of the lost letter.

Similarly if more than 33 percent of the characters of the main text are lost (the asterisk "*" is typed in place of the actual letter), the printing is stopped.

Note that the message having serial No.00 (e.g., SAR message) is reprinted whenever it is received.

VERIFICATION OF NAVTEX STATION AND MESSAGE TO BE RECEIVED

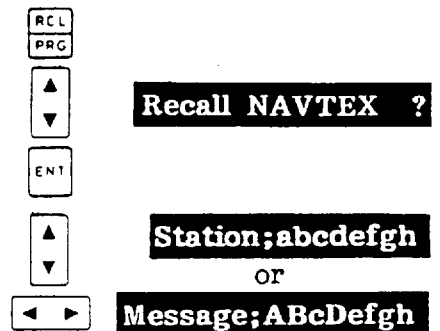
You may verify the setting for NAVTEX reception (station and message ID) by the LCD display or the printer.

Press the [RCL/PRG] key and scroll the menu with the [▲] or [▼] key so that the message "Recall NAVTEX?" is displayed on the window. Hit [ENT], then an arrow key to obtain the desired display.

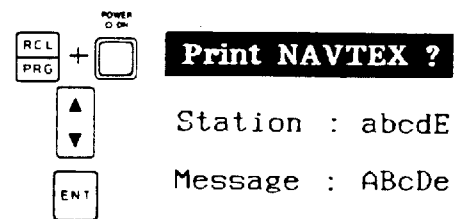
[▲] : Alternately changes the display to
[▼] either station or message data.

[▶] : Scrolls the display to the left.

[◀] : Scrolls the display to the right.



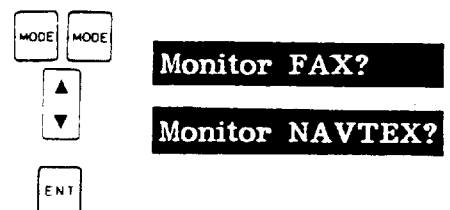
To print out the setting for NAVTEX reception, first turn off the unit, then hold the [RCL/PRG] key while pressing the POWER button. Scroll the display with the [▲] or [▼] key to obtain the message "Print NAVTEX?", followed by pressing the [ENT] key. When the printing is completed, turn off the unit to escape from this mode.



MONITORING THE NAVTEX SIGNAL

If necessary, you may monitor the NAVTEX signal instead of the facsimile signal.

Pressing the [MODE] key twice, either the message "Monitor FAX?" or "Monitor NAVTEX?" is displayed on the window. Select the message "Monitor NAVTEX?" with the [▲] or [▼] key (these keys alternately select the above messages), then hit the [ENT] key.



RECEPTION BY EXTERNAL RECEIVER

The unit requires no external receiver for normal use because most of the LF and HF weather facsimile broadcast frequencies have been programmed in the built-in memory. However you may also utilize a high performance external receiver when the signal level is marginal.

1. Connect the AF output of the external receiver to the EXT SIG terminal on the unit (Refer to page 4-6 for details). Generally the optimum level of AF signal (1mW/600ohms) may probably be taken out from LINE OUT of the receiver. Adjustment of the AF signal level is very important. If the level is insufficient (less than 0.1mW) the unit will not operate, if it is too high (more the 10mW) the recorder circuitry may be damaged. In practice, it is essential to tune the receiver in the desired station, and then gradually increase the AF output to the rated level.
2. Set the MODE and BANDWIDTH selectors of the receiver to "CW" and "NARROW (approx. 1kHz)". Turn the RF GAIN control fully clockwise and set the AGC switch to "OFF". Place the BFO control at the mid point of its travel and set the receiver to the desired frequency. Adjust the VOLUME and BFO controls for a clear facsimile signal.

Note: To receive an ISB station, it may be necessary to shift the frequency within +2kHz relative to the assigned frequency.

3. Place the RECEIVER switch in the EXT position.
4. Apply the power to the FAX-214. The message "999N" is displayed on the LCD Display. (N, meaning "normal", is a designator for picture mode. Designate "R" if the transmitting station transmits the picture reversely. For further details, see page 1-14.)
5. Get the message "SPD/IOC xx/xx" on the LCD window by pressing the [MODE] key followed by the [ENT] key, and set the proper SPEED and IOC number referring to the Facsimile Schedule Book.
6. On completion of the SPD/IOC settings, press the [ENT] key to activate recording. Gradually increase the AF signal level so that the picture is plotted on the recording paper. If necessary, readjust the BFO control for a clear recording.
7. When interference or noise is heavy, try to shift the TUNING dial within 300Hz of the assigned frequency to obtain a better picture. A narrower bandwidth is better for rejecting noise. However if the resolution of picture becomes poor, select a wider bandwidth.

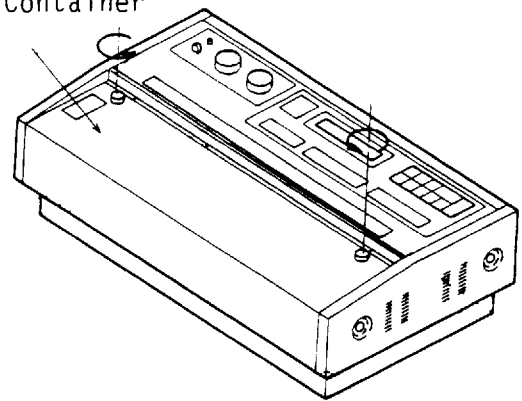
REPLACING THE RECORDING PAPER

When the recording paper runs out completely, a distinct beep sound is released for about one second and the PAPER (out) annunciator LED lights to call the operator's attention. The message "PAPER OUT" also appears on the LCD display.

In the conventional facsimile receiver using a recording stylus, the operator must carefully note the remaining length of the recording paper since lack of paper may cause serious damage to the stylus. In most cases, shortage of paper will be acknowledged by an "end of roll mark" printed on the paper. Similar to the conventional facsimile recorder, the FAX-214 acknowledges "end of roll" by printing a 50cm-long red line when about 2m of paper remains. However, there is no need to worry about damage to the printing head since the printing mechanism stops when the paper runs out.

1. Loosen two screws securing the paper container cover. Open the Paper Container Cover.

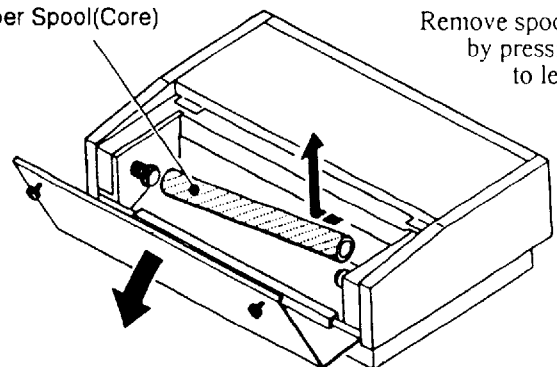
Paper Container Cover



2. With the spool catch pushed leftward, take out the Paper Spool. (If there is paper remaining remove it.)

Paper Spool(Core)

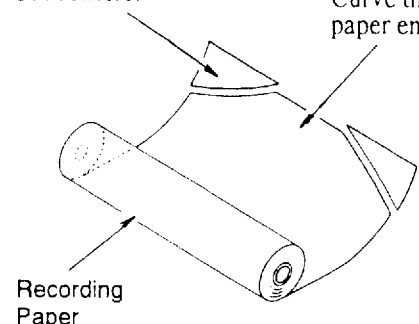
Remove spool by pressing it to left.



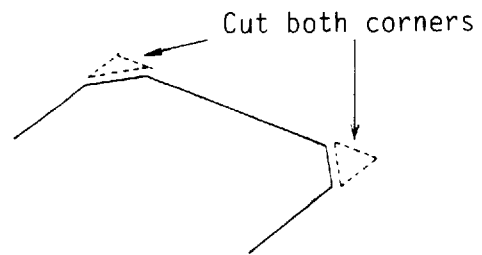
3. Cut both corners of the paper end and curve it to ensure smooth feeding.

Cut corners.


Curve the paper end

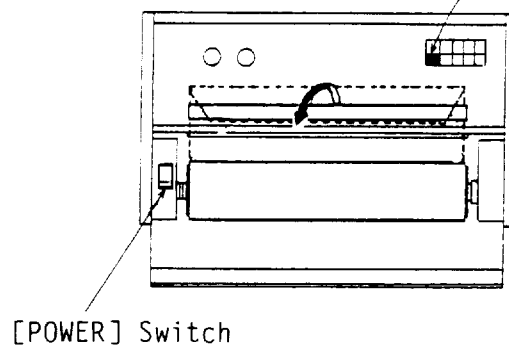


4. Cut both corners of the paper end to ensure smooth feeding.



5. Put the paper back in the paper container. Insert the paper into the slot just above the container until the PAPER (out) LED goes off. Do not straighten the paper end, otherwise it will jam inside the cabinet.

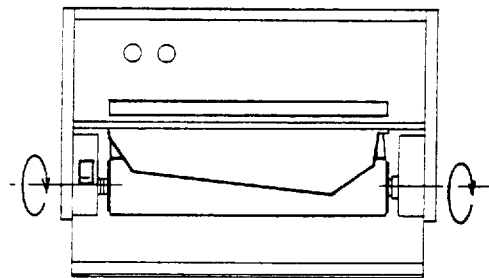
 (Paper Feed)
Key



6. Press the [] key to feed out the paper from the slot below the scale.

* If the paper can not be fed out, check that it is properly engaged in the slot.

7. Tighten slack with the brims. Check that the paper is aligned evenly.
8. Close the paper container cover.
9. Press the [ENT] key to return to the normal display.



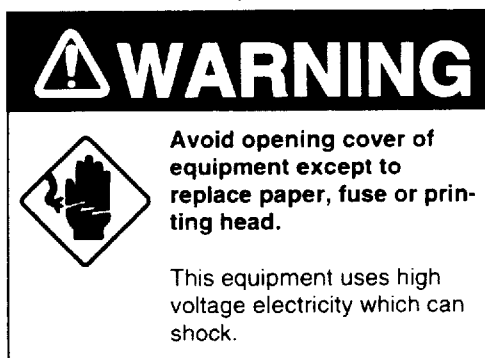
RECORDING PAPER

type: TP-1440A 08S0251-0
code no: 000-805-605

CHAPTER 2 MAINTENANCE

GENERAL

The equipment will maintain optimum performance for a reasonably long period. However, continued performance can not be expected without periodic inspection and maintenance. Important points to be checked from time to time are tabulated below.



Check Item	Action
whip antenna	If cracked or broken, replace it with a new one.
antenna wire, coaxial cable	If sheath has peeled, seal with vinyl tape. If wet, stretch new coaxial cable.
junction of whip antenna and preamp unit	If corroded, clean and waterproof with sealing compound.
coaxial plug connection	If loosened, reconnect. If corroded, clean contacts.
power plug connection	If loosened, reconnect. If corroded, clean contacts.
battery connection	If corroded, clean power terminals.
grounding terminal	If corroded, clean terminal.

CLEANING

The unit should be kept clean and dry at all times. Dust or loose dirt can be wiped off with a soft and dry cloth. To remove thick and heavy dirt, use a mild detergent and water on a soft cloth.

NOTICE

Never use plastic solvents, such as thinner or acetone, for cleaning. These may harm the cabinet case, keys and the display window.

Cleaning of Thermal Head

Though the thermal head of printer is capable for printing out to more than **30** rolles of paper, the print contrast may become worse in a short period if the debris are accumulated on the surface of thermal head. To remove such debris, cleaning pen (Code No. 000-115-199) is supplied. It is recommended to clean up the thermal head when 3 to 4 rolls of paper is consumed.

REPLACING THE BATTERY

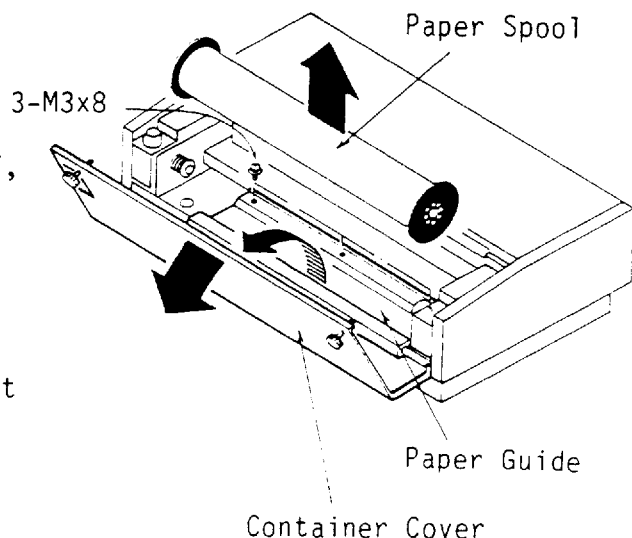
A lithium battery is used to keep the memory alive, and its estimated life is about 5 years. If your unit is exhibiting any of the symptoms shown below, the battery should be replaced. After replacing the battery, always execute the "Cold Start" to clear stray data from the memory. Refer to page 1-6 for "Cold Start".

Symptoms When the Battery Voltage is Low

1. The contents of the memory are erased.
2. The time of the internal clock is incorrect.
3. Power cannot be applied.

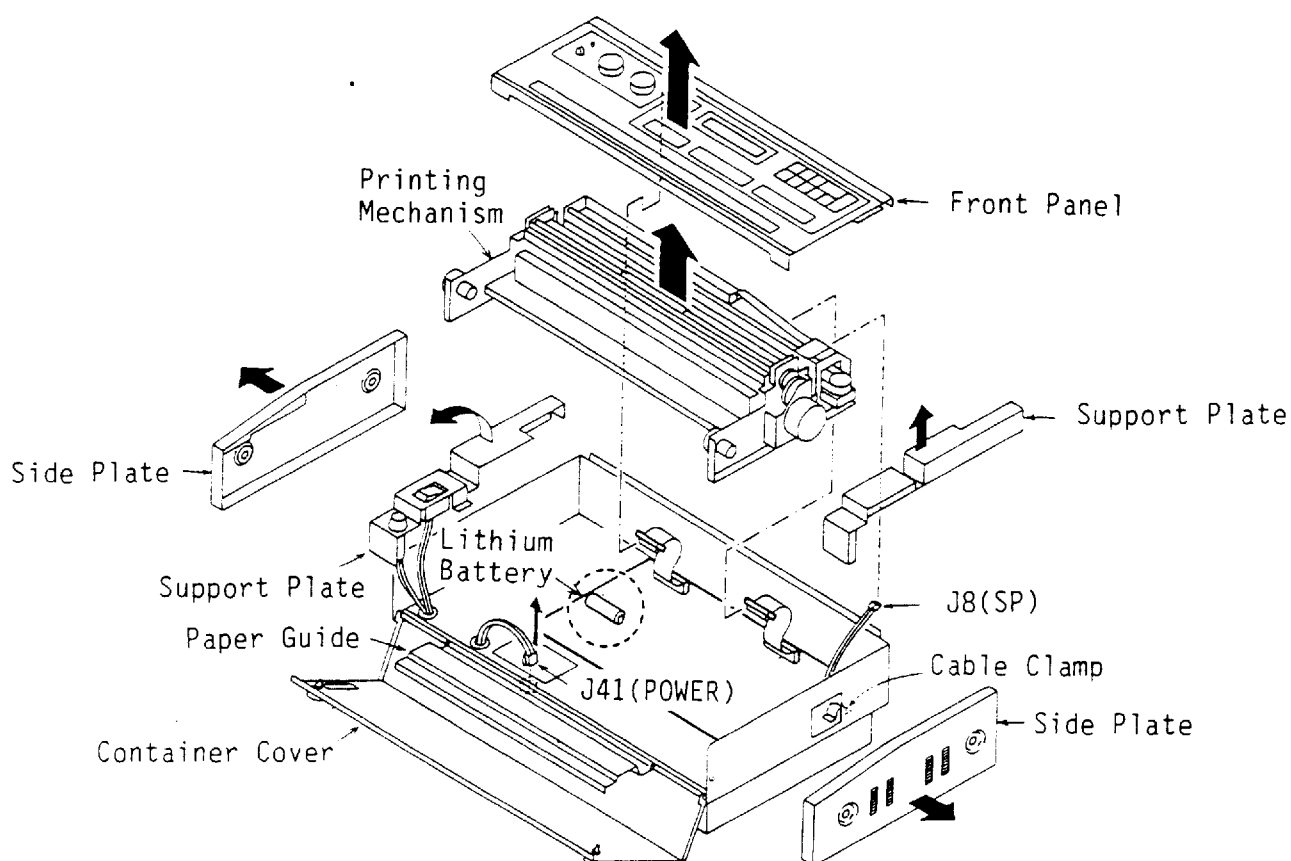
Procedure

1. Open the container cover and remove the paper spool.
2. Loosen three screws to open the paper guide.
3. If the power can't be cut off, loosen plug J41(2P POWER).
4. Disconnect the flat cables on the front panel, and then remove the front panel.
5. Detach side plates and support plates.
6. Unplug plug J8(SP) behind the printing mechanism.



7. Take off the cable from the cable clamp at the rear right side of the printing mechanism.
8. Loosen the six screws fixing the printing mechanism, and then remove the printing mechanism.
9. The lithium battery is on the MAIN CPU board (see the next page). Replace the battery.
10. Reassemble the unit.

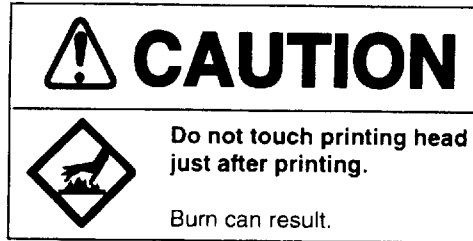
LOCATION OF LITHIUM BATTERY



<p>LITHIUM BATTERY</p> <p>type: ER6N4 3.6V</p> <p>code no: 000-108-706</p>
--

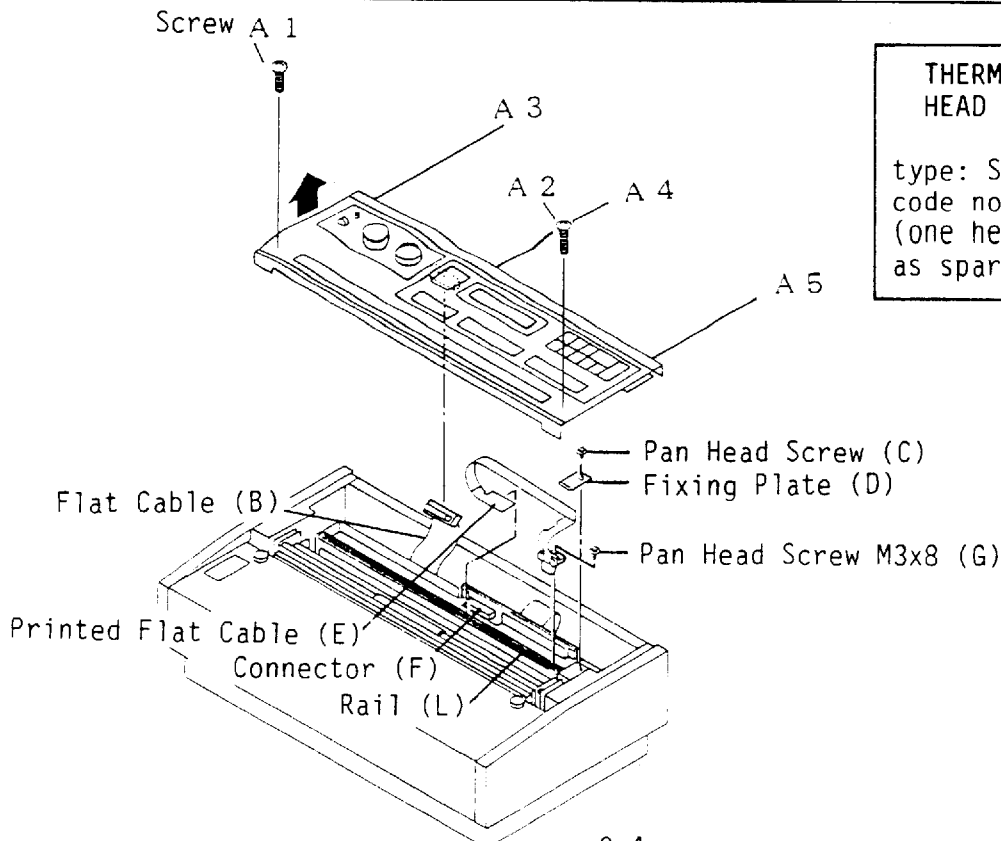
REPLACING THE PRINTING HEAD

The estimated life of the printing head is about 500,000 lines. If picture quality is poor, and cannot be improved by cleaning the printing head, etc. the printing head should be replaced.



NOTE

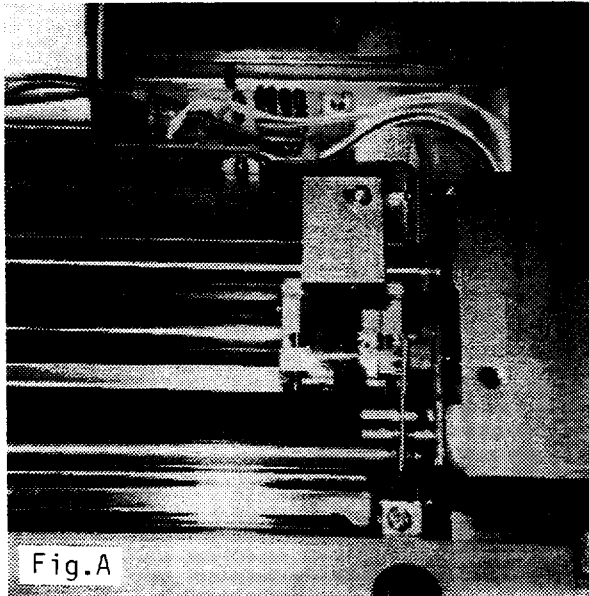
- 1) Do not touch the side of the printing head which contacts the recording paper.
- 2) The condition of the printing head can be checked by performing the Self-test.
- 3) After replacing the printing head, ensure it is positioned correctly by executing the Self-test.
- 4) Ensure that no stress is applied to the flat cable even when the head moves to the end of the rail.
- 5) Damage to the rail will greatly reduce print quality.



THERMAL PRINTING HEAD

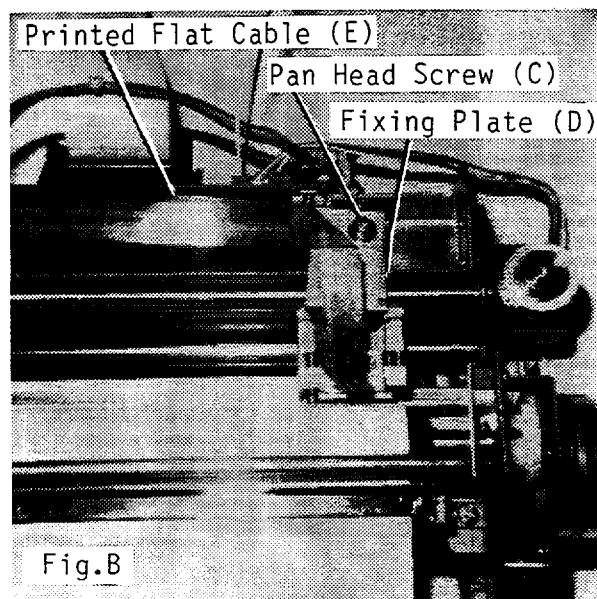
type: SP08-00720
code no: 007-903-800
(one head is supplied as spare parts)

Procedure



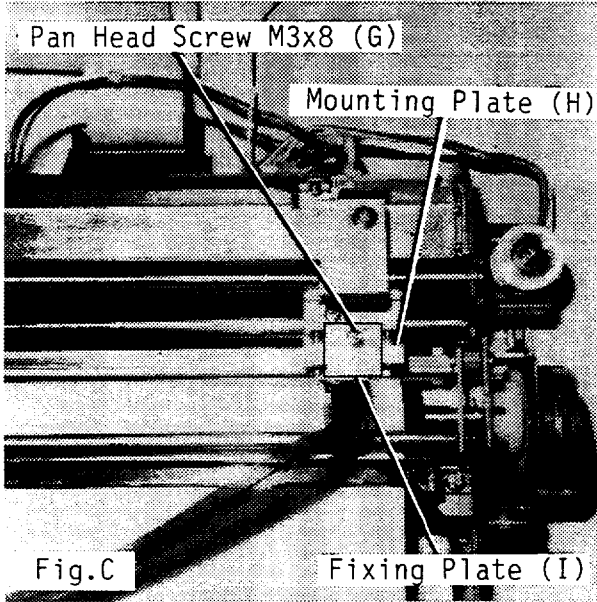
- 1) Remove the front panel.
(Loosen screws (A1 to A5) and lift the panel. Disconnect flat cable (B)).

Fig. A shows the head after the panel is removed.

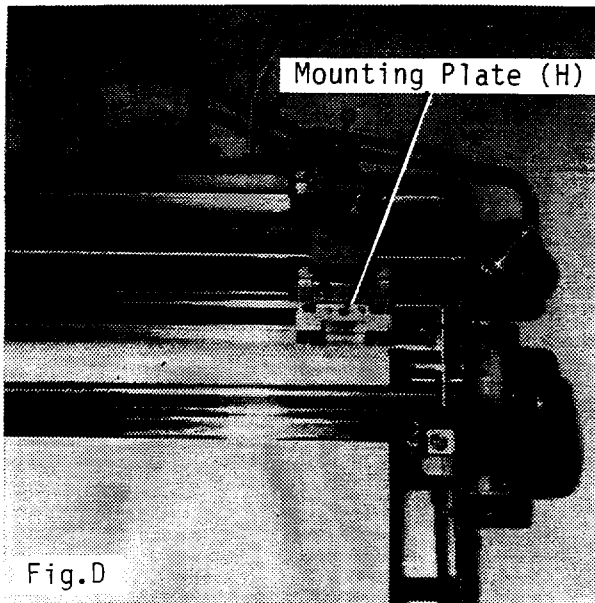


- 2) Slightly loosen two pan head screws M3x6 (C) to pull out the printed flat cable (E) from the fixing plate (D).

3) Disconnect printed flat cable (E) from connector (F).

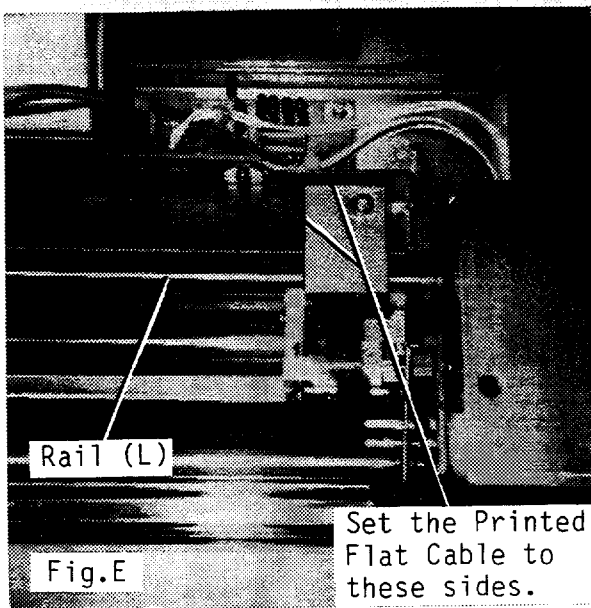


4) Loosen pan head screw M3x8 (G) to separate the mounting plate (H) and the head fixing plate (I).



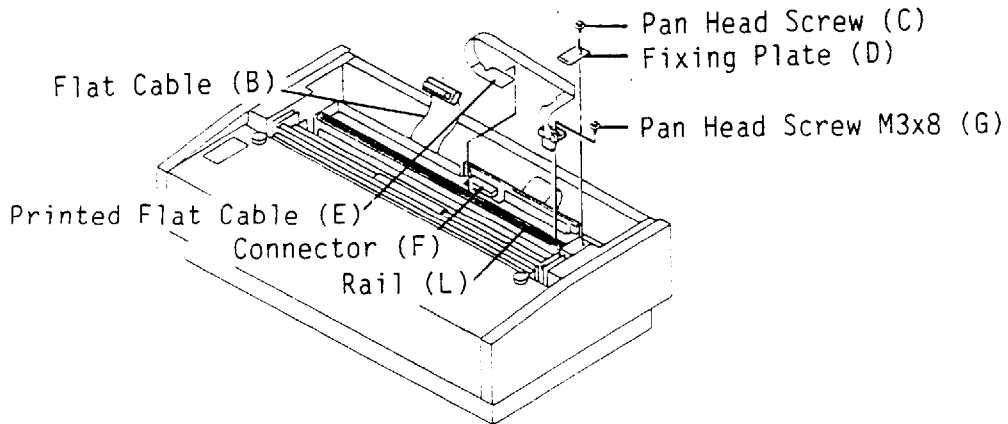
5) Loosen pan head screw M2.6x6 (J) to separate the printing head (K) and the head fixing plate (I).

- 6) Fix new printing head (K) to head fixing plate (I). Ensure that the head is fixed properly. Never touch the side of the printing head which contacts the recording paper. If touched, wipe it with a soft cloth and a small amount of isopropyl alcohol. Also do not pull the flat cable since it is connected to only the printing head.
- 7) Fix head fixing plate (I) to mounting plate (H) with pan head screw M3x8 (H).
- 8) Insert printed flat cable (E) between fixing plate (D) with pan head screw M3x6 (C).



NOTE: Fix printed flat cable (E) parallel to rail (L). Leave some slack in the flat cable between the fixing plate (I) and the printing head, so that the printing head can move smoothly while recording. Set the printed flat cable to the sides of the fixing plate (D) as shown in Fig. E.

- 4) Connect printed flat cable (E) to connector (F).
- 5) Reassemble the front panel.




FUSE REPLACEMENT

To protect the equipment from serious damage, a fuse is provided in both the primary and secondary of the power supply.

The primary fuse protects against overvoltage/reverse polarity of the ship's mains, and is located on the pc board on the inner side of the mounting cradle. When the primary fuse blows, locate the cause of the problem before replacing it. A fuse rated for more than 7A (DC set) or 2A (AC set) should not be used, since it may cause permanent damage to the equipment.

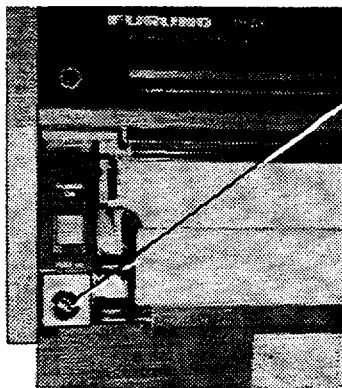
The secondary fuse, which is located inside the recorder unit, just below the power switch, protects against the internal fault of the equipment. When the secondary fuse blows, replace it with a fuse rated for 3A.

If the equipment cannot be operated after a fuse is replaced, call for service.

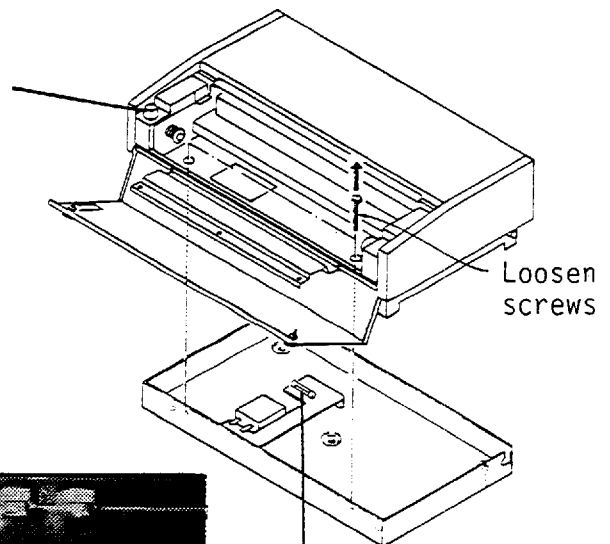
 **CAUTION**

Use the correct fuse.

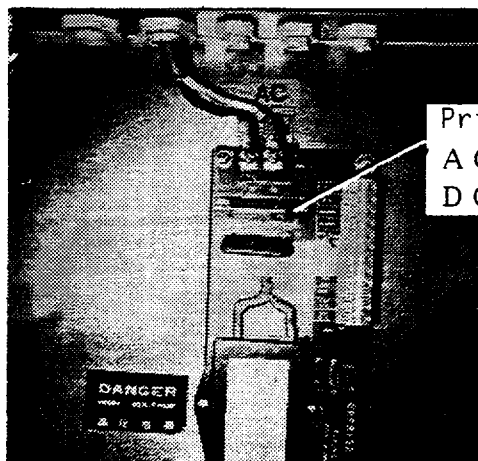
Use of the wrong fuse can cause fire or equipment damage.



Secondary Fuse
125V 3A



Loosen screws



Primary Fuse
AC: 250V 2A
DC: 125V 7A

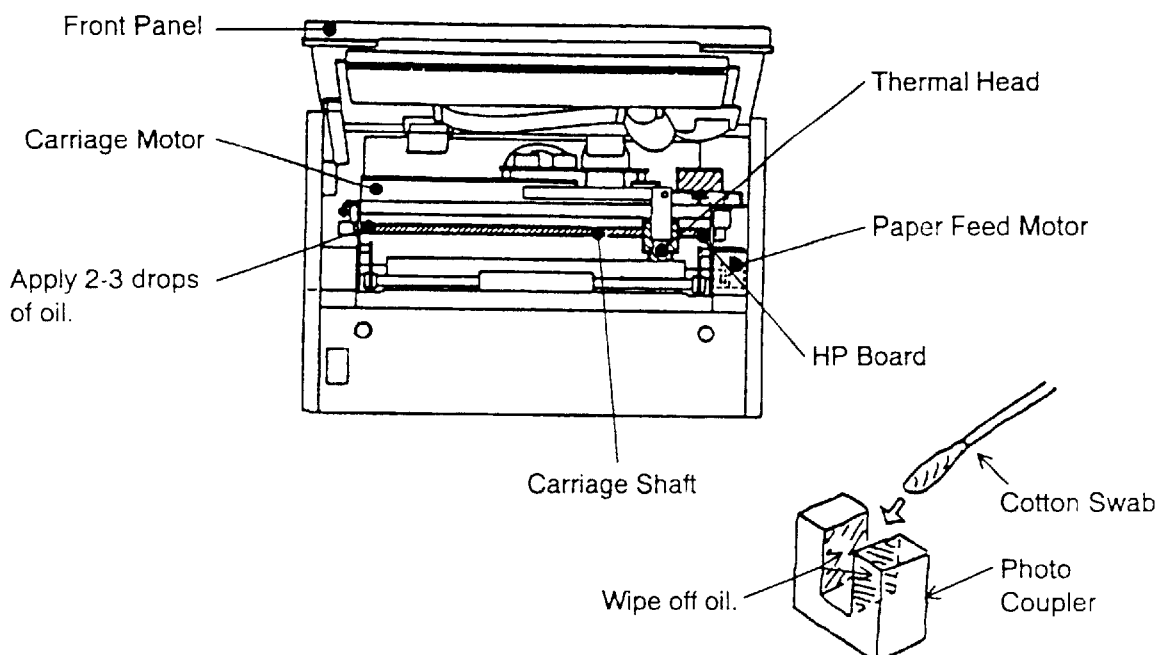
LUBRICATION

For recording pictures the carriage moves right and left on the shaft. Too heavy friction between the carriage and the carriage shaft can cause uneven recording or carriage motor overload. In every three to six months, lubricate to the carriage shaft.

Procedure

1. Turn on the power and confirm that the thermal head moves to the right end of the slide shaft and stops. Then, turn off the power.
2. Open the front panel by removing five screws.
3. Wipe off dirt on the carriage shaft and apply a thin coat of oil (two to three drops of oil) to the left end of the slide shaft. (The lubrication oil and the oil pot are supplied.)
4. Apply a drop of oil on each reduction gear of the carriage motor and paper feed motor.

CAUTION: Do not over lubricate. Spilt oil can damage the rubber rollers or electronic components inside the recorder. Pay particular attention to the photo coupler on the HP board. If there is oil on the photo coupler, wipe off oil from the inside of the photo coupler by using a cotton swab. (Oil on the photo coupler obstructs optical signal flow, causing the thermal head to move to extreme left side. You can hear abnormal noise.)



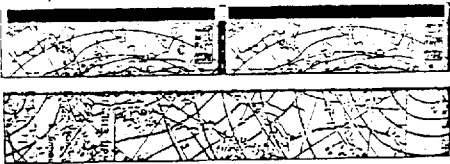


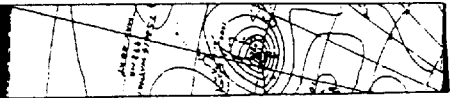
CHAPTER 3 TROUBLESHOOTING

OPERATOR TROUBLESHOOTING

Problems with the equipment may be caused not only by a faulty circuit but also by the incoming signal condition, inadequate installation, or even operator error.

The list below shows the typical troubles which may be mistaken as equipment malfunction.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Power won't come on. (No display nor sound)	<ol style="list-style-type: none"> 1. Switch at main switchboard is turned off. 2. Power connector is loose or pulled out. 3. Power fuse has blown. 4. Battery is dead. 	<ol style="list-style-type: none"> 1. Turn on the main switch. 2. Plug connector firmly. 3. Check mains voltage and polarity first, and put a new fuse. If it blows again, call for service. 4. Charge or replace battery.
Lamp lights but no or faint display.	<ol style="list-style-type: none"> 1. Improper CONTRAST setting 	<ol style="list-style-type: none"> 1. Adjust the CONTRAST control. (Ref. page 1-6.)
Unreadable character displayed	<ol style="list-style-type: none"> 1. Back-up memory contents destroyed. 2. Keep-alive battery is dead. 	<ol style="list-style-type: none"> 1. Perform "Cold Start." (Ref. page 1-6.) 2. Replace battery. (page 2-2)
No audible sound	<ol style="list-style-type: none"> 1. VOLUME is set too low. 2. Loop-back jumper wire(s) at rear terminal board is disconnected. 	<ol style="list-style-type: none"> 1. Adjust the VOLUME control. (page 1-8) 2. Connect the jumpers correctly. (#2 - #3 & #5 - #6)
Noise sound but no or very weak signal	<ol style="list-style-type: none"> 1. Antenna connector is loose or disconnected. 2. Antenna cable is cut or shorted. 	<ol style="list-style-type: none"> 1. Fasten it tightly. 2. Repair the cable.
No response to key operation	<ol style="list-style-type: none"> 1. Connector is pulled out. 	<ol style="list-style-type: none"> 1. Connect it firmly.
Can't start recording.	<ol style="list-style-type: none"> 1. Paper has run out. (PAPER OUT lamp is on.) 	<ol style="list-style-type: none"> 1. Load a new roll of paper.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Paper won't advance.	<ol style="list-style-type: none"> Paper is jammed. Paper roll has slipped out of supporting catches. 	<ol style="list-style-type: none"> Clean paper path. Load paper correctly.
Paper feeds but no recording.	<ol style="list-style-type: none"> Paper is loaded with front-side-back. Normal paper (non-thermal) is used. 	<ol style="list-style-type: none"> Load paper correctly. Use specified thermal paper.
Multiple or overlapped picture	<ol style="list-style-type: none"> Speed mismatch 	<ol style="list-style-type: none"> Select correct speed. (Ref. page 1-9.)
Split picture (Dead sector in the middle)	<ol style="list-style-type: none"> Out of phase 	<ol style="list-style-type: none"> Set PHASE manually. (Ref. page 1-10.)
Vertically expanded or compressed picture	<ol style="list-style-type: none"> IOC mismatch 	<ol style="list-style-type: none"> Change IOC manually. (Ref. page 1-9.)
Skew picture	<ol style="list-style-type: none"> SYNC is deviated. 	<ol style="list-style-type: none"> Adjust SYNC control. (Ref. page 1-11.)
Faint or distorted picture	<ol style="list-style-type: none"> Receiver detuned Weak incoming signal 	<ol style="list-style-type: none"> Adjust frequency manually while watching TUNE indicator. (Ref. page 1-8.) Select another frequency.
Won't start recording as scheduled.	<ol style="list-style-type: none"> Remote start mode is selected but start signal is not transmitted. Improper schedule setting (Two programs overlapped in time - later schedule will be disregarded.) 	<ol style="list-style-type: none"> Use time start mode if dead sector is transmitted in black. Review schedule.
Schedule and private channel settings are cleared or destroyed.	<ol style="list-style-type: none"> Keep-alive battery for memory back-up is dead. 	<ol style="list-style-type: none"> Replace battery. (Page 2-2) Perform "Cold Start" sequence. (Page 1-6.)
Paper turned black	<ol style="list-style-type: none"> Paper has been stored in hot environment or exposed to active chemical gas. 	<ol style="list-style-type: none"> The paper should be kept in dry and cool place.

SELF-TEST

To aid the service technician in tracing down a defective circuit block inside the equipment, the FAX-214 is equipped with a self-test facility. As this test is intended for use by service personnel, do not attempt further circuit check inside even if the faulty block can be identified.

Prior to starting the self-test, make sure that the mains voltage is within the rated range (10 to 40Vdc or 85-132/170-264VAC) and the power fuses are not blown. Check also that the recording paper is loaded correctly.

To start the test, press the POWER switch while holding down the [MODE] key.

LCD READOUT

PRINTOUT

Self Test

* Hold down the [MODE] key until you see "Self Test."

Prints program version number and copyright message.

```
< * DFAX * >      Program No. 0850-1111-00
FURUNO Electric Co.,LTD. Japan 1986.7
```

* Program No. (and the date of issue) is subject to change.

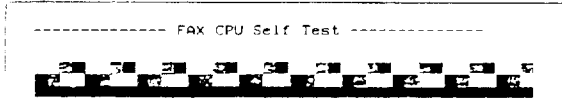
Test Printer

Prints complete character set.

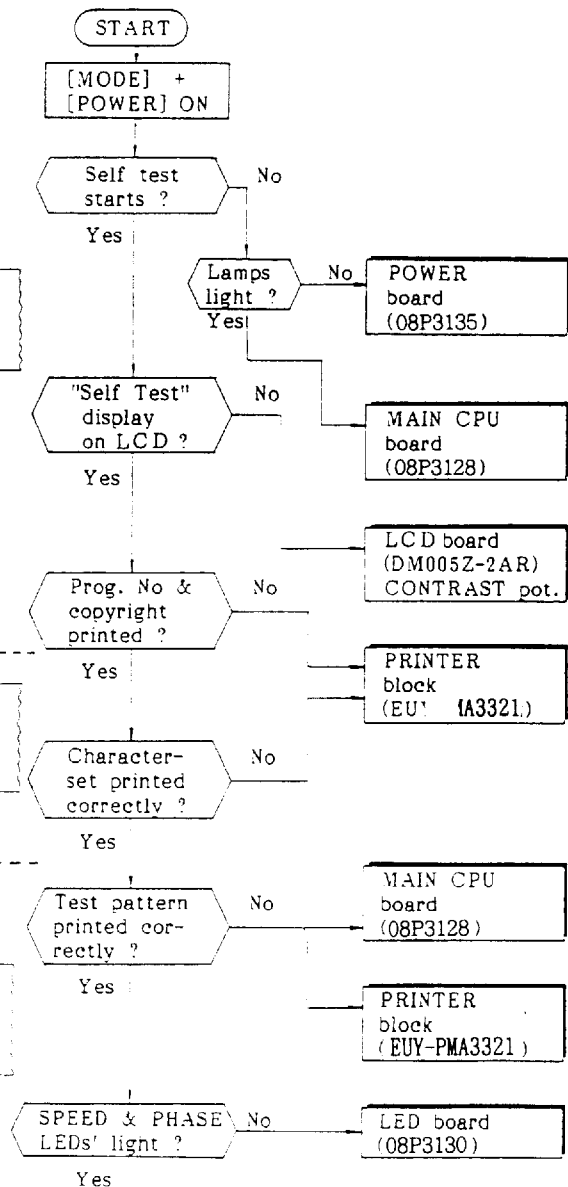
```
----- Printer CPU Self Test -----
abcdefghijklmnopqrstuvwxyz0123456789 *()*+,-./:;=?
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 *()*+,-./:;=?
```

Test FAX

Prints four-tone checker pattern.



Puts PHASE and SPEED LEDs on.



- cont -

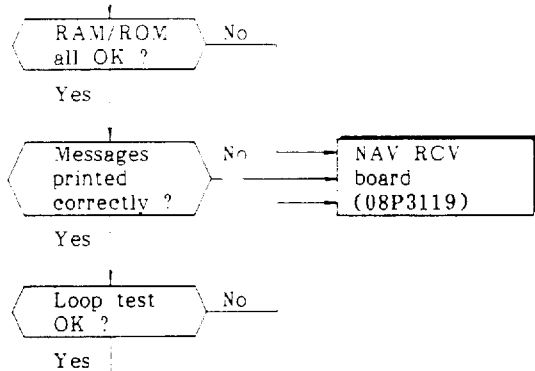
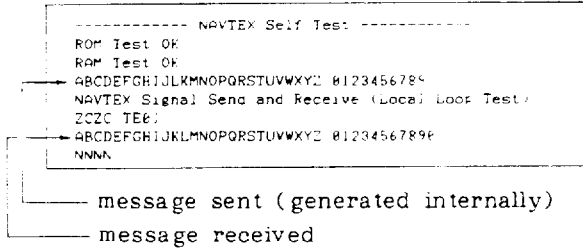
LCD READOUT

PRINTOUT

Test NAVTEX

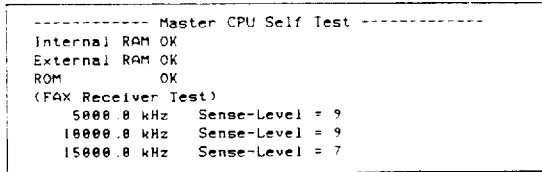
(Available on Navtex version only)

Checks ROM/RAM on NAV RCV board and performs local loop-back test. (Frequency-shift tone can be heard.)

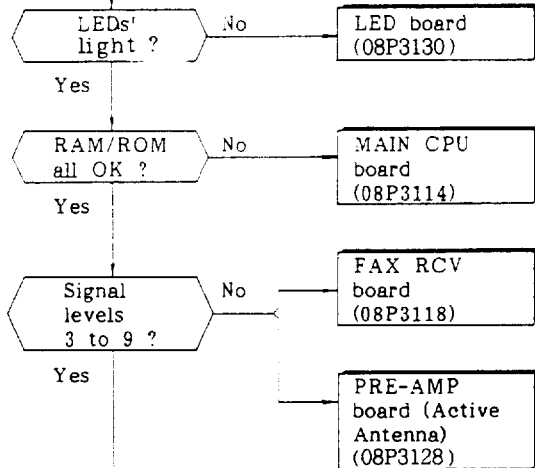


Test Master

Checks RAM/ROM for master CPU. Lights all LEDs on front panel.



Receives standard time signal (WWX, JJY, MSF, ZUO, etc) at 5, 10 and 15MHz and prints each signal level (0 to 9). If abnormal, signal level will be 0, 1 or 2.

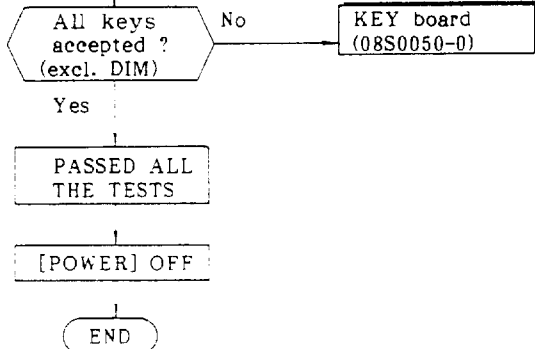


Push [ENT]

- * Press the key as the LCD readout prompts.
- * If the key operation is accepted, a beep is generated and the readout shows the next key to be pressed.

Push [PHASE]

All key OK



End of Self Test

CHAPTER 4 INSTALLATION

RECORDER UNIT INSTALLATION

GENERAL MOUNTING CONSIDERATIONS

Proper performance of the recorder unit is directly related to its location. A poorly selected location will not only affect print quality and facsimile signal reception but may also shorten the life of the equipment. When selecting a mounting location keep the following points in mind.

Water Spray

The recorder unit is designed and constructed to be able to withstand the humidity and corrosive atmosphere common in small vessels, but it is not designed to be used outside, directly exposed to the environment! Salt water spray will most assuredly cause damage to the sensitive components inside.

FURUNO will assume no responsibility for the damage caused by exposure to water spray.

Mechanical Shock and Vibration

The recorder itself is constructed to withstand minor shocks and engine vibrations, but excessive and continued shock can shorten the life of the precision printer mechanism. Shock may also degrade the print quality due to uneven contact between the printer head and the recording paper.

Heat Accumulation

This unit consumes very little power, so there is no need for forced air ventilation. However, it is recommended to provide at least some space around the recorder unit to allow circulation of cooling air.

Even though the LCD (Liquid Crystal Display) is quite legible even in direct sunlight, it is recommended to keep the recorder unit out of direct sunlight or at least shaded because of heat that can build up inside the cabinet. Excessive heat can darken the thermal recording paper.

Onboard Noise

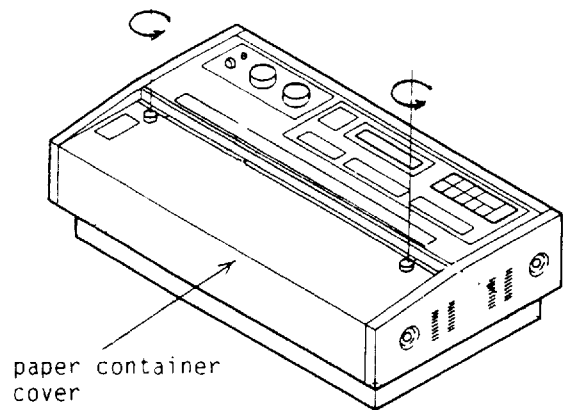
This unit contains a very sensitive receiver. To avoid mutual interference with other radio or navigational equipment, do not install the recorder near an SSB/VHF/CB radiotelephone, direction finder or Loran receiver.

MOUNTING

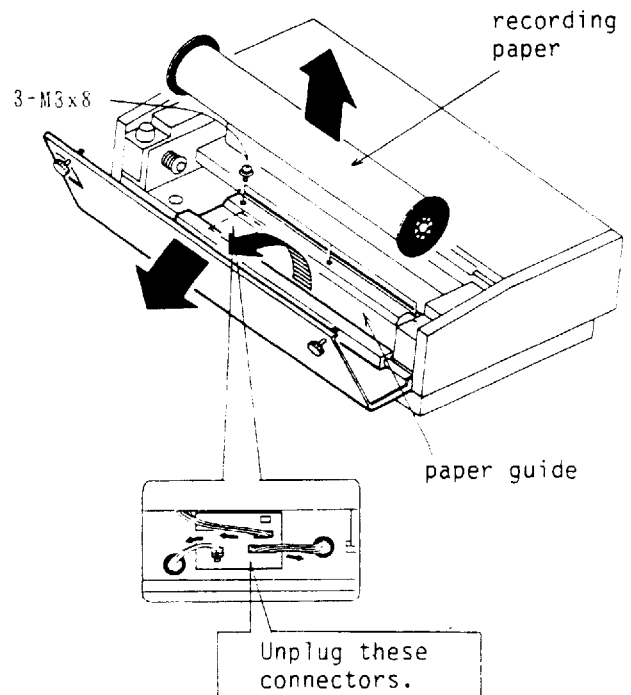
The recorder unit can be mounted on either a bulkhead or tabletop. Make sure the selected location is strong enough to support the unit against possible vibration and shock. If necessary, appropriate reinforcement measures should be made on the mounting area.

During unattended operation of the equipment, a long recorded paper may hang down from the recorder. To prevent the paper from running skew or being jammed on the way, level the recorder horizontally and keep the paper path clear so that the paper can run down smoothly. Also remember to leave some space below the paper container so that the container cover can flip down.

1. Loosen the two large screws (M6x40) securing the paper container cover; then remove the recording paper w/spool.

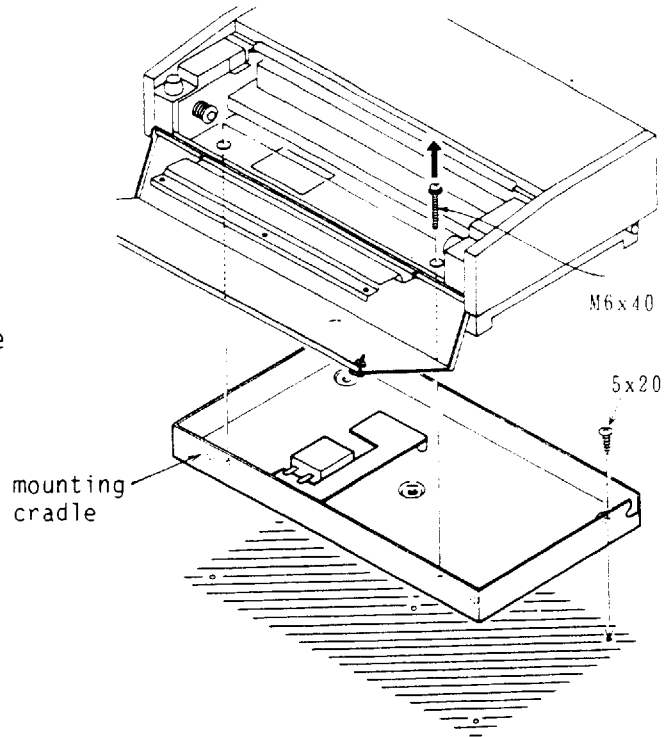


2. Loosen the three screws securing the paper guide; then remove the paper guide.



3. Unplug the three connectors connected between the printer and the mounting cradle.

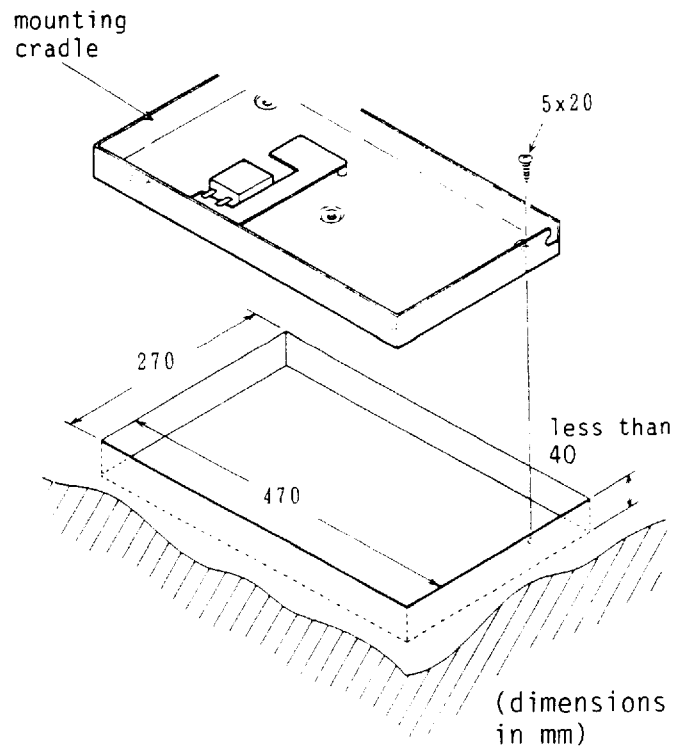
4. Loosen the screws on each side of the paper container; then separate the recorder unit from the mounting cradle.
5. Fix the mounting cradle to the chosen location with four M5x20 tapping screws.
6. Lay the recorder unit atop the mounting cradle. Reassemble the recorder unit.



FLUSH MOUNTING

If required the mounting cradle can be flush mounted. The dimensions for flush mounting are given in the illustration at right.

NOTE: In some installations SC lock cable fixing gland cannot be used. In this case, use a cable clamp and fix the cable near the recorder.



ANTENNA INSTALLATION

Performance of this receiver, especially in weak signal areas, is directly related to the antenna installation. In general, the antenna should be installed as high as possible on the vessel, free from the influence of nearby antennas, rigging and masts.

The antenna commonly used for the facsimile receiver is a long-wire or whip of 6 meters or longer. In order to receive LF facsimile or NAVTEX signals in every situation, however, the total antenna length should be at least 15 meters.

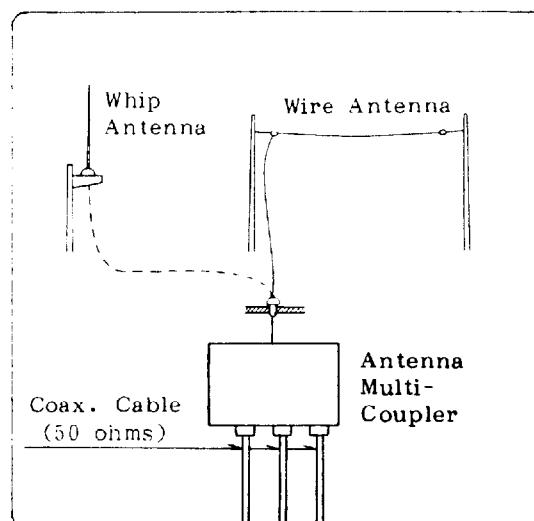
To allow antenna installation on smaller vessels where the long-wire antenna can not be stretched, this receiver is designed to be connected to an active antenna (preamp unit w/2.6m whip antenna) as well as a conventional long-wire antenna.

PASSIVE ANTENNA

If your vessel is large enough, install a long-wire or whip antenna with slant wire of 15 meters or longer in total length. If a long wire antenna already exists for an all wave receiver, it may be a good idea to share the antenna by using an Antenna Multicoupler.

Do not share the antenna with the transmitter.

To minimize noise pick-up from onboard electronic equipment, a 50 ohm coaxial cable (RG-8/U, RG-5/U, etc.) should be used for indoor wiring. (Connect the center conductor to the antenna wire and insulate the outer conductor with vinyl tape.)



ACTIVE ANTENNA (Preamp Unit; option)

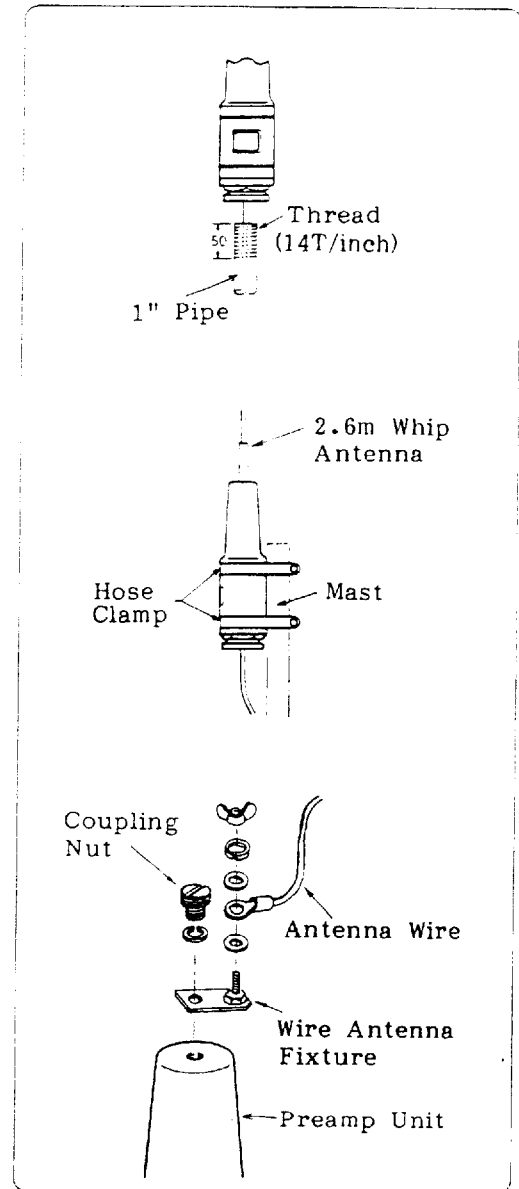
If your vessel is small and you can not provide space for such a long antenna, it is recommended to install the optional Preamp Unit with 2.6m Whip Antenna.

The body of the Preamp Unit can be mounted in two ways;

1. The bottom of the Preamp Unit is designed to accept a threaded extension mast of 1 inch diameter. The pitch of the thread should be 14 threads per inch. To prevent undue flexing of the mast in heavy winds, the mast should not be longer than 5 feet (1.5m).
2. The side of the Preamp Unit has a molded channel so that it may be mounted directly to a stub mast with two stainless steel hose clamps. Hose clamps must be arranged locally.

Screw the 2.6m whip antenna tightly onto the Preamp Unit and waterproof the junction and other exposed metallic parts with sealing compound (silicone rubber, putty, etc).

Instead of using the 2.6m whip antenna, an antenna wire of 2 to 3 meter long may be connected as shown right.



NOTE 1: If the Preamp Unit is installed, the preset switch (S1) inside the recorder must be set to "ACTIVE" side to supply 9Vdc to the Preamp Unit. Refer to page 4-11.

- 2: If receiver sensitivity is insufficient on preamp unit-equipped sets produced in Feb. 1990 and after, ground the preamp unit referring to page C-1.

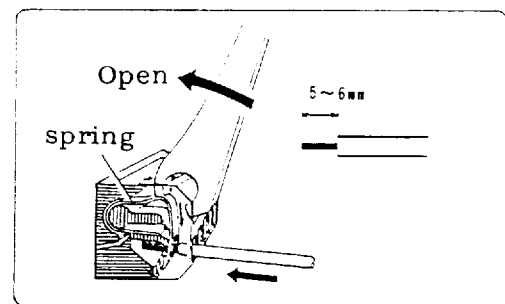
EXTERNAL CONNECTIONS AND INTERNAL PRESETS

EXTERNAL INPUT/OUTPUT

At the rear panel of the recorder unit, 12P and 2P terminal boards are provided for connecting external equipment.

No.	Symbol	Purpose	Condition	Connected to;
1 2	BK BK	BK signal (to protect the receiver front end from RF induction.)	BK relay (24V) is actuated when BK signal (24VDC, no polarity) is applied.	BK connector of transmitter. (transceiver)
3 4	ALARM ALARM	To alert reception of SAR message in a louder sound.	MAX. 1A(DC) or 20W. Contact Closure Signal.	Buzzer, Bell etc.
5 6 7	NAV EXT GND	NAV AF Output NAV AF Input NAV AF Common	0dBm/600ohms. When external NAVTEX receiver is not connected, put link wire between #5 and #6 on the terminal board.	All-wave receiver or DAT (Digital Audio Tapere-corder)
8 9 10	FAX RX OUT FAX EXT GND	FAX AF Output FAX AF Input FAX AF Common		
11 12	NX-5 ANT GND			

Connections to these clipper terminals (spring-loaded) can be made by using the special hook spanner, provided as spare parts.



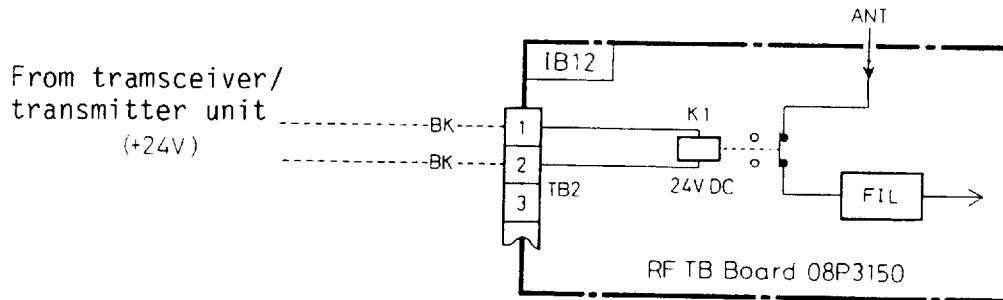
Connection of Break-in Relay

In some cases where the FAX-214 is installed on a boat equipped with a high power MF/HF transmitter (200W or more), there is a possibility of induced high power RF signal on the facsimile.

If the Pre -amp Unit (active antenna) is installed, there is no need of protection against an RF induction, since the unit is designed to withstand against a 30Vrms antenna input for at least 15 minutes.

However, if a long-wire antenna and/or a whip antenna is directly connected to the FAX-214, high power RF induction may well damage its front end.

To protect the front end, a relay is provided in the recorder so that the antenna is disconnected from the receiver circuit and connected to ground when the transmitter is keyed.



NOTE

The NAVTEX provides its intended performance when it is received continuously. Unlike facsimile reception, even a short break can destroy reception of one complete NAVTEX message.

It is, thus, strongly recommended to install the Pre-amp Unit (active antenna) and to place the facsimile antenna far apart from transmitting antenna if NAVTEX is mandatory for your navigation.

Facsimile and NAVTEX Signal Input/Output

The receiver and the recorder sections of this unit are independent of each other. That is, the audio signals (frequency shift tone) from the internal facsimile and NAVTEX receiver are output to terminals #3 and #6, and they are usually fed back to respective recorder input terminals #2 and #5 through the external loop-back links. (Terminals #1 and #4 are common ground for facsimile and NAVTEX signals respectively.)

If a signal is available from an external all wave receiver, its audio output may be connected to the recorder input of this unit. The figure below shows an example connection for an external receiver.

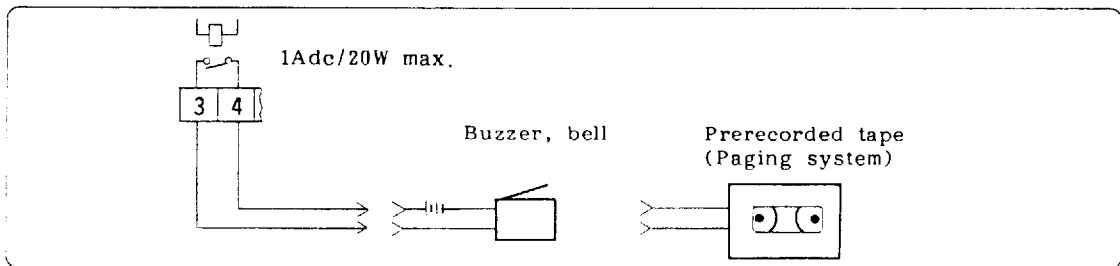
The external input/output terminals may also be used for tape recording and play-back of NAVTEX messages. Note that the tape running speed must be accurate and stable enough to obtain NAVTEX messages correctly.

CAUTION

Don't forget to install loop-back links between terminals #8 and #9, and #5 and #6 when no external equipment is connected, otherwise normal recording will not be available.

NAVTEX Alarm Output

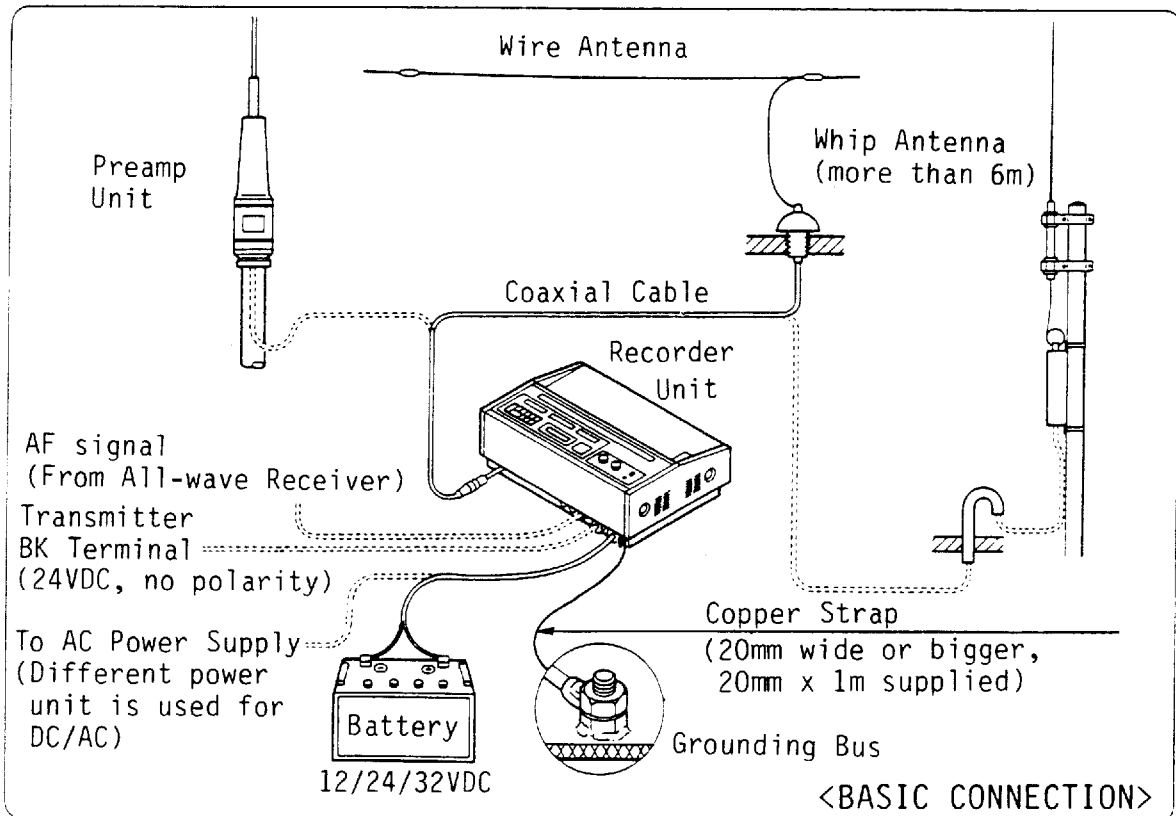
Terminals #3 and #4 are contact closure type output which may be used to alert you in the event a search and rescue (SAR) message is being received on NAVTEX. If it is necessary to signal the situation in a louder sound level than the built-in speaker or by some other means, such as a flashing light or a prerecorded tape, use this contact signal. The relay contact is capable of handling a 1A/20W load.



To maintain good reception, the device connected to the alarm terminal should not generate radio noise. (A poor quality electric buzzer may cause heavy radio noise due to arcing at its contact.)

CABLE CONNECTIONS

The power and antenna cables are to be connected to their respective connectors at the rear of the recorder, and the grounding wire directly to the rear panel terminal. General connecting instruction is illustrated below.



POWER CABLE

The FAX-214, depending on the power specification, is designed to operate normally at any DC voltage between 10 and 40Vdc (connected directly to 12V, 24V or 32V power system without any presetting inside the recorder) or any AC voltage between 86-260VAC (switchable).

The power cable must be supplied locally, and should be type DPYC-1.25 or the equivalent.

⚠ CAUTION

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the equipment.

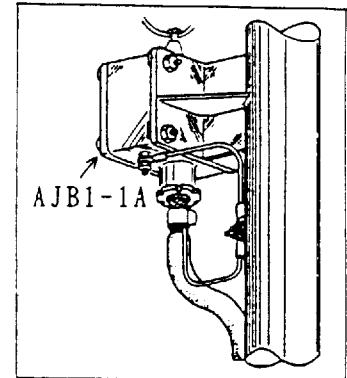
CAUTION

The power specification of this unit is AC or DC (specified when ordering), and is recorded on the mounting base and the power pack cover. If the unit is AC specification, be sure the AC power supply selector switch on the Power Board (see page 4-13) is set in the proper position. And if the unit is DC specification, ensure the power cable is connected correctly (+, - connections).

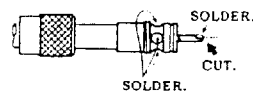
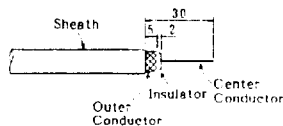
ANTENNA CABLE

If the Preamp Unit is installed, a coaxial plug is already connected at the end of 15m feeder. Connect the plug firmly to the female connector at the rear of the recorder.

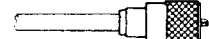
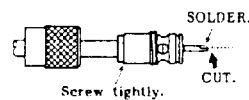
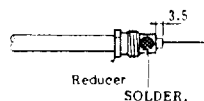
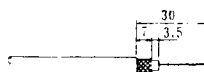
If a wire and/or whip antenna is installed, a antenna junction box (e.g., Furuno type AJB1-1A) must be installed since connection with the FAX-214 must be made with coaxial cable (RG-10/U or equivalent, 50 or 75ohm). Fabricate the cable end as shown below. Depending on the cable size, use an appropriate reducer, provided as standard supply. If you do not know how to solder, leave this job to a qualified technician, since most radio troubles are caused by improper antenna connections.



RG-8/U, RG-213/U

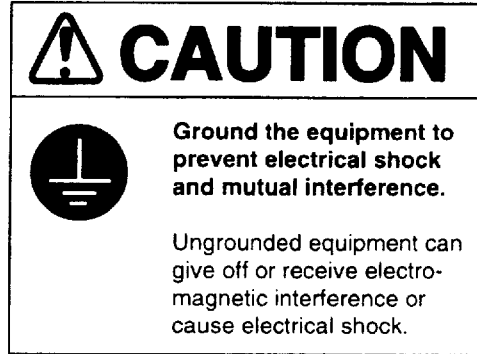


RG-5/U, RG-58/U



GROUNDING

In order to minimize noise pick-up from onboard equipment, it is important to ground the recorder unit to the vessel's grounding bus.

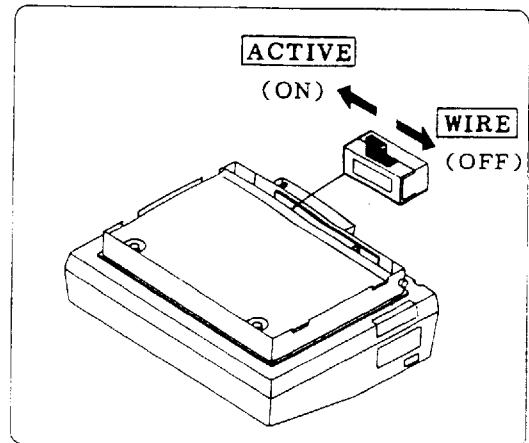


Fix one end of a copper strap (20mm width or more, shipyard supply) to the grounding terminal at the rear panel of the recorder unit, and connect the other end to the nearest efficient grounding spot on the vessel. It is best to find a good grounding spot while receiving a facsimile signal.

PRESET FOR PREAMP UNIT

If the Preamp Unit is installed, it must be supplied with 9Vdc power (through the coaxial cable) in order to function. Set the switch inside the recorder unit as prescribed below.

1. Detach the recorder unit from the mounting cradle. Refer to page 4-2.
2. Find the miniature slide switch S1 on the TB board (see page 4-13), and set it to "ACTIVE".

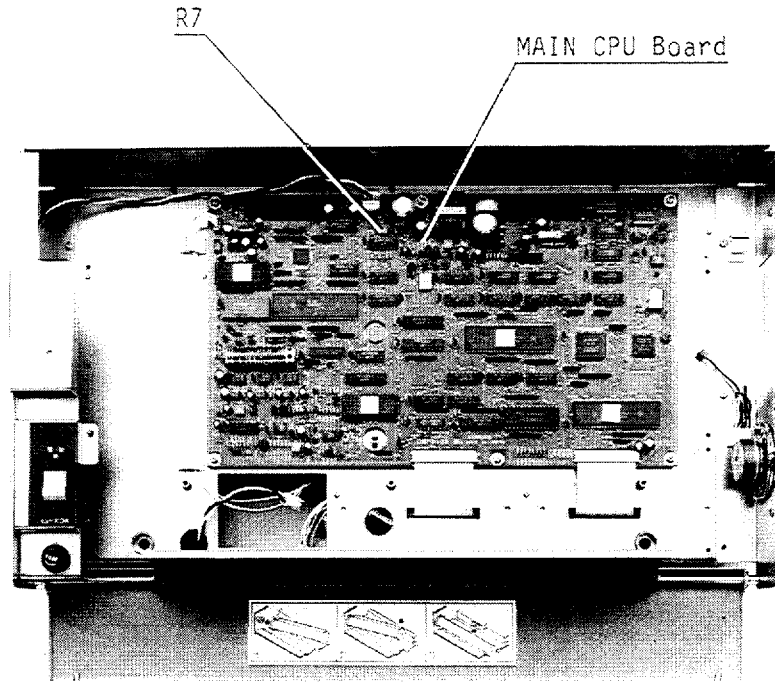


NOTICE

Be careful not to make a short circuit between the center and outer conductors of the antenna connector.

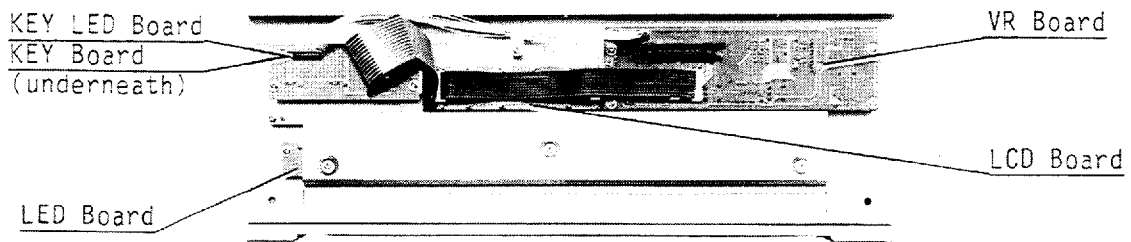
Make sure the slide switch is set to "WIRE" when a conventional long-wire and/or whip antenna is used. Otherwise the recorder unit may be damaged due to an antenna short circuit.

LOCATION OF CIRCUIT BOARDS



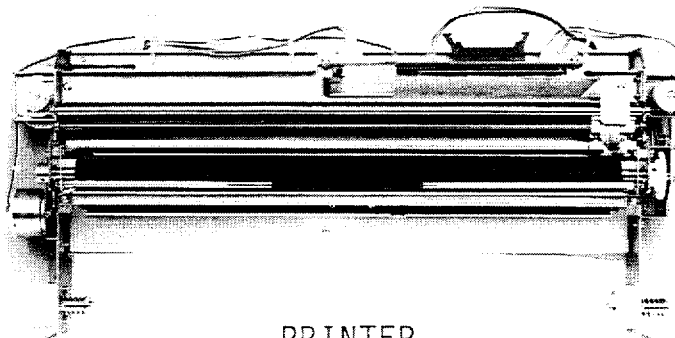
N Photo No.2419

RECORDER UNIT, FRONT VIEW (operation panel & printer removed)



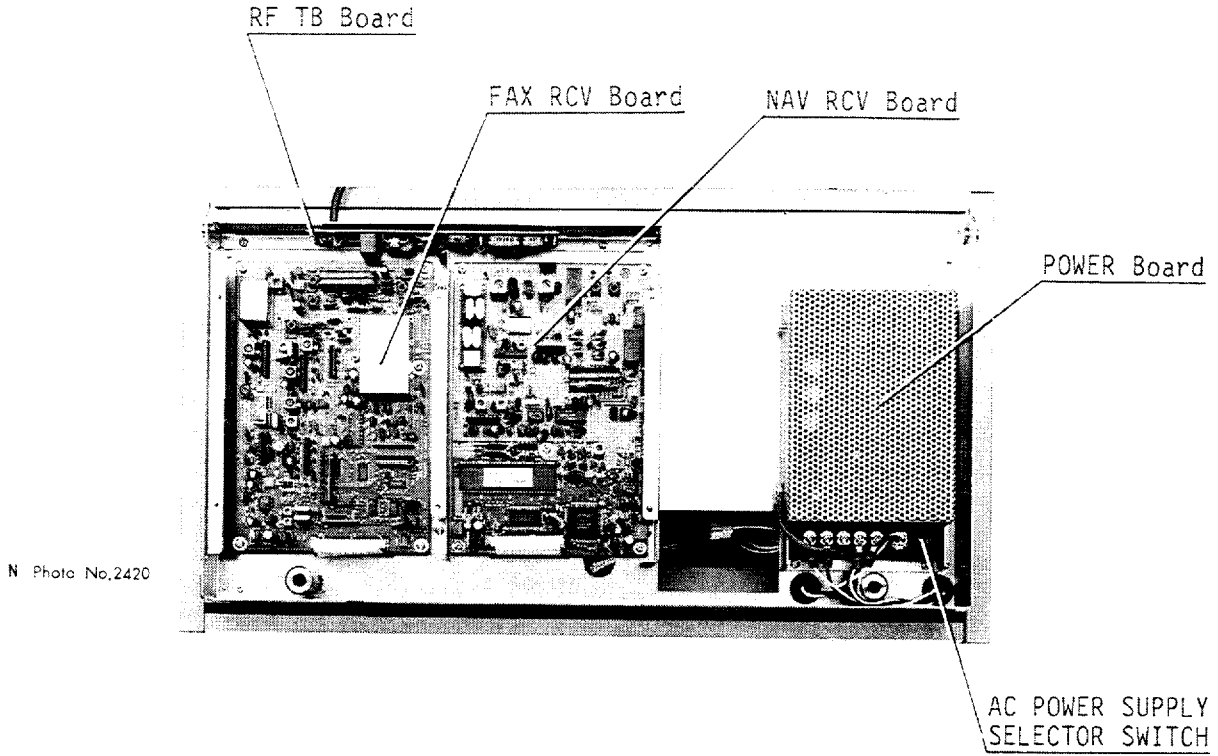
N Photo No.2421

OPERATION PANEL, REAR VIEW



N Photo No.2421

PRINTER



RECORDER UNIT, BOTTOM VIEW (mounting base removed)

APPENDIX A PRINCIPLE OF FACSIMILE AND NAVTEX SYSTEMS

HOW A FACSIMILE SYSTEM WORKS

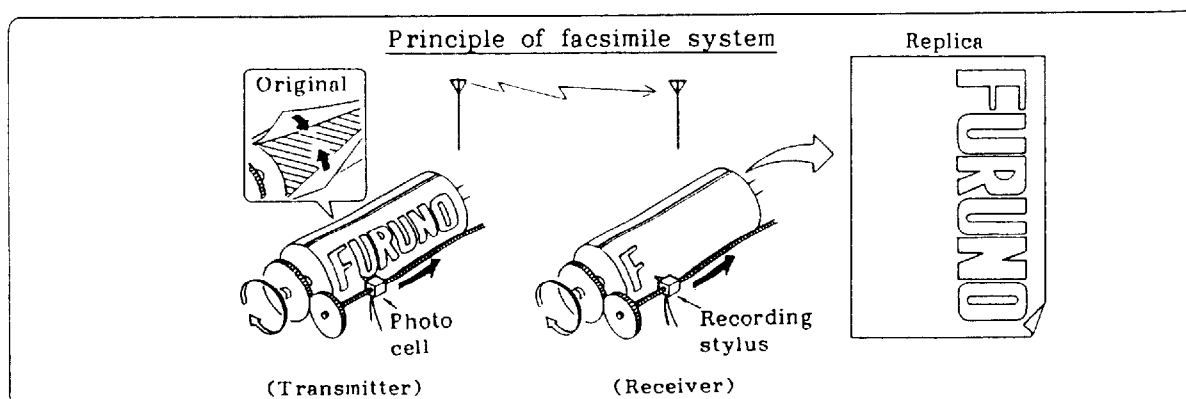
The picture on a TV screen and a facsimile recording are produced similarly.

The picture on a TV screen is composed of many fine horizontal lines. This is because of its transmission system that a frame of picture is sliced into narrow strips and sent piece by piece serially to a receiving station, where the strips are reassembled to reconstruct the original picture. As the frequency band assigned for TV broadcasting is comparatively wide, 25 or 30 frames of pictures can be sent in a second.

The radio facsimile uses much the same principle as the TV broadcasting system, but in a lower frequency and in a narrower bandwidth. Due to this limitation, it takes several minutes for the facsimile transmitter to send a frame of picture.

Though the transmission speed is slower than that of the TV, the facsimile signals in LF or HF bands propagate at much greater distances than the normal TV signal.

RADIO FACSIMILE SYSTEM



At the facsimile transmitter, the original picture is fitted on a drum rotating at 60, 90, 120 or 240 rpm, and a photo cell mounted on the threaded shaft moves slowly along the drum. The photo cell, focused on a point on the drum, converts black and white information into an electrical signal. As the drum rotates and the photo cell moves, the picture information is sliced into narrow pieces and a series of black and white signals are obtained. In the transmitter, the black and white signals are converted into 1500Hz (black) and 2300Hz (white) frequency shifts and modulates the radio frequency assigned for the station. (The black and white frequencies will be reversed in the LSB transmission.)

At the receiver, the frequency shift (FS) signals are converted into a black and white recording signal and the marks are printed on the recording paper.

To obtain an exact copy of the original picture at the receiver, the rotating speed and phasing of the transmitter and receiver must agree with each other, i.e., synchronization in rotation and synchronization in position.

To achieve automatic synchronization, most transmitters transmit a phasing signal before sending pictures. The phasing signal is a continuous black signal with narrow white gaps at the seam of the original picture. In the automatic facsimile receiver, the repetition rate and position of the white gaps are detected to determine rotating speed and phase.

In addition to the speed and phase synchronization, the line density with respect to the picture width for the transmitter and receiver must agree with each other to obtain an exact copy of the original picture. Otherwise the reproduced picture may be expanded or compressed vertically. To maintain international compatibility, two line density standards are assigned by WMO; high density - IOC 576 and low density - IOC 288.

IOC stands for Index Of Cooperation, and indicates the horizontal/vertical ratio of a picture. In practice, it is the product of line density and drum diameter.

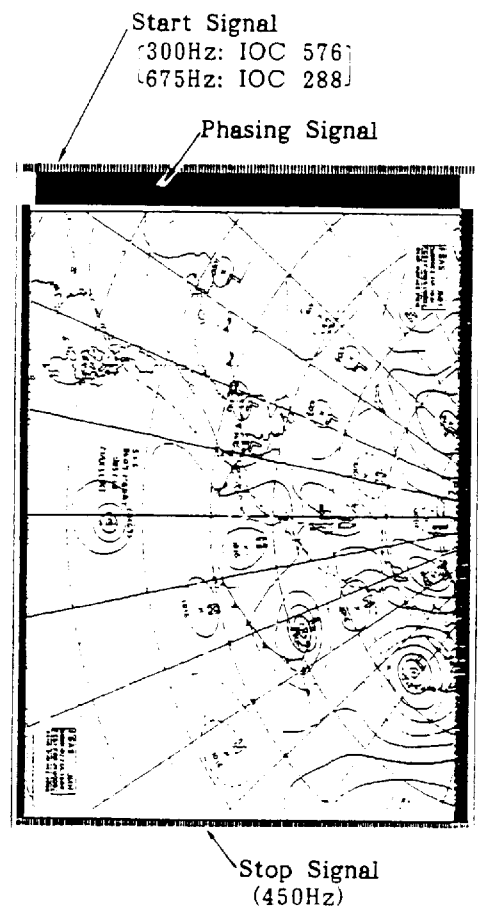
$$\text{IOC} = (\text{line density}) \times (\text{drum diameter})$$

or

$$\text{IOC} = \frac{(\text{line density}) \times (\text{picture width})}{\pi}$$

To enable fully automatic start and stop of picture recording, most facsimile transmitters send remote start and remote stop signals before and after transmission of pictures. The remote signals appear as black/white stripes as shown right.

For identification of start, stop and line density of picture transmission, three frequencies are used as remote signals. The start signal is either 300Hz or 675Hz to indicate the line density of the forthcoming picture. The remote stop signal is always 450Hz.



RECORDING SYSTEM ON THE FAX-214

The recording system used in FAX-214 is somewhat different from conventional facsimile recorders.

The received signal is first stored and assembled in the memory according to the given speed, phase and IOC. It is then printed out by the parallel printer head when a certain amount of picture information is accumulated in the memory. For IOC 576, one piece of the picture, corresponding to approximately 30 scan lines of incoming signal, is printed at a time.

Picture recording is performed by controlling the temperature of each thermal element rapidly while moving the parallel head on the recording paper. Depending on the temperature, chemical material on the paper changes the color of the paper and reproduces picture.

HOW NAVTEX WORKS

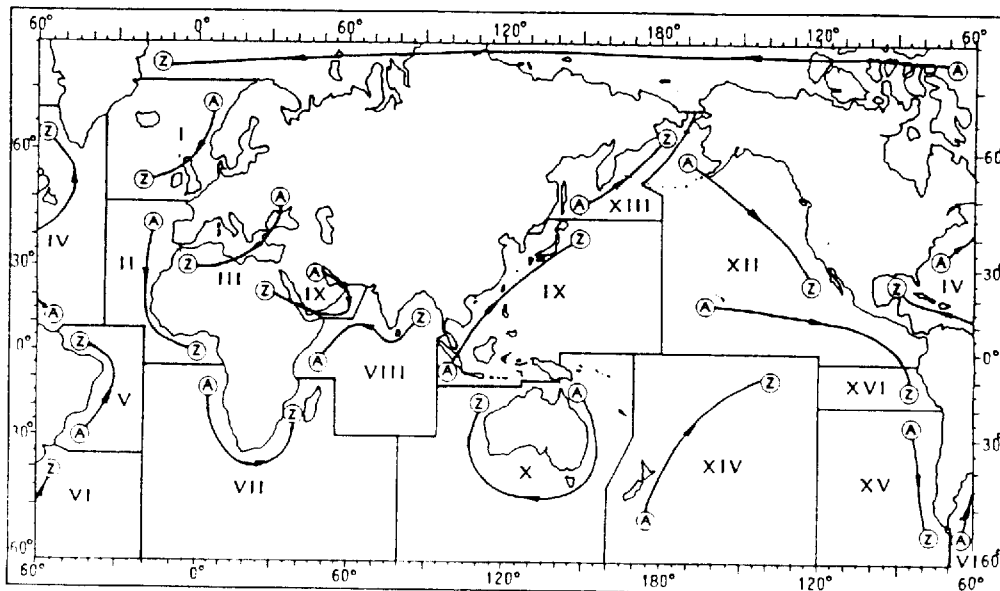
There are many types of navigational and meteorological information available on radio such as NAVAREA, HYDROPAC, etc. However, these systems rely heavily upon the operator's experience and skill in tuning the radio and interpreting messages. In addition, constant monitoring to pick up wanted information among a vast volume of messages is not practical with a limited radio staff.

To provide all mariners with up-to-the-minute information automatically, the NAVTEX system was developed.

NAVTEX is an acronym meanings Navigational Telex, and as its name shows, it is a kind of narrow band radio teletype system for sending (by frequency shift keying) text messages expressed in a 7-unit code. The difference between the conventional narrow band teletype system and the NAVTEX is that a NAVTEX transmitter transmits nine control characters (header code) ahead of the main message, so that the receiver can identify the station, message type and serial number automatically.

NAVTEX SYSTEM OPERATION

For navigation purposes, the world is divided into 16 areas as shown in the figure below. Each NAVTEX station in each area has an identification code, from "A" to "Z."



The frequency assigned to NAVTEX is only one (518kHz), and many stations exist in the same service coverage. If the stations were to transmit without any rule, the system would collapse due to mutual interference. To avoid this problem, the following rules apply.

- The transmission schedule is determined so that two or more stations having common a service area may not overlap in time.
- Each station transmits with minimum required power to cover its service area (200 nautical miles nominal).

The table below shows the transmission time schedule in Navarea I.

Reykjavik (R)	0318	0718	1118	1518	1918	2318
Scheveningen (P)	0348	0748	1148	1548	1948	2348
Stockholm (J)	0330	0730	1130	1530	1930	2330
Oostend (T)	0248	0648		1248	1848	2248
Rogoland (L)	0148	0548	0948	1348	1748	2148
Brest le C. (F)	0118	0518	0918	1318	1718	2118
Cullercoast (G)	0048	0448	0848		1648	2048
Tallin (U)	0030	0430	0830	1230	1630	2030
Haerndesand (H)	0000	0400	0800	1200	1600	2000
Bodo (B)	0018	0418	0900	1218	1618	2100

MESSAGE FORMAT

For automatic identification of messages, each message starts with nine control characters so called "Header codes."

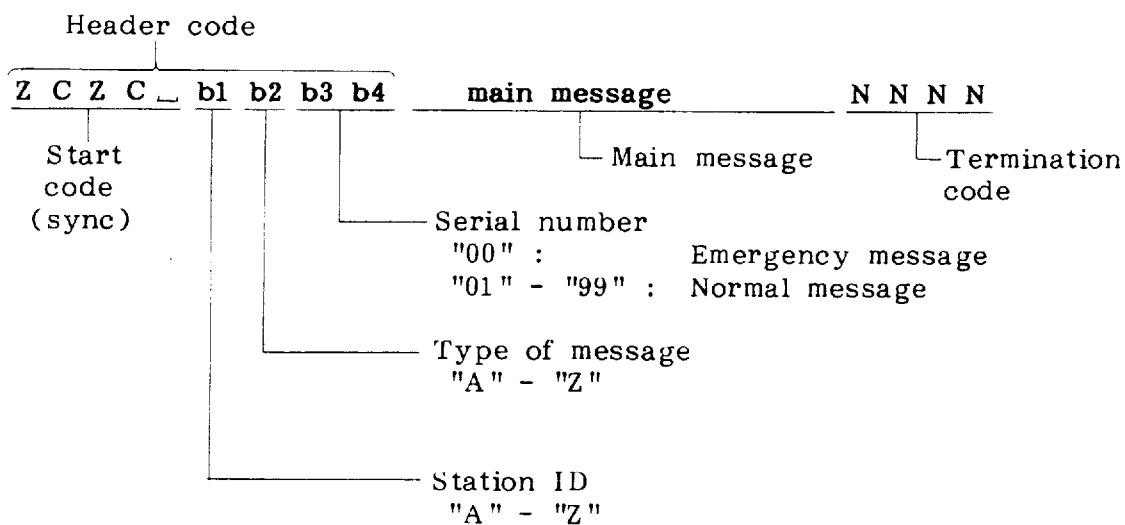
The first five characters are always "ZCZC_" and common to all messages. This part is used for message synchronization. The latter four characters are designated as B1, B2, B3 and B4, and indicate origin, category and serial number of the message.

Character B1 is the identification letter of the Navtex station; "A" thru "Z." Character B2 indicates the type of message, "A" thru "Z", as listed in the following page. Characters B3 and B4 indicate the serial number of the message. The serial numbers are counted up from "01" to "99", and starts from "01" again. Number "00" is specially reserved for important emergency messages, such as a search and rescue (SAR) message.

The end of each message is indicated by "NNNN" (four successive Ns').

FURUNO

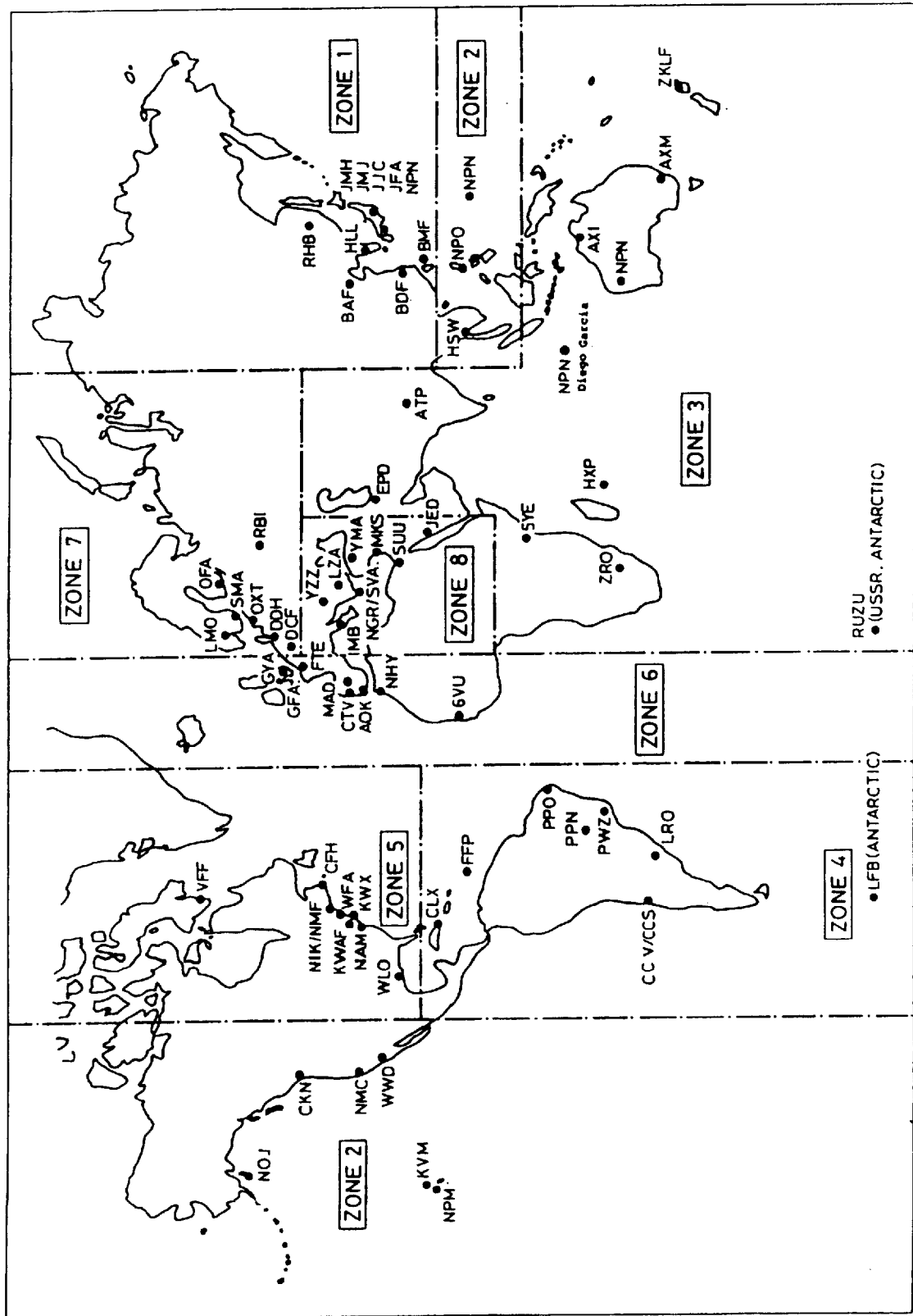
General message format is summarized below.



[Type of message (category)]

- | | | | |
|----|----------------------------------|------|--------------------------------------|
| A: | Coastal navigational information | I: | Omega message |
| B: | Meteorological warning | J: | Differential Omega message |
| C: | Ice report | K: | Other electronic nav. system message |
| D: | Search and rescue alert | L: | NAVAREA message |
| E: | Meteorological forecast | M-Y: | No category assigned |
| F: | Pilot message | Z: | QRU (no message on hand) |
| G: | Decca message | | |
| H: | Loran C-message | | |

FACSIMILE STATION MAP



ZONE 1 NORTH PACIFIC OCEAN WESTERN PART		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	JMH	Tokyo JAPAN
1	JMJ	Tokyo JAPAN
2	JJC	Tokyo JAPAN
	9VF *	Via SINGAPORE
3	JFA	Tokyo JAPAN
4	3SD	Beijing CHINA
5	BAF	Beijing CHINA
6	BDF	Shanghai CHINA
7	BMF	Taipei TAIWAN
8	RHB	Khabarovsk RUSSIA
9	HLL	Seoul KOREA

ZONE 2 NORTH PACIFIC OCEAN EASTERN PART		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	NPN	Guam MARIANA IS.
1	NPO	Sanglay Point PHILIPPINES
2	HSW	Bangkok THAILAND
3	NPM	Pearl Harbour USA
4	KVM	Honolulu USA
5	NOJ	Kodiak Alaska USA
6	CKN	Esquimalt CANADA
7	NMC	San Francisco USA
8	WWD	La Jolla USA
9	AUX	

ZONE 3 SOUTH PACIFIC OCEAN, INDIAN OCEAN, PERSIAN GULF		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	AXI	Darwin AUSTRALIA
1	AXM	Camberra AUSTRALIA
2	ZKLF	Auckland NWE ZEALAND
3	NPN	Guam Via AUSTRALIA
4	ATP	New Delhi INDIA
5	EPD	Teheran IRAN
	NPN *	Guam Via Diego Garcia
6	5YE	Nairobi KENYA
7	ZRO	Pretoria SOUTH AFRICA
8	HXP	Saint Denis MAURITIUS
9	RUZU	Molodezhnaya RUSSIA

ZONE 4 SOUTH ATLANTIC OCEAN		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	CLX	Casablanca CUBA
1	FFP	Fort de France MARTINIQUE
2	GYA	
3	PPN	Brasilia BRASIL
4	PWZ	Rio de Janeiro BRASIL
	PRO *	Orinda BRASIL
5	LRO	Buenos Aires ARGENTINE
6	CCS	Santiago CHILE
7	CCV	Belloto CHILE
8	LFB	Centro Meteorologico ANTARCTIC
9	CBV	Valparaiso Armada de CHILE

ZONE 5 NORTH ATLANTIC OCEAN WESTERN PART		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	WLO	Mobile USA
1	NAM	Norfolk USA
2	KWAF	Washington DC USA
3	KW	Lewes USA
4	WFH	Dalaware USA
5	NIK	Brentwood USA
6	NMF	Boston USA
7	CFH	Halifax CANADA
8	VFF	Frobisher CANADA
9	OXT	Skamlebaek GREENLAND
	XPM	

ZONE 6 NORTH ATLANTIC OCEAN EASTERN PART		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	GFA	Bracknell UK
1		Bracknell UK
2	GYA	
	GZZ *	Northwood UK
	GYJ *	
3	FTE	Paris FRANCE
4	CTV	Monsanto PORTUGAL
5	AOK	Rota SPAIN
6	MAD	Madrid SPAIN
	NPN *	
7	NHY	Kenitora MOROCCO
8	6VU	Dakar SENEGAL
9	AUX	

ZONE 7 NORTH ATLANTIC OCEAN NORTHERN PART		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	DCF	Offenbach GERMANY
1	DDK	Hamburg GERMANY
	DDH *	
2	OXT	Copenhagen DENMARK
3	OLT	Praha-Modrany CZECHOSLOVAKIA
4	SMA	Norrkoping SWEDEN
5	LMO	Oslo NORWAY
	OFA	
6	OFH *	Helinski FINLAND
	OHG *	
7	OFW	Vaasa FINLAND
	TFA *	Reykjavic ICELAND
8	RBI	Moscow RUSSIA
9	AUX	

ZONE 8 MEDITERRANEAN SEA		
STA-TION	CALL SIGN	TRANSMITTED FROM
0	IMB	Rome ITALY
1	NPN	Ahtens GREECE
	SVG4 *	
2	YZZ	Beograd YUGOSLAVIA
3	NGR	Athens GREECE
4	LZJ2	Sofia BULGARIA
5	YMA	Ankara TURKEY
6	MKS	Episkopi CYPRUS
7	SUU	Cairo EGYPT
8	JED	Jeddah SAUDI ARABIA
	HZN *	
9	AUX	

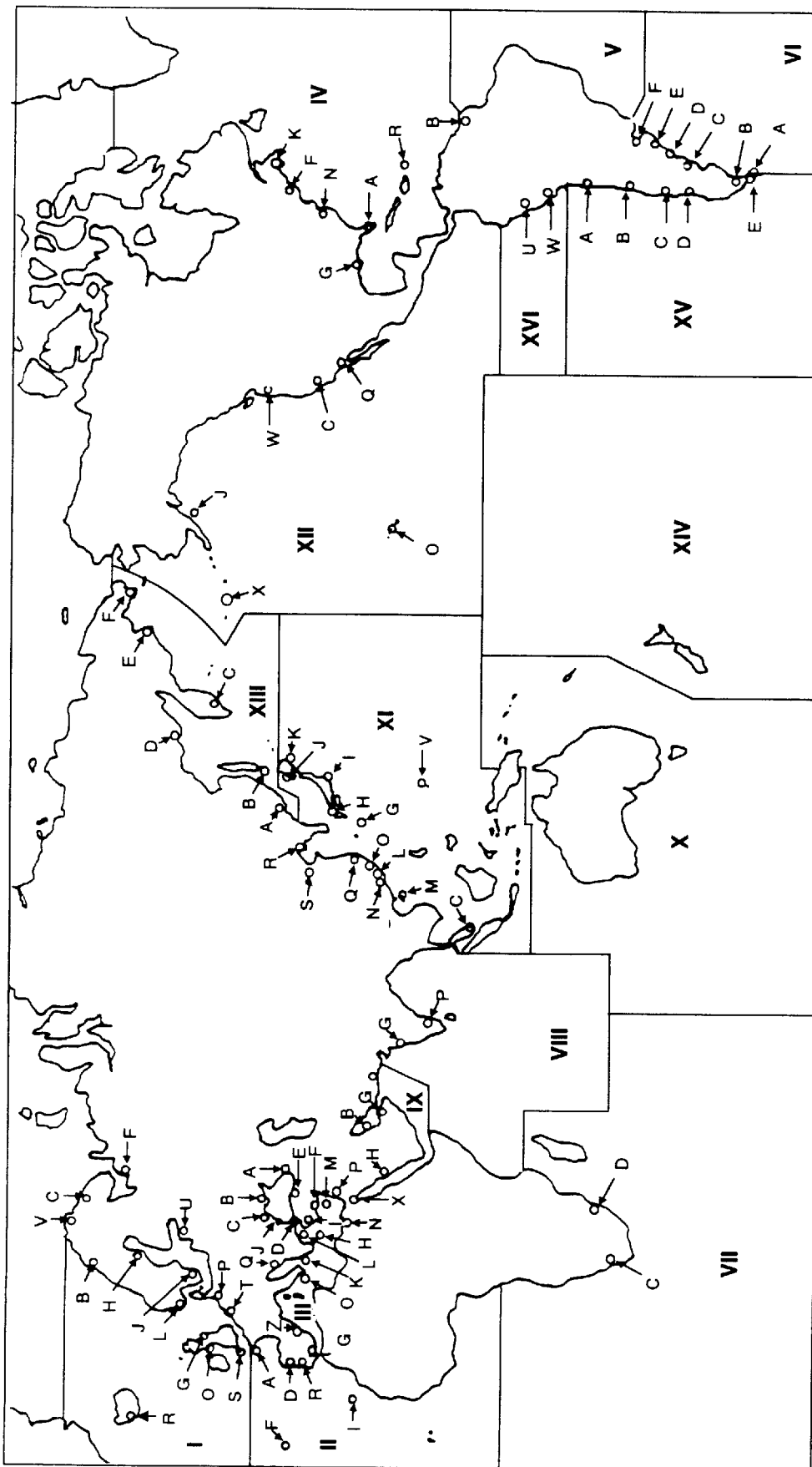
FACSIMILE STATION LIST

ZONE[0] is allocated for private channels.
(10 channels each for 12 stations)
*: Callsign not displayed.

FACSIMILE STATION LIST (ALPHABETICAL ORDER)

	Nation	City	Zone No.	Station No.	Call sign	Remarks	Nation	City	Zone No.	Station No.	Call sign	Remarks
A	ANTARCTIC	Meteorologic.	4	8	LFB		M	GUAM	2	0	NPN	US Navy
	ARGENTINE	Buenos Aires	4	5	LRO			Fort de France	4	1	FFP	
	AUSTRALIA	Camberra	3	1	AXM			Sain Denis	3	8	HXP	
		Darwin	3	0	AXI			Kenitora	6	7	NHY	
		H.E.Holt	3	3	NPN	US Navy						
B	BRAZIL	Brasilia	4	3	PPN		N	Auckland	3	2	ZKLF	
		Orinda	4	4	PPO			Oslo	7	5	LMO	
	BULGARIA	Rio de Janeiro	4	4	PWZ		P	Sanglay Point	2	1	NPO	US Navy
		Sofia	8	4	LZJ2			Monsanto	6	4	CTV	
C	CANADA	Esquimalt	2	6	CKN		S	Dakar	6	3	6YU	
		Frobisher	5	8	VFF			Jeddah	8	8	JED	
		Halifax	5	7	CFH						HZN	
	CHILE	Belloto	4	7	CCV			Pretoria	3	7	ZRO	
		Santiago	4	6	CCS			Rota	6	5	AOK	US Navy
		Valparaiso	4	9	CBV			Madrid	6	6	MAD	
	CHINA	Beijing	1	4	JSD						NPN	
		Beijing	1	5	BAF			Norrkoping	7	4	SMA	
		Shanghai	1	6	BDF							
	CUBA	Casablanca	4	0	CLX		T	Taipei	1	7	BMF	
	CYPRUS	Episkopi	8	6	MKS			Bangkok	2	2	HSW	
	CZECHOSLOVAKIA	Praha-Modraný	7	3	OLT			Ankara	8	5	YMA	
D	DENMARK	Copenhagen	7	2	OXT		U	Bracknell	6	0	GFA	
E	EGYPT	Cairo	8	7	SUU			Bracknell	6	1	GFA	
F	FINLAND	Helsinki	7	6	OFA			Northwood	4	2	GFA	For S.A.
					OFH			Northwood	6	2	GFA	
	FRANCE	Vaasa	7	7	OFW						GZZ	
		Paris	6	3	FTE						GYJ	
							USA	Boston	5	5	NIK	
								Boston	5	6	NMF	
								Brentwood	5	4	WFH	
								Diego Garcia	3	5	NPN	
G	GREECE	Athens	8	1	NPN			Honolulu	2	4	KVM	
					SVG4			Kodiak Alaska	2	5	NOJ	
					NGR	US Navy		La Jolla	2	8	WWD	
	GREENLAND	Athens	8	3	OXT			Lewes	5	3	KWX	
		Skamlebaek	5	9	XPM			Delaware	5	3	KWX	
								Mobile	5	0	WLO	
I	ICELAND	Reykjavik	7	7	TFA			Norfolk	5	1	NAM	
	INDIA	New Delhi	3	4	ATP			Pearl Harbour	2	3	NPM	US Navy
	IRAN	Teheran	3	5	EPD			San Francisco	2	7	NMC	
	ITALY	Rome	8	0	IMB			Washington DC	5	2	KWAF	AIR Force
J	JAPAN	Tokyo	1	0	JMH	No.1	RUSSIA	Khabarovsk	1	8	RHB	
		Tokyo	1	1	JMJ	No.2		Molodezhnaya	3	9	RUZU	
		Tokyo	1	2	JJC	JMSA & Kyodo		Moscow	7	8	RBI	
		Tokyo	1	3	9VF	Chuo Gyogyo						
					JFA		GERMANY	Hamburg	7	1	DDK	
								Offenbach	7	0	DDH	
K	KENYA	Nairobi	3	6	5YE						DCF	
	KOREA	Seoul	1	9	HLL		YUGOSLAVIA	Belgrade	8	2	YZZ	

NAVTEX STATION MAP



NAVTEX STATION LIST

Nav-area	Stn ID	Country	City	Time Schedule (UTC)	Remarks	
I	B	NORWAY	Bodo	0018, 0418, 0900, 1218, 1618, 2100	Pre-operational	
	C	RUSSIA	Murmansk	0120, 0520, 0920, 1320, 1720, 2120		
	F	RUSSIA	Arkhangelsk	0200, 0600, 1000, 1400, 1800, 2200		
	G	U.K.	Cullercoats	0048, 0448, 0848, 1248, 1648, 2048		
	H	SWEDEN	Haernoessand	0000, 0400, 0800, 1200, 1600, 2000		
	J	SWEDEN	Stockholm	0300, 0730, 1130, 1530, 1930, 2330		
	L	NORWAY	Rogaland	0148, 0548, 0948, 1348, 1748, 2148		
	O	U.K.	Portpatrick	0130, 0530, 0930, 1330, 1730, 2130		
	P	NETH. L	Scheveningen	0348, 0748, 1148, 1548, 1948, 2348		
	R	ICELAND	Reykjavik	0318, 0718, 1118, 1518, 1918, 2318		
	S	U.K.	Niton	0018, 0418, 0900, 1218, 1618, 2100		
	T	BELGIUM	Oostende	0248, 0648, 1048, 1448, 1848, 2248		
U	RUSSIA	Tallin	0030, 0430, 0830, 1230, 1630, 2030			
V	NORWAY	Vardoe	0300, 0700, 1100, 1500, 1900, 2300			
II	A	FRANCE	Brest-Le conq	0030, 0430, 0830, 1230, 1630, 2030	Planned	
	D	SPAIN	Finisterre			
	F	PORTUGAL	Azores		0050, 0450, 0850, 1250, 1650, 2050	
	I	SPAIN	Canary Islands		0100, 0500, 0900, 1300, 1700, 2100	
	R	PORTUGAL	Lisbon	0250, 0650, 1050, 1450, 1850, 2250	Planned	
		CAMEROON	Douala			
III	A	RUSSIA	Novorossiysk	0300, 0700, 1100, 1500, 1900, 2300	Planned	
	B	RUSSIA	Mariupol	0100, 0500, 0900, 1300, 1700, 2100		
	C	RUSSIA	Odessa	0230, 0630, 1030, 1430, 1830, 2230		
	D	TURKEY	Istanbul	0030, 0430, 0830, 1230, 1630, 2030		
	E	TURKEY	Samsun	0040, 0440, 0840, 1240, 1640, 2040		
	F	TURKEY	Antalya	0050, 0450, 0850, 1250, 1650, 2050		
	G	SPAIN	Tarifa	0100, 0500, 0900, 1300, 1700, 2100		
	H	GREECE	Iraklion	0110, 0510, 0910, 1310, 1710, 2110		
	I	TURKEY	Izmir	0120, 0520, 0920, 1320, 1720, 2120	Planned	
	J	BULGARIA	Varna	0130, 0530, 0930, 1330, 1730, 2130		
	K	GREECE	Kerkyra	0140, 0540, 0940, 1340, 1740, 2140		
	L	GREECE	Limnos	0150, 0550, 0950, 1350, 1750, 2150		
	M	CYPRUS	Troodos	0200, 0600, 1000, 1400, 1800, 2200		
	N	EGYPT	Alexandria	0210, 0610, 1010, 1410, 1810, 2210		
	O	MALTA	Malta	0220, 0620, 1020, 1420, 1820, 2220		Planned
	P	ISRAEL	Haifa	0020, 0420, 0820, 1220, 1620, 2020		Planned
Q	YUGO.	Split	0250, 0650, 1050, 1450, 1850, 2250			
Z	SPAIN	Cabo La Nao				
		FRANCE	La Garde			
IV	A	USA	Miami	0000, 0600, 1200, 1800	Pre-operational	
	B	BERMUDA	St. Georges	0100, 0700, 1300, 1900		
	F	USA	Boston	0445, 1045, 1645, 2245		
	G	USA	New Orleans	0300, 0900, 1500, 2100		
	K	CANADA	Sydney	0040, 0540, 0940, 1340, 1740, 2140	Under trials	
	N	USA	Portsmouth	0130, 0730, 1330, 1930	Pre-operational	
	R	USA	San Juan	0415, 1015, 1615, 2215	Pre-operational	

Nav-area	Stn ID	Country	City	Time Schedule (UTC)	Remarks
V		URUGUAY URUGUAY URUGUAY URUGUAY URUGUAY	Colonia Laguna D Sauce La Paloma Montevideo Punta de Este Salto		Planned Planned Planned Planned Planned
VI	A B C D E F G	ARGENTINA ARGENTINA ARGENTINA ARGENTINA ARGENTINA ARGENTINA ARGENTINA	Ushuaia Rio Gallegos Rivadavia Bahia Blanca Mar Del Plata Buenos Aires Rosario	0240, 0840, 1440, 2040 0140, 0740, 1340, 1940 0040, 0640, 1240, 1840 0210, 0810, 1410, 2010 0110, 0710, 1310, 1910 0510, 1110, 1710, 2310 0110, 0610, 1210, 1810	planned
VII	C D	S. AFRICA S. AFRICA	CAPETOWN DURBAN	0020, 0420, 0820, 1220, 1620, 2020 0120, 0520, 0920, 1320, 1720, 2120	
VIII	G P	INDIA INDIA	Bombay Madras	0100, 0500, 0900, 1300, 1700, 2100 0230, 0630, 1030, 1430, 1830, 2230	
IX	H G X B	S. ARABIA S. ARABIA EGYPT BAHRAIN	Jeddah Dammam Ismailia Hamala	0010, 0410, 0810, 1210, 1610, 2010	Planned Planned Planned Planned
XI	V C G H I J K L M N O R Q S	USA SINGAPORE JAPAN JAPAN JAPAN JAPAN HONG KONG CHINA CHINA CHINA CHINA CHINA CHINA	Guam Jurong Naha Moji Yokohama Otaru Kushiro Hong Kong Zhanjiang Guangzhou Fuzhou Dalian Shanghai Tianjin Hainan	0100, 0700, 1300, 1900 0020, 0420, 0820, 1220, 1620, 2020 0100, 0500, 0900, 1300, 1700, 2100 0110, 0510, 0910, 1310, 1710, 2110 0120, 0520, 0920, 1320, 1720, 2120 0130, 0530, 0930, 1330, 1730, 2130 0140, 0540, 0940, 1340, 1740, 2140 0200, 0600, 1000, 1400, 1800, 2200 0210, 0610, 1010, 1410, 2210 0250, 0650, 1050, 1450, 2250 0240, 0640, 1040, 1440, 2240	
XII	C W Q J O X	USA USA USA USA USA USA	San Francisco Astoria Cambria Kodiak Honolulu Adak	0400, 1000, 1600, 2200 0130, 0730, 1330, 1930 0445, 1045, 1645, 2245 0300, 0900, 1500, 2100 0040, 0640, 1240, 1840 0000, 0600, 1200, 1745	Pre-operational Pre-operational Pre-operational Pre-operational Planned
XIII	A B C D E F	RUSSIA RUSSIA RUSSIA RUSSIA RUSSIA RUSSIA	Vladivostok Kholmsk Petropavlovsk Magadan Beringovskiy Providenya	0000, 0400, 0800, 1200, 1600, 2000 0010, 0410, 0810, 1210, 1610, 2010 0050, 0450, 0850 0030, 0430, 0830, 1230, 1630, 2030 0040, 0440, 0840, 1240, 1640, 2040 0050, 0450, 0850, 1250, 1650, 2050	

Nav-area	Str ID	Country	City	Time Schedule (UTC)	Remarks
XV	A	CHILE	Antofagasta	0010, 0410, 0810, 1210, 1610, 2010	
	B	CHILE	Valparaiso		
	C	CHILE	Talcahuano		
	D	CHILE	Puerto Montt		
	E	CHILE	Magallanes		
XVI	S	PERU	Paita	0300, 0700, 1100, 1500, 1900, 2300	Planned
	U	PERU	Callao	0320, 0720, 1120, 1520, 1920, 2320	Planned
	W	PERU	Mollendo	0340, 0740, 1140, 1540, 1940, 2340	Planned

NOTE: The list above shows the stations registered with the International Frequency Registration Board (IFRB) for transmission of 518 kHz (as of Jan. 1994). Note that not all stations are operational.

PRIVATE CHANNEL LIST

Zone	Station	Channel	Call sign	Remarks
0	0	0	PRV	
		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
	9		AUX	

APPENDIX C IMPROVEMENT OF RECEIVER S/N RATIO (Remedy for RFI)

PROBLEM

FAX-208A/N and FAX-214 may experience a decrease in receiver sensitivity. This may occur if the coaxial cable connected between the optional preamp unit and the main unit is extended by the use of an extension cable.

CAUSE

The outer conductor of the coaxial picks up unwanted signal/noise.

OUTLINE OF FIELD MODIFICATION

Connect a vinyl ground wire between the shield of the coaxial cable at the base of the preamp unit and the mast. Figures 1 and 2 on the next page illustrate how to do this modification.

NOTE: The coaxial cable should not be laid close to or bound with power cables or control cables.

MODIFICATION REQUIRED/NOT REQUIRED

Required

- 1) If most of the original supply coaxial cable is outside of the mast.
- 2) Extension cable is used.
- 3) Where RFI/noise is a problem.

Not required

- 1) Coaxial cable runs inside a steel mast or conduit.
- 2) Where the original supply coaxial cable has been replaced (or can be replaced) with one having an armor.
- 3) For FRP ships and non-metallic masts where a good ground cannot be made at the base of the preamp unit.
- 4) If the coaxial cable can be shortened.

FACTORY-MODIFIED SETS

This modification will be made on the corresponding sets produced from February 1990. If the factory-added ground wire is not long enough, run an additional ground wire between the ground terminal and the mast. See the figure below.

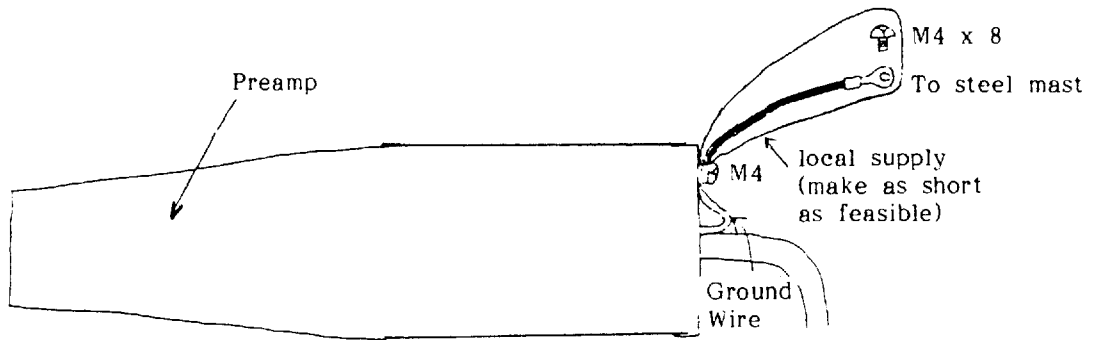


Fig. 1

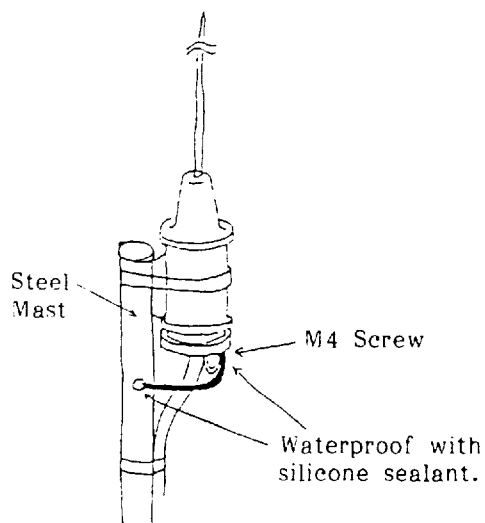
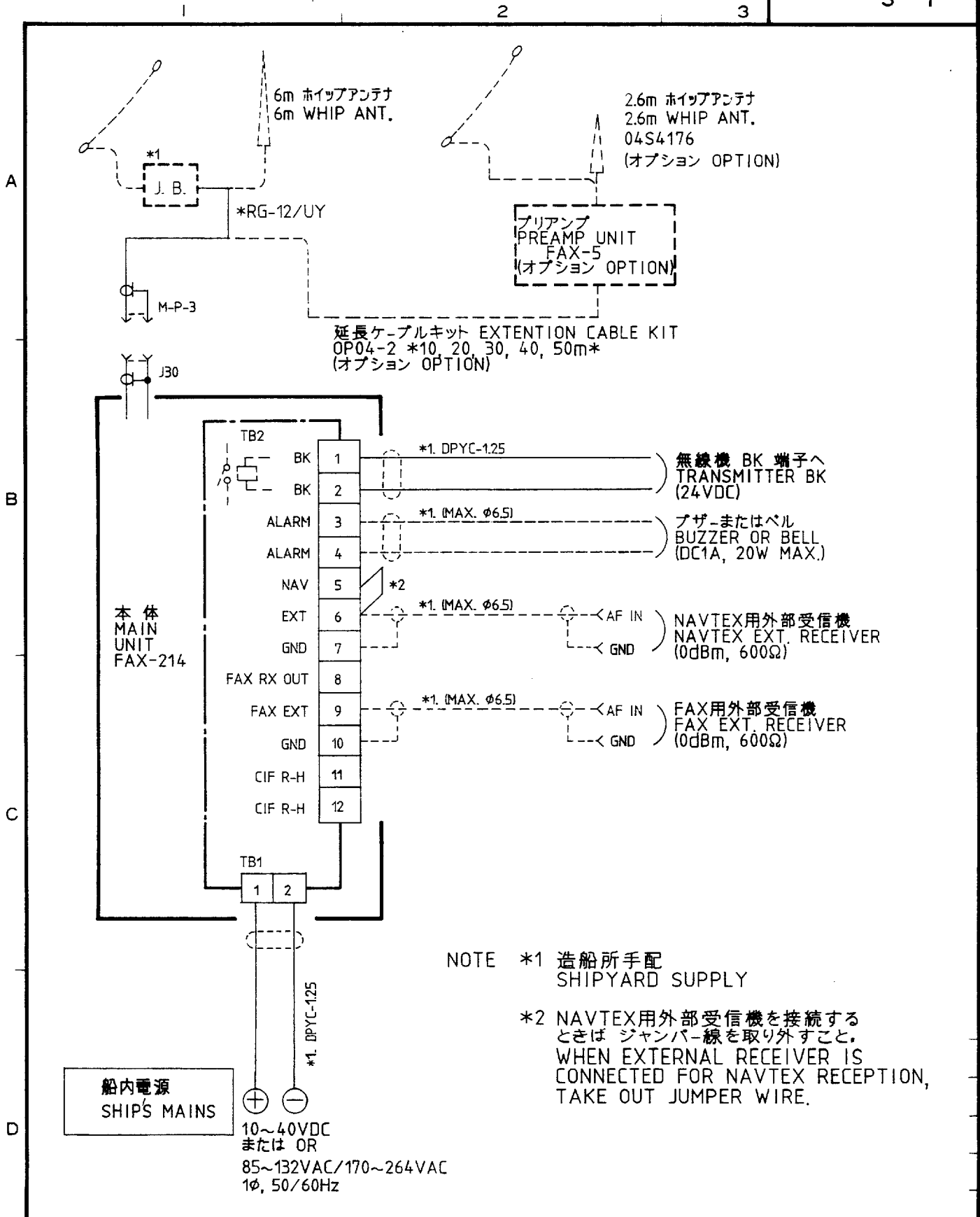


Fig. 2



NOTE *1 造船所手配 SHIPYARD SUPPLY

*2 NAVTEX用外部受信機を接続するときば ジャンパー線を取り外すこと。
WHEN EXTERNAL RECEIVER IS CONNECTED FOR NAVTEX RECEPTION, TAKE OUT JUMPER WIRE.

船内電源 SHIP'S MAINS

10~40VDC
または OR
85~132VAC/170~264VAC
1φ, 50/60Hz

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
承認 APPROVED	JAN. 28 '88 T. NAKANO	三角法 THIRD ANGLE PROJECTION	名称 TITLE	相互結線図 FAX-214 INTERCONNECTION DIAGRAM	
検図 CHECKED	Jan. 28 '88 M. IKEDA	尺度 SCALE			
製図 DRAWN	Jan. 28 '88 TAKAHASHI	重量 WEIGHT	kg	図番 DWG.NO.	C6246-003-A

