AL-7203

0.82m (32") Ku-Band Linear Maritime Stabilized TVRO System

Installation and Operation Manual

DOCUMENT: MAN22-0001-3 Revision: B

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Revision History & Control

Revision History

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Rev: -	May 2002	Initial version
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SAFETY PRECAUTIONS

The following general safety information is for installing, operating, and servicing. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary. Observe the following list of safety precautions when installing, operating and maintaining the TVRO System:

WARNING

The antenna pedestal is equipped with high torque DC motors that develop considerable forces. These forces can be harmfull.

The ADE POWER switch on the Front Panel will remove power from the antenna drive motors and should be used appropriately.

WARNING

This equipment contains potentially harmful voltages when connected to the designated power sources. Never remove equipment covers except for maintenance or internal adjustments.

WARNING

Before removing the covers of any unit, verify that the main POWER switch is in the OFF position, and disconnect the power cable from the unit. Note: The ACU receives voltage from two sources: from the ship's power network and from the compass gyro.

CAUTION

Metal parts accessible to the operator are grounded to the chassis ground to prevent shock or fire hazard from lightning and similar hazards. The chassis ground conductor must not be removed or defeated. If necessary, make an appropriate power system ground to ensure the enclosure is at ground potential.

CAUTION

Only qualified and trained personnel should perform installation, operation and maintenance of this equipment.

CAUTION

Although the kevlar radome is light, two to three people are needed to lift it since the radome is bulky and will act as a sail in wind.

CAUTION

To prevent shock or fire hazard, do not expose the equipment (with the exception of the radome) to rain or moisture.

CAUTION

Avoid making unauthorized modifications to the circuitry.

CAUTION

Do not disconnect cables from the equipment while the system is powered-on.

NOTES

Interfacing this equipment requires the use of high quality connectors and cables. Use only ORBIT authorized parts for repair.

ACRONYMS AND ABBREVIATIONS

ACU	Antenna Control Unit
ADE	Above Deck Equipment
BDE	Below Deck Equipment
BIT	Built In Test
IMU	Inertial Measurement Unit
IRD	Integrated Receiver-Decoder
LNB	Low Noise Block converter
MMI	Man-Machine Interface
SDU	Stepper Driver Unit
TVRO	TV Receive Only

ABOUT THIS MANUAL

This Manual provides the shipboard system's operator with system description, operation instructions, maintenance procedures and troubleshooting guidelines. The Manual is divided into the following chapters:

Chapter 1. General Description

Provides a general description of the system, including the following main subjects:

- Introduction
- System Structure and Units
- Theory of Operation
- System Specifications

Chapter 2. Basic Operation

Provides detailed basic-operation information and instructions.

Chapter 3. Advanced Operation

Provides brief description of the advanced-operation modes, usually not used by the system's operator.

Chapter 4. Maintenance

Provides maintenance instructions, for both preventive and corrective on-ship maintenance, and a detailed troubleshooting guide.

Chapter 5. Installation Guide

Provides installation guidelines and detailed setup, configuration and installation procedures.

1. SYSTEM DESCRIPTION

1.1. AL-7200 SERIES - INTRODUCTION

1.1.1. General

ORBIT Communications-Marine Division is an experienced, dedicated designer and manufacturer of Marine Stabilized Satellite Systems covering communications and entertainment (satellite TV) systems for commercial, private and military customers.

ORBIT Communications is qualified for ISO-9001 and European CE, and uses state-of-the-art technology in order to maintain optimal performance.

The cost effective AL-7200 series is designed by ORBIT for Satellite TV Receive Only (TVRO) Marine Entertainment Systems.

It is designed to stabilize a TV antenna on ships, vessels, boats, yachts, buoys, oil rigs, etc. The System is flexible and supports different satellites, frequency bands, polarizations, antenna sizes, etc.

1.1.2. AL-7200 System Features

- Supports different antenna sizes
- No Gimbal lock during zenith pass
- Polarization stabilization supported
- Independent of Pitch/Roll inertial system
- Frequency range: C-Band and Ku-Band (Ka-Band is optional)
- Extensive maintenance and data logging features
- User-Friendly Man-Machine Interface (MMI)
- GPS Receiver
- Easy installation and maintenance
- Combination of inertial stabilization and RF step-track method, which enables tracking under severe sea conditions
- Continuous azimuth rotation with no need of slip-ring and rotary joint
- High performance antennas and feeds
- Satellite World Coverage Data Base - available satellites are displayed on the LCD screen for selection according to the actual ship position. Complete satellite and programming channel database, derived from

the industry standard International Satellite Directory, by Design Publishers, Sonoma CA.

- Capability to place some of the more advanced operational functions at the Basic Operation screen, thus enabling better control over the system to the more sophisticated users; all that without the need of giving away full access via the maintenance pass-name.

1.2. 0.8m TVRO SYSTEM

1.2.1. Introduction

The state-of-the art high performance and cost–effective AL-7203 Mk III System is designed to receive high quality analogue and/ or digital TVRO transmissions from a Ku-Band satellites and to distribute the TV signal to any desired location on the ship. The system is suitable for installation on all types of vessels from 20m and above.

1.2.2. Main Features

- Highly efficient 82cm Cassegrain antenna, similar performance to a 1.0m prime focus antenna.
- Supports analogue and digital reception.
- Fully stabilized 3-Axis antenna.
- X/Y Pedestal configuration, no gimbal lock during zenith pass, continuous azimuth rotation.
- User-friendly, Man-Machine Interface (MMI) on a high-resolution compact LCD screen.
- Built-in satellite world database.
- Powerful diagnostic and analysis tools.
- Real time data logger.
- Interface to vessels gyro compass (synchro, NMEA, step-by-step).
- Built-in GPS receiver and antenna.
- Tracking receiver included.
- Light weight: only 50kg/112lbs (including radome).
- Easy installation: single control cable.
- Option - Remote operation and analysis via a modem or remote operation via internal TCP/IP network.

1.2.3. System Description

The 0.8m TVRO system components are divided into two groups:

- Above Deck Equipment (ADE)
- Below Deck Equipment (BDE)

1.2.3.1. Above Deck Equipment (ADE)

The Above Deck Equipment (ADE) is installed (secured to a mounting plate) within a weather-tight 45-inch (1.15-meter) radome. The radome is comprised of a base and a removable dome. The radome assembly is mounted on and secured to the ship's deck. Removing the radome provides access to the ADE.

The ADE includes the following components:

- AL-7203-1A X-Y Pedestal, carrying a 0.82-m casegrane antenna, which is equipped with a Ku-Band feed assembly. The feed assembly includes an LNB, Ferotor and feed.
- AL-7203-SDU3 Stepper Driver Unit (SDU), including stepper-motor drivers.
- AL-7203-IMU-NT3 Inertial Measurement Unit including a Pitch/Roll sensor and short-term Yaw sensor
- AL-7203-MUX3 Multiplexer Unit, including a +5V/±12VDC power supply, a GPS receiver (to which the GPS antenna is connected), and a MUX card that enables to transfer a large amount of data and control signals on only one cable (for easy and convenient installation).
- AL-7203-F.P3 Front Panel Unit, providing the following ADE external interfaces: 110/220 VAC mains supply, control/data I/O, RF cables (up to 4).
- AL-7203-P.S Power Supply Unit, which provides 24VDC voltage to the SDU.

The following figures provide ADE general views and outline drawings.

Figure 1. ADE General View

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Figure 2. ADE General View – Radome Removed

Figure 3. ADE General Internal View (Radome Removed)

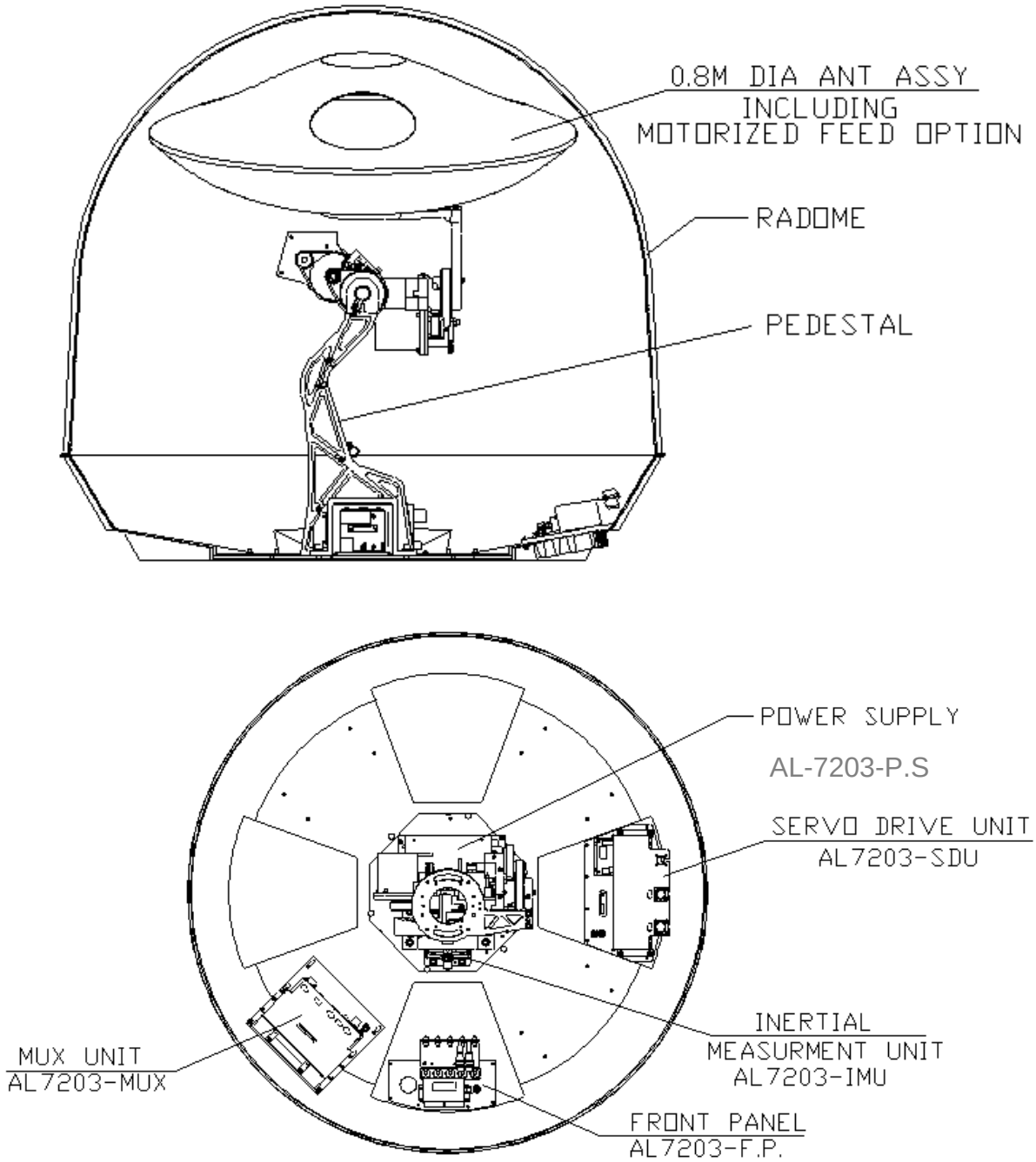


Figure 4. ADE – Units Location and Identification

Figure 5. ADE – Units Location and Identification

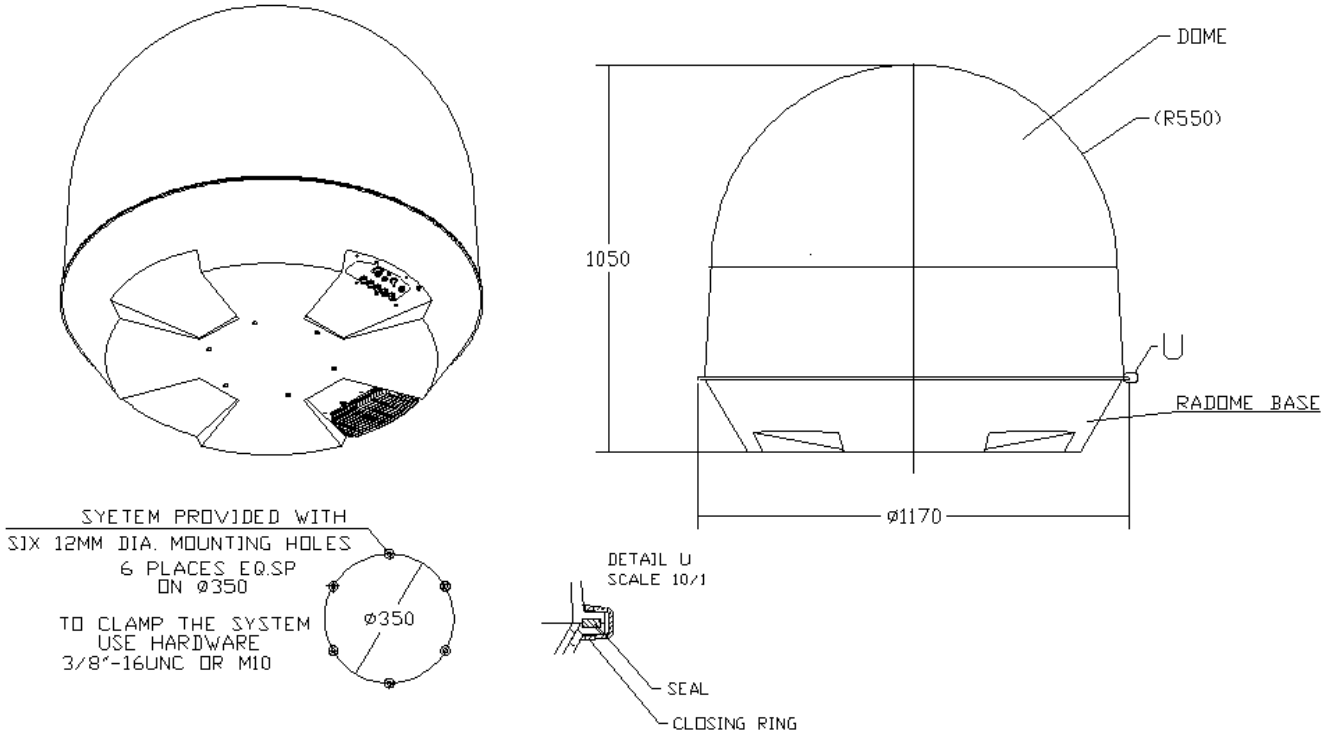


Figure 6. ADE Outline Drawing

1.2.3.2. Below Deck Equipment (BDE)

The Below Deck Equipment (BDE) comprises an AL-7203-CONT3 Antenna Control Unit (ACU), which controls the operation of the TVRO system. The ACU includes a tracking receiver and interface to ship gyro compass.

The AL-7203-CONT3 ACU is a 19" 4U, 14-slot industrial computer, with TFT LCD and keypad, featuring a user-friendly man-machine interface.

The AL-7203-CONT3 main features are:

- "ON SCREEN" user-friendly man machine interface
- Digital Control Loops Interface to the Servo Drivers for X/Y axes, DC Driver for POLL axis and GPS receiver.
- Interface to the ship gyro compass
- Advanced stabilization algorithm which processes the IMU Roll & Pitch sensor data as well as the GPS readout into real-time antenna pointing commands
- Satellite World Coverage Data Base
- Powerful diagnostic tools (BIT)
- Real time data logger
- Enhanced maintenance functions
- Fully automatic operation
- Power: 110 or 230 VAC, 50 or 60 Hz

The AL-7203-CONT3 contains the following cards:

- CPU Card
- Receiver Card
- I/O Card

Figure 7. ACU General View

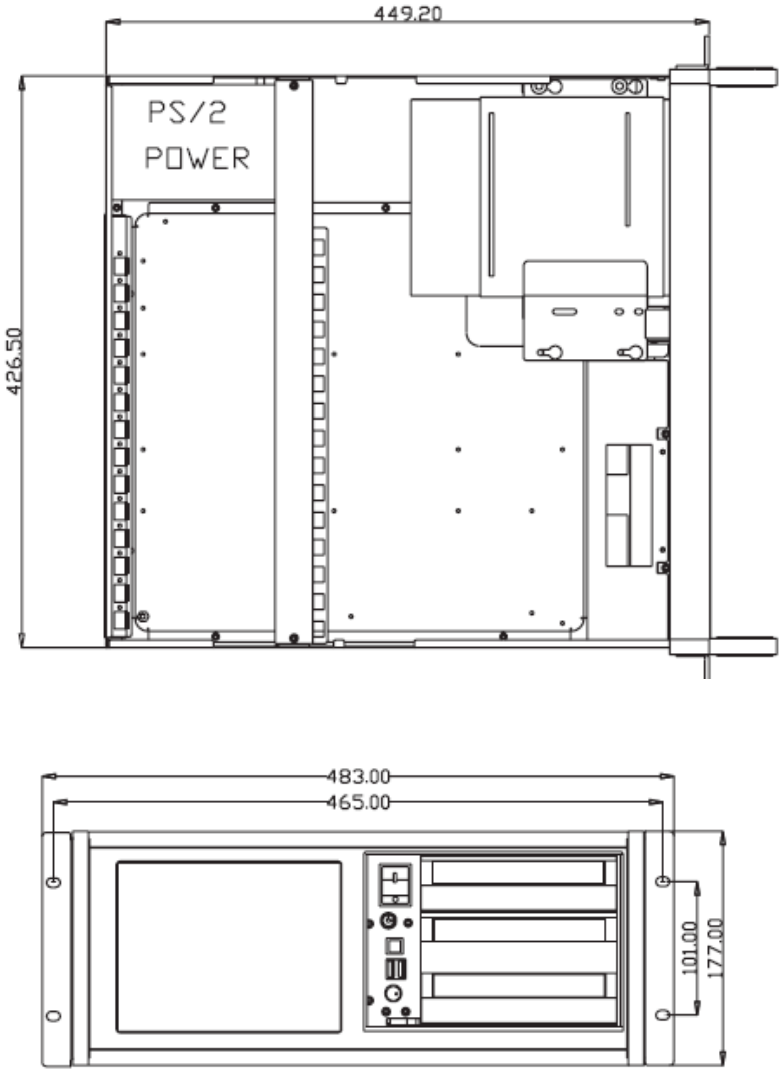


Figure 8. ACU Dimensions (Top and Front Views)

1.2.4. Theory of Operation

1.2.4.1. Block Diagram Description

The operation of the TVRO system is fully controlled from the AL-7203-CONT3 ACU (installed below the deck). Using the ACU, the operator may select the desired satellite and channel from a list displayed on the ACU monitor.

The system automatically extracts the desired satellite information using the sattelite database, acquires it and tracks the selected satellite by pointing the antenna towards the satellite, while compensating for the platform pitch, roll and yaw movements.

ACU Operation

The AL-7203-CONT3 ACU, which is fed by 115/230 VAC, 50/60 Hz single-phase power supply (from the ship's power system), receives the following data:

- Ship's gyro compass signals - The ACU can be connected to any standard ship gyro compass. The following are typical gyro compass types:
  - Synchro compass 1:1, 36:1, 60:1, 90:1 or 360:1 [115VAC, 50Hz or 400 Hz]
  - NMEA-0183 (RS-422 interface) - default configuration
  - Step-by-Step.
- GPS data (from the MUX internal receiver).
- Antenna position signals from the pedestal encoders (via the PEDESTAL ENCODER cable).
- Ship position signals from the IMU.
- L-band RF signal from the antenna's LNB output.

The ACU uses the above data to produce control signals that are sent to the pedestal (via the CONTROL cable). These control signals provide antenna azimuth and elevation direction to position the antenna correctly in order to optimally receive the satellite signals.

SDU Operation

The SDU receives 24V supply from the Power Supply unit, and provides power to the pedestal. The SDU contains two stepper-motor driver amplifier cards, which drive the pedestal axes, and a single DC driver card for driving an optional Ferotor /Motorized Polarizer.

IMU Operation

During operation, the IMU provides the ACU with the following ship's position information:

- Pitch, Roll – measured by two rate-gyro sensors (short-term information) and two inclinometers (long-term information). The Pitch and Roll short-term data is integrated with the long-term data to provide a smooth and stable signal for antenna stabillization.
- Yaw variations – measured by a rate-gyro sensor (short-term information). The Yaw short-term data is integrated with the long-term Yaw data received from the ship's gyro compass.

The Omni-Directional GPS Antenna is connected to the GPS receiver in the MUX.

The following figure provides a block/interconnection diagram of the TVRO system.

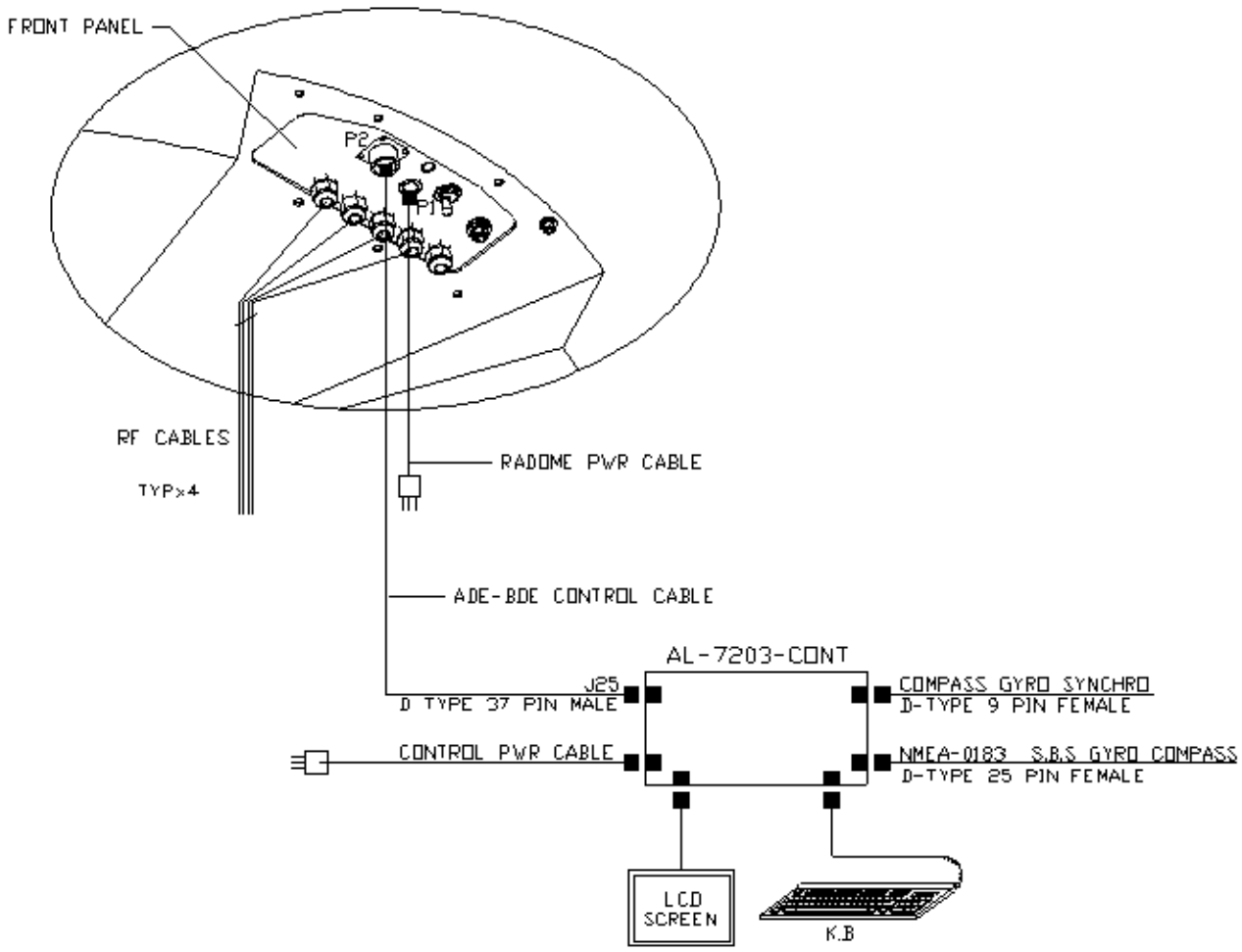


Figure 9. TVRO System - Block/Interconnection Diagram

1.2.4.2. Satellite Acquisition and Tracking Principles

NOTE

Total time required to acquire a satellite, during normal operation, is less than 1 minute. After power-up, acquisition time is approximately 7 minutes.

Auto-Restart

When the system is turned-on, an Auto-Restart sequence is initiated, which includes the following steps:

- Encoder Initiation procedure, which lasts up to 40 seconds. At the end of this procedure, the antenna is positioned at the 0, 0 position (zenith).
- IMU Initiation procedure, which lasts up to 360 seconds. At the end of this procedure, the IMU is "locked", i.e., the antenna is slaved to and stabilized by the information supplied by the IMU.
- Satellite acquisition (point-to-SAT), which lasts up to 30 seconds. During this period, the antenna moves to the estimated position of the last-selected satellite. When the satellite is found, the system diverts to the Step-Track mode, maintaining the antenna boresight directed towards the satellite.

CAUTION

Do not select a satellite until the auto restart sequence is terminated, and the IMU status is "Locked".

Manual Satellite Selection

When the operator activates the Satellite Selection mode, the system automatically identifies all satellites that are within the parameters set in the ACU configuration, and displays a menu that lists all these satellites. The operator selects a satellite and thus activates the Acquisition Mode.

Acquisition Mode

In this mode, the system automatically acquires the desired satellite according to the following parameters:

- Satellite position selected by operator from the ACU monitor, or the last-selected satellite before shut-down
- Ship's position (given by the GPS)

- Ship's heading (given by the ship's gyro compass, or manual pier-side input)
- Ship's Pitch and Roll (given by the IMU pitch and roll sensors)

The ACU calculates the satellite direction relative to the ship and antenna positioner and points the antenna to the best-estimated satellite direction. The system will then revert to step-track (Acquisition Steps feature).

Step-Track Mode

In this mode, which is intended for tracking low angular-dynamic targets such as geo-stationary satellites having some inclination, the system maintains the antenna boresight directed towards the satellite.

In this mode, the ACU implements periodic step-track of the antenna positioner in the Elevation axis (Up/Down) and in the Azimuth axis (CW/CCW) for re-positioning to the point of the maximal reception level.

Step-Track Features:

- *Minimal signal threshold level*

If most of the AGC samples gathered during step-track are below the minimal level, the step is proclaimed as a "low signal step" and the disregarded - previous peak point prevails.

This effectively improves the situation where the system does not see any signal and just wonders off, as in temporary blockage of signal.

- *Acquisition Steps*

The first few steps after Step-Track is invoked are referred to as "acquisition steps". Those steps differ from the normal operation steps to improve system capability to quickly catch onto a target:

The first two steps span is double the size of the normal steps (as per operator set-up).

The first five steps will not have any delay between them (continuous steps), even if the Step-Track set-up specifies for "Re-Step time" other then 0 seconds.

The acquisition steps are a fully automatic feature: there is no set-up for it in the controller configuration.

- *Low Signal Timeout*

When a "low signal step" situation (see above) is identified, a clock count-down is initiated. Meanwhile the Step-track keeps on step-tracking around the very same position. If the count-down of the predefined timeout elapses, the Step-Track reverts to either one of the following pre-defined modes:

Peak, Search, Box-Scan, Pnt-to-Sat, Acquire, Preset, Stand-by, Step-Track, Restart.

Search Mode

In this mode, the ACU performs a spiral-type search around the current positioner's location, within a pre-defined Az/El sector, for initial target acquisition.

The search mode moves the antenna in an expanding-contracting spiral trajectory, not necessarily round.

The purpose of this mode is to acquire a satellite signal having strength of just a little bit above the Step-Track threshold level. In this case the Search mode will automatically revert to Step-Track, in order to lock on the signal.

The Search mode has a Timeout. If during the predefined amount of seconds, a signal is not acquired, it will revert to a pre-defined revert mode.

Available revert modes are:

Peak, Search, Box-Scan, Pnt-to-Sat, Acquire, Preset, Stand-by, Step-Track, Restart.

1.3. 0.8-M TVRO SYSTEM SPECIFICATIONS

Table 1. Technical Specifications

Parameter	Specification
RF System:	
Antenna type	Cassegrain
Antenna diameter	82 cm
Frequency band	Ku-Band
Operating frequency	10.7-12.75 Ghz
Antenna polarity	Linear V/H or Circular L/R
Antenna gain, typical	38 dB @ 11.7 GHz
EIRP Level (min.)	45 dBW
Radome size	Radome diameter – 1.10 m Base diameter – 1.15 m
Tracking System:	
Pedestal type	AL-7203-1
Axis configuration	ROLL/X/Y
Tracking Controller	AL-7203-CONT3
Stepper Drive Unit (SDU)	AL-7203-SDU
Pitch/Roll sensors - IMU	AL-7203-IMU
Multiplexer	AL-7203-MUX
Front Panel	AL-7203-F.P
Power Supply	AL-7203-P.S
Ship Gyro Compass Interface *Note: other interfaces are also supported by the system. Consult ORBIT.*	Typical interfaces: Synchro 1:1, 36:1 or 360:1 Step-by-Step (both polarities) NMEA-0183 (RS-232 or RS-422)
Tracking receiver	Yes
GPS	Yes

Table 1. Technical Specifications

Parameter	Specification
Ship Motions:	
ROLL	±30° @ 8 sec
PITCH	±15° @ 6 sec
YAW	±80° @ 50 sec
SURGE	±0.2g
SWAY	±0.2g
HEAVE	±0.5g
Turning rate	10° / sec
Environmental (Above Deck Equipment):	
Temperature, Operational	-30° C to 70°C
Temperature, Storage	-35° C to 75°C
Humidity	95% @ 40°C
Spray	Radome-protected
Icing	Radome-protected
Rain	Radome-protected
Wind speed, Operational	100 knots
Wind speed, Survival	130 knots
Power requirements	115/230 VAC (± 5%), 50/60 Hz (+0, -3%)

1.4. ADE UNITS

1.4.1. Stepper Driver Unit (SDU) AL-7203-SDU3

The AL-7203-SDU3 Stepper Driver Unit includes two stepper-motor driver amplifier cards (Micro Stepping drivers), which drive the pedestal and IMU axes, and a single DC driver card for driving an optional Ferotor / Motorized Polarizer.

The AL-7203-SDU3 is fed by 24VDC from Power Supply AL-7203-P.S.

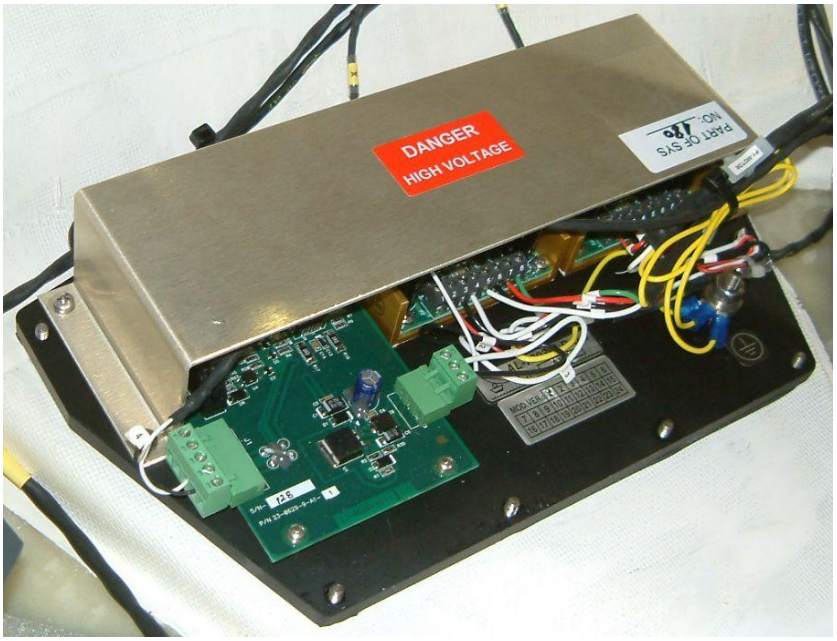


Figure 10. AL-7203-SDU3 General View

Figure 11. SDU Heatsink

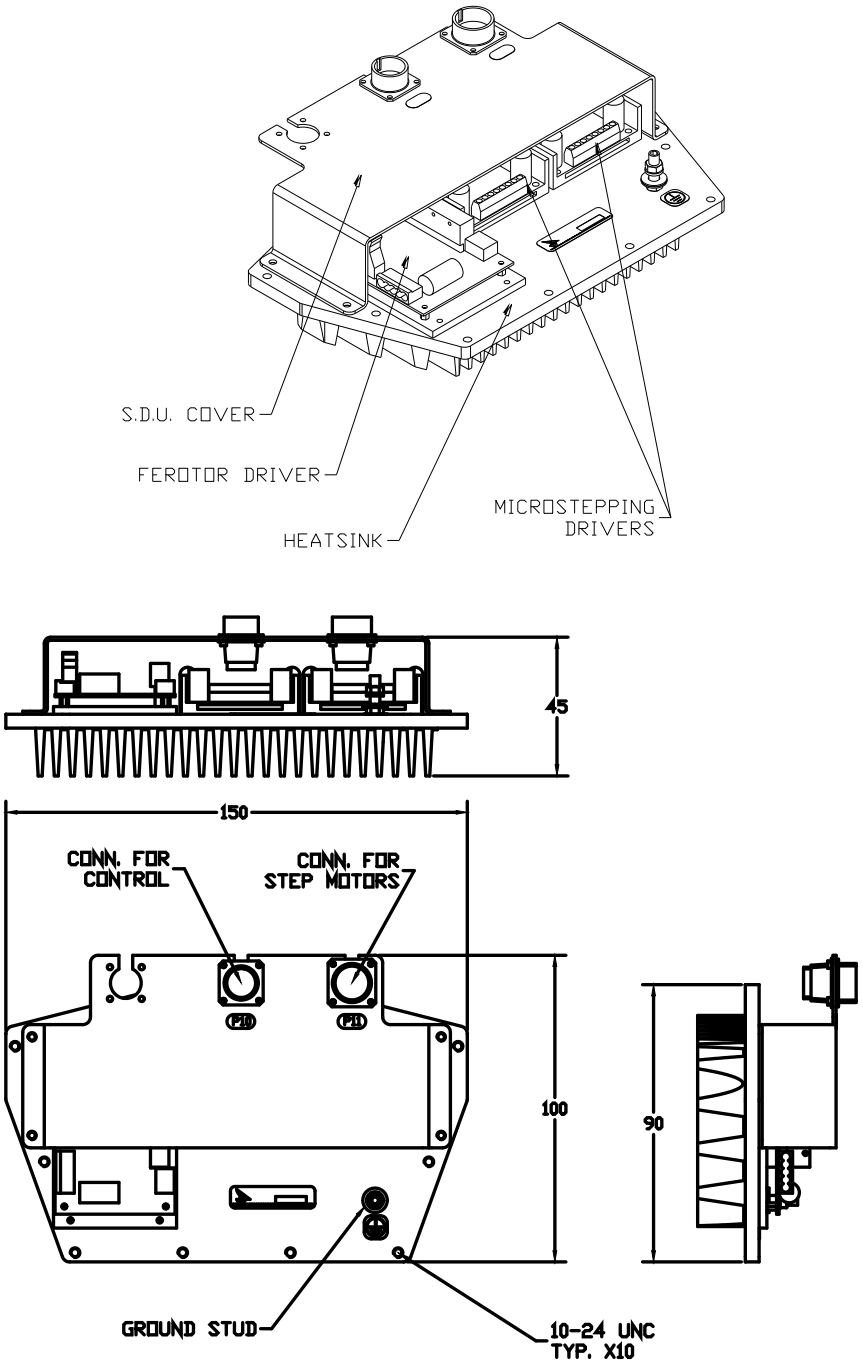


Figure 12. SDU Outline Drawing

1.4.2. Inertial Measurement Unit (IMU) AL-7203-IMU-NT3

The Inertial Measurement Unit (IMU) is the “heart” of the antenna stabilized TVRO system. The IMU task is to provide accurate dynamic readings of the antenna platform roll pitch and yaw angles at all times. To produce a true yaw angle the IMU relies on a long-term reference feedback from the ship’s gyro.

The AL-7203-IMU-NT3 is a solid-state (static sensor platform) inertial measurement unit, designed to stabilize a Ku antenna on a small ship, using the ship’s gyro as a heading long-term reference. The IMU provides extremely aacurate information on ship’s motion in Pitch, Roll and Yaw axes.

The Controller software utilizes a 3D-calibration algorithm to correct the individual sensor readings in real-time, thus producing over-all pitch-roll-yaw angle accuracy of better then 0.5 degree. This makes the AL-7203-IMU-NT3 ideal for applications with antennas of up to 1.5m in Ku-Band and C-band.

The AL-7203-IMU-NT3 is an accurate and agile device, suitable of operating in harsh dynamics of a relatively small vessel, such as a yacht.

Specications

Dimensions:	104 x 145 x 88 mm
Weight:	1 Kg.
Power Consumption:	7 Watt
Accuracy:	1° envelope
Dynamics:	30°/s in pitch & roll
	10°/s rate of turn in heading
Output:	Analog or Digital (high rate serial comm. link).

NOTE

Each IMU is individually pre-calibrated in the factory. The calibration data resides on the Controller’s non-volatile memory and it is also provided with the IMU on a floppy disk. If an IMU is to be replaced, its individual set of calibration-parameters must be copied into the Controller’s memory.

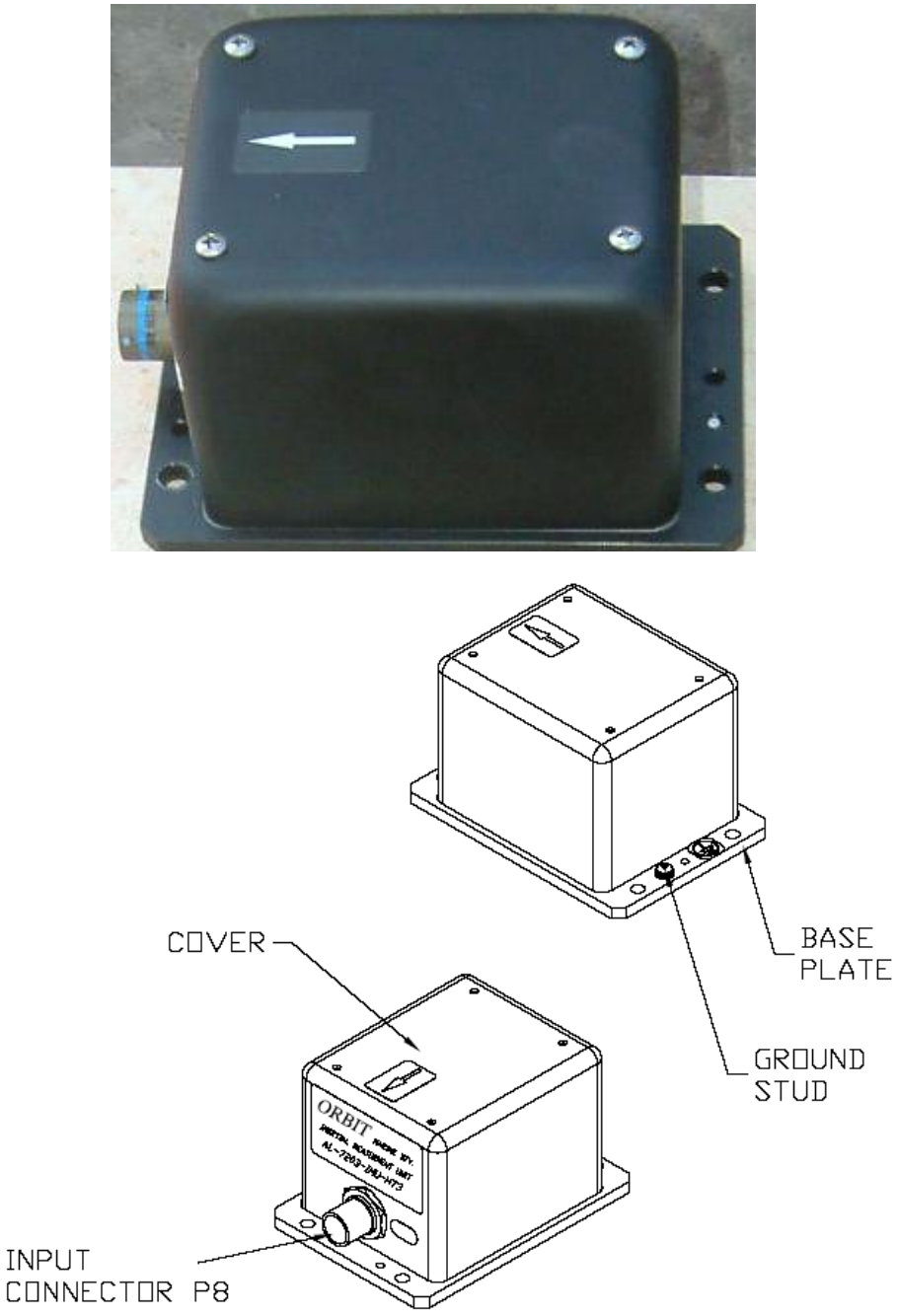


Figure 13. AL-7203-IMU-NT3 General View

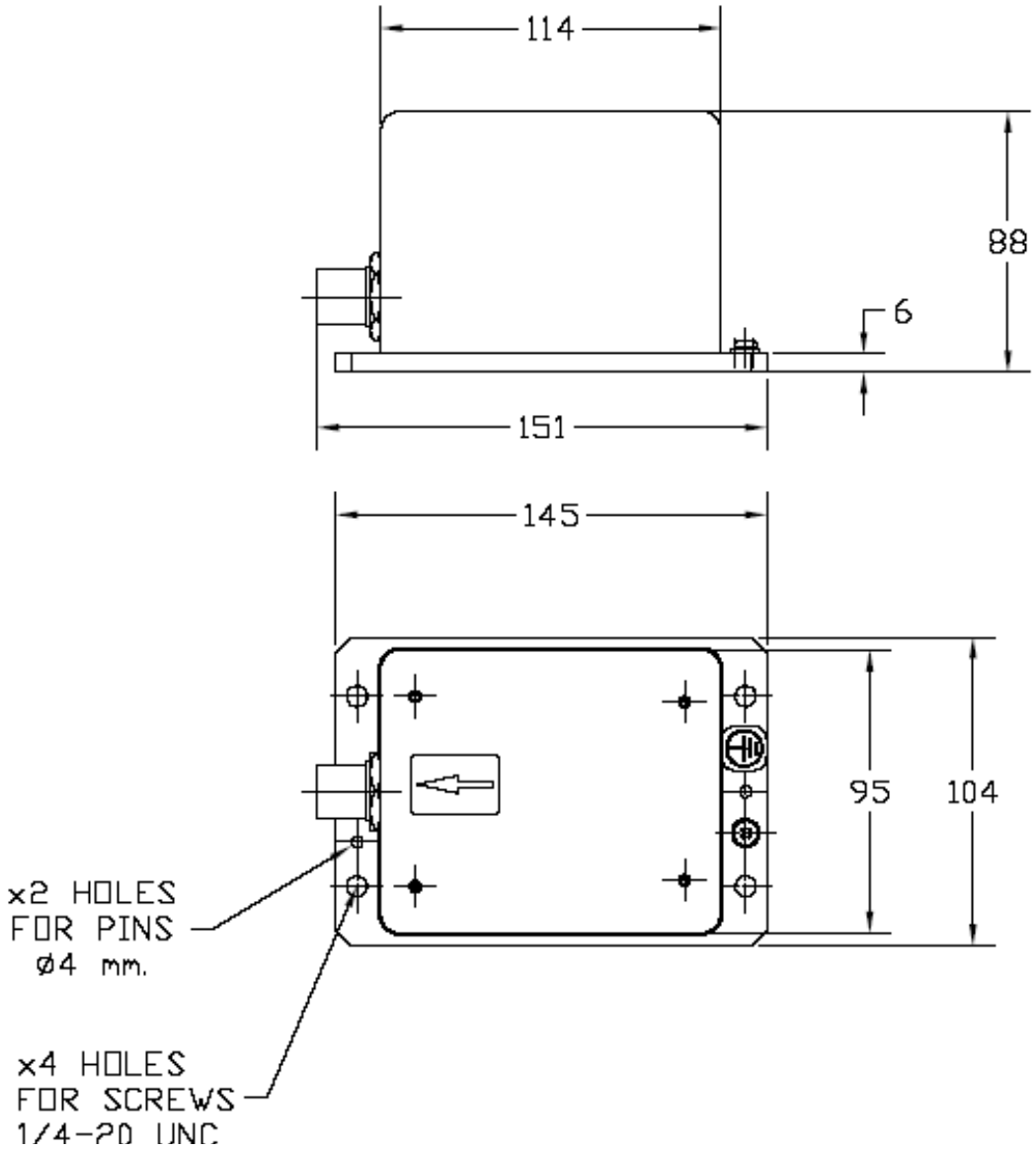


Figure 14. AL-7203-IMU-NT3 Outline Drawing

1.4.3. MUX Unit AL-7203-MUX3

The AL-7203-MUX3 Unit includes the following components:

- Internal GPS receiver
- +5V/±12VDC power supply
- MUX card

Figure 15. AL-7203-MUX3 General View

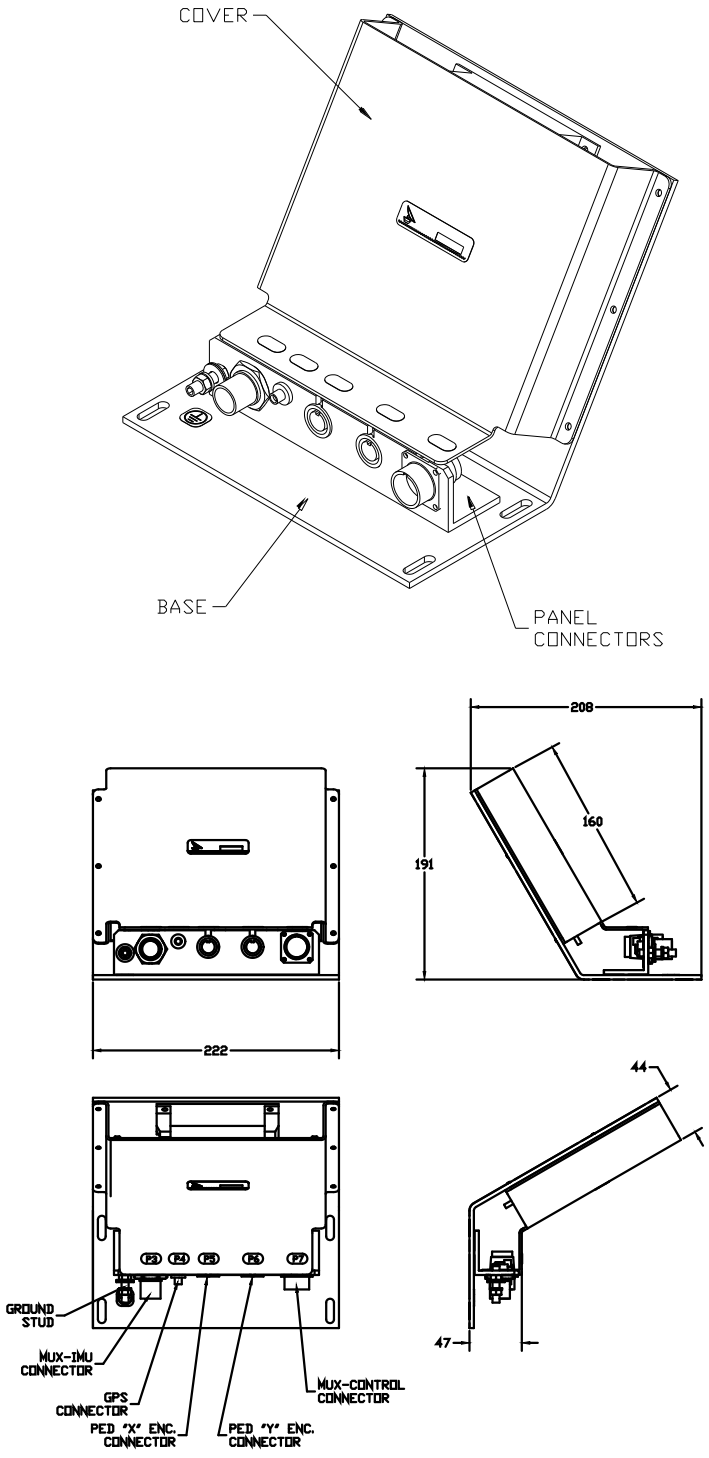


Figure 16. MUX Outline Drawing

1.4.4. Power Supply Unit AL-7203-P.S

The AL-7203-P.S Power Supply Unit provides 24VDC voltage to the SDU.

Figure 17. Power Supply General View

1.4.5. Front Panel AL-7203-F.P3

The AL-7203-F.P3 Front Panel includes the following components:

- ADE fuse (AC supply)
- ADE ON/OFF switch
- EMI protection (on AC supply lines)
- POWER connector
- POWER indicator
- RF cable glands
- Control cable connector

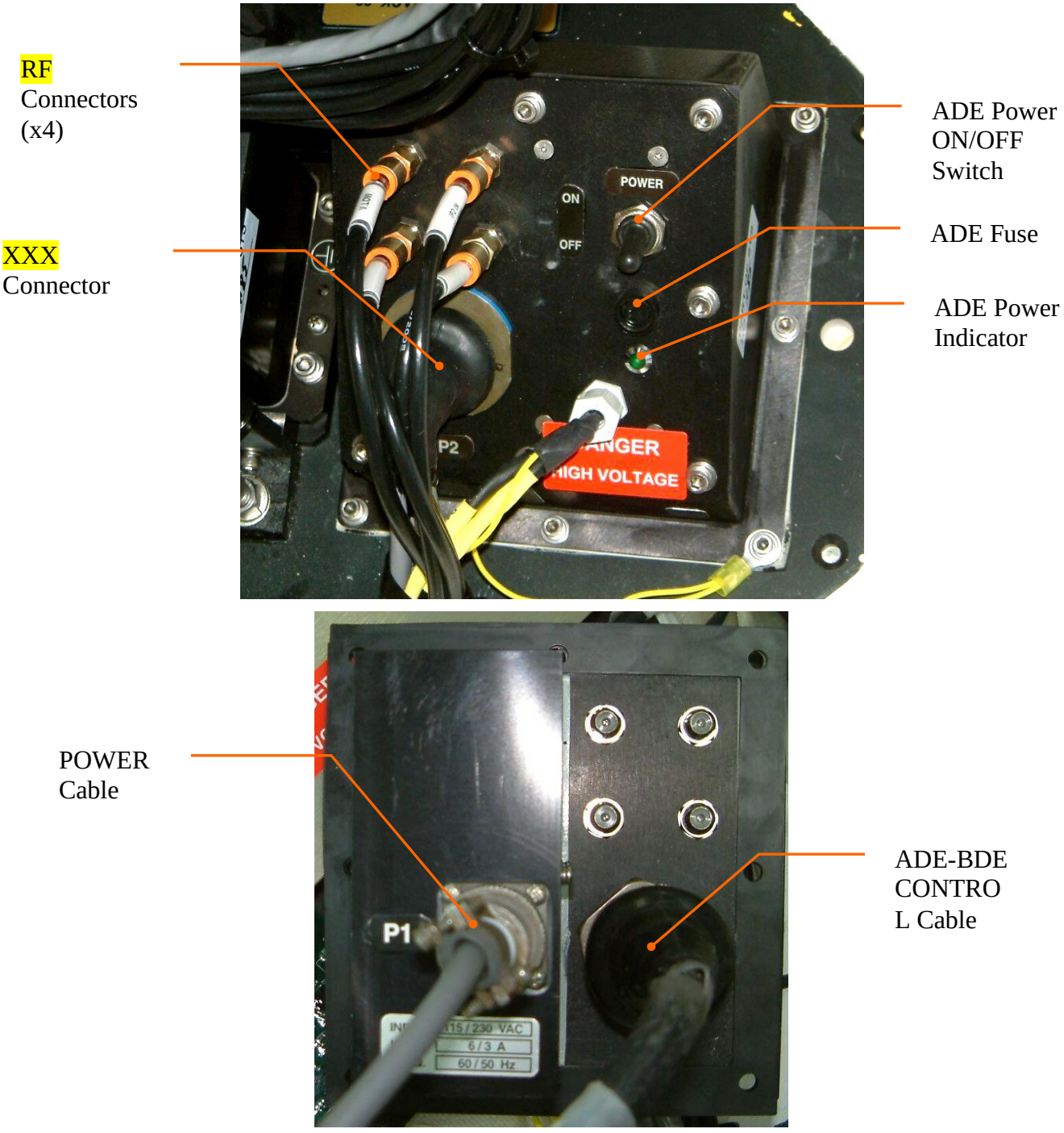


Figure 18. Front Panel Connectors, Controls and Indicators

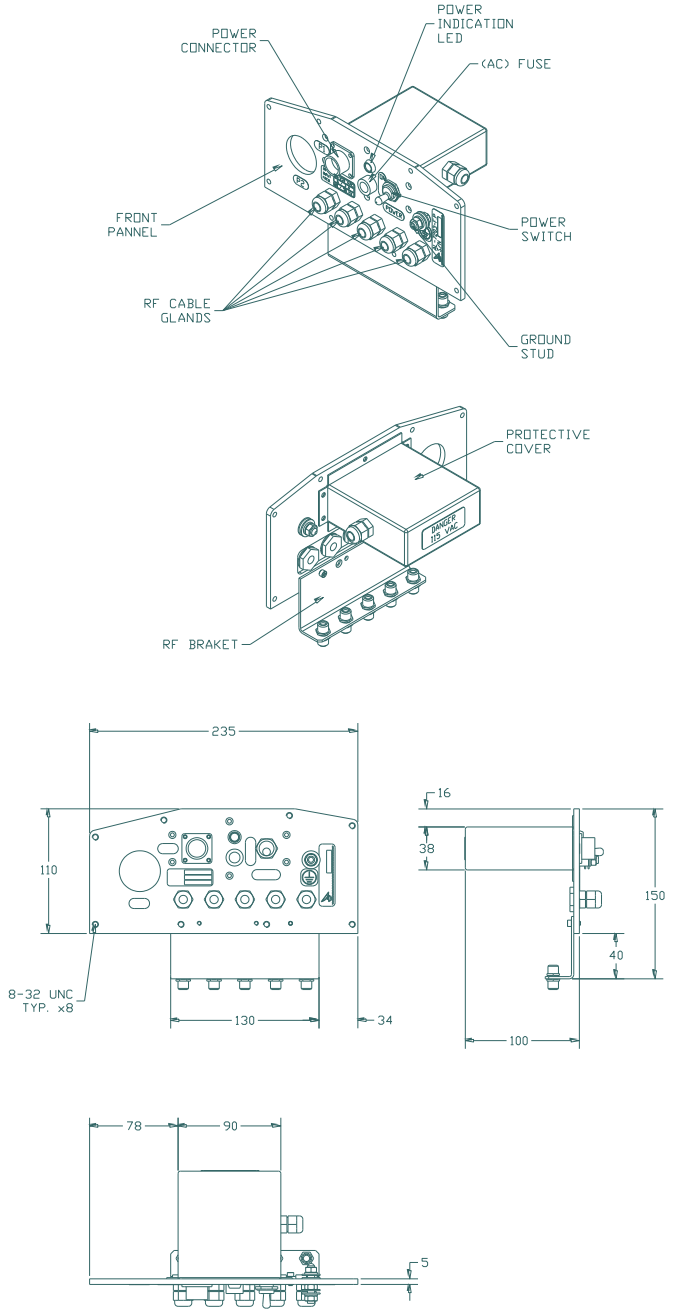


Figure 19. Front Panel Outline Drawing

1.4.6. X/Y Pedestal AL-7203-1A

The X/Y pedestal can carry the antenna to any required angle, at high speed and high aacuracy with continuous axis movement (no Azimuth limits), without the need of slip-rings or rotary joints. The X/Y configuration also eliminates the ZENITH PASS problem. The X/Y Pedestal utilizes brushless motors that contribute to high reliability.

The elevation axis is capable of continuous movement from -20° to 200°, providing a total of 220° of uninterrupted movement. In addition, the system has no cable wrap (unlimited azimuth) and no requirement for rotary joints or slip rings.

NOTES

- *The dish is mounted on the Y axis.*
- *To improve operation, the system should be installed with the X axis pointed toward an obstruction to satellite visibility. The X axis direction is marked by an arrow on the Radome, above the Front Panel. This arrow also indicates the "0" reference of the Azimuth axis*

The pedestal comprises the following sub-assemblies as shown in the following figure:

- Pedestal leg and base
- Two axes, each equipped with a motor and encoder
- Antenna adapter
- Interconnection cables

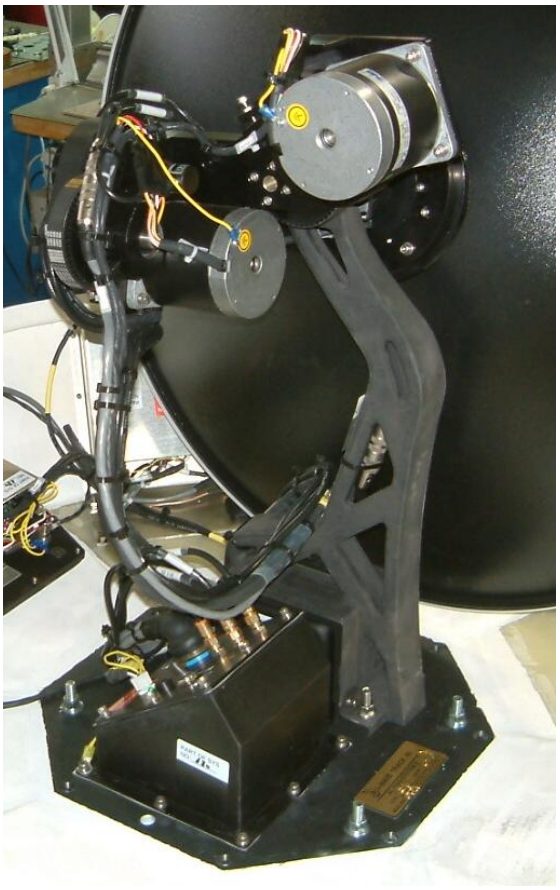
The AL-7203-1A Pedestal Main Features are:

- High torque Stepper motors
- High accuracy planetary gear
- No azimuth slip rings, rotary joint or cable wraps are needed
- Continuous rotation
- High aacuracy at extreme dynamics
- Exceptional reliability by use of stepper motors, micro-stepper drivers, and 3,000 PPR encoders
- Unique and clean design

- Easy installation and maintenance

NOTE

The pedestal nameplate indicates the factory-measured Encoder offset values of the X and Y axes. When replacing the pedestal, these values must be entered into the Controller, via the Maintenance screen, as the Pedestal X and Y axis offsets.



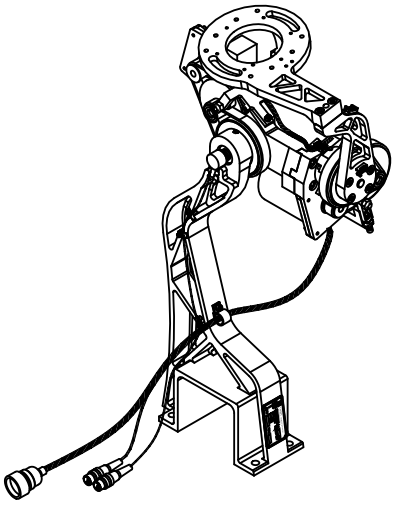


Figure 20. Pedestal General Views

1.4.7. Antenna and Feed Assembly

1.4.7.1. Feed Assembly Structure

The system is supplied with a feed assembly, which includes the following items:

Quad Ku-Band LNB – provides four L-Band outputs (950-1450 MHz) concurrently:

- Low frequencies (10.7 – 11.7 MHz) vertical polarization signal
- Low frequencies (10.7 – 11.7 MHz) horizontal polarization signal
- High frequencies (11.7 – 12.95 MHz) vertical polarization signal
- High frequencies (11.7 – 12.95 MHz) horizontal polarization signal

Ku-Band Feed - linear, vertical and horizontal polarization feed.

Ferotor – used to hold the feed polarization, regardless of position and location changes. The Ferotor receives variable DC voltage from the SDU, according to commands sent by the ACU. The Ferotor frequency range is 10.7 – 12.75 MHz.

1.4.7.2. Ku-Band Feed Assembly Characteristics

Parameter	Specification
Type	Integral Feed and LNB
Frequency Range	10.700 GHz - 12.750 GHz
Output Frequency	950 MHz - 1450 MHz
Local Oscillator	9750, 10600 MHz
Noise Figure	1.1 dB
Output Connector	F-type
Cross Pole Isolation	32 dB
DC Voltage	13V in H. HIGH Input

Figure 21. Ku-Band Feed Assembly

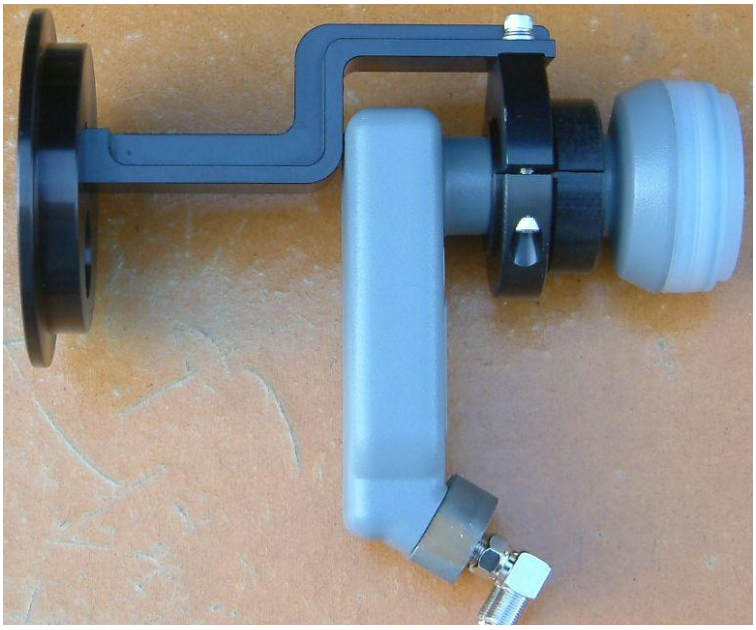


Figure 22. Ku-Band Feed Assembly

2. BASIC OPERATION

2.1. INTRODUCTION

This section describes the basic operation procedures of the system, to be carried out by the system operator on the ship.

2.2. ACU MMI PRINCIPLES

The below-deck AL-7203-CONT3 ACU controls, monitors and configures the system. Using the ACU's screen, the operator can monitor system status, and using the alpha-numeric keyboard, menus and functions can be selected, and operational parameters can be changed.

At any screen, the Up and Down arrow keys are used to select one particular item (the Right and Left arrow keys are not active for this function). The item appearing under the blue highlighted bar is the selected item. The "ENTER" key is then used to activate the selection.

Additional controls and utility items are located on the ACU:

- Power ON/OFF switch
- RESET button
- External Keyboard connector
- Floppy disk drive
- Configuration parameters (utility) disk

2.3. SCREENS TREE

The tree-type flow of the ACU screens and menus is presented in the following Figure, presenting both the basic and password-protected advanced screens and drop-down menus.

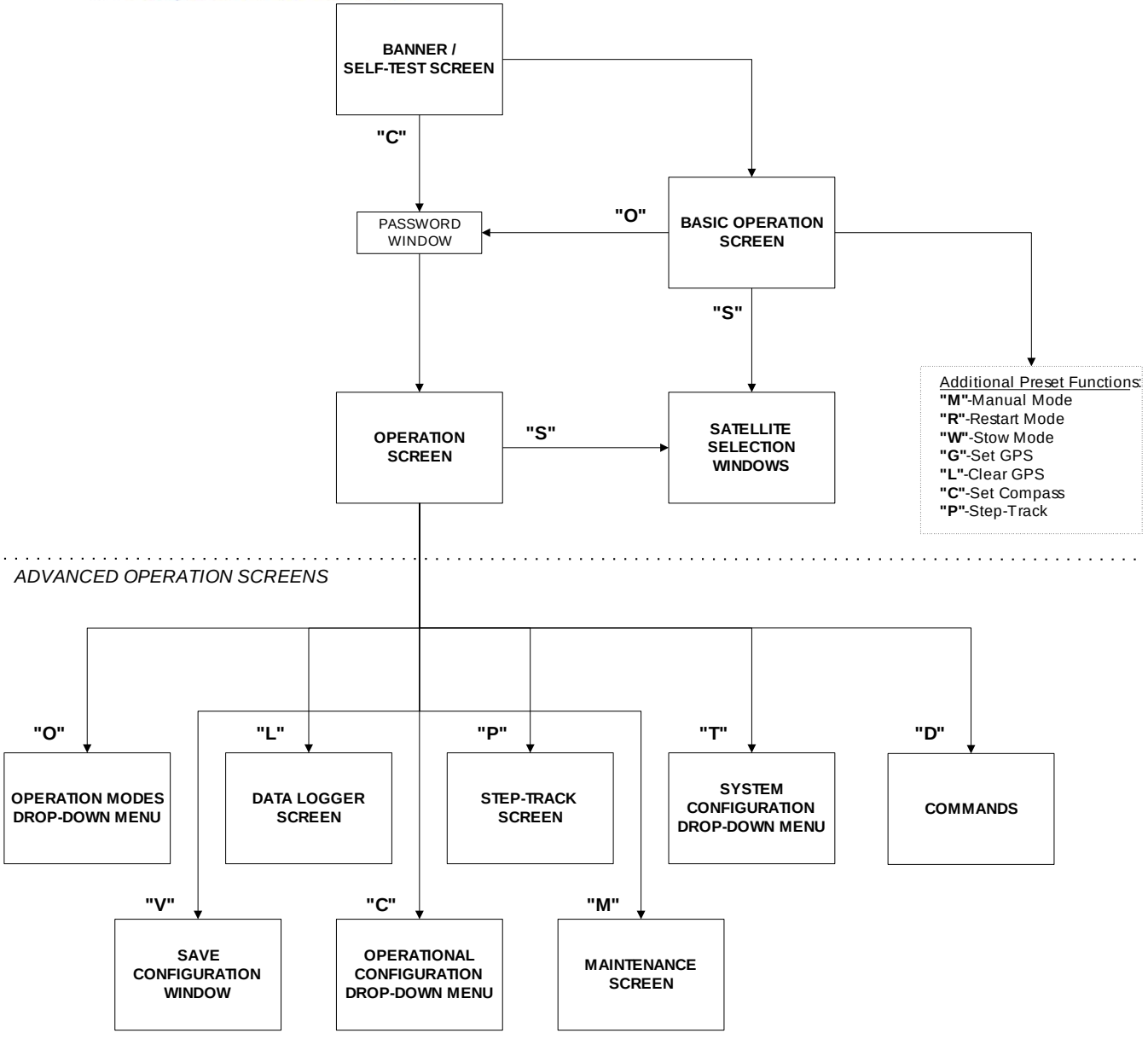
The shipboard operator should use only the basic operation modes (Basic Operation Screen and Satellite Selection). The advanced functions are to be used only by authorized personnel.

After start-up, the ACU presents a Banner/Self-Test screen, and if the self-test is successful a Basic Operation screen is displayed, providing all controls and indications needed for normal basic operation of the Communication system. This screen enables the operator to activate the basic modes of operation (satellite and channel selection), while monitoring system's parameters and indicators.

For more advanced control and configuration features, a series of password-accessible screens are available. The tree-type flow of the ACU screens is presented in the following figure.

NOTE

The password is factory-set and cannot be altered.



NOTE: The letters in parenthesis are single-letter inputs that shift the display to the indicated screen.

Figure 23. ACU Screens Tree

2.4. GETTING STARTED - POWER UP SEQUENCE

1. To power up the ACU, open the front-panel door and turn ON the ACU's power switch. This commences an automatic restart procedure, as described herein.
2. After a few operating system messages, the Banner/Self-Test screen appears (refer to the following figure), indicating that the ACU performs the self-test procedure. This screen is presented for a period of 10 seconds, during which a 10-to-0 countdown is displayed.

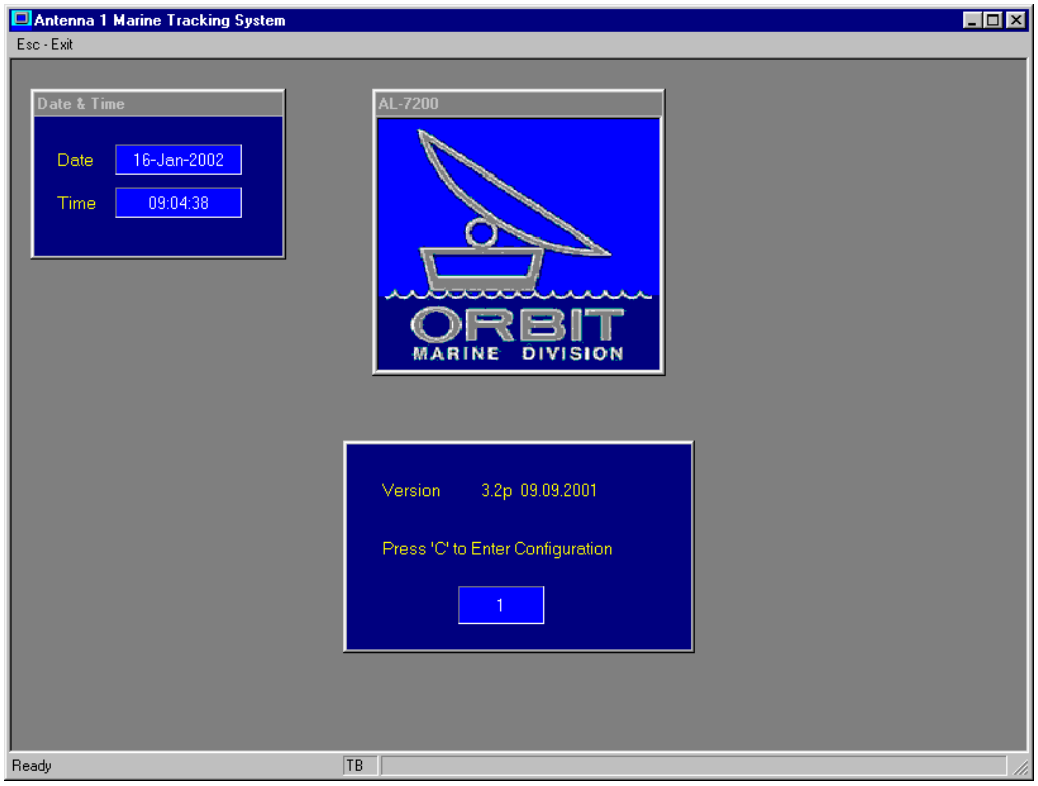


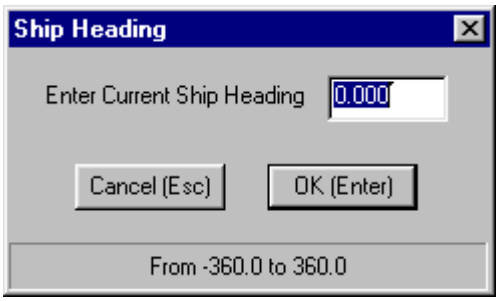
Figure 24. Banner/Self-Test Screen

NOTE

The internal PC clock provides the Date and Time presented on this screen.

NOTE

If the ACU is configured for an incremental-type interface with the ship's gyro compass, an on-screen message will appear after self-test, requesting the operator to enter the current ship's Heading:



Typical ship's gyro compass with Incremental-type interface:

- *Step-by-Step*
- *36:1 Synchro*
- *60:1 Synchro*
- *90:1 Synchro*
- *360:1 Synchro*

3. After the self-test procedure is successfully completed, the display switches automatically to the Basic Operation screen:

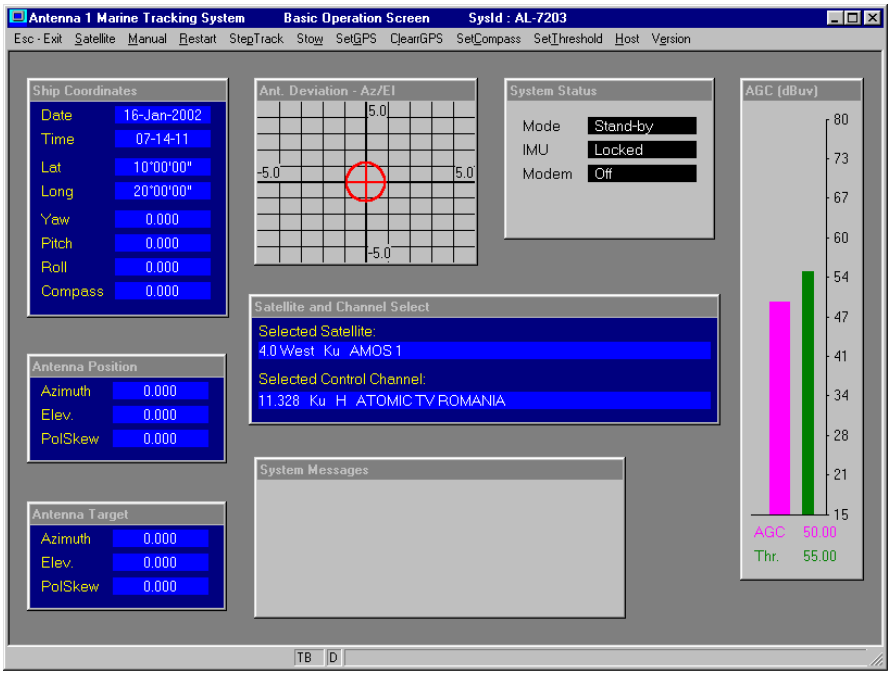


Figure 25. Basic Operation Screen

4. During the automatic restart procedure, the Basic Operation screen displays the following message: “Auto Restart In Progress”. The automatic restart procedure includes the following steps:

   - Encoder Initiation procedure, which lasts up to 40 seconds. Throughout this procedure, the Mode field on the Basic Operation screen indicates “ENC Init”. At the end of this procedure, the antenna is moved to the zenith position - where both the X and Y axes are positioned at 0°.
   - When the Encoder Init procedure is terminated, the system commences the IMU Initiation procedure, which lasts up to 240 seconds. Throughout this procedure, the IMU field on the Basic Operation screen indicates “Unlocked”. At the end of this procedure, the IMU is “Locked”, and the system initiates the Satellite Acquisition (Point-to-SAT) mode.
   - During the Point-to-SAT mode, which lasts up to 60 seconds, the antenna is pointed to the best-estimated direction of the last-selected satellite, and searches for the required satellite within a pre-defined sector. When the received signal AGC exceeds the Acquire level, the

system automatically revert to Step-Track mode, in order to lock on the signal.

- In the Step-Track mode, the ACU implements periodic step-movement of the antenna pedestal in the Elevation axis (Up and Down) and in the Azimuth axis (Clockwise or Counterclockwise) for re-positioning to the point of the maximal reception level.

2.5. BASIC OPERATION SCREEN DESCRIPTION

Using the Basic Operation screen, the operator monitors the system parameters, and may select a new Satellite and/or tracking Channel.

The Basic Operation screen is divided into several display fields that present the parameters and information required for the system's operator.

NOTE

Basic Screen Configuration*: Up to 8 advanced functions can be added to the Basic Operation screen. To allow this, select one or more of the following functions in the* ***System Configuration/Basic Screen*** *sub-menu (advanced-operation mode - password-protected):*

Manual Mode, Restart Mode, Step Track Mode, Stow Mode, Set GPS, Set Compass, Set Threshold.

The following table depicts and describes the Basic Operation screen fields.

NOTE

The underlined letters of menu-options denote the fast activation keys (shortcuts) for the same functions.

Table 2. Basic Operation Screen Fields

Field	Description
	**System ID (part of header bar):** The right side of the header bar is labeled by a configuration-defined System ID, i.e., AL-7203.
	**Menu Bar** Provides access to the following functions: • **ESC-Exit -** Terminates the application • **Satellite -** Invokes the Satellite Selection procedure • **Manual –** Invokes the Manual mode, which enables manual control of the antenna axes. • **Restart-** Restarts the system. • **StepTrack-** Invokes the Step Track mode. This allows successful return to step tracking after the Manual Mode was invoked from the Basic Screen. • **Stow-** Invokes the Stow mode. • **SetGPS-** Enables to manually enter Longitude and Latitude angles, to overcome temporary GPS fault. • **SetCompass-** When activated, it looks at the selected compass interface type: For incremental types, namely: Step-by-Step, Synchro 36:1, Synchro 360:1, a start value of the compass may be set by the operator. If an absolute type is selected, namely NMEA-0183 or Synchro 1:1, a default compass value may be set by the operator. This value will prevail until a valid compass update is received. • **SetThreshold-** Enables to manually enter

Table 2. Basic Operation Screen Fields

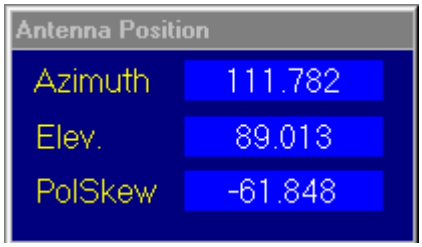
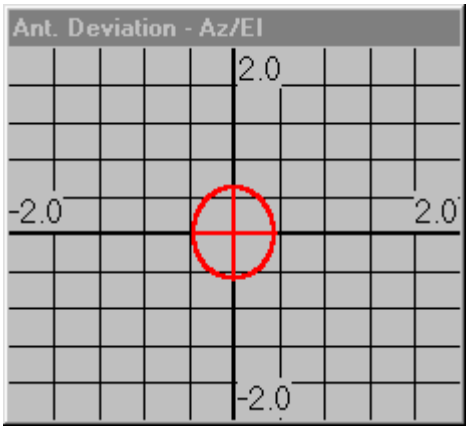
Field	Description
	AGC Threshold level.
	**Ship Coordinates Field:** • **Date -** From the internal PC Clock • **Time-** From the internal PC Clock • **Lat** - Ship's latitude- From the GPS receiver • **Long** - Ship's longitude - From the GPS receiver • **Yaw -** IMU Yaw • **Pitch -** IMU Pitch • **Roll –** IMU Roll • **Comps** - Ship's Heading (as read from the ship's compass or as entered manually)
	**Antenna Position Field:** The ACU constantly calculates and presents the following parameters: • **Azimuth** - Azimuth axis angle • **Elev.** - Elevation axis angle • **PolSkew** - Polarization Skew axis angle.
	**Antenna Deviation Field:** This field graphically depicts the tracking error of the antenna (the error between true boresight as calculated by each step-track and the mechanical boresight to which the antenna is pointed), presented in two-dimensional cross-hair type error display. The deviation is presented in degrees of AZ/EL.

Table 2. Basic Operation Screen Fields

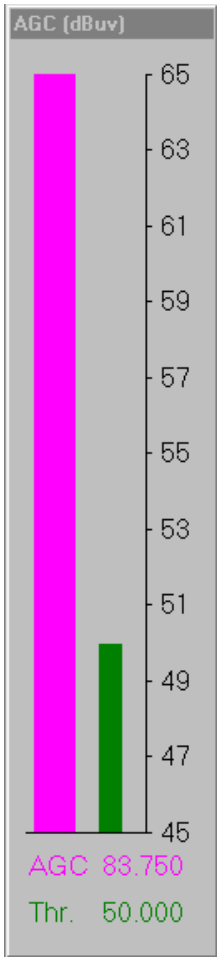
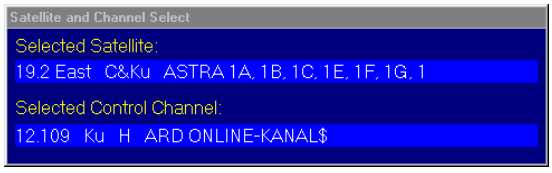
Field	Description
	**AGC Field:** This field presents (both graphically and numerically) the AGC signal level, which represents the strength of the satellite's signal that is received by the antenna. In addition, a threshold level is presented for reference.
	**Satellite and Channel Select Field:** This field presents the following information: • **Selected Satellite** - current selected satellite (e.g. 100.0 East C&Ku INTELSAT 511) • **Selected Control Channel** - current selected channel (e.g. 3.975 C R DW TV)

Table 2. Basic Operation Screen Fields

Field	Description

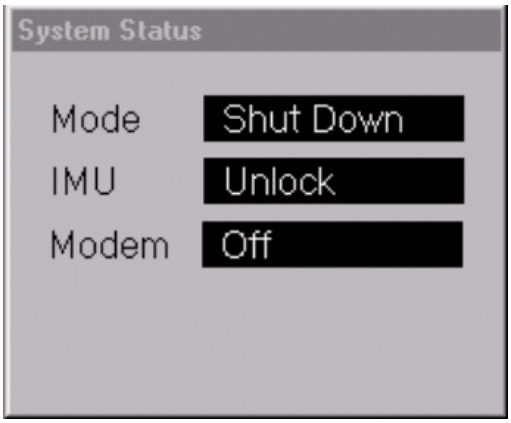
	**System Status Field:**
	This field presents the following information:
	• **Mode –** Current operational mode (StndBy, Step-Track, etc.)
	• **IMU -** IMU status (locked, unlocked, init, preset)
	• **Modem -** Modem status (displayed only if a modem is installed):
	  • "Off" – The controller doesn't recognize the modem card
	  • "Discon" – The modem is disconnected
	  • "Init" – The modem is initializing
	  • "OnHook" – The modem is initialized and waiting for a call
	  • "Answer" – The modem is sending the dial-up initialization string to the host
	  • "Connect" – The modem is engaged in a communication session

Table 2. Basic Operation Screen Fields

Field	Description
	**System Messages Field:** The System Messages Field displays the following types of indications: • Messages (green and have no preamble) - Such as “Auto-Restart in progress” or “Acquiring a satellite”… • Warnings (blue and have a “Wrn:” preamble) - Such as “No GPS Position Updates” or “Synchro Compass Fault”… • Errors (flashing-red and have an “Err:” preamble) - Such as “Auto-Restart Failed” or “Pedestal Axis X Mech Fault”… *The configuration for all the displayed messages is done by a configuration sub-screen (“System Messages”), in which each message may be enabled or disabled.* *In addition, the “Error” type messages may be configured to shut-down all system mechanical axes on their appearance.*

2.6. SATELLITE AND CHANNEL SELECTION

2.6.1. Guidelines for Satellite and Tracking Frequency Selection

- Satellites transmit to limited areas. Therefore, to receive any given satellite you must be within its foot print (the area to which it is transmitting) and have an appropriate receive system, i.e., in general a 2.4 meter antenna will receive a signal over a greater area than a 1.2 meter antenna.
- In addition, some satellites transmit to two or three areas of the world (Multiple foot prints) at the same time. Pas 1 @ 45 deg W (Pan-American satellite 1 - located at 45 degrees over the equator) transmits to North America, Europe and South America, but not to the areas of Ocean in between.
- Not only must you be inside the foot print of the satellite you must also select a tracking frequency which is being transmitted inside that foot print. The system will not work if you try to receive a Channel transmitted to South America if you are in Europe.
- Select a Channel with Frequency as close as possible to the frequency you wish to receive. If multiple channels are to be viewed select a channel at a middle Frequency. As some satellites transmit to multiple area and some channels are only available in one area, care should be taken to select only those channels that are transmitted to the same area as vessel.
- The following information is given for each Channel: Frequency (GHz), Polarization (H-Horizontal, V-Vertical, L-Left hand Circular, R-Right hand Circular), channel name.

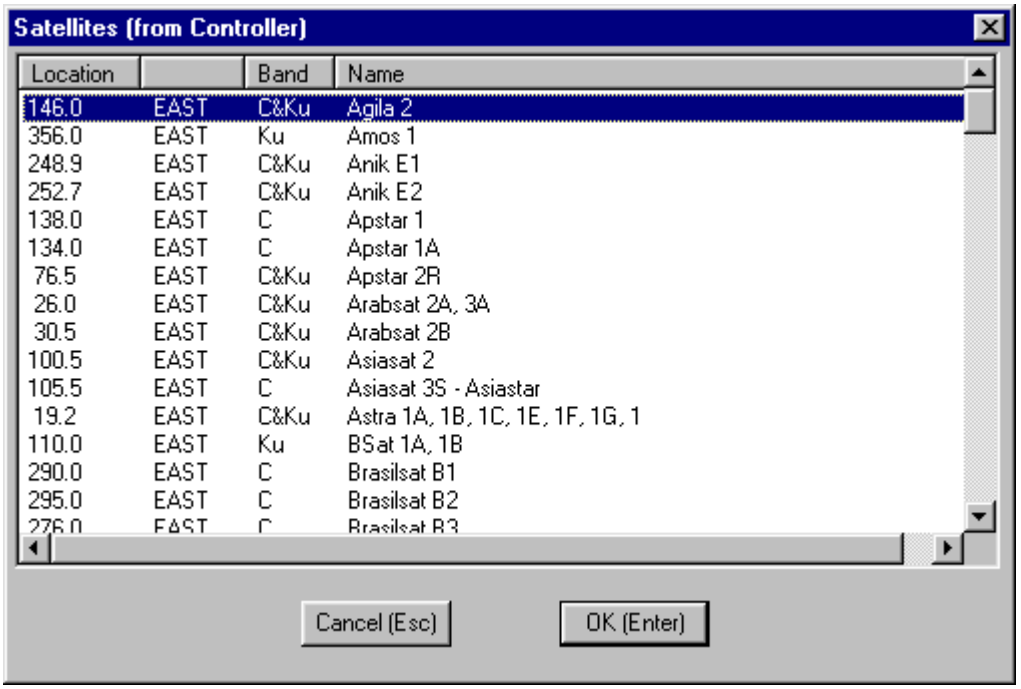
2.6.2. Selecting Satellite and Tracking Frequency

To select a new Satellite, perform the following procedure:

CAUTION

Do not select a satellite until the auto restart sequence is terminated, and the IMU status is "Locked".

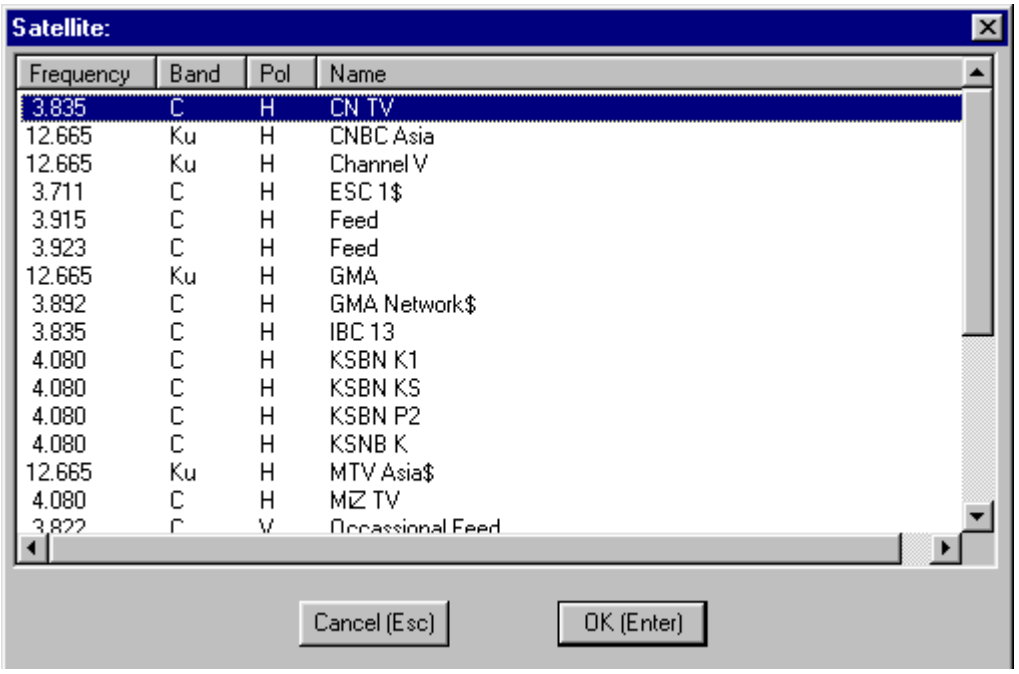
1. Press the "S" key or click the **Satellite** option. The following window is opened, listing the available satellites:



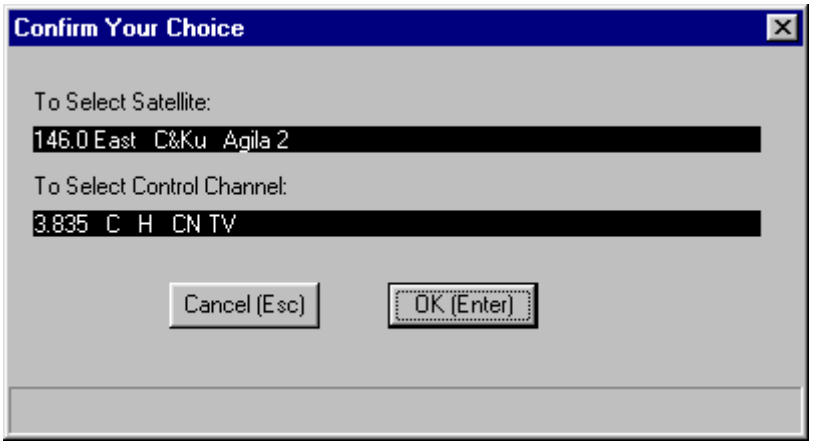
   If the required satellite is not listed, it may be because the ship's current location is not within the satellite footprint.

2. Use the up or down arrow keys to highlight the desired satellite.
3. Select the desired satellite by pressing the ENTER key or clicking the **OK** button. A new window appears, listing the available selected-satellite channels (transponders - satellite frequencies):

Orbit Communication Ltd. 8D Hatzoran St. P.O.B. 8657, Netanya 42504, Israel, Tel: +(972) 9 892 2777, Fax: +(972) 9 885 5944 www.orbit-cs.com



4. Use the up or down arrow keys to select the desired frequency (in GHz) and press the ENTER key. The ACU presents a Confirmation window:



5. To accept the new selection, press ENTER key. To discard the new selection, press the ESC key.
6. Once the selection is confirmed, the basic operation screen is updated, and the "**Acquiring a Satellite**" message appears while the antenna moves to acquire the selected satellite.

   Monitor the changes on the Basic Operation screen's fields as the antenna moves to the new position. To confirm tracking, verify that:

   - AGC level indication increases as antenna acquires satellite signal

- Antenna position elevation and azimuth indicators should stop and indicate minimal change, within its step-track sectors.
- Current Mode indicates “Step-Track”.

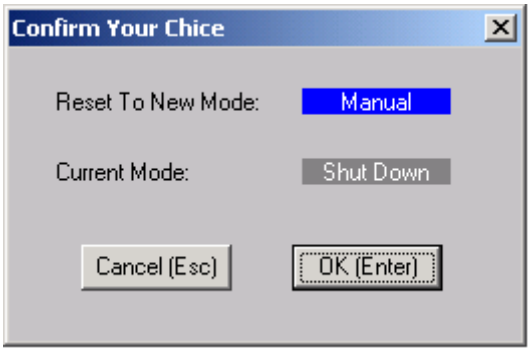
2.7. USING THE MANUAL MODE TO MOVE THE ANTENNA

NOTE

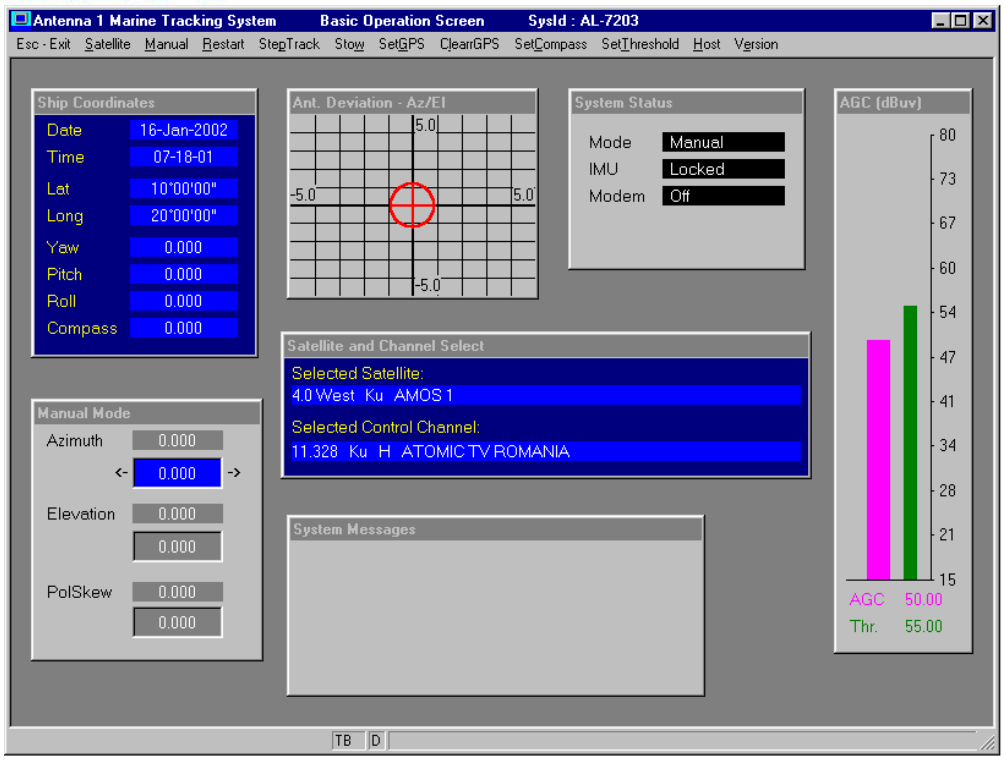
The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To invoke the Manual Mode, which enables you to manually move the antenna axes, perform the following procedure:

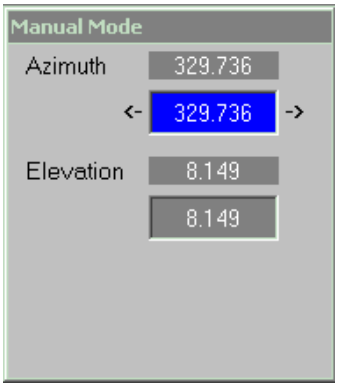
1. At the Basic Operation screen, press the “M” key. The following confirmation window appears:



2. Press ENTER twice to confirm. A Manual Mode window is added to the bottom left corner of the Basic Operation screen.



3. For each axis (Azimuth, Elevation and PolSkew [if applicable]), the Manual Mode window provides two display fields: the upper field displays the current angle of the axis, and the bottom one displayes the new manually changed angle.



To move the antenna to different direction, use the up/down arrow keys to highlight the pertaining axis bottom-field, and use the right/left arrows to increase/decrease the angle in step increments. The increment size may be defined in the pertaining configuration screen (password-protected). Default setting: 0.05-degree steps.

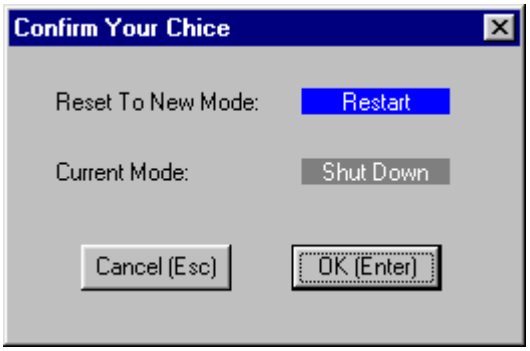
2.8. RESTARTING THE SYSTEM

NOTE

The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To restart the system, perform the following procedure:

1. At the Basic Operation screen, press the “R” key. The following confirmation window appears:



2. Press ENTER to confirm. The system will initialize the restart/initialization sequence.

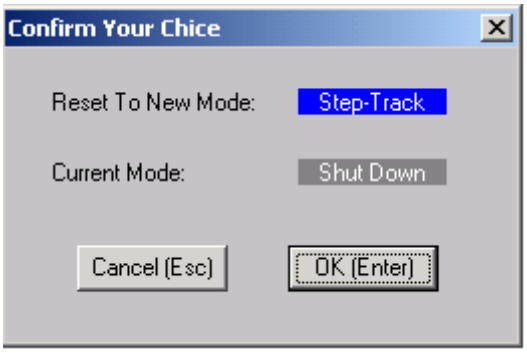
2.9. INVOKING THE STEP-TRACK MODE

NOTE

The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To invoke the Step Track mode, perform the following procedure:

1. At the Basic Operation screen, press the “P” key. The following confirmation window appears:



2. Press ENTER to confirm. The system will switch to Step-Track mode.

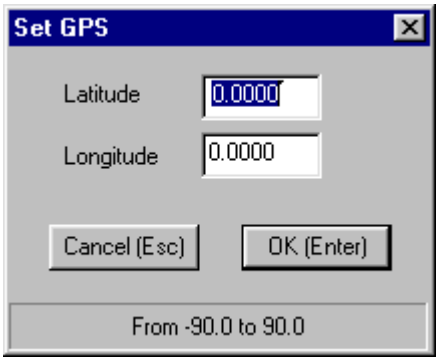
2.10. SETTING GPS COORDINATES

NOTE

The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To set new GPS Longitude and Latitude coordinates, perform the following procedure:

1. At the Basic Operation screen, press the “G” key. The following Set Gps window appears:



2. The Set GPS window displays the current GPS Longitude and Latitude coordinates. Type new values into the Longitude and Latitude fields, and press ENTER to confirm.

NOTE

The Longitude and Latitude values should be entered in their decimal representation, e.g.:

- *Latitude of 34° 30’ 00” North should be entered as +34.5000*
- *Latitude of 28° 45’ 00” South should be entered as -28.7500*
- *Longitude of 68° 15’ 00” East should be entered as +68.2500*
- *Longitude of 91° 20’ 00” West should be entered as –91.3333*

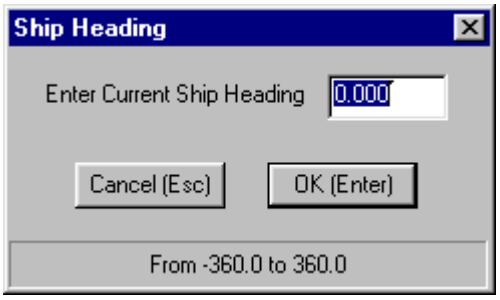
2.11. SETTING COMPASS PARAMETERS

NOTE

The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To set new Compass angle, perform the following procedure:

1. At the Basic Operation screen, press the “C” key. The following Ship Heading window appears:



NOTE

For incremental compass types (Step-by-Step, Synchro 36:1, Synchro 360:1), a start value of the compass may be set by the operator.

For absolute type, (NMEA-0183, Synchro 1:1, 60:1, 90:1), a default compass value may be set by the operator. This value will prevail until a valid compass update is received.

2. Type in a new value into the window, and press ENTER to confirm.

2.12. SETTING AGC THRESHOLD

NOTE

The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To set new Compass angle, perform the following procedure:

1. At the Basic Operation screen, press the “T” key. The following window appears:

2. Type in a new value (in dbμV) into the window, and press ENTER to confirm.

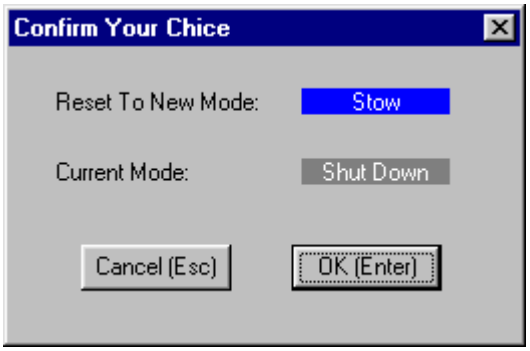
2.13. STOW AND SHUT-DOWN SEQUENCE

NOTE

The following function is available only if the Basic Operation Screen menu includes the appropriate command. Otherwise, this function can be accessed only from the pertaining Advanced Operation screen.

To shut down the system, perform the following procedure:

1. At the Basic Operation screen, press the “W” key. The following confirmation window appears:



2. Press ENTER to confirm.
3. The antenna moves to the pre-defined Stow position and then halts. In this situation the IMU is unlocked and the antenna is not stabilized.
4. Press ESC and ENTER to shut down the controller.
5. Turn OFF the power switch.

NOTE

To define a new Stow position, use the Maintenance screen (advanced-operation mode) to shutdown the axes, move the dish manually to the new position, read the X and Y values, and feed them into the Maintenance screen as the new Stow parameters.

Alternatively, the Stow-up mode may be used to stow the dish at its Zenith position (x=y=0 degrees).

2.14. SOFTWARE UPDATES

1. Boot the AL-7203-CONT3 to DOS, using the regular Utility Disk.
2. Use the “getconf” utility to store the controller configuration, just as a precaution.
3. Take out the Utility Disk and insert the Ver 3.21 (or higher) Update Disk for AL-7203-CONT3.
4. Write “Install”, and then hit the Enter-key. Wait until the message announcing successful software installation is displayed.
5. If a new Satellite database is required, write “Setsatf”, then hit the Enter-key.

3. ADVANCED OPERATION

3.1. INTRODUCTION

This section describes the advanced control functions of the Controller Software.

CAUTION

Only authorized and qualified personnel (installation and service personnel) are allowed to use the advanced functions. System operators are not allowed to perform advanced functions.

3.2. ACCESS TO ADVANCED CONTROL FUNCTIONS

1. While in the Basic Operation screen, press the "O" key. The password window appears:

2. Enter the password. The Operation screen is displayed (refer to the following figure).

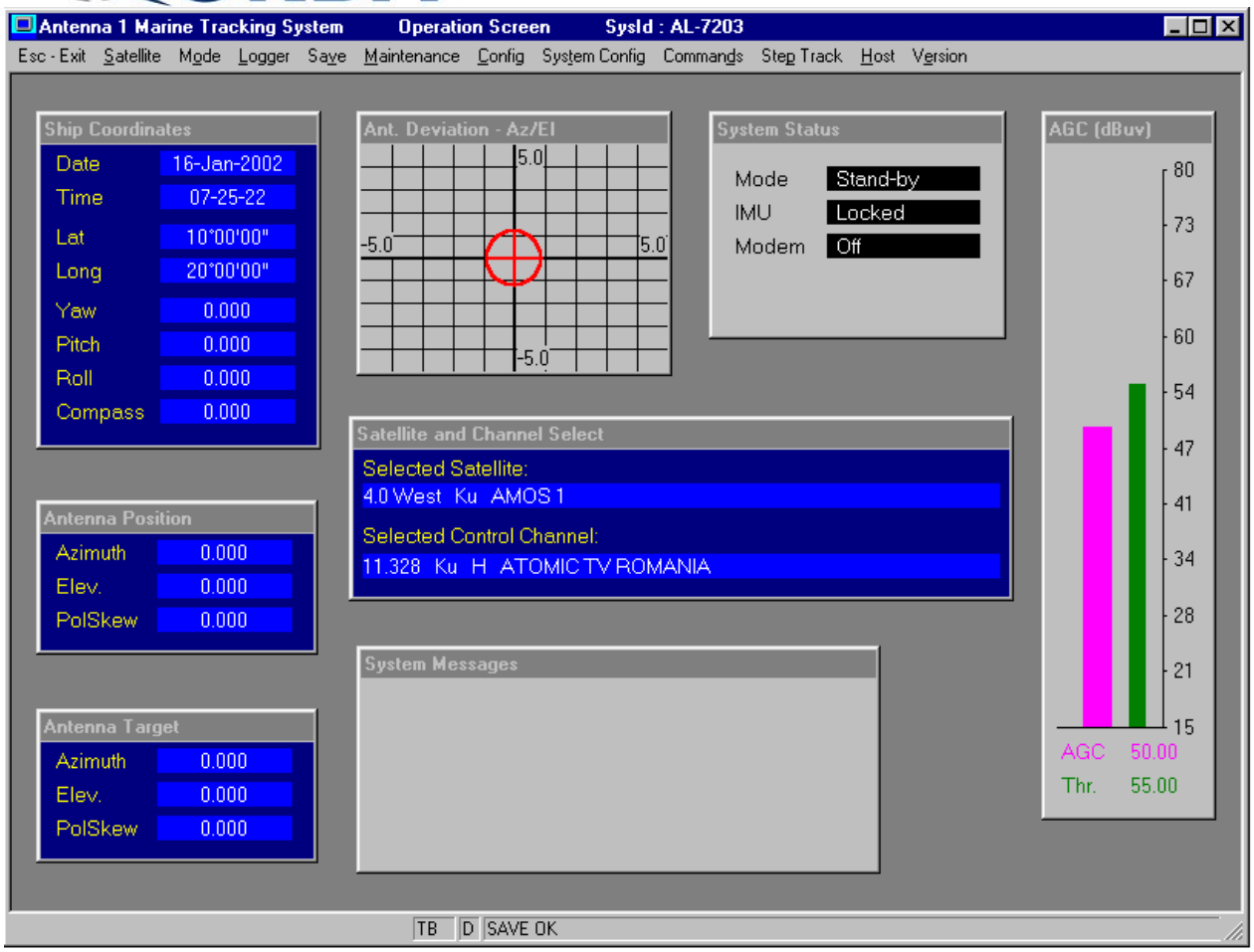


Figure 26. Operation Screen

3. The Operation Screen menu presents the available advanced functions. You can access each function by selecting the option or by pressing the appropriate shortcut key. Refer to the following table.

NOTE

To return to the Operation screen from any one of the advanced screens press the "Esc" key; to revert to the Basic Operation screen press the "U" key.

Table 3. Advanced Operation Modes

Menu Option	Shortcut Key	Function	Description
Esc-Exit	**<ESC>**	Exit	Terminates the application.
Satellite	**S**	Satellite Selection	Invokes the Satellite Selection procedure. Same as in Basic Operation screen.
Mode	**O**	Operation Modes	Allows you to change current operating mode of system, by selecting an available mode from a list: • Standby – Places the system in the standby mode and stops all current operations • Manual – Allows operator to move the antenna in Azimuth and Elevation (operates by left and right arrow keys selection) • Restart – Manually restarts system • Preset – Sends antenna to a pre-defined position. Allows you to enter settings for: Azimuth (-180 - 180°), Elevation (0.0 - 90.0 °), Polarization • Search – Starts system search for a satellite in a round spiral trajectory • Peak – Tells the system to go to the peak received signal determined by the step-track • Step Track – This is the systems normal operating mode. Starts the system step track function to determine peak receive signal • Pnt to Sat – Sends the antenna to the last calculated position on the current satellite selection • Encoder init – Initializes all system encoders • Test Traj – Starts the Positioner on a pre-determined test program • Box Scan – Starts system search for a satellite in a rectangular spiral trajectory

Table 3. Advanced Operation Modes

Menu Option	Shortcut Key	Function	Description
			• Acquire – Initiates the Pnt-to-Sat and then Step Track mode • Satellite Preset – Sends the antenna to a satellite according to its location on the geo-synchronic arc • Stow – Sends the antenna to a stow position • Stow Up - Sends the antenna to its Zenith position (x=y=0 degrees) • Slave - Sends the antenna to an Azimuth/Elevation position received from a host computer via communication link.
Logger	**L**	Data Logger	The Data Logger is basically a data recorder, which can monitor and record information from over 200 points in the system. Up to 4 different tracks can be recorded and viewed at any one time. The overall sample time can be varied as can the scale of the display. In addition the Data Logger can be set-up in advance and set to trigger at a given change in system performance.
Save	**V**	Save Configuration	Allows saving various system configuration changes that have been made.
Maintenance	**M**	Maintenance	Presents detailed system information and technical data relating to the pedestal and IMU axes, the Receiver, the GPS and SDU power. For each axis, the maintenance screen allows monitoring and changing of operational parameters, changing individual axis modes, and enabling system's Calibration and Alignment.
Config	**C**	Operational Configuration	Allows configuration of system modes such as: Manual Mode (change azimuth increment size), Search Mode (change sector step, velocity for azimuth), Step-Track, etc.

Table 3. Advanced Operation Modes

Menu Option	Shortcut Key	Function	Description
SystemConfig	**T**	System Configuration	Allows changes to system parameters such as: General parameters, GPS, Set clock, etc.
Commands	**D**	Commands	This menu provides quick access to several commands, such as SetGPS, IMU Init, etc.
StepTrack	**P**	Step Track	This screen provides a graphical display of AGC variations while the step track mode is activated. This display clearly shows the small step-track displacements, at both the Azimuth and Elevation antenna axes.
---	**U**	Basic Operation	Reverts to the Basic Operation screen.

4. MAINTENANCE

4.1. INTRODUCTION

This section provides instructions and procedures for Organizational Level (O-Level/Shipboard) Maintenance of the TVRO system.

4.2. TOOLS AND TEST EQUIPMENT

The TVRO system does not require any special tools or test equipment for maintenance.

Use the following standard tools and equipment to accomplish prescribed maintenance:

- Philips screwdriver, #2
- Flat-blade screwdrivers, set of small and large
- Open-ended wrenches
- Allen wrenches, standard set of small ones
- Allen wrench
- Locking compound, LocTite 270
- Flashlight.

4.3. PREVENTIVE MAINTENANCE

4.3.1. Semi-Annual Inspection

The Above Deck Equipment (ADE) of the TVRO system should be visually examined twice a year, using the following procedure:

- Turn OFF power to the ADE.
- Remove closing ring securing the radome to the radome base; Remove the radome.

CAUTION

Although the kevlar radome is light, two people are needed to lift it since the radome is bulky and will act as a sail in wind.

- Visually inspect the cables for rubbing or chafing.
- Check the inside of the radome for excessive moisture and/or corrosion.

- Verify that there are no screws, nuts, washers lockwashers or other parts in the radome base.
- Check for areas of chipped or peeling paint. Use only non-metallic paint for touch-up.
- Check feed tightness.
- Check for areas of chipped or peeling paint. Use only non-metallic paint for touch-up painting.
- Verify that all assembled nuts and bolts are secured and tightened. If nuts and bolts are loose, apply LocTite 270 and fasten them.
- Install and secure the radome to the radome base.

NOTE

If the system has not been operated within the last 30 days, it should be initialized and operated to verify proper operation and acquisition capabilities.

4.4. TROUBLESHOOTING GUIDE

4.4.1. Introduction

Use the following troubleshooting guide when a problem or malfunction is detected during operation.

The troubleshooting guide consists of the following columns:

- **Symptom**: Describes problems and malfunctions that might be detected during operation.
- **Possible Cause**: Describes the most likely reasons to the malfunction symptoms.
- **Recommended Action**: Details the maintenance procedures required to repair the system.

4.4.2. Using the Troubleshooting Guide

1. When a malfunction symptom is detected, start with the first possible cause and perform the first appropriate recommended action. If the symptom persists, perform the next recommended action, and so on, until the problem is solved.
2. If the symptom persists after performing all recommended actions for a specific possible cause, proceed with the next possible cause.
3. Repeat step (2.) until the malfunction symptom disappears.
4. In case the malfunction is not eliminated by the troubleshooting procedure, consult ORBIT.

Table 4. Troubleshooting Guide

Symptom	*Possible Cause*	*Corrective Action*
Missing picture; AGC signal is present.	Faulty cables or receivers.	Check cable connections to the TV distribution system.
Loss of signal (no picture or AGC reading)	LNB power supply failure.	Check for 13V/17V voltage on coax cable (between center and shield) at the LNB input. Check for 13V/17V voltage on coax cable (between center and shield) at the ACU output. NOTE: In Ku-Band, if only one polarity is missing, perform the above checks only on that polarity path.
	Faulty Ku-Band LNB.	**For Ku Band**: Replace Feed & LNB assembly
System is unable to acquire a satellite; AGC reading is present.	Satellite out of range.	Try to acquire another satellite.
	Faulty MUX. To verify, open the Maintenance screen, and check: • SDU 5V supply • +12V supply • GPS updates	Verify that the power indicator on the Front Panel is ON (green light). **Turn OFF the ADE power**, and check cables, connectors and power supply in the AL-7203-MUX.
	Faulty pedestal axis. To verify, use the Maintenance screen to move the axes.	If all axes fail, check cables, connectors and power supply.

Table 4. Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
The ACU displays an Error, Warning or a Message: **NOTE** *The messages are classified into three categories, each identified by a different color:* • *Message - green* • *Warning - blue* • *Error –red.* *Errors may be configured to shut down system operation on their occurrence.*		
Pedestal X Axis Jammed **Pedestal Y Axis Jammed** **Polarizer Axis Jammed** Accompanied with the following messages, respectively: **System Shut-Down, Ped-X Jammed** **System Shut-Down, Ped-Y Jammed**	A situation occurred when a 100% command was initiated to a particular axis, but it didn't move as expected. Note that the "System Shut-Down…" messages will appear if the above errors are configured to shut-down the system on their occurrence.	Check for mechanical obstructions and interferences. Restart system, if problem persists, consult Orbit.
Restart timed out	The system is not able to complete the initialization process in the allocated time usually due to mechanical axis jam or inability to find encoder zero mark.	Check for mechanical obstructions and interferences. Restart the system, if the fault persists, consult Orbit.

Table 4. Troubleshooting Guide

Symptom	*Possible Cause*	*Corrective Action*
SDU/IMU power out of tolerance **I/O power out of tolerance** **LNB voltage out of tolerance** **RCVR power out of tolerance**	The power voltage test point is out of tolerance as defined in the controller maintenance configuration.	Replace the suspected sub-assembly. If replacement is not available, consult Orbit.
I/O card not recognized **Receiver 2 card not recognized** **Receiver card not recognized**	The specific card is not recognized by the ACU on its bus.	Replace the suspected sub-assembly. If replacement is not available, consult Orbit.
Compass Communication Failed (Applicable when a RS-232 compass is used, e.g. NMEA-0183)	Disconnected cable; Inactive compass; Disconnected compass.	Check and connect compass cable; Check and connect compass.
GPS Communication Failed	Communication failure with GPS receiver.	Open the Maintenance screen and verify that the GPS window presents a blinking “Updated” message and that at least 3 space vehicles are present. If these conditions do not exist, check cable between the ADE and the controller.

Table 4. Troubleshooting Guide

Symptom	*Possible Cause*	*Corrective Action*
No GPS Position Updates	The GPS position updates rate, normally an update per second, is interrupted for more then 30 seconds. **NOTE** *This message is displayed in addition to the "GPS Communication Failure" which is displayed whenever all communication with the GPS receiver is lost.*	Verify that the GPS antenna is not obstructed by the ADE. Check GPS antenna cable and connector.
Illegal Step-by-Step Compass Data (Applicable when using a Step-by-Step compass)	Disconnected cable; Inactive compass; Disconnected compass	Check and connect compass cable; Check and connect compass.

Table 4. Troubleshooting Guide

Symptom	*Possible Cause*	*Corrective Action*
Synchro Compass Fault (Applicable when a Synchro type compass interface is selected (1:1, 36:1, 60:1, 90:1 or 360:1)	No 115VAC Reference - or - There is a too large tracking error inside the S/D converter - or - The synchro S1, S2, S3 signals are not present. - or - compass is inactive or disconnected **NOTE** *When a Synchro fault is identified, the synchro readout is forced to the last valid update, which may be then overwritten by the "Set Compass" function.*	Verify that the compass functions properly. Check compass harness and connector. **NOTE** *When the compass is inactive or disconnected and the ship is static (for example, when the ship is in the dock), Activate the Set Compass function and enter the ship's heading.*
System not Initialized	Power to the ADE was disconnected and connected again. This message alerts the operator that after ADE power loss, all the mechanical axes incremental encoders as well as the IMU filters must be initialized.	Restart the System by turning the ADE and controller POWER switches OFF, wait for approximately one minute, and then execute the full start-up procedure.
Auto-Restart in Progress	The ACU performs Auto-Restart.	Wait until Auto-Restart is complete.
Acquiring a Satellite	The system is acquiring a satellite.	Wait until the Acquire procedure is complete.

4.5. CORRECTIVE MAINTENANCE

4.5.1. Replacement of Front Panel Fuse

To replace the Front Panel fuse, perform the following procedure:

1. Turn OFF the Front Panel POWER switch.
2. Disconnect power cable from connector P1 on the front panel.
3. Use a flat-blade screwdriver to remove the fuse housing by pressing the fuse housing and turning it a half turn counter-clockwise.
4. Remove the defective fuse and replace it with a new one: 220V/3A or 115V/6A.

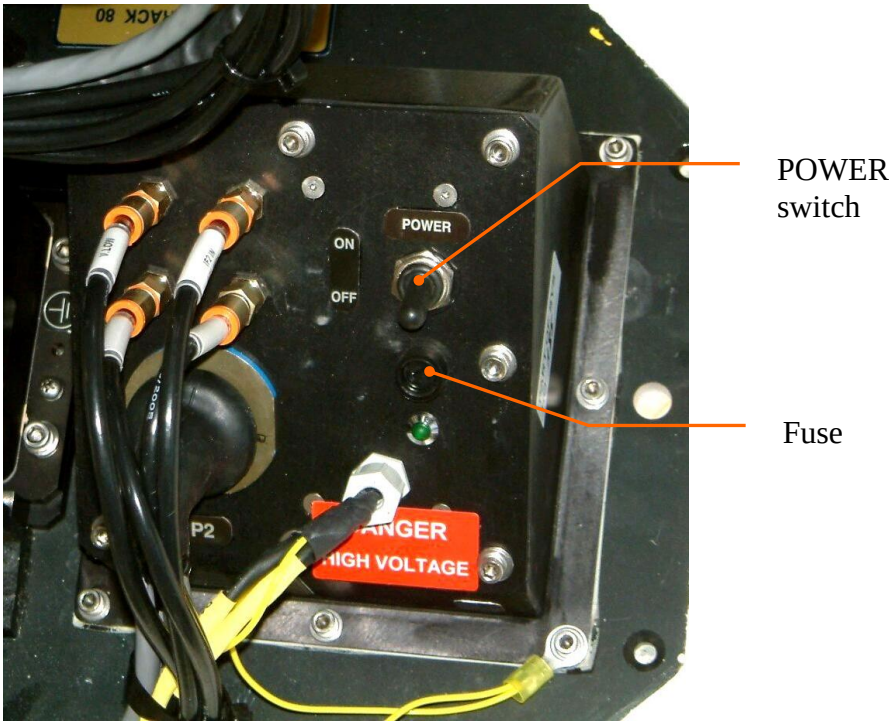


Figure 27. Front Panel Fuse

5. INSTALLATION GUIDE

5.1. INTRODUCTION

The purpose of this chapter is to establish the plan, guidelines and procedures for installation of a typical AL-7203 Marine Stabilized TVRO System aboard a designated ship/vessel.

The processes and procedures outlined provide the basic step-by-step structure necessary to successfully accomplish system installation and checkout.

The procedures provided in this chapter are intended for implementation by personnel with a background in electronics, standard shipboard installations, and in-depth familiarity with the operation of the AL-7203 system. Installing personnel should be totally familiar with the content of this AL-7203 Technical Manual.

5.2. SEQUENCE OF INSTALLATION

Regardless of the varying installation requirements and working conditions onboard different ships, the following sequence of installation is recommended.

1. **Ship Survey and Installation Planning** - ship's survey and installation planning, including choosing the mounting sites, and preparing an installation plan.

NOTE

Preliminary activities such as system site preparation and installation planning must be pursued before installation operations may be started.

2. **On-Site Unpacking and Inspection** – unpacking and inspection of the system's components at the installation site (harbor or shipyard).
3. **On-Ship installation** – mounting the ADE and BDE on the ship; laying and connecting system cables and wiring (between the system's units); connecting the system to ship's power supply and gyrocompass.
4. **System Power-Up and Setup** - power-up, setup, and testing.
5. **System Commissioning** – commissioning and acceptance of the system.

NOTE

System installation involves the deployment of several units, components and cables on the ship. Since the working conditions are strenuous, the process must be properly coordinated among the installation staff and ship crew.

5.3. SHIP SURVEY

5.3.1. Introduction

A Pre-installation Site/Ship Survey should be conducted. The site survey is very important in that it allows an opportunity to collect valuable information on ship facilities and the parameters affecting installation decisions. This site survey is best conducted with a representative of ship's personnel in attendance.

5.3.2. Survey Report

During the visit to the ship, fill out a Survey Report, to allow accurate and efficient installation planning. This report, tailored to each AL-7203 system installation, is detailed to the level that ensures no technical and/or design information are missed.

During the site survey particular attention should be given to requirements for cable runs, available, interfaces to the ship's systems (power, gyro, etc.), intended locations for equipment placement, etc. Upon completion of the site survey, collected data should be incorporated into a Site Survey Report which will detail specific installation processes and include "red-lined' drawings to document pending changes to ships configuration.

During the site survey particular attention should be given to location of both equipment groups associated with the system. These groups are the Above Deck Equipment (ADE) and Below Deck Equipment (BDE).

5.4. INSTALLATION PLANNING

5.4.1. Introduction

Installation planning is one of the most important stages in any installation. Correct planning will lead to a successful installation with minimum trouble before and throughout system operation.

Before installation, make sure that:

1. You have visited the ship and familiarized yourself with the ship layout, or received a filled-out Survey Report.
2. You have received existing ship layouts, as may be available:
   - Ship construction plan
   - Ship electric mains layout and UPS access (if available)
   - Ship gyro compass interface type, wiring and availability.
3. You identify the ship's power supply voltage, Gyro compass (standard and voltage), and Gyro repeater output (standard and voltage).

CAUTION

The ship's Gyro repeaters may convert the original signals accepted from the compass. Therefore, verify that the appropriate signal is supplied to the system.

Now use these data to prepare the installation plan, which should include equipment locations, installation details, cable runs, etc.

5.4.2. Installation by Location

Typically, the system installation is divided into two groups, in respect to the installation place:

- Above Deck Equipment (ADE) Installation
- Below Deck Equipment (BDE) Installation.

The following paragraphs describe the guidelines that must be considered when planning and selecting installation sites for the equipment.

5.4.3. Choosing the Best ADE Location

Special consideration must be given to selection of installation locations for the ADE. The following paragraphs describe the special considerations for assessing selected installation sites for the equipment:

- Mechanical stability
- Radome Outline Dimensions
- Line Of Site (LOS)
- Distance between ADE and BDE
- Maintenance access
- Other Location Considerations

5.4.3.1. Mechanical Stability

Verify that the mounting surface intended for the ADE is rigid, flat, free of vibration, leveled and stable surface. The mounting surface should be capable of supporting the total equipment weight (about 50 kg).

In addition, the mounting surface should be able to withstand lateral wind loading forces, and should be stable with natural resonance frequency of above 30 Hz.

5.4.3.2. Line Of Site (LOS) Considerations

Line Of Site (LOS) is a straight line between the antenna and the satellite. Obstructions to LOS will typically be the ship's funnels and masts.

Ideally, the optimum ADE site will have no obstructions to the LOS, i.e., clear view of the horizon/satellite all around. However, it is normal that a compromise will have to be made between the LOS and other considerations.

NOTE

To improve operation, the system should be installed with the X-axis pointed toward an obstruction to satellite visibility. The X-axis direction is marked on the Radome, above the Front Panel. If no such obstruction exists, it is recommended to install the system with the X-axis pointing toward and aligned with the bow.

5.4.3.3. Radome Outline Dimensions

When selecting the ADE location, be sure to account for the Radome envelope dimensions, as illustrated in the following Figure:

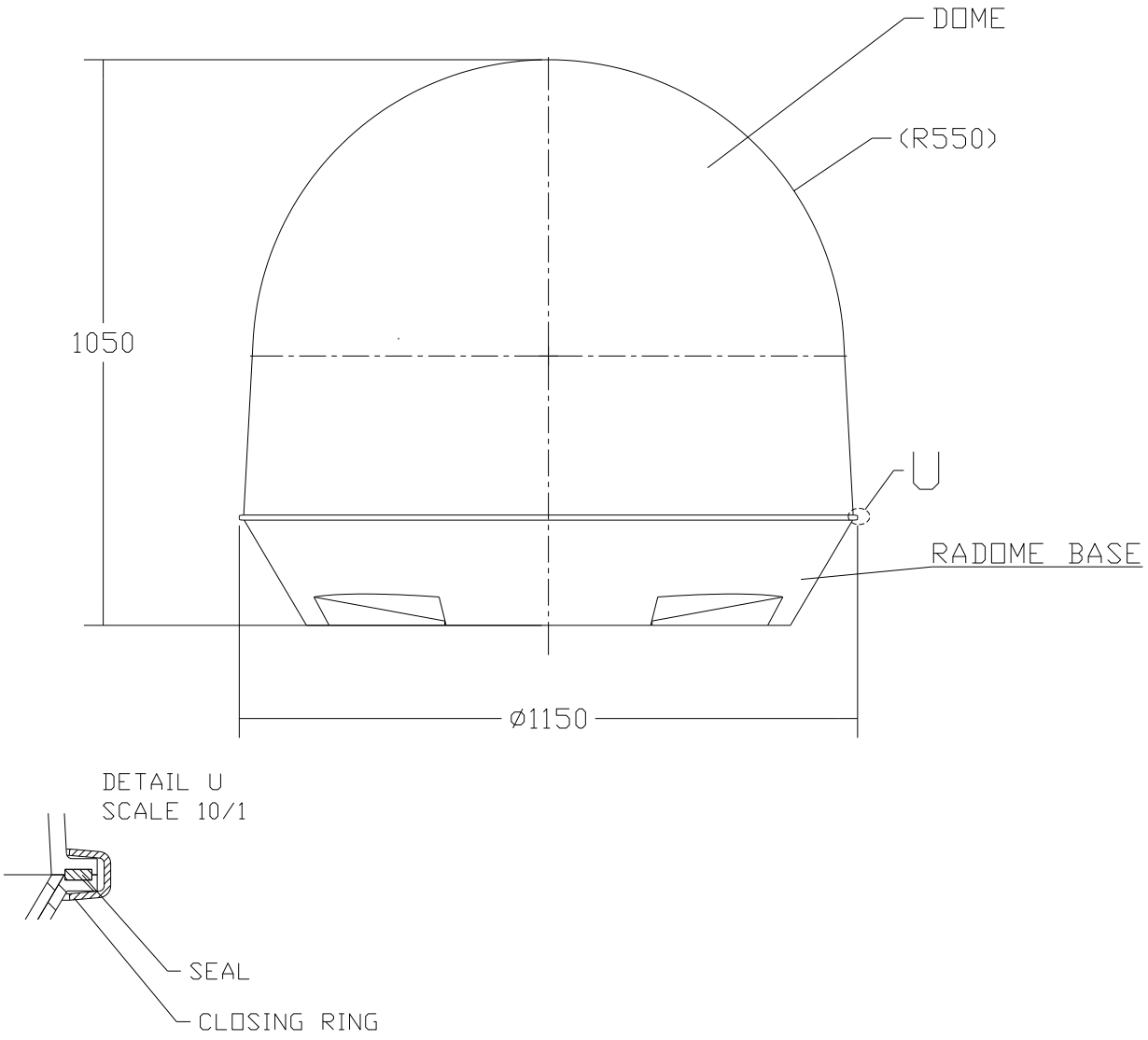


Figure 28. Radome Outline Drawing

5.4.3.4. Distance between ADE and BDE

The system is supplied with a single ADE-BDE Control cable. The length of the cable depends on the cable-run distance between the ADE and the BDE, as measured during the site survey.

The system supports ADE-BDE cables length of up to 165 meter (500 feet).

5.4.3.5. Maintenance Access

Consideration should be given to allow free-of-obstacles space below the support to allow sufficient maintenance access for technical staff.

5.4.3.6. Other Location Considerations

The following paragraphs provide general guidelines of installation aboard ships:

- The mounting location should not be immediately adjacent to high-power radars or other communication equipment.
- The location selected for installation should have maximum non-blocked hemispheric view down to 10 degrees visibility.
- The orientation on azimuth, given that there is a direction of blockage, is to point the x-axis toward this blockage. To improve operation, the system should be installed with the X axis (horizontal keyhole) pointed toward an obstruction to satellite visibility. The X axis direction is marked on the Radome, above the Front Panel.

5.4.3.7. Power Supply Considerations

It is highly recommended that power supplies to both the ADE and BDE shall be conditioned, preferably with appropriately rated Uninterruptible Power Supply (UPS).

5.4.4. Mounting Surface

The mounting surface intended for the ADE should be a stable (with natural resonance frequency of above 30 Hz) flat surface, capable of supporting the total equipment weight (radome with all units installed in it).

The following Figure depicts the layout of the mounting surface's holes, required for the bolts securing the ADE to mounting surface.

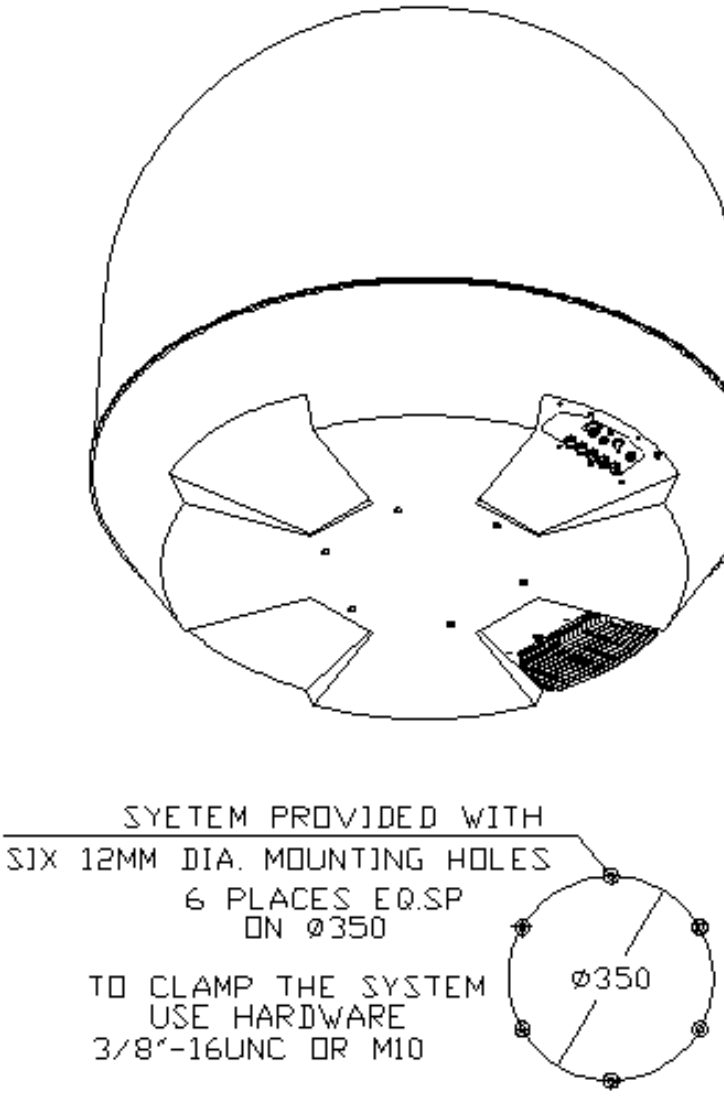


Figure 29. Mounting Surface Screw Holes Outline

5.4.5. ADE Support Construction

If the need arises to elevate the ADE, the radome can be mounted on an optional structure, supporting the radome with all ADE units installed in it.

The following Figures provide outline drawings of the recommended support construction and base plate, which are designed to carry the AL-7203 system onboard the ship.

NOTE

The holes on the support plate are intended for the bolts securing the Base Ring to the support construction.

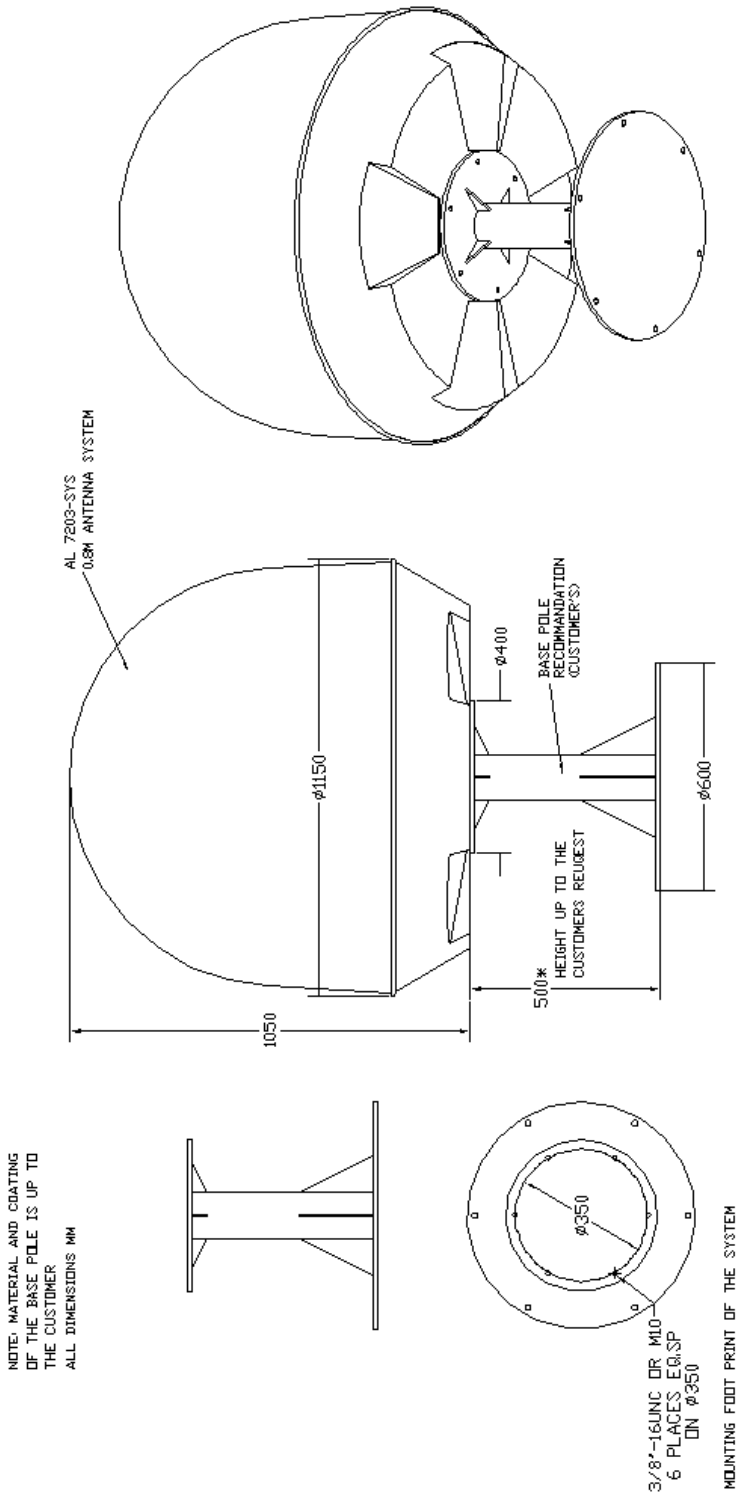


Figure 30. Recommended Support Structure

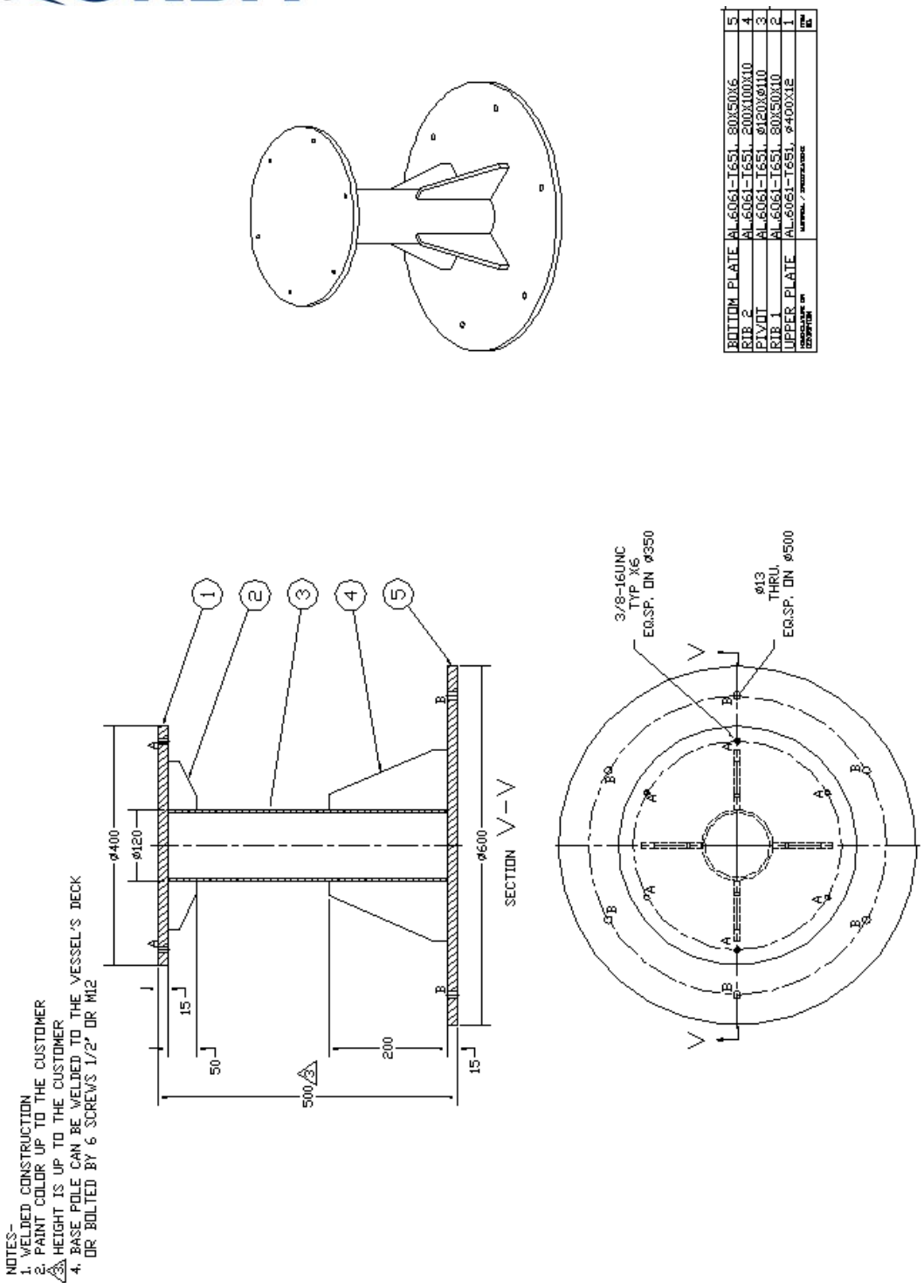


Figure 31. Recommended Base Pole

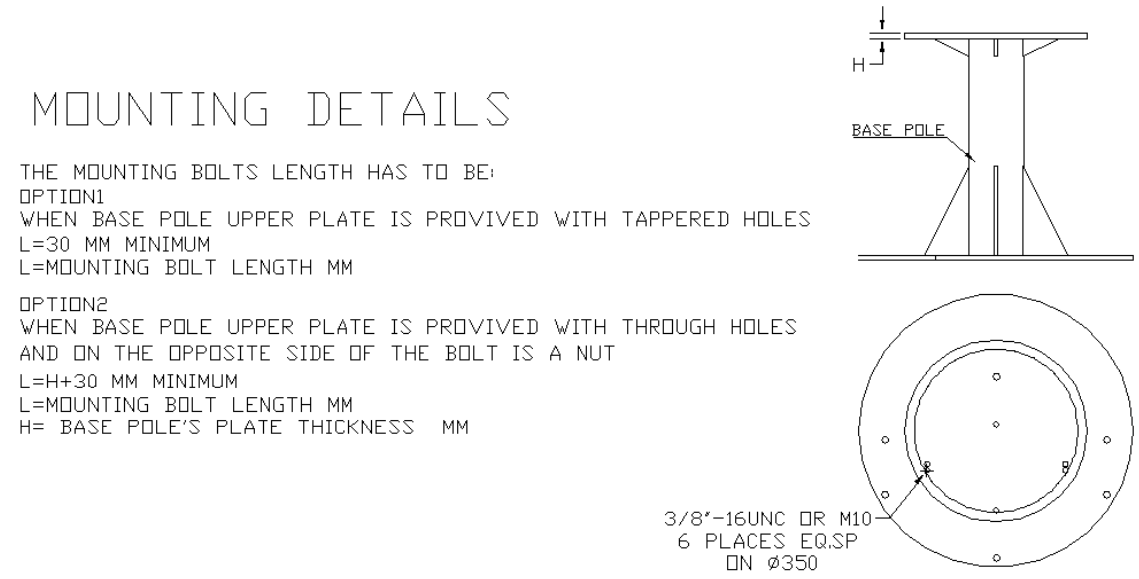


Figure 32. Recommended Mounting Details

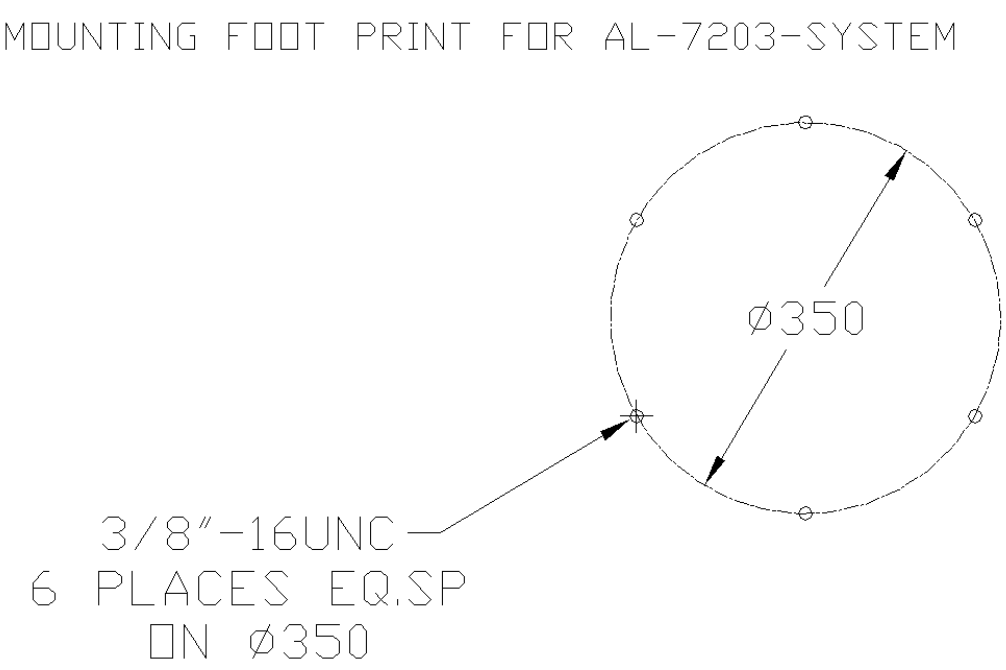


Figure 33. Recommended Mounting Foot Print

Although it is advisable to use the above-recommended support, any other construction that shall support the weight of the system and fit the base ring dimensions can be used. The following Figure depicts such a typical support structure:

Figure 34. Typical Support Structure

5.4.6. BDE Location Considerations

5.4.6.1. Installation Method

The BDE units should be mounted and secured to solid surfaces.

NOTE

The BDE environment should be climate-controlled.

5.4.6.2. BDE Cables Length Considerations

When planning the BDE units' location, verify that the distance between the units is in accordance with the lengths of the supplied cables:

- Controller-keyboard 10m cable
- Controller-display 8m cable

5.4.6.3. Operator/Maintenance Accessibility

The BDE operation is largely automatic, but it is desirable that it be monitored periodically. Therefore, it is beneficial that it be sited in a location with easy operator access.

In addition, consideration should be given to allow free-of-obstacles space around the equipment to allow sufficient maintenance access for technical staff to the rear panel, where cables are connected to the equipment.

5.4.7. Pre-Installation Checklist

Before sending the installation crew to the site, several installation site details and status require to be addressed and finally verified by the client. Therefore, the client should fill out the Pre-Installation Checklist.

The checklist assures that the installation site and client-supplied equipment are available and ready for arrival of the installation team.

5.5. ON-SITE UNPACKING AND INSPECTION

5.5.1. Packing List

NOTE

This section presents a typical shipping configuration.

Typically, the AL-7203 System and installation tools/materials are sent to the installation site packed in a single shipping crate, containing the following items (for a typical installation).

Figure 35. AL-7203 Shipping Crate

Figure 36. AL-7203 Shipping Crate- Internal Arrangement

Figure 37. AL-7203 Shipping Crate- Internal Arrangement (Radome Removed)

Table 5. AL-7203 System - Packing List / Bill of Materials

No.	ITEM Part No. / Doc No.	Qty.	Description
1.	AL-7203-1A	1	PED. ASSY AL-7203-SYS3
2.	AL-7203-IMU-NT3	1	INTERIAL MEASURING UNIT
3.	AL-7203-SDU3	1	SERVO DRIVE UNIT
4.	AL-7203-MUX3	1	MULTI PLEXER UNIT
5.	AL-7203-F.P3	1	FRONT PANEL UNIT
6.	AL-7203-CONT3	1	CONTROLLER UNIT
7.	ALL PARTS IN TAK EXCEPT *		
8.	KIT21-0969 *	1	UTILITY BAG
9.	CD22-0001-3 *	1	CD INSTALLATION MANUAL *
10.	KIT21-0859 *	1	AL-7203 MOUNTINING SCREWS
11.	21-0688-9-30M *	1	ADE TO BDE CABLE 30M
12.	DCD20-0750-3	1 1	INTERFACE CONTROL DWG.
No.	ITEM Part No. / Doc No.	Qty.	Description
13.	AL-7203-POL3	1	d Option
14.	22-0425-4-1	1	Latin American Circular LNBF
15.	21-0560-4-1	1	American Circular LNBF
16.	21-0864-9-1	1	

* These parts are parts of TAK22-0001-9-3.

5.5.2. Unpacking and Inspection Guide (At the Installation Site)

NOTE

Before unpacking, check the contents of the shipping crate, and verify that all components are present.

Where applicable, record the components' serial numbers. The serial numbers are marked on the components' nameplates. The service department will request these numbers if you contact ORBIT for technical assistance.

1. Liaise with Client Representative and Site Foreman to locate the crate supplied to the site by the Installation Contractor.
2. Find a suitable build area according to pre-install checklist.
3. Locate the packing manifest on the side of the crate.
4. Inspect all contents and ensure all items are accounted for.
5. Place the shipment crate on a rigid, leveled surface.
6. Open the crate without damaging the contents.
7. Remove the Radome by releasing its ring clamp.
8. Carefully remove all packages from within the ADE, and place them at a designated storage area in an orderly manner.
9. Visually inspect the exterior of the equipment for evidence of any physical damage that might have occurred in shipment/storage.
10. Tighten any loose mounting screws and terminal board screws.
11. Clean the exterior of the equipment.

CAUTION

Check all components for shipping damage, and report all damage to shippers immediately, as units damaged in shipping will not be replaced under Warranty terms and conditions.

5.6. ON-SHIP INSTALLATION

5.6.1. ADE Installation

5.6.1.1. Removal of Radome

CAUTION

When removing or installing the radome-securing ring, take care not to scrape the radome.

When the radome is removed, verify that the internal components are not getting wet. Before installing the radome, remove foreign objects, and clean and dry the ADE interior.

Release the Radome ring clamp and remove the Radome.

Figure 38. Radome Securing Ring Clamp

5.6.1.2. *Mounting and Securing the ADE Radome Base*

Place isolation (rubber sheets) between radome base and support surface (not supplied by ORBIT).

Place the ADE on the mounting surface, with the arrow on the ADE Base pointing FORWARD or toward an obstruction.

Figure 39. ADE Base Mounting Orientation

Install and fasten the bolts securing the ADE Base to the mounting surface.

Figure 40. ADE Base Mounting Bolts

Seal the mounting screws protruding below mounting surface. Use silicon sealing compound.

5.6.2. Connecting Cables to ADE

5.6.2.1. ADE-BDE Cables Routing

Lay and route the cables connecting between the ADE and BDE (CONTROL, Power Supply, RF). Use standard practice - Bending diameter 10 - 12 cm min.

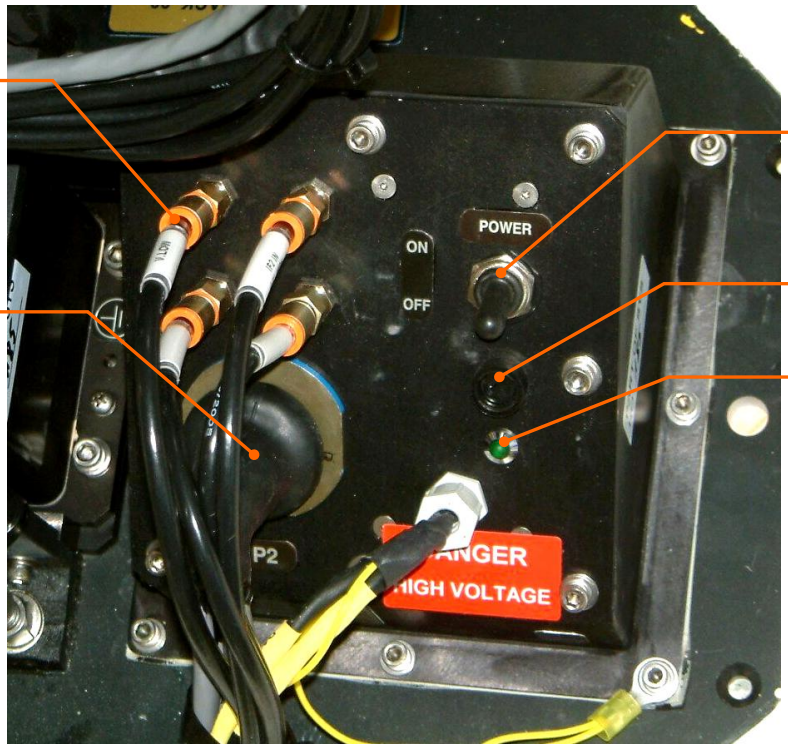
CAUTION

The CONTROL cable is supplied with the BDE-side connector removed, and should be routed from the ADE-side towards the BDE-side.

When routing this cable, verify that the BDE-side pins are not damaged.

5.6.2.2. Front Panel Connectors

The following Figure depicts the ADE Front Panel connectors and the cables connected to them.



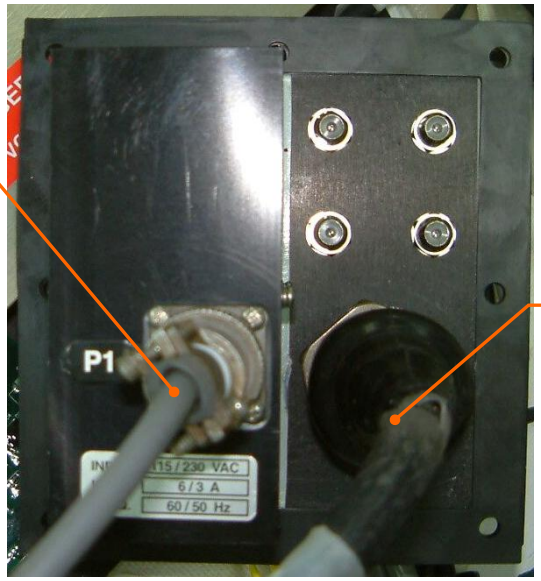
RF Connectors (x4)

XXX Connector

ADE Power ON/OFF Switch

ADE Fuse

ADE Power Indicator



POWER Cable

ADE-BDE CONTRO L Cable

Figure 41. Front Panel Connectors

5.6.2.3. RF cables connection

Insert the RF cables via the Front Panel glands into the ADE base.

Connect the RF cables to the Front Panel RF connectors.

5.6.2.4. Control Cable Connection

Connect CONTROL cable to connector P2 on the Front Panel.

Verify good connection and then disconnect the cable.

5.6.2.5. Power Cable Termination and Connection

The POWER cable connector is supplied by ORBIT, packaged as Utility Kit P/N 21-0969. The kit includes an MS connector, shrinkable boot, and an assembly instructions sheet.

Prepare a power cable with the pertaining length (the cable is not supplied by ORBIT).

Connect the connector to the POWER cable per the following instructions sheet. Apply black-epoxy glue to internal surface of boot connector side before shrinking, and also apply to boot cable side for sealing (glue is not supplied by ORBIT).

Connect POWER cable to connector P1 on the Front Panel.

Verify good connection and then disconnect the cable.

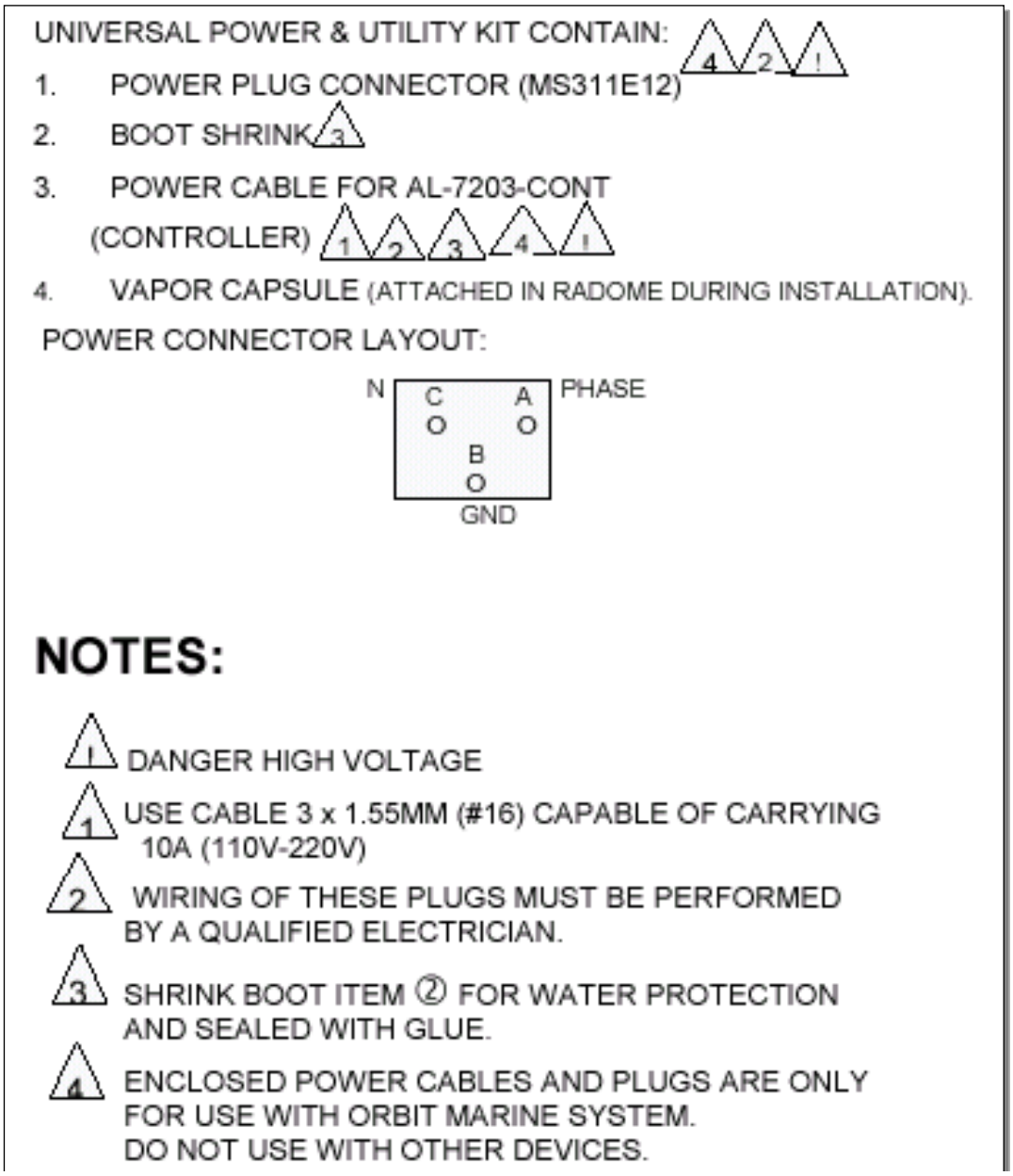


Figure 42. Power Cable Termination Instructions Sheet

5.6.2.6. Ground Wire Connection

Use a 14# GND wire, terminated with a terminal lug. Connect the grounding cable to the Front Panel GND jack.

5.6.3. ADE Initial Power-Up

Verify that the mains voltage is 115 – 230VAC.

Turn ON the ADE POWER switch. Verify that the POWER green LED illuminates and that the power supply fan is working.

CAUTION

In this state, the Antenna is held in place (stowed) by the pedestal motors. Do not attempt to manually move the Antenna.

5.6.4. Installation of Radome

CAUTION

When removing or installing the radome-securing ring, take care not to scrape the radome.

Before installing the radome, remove foreign objects, and clean and dry the ADE interior.

Place the Radome on the ADE Base, and lock the securing ring clamp.

Secure the clamp with a tie-wrap.

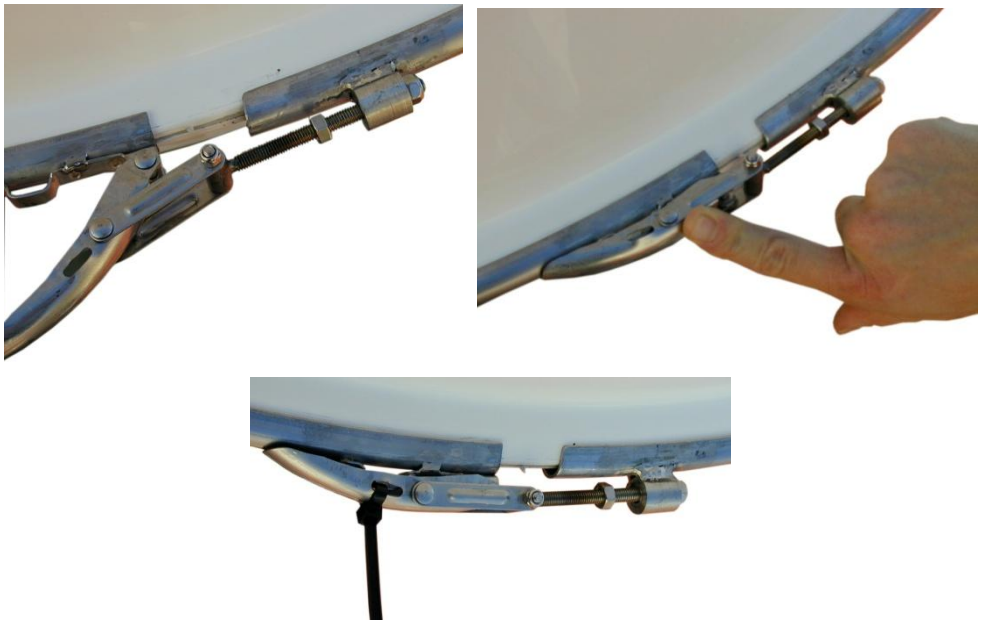


Figure 43. Locking the Radome Securing Ring

5.6.5. BDE Installation

Before installing the BDE, remove power and control cables from the ADE. Reinstall caps on ADE MS connectors.

Mount the Controller, Monitor and Keyboard. These BDE units should be secured to prevent movement during sailing

5.6.6. Connecting Cables to BDE

5.6.6.1. Gyro Compass Cable Termination

The Gyro feed cable from the vessel should be routed into the BDE location, its armour sheathing should be removed (at least 2m), and should be terminated in the appropriate connector for the Gyro signal in question.

Use the following wiring diagram to prepare and connect the COMPASS cable to the pertaining connector.

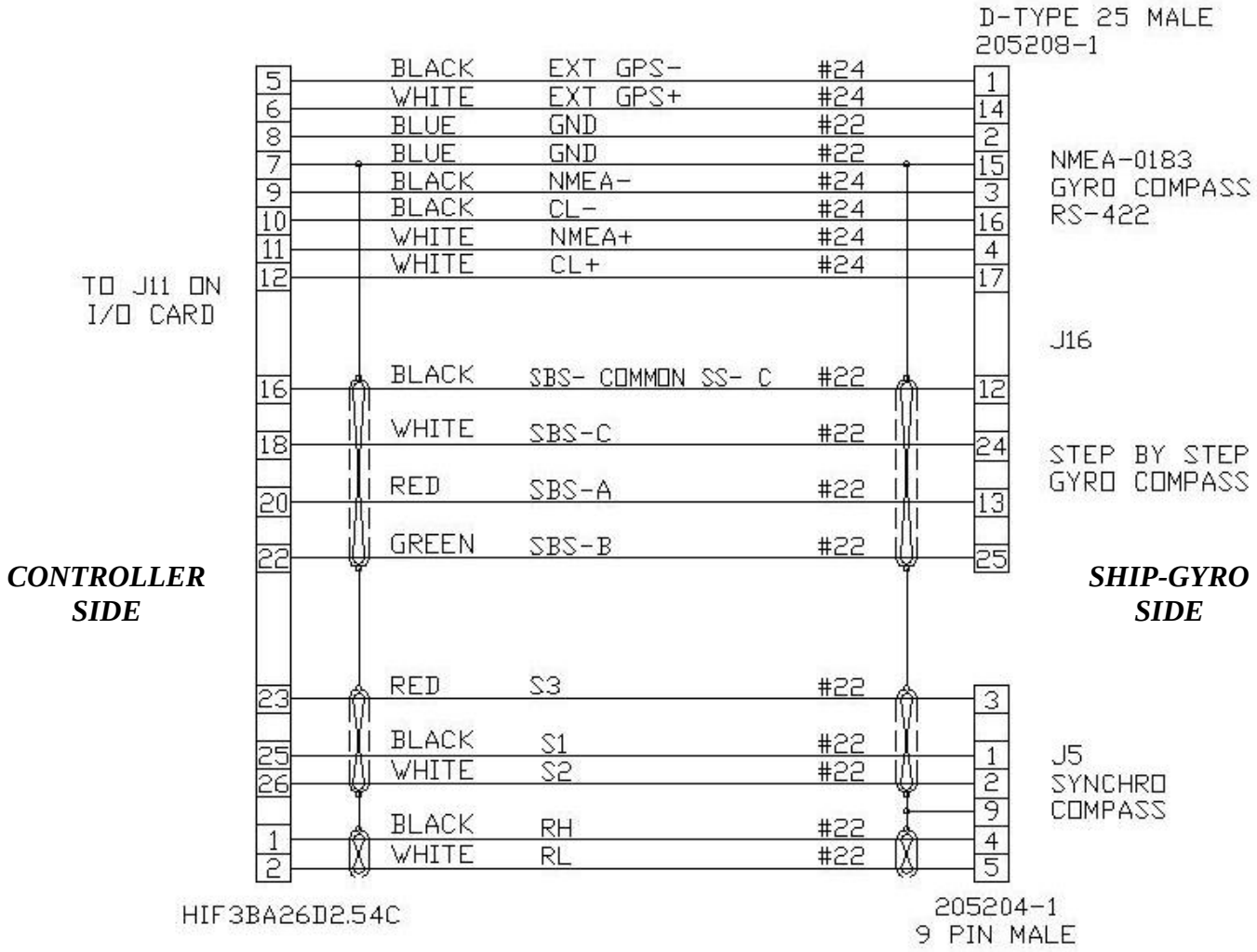


Figure 44. Compass Harness Interface

5.6.6.2. Control Cable Termination

5.6.6.2.1. General

The system is supplied with a CONTROL cable that connects between the ADE and BDE, and should be laid down via the ship's designated cable guides/ducts.

The cable can be supplied in various lengths, depending on the specific installation. The following Figure provides the ordering information.

ITEM P/N	PARTS LIST	LENGTH
21-0688-9-05	PL21-0688-9-05	05 m
21-0688-9-10	PL21-0688-9-10	10 m
21-0688-9-15	PL21-0688-9-15	15 m
21-0688-9-20	PL21-0688-9-20	20 m
21-0688-9-25	PL21-0688-9-25	25 m
21-0688-9-30	PL21-0688-9-30	30 m
21-0688-9-35	PL21-0688-9-35	35 m
21-0688-9-40	PL21-0688-9-40	40 m
21-0688-9-45	PL21-0688-9-45	45 m
21-0688-9-50	PL21-0688-9-50	50 m
21-0688-9-55	PL21-0688-9-55	55 m
21-0688-9-60	PL21-0688-9-60	60 m
21-0688-9-65	PL21-0688-9-65	65 m
21-0688-9-70	PL21-0688-9-70	70 m
21-0688-9-75	PL21-0688-9-75	75 m
21-0688-9-80	PL21-0688-9-80	80 m

Figure 45. CONTROL Cable– Ordering Information

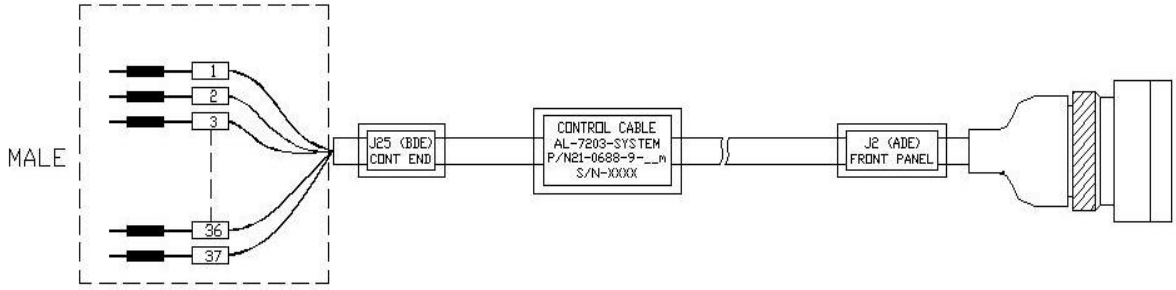
5.6.6.2.2. Termination Procedure

The CONTROL cable is supplied with the BDE-side connector removed, to allow easy routing and to prevent damage to the connector during installation. After the cable is laid down, connect the connector to the cable.

The cable is supplied with D-Type pins crimped to the cable wires. The wires are labeled with pin numbers, and protected at the cable's end by transparent shrinkable tubing.

To terminate the CONTROL cable with the connector, perform the following procedure (Installation details and wiring diagram of the CONTROL cable are shown in the following Figures):

1. Carefully remove the transparent shrinkable tubing at the cable's BDE-end.
2. Separate and arrange the pins in an ascending order, to match the D-Type connector layout. Verify that the wires are not crossed.
3. Connect the cable's pins to the D-Type connector.
4. Use a pertaining test equipment to check leakage currents, short circuits and continuity.
5. Fit the DB37 shells to the cable, ensuring that the wires are not pressed nor stressed.
6. Secure the shells, ensuring that the drain wire is wrapped around the cable clamping grommet in such a way that electrical continuity is maintained with the shell body.



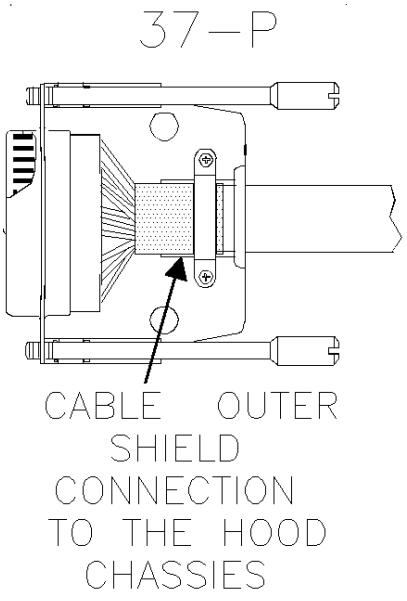


Figure 46. CONTROL Cable Installation Details

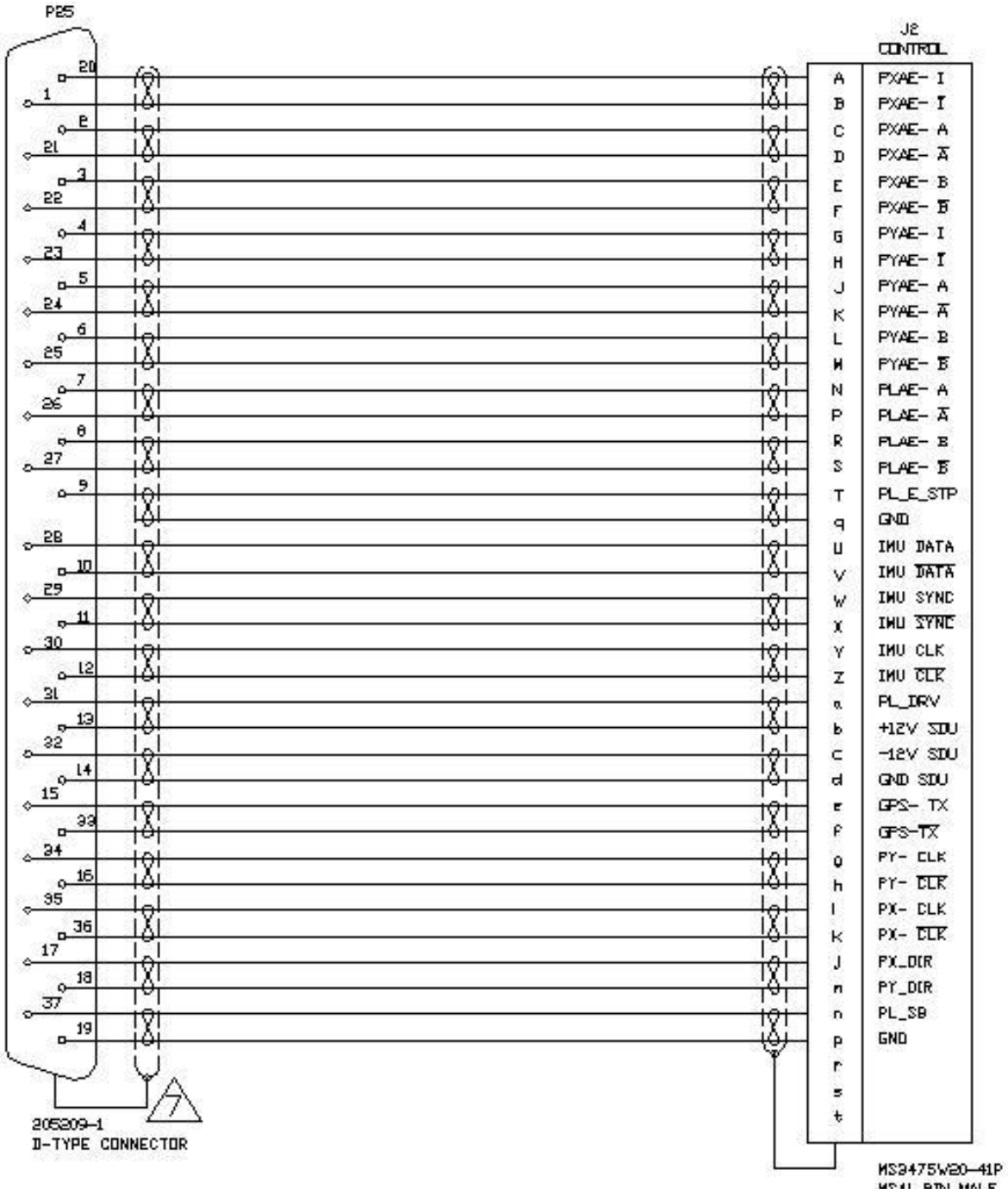


Figure 47. CONTROL Cable Wiring Diagram

5.6.6.3. Connecting Cables to the Controller

Connect cables to the Controller as described in the following procedure, and as depicted in the subsequent Figure.

1. Connect the LCD Monitor cable to the DISPLAY connector.
2. Connect the Keyboard cable to the PS/2 Keyboard connector.
3. Connect the RF cable to the LOWER TUNER connector.
4. Connect the Compass cable to J5 (for Synchro Compass) or J16 (for Step-by-Step or NMEA-183 Compass).
5. Connect CONTROL cable DB-37 Male connector to P25.
6. Fasten the screws securing the cable connectors to the Controller's connectors.

WARNING

Terminating the Power cable with a pertaining plug should be performed only by a certified electrician.

7. Install a pertaining plug on the Power cable.
8. Connect the POWER cable to the Controller.
9. Re-connect the POWER and CONTROL cables to the ADE Front Panel.

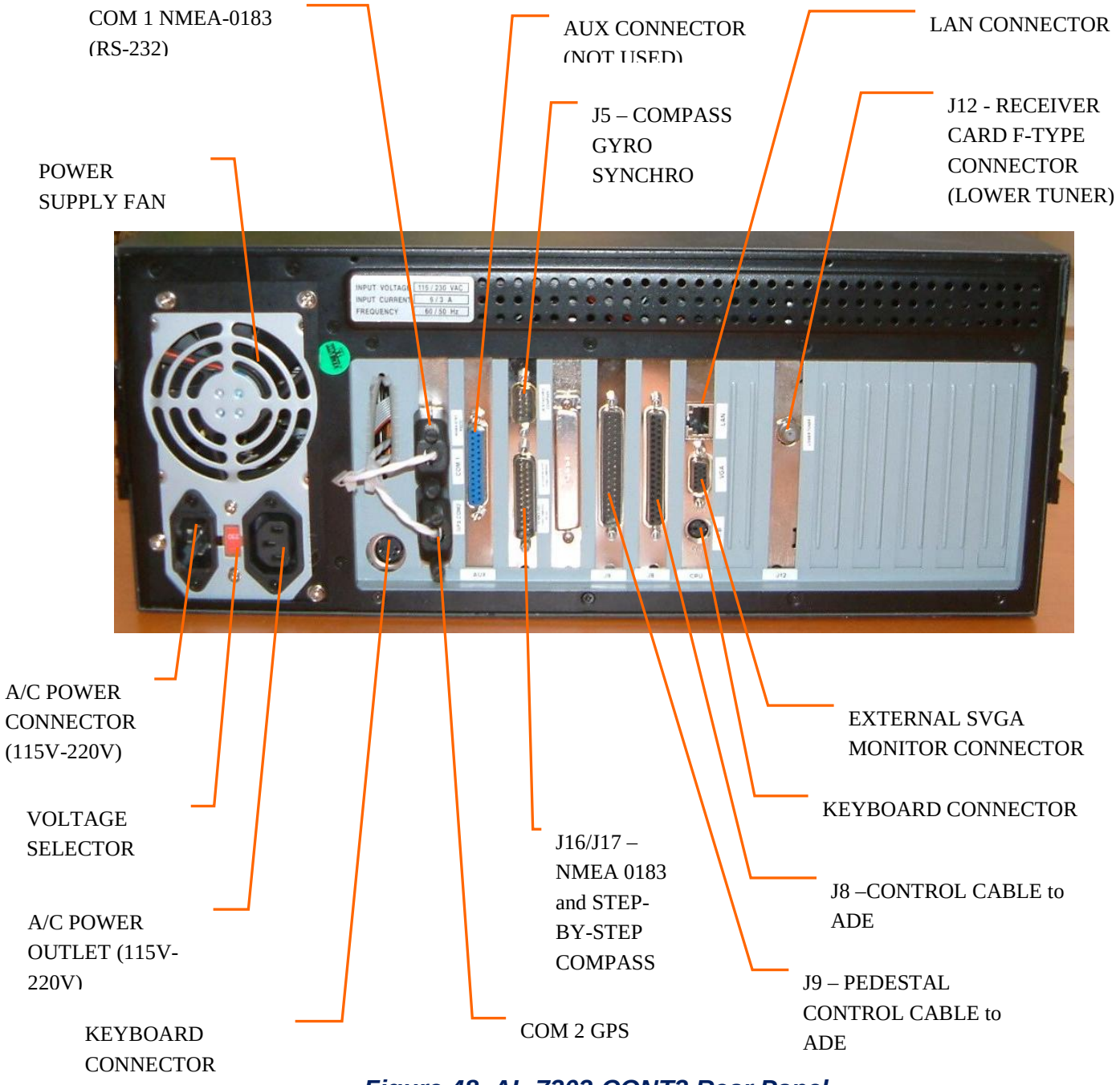


Figure 48. AL-7203-CONT3 Rear Panel

5.7. SYSTEM POWER-UP AND SETUP

Upon completion of the installation, as described in the preceding sections, the system should be energized to perform system setup, functional tests and operability verification (satellite tracking/acquisition and RF aspects of system operation).

The System Power-Up and Setup phase includes the following procedures:

- Initial Inspections
- System Power-Up and Setup Procedure
- Pre-Commissioning Checks
- System Commissioning and Acceptance

5.8. INITIAL INSPECTIONS

Perform the following visual inspections before starting up the system:

1. Rack Wiring - Inspect all internal wiring terminations and labeling as appropriate
2. Mechanical Completion - Inspect all metalwork and moving parts and ensure that all edges are smooth and moving parts are operating correctly.
3. Labeling - Inspect all equipment labels and equipment tag numbers are correct and that power supplies are properly identified.

5.9. SYSTEM POWER-UP AND SETUP PROCEDURE

5.9.1. Introduction

The purpose of the following is to set-up the system and verify the ability of the stabilised pedestal to track a carrier under normal operating conditions prior to Final Commissioning and Acceptance.

CAUTION

Before the system is powered up, verify that the radome is closed and secured.

5.9.2. Initial Set-up

1. Using the relevant terminations detail drawings, ensure all interconnection cables are correctly terminated between below deck equipment (BDE) and above deck equipment (ADE).
2. Carry out verification checks of shipboard mains supply, ensuring that the supply is suitably conditioned.
3. Apply power to BDE/ADE equipment and observe the following:-

- BDE Equipment:-
    a. Tracking Controller has powered up and loaded control software.
    b. The monitor displays the manufacturer's logo whilst it carries out a self-test routine. **During self-test countdown, press the 'c' key and then enter the password to prevent auto-restart**.
- ADE Equipment:-
    a. Front-Panel power LED is illuminated.

5.9.3. Status and Indications Check

Operation Screen

1. If you are still at the Basic Operation screen, enter password to enter into the Operation screen (AL_7200).
2. Enter the System Configuration mode. Under General, verify that the Auto Restart option is set to No.

NOTE

It is recommended to keep the Auto-Restart disabled throughout the tests and pre-commissioning procedures.

3. On the 'Operational Screen' check the following:-

- Check for error/warning messages in the message window for. Refer to each as appropriate.
- Check that the pertaining system's ID is displayed (AL-7203).
- Check that the time and date are displayed.

Compass Selection

4. Press 'T' and 'C' to select compass type and set the compass offset to 0. Check that the vessel's heading is displayed, and that it matches the ship's compass reading.

Satellite Selection

5. Press 'S' to select the required satellite and known channel with high signal (within the band and polarity of the installed system feed).

NOTE

For tests and commissioning, it is recommended to select a known accessible satellite.

6. Press 'D' and set the receiver. Press ENTER twice.

Maintenance Screen

1. Press ‘M’ to enter the Maintenance Screen.
2. Monitor the SDU Power indicators, and verify a reading of 4.9-5.0V on the 5V indicator, and 12V on the 12V indicator. Press ‘P’ and monitor the Power Parameters. Verify that are no red-colored parameters.
3. Check for GPS updates. Verify that the X, Y, Z coordinates are displayed, and that the PDOP, HDOP, VDOP, TDOP fields display valid values.

NOTE

GPS updates commence only 5 minutes after the ADE is powered-up.

It is recommended to compare the GPS readings with a reference GPS unit.

5.9.4. Calibrating the Auto Tracking Switching Feedback

When using a multy switch box to disribute the 4 LNB outputs, one of the outputs is fed to the Controller’s Receiver Card. To configure the Controller to address the desired line, perform the following procedure:

1. At the Operation Screen, Press ‘T’ to enter System Configuration, and select ‘Lower Tuner’.
2. Enter into LNB-V dual polarization.
3. Press the SPACE bar twice, and select 13V/00Hz, 13V/22Hz, 17V/00Hz, or 13V/22Hz (depending on the line connected to the multy switch).

5.10. PRE-COMMISSIONING CHECKS

5.10.1. Checking of Axes Movement

1. Press ‘M’ for Maintenance, then ‘S’ for Select Window and select ‘Pedestal X’.
2. Select ‘Mode’, press enter and select ‘Slew’ and perform the following tests: -
    a. Use ‘↓’ to move cursor to the velocity readout.
    b. Use the ‘←’ and ‘→’ keys to change the velocity to 1 or –1, and slew the axis by no more than 15 degrees in either direction of the starting position. Monitor the axis’ position and velocity displays, and verify that the position tracking is smooth and consistent, and that the actual axis velocity is within ±0.2 deg/sec of the velocity command.

CAUTION

If any problem arises during slew, shut down the axis immediately.

    c. Use ‘↓’ to move the cursor to ‘mode’ and select ‘Halt’ to stop the axis movement
    d. Use ‘↓’ to move the cursor to ‘mode’ and select ‘Enc Init’.
    e. Ensure the velocity remains steady and the encoder position varies steadily and does not jump. In this case you can disregard the warnings appearing in the axis window (Jmm, Rlm, Flm).
    f. Verify that the red Init flag is turned off after the axis movement.
    g. Select new mode of ‘slew’ again and slew the axis 60 degrees in either direction around the zero position.
3. Repeat steps (1.) to (2.) for ‘Pedestal Y’ axis.
4. Perform Enc Init test of all axes: Select ‘O’ at the Operation Screen and select ‘Enc Init’. Verify that all axes are moving properly and zeroing.
5. Perform IMU Init test: Select ‘D’ at the Operation Screen and select ‘IMU Init’, and confirm by pressing ENTER twice.
6. Monitor Pitch and Roll, taking into consideration the leveling degree of the ADE mounting plate with the ship’s deck.

NOTE

It is recommended to visually inspect the Pedestal's leveling within the Radome.

IMU Initiation procedure lasts for about 4 minutes. At the end of this procedure, the System Status field indicates that the IMU is "locked", i.e., the antenna is slaved to and stabilized by the information supplied by the IMU.

5.10.2. Restart Initiation

1. On the Operation Screen, press "O" for operation mode and press "Restart" and press ENTER twice. The system will perform a full restart procedure, point to the selected satellite, and then step-track on the selected channel.
2. If there is no AGC level, perform the following procedure:
    a. Press "M" on the Operation Screen for manual and press ENTER twice.
    b. Move in Azimuth axis until the AGC level rises.
    c. Verify that the system is pointed to the correct satellite and press "O". Select step-track and press ENTER twice.

5.10.3. Calculating Azimuth Error (Compass Offset)

When the system is installed onto a vessel you will find that it is not aligned with the bow of the ship. This means that you will need to set the compass offset so that the system is aligned with the vessels gyro compass:

1. Press 'L' for Logger, then 'A' for Add and select 'Step-Track', then 'Azimuth Error'.
2. Press 'C'. Enter 6 in the first field (sampling time), press ESC and then ENTER.
3. Press 'R' for Run and wait for logger sampling termination. Take note of the 'Mean' value.
4. Press 'Esc' to return to the Operation screen.
5. Press 'o' and select Stand By.
6. Press 'T' for System Configuration, select 'Compass' and add the 'Mean' value to the 'Offset' value and enter into the 'Offset' field.

7. Press ‘o’ and select Step Track.
8. Repeat the above steps, and verify that the ‘Mean’ value dropped to ~0±0.4.

5.10.4. Setting Noise floor and Threshold Values

1. Note the ‘On Satellite’ receive signal strength in dBμV.
2. Note the ‘Off Satellite’ receive signal strength in dbμV. This can be obtained by pressing ‘O’ for Mode in the Operation screen and selecting ‘Manual’ and using the arrow keys to move the antenna off satellite.
3. Press ‘D’ for System Configuration, select ‘Set Threshold’ and enter the Off Satellite AGC value.

5.10.5. Configuration of Auto-Restart

1. Press ‘T’ for System Configuration, select ‘General’ and change ‘Auto Start’ to Yes.

5.10.6. Saving the configuration Settings

CAUTION

The pre-commissioning procedures may take some time, under non-stable ship’s power supply. Therefore, it is recommended to save the configuration parameters frequently, using the Save Configuration function.

1. Press ‘V’ for Save, and select ‘All’ or the desired option.

5.10.7. Saving the configuration Settings on the Utility Disk

1. Press ‘O’ for Mode, select ‘Stow’.
2. Press ‘Esc’ at Operation screen and Shutdown the system.
3. Insert the Utility disk into a: drive and press the reset key.
4. At the a: prompt, type ‘getconf’. Once the configuration has been saved, remove the disk and reset the system.

5.10.8. System Restart

1. Power down the system.
2. Re-apply the power to the system.
3. Observe the following: -

- The system re-boots.
- The encoders initiate.
- The IMU initiates.
- The system acquires the satellite.
- The system goes into Step-Track.