

RAYTHEON SERVICE COMPANY
(RAYTHEON MARINE)

28 MAY 1991

License Application: NEW-INMARSAT SATCOM

ITEM 6. DIRECTIONAL ANTENNA

The JUE-45A MII Inmarsat-A Ship Terminal Station utilizes a directional parabolic antenna with a 15 degree beamwidth at the -3dB points. This antenna tracks the satellite and is capable of positions from the horizon to zenith (3° to 90° elevation) and 360 degrees in the horizontal plane. (See attached brochures)

The JUE-75A Inmarsat-C Marine Mobile Earth Station has an omnidirectional antenna with a hemispherical radiation pattern.

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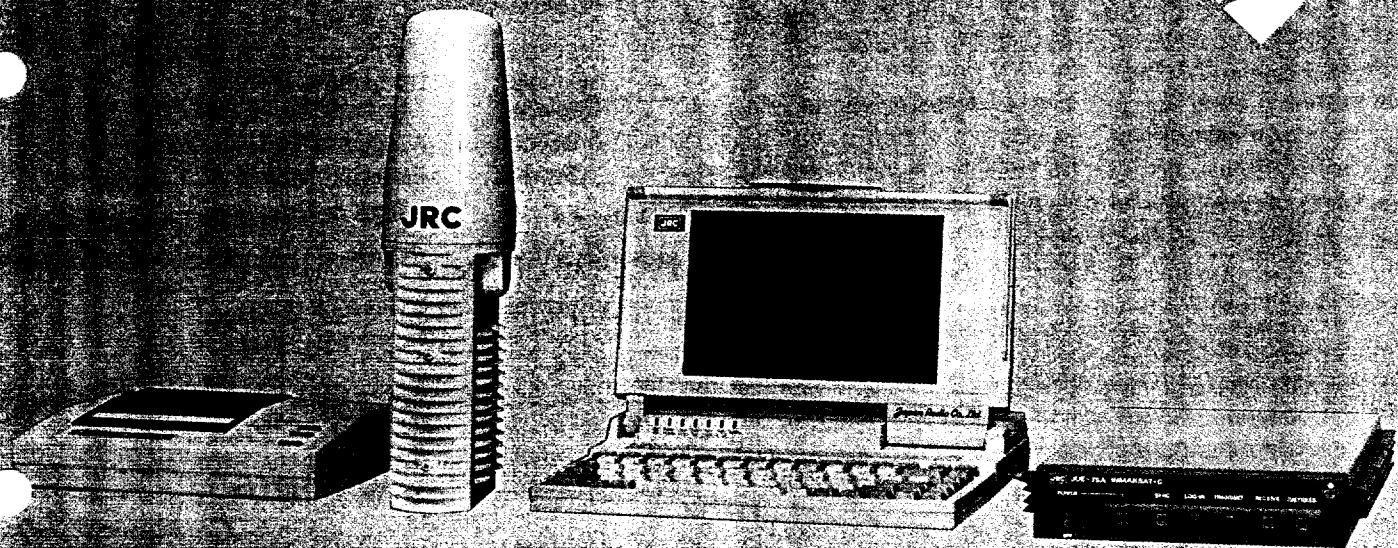
ITEM 10. NARRATIVE STATEMENT OF PURPOSE

Raytheon Marine Company sells and maintains these Inmarsat Ship Terminal Equipments onboard ships around the world in support of the new Global Maritime Distress and Safety System (GMDSS). The intent of this station is solely for the purpose of providing technical maintenance training and support as well as operator training for Inmarsat Type Approved Shipboard Terminal Equipments sold and serviced by Raytheon Marine Company. The purpose of this training is to provide our customers with, not only well qualified service, but also knowledgeable operators who are thoroughly competent in the proper usage of these Inmarsat Satellite Communications Systems.

JRC INMARSAT-C MARINE MOBILE EARTH STATION JUE-75A



Designed in compliance with the carriage requirements for the GMDSS to enter into force on February 1, 1992.



The JUE-75A Inmarsat-C mobile earth station is designed for marine use and provides two-way data/message communications anywhere in the INMARSAT coverage area. The JUE-75A is a very small, light-weight and low-cost terminal and can be installed on small fishing and leisure boats.

Moreover, its operation is simple, supported by a user-friendly software and interactive multi-level menus with window-menus. Installation is also easy with a single EME/IME coaxial cable.

To meet the carriage requirements for the Global Maritime Distress and Safety System (GMDSS) that will be implemented in 1992, the JUE-75A can optionally be equipped with a remote distress button, a buzzer box and an automatically switchable AC/DC power supply.

The JUE-75A incorporates JRC's outstanding technology of the JUE-series Inmarsat terminals that have earned a high reputation for their field-proven quality and reliability.

■ STANDARD FUNCTIONS

● Store and Forward Message Transfer

Store and forward messages are transmitted in two ways between the MES and land-line telex or electronic mail subscribers through satellite channel.

● Distress Alert

An automatically formatted distress alert can be activated by simple key operation. The alert includes ship's position, ID, date/time and the other navigation data which can be updated manually, or automatically if navigation equipment is connected to the MES.

● Polling

The MES is programmed to automatically respond to specific calls from land-line subscribers in a pre-determined method.

The ship's position data, if built-in a GPS receiver is incorporated or through an interface circuit, can be transmitted.

● Data Reporting

The MES is capable of automatic transmission of a small amount of data such as position data in regular intervals scheduled by the onboard operator.

● Abbreviated Dialing

Abbreviated dialing permits subscriber calling by one or two digit dialing.

Redialing of the last dialed number is also available.

● Enhanced Group Call Reception

The MES incorporates an EGC receiver which receives SAFETYNET and FLEETNET messages.

● Testing Facilities

To maintain the fail-free operation of the MES and the integrity of the Inmarsat system, the MES incorporates the following testing facilities:

- Fail-safe
- Self-monitoring
- Automatic testing for performance verification and commissioning test

■ OPTIONAL FUNCTIONS

● DTE and printer

The MES is compatible with several types of lap-top PC and two types of printer.

● GPS Receiver

By adding a JRC GPS receiver on the JUE-75's IME (Internally-Mounted Equipment), position polling and reporting are available.

● Remote Distress Button (RDB)

The RDB is fitted in the position from which the ship is normally navigated, and only pushing the button activates the distress alert.

● Buzzer Box

On receipt of a valid or urgent message in the position from which the ship is normally navigated, the buzzer box generates audible alarms.

● External Data port

The MES is provided with an external data port to interface with onboard data sources through a data interface unit.

● AC/DC Power Supply

In case of failure of the ship's mains (AC source), the AC/DC power supply is automatically switched to a reverse source, that is, an emergency DC source.

■ SPECIFICATIONS

Frequency range : TX:1626.5 - 1646.5 MHz
RX:1530.0 - 1545.0 MHz

Antenna pattern : Hemisphere

Polarization : Right-hand circular

EIRP : 14 ± 2 dBW

Modulation : TX: 600 symbols/sec, BPSK
(1st generation satellite)
1200 symbols/sec, BPSK
(2nd generation satellite)

Coding : RX: 1200 symbols/sec, BPSK
Interleaved, convolutional code
($R = 1/2$, $K = 7$)

Data rate : TX: 300 bps (1st generation satellite)
600 bps (2nd generation satellite)
RX: 600 bps

Primary power : 12-24 VDC +35%, -20%

Environmental conditions

Temperature

Operational : -35°C to +55°C (EME)
-25°C to +55°C (IME)

Survival : -40°C to +80°C (EME/IME)

Humidity : Up to 95% at 40°C

Vibration

Operational : Random vibration - 0.5g rms

Survival : Random vibration - 1.0g rms

Interface : NMEA 0183 and JRC standard format

■ COMPONENTS

Externally Mounted Equipment (EME)

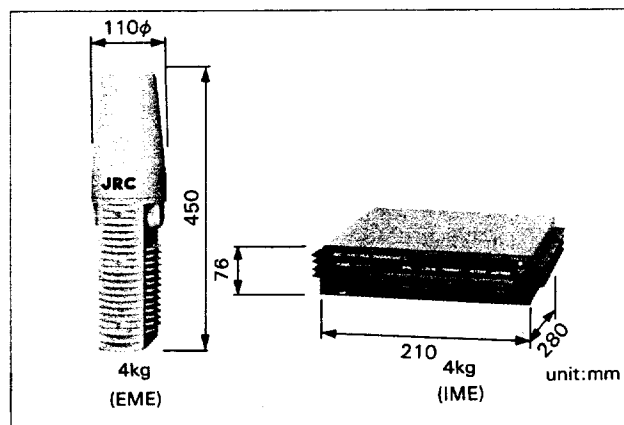
Internally Mounted Equipment (IME)

EME/IME Coaxial Cable

Data Terminal Equipment (Option)

Printer (Option)

■ DIMENSIONS & WEIGHTS



Note: JRC reserves the right to change the design and specifications of the equipment for improvement without notice.

JRC

Since 1915

Japan Radio Co., Ltd.

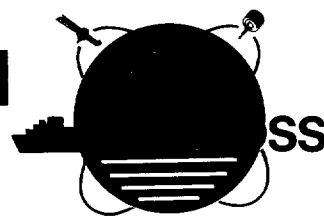
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Seattle, Rio de Janeiro, Harlow,
Rotterdam, Las Palmas.

JRC INMARSAT-A SHIP EARTH STATION JUE-45A MII



Designed in compliance with the GMDSS carriage requirements under the latest SOLAS



Japan Radio Co. Ltd.

ABUNDANT, ENHANCED CAPABILITIES FOR QUALITY COMMUNICATIONS

The JRC model JUE-45A MII is a new version of the JUE-45A Inmarsat-A Ship Earth Station, which was type-approved by INMARSAT in April 1990 in accordance with the INMARSAT Technical Requirements.

The JUE-45A MII is, in the class 1 version, also designed to comply with the carriage requirements for the Global Maritime Distress and Safety System (GMDSS) that will be implemented on 1 February, 1992.

Not to speak of the highest reliability of the JUE-series SES in the world, the JUE-45A MII features its improved compatibility with various types of gyro compass, additional optional functions and easier installation, compared with the JUE-45A SES.

JRC, THE DEPENDABLE SUPPLIER OF QUALITY SATCOM TERMINALS

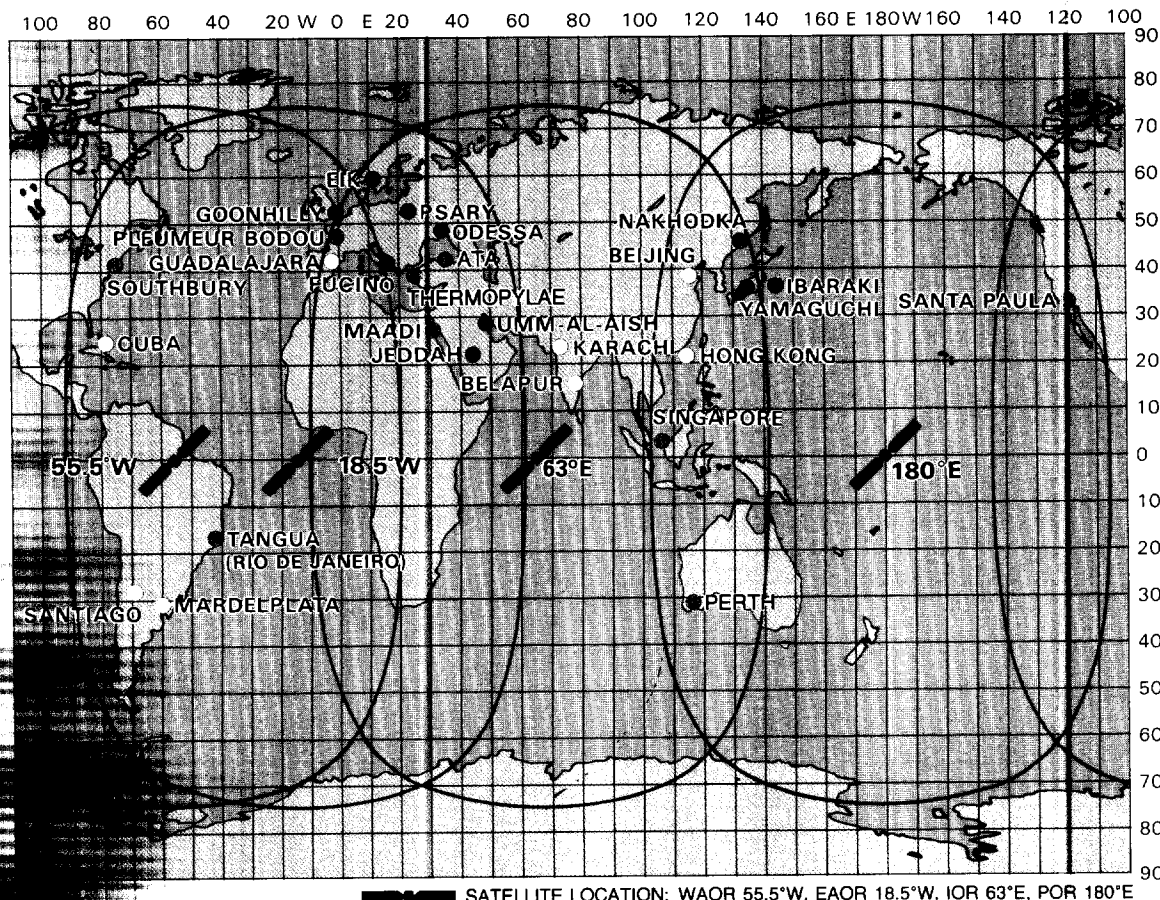
Worldwide Field-Proven Reliability

Since delivering the first JUE-series satellite communications terminal in 1977, JRC has become the world's largest supplier of shipboard satellite communications terminals.

Based on worldwide users' field experience with the

JUE-series Ship Earth Stations (SES's), JRC has improved SES technology, always keeping it at the state-of-the-art level. As a result, the JUE-series SES has a proven superior reliability – over 40,000 hours MTBF (Mean Time Between Failures).

Coverage area of the INMARSAT system at elevation angle of 5°



FEATURES

■New Enhanced Features

The new model JUE-45A MII SES is designed to comply with the carriage requirements for the GMDSS that will be implemented on 1 February, 1992, and it can also operate in the fourth coverage region that will be implemented at the end of October, 1990. The JUE-45A MII is compatible with various types of gyro compass, and new option - Distress Message Unit - is additionally available.

■Flexible Installation

The BDE's main unit is available in various types; bulkhead-mount, table-top, floor-standing and rack-mount. By mounting the main unit in a terminal stand to combine it with the Video Display Unit (VDU), the BDE's installation space is minimized.

The ADE is provided with two hatches for easy access to the radome inside, ensuring easy selection of its installation position and easy checking and maintenance, especially when it is mounted on girder-type mast.

The ADE can be installed even at a location exposed to radar beams, ensuring easy selection of its installation position.

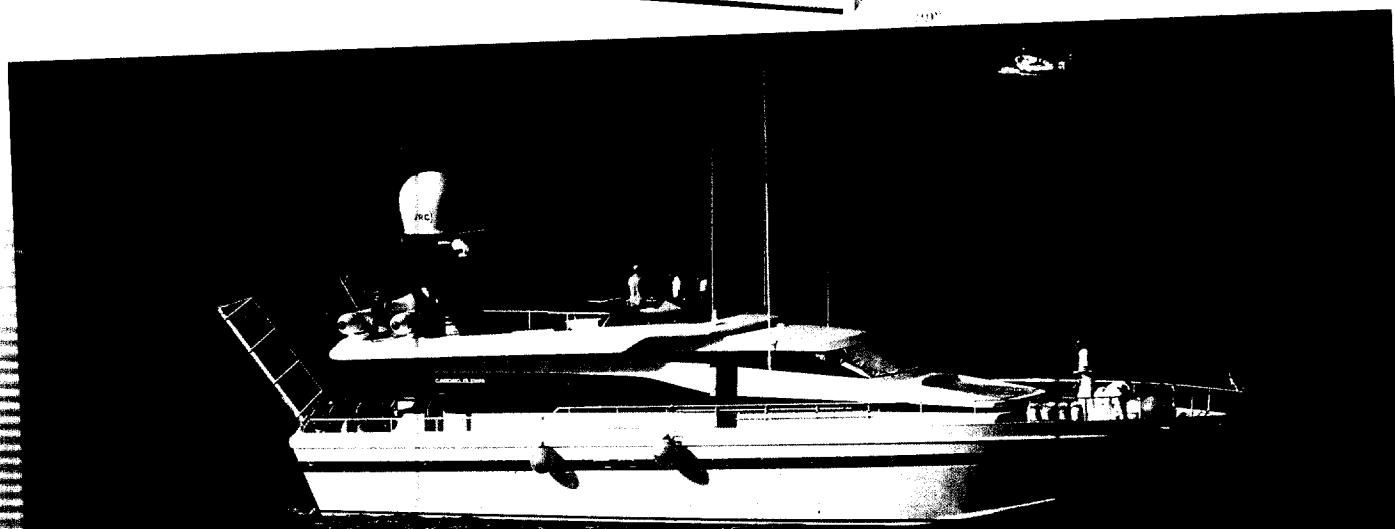
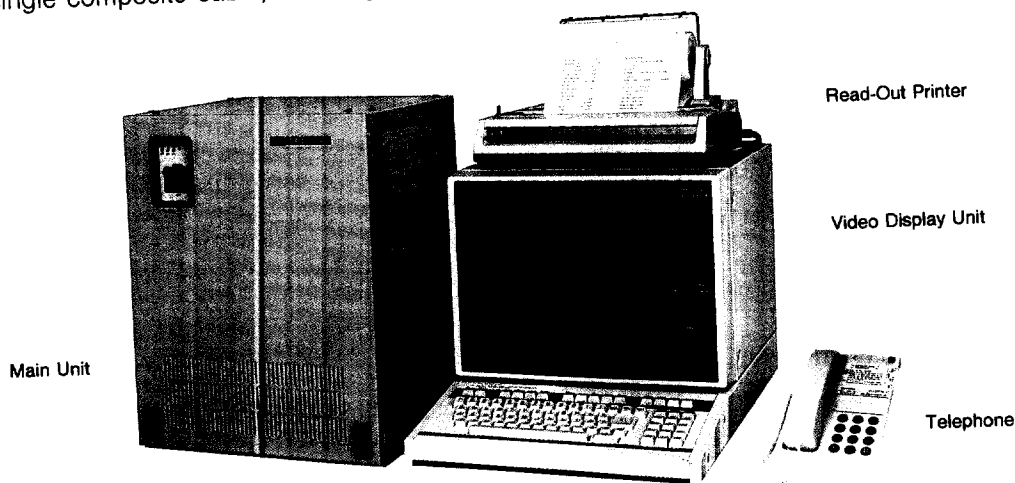
Interconnection between the ADE and the BDE is made with a single composite cable, ensuring easy installation.

■Self-Testing Facility and Alarm Pack

The JUE-45A MII incorporates many sophisticated self-testing facilities to ensure easy troubleshooting and maintenance, including automatic testing of Read Only Memories (ROMs), Random Access Memories (RAMs) and echo-back. When the self-diagnostic testing is executed on a manual test command, the results of tests are displayed on the Video Display Unit (VDU) and printed out on the Read-Out Printer (ROP).

All main circuits incorporate alarm detectors. The alarm information for the entire equipment is automatically stored in an alarm pack together with time data and equipment status information. The stored information in the alarm packs can be outputted via manual output command on the VDU's screen and on the RO Printer, allowing easy checking of the alarm records.

In this manner, ship personnel and service technicians can see a written record of any intermittent conditions that have existed and "after the fact" remedies can be accomplished.



STANDARD FUNCTIONS

• Automatic Antenna Scanning and Automatic Satellite Selection

Automatic antenna scanning allows the JUE-45A MII to automatically search for and find the TDM signal from the satellite, eliminating the need for manual input of AZ/EL angles for antenna pointing. Even if the signal is temporarily blocked (mast, stack, etc.), the system will automatically recover.

In case the SES can not receive the TDM signal from one satellite with the antenna's elevation angle of 7° or less in a boundary area where two satellite coverages overlap, it automatically selects the other satellite to receive the TDM signal. If no TDM signal can be received despite satellite change, the antenna is automatically pointed back to the original satellite.

When the SES can not receive the TDM signal after its power fails momentarily, the antenna is automatically re-pointed to the satellite within one minute.

With a satellite navigator (option) connected to it, the SES can calculate the direction of the satellite from the ship's position and point to the satellite.

• Abbreviated Dialing and Redialing

The SES is capable of abbreviated dialing and redialing. The abbreviated dialing permits calling by dialing a one-digit or two-digit code instead of 10 digits or more for a telephone or telex number. The SES can store up to 40 abbreviated dial codes for telephone and telex, respectively. The redialing function permits the last number dialed to be automatically redialed. The last dialed number can be memorized individually in each telephone and each VDU.

• General Purpose Telephone Interfaces

The SES is provided with four 2-wire interface circuits for system expansion to interface with telephone channel Data Terminal Equipment (DTE) for general purposes.

The two-wire interface incorporates a four-wire/two-wire convertor and an echo suppressor. The typical telephone channel DTE which can be connected to the SES are;

- Telephones (remote telephones)
- Facsimile transceivers
- PABX interfaces
- Data modems (300 to 9600 bps)
- Personal computer (PC-to-PC data transmission)

• Automatic Reception of Data Transmission

An onboard DTE can be automatically connected with a shore-based terminal on the voice channel (telephone line) without intervention of an onboard operator. The automatic reception is made in the following two modes;

(1) "9" dialing

When dialing "9" ahead of the ship station number, the onboard DTE as preselected by operator on the VDU is automatically connected with the shore-based terminal through a coast earth station which provides the "9" dialing function.

(2) Telex designation

When a shore-based subscriber requests a voice call or data transmission after sending a prescribed command by telex to designate an onboard DTE, the DTE automatically initiates to receive the data on the channel.

• Telex File Transmission by Automatic Request

A data file can be transmitted automatically from the VDU to a shore-based terminal via telex channel, eliminating keyboard operation except command operation after initial setting of the file number, the subscriber's telex number/answerback, etc.

When the command for telex file automatic transmission is keyed in, the SES initiates automatically the telex call and automatically transmits the specified file to the shore-based subscriber after detecting his answerback.

• Telex File Transmission by Polling Command

A shore-based subscriber can directly access a file in the onboard VDU by keying in a polling command during telex communications. Upon receipt of a response signal from the SES a pre-programmed password is keyed in on the shore-based terminal. Up to 8 passwords are available for pre-programming to perform the telex file transmission.

• Video Display Unit (VDU) with Read-Out Printer

The VDU provides display of transmitting/receiving messages, centralized control of the entire SES equipment and word-processing capabilities such as editing/storing.

The transmitting and receiving messages can be presented in normal or reverse field mode on the VDU.

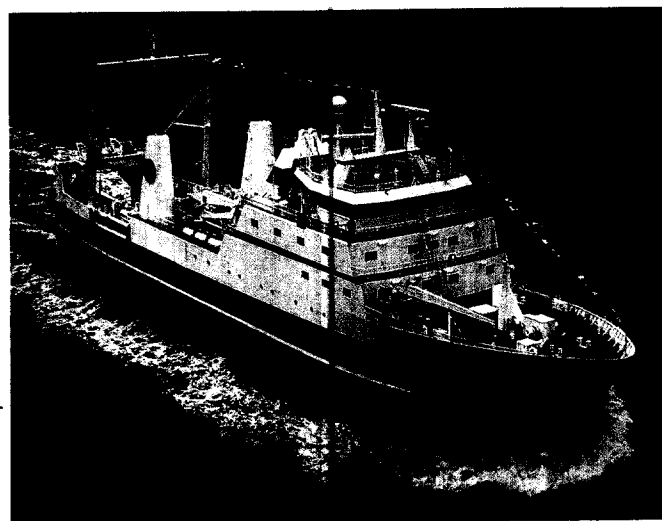
Ordinary telephone and telex communications as well as those in case of emergency are easy to initiate in an interactive mode according to the operation procedure displayed on the VDU screen.

The messages in the memory are kept stored by a super-capacitor even in case of power failure for 12 hours or more.

The standard file memory capacity in the VDU is 16K bytes for transmission (editing) and 16K bytes for reception. The 16K byte messages are equivalent to approximate 40-minute telex messages.

The total number of characters of an edited message is indicated on the VDU screen for estimating communication charges.

The 14-inch display screen presents messages with clear, large and easy-to-read green characters (2.54 mm (W) × 5.0 mm (H)/character).



The VDU is also provided with a serial port to connect external equipment such as paper tape punch/reader.

The RO Printer is capable of copying in triplicate. The line spacing for printing can be selected from 4, 6, and 8 lines per inch.

• Verbal Instructions

The telephones can be operated by following synthetic voice instructions (short English verbal commands) that are given from the handsets in an interactive mode. Anyone who has no skill of operation can easily initiate a telephone channel request call.

This function can be turned on/off for each telephone as it may be needed. When any telephone is using these verbal instructions, another telephones can not be used.

• Communication Duration Auto Print

When a telephone or telex call is finished, the call data i.e. communication duration, start time, called number, communication mode, calling telephone number and priority are printed out automatically on the RO Printer. The communication duration includes the time required for making the connection. However, by pressing any numerical key of the telephone when the called party answers, the communication duration counter restarts, resulting in more accurate communication duration printout.

VARIETY OF OPTIONS

• Voice Distress Box (VDB)

By using the VDB and telephone, a voice distress call can be requested from the radio room or the captain room even when a person is communicating with the SES. Up to 2 VDBs can be connected to the SES.

• Distress Message Unit (DMU)

In an emergency, by pressing the two buttons of the DMU, the stored distress information (ship's name, nationality, ship's position, nature of distress, etc.) is automatically transmitted to the rescue center via telex channel.

• Automatic Ship's Position Reporting System

By adding an interface circuit board, a satellite navigator can be connected to the SES. The navigational information including ship's position from the satellite navigator is reported to the shore office via telex channel on a polling command from the shore office, or on a manual command by the onboard operator.

By adding the Telex Channel Interface (TCI), the SES can be pre-programmed to originate telex calls, automatically making scheduled transmission for ship's position reporting to the shore office without intervention by the operators onboard and ashore.

The interface condition between a satellite navigator and the BDE main unit is RS-232C, 20 mA current loop, or NMEA0183.

• VDU File Transmission on Telephone Channel

By adding a data modem and inserting a data RAM PCB in the Terminal Control Unit (TCU) in the BDE, and on the other side by adding a personal computer, a data modem and communication software at the shore office, a message file in

• Designation of Call Originating Telephones

Up to 5 telephones can be designated for calling (request call). Of these designated telephones, the telephone whose handset is first picked up can originate a call. A distress call can be originated from every telephone.

• Designation of Ringing Telephones for Incoming Call

Up to 5 telephones can be designated to ring at an incoming call, and the first handset to be picked up will receive the call.

• Absentee-Transfer

When the handset of the ringing telephone is not picked up for 25 seconds or more after the bell starts ringing, all other telephones (up to 4) will ring. This absentee-transfer function can be turned on/off as it may be needed.

• Telephone Monitor

The SES is provided with a telephone monitor circuit. The incoming voice can be monitored in a remote place through an onboard public addressor.

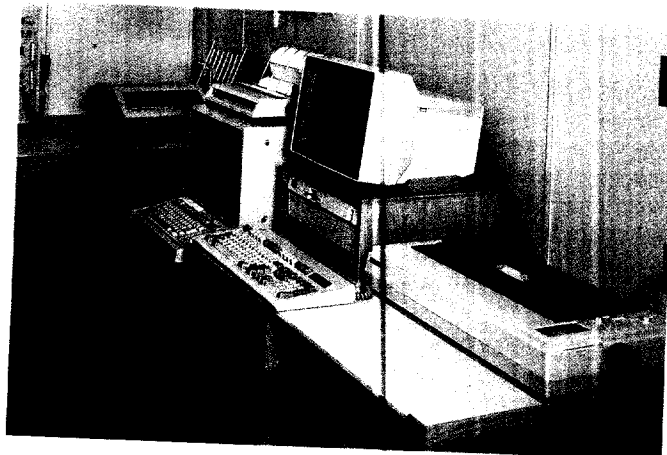
• Compass Interface

The SES can be interfaced with a gyro compass or a magnetic compass providing the output signals of three-phase step pulses or synchro signals.

the onboard VDU can be transmitted to a personal computer at the shore office at 1,200/2,400 bps via telephone channel, thus shortening communication time and saving costs. The onboard VDU message file can also be transmitted by shore polling, while a data file in a shore personal computer can be received by the SES on the telephone channel.

The data file messages displayed on the VDU screen can once be stored in the data RAM, then transmitted to a shore office. The text messages received from shore are stored in the memory on an optional function PCB (OFB). The stored messages can be displayed on the VDU screen and printed out on the RO Printer, by a command from the VDU keyboard.

The data RAM has a maximum capacity of 160K bytes; 16K bytes for transmission and 144K bytes for reception. One file for transmission and 32 files for reception are available. The interface condition between a data modem and the BDE main unit is RS-232C.



• Confidential Message

By inserting a memory PCB into the Terminal Control Unit (TCU) in the BDE, a confidential message from the shore office can be saved in a memory board without being displayed. The saved message can be recalled and displayed on the VDU screen or printed out on the RO Printer when the addressee or his delegate onboard keys in his unique pre-programmed cipher. The memory has a maximum capacity of 64K bytes (15 files) equivalent to messages for 2.5 hours or more.

• Call Logging History

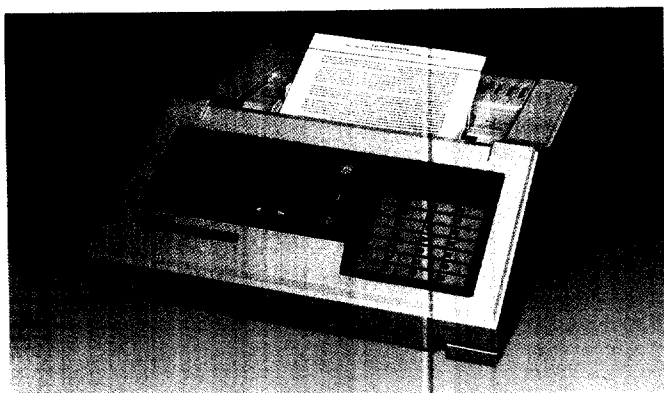
By inserting a memory PCB into the TCU, a communication traffic record can be printed out by the RO Printer in a specified logging format for both incoming and outgoing calls. 100 calls for telephone and telex, respectively, can be stored in the memory for printout when manually selected. The call logging data is the same as that of "Communication Duration Auto Print" with the exception of the memory storage.

• Personal Access Code

In telephone or telex calling, the user's access code (secret code) has to be keyed in before a call can be originated. The SES is capable of storing a register of 84 users' names with users' access codes. The users' names, but not their codes, are printed out in the call logging registration as applicable. A distress call can be originated without keying in a user's code.

• Facsimile Transmission

Drawings and texts can be transmitted and received between the ship station and the shore office via telephone channel. When the subscriber dials the second SES number or the "9" ahead of the main SES number, the onboard facsimile transceiver is automatically started. When the SES needs the automatic facsimile reception through a CES providing no "9" dialing service, the SES should provide the optional second SES number.



• Remote Telephones

In addition to one standard telephone, up to 4 remote telephones can be connected to the SES. Call transfer* and absentee-transfer service are also available to those remote telephones installed on the bridge and in other locations. A maximum of 5 telephones can also be used for internal onboard communications (intercom).

*Call transfer: Transfer of an incoming call to remote telephones.

• Buzzer Boxes

In order to inform the bridge and other locations of incoming calls of telephone, telex and data/facsimile, up to 4 buzzer boxes (2 + 2 in parallel connection) can be connected to the SES.

• Second SES Number

Shore-based telephone subscribers can dial the second ship earth station number to automatically start the onboard telephone channel DTE connected to the No. 2 telephone port.

• PABX Interface

By connecting a JRC PABX interface between a ship's exchange (PABX) and SES, INMARSAT communications service is available to cabins equipped with ordinary extension telephones.

• Memory Capacity Expansion

The VDU memory capacity for transmission (editing) can be expanded in 16K-byte steps up to 80K bytes in the internal memory. The VDU memory capacity for receiving (File 0) can be also expanded in 16K-byte steps up to 48K bytes in the internal memory.

• Paper Tape Punch/Reader (PTP/PTR)

Text messages stored in the VDU can be punched out in paper tape, while the messages in punched paper tape can be stored in the VDU memory or transmitted to shore-based telex subscribers. As the punch code, CCITT #2 (5-units), NTT (6-units) and ASCII (8-units) are available. Interface condition with the VDU is RS-232C.

• Remote VDU with RO Printer

The remote VDU with RO Printer can be used for supervision of the SES equipment and for message text editing while the main VDU is in use for telex communications.

• Backup Power Supply

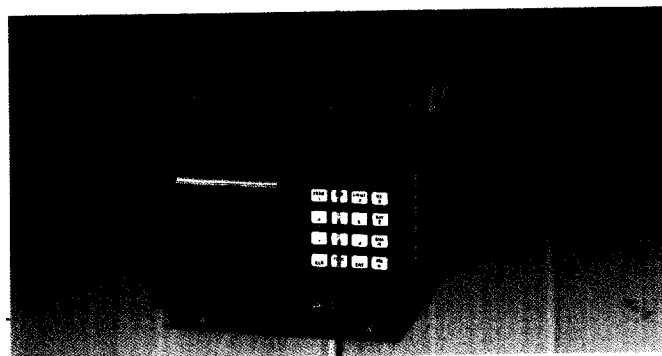
An inverter (DC-AC transformer) is available as a backup power supply unit to allow the SES to operate normally in case of failure of the ship's mains.

• Operation Panel Unit (OPU)

The OPU enables the supervision of the SES equipment status, the antenna control, the setting of area code and tests by key operations.

• EGC Decoder

When connecting a JRC Enhanced Group Call (EGC) decoder to it, the SES can receive the SAFETYNET and FLEETNET services. SAFETYNET is a broadcasting service for maritime safety information such as shore-to-ship distress alerts, weather forecasts and coastal warnings. FLEETNET is a commercial communication service which allows terrestrial information providers to send messages to pre-defined groups of subscribers.

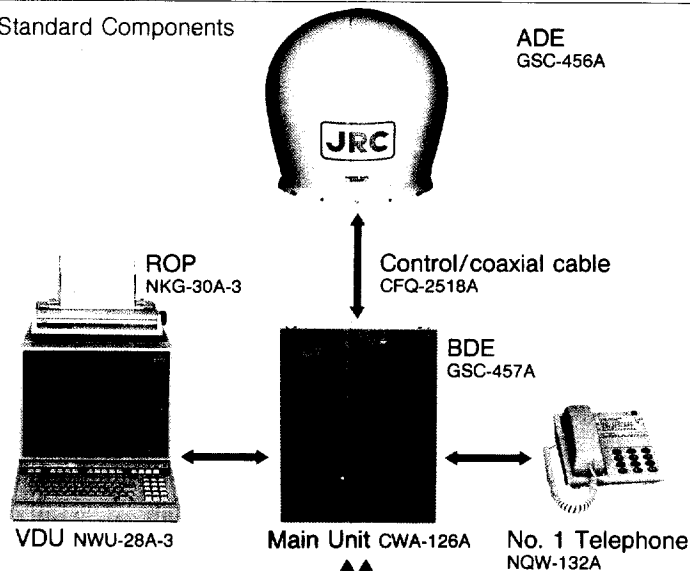


• Slow-Scan TV-Still Picture Transmission

Slow-scan TV equipment is available to transmit multicolor still pictures via telephone channel to the shore office.

SCHEMATIC DIAGRAM

• Standard Components



ADE	Antenna Assembly
	Frequency Translation Unit (FTU)
	Antenna Control Unit (ACU)
BDE	Radome Assembly
	Terminal Control Unit (TCU)
	Power Supply Unit (PSU)
	Terminal Board
	Video Display Unit (VDU)
	Read-Out Printer (ROP)
	Telephone
Single Cable (Note 1)	
Operation Manual with antenna initial setting quick chart	
Spares Kit (Note 2)	

(Note 1): A single cable is used for controlling antenna and transceiving RF signals.
The standard lengths of the cable are 25, 30, 40 and 50 m. The cable length can be extended up to 100 m optionally.

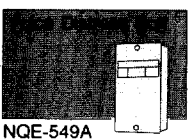
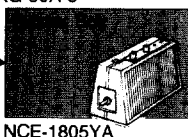
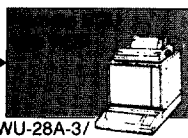
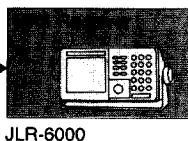
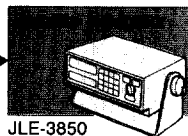
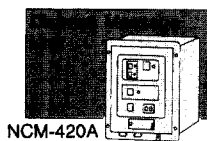
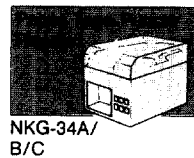
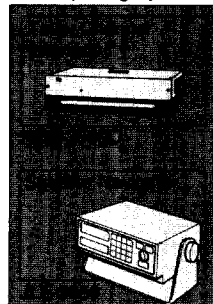
(Note 2): Spares Kit consists of 18 fuses, 1 test plug, 1 RO Printer ribbon, 3 paper rolls and 1 spare-parts box.

Gyro cable (Dock supply) 250 V MPYC-5 or equivalent

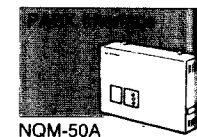
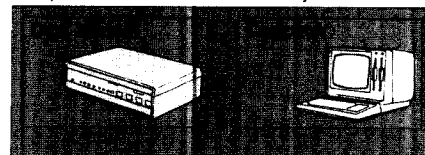
Power cable (Dock supply) 660 V DPYC-3.5 or equivalent 100/110/220 V AC,
1 ϕ , 60 Hz, 590 VA (440 V AC: option)

• Optional Components

Automatic Ship's Position Reporting System



Computer Data Communications System



Telex Channel Interface is available to connect up to 6 serial data output sensors (JRC satellite navigator, data logger, etc.).

SPECIFICATIONS

Frequency Range

Transmit: 1636.5 to 1645.0 MHz

Receive: 1535.0 to 1543.5 MHz

Tuning: 339 channels with 25 kHz spacing

EIRP: (36 ± 1) dBW

G/T: -4 dB/k

Modulation

Telephone: SCPC FM for transmission and reception

Telex: 4.8K bps 2 ϕ PSK/TDMA for transmission

1.2K bps 2 ϕ PSK/TDM for reception

Antenna

Type: 0.89 m diameter parabolic reflector

Polarization: Right-hand circular

Beamwidth: 15° at 3 dB down

Pointing: Automatic step tracking with 4-axis stabilization

Enclosure: FRP radome (1.39 m diameter)

Primary Power

Voltage: 100/110/220 V AC $\pm 10\%$, 1 ϕ (440 V AC: option)

Frequency: 60 Hz $\pm 6\%$

Consumption: 590 VA max.

Environmental Conditions

Temperature

ADE: -35°C to +55°C

BDE: 0°C to +45°C

Relative humidity: Up to 95%

Icing: Up to 25 mm

Precipitation: Up to 100 mm/hour

Winds: Up to 100 knots (in operation)

Up to 120 knots (in survival)

Vibrations: As specified by INMARSAT

Coverage

Azimuth: $\pm 270^\circ$ with automatic rewind

Elevation: 3° to 90°

Ship's Motions

Roll $\pm 33^\circ$; pitch $\pm 13^\circ$; yaw $\pm 8^\circ$;

Surge ± 0.2 g; sway ± 0.2 g; heave ± 0.5 g;

Turning rate 6°/sec.; headway 30 knots

Video Display Unit

CRT: 14-inch, green, non-glare

Character size: 2.54 mm (W) $\times$ 5.0 mm (H)

Memory capacity: 32K bytes (standard)

Dimensions and Weight

ADE: 1,390 mm dia. $\times$ 1,350 mm (H); 110 kg
(54.7 in. dia. $\times$ 53.1 in. (H) 242.5 lb.)

BDE: Main Unit

400 (W) $\times$ 500 (H) $\times$ 350 (D) mm; 38 kg

(15.7 (W) $\times$ 19.7 (H) $\times$ 13.8 (D) in. 83.8 lb.)

VDU with ROP

415 (W) $\times$ 625 (H) $\times$ 620 (D) mm; 35 kg

(16.3 (W) $\times$ 24.6 (H) $\times$ 24.4 (D) in. 77.2 lb.)

Telephone

150 (W) $\times$ 228 (H) $\times$ 78 (D) mm; 0.7 kg

(5.9 (W) $\times$ 9.0 (H) $\times$ 3.1 (D) in. 1.5 lb.)

Interface for External Equipment

Satellite Navigator: RS-232C, 20 mA

current loop or NMEA0183

Data Modem: RS-232C

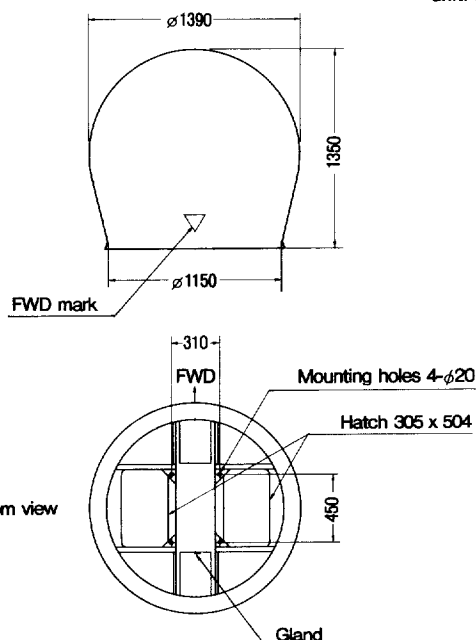
Paper Tape Punch/Reader: RS-232C

- * JRC reserves the right to make changes to its products and specifications for improvement without notice.

Above Deck Equipment

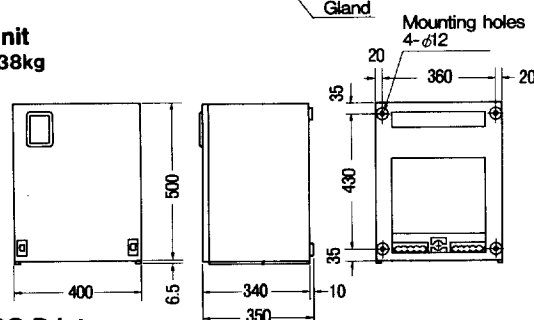
Weight: 110kg

unit: mm



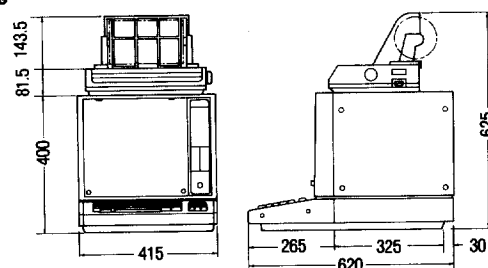
Main Unit

Weight: 38kg



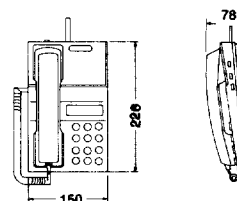
VDU/RO Printer

Weight: 35kg



Telephone

Weight: 0.7kg



For further information, contact:

JRC
Since 1915

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