# INSTALLATION & OPERATION MANUAL
# FOR SEA TEL
# DUAL ANTENNA ARBITRATOR




| | | |
|---|---|---|
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***Sea Tel Inc is also doing business as Cobham Antenna Systems***

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**Sea Tel Marine Stabilized Antenna systems are manufactured in the United States of America.**

Sea Tel is an ISO 9001:2008 registered company.

Certificate Number 13690 issued March 14, 2011.

**R&TTE**

**CE**

The Sea Tel Dual Antenna Arbitrator used with the Sea Tel Antenna systems complies with the requirements for Radio and Telecommunication Terminal Equipment. A copy of the R&TTE Declaration of Conformity for this equipment is contained in thin this manual.

The Sea Tel DAC-2202, or DAC-2302, Antenna Control Unit contains FCC compliant supervisory software to continuously monitor the pedestal pointing accuracy and use it to control the "Transmit Mute" function of the satellite modem to satisfy the provisions of FCC 47 C.F.R. § 25.222(a)(l)(iii). A copy of the FCC Declaration of Conformity for this equipment is contained in the Antenna Manual for your system.

**Revision History**

| REV | ECO# | Date | Description | By |
|---|---|---|---|---|
| X1 | N/A | May 23, 2011 | PRELIMINARY release | MDN |
| A | 8761 | September 13, 2011 | Production Release | MDN |
| B | 9058 | November 2, 2011 | Added rail installation information. | MDN |
| C | N/A | June 28, 2013 | Updated text and drawings | MDN |
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# European Union Declaration of Conformity

Doc Number 134921 Revision A

**Sea Tel Inc.** declares, under our sole responsibility, that the products identified below are in conformity with the requirements of:

DIRECTIVE 1999/5/EC of the European Parliament and of the Council of 15 March 2004 on Radio equipment and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

**Product Names:** **Arbitrator - Sea Tel**

These products have been assessed to Conformity Procedures, Annex IV, of the above Directive by application of the following standard(s):

**EMC:**

Marine Navigational and Radio Communication Equipment and Systems – General Requirements: **IEC/EN 60945:2002 + Corr 1:2008**

Conducted Emissions, Clauses 9.2
Radiated Emissions, Clauses 9.3
Electrostatic discharge, Clause 10.9 and IEC 61000-4-2 §5
Continuous Radiated Disturbances, Clause 10.4
Fast Transients Bursts, Clause 10.5.2, and IEC 61000-4-4 §5
Surges EN, Clause 10.6, and EN 61000-4-6: ED 2
Continuous Conducted Disturbance, Clause 10.3, and IEC 61000-4-6 §5
Power Supply Failure, Clause 10.8 Further information in IEC 61000-4-6: ED 3

**SAFETY:**

Safety of Information Technology Equipment: **IEC/EN 60950-1:2006 + A1:2010**

Certificates of Assessment were completed and are on file at BACL- Bay Area Compliance Laboratories, Sunnyvale, CA 94089

Sea Tel, Inc
Concord, CA

Peter Blaney, Chief Engineer 6/3/11 Date

# 1. Introduction

The Dual Antenna Arbitrator is used with two complete Sea Tel Transmit/Receive (TX/RX) satellite communication systems. The primary purpose of the Dual Antenna Arbitrator is to switch services from one antenna, which has become blocked by the ships structure or has otherwise lost service, to the other antenna. Switching services to the satellite modem under these conditions greatly improves on-air time by reducing the out of service time.

Additionally, this device allows for remote monitor, control and diagnostics directly or with Out of Band Management (OBM) device(s).

## *1.1. Dual Antenna Configuration*

Sometimes, due to very large blockage conditions, you may need to install a dual antenna configuration to provide virtually uninterrupted services. Two full antenna systems are installed and the two ACU control outputs are connected to a dual antenna arbitrator switch panel which then is connected to the satellite modem, and other below decks equipment if provided. Refer to the appropriate installation chapter for the model of the Sea Tel antenna systems that you will be installing this arbitrator panel with.

You will program the blockage zone(s) and optimize all other settings for best "on-satellite" performance for each of the two Sea Tel antennas.

The following signals pass through the arbitrator to/from the ACU's and the Satellite Modem:

- TX IF signal to the active (selected) antenna from the Satellite Modem. 10 MHz reference is also passed when provided by the modem.
- RX IF from the active (selected) antenna to the Satellite Modem
- Blockage control output from each ACU – this output provides signal to the arbitrator when the antenna it is connected to is not available for services.
- GPS position - output from the active (selected) antenna (this setting can be changed in the arbitrator).
- Network Lock signal from the Satellite Modem is routed to both ACU's to enable both antennas to track the same satellite.

When one antenna is blocked, its blockage output will command the arbitrator panel to switch services for the modem from that antenna to the other antenna. The arbitrator panel provides a logic latch to prevent excess switching when the ship heading is yawing, therefore, causing either antenna to be repeatedly blocked – unblocked – blocked.

## *1.2. Dual Antenna Arbitrator*

The Dual Antenna Arbitrator panel automatically switches the signal from one of the two antennas. It can pass LNB voltages (and handle 250-400 ma of current) and all of the typical RX IF and M&C signals on the RX connections.

DC Voltage to power the BUC(s) should ***NOT*** be passed through this arbitrator panel, nor the dual channel coax rotary joint of the antenna pedestal. BUC power should be supplied on the Antenna Pedestal.

TX IF and Reference signals can be passed through the dual antenna arbitrator.

The blockage (SW2) output, GPS output and Modem lock input from the two terminal mounting strips (antenna "A" and antenna "B") are wired through the arbitrator panel to the satellite modem. When antenna "A" is blocked, the arbitrator PCB will toggle the coax switches so that antenna "B" provides signal to the satellite modem. When antenna "A" is no longer blocked the arbitrator will do nothing (because it is a latch circuit). When antenna "B" is blocked the panel will switch so that antenna "A" is again providing signal the BDE distribution.

To provide a seamless switching transition, refer to the arbitrator installation instructions to balance the TX & RX signal levels between the two antennas.

## *1.3. Automatic Beam Switching (ABS)*

ABS is a method of communicating remotely via an overhead channel, or locally from the modem, to reconfigure the ACU(s) to use a different beam on the same satellite or to use a different satellite. The ACU's include commands which allow remotely setting all of the necessary parameters and to command the targeting of the desired satellite.

## *1.4. OpenAMIP™*

OpenAMIP™ is a standardized language incorporated into the 5000 series iDirect modems which communicates automatic beam switching settings from the option file to the Sea Tel ACU(s). This allows the network to accomplish to provide automatic beam switching remotely by switching option files in the remote modem.

## *1.5. FCC Compliance*

FCC regulation 47 C.F.R. § 25.221 (C-Band) and 47 C.F.R. § 25.222 (Ku-Band) define the provisions for blanket licensing of ESV antennas operating in the C, and Ku, Band respectively. Please refer to the FCC Declaration in your antenna manual for specifics.

The Sea Tel antennas referenced in this document, will maintain a stabilization pointing accuracy of better than 0.2 degrees under specified ship motion conditions.

These antenna systems, with current software, contain FCC compliant supervisory software to continuously monitor the pedestal pointing error. This supervisory software will trip an error flag, which will automatically cease transmission within 100 milliseconds, if the pointing error should exceed 0.5 degrees. Transmission will not resume until the pointing error drops below 0.2 degrees.

***To be compliant with these FCC requirements, the "Transmit Mute" output of the Sea Tel below decks controller must be connected, through the Dual Antenna Arbitrator, to the "Mute Input" of the satellite modem via serial or Ethernet connection.***

# 2. Front Panel Operation


## *2.1. Front Panel Buttons*

**ANT A** - In Manual Mode this button selects Antenna "A" to be the "Active" antenna. The TX & RX IF signals from Antenna "A" are routed to the Satellite Modem via the Arbitrator coax switches. Antenna "B" is the "Standby" antenna.

**ANT B** - In Manual Mode this button selects Antenna "B" to be the "Active" antenna. The TX & RX IF signals from Antenna "B" are routed to the Satellite Modem via the Arbitrator coax switches. Antenna "A" is the "Standby" antenna.

**Manual** - Selects Manual Mode.

**Auto** - Selects Automatic Mode.

**RESET** - Resets the processors in the Dual Antenna Arbitrator

**Power** - Turns the Dual Antenna Arbitrator ON/OFF. When OFF, the de-energized state of the coax switches is Antenna "A". When energized, the default power-up state in **Auto** – **ANT A**.

## *2.2. Front Panel LEDs*

**ANT A** - When illuminated, this LED indicates that Antenna "A" is the "Active" antenna.

**ANT B** - When illuminated, this LED indicates that Antenna "B" is the "Active" antenna.

**Manual** - When illuminated, this LED indicates that the Dual Antenna Arbitrator is in Manual Mode.

**Auto** - When illuminated, this LED indicates that the Dual Antenna Arbitrator is in Automatic Mode.

**Power** - When illuminated, this LED indicates that Power is ON.

## *2.3. Automatic Mode*

The normal mode of operation is Automatic. In automatic mode operator intervention is not required because the Dual Antenna Arbitrator will switch the antennas using the inputs from the two ACU's. Press Auto to select this mode.

The latching logic is:

| Antenna "A" | Antenna "B" | Action |
|---|---|---|
| Available | Not Available | Switch to ANT A |
| Available | Available | Do Not change state |
| Not Available | Available | Switch to ANT B |
| Not Available | Not Available | Do Not change state |

**Available** - The antenna is tracking the desired satellite and the satellite modem has network lock. Satellite services are available from this antenna.

**Not Available** - The ACU will output "Blocked" and "Mute" signals to the Dual Antenna Arbitrator, indicating that that Satellite services are NOT available from this antenna if:

- The antenna is searching, targeting or is mispointed by more than 0.5 degrees.
- The antenna is within any one of the blockage zones saved in its ACU.
- Loss of Modem Lock will cause Search, leading to the same ACU output.
- Modem failure
- Failure in the RF Receive path to the modem.
- If Tracking is turned OFF and the AGC level of the ACU is below Threshold.

- This Antenna, or its ACU, is de-energized.

## *2.4. Manual Mode*

Manual mode allows you to manually select which antenna is providing services to the modem. Manual mode will allow you to select an antenna, that would not be available in automatic mode, to provide services to the modem. While in manual mode of operation, operator action is REQUIRED to switch the antennas whenever necessary.

Press the **Manual** button to select Manual Mode of operation.

Then;

Press **ANT A** to select Antenna "A" to be the "Active" antenna.

Press **ANT B** to select Antenna "B" to be the "Active" antenna.

Press **Auto** to return to Automatic Mode of operation .

# 3. Remote Operation

Below are commands that are most commonly used for communicating with the ACU(s) or the Dual Antenna Arbitrator.

## *3.1. Automatic Beam Switching (ABS)*

Listed below are the basic commands and their responses:

| Name | Command | Response |
|---|---|---|
| Azimuth | Aaaaa↵ | |
| Elevation | Eaaaa↵ | |
| Satellite longitude | Tnnnn↵ | |
| Target NID | tnnnn↵ | |
| Tuning freq (MHz) or DVB/RF mode | cnnnn↵ | Lnnnn RL |
| Set Baud rate/KHz tuning | dnnnn↵ | Lnnnn RL |
| Target current Satellite (Find) | F↵ | |
| Polang Tx Type | mAnnn↵ A=087 | m0nnn↵ |
| Satellite | mAnnn↵ A=104; A=105 | m0nnn↵ |
| Satellite E/W | mAnnn↵ A=106; | m0nnn↵ |
| FEC Tone Volt | mAnnn↵ A=117 | m0nnn↵ |
| Saved (Target) NID | mAnnn↵ A=125; A=126 | m0nnn↵ |
| SatSkew | mAnnn↵ A=0138 | m0nnn↵ |
| Status | S | S@@@@Lnnnn RL \r\n |
| Relative AZ / Ships Heading | H | RrrrrHaaaa \r\n |
| Az/El/Cl Position Decimal | P | EaaaaAaaaaCaaaa \r\n |
| Az/El/Cl Position Hex | p | ExxxxAxxxxCxxxx \r\n |
| Read Tuning Frequencies, Rec NID | q | Qnnnn nnnn xxxx \r\n |

Notes:
1) Target NID is set using tnnnn but never read using mA commands.
2) Target NIDs of 54 and 55 are used to switch AUX on/off, effectively toggling CoPol/XPol in legacy mode.
3) Target NIDs of 48 and 49 are used to switch Reflector A or B in dual-Reflector pedestals in legacy mode.

## *3.2. Open Antenna-Modem Interface Protocol (OpenAMIP™) Specification:*

### 3.2.1. Overview:

OpenAMIP™, an ASCII message based protocol invented and Trademarked by iDirect is a specification for the interchange of information between an antenna controller and a satellite modem. This protocol allows the satellite modem to command the ACU (via TCP port 2002) to seek a particular satellite as well as allowing exchange of information necessary to permit the modem to initiate and maintain communication via the antenna and the satellite. In general, OpenAMIP™ is not intended for any purpose except to permit a modem and the ACU to perform synchronized automatic beam switching. It is ***NOT*** a status logging system or a diagnostic system. In addition, OpenAMIP™ is intended for a typical installation whereby a specific satellite modem and Antenna system are properly configured to work together. The protocol does not make specific provisions for auto-discovery or parameter negotiation. It is still the responsibility of the installer to ensure that the parameters of both the satellite modem (proper option files) and the ACU/PCU (setup parameters) are actually compatible for the intended satellite(s).

### 3.2.2. Interface requirements:

#### *3.2.2.1. Hardware*

Sea Tel Antenna Control Units Model DAC-2202 or DAC-2302.
Any Satellite modem manufacturer that is compatible with OpenAMIP™
CAT5 Patch cable

#### *3.2.2.2. Software*

Sea Tel model DAC-2202:
ACU software version 6.06 or greater
CommIF module software version 1.10f or greater
Sea Tel model DAC-2302:
ACU software version 7.06 or greater
CommIF module software version 1.10f or greater

## *3.3. Dual Antenna Arbitrator Command Summary*

Use the following commands to communicate directly with the Dual Antenna Arbitrator:

| COMMAND | FUNCTION |
|---|---|
| set system default | Set all Arbitrator parameters to default |
| set system network {gatewaylnetmasklip} nnn.nnn.nnn.nnn | Set network address values |
| set system mode {manuallauto} | Set Arbitrator switching mode |
| set system forward port nnnnn | Set TCP forwarding port between DACs and modem |
| set system {usernamelpassword} | Change default username or password |
| set antenna {alb} ip nnn.nnn.nnn.nnn | Set DAC A/B IP address |
| set antenna {alb} active | Set which antenna is currently active |
| set hot_standby {onloff} | Turn 10MHz Reference for hot standby on/off |
| set gps source obm | Set GPS source to OBM or none |
| set gps source antenna {alblactive} | Set GPS source to either antenna a/b/whichever is active |
| show all | Show all system parameters |
| show system network {gatewaylnetmasklip} | Show the current network gateway, netmask, or IP address |
| show system mode | Show whether the Arbitrator is in auto or manual mode |
| show system forward port | Show which TCP port links the DACs and modem |
| show system version | Show the current loaded Arbitrator software version |
| show antenna {alb} ip | Show the IP address of DAC A/B |
| show antenna source | Show which antenna is used in the current RF path |
| show hot_standby | Show whether the hot standby reference is on/off |
| show gps source | Show the current source of GPS data |
| upgrade system serial | Update the Arbitrator software via the serial port |
| help | Show possible command options |
| save | Save the current parameters settings |
| {quitlexit} | End the Telnet session |
| logout | Return to the Telnet session login screen |
| reset | Reboot the Arbitrator via software reset |

**ABBREVIATIONS:**

| | |
|---|---|
| aaaa | ASCII number of degrees in tenths. |
| xxxx | ASCII hex I/O data 0000 – FFFF range |
| nnnnn | ASCII decimal number (0000 - 99999) |
| nnnn | ASCII decimal number (0000 - 9999) |
| nnn | ASCII decimal number (0 - 255) |
| sss | ASCII string of characters. |
| lf (0x0A) or \n | Line Feed (New Line) |
| ↵, cr (0x0D) or \r | Carriage Return (Enter) |

### 3.3.1. Command Details

#### set system default

The set system default command changes all of the Arbitrator's configurable parameters to their default values specified in Appendix B.

Note: This command choice will be confirmed by user with a prompt with arguments of {yes / no}. yes will confirm setting system parameters to default values; no will confirm ignoring of set system default command.

#### set system network *{gateway / netmask / ip} nnn.nnn.nnn.nnn*

The set system network command changes the values for the Arbitrator IP address, netmask, and network gateway. Parameters:

gateway: changes the Arbitrator network gateway to value specified

netmask: changes the Arbitrator netmask to value specified

ip: changes the Arbitrator ip address to value specified

nnn.nnn.nnn.nnn: argument specified in standard dot-decimal notation

Note: these changes will not be implemented until after a hardware or software reset. Note: the Arbitrator only supports IPv4

#### set system mode *{manual / auto}*

The set system mode command changes the Arbitrator switching mode. Parameters:

manual: the active antenna is user selectable and will not switch based on antenna state

auto: the active antenna is not user selectable and will switch automatically based on antenna state

#### set system forward port *nnnnn*

The system forward port command changes the TCP port on which packets will be forwarded to and from the satellite modem to the DACs. Parameters:

nnnnn: This is the decimal value of the port number between 0-65535 inclusive.

#### set system *{username | password}* sssssssss

The set system username/password command changes the default username/password. Parameters:

username: change the default username

password: change the default password

sssssssss: the new username string

Note: the username/password must be alphanumeric and no longer than 9 characters. Note: the user will be prompted to confirm the username/password selection. To confirm, retype the username/password as entered in the command above. Any other input will force the username/password change to be ignored.

### set antenna *{a / b}* ip nnn.nnn.nnn.nnn

The set antenna A/B ip command changes the IP addresses that correspond to ANT A/B DACs, use. Parameters:

a: the IP entered corresponds to ANT A's DAC

b: the IP entered corresponds to ANT B's DAC

nnn.nnn.nnn.nnn: IP address specified in standard dot-decimal notation

Note: the Arbitrator only supports IPv4

### set antenna *{a | b}* active

The set antenna A/B active command changes which antenna is currently active. Parameters:

a: ANT A is active

b: ANT B is active

Note: this will temporarily override the current active antenna regardless of switching mode. If the Arbitrator is in auto mode and the system state is such that the antenna not selected should be active, the Arbitrator will switch back to that antenna almost immediately.

### set hot_standby *{on / off}*

The set hot standby command turns the 10MHz reference on or off. Parameters:

on: 10MHz oscillator will be enabled

off: 10MHz oscillator will be disabled

**Note**: Regardless of whether or not the connector is accessible on the back panel, this command will still configure the reference oscillator. For customers without the 10MHz Reference connector, it is recommended the hot_standby be turned off.

### set gps source obm

The set gps source obm command changes the GPS source to be either the Out of Band Manger connected to the Arbitrator or have the GPS taken from a source that is not either antenna's DAC.

### set gps source antenna *{a / b / active}*

The set gps source antenna command changes the GPS source to be one of the antenna's DACs. Parameters:

a: always take the GPS data from ANT A DAC

b: always take the GPS data from ANT B DAC

active: GPS data source will switch automatically along with RF path

### show all

The show all command displays all of the Arbitrator's current settings.

Note: the output of this command is structured such that it can be issued back into the Arbitrator to restore its previous state.

### show system network *{gateway | netmask | ip}*

The show system network command displays the Arbitrator network settings. Parameters:

gateway: displays the network gateway address in dot-decimal notation

netmask: displays the netmask in dot-decimal notation

ip: displays the Arbitrator IP address in dot-decimal notation

### show system mode

The show system mode command displays the current Arbitrator switching mode.

### show system forward port

The show system forward port command displays the current TCP forwarding port between the modem and the DACs.

### show system version

The show system version command displays the current Arbitrator software version.

### show antenna *{a | b}* ip

The show antenna A/B ip command displays the current IP addresses set for the two DACs.

Parameters:

a: shows DAC A's IP address in dot-decimal format

b: shows DAC B's IP address in dot-decimal format

### show antenna source

The show antenna source command displays the current active antenna.

### show hot_standby

The show hot_standby command displays the current status of the 10MHz oscillator.

### show gps source

The show gps source command displays the current source of GPS data.

### upgrade system serial

The upgrade system serial command upgrades the software version using the serial downloader.

### help

The help command provides the user with additional information about the command structure in relation to what has been entered at the command prompt by the user.

### save

The save command stores the current Arbitrator parameters.

Note: upon hardware or software reset, the Arbitrator will load the parameters from the last save point or the default parameters if a save point has not yet been created.

### *{quit | exit}*

The quit or exit commands closes the Telnet session.

Note: this command is not valid for the serial interface.

### logout

The logout command returns the user to the login screen of the Telnet interface.

Note: this command is not valid for the serial interface.

### Reset

The reset command forces the Arbitrator to perform a software reset.

Note: any unsaved parameter changes will be lost upon hardware or software reset.

### 3.3.2. General Notes

Unless otherwise noted, the cr (0x0D), lf (0x0A), ">" echo indicates that the Arbitrator has accepted a command and is ready to process the next command. Any additional commands will not be accepted until after the Arbitrator echoes cr (0x0D), lf, ">".

***All commands are case independent such that commands can be entered as all capital letters, all lower case, or a random mix for a valid command.***

***All commands should be followed by cr (0x0D) in order to be received and processed. This was intentionally omitted above for ease of readability***.

Additional characters added after a valid command are not ignored and will return a user error message. After a valid command, " ' " (0x27) can be used to add comments or other characters to be ignored by the Arbitrator.

# 4. Installation – Dual Series 09 Antennas

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *4.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *4.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *- Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *4.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

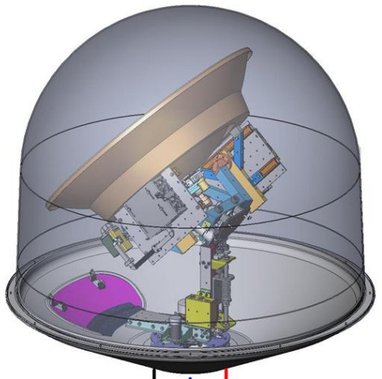
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

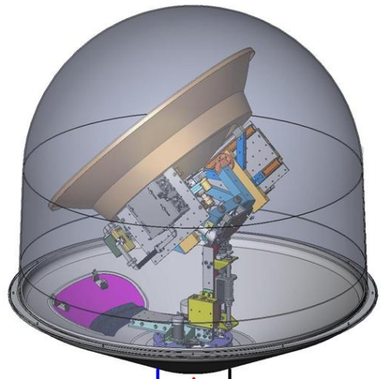
## *4.4. Connecting the Below Decks Equipment*

You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



Series 09
Antenna “A”



Series 09
Antenna “B”

# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input To
Tracking Receiver

RX IF output from Antenna “A” to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU “A”

Antenna M&C To Com Port

DAC-2202
Antenna
Control Unit
“A”

J4 ANTENNA
J6 RF IN
J7 RF Out
J3 M&C
Ethernet
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting Strip

J1 Modem Console Port

NMEA
SBS
Synchro

Ships Gyro
Compass

Dual Antenna
Arbitrator

ANT “A”
LNB 1
LNB 2
BUC 1
BUC 2
ANT “B”
AC Power

RX IN
Ethernet
TX OUT
RX OUT

CFE Satellite Modem
with Router

CFE Spectrum Analyzer

LAN Connection
VOIP Connection
VOIP Connection
LAN Connection

Computer
Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

Computer
Your Computer with
LAN Card

Receive IF Signal

Transmit IF Signal

110/220 VAC
Power Input

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422 Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input To Tracking Receiver

RX IF output from Antenna “B” to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU “B”

Antenna M&C
To Com Port

DAC-2202
Antenna
Control
Unit “B”

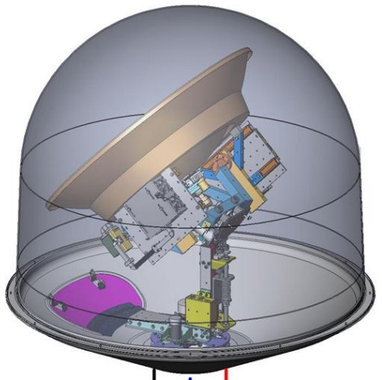
Ethernet
J4 ANTENNA
J3 M&C
J7 RF Out
J6 RF IN
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting
Strip

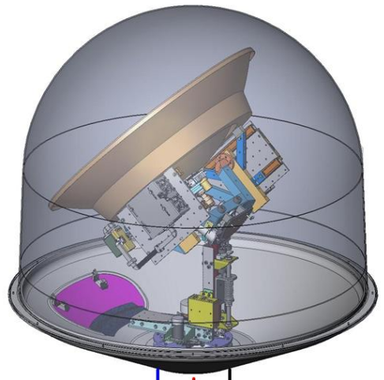
J1 Modem Console Port

NMEA
SBS
Synchro

Dual 09-33_A.vsd



Series 09
Mini-BUC
Antenna “A”



Series 09
Mini-BUC
Antenna “B”

# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

(Optional)
7550 or 7552
FSK Adapter

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF Input To
Tracking Receiver

RX IF output from Antenna “A” to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU “A”

Antenna M&C To Com Port

DAC-2202
Antenna
Control Unit
“A”

J4 ANTENNA
J6 RF IN
J7 RF Out
J3 M&C
Ethernet
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting Strip

J1 Modem Console Port
J4 NMEA
SBS
Synchro

Ships Gyro
Compass

(Optional) FSK Interface Harness

Dual Antenna
Arbitrator

ANT “A”
LNB 1
LNB 2
BUC 1
BUC 2
ANT “B”
AC Power

Ethernet

RX IN
TX OUT
RX OUT

CFE Satellite Modem
with Router

CFE Spectrum Analyzer

LAN Connection
VOIP Connection
VOIP Connection
LAN Connection

Computer
Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

Computer
Your Computer with
LAN Card

(Optional) FSK Interface Harness

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RX IF output from Antenna “B” to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU “B”

(Optional)
7550 or 7552
FSK Adapter

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

RS-422 Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF Input To Tracking Receiver

Antenna M&C
To Com Port

DAC-2202
Antenna
Control
Unit “B”

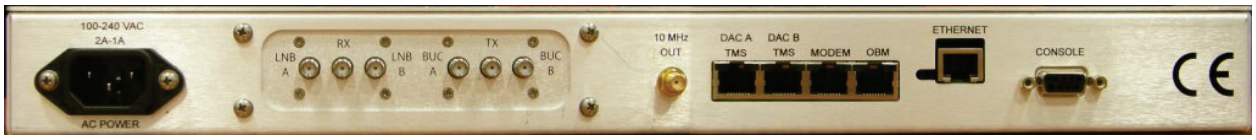
Ethernet
J4 ANTENNA
J3 M&C
J7 RF Out
J6 RF IN
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting
Strip

J1 Modem Console Port
J4 NMEA
SBS
Synchro

Dual 09-91_A.vsd

## *4.5. Dual Antenna Arbitrator Connections*




### 4.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A -** Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

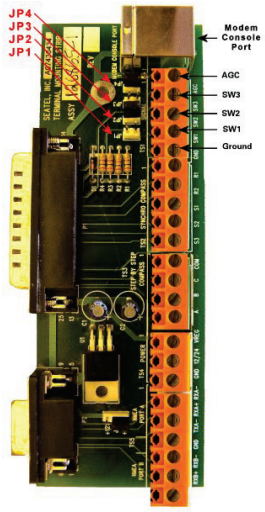
**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *4.6. Terminal Mounting Strip Connections and Jumpers*

Connections and Jumpers on the DAC-2202 & DAC-2302 Terminal Mounting Strips are as follows:




### 4.6.1. Jumper JP2

Jumper JP2 ***must be removed*** for use with the Dual Antenna Arbitrator.

### 4.6.2. Jumper JP4

*Jumper **JP4** on the Terminal Mounting Strip must be **removed** when using iDirect 3000 & 5000 Series Modems.*

**JP4** must be **installed** for use with Comtech & Hughes modems.

### 4.6.3. Modem Console Port Connection

Use an RJ-45 straight serial cables connected from the Terminal Mounting Strip "Modem Console Port" to the DAC A, or DAC B, connector as appropriate on the rear panel of the Dual Antenna Arbitrator.

## *4.7. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 4.7.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 4.7.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 4.7.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 4.7.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *4.8. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

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# 5. Installation – Dual Series 10 Antennas

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *5.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *5.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *- Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *5.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

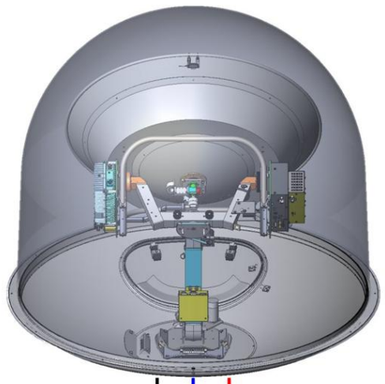
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

## *5.4. Connecting the Below Decks Equipment*

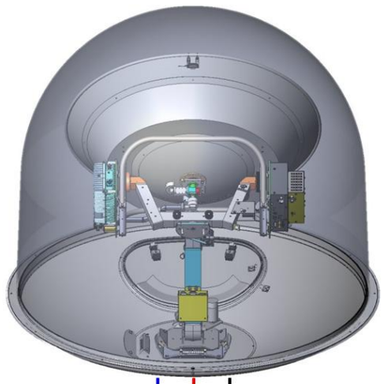
You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



Series 10
Antenna “A”

Series 10
Antenna “B”



# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input To
Tracking Receiver

RX IF output from Antenna “A” to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU “A”

Antenna M&C To Com Port

DAC-2202
Antenna
Control Unit
“A”

J4 ANTENNA
J6 RF IN
J7 RF Out
J3 M&C
Ethernet
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting Strip

J1 Modem Console Port

NMEA
SBS
Synchro

Ships Gyro
Compass

Dual Antenna
Arbitrator

ANT “A”
LNB 1
LNB 2
BUC 1
BUC 2
ANT “B”
AC Power

RX IN
Ethernet
TX OUT
RX OUT

CFE Satellite Modem
with Router

CFE Spectrum Analyzer

LAN Connection
VOIP Connection
VOIP Connection
LAN Connection

Computer
Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

Computer
Your Computer with
LAN Card

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RX IF output from Antenna “B” to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU “B”

RS-422 Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input To Tracking Receiver

Antenna M&C
To Com Port

Ethernet
J4 ANTENNA
J3 M&C
J7 RF Out
J6 RF IN
AC Power
J2 NMEA
J1 Ships Gyro

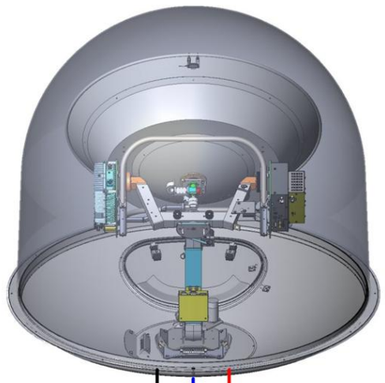
DAC-2202
Antenna
Control
Unit “B”

Terminal
Mounting
Strip

J1 Modem Console Port

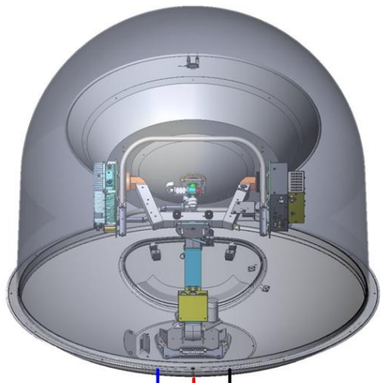
NMEA
SBS
Synchro

Dual 10-33_SimBlk_A.vsd



Series 10
Mini-BUC
Antenna "A"

Series 10
Mini-BUC
Antenna "B"



# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

(Optional)
7550 or 7552
FSK Adapter

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF Input To
Tracking Receiver

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

Dual Antenna
Arbitrator

ANT "A"
LNB 1
LNB 2
BUC 1
BUC 2
ANT "B"
AC Power

CFE Spectrum Analyzer

RX IN
Ethernet
TX OUT
RX OUT
CFE Satellite Modem
with Router

Antenna M&C To Com Port

DAC-2202
Antenna
Control Unit
"A"

J4 ANTENNA
J6 RF IN
J7 RF Out
J3 M&C
Ethernet
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting Strip

J1 Modem Console Port
J5 NMEA
SBS
J6
Synchro

LAN Connection
VOIP Connection
VOIP Connection
LAN Connection

(Optional) FSK Interface Harness

Computer
Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

Computer
Your Computer with
LAN Card

(Optional) FSK Interface Harness

Ships Gyro
Compass

(Optional)
7550 or 7552
FSK Adapter

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

RS-422 Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF Input To Tracking Receiver

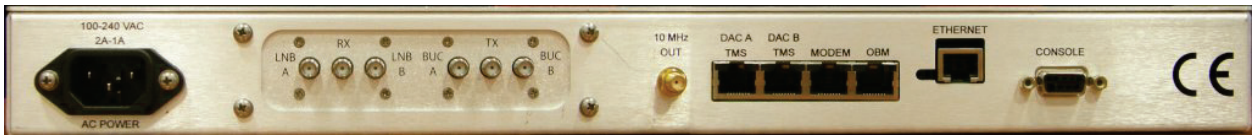
Antenna M&C
To Com Port

DAC-2202
Antenna
Control
Unit "B"

Terminal
Mounting
Strip

Dual 10-91_SimBlk_A.vsd

## *5.5. Dual Antenna Arbitrator Connections*




### 5.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A -** Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

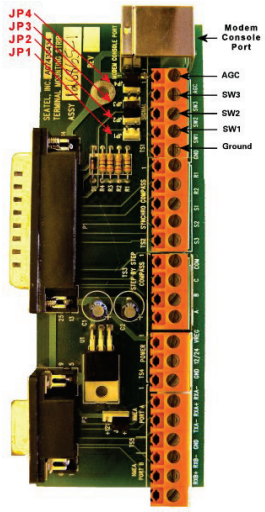
**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *5.6. Terminal Mounting Strip Connections and Jumpers*

Connections and Jumpers on the DAC-2202 & DAC-2302 Terminal Mounting Strips are as follows:




### 5.6.1. Jumper JP2

Jumper JP2 ***must be removed*** for use with the Dual Antenna Arbitrator.

### 5.6.2. Jumper JP4

*Jumper **JP4** on the Terminal Mounting Strip must be **removed** when using iDirect 3000 & 5000 Series Modems.*

**JP4** must be **installed** for use with Comtech & Hughes modems.

### 5.6.3. Modem Console Port Connection

Use an RJ-45 straight serial cables connected from the Terminal Mounting Strip "Modem Console Port" to the DAC A, or DAC B, connector as appropriate on the rear panel of the Dual Antenna Arbitrator.

## *5.7. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 5.7.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 5.7.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 5.7.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 5.7.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *5.8. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

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# 6. Installation – Dual USAT Series Antennas

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *6.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *6.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *– Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *6.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

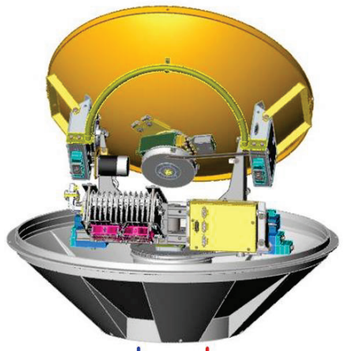
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

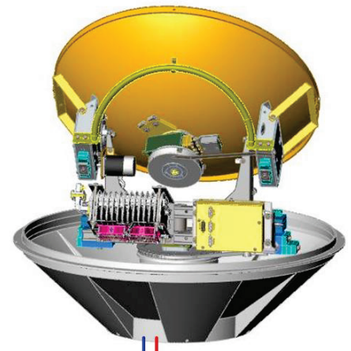
## *6.4. Connecting the Below Decks Equipment*

You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



USAT Series
Antenna "A"



USAT Series
Antenna "B"

**Above Decks**

**Below Decks**

Receive IF Signal

TXIF, 10MHz Reference and 48 VDC BUC Power

110/220 VAC Power Input

150W Power Supply Panel

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422 Pedestal M&C

RS-232 Radio M&C to Com Port

RX IF input To Tracking Receiver

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

Dual Antenna Arbitrator

ANT "A" LNB 1 LNB 2 BUC 1 BUC 2 ANT "B"

AC Power

CFE Spectrum Analyzer

RX IN Ethernet TX OUT RX OUT

CFE Satellite Modem with Router

Antenna M&C To Com Port

DAC-2202 Antenna Control Unit "A"

J4 ANTENNA J6 RF IN J7 RF Out J3 M&C Ethernet J2 NMEA J1 Ships Gyro

Terminal Mounting Strip

J1 Modem Console Port

NMEA0 SBS Synchro

LAN Connection VOIP Connection VOIP Connection LAN Connection

Computer

Your Computer with LAN Card

Your Telephone or PBX device

Your Telephone/FAX

Computer

Your Computer with LAN Card

Ships Gyro Compass

Dual USAT 2202 w-SeaTelArbitrator_A.vsd

Receive IF Signal

TXIF, 10MHz Reference and 48 VDC BUC Power

150W Power Supply Panel

110/220 VAC Power Input

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422 Pedestal M&C

RS-232 Radio M&C to Com Port

RX IF input To Tracking Receiver

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

Antenna M&C To Com Port

Ethernet J4 ANTENNA J3 M&C J7 RF Out J6 RF IN

DAC-2202 Antenna Control Unit "B"

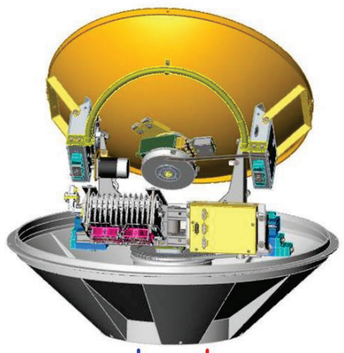
AC Power J2 NMEA J1 Ships Gyro

Terminal Mounting Strip

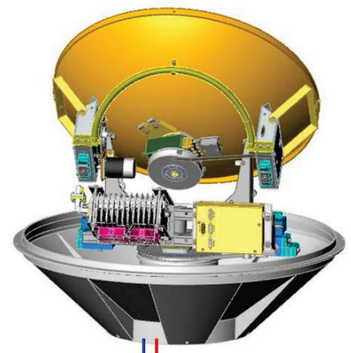
J1 Modem Console Port

NMEA0 SBS Synchro

**Dual USAT Series Antenna Simplified Block Diagram**



USAT Series
Mini-BUC
Antenna "A"



USAT Series
Mini-BUC
Antenna "B"

**Above Decks**

**Below Decks**

Receive IF Signal

TXIF, 10MHz Reference and 48 VDC BUC Power

110/220 VAC Power Input

150W Power Supply Panel

(Optional) 7550 or 7552 FSK Adapter

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422 Pedestal M&C

RS-232 Radio M&C to Com Port

RX IF input To Tracking Receiver

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

Antenna M&C To Com Port

DAC-2202 Antenna Control Unit "A"

J4 ANTENNA, J6 RF IN, J7 RF Out, J3 M&C, Ethernet, AC Power, J2 NMEA, J1 Ships Gyro

Terminal Mounting Strip

J1 Modem Console Port

NMEA/AH, SBS, 5V, Synchro

Ships Gyro Compass

(Optional) FSK Interface Harness

Dual Antenna Arbitrator

ANT "A", LNB 1, LNB 2, BUC 1, BUC 2, ANT "B", AC Power, Ethernet

CFE Spectrum Analyzer

RX IN, TX OUT, RX OUT

CFE Satellite Modem with Router

LAN Connection, VOIP Connection, VOIP Connection, LAN Connection

Computer

Your Computer with LAN Card

Your Telephone or PBX device

Your Telephone/FAX

Computer

Your Computer with LAN Card

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

(Optional) FSK Interface Harness

Receive IF Signal

TXIF, 10MHz Reference and 48 VDC BUC Power

150W Power Supply Panel

110/220 VAC Power Input

(Optional) 7550 or 7552 FSK Adapter

RS-422 Pedestal M&C

RS-232 Radio M&C to Com Port

RX IF Input To Tracking Receiver

Antenna M&C To Com Port

Ethernet, J4 ANTENNA, J3 M&C, J7 RF Out, J6 RF IN, AC Power, J2 NMEA, J1 Ships Gyro

DAC-2202 Antenna Control Unit "B"

Terminal Mounting Strip

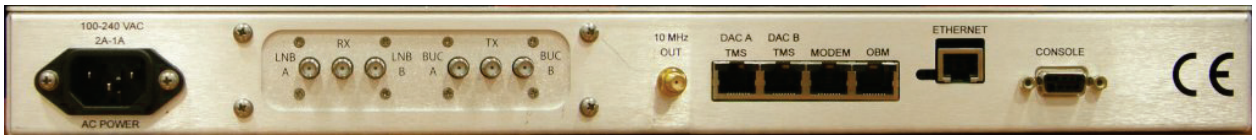
J1 Modem Console Port

NMEA/AH, SBS, 5V, Synchro

Dual USAT Mini-BUC 2202 w-SeaTelArbitrator_A.vsd

**Dual USAT Series Mini-BUC Antenna Simplified Block Diagram**

## *6.5. Dual Antenna Arbitrator Connections*




### 6.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A -** Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

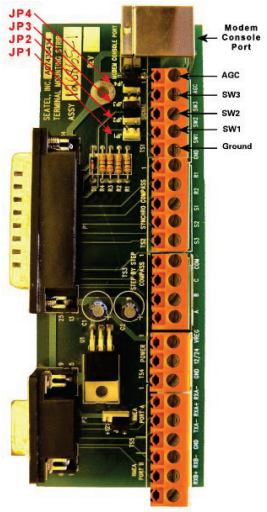
**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *6.6. Terminal Mounting Strip Connections and Jumpers*

Connections and Jumpers on the DAC-2202 & DAC-2302 Terminal Mounting Strips are as follows:




### 6.6.1. Jumper JP2

Jumper JP2 ***must be removed*** for use with the Dual Antenna Arbitrator.

### 6.6.2. Jumper JP4

*Jumper **JP4** on the Terminal Mounting Strip must be **removed** when using iDirect 3000 & 5000 Series Modems.*

**JP4** must be **installed** for use with Comtech & Hughes modems.

### 6.6.3. Modem Console Port Connection

Use an RJ-45 straight serial cables connected from the Terminal Mounting Strip "Modem Console Port" to the DAC A, or DAC B, connector as appropriate on the rear panel of the Dual Antenna Arbitrator.

## *6.7. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 6.7.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 6.7.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 6.7.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 6.7.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *6.8. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

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# 7. Installation – Dual Series 97B L-Band IF Antennas

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *7.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *7.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *– Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *7.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

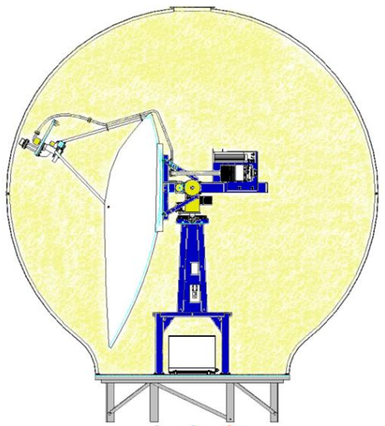
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

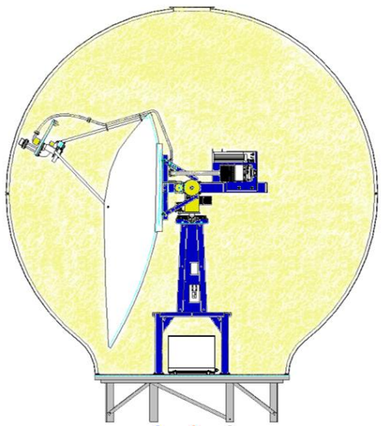
## *7.4. Connecting the Below Decks Equipment*

You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



Series 97
Antenna "A"



Series 97
Antenna "B"

# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input To
Tracking Receiver

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

Antenna M&C To Com Port

DAC-2202
Antenna
Control Unit
"A"

J4 ANTENNA
J6 RF IN
J7 RF Out
J3 M&C
Ethernet
AC Power
J2 NMEA
J1 Ships Gyro

Terminal
Mounting Strip

J1 Modem Console Port

NMEA
SBS
Synchro

Ships Gyro
Compass

Dual Antenna
Arbitrator

ANT "A"
LNB 1
LNB 2
BUC 1
BUC 2
ANT "B"
AC Power

RX IN
Ethernet
TX OUT
RX OUT

CFE Satellite Modem
with Router

CFE Spectrum Analyzer

LAN Connection
VOIP Connection
VOIP Connection
LAN Connection

Computer
Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

Computer
Your Computer with
LAN Card

Receive IF Signal

Transmit IF Signal

110/220 VAC
Power Input

If Active – TX IF & 10MHz Reference from Satellite Modem via Arbitrator

If Standby – 10MHz Reference (optional) from Arbitrator

RS-422 Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input To Tracking Receiver

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

Antenna M&C
To Com Port

DAC-2202
Antenna
Control
Unit "B"

Ethernet
J4 ANTENNA
J3 M&C
J7 RF Out
J6 RF IN
AC Power
J2 NMEA
J1 Ships Gyro

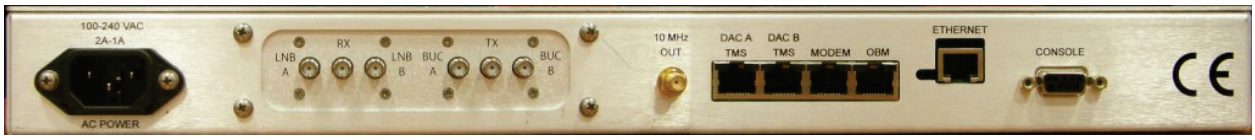
Terminal
Mounting
Strip

J1 Modem Console Port

NMEA
SBS
Synchro

Dual 97 2202 w-SeaTelArbitrator_A.vsd

## *7.5. Dual Antenna Arbitrator Connections*




### 7.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

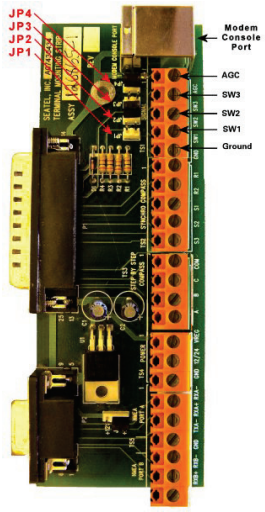
**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *7.6. Terminal Mounting Strip Connections and Jumpers*

Connections and Jumpers on the DAC-2202 & DAC-2302 Terminal Mounting Strips are as follows:




### 7.6.1. Jumper JP2

Jumper JP2 ***must be removed*** for use with the Dual Antenna Arbitrator.

### 7.6.2. Jumper JP4

*Jumper **JP4** on the Terminal Mounting Strip must be **removed** when using iDirect 3000 & 5000 Series Modems.*

**JP4** must be **installed** for use with Comtech & Hughes modems.

### 7.6.3. Modem Console Port Connection

Use an RJ-45 straight serial cables connected from the Terminal Mounting Strip "Modem Console Port" to the DAC A, or DAC B, connector as appropriate on the rear panel of the Dual Antenna Arbitrator.

## *7.7. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 7.7.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 7.7.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 7.7.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 7.7.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *7.8. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

# 8. Installation – Dual Series 97B 70/140 MHz IF Antennas

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *8.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *8.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *– Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *8.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

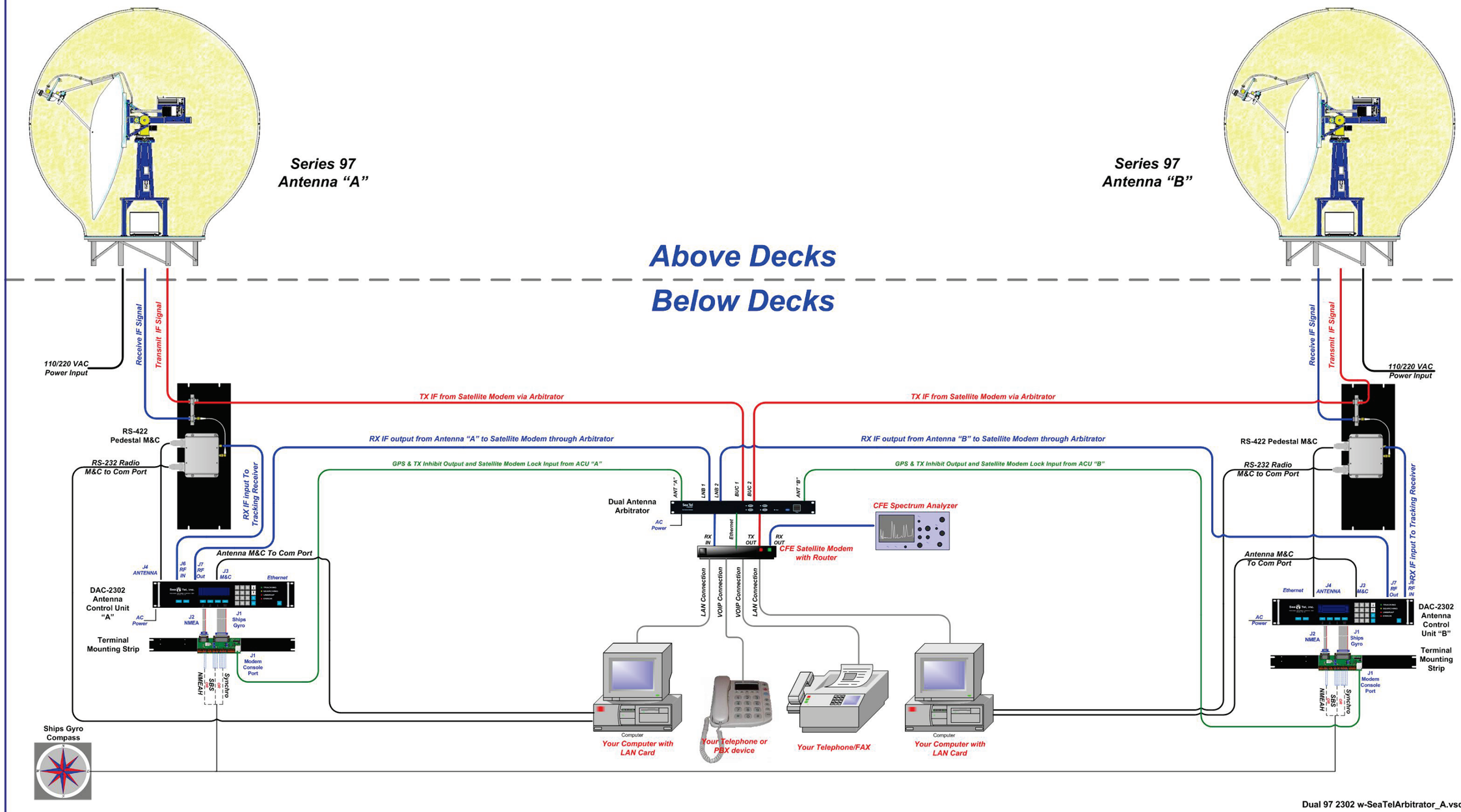
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

## *8.4. Connecting the Below Decks Equipment*

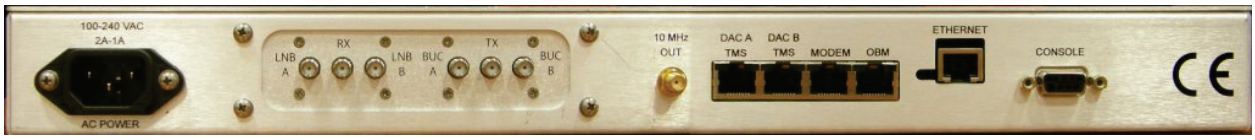
You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.




**Dual Series 97 (DAC-2302) Antenna Simplified Block Diagram**

## *8.5. Dual Antenna Arbitrator Connections*




### 8.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A -** Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-N coax cable assembly (Sea Tel PN 111079-6 or equivalent) from here to the TX connector on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Modem Console Port" jack on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

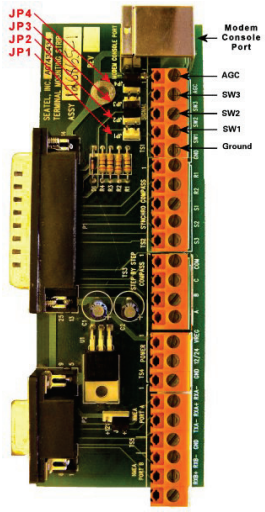
**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *8.6. Terminal Mounting Strip Connections and Jumpers*

Connections and Jumpers on the DAC-2202 & DAC-2302 Terminal Mounting Strips are as follows:




### 8.6.1. Jumper JP2

Jumper JP2 ***must be removed*** for use with the Dual Antenna Arbitrator.

### 8.6.2. Jumper JP4

*Jumper **JP4** on the Terminal Mounting Strip must be **removed** when using iDirect 3000 & 5000 Series Modems.*

**JP4** must be **installed** for use with Comtech & Hughes modems.

### 8.6.3. Modem Console Port Connection

Use an RJ-45 straight serial cables connected from the Terminal Mounting Strip "Modem Console Port" to the DAC A, or DAC B, connector as appropriate on the rear panel of the Dual Antenna Arbitrator.

## *8.7. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 8.7.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 8.7.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 8.7.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 8.7.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *8.8. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

# 9. Installation – Dual Series 97 or 97A L-Band IF Antennas

These systems were provided with older style Terminal Mounting Strip Connections and either DAC-97, or DAC-03, Antenna Control Units.

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *9.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *9.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *– Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *9.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

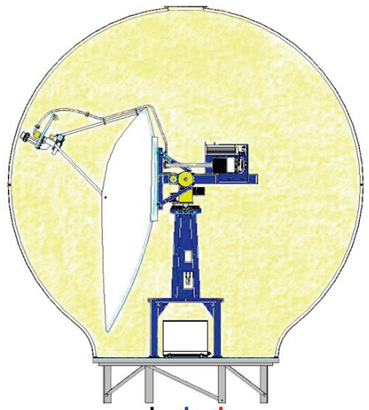
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

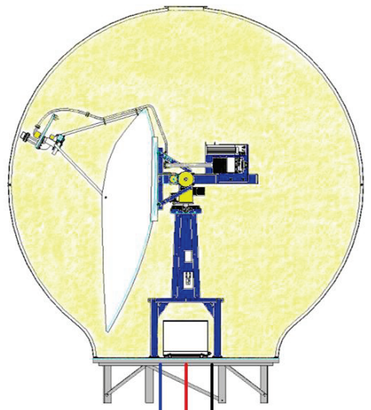
## *9.4. Connecting the Below Decks Equipment*

You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



Series 97
Antenna "A"



Series 97
Antenna "B"

# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

TX IF from Satellite Modem via Arbitrator

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

TX IF from Satellite Modem via Arbitrator

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input
To Tracking
Receiver

Antenna M&C To Com Port

DAC-97 or
DAC-03
Antenna
Control Unit
"A"

J4
ANTENNA

J6
RF
IN

J3
M&C

AC
Power

Terminal
Mounting Strip

NMEA0

Synchro

SBS

Ships Gyro
Compass

Dual Antenna
Arbitrator

ANT "A"

LNB 1

LNB 2

BUC 1

BUC 2

ANT "B"

AC
Power

RX
IN

Ethernet

TX
OUT

RX
OUT

CFE Spectrum Analyzer

CFE Satellite Modem
with Router

LAN Connection

VOIP Connection

VOIP Connection

LAN Connection

Computer

Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

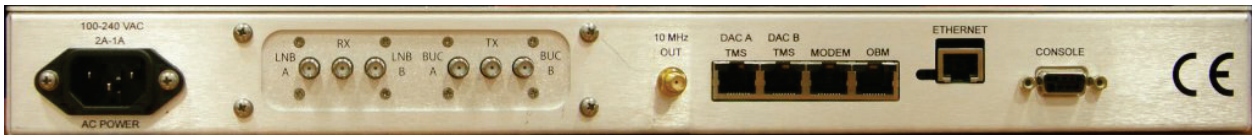
Computer

Your Computer with
LAN Card

Dual 97 DAC97 w-
SeaTelArbitrator_A.vsd

**Dual Series 97 (DAC-97 or DAC-03) 06 Antenna Simplified Block Diagram**

## *9.5. Dual Antenna Arbitrator Connections*




### 9.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to the L-band input on the Radio M&C base modem on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to the L-band input on the Radio M&C base modem on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 135192 or equivalent) from here to the appropriate screw terminals on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 135192 or equivalent) from here to the appropriate screw terminals on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

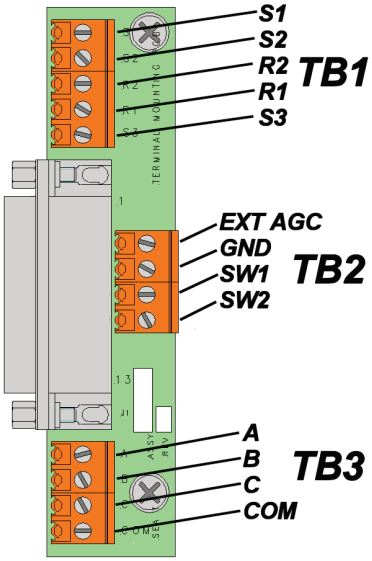
**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *9.6. Terminal Mounting Strip (TMS) Connections*

There are several functional connections that may be made on the TMS connectors. You may not need to make all of these connections, but they are listed here for you to decide which ones you do need to make during the installation. Connect the 9 pin ribbon cable from this PCB to J13 "NMEA" jack on the rear panel of the ACU. Connect the 25 pin ribbon cable from this PCB to J3 "Gyro Compass" jack on the rear panel of the ACU. They are:

***CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip.***

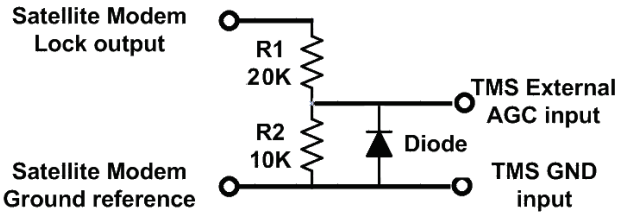



***SW2*** - The ***Blockage/TX Mute*** Control output is driven by Blockage and RF Radiation Hazard functions. This output will short to ground whenever the antenna is within the AZ LIMIT zone(s) or is Searching, Targeting, Unwrapping or is mispointed 0.5 degrees from satellite peak. This output will be used to drive the Dual Antenna Arbitrator coax switches to select which antenna is feeding satellite modem and to Mute the Transmit output of the Satellite Modem when the antenna is positioned where people may be harmed by the transmit power emanating from the antenna (RF Radiation Hazard).

For FCC compliance, this output will also mute the Transmit output of the Satellite Modem when the antenna is mispointed by 0.5 degrees, or more, and keep it muted until the antenna has been within 0.2 degrees of peak pointing to the satellite (FCC part 25.221 & 25.222 TX Mute requirement).

***AGC & GND*** - ***External AGC, or Modem Lock, input***.

External Modem (network) Lock from a satellite modem is used as a positive ID that the antenna is on the desired satellite. **This input is NOT used for Tracking purposes**, it is only used for satellite identification to acquire the correct satellite during search. To enable the external modem input you must include a 2 in the SYSTEM TYPE parameter and **NID MUST be set to 0000**.

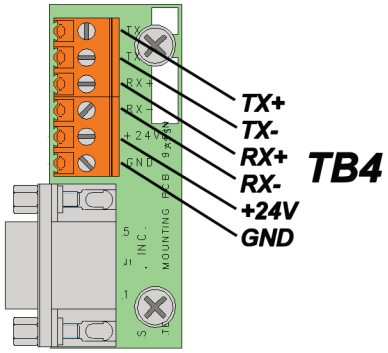



**Connections** - The modem lock signal connects to EXT AGC and a ground reference from the modem connects to GND. The expected signal from the modem is 0VDC to +5VDC. Low voltage indicates modem lock, high voltage indicates modem unlock.

**NOTE** - If the modem signal produces a negative voltage, an external diode will need to be installed across the modem signal and ground (Cathode to modem signal, Anode to ground). Voltages up to +/- 15 VDC can be used with addition of a resistor voltage divider to supply 0-5VDC into the ACU . An example of external components is show here.

**Testing** - Refer to Blockage Simulation Test below.

**Operation** - In *NORMAL* operation, AGC must be above Threshold AND external MODEM Lock input must be locked to Track the satellite. If you are tracking a satellite signal and the AGC is above threshold (Tracking light on solid) but the external AGC signal rises above 2.5 volts for more than 20 seconds (external MODEM input ***UNLOCKED***) the ACU will automatically retarget the selected satellite.




**TB-4 NMEA 9-pin PCB**. - ***TX+ and TX-*** screw terminals are used to provide GPS NMEA GPGGA output to a Satellite Modem used with Sea Tel Transmit/Receive (TX/RX) antennas.

## *9.1. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 9.1.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 9.1.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 9.1.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 9.1.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *9.2. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

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# 10. Installation – Dual Series 97 or 97A 70/140 MHz IF Antennas

These systems were provided with older style Terminal Mounting Strip Connections and either DAC-97, or DAC-03, Antenna Control Units.

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *10.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *10.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *– Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *10.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

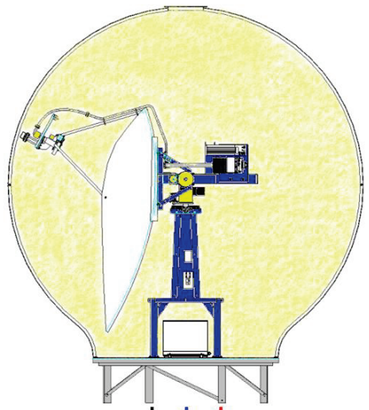
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

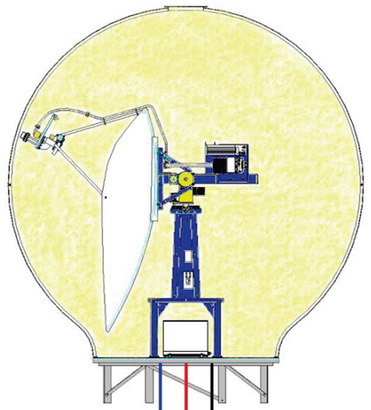
## *10.4. Connecting the Below Decks Equipment*

You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



Series 97
Antenna "A"



Series 97
Antenna "B"

# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

TX IF from Satellite Modem via Arbitrator

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

TX IF from Satellite Modem via Arbitrator

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

RS-422
Pedestal M&C

RS-232 Radio
M&C to Com Port

RX IF input
To Tracking
Receiver

Antenna M&C To Com Port

DAC-97 or
DAC-03
Antenna
Control Unit
"A"

J4
ANTENNA

J6
RF
IN

J3
M&C

AC
Power

Terminal
Mounting Strip

NMEA0

Synchro

SBS

Ships Gyro
Compass

Dual Antenna
Arbitrator

ANT "A"

LNB 1

LNB 2

BUC 1

BUC 2

ANT "B"

AC
Power

RX
IN

Ethernet

TX
OUT

RX
OUT

CFE Spectrum Analyzer

CFE Satellite Modem
with Router

LAN Connection

VOIP Connection

VOIP Connection

LAN Connection

Computer

Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

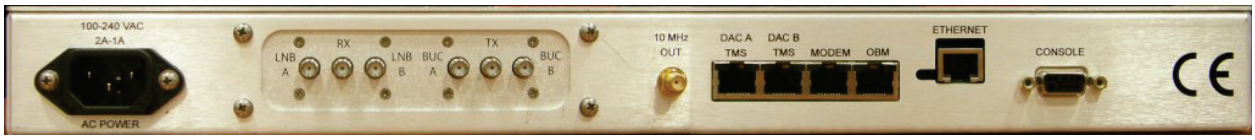
Computer

Your Computer with
LAN Card

Dual 97 DAC97 w-
SeaTelArbitrator_A.vsd

**Dual Series 97 (DAC-97 or DAC-03) 06 Antenna Simplified Block Diagram**

## *10.5. Dual Antenna Arbitrator Connections*




### 10.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A** - Connect an SMA-BNC coax cable assembly (Sea Tel PN 115384-3 or equivalent) from here to an available RF OUT on 70/140 MHz splitter for Antenna "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-BNC coax cable assembly (Sea Tel PN 115384-3 or equivalent) from here to an available RF OUT on 70/140 MHz splitter for Antenna "B".

**BUC A** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to the L-band input on the Radio M&C base modem on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to the L-band input on the Radio M&C base modem on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 135192 or equivalent) from here to the appropriate screw terminals on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 135192 or equivalent) from here to the appropriate screw terminals on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

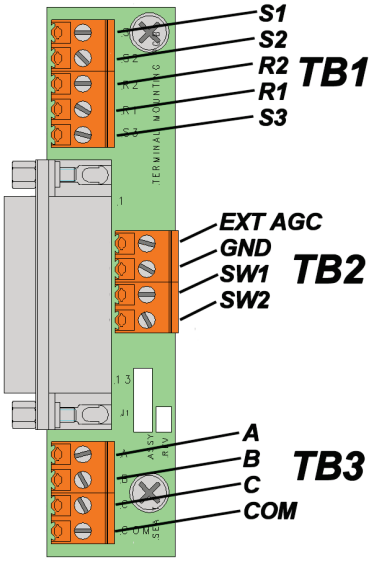
**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *10.1. Terminal Mounting Strip (TMS) Connections*

There are several functional connections that may be made on the TMS connectors. You may not need to make all of these connections, but they are listed here for you to decide which ones you do need to make during the installation. Connect the 9 pin ribbon cable from this PCB to J13 "NMEA" jack on the rear panel of the ACU. Connect the 25 pin ribbon cable from this PCB to J3 "Gyro Compass" jack on the rear panel of the ACU. They are:

***CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip.***

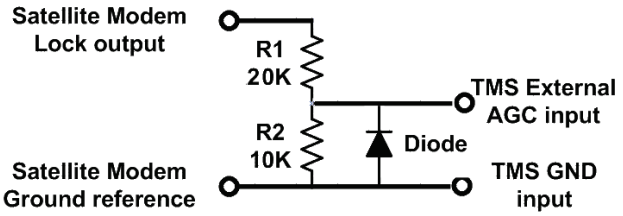



***SW2*** - The ***Blockage/TX Mute*** Control output is driven by Blockage and RF Radiation Hazard functions. This output will short to ground whenever the antenna is within the AZ LIMIT zone(s) or is Searching, Targeting, Unwrapping or is mispointed 0.5 degrees from satellite peak. This output will be used to drive the Dual Antenna Arbitrator coax switches to select which antenna is feeding satellite modem and to Mute the Transmit output of the Satellite Modem when the antenna is positioned where people may be harmed by the transmit power emanating from the antenna (RF Radiation Hazard).

For FCC compliance, this output will also mute the Transmit output of the Satellite Modem when the antenna is mispointed by 0.5 degrees, or more, and keep it muted until the antenna has been within 0.2 degrees of peak pointing to the satellite (FCC part 25.221 & 25.222 TX Mute requirement).

***AGC & GND*** - ***External AGC, or Modem Lock, input***.

External Modem (network) Lock from a satellite modem is used as a positive ID that the antenna is on the desired satellite. **This input is NOT used for Tracking purposes**, it is only used for satellite identification to acquire the correct satellite during search. To enable the external modem input you must include a 2 in the SYSTEM TYPE parameter and **NID MUST be set to 0000**.

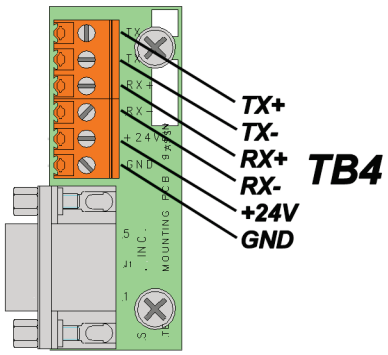



**Connections** - The modem lock signal connects to EXT AGC and a ground reference from the modem connects to GND. The expected signal from the modem is 0VDC to +5VDC. Low voltage indicates modem lock, high voltage indicates modem unlock.

**NOTE** - If the modem signal produces a negative voltage, an external diode will need to be installed across the modem signal and ground (Cathode to modem signal, Anode to ground). Voltages up to +/- 15 VDC can be used with addition of a resistor voltage divider to supply 0-5VDC into the ACU . An example of external components is show here.

**Testing** - Refer to Blockage Simulation Test below.

**Operation** - In *NORMAL* operation, AGC must be above Threshold AND external MODEM Lock input must be locked to Track the satellite. If you are tracking a satellite signal and the AGC is above threshold (Tracking light on solid) but the external AGC signal rises above 2.5 volts for more than 20 seconds (external MODEM input ***UNLOCKED***) the ACU will automatically retarget the selected satellite.




**TB-4 NMEA 9-pin PCB**. - ***TX+ and TX-*** screw terminals are used to provide GPS NMEA GPGGA output to a Satellite Modem used with Sea Tel Transmit/Receive (TX/RX) antennas.

## *10.1. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 10.1.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 10.1.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 10.1.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 10.1.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *10.2. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

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# 11. Installation – Dual Series 06 Antennas

These systems were provided with older style Terminal Mounting Strip Connections and either DAC-97, or DAC-03, Antenna Control Units.

If not already installed, refer to your antenna installation manuals to install the two Sea Tel antennas. After installation of the antennas, Antenna Control Units, Terminal Mounting Strips, Base multiplexer panels and cables have been installed refer to the information below to install the Dual Antenna Arbitrator.

## *11.1. Unpacking and Inspection*

Exercise caution when unpacking the equipment.

1. Unpack the carton.
2. Carefully inspect the arbitrator for evidence of shipping damage.
3. Inventory the contents using the Bill Of Materials provided in the carton.
4. Inspect everything to assure that all materials have been received and are in good condition.

## *11.2. Install the Dual Antenna Arbitrator*

***CAUTION*** *– Allow only an* ***authorized dealer*** *to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and may void the warranty.*

Install the Dual Antenna Arbitrator in a convenient location within your 19" equipment rack where it is in proximity of both ACU's, satellite modem and any other below decks equipment that it will be connected to.

## *11.3. Shipboard Cable Installation*

**CAUTION**: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

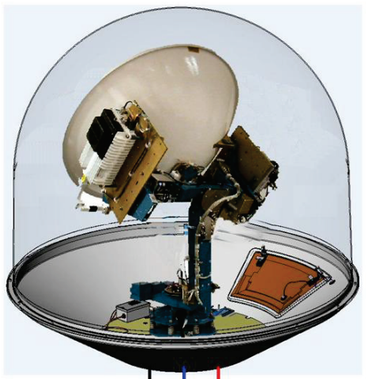
Use caution in installing interconnecting cables. Avoid routing cables across sharp edges that will cut of chafe these cables. Don't lay these cables on other power or signal cables which may induce noise into them. Avoid sharp bends, kinking, and the use of excessive force.

If slide rails are being used, assure that the cables are dressed & routed properly, and are of sufficient length, to allow the equipment to be pulled out on it's slide rails.

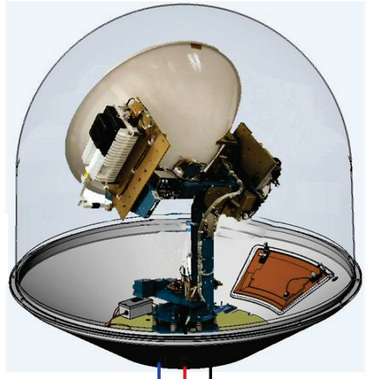
## *11.4. Connecting the Below Decks Equipment*

You may also elect to provide an Ethernet router / hub / switch and install interconnecting cables between other below decks equipment than are sited herein. These additional Ethernet cables are not provided, nor are they discussed below.

Connect the Dual Antenna Arbitrator to the other below decks equipment as shown in the Simplified Block Diagram and as described below.



Series 06
Antenna "A"



Series 06
Antenna "B"

# Above Decks

# Below Decks

110/220 VAC
Power Input

Receive IF Signal

Transmit IF Signal

TX IF from Satellite Modem via Arbitrator

RX IF output from Antenna "A" to Satellite Modem through Arbitrator

RS-422
Pedestal M&C

RX IF input
To Tracking
Receiver

RS-232 Radio
M&C to Com Port

Antenna M&C To Com Port

DAC-2200
Antenna
Control Unit
"A"

J4
ANTENNA

J6
RF
IN

J3
M&C

AC
Power

Terminal
Mounting Strip

NMEA/I

SBS

Synchro

Ships Gyro
Compass

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "A"

Dual Antenna
Arbitrator

ANT "A"

LNB 1

LNB 2

BUC 1

BUC 2

ANT "B"

AC
Power

RX
IN

Ethernet

TX
OUT

RX
OUT

CFE Satellite Modem
with Router

CFE Spectrum Analyzer

LAN Connection

VOIP Connection

VOIP Connection

LAN Connection

Computer

Your Computer with
LAN Card

Your Telephone or
PBX device

Your Telephone/FAX

Computer

Your Computer with
LAN Card

TX IF from Satellite Modem via Arbitrator

RX IF output from Antenna "B" to Satellite Modem through Arbitrator

GPS & TX Inhibit Output and Satellite Modem Lock Input from ACU "B"

Receive IF Signal

Transmit IF Signal

110/220 VAC
Power Input

RS-422
Pedestal M&C

RX IF input
To Tracking
Receiver

RS-232 Radio M&C
to Com Port

Antenna M&C
To Com Port

DAC-2200
Antenna
Control Unit
"B"

J4
ANTENNA

J3
M&C

J6
RF
IN

AC
Power

Terminal
Mounting Strip

NMEA/I

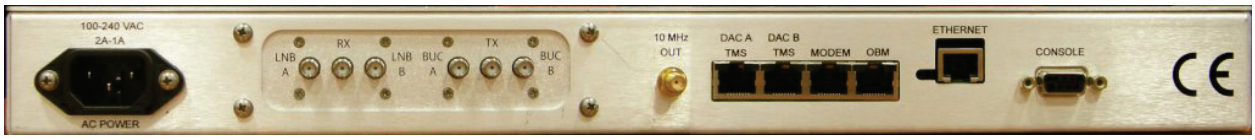
SBS

Synchro

Dual 06 DAC2200 w-
SeaTelArbitrator_A.vsd

**Dual Series 06 Antenna Simplified Block Diagram**

## *11.5. Dual Antenna Arbitrator Connections*




### 11.5.1. AC Power Cable

Connect the AC Power cable from the rear of the Dual Antenna Arbitrator to an AC outlet fed from a suitably rated breaker or UPS.

**LNB A** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "A".

**RX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF INPUT on your Satellite Modem.

**LNB B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to RF OUT (J-7) on Antenna Control Unit "B".

**BUC A** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to the L-band input on the Radio M&C base modem on Base Multiplexer Panel "A".

**TX** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to TX OUTPUT on your Satellite Modem.

**BUC B** - Connect an SMA-SMA coax cable assembly (Sea Tel PN 114972-1 or equivalent) with an SMA-F impedance matching pad (Sea Tel PN 125580-3 or equivalent) from here to the L-band input on the Radio M&C base modem on Base Multiplexer Panel "B".

**10MHz In (if fitted)** - If fitted, connect SMA-SMA coax jumper cable assembly from here to 10MHz Out.

**10MHz Out** - Not connected unless **10MHz In** is fitted.

**DAC "A" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 135192 or equivalent) from here to the appropriate screw terminals on Terminal Mounting Strip "A".

**DAC "B" TMS** - Connect an RJ-45 serial cable (Sea Tel PN 135192 or equivalent) from here to the appropriate screw terminals on Terminal Mounting Strip "B".

**Modem** - Connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the "Console" port on your iDirect Satellite Modem.

**OBM** - If Out of Band Management equipment is provided, connect an RJ-45 serial cable (Sea Tel PN 119478-5 or equivalent) from here to the appropriate jack on your OBM equipment.

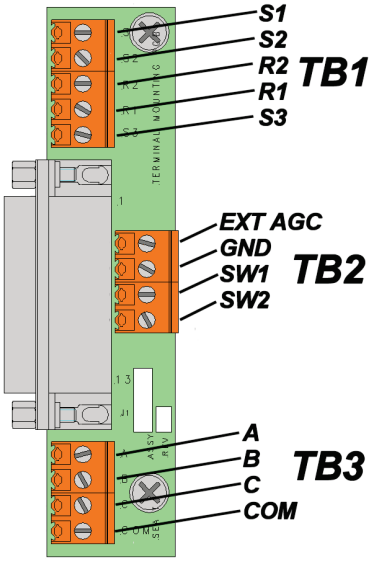
**ETHERNET** - Connect an Ethernet patch cable (Sea Tel PN 119479-10 or equivalent) from here to an open port on your Ethernet router/hub/switch.

**CONSOLE** - This port is a 9-pin RS-232 Serial M&C port that can be connected to an open COM port on a computer for command line access to the Dual Antenna Arbitrator. For remote access, connect to appropriate out of band communications equipment. Use RS-232 Straight 9-Wire Serial cable (Sea Tel PN 120643-25 or equivalent).

## *11.1. Terminal Mounting Strip (TMS) Connections*

There are several functional connections that may be made on the TMS connectors. You may not need to make all of these connections, but they are listed here for you to decide which ones you do need to make during the installation. Connect the 9 pin ribbon cable from this PCB to J13 "NMEA" jack on the rear panel of the ACU. Connect the 25 pin ribbon cable from this PCB to J3 "Gyro Compass" jack on the rear panel of the ACU. They are:

***CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip.***

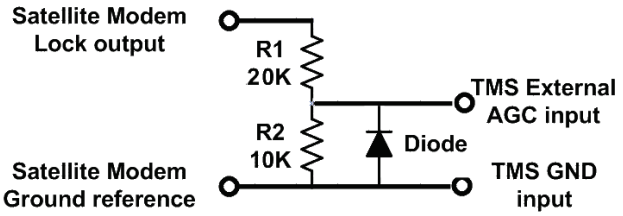



***SW2*** - The ***Blockage/TX Mute*** Control output is driven by Blockage and RF Radiation Hazard functions. This output will short to ground whenever the antenna is within the AZ LIMIT zone(s) or is Searching, Targeting, Unwrapping or is mispointed 0.5 degrees from satellite peak. This output will be used to drive the Dual Antenna Arbitrator coax switches to select which antenna is feeding satellite modem and to Mute the Transmit output of the Satellite Modem when the antenna is positioned where people may be harmed by the transmit power emanating from the antenna (RF Radiation Hazard).

For FCC compliance, this output will also mute the Transmit output of the Satellite Modem when the antenna is mispointed by 0.5 degrees, or more, and keep it muted until the antenna has been within 0.2 degrees of peak pointing to the satellite (FCC part 25.221 & 25.222 TX Mute requirement).

***AGC & GND*** - ***External AGC, or Modem Lock, input***.

External Modem (network) Lock from a satellite modem is used as a positive ID that the antenna is on the desired satellite. **This input is NOT used for Tracking purposes**, it is only used for satellite identification to acquire the correct satellite during search. To enable the external modem input you must include a 2 in the SYSTEM TYPE parameter and **NID MUST be set to 0000**.

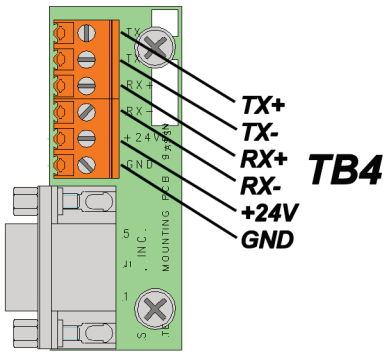



**Connections** - The modem lock signal connects to EXT AGC and a ground reference from the modem connects to GND. The expected signal from the modem is 0VDC to +5VDC. Low voltage indicates modem lock, high voltage indicates modem unlock.

**NOTE** - If the modem signal produces a negative voltage, an external diode will need to be installed across the modem signal and ground (Cathode to modem signal, Anode to ground). Voltages up to +/- 15 VDC can be used with addition of a resistor voltage divider to supply 0-5VDC into the ACU . An example of external components is show here.

**Testing** - Refer to Blockage Simulation Test below.

**Operation** - In *NORMAL* operation, AGC must be above Threshold AND external MODEM Lock input must be locked to Track the satellite. If you are tracking a satellite signal and the AGC is above threshold (Tracking light on solid) but the external AGC signal rises above 2.5 volts for more than 20 seconds (external MODEM input ***UNLOCKED***) the ACU will automatically retarget the selected satellite.




**TB-4 NMEA 9-pin PCB**. - ***TX+ and TX-*** screw terminals are used to provide GPS NMEA GPGGA output to a Satellite Modem used with Sea Tel Transmit/Receive (TX/RX) antennas.

## *11.1. Set-up*

Both antennas must be set-up & RF balanced to optimize their performance on the same satellite.

### 11.1.1. Tracking Settings

Refer to the antenna installation manual to optimize the tracking settings for the desired satellite.

### 11.1.2. Targeting

Refer to the antenna installation manual to optimize the targeting of the antenna on the desired satellite.

### 11.1.3. Blockage Zones

Refer to the antenna installation manual to enter blockage zones of mast, stack or other structures aboard the ship which block the satellite signal from reaching each of the two Sea Tel antennas.

### 11.1.4. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

Refer to the Setup chapter in this manual to balance the outputs of your antennas.

## *11.2. Testing Switching*

Refer to the Functional Testing chapter of this manual to test the switching of this Dual Antenna Arbitrator.

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# 12. Setup

## *12.1. Default Parameter Settings:*

The default settings in the Dual Antenna Arbitrator and in the two Antenna Control Units typically are as listed in the table below. You may need, or elect, to change these to conform with your network or LAN.

**SYSTEM TYPE** parameter **BOTH** of the in the Sea Tel Antenna Control Units **MUST** include the **16 value** (please refer to your antenna, and/or antenna control unit, installation manual(s).

| | **ARBITRATOR** | **DAC A** | **DAC B** |
|---|---|---|---|
| User Name | seatel | seatel | seatel |
| Password | 1234 | 1234 | 1234 |
| IP Addreess | 192.168.30.194 | 192.168.30.195 | 192.168.30.196 |
| Subnet mask | 255.255.255.000 | 255.255.255.248 | 255.255.255.248 |
| Default Gateway | 192.168.30.254 | 192.168.30.195 | 192.168.30.195 |
| UDP Port | 3000 | 3000 | 3000 |
| Forward Port | 2002 | | |
| Management ports | | 2000 : 2001 | 2000 : 2001 |
| Serial Baud Rate | 9600 | | |
| Telnet Port | 23 | | |
| Arbitrator Switching Mode | Auto | | |
| Default Active Antenna | ANT A | | |
| Arbitrator GPS Source | Active DAC | | |
| 10MHz Hot Standby | Off | | |
| Default Mute Polarity | Low Voltage | | |

### 12.1.1. Balancing TX Output

To provide seamless switching performance on the satellite network, it may be necessary to balance the RF performance (TX & RX ) of the two antennas to compensate for dissimilar antenna sizes, BUC & LNB gains, different cable losses, etc.

***NOTE:*** You will cause other users to be knocked off of the network if you switch to an antenna which has more than 2 dB difference and may cause detrimental impact on the network if the difference is greater than 4 dB.

1. Contact NOC technician
2. Select Manual Mode
3. Select ANT A
4. Conduct cross-pol isolation optimization with the NOC technician.
5. Conduct 1dB compression test on Antenna "A", measure using one of the following means:
    - Feedback from the network (preferred).
    - Radio M&C power output value, if available on your RF equipment.
    - Power meter

    Record TX Output @ 1dB compression point. ____ dB

6. Measure RX signal level at the RX Input to the satellite modem using a spectrum analyzer, modem signal level, EbNo or SNR value. Record RX Input ____ dB
7. Select ANT B
8. Conduct cross-pol isolation optimization with the NOC technician.
9. Conduct 1dB compression test on Antenna "B", measure using one of the following means:
    - Feedback from the network (preferred).
    - Radio M&C power output value, if available on your RF equipment.
    - Power meter

    Record TX Output @ 1dB compression point. ____ dB
10. Measure RX signal level at the RX Input to the satellite modem using a spectrum analyzer, modem signal level, EbNo or SNR value. Record RX Input ____ dB
11. Compare measured RX output levels and notify operators if the difference is greater than +/-1.0 dB of each other ... this is for informational purposes only, so that the operators know differences in performance when switching. RX in-line attenuators may be installed at the LNB input to the Dual Antenna Arbitrator which has the higher RX signal level, if balanced performance is desired, but it is not necessary.
12. Compare measured TX results to determine if the outputs are balanced. Outputs ***must not be*** greater than +/-2.0 dB ***MAX*** of each other. If necessary, add TX attenuation via BUC M&C, or by installing in-line attenuators (not supplied) at the input, of the BUC which has the higher power output to balance the performance of the two antennas within +/- 1.0 dB.
13. Verify with the NOC that the TX outputs (RX signal level at the network) from ANT A & ANT B are equal +/- 1.0dB.
14. Select Auto Mode.

# 13. Functional Testing

Test the Dual Antenna Arbitrator to assure it switches properly when one, or the other, antenna is blocked and that you are getting proper modem lock to both Antenna Control Units.

## *13.1. Test Dual Antenna Arbitrator – DAC-2202*

Connect systems per the appropriate simplified block diagram.

1. Assure that BOTH systems are energized, are on satellite and that the satellite modem has normal network lock.
2. Simulate blocked condition on ACU for Antenna "A" :
    - Press the **NEXT** key until you are at the Status menu. (Sea Tel – Remote and antenna software display) Press **ENTER** to access the Tracking menu.
    - Press the **RIGHT** arrow key to bring up and move the cursor to the far right. Press the **UP** arrow to simulate a manual BLOCKED condition. BLOCKED will appear in the Tracking display.
3. Verify that the Arbitrator switches to Antenna " B"
4. Un Block ACU for Antenna "A":
    - Press the **LEFT** arrow key and then press the **UP** arrow key to turn the simulated blocked condition OFF. BLOCKED will disappear, leaving the ON/OFF Tracking status and the band selection in the Tracking display. Press the UP arrow key again if you wish to toggle the Tracking state.
5. Verify that the Arbitrator does nothing (remains latched on Antenna "B")
6. Simulate blocked condition from ACU for Antenna "B"
    - Press the **NEXT** key until you are at the Status menu. (Sea Tel – Remote and antenna software display) Press **ENTER** to access the Tracking menu.
    - Press the **RIGHT** arrow key to bring up and move the cursor to the far right. Press the **UP** arrow to simulate a manual BLOCKED condition. BLOCKED will appear in the Tracking display.
7. Verify that the Arbitrator switches to Antenna " A"
8. Un Block ACU for Antenna "B":
    - Press the **LEFT** arrow key and then press the **UP** arrow key to turn the simulated blocked condition OFF. BLOCKED will disappear, leaving the ON/OFF Tracking status and the band selection in the Tracking display. Press the UP arrow key again if you wish to toggle the Tracking state.
9. Verify that the Arbitrator does nothing (remains latched on Antenna "A")

## *13.2. Test Dual Antenna Arbitrator – DAC-97, DAC-03 & DAC-2302*

Connect systems per the appropriate simplified block diagram

1. Assure that BOTH systems are energized, are on satellite and that the satellite modem has normal network lock.
2. Simulate blocked condition on ACU for Antenna "A" :
    - Press the **MODE** key to access the Tracking menu.
    - Press the **5** key to simulate a manual BLOCKED condition to test SW2 logic output. BLOCKED will appear in the Tracking display.
3. Verify that the Arbitrator switches to Antenna " B"
4. Un Block ACU for Antenna "A":
    - Press the **UP** arrow key is pressed to turn the simulated blocked condition OFF. BLOCKED will disappear from the Tracking display. Press the **UP** arrow key again if you wish to toggle the Tracking state.
5. Verify that the Arbitrator does nothing (remains latched on Antenna "B")
6. Simulate blocked condition from ACU for Antenna "B"
    - Press the **MODE** key to access the Tracking menu.

- Press the **5** key to simulate a manual BLOCKED condition to test SW2 logic output. BLOCKED will appear in the Tracking display.

7. Verify that the Arbitrator switches to Antenna " A"
8. Un Block ACU for Antenna "B":
    - Press the **UP** arrow key is pressed to turn the simulated blocked condition OFF. BLOCKED will disappear from the Tracking display. Press the **UP** arrow key again if you wish to toggle the Tracking state.
9. Verify that the Arbitrator does nothing (remains latched on Antenna "A")

## *13.3. Testing the Satellite Modem Lock Input – DAC-2202*

The input connections from the modem can be tested by selecting the external AGC input and monitoring the displayed value. To test the external AGC, set the tuning frequency to 0000. Normally, AGC readings below 800 are considered a low condition and indicate modem lock and AGC readings above 800 are considered a high condition and indicate modem unlock.

1. Verify that the satellite modem currently has RX Sync (RX Sync LED ON).
2. Turn tracking **OFF** so that the antenna stays pointed ON satellite.
3. Press **NEXT** until the Satellite menu is displayed. Press **ENTER** 3 times to display the Frequency entry window. Record the frequency that the tracking receiver is currently tuned to. Press **LEFT** or **RIGHT** arrow key to bring up the cursor under the units digit Use the **UP** or **DOWN** arrow keys to increment or decrement the selected digit, use the **LEFT** arrow key and the **UP** or **DOWN** arrow keys to change the next digit. Continue until frequency is set to 0000. Press the **ENTE**R key to tune the tracking receiver to this frequency.
4. View current ON satellite **LOCKED** AGC value in the lower right corner of the display and measure the DC Voltage from EXT AGC (+) terminal to the GND (-) terminal. The iDirect and Comtech modems should have an AGC readings below 800 (LOCK = low condition) and 0 VDC across the EXT AGC and GND terminals. The Hughes modem will have an AGC reading above 800 (LOCK = high condition) and 12VDC across the EXT AGC and GND terminals.
5. Disconnect the RXIF input coax from the rear of the satellite modem. It should lose RX Sync (RX Sync LED OFF).
6. View current ON satellite **UN-LOCKED** AGC value in the lower right corner of the display and measure the DC Voltage from EXT AGC (+) terminal to the GND (-) terminal. The iDirect & Comtech modems should have an AGC readings above 800 (UN-LOCKED = high condition) and about +12 VDC across the EXT AGC and GND terminals. The Hughes modem will have an AGC reading below 800 (UN-LOCKED = low condition) and 12VDC across the EXT AGC and GND terminals.
7. Reconnect the RXIF input coax to the rear of the satellite modem. It should regain RX Sync (RX Sync LED ON).
8. Press **LEFT** or **RIGHT** arrow key to bring the up the cursor under the units digit Use the **UP** or **DOWN** arrow keys to increment or decrement the selected digit, use the **LEFT** arrow key and the **UP** or **DOWN** arrow keys to change the next digit. Continue until frequency value, recorded in step 3, is displayed and press the **ENTE**R key to re-tune the tracking receiver.

## *13.4. Testing the Satellite Modem Lock Input – DAC-97, DAC-03 & DAC-2302*

The input connections from the modem can be tested by selecting the external AGC input and monitoring the displayed value. To test the external AGC, set the tuning frequency to 0000. Normally, AGC readings below 800 are considered a low condition and indicate modem lock and AGC readings above 800 are considered a high condition and indicate modem unlock.

1. Verify that the satellite modem currently has RX Sync (RX Sync LED ON).
2. Turn tracking **OFF** so that the antenna stays pointed ON satellite.
3. Press **SAT** key until the full Satellite menu is displayed. Press **SAT** key 3 times to display the Frequency entry window. Record the frequency that the tracking receiver is currently tuned to. Using the numeric key pad, set the tracking frequency to 0000. Press the **ENTE**R key to submit and tune the tracking receiver to this frequency.
4. View current ON satellite **LOCKED** AGC value in the lower right corner of the display and measure the DC Voltage from EXT AGC (+) terminal to the GND (-) terminal. The iDirect & Comtech modems should have an AGC readings below 800 (LOCK = low condition) and 0 VDC across the EXT AGC and GND terminals. The

Hughes modem will have an AGC reading above 800 (LOCK = high condition) and 12VDC across the EXT AGC and GND terminals.

5. Disconnect the RXIF input coax from the rear of the satellite modem. It should lose RX Sync (RX Sync LED OFF).
6. View current ON satellite **UN-LOCKED** AGC value in the lower right corner of the display and measure the DC Voltage from EXT AGC (+) terminal to the GND (-) terminal. The iDirect & Comtech modems should have an AGC readings above 800 (UN-LOCKED = high condition) and about +12 VDC across the EXT AGC and GND terminals. The Hughes modem will have an AGC reading below 800 (UN-LOCKED = low condition) and 12VDC across the EXT AGC and GND terminals.
7. Reconnect the RXIF input coax to the rear of the satellite modem. It should regain RX Sync (RX Sync LED ON).
8. Using the numeric key pad, enter in the frequency value, recorded in step 3, and press the **ENTE**R key to re-tune the tracking receiver.

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# 14. Troubleshooting & Maintenance

## *14.1. Isolating IF & RF problems:*

Refer to the appropriate Simplified Block Diagram for your system to trace the TX IF or RX IF signal paths between the ADE and BDE. Use a spectrum analyzer to test IF and RF signals.

- For ADE RF problems refer to the System Block Diagram in your antenna manual.
- For BDE RF problems refer to the appropriate Simplified Block Diagram in this manual. (Note: When the Dual Antenna Arbitrator looses power the switches will default to ANT A).

## *14.2. GPS problems:*

Current Production Systems:

- Refer the maintenance chapter of you antenna manual to test the GPS mounted on each of your antenna pedestals.
- Test the GPS terminals on the each of the Terminal Mounting Strips.
- Check continuity of each of the interconnecting RJ-45 console cables between the Terminal Mounting Strips and the Dual Antenna Arbitrator.
- Check GPS setting in the Dual Antenna Arbitrator.
- Check continuity of the interconnecting RJ-45 console cable, or Ethernet cable, between the Dual Antenna Arbitrator and the Satellite Modem.
- Query the GPS LAT/LON position in the PCU, ACU and in the modem.

Legacy (no longer produced) Systems:

- Test the output of the external GPS input wired to the Terminal Mounting Strip(s).
- Check continuity each of the interconnecting bare wire to RJ-45 cables between the Terminal Mounting Strips and the Dual Antenna Arbitrator.
- Check GPS setting in the Dual Antenna Arbitrator.
- Check continuity of the interconnecting RJ-45 console cable, or Ethernet cable, between the Dual Antenna Arbitrator and the Satellite Modem.
- Query the GPS LAT/LON position in the PCU, ACU and in the modem.

## *14.3. Network Lock problems:*

If Network lock is not getting into the ACU(s), you will have to ascertain if the problem is in the modem, the Dual Antenna Arbitrator, Terminal Mounting Strip(s), ribbon cables or any one of the other interconnecting cables which carry this signal.

If your modem does NOT have network lock output available:

- Assure that the System Type parameter does NOT include the “2” value, so that it will track on any satellite signal level, at the tracking frequency, which is above threshold.

If your modem does have network lock output available:

- Test the output from the modem to the Dual Antenna Arbitrator.
- Check continuity of the interconnecting RJ-45 console and Ethernet cables, between the Satellite Modem and the Dual Antenna Arbitrator. If your system is Ethernet based, check continuity of the Ethernet cable to the Dual Antenna Arbitrator.
- Check continuity of the interconnecting RJ-45 console cable, bare wire to RJ-45 cables between the Satellite Modem and the Dual Antenna Arbitrator. If your system is Ethernet based, check continuity of the Ethernet cable(s) to the ACU’s.
- Check EXT AGC terminals on each of the Terminal Mounting Strips.
- Check continuity of the ribbon cables from the affected Terminal Mounting Strip to it’s ACU.

- Test the Satellite Modem Lock input to ***EACH*** ACU (refer to the "Testing the Satellite Modem Lock (Network ID) Input in the ACU" in the Functional Testing chapter of this manual.

## *14.4. TX Mute problems:*

If your modem does NOT have a "TX Mute" input available - The system will NOT be able to comply with US FCC requirements.

If your modem does have a "TX Mute" input available:

- Test the TX Mute output from ***EACH*** ACU (refer to the "Blockage Simulation Test" in the Functional Testing chapter of this manual.
- Check SW2 terminal (to GND) on each of the Terminal Mounting Strips.
- Check continuity each of the interconnecting RJ-45 cables between the Terminal Mounting Strips and the Dual Antenna Arbitrator.
- Check continuity of the interconnecting RJ-45 console cable, or Ethernet cable, between the Dual Antenna Arbitrator and the Satellite Modem.
- Query the TX Mute (TX enable = OFF, or TX disable = ON ) status in the modem.

# 15. Slide Rail Kit (optional) Installation

If you have purchased the optional slide rail kit, follow the instructions below to install the slide rails.

Refer to drawing 135681 in the drawing section of this manual.

## *15.1. Assembling the Outer Rails*

Refer to drawing 135681 Detail A to assemble the outer rails for the inside of the rack.

1. Attach the Mounting brackets to the rack rails using the hardware provided. Do not tighten the hardware at this time.
2. Adjust the mounting brackets to the correct length for the rack that they will be installed in (test fit in the rack is highly recommended).
3. Apply Loctite 242 to and tighten the mounting bracket hardware.

## *15.2. Mounting the Outer Rails In the Rack*

Refer to drawing 135681 Detail C to install the outer rails into your equipment rack. Refer to detail C1, C2 or C3 as is appropriate for the vertical rails in your equipment rack.

1. Attach the Mounting brackets to the vertical rack rails using the appropriate hardware (provided per detail C1, C2 or C3 as is appropriate for the type of vertical rails in your equipment rack).
2. Tighten the mounting bracket hardware.

## *15.3. Mounting the Inner Rails*

Refer to drawing 135681 Detail B to assemble the outer rails for the inside of the rack.

1. Attach the inner rails to the body of the Arbitrator using the hardware provided.
2. Apply Loctite 242 to and tighten the mounting hardware.

## *15.4. Mounting the Arbitrator Into Your Rack*

Refer to drawing 135681 Detail D to install the Arbitrator into your equipment rack.

1. Slide the inner rails mounted to the Arbitrator into the outer rails mounted in the equipment rack.
2. Route and connect the cables to the rear of the Arbitrator, assuring that you have sufficient cable length to allow the Arbitrator to be fully extended out on its slides without chaffing or tearing the cables.
3. Push the Arbitrator fully into the rack.
4. Install the 4 retaining screws through the front panel of the Arbitrator into the vertical rails and tighten.

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# 16. Specifications

The technical specifications for the Dual Antenna Arbitrator are:

## *16.1. General*

| | |
|---|---|
| Physical Dimensions: | Rackmount: 4.5 x 43.2 x 25.4 cm (1.75 x 17 x 10 inches) |
| Input Voltage: | 88-264 VAC, 47-63 Hz, 1 phase |
| Power Requirements: | 160 Watts maximum |
| Weight | 2.8 kg (6.2 lbs) |

## *16.2. Front Panel*

| | |
|---|---|
| Status Indicator Display: | 4 LED enunciators for Ant A, Ant B, Manual and Auto |
| Ant A Button | Select Ant A as Active Antenna (Manual Mode Only) |
| Ant B Button | Select Ant B as Active Antenna (Manual Mode Only) |
| Manual Button | Manual Mode |
| Auto Button | Automatic Mode |
| Reset Button | Resets the Arbitrator |
| Controls: | AC Power On/Off |

## *16.3. Rear Panel*

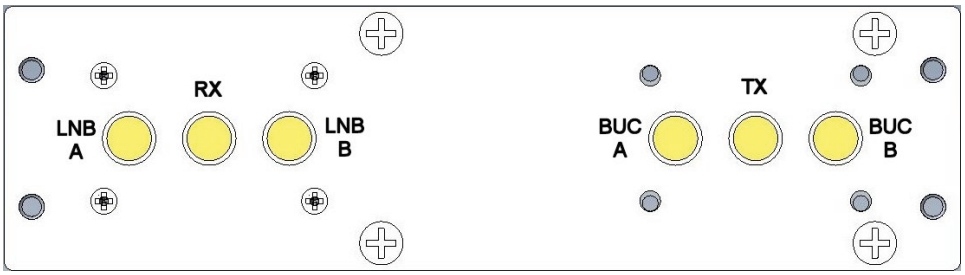
The connectors available on the rear panel are:

### 16.3.1. AC POWER

| | |
|---|---|
| Connection | IEC receptacle with line filter. |

### 16.3.2. Switch Plate - Standard Low Power

The standard switch plate, mounted in the rear panel, has the following connections:




#### *16.3.2.1. LNB A - RX IF Input from Antenna A*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.2.2. RX - RX IF Output to Modem*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.2.3. LNB B - RX IF Input from Antenna B*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.2.4. BUC A - TX IF Output to Antenna A BUC*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.2.5. TX - TX IF Input from Modem*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

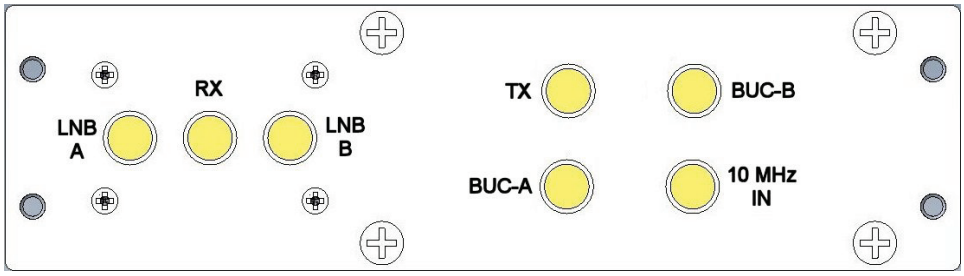
#### *16.3.2.6. BUC B - TX IF Output to Antenna B BUC*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

### 16.3.3. Switch Plate - 10 MHz Option

The 10MHz Option switch plate, mounted in the rear panel, has the following connections:



#### *16.3.3.1. LNB A – RX IF Input from Antenna A*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.3.2. RX – RX IF Output to Modem*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.3.3. LNB B – RX IF Input from Antenna B*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.3.4. BUC A – TX IF Output to Antenna A BUC*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.3.5. TX – TX IF Input from Modem*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.3.6. BUC B – TX IF Output to Antenna B BUC*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.3.7. 10MHZ INPUT (OPTIONAL) – 10MHz reference for the Standby Antenna*

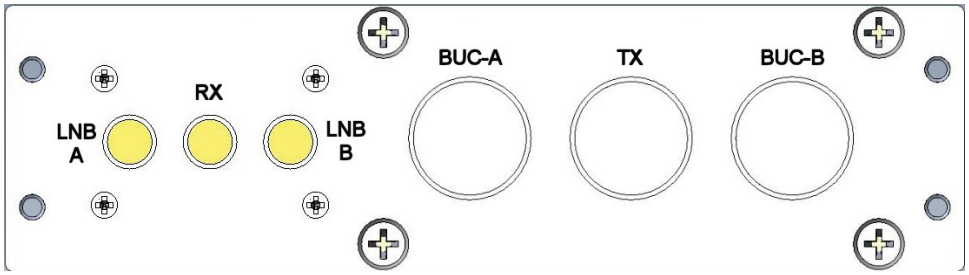
If the 10MHz option is installed in your arbitrator, this connector allow you to install a SMA-SMA loop-through coax cable from the 10MHz Output connector to this input connector. Internally this input will be coupled to the "Standby" antenna BUC to keep its frequency stable.

SMA-Type, 50 Ohm

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |

### 16.3.4. Switch Plate - High Power Option

The 10MHz Option switch plate, mounted in the rear panel, has the following connections:




#### *16.3.4.1. LNB A - RX IF Input from Antenna A*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.4.2. RX - RX IF Output to Modem*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.4.3. LNB B - RX IF Input from Antenna B*

SMA-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.1dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.4.4. BUC A - TX IF Output to Antenna A BUC*

N-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.4.5. TX - TX IF Input from Modem*

N-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

#### *16.3.4.6. BUC B – TX IF Output to Antenna B BUC*

N-Type, 50 Ohm, coax switch

| | |
|---|---|
| Frequency Pass | DC – 4.0 GHz: |
| Insertion Loss: | 0.2dB Typical |
| Isolation: | 80dB |
| Switching Time: | 15 ms max |

### 16.3.5. 10MHZ OUT (OPTIONAL - CONFIGURABLE) - 10MHz Output to Standby Antenna

The SMA connector is installed in all arbitrators. This output can be connected, if it's use is desired, to the 10MHz INPUT (on the 10MHz Switch Plate), if this option is installed, to provide a reference signal to keep the frequency of the BUC on the "standby" antenna stable. This output can be enabled/disabled.

SMA-Type, 50 Ohm

| | |
|---|---|
| Frequency Output | 10MHz +/- 25 ppm |

### 16.3.6. DAC A TMS

RJ-45 Serial connection from the Console port on the TMS which is connected to Antenna Control Unit "A". Signals are RS232 logic levels

| | |
|---|---|
| Pin 2: | Network Lock (from Modem) |
| Pin 4 & 5: | Ground |
| Pin 6: | GPS LAT/LON data (from Antenna Control Unit) |
| Pin 7: | Mute (from Antenna Control Unit) |

### 16.3.7. DAC B TMS

RJ-45 Serial connection from the Console port on the TMS which is connected to Antenna Control Unit "B". Signals are RS232 logic levels

| | |
|---|---|
| Pin 2: | Network Lock (from Modem) |
| Pin 4 & 5: | Ground |
| Pin 6: | GPS LAT/LON data (from Antenna Control Unit) |
| Pin 7: | Mute (from Antenna Control Unit) |

### 16.3.8. MODEM

RJ-45 Serial connection from the Arbitrator to the satellite modem.

Signals are RS232 logic levels

| | |
|---|---|
| Pin 1: | Control to OBM device |
| Pin 2: | Network Lock (from Modem) |
| Pin 3: | TX to OBM device |
| Pin 4 & 5: | Ground |
| Pin 6: | GPS LAT/LON data (from Arbitrator) / TX from OBM device |
| Pin 7: | Mute (to Modem) |
| Pin 8: | Control from OBM device |

### 16.3.9. OBM

RJ-45 Serial connection from the Arbitrator to the satellite modem.
Signals are RS232 logic levels

| | |
|---|---|
| Pin 1: | Control from OBM device |
| Pin 3: | TX from modem |
| Pin 4 & 5: | Ground |
| Pin 6: | GPS LAT/LON data (from Arbitrator) / TX from OBM device |
| Pin 7: | Mute (to Modem) |
| Pin 8: | Control to modem |

### 16.3.10. ETHERNET

| | |
|---|---|
| Interface Protocol | 10BaseT |
| Interface Connector | RJ-45 |
| Interface Ports | 1 TCP Forwarding Port (configurable) |
| | 1 UPD Upload (Port 3000) |
| | 1 Multi-User HTML (Port 80) |
| | 1 Telnet CLI (Port 23) |

### 16.3.11. CONSOLE

Serial Monitor & Control I/O port:

| | |
|---|---|
| Communications Parameters: | 9600 Baud, 8 bits, No parity, 1Stop Bit |
| Interface Protocol: | RS-422/RS232 |
| Interface Connector: | 9 pin D-Subminiature (DE9S) female |

## *16.4. Compliance*

| | |
|---|---|
| CE / R&TTE testing: | |
| EMC: | EN60945 |
| Safety: | EN60950 |
| RoHS | Compliant |

## *16.5. Environmental Conditions*

The following requirements apply to equipment installed in weather protected locations.

| | |
|---|---|
| Temperature | 0 to 40 degrees C |
| Humidity | Up to 80% @ 40 degrees C, Non-condensing |

# 17. Drawings

## *17.1. Dual Antenna Arbitrator Drawings*

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SINGLE LEVEL MFG BILL OF MATERIAL

| FIND | QTY | PART NO | REV | DESCRIPTION | REFERENCE DESIGNATOR |
|---|---|---|---|---|---|
| 1 | 1 EA | 133570-1 | A | ENCLOSURE ASS'Y, ARBITRATOR | |
| 2 | 4 EA | 119478-5 | D | CABLE ASS'Y, RJ-45 SERIAL, 60 IN. | |
| 3 | 1 EA | 119479-10 | B1 | CABLE ASS'Y, CAT5 JUMPER, 10 FT. | |
| 4 | 4 EA | 114972-1 | N | CABLE ASS'Y, SMA(M) - SMA(M), 60 IN | |
| 5 | 2 EA | 111079-6 | G1 | CABLE ASS'Y, SMA(M)-N(M), 6 FT. | |
| 6 | 4 EA | 125580-3 | A | IMPEDANCE MATCHING PAD, 50-75 OHM, SM | |
| 7 | 1 EA | 120643-25 | B | CABLE ASS'Y, RS232, 9-WIRE, STRAIGHT, | |
| 10 | 1 EA | 135192-1 | A | CABLE ASSEMBLY, RJ45 - BARE WIRE, 72 | |
| 11 | 1 EA | 135512 | X1 | CUSTOMER DOC KIT, ARBITRATOR | |

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KIT, ARBITRATOR TX/RX, STANDARD

| PROD FAMILY | EFF. DATE | SHT | DRAWING NUMBER | REV |
|---|---|---|---|---|
| COMMON | 9/13/2011 | 1 OF 1 | 133804-1 | A |

SINGLE LEVEL MFG BILL OF MATERIAL

| FIND | QTY | PART NO | REV | DESCRIPTION | REFERENCE DESIGNATOR |
|---|---|---|---|---|---|
| 1 | 1 EA | 133570-2 | A | ENCLOSURE ASS'Y, ARBITRATOR, W/10 MHZ | |
| 2 | 4 EA | 119478-5 | D | CABLE ASS'Y, RJ-45 SERIAL, 60 IN. | |
| 3 | 1 EA | 119479-10 | B1 | CABLE ASS'Y, CAT5 JUMPER, 10 FT. | |
| 4 | 4 EA | 114972-1 | N | CABLE ASS'Y, SMA(M) - SMA(M), 60 IN | |
| 5 | 2 EA | 111079-6 | G1 | CABLE ASS'Y, SMA(M)-N(M), 6 FT. | |
| 6 | 4 EA | 125580-3 | A | IMPEDANCE MATCHING PAD, 50-75 OHM, SM | |
| 7 | 1 EA | 120643-25 | B | CABLE ASS'Y, RS232, 9-WIRE, STRAIGHT, | |
| 8 | 1 EA | 114972-8 | N | CABLE ASS'Y, SMA(M) - SMA(M), 14 IN | |
| 9 | 1 EA | 135192-1 | A | CABLE ASSEMBLY, RJ45 - BARE WIRE, 72 | |
| 10 | 1 EA | 135512 | X1 | CUSTOMER DOC KIT, ARBITRATOR | |

Sea Tel
COBHAM

KIT, ARBITRATOR TX/RX, 10MHZ REFERENCE

| PROD FAMILY | EFF. DATE | SHT | DRAWING NUMBER | REV |
|---|---|---|---|---|
| COMMON | 9/13/2011 | 1 OF 1 | 133804-2 | A |

SINGLE LEVEL MFG BILL OF MATERIAL

| FIND | QTY | PART NO | REV | DESCRIPTION | REFERENCE DESIGNATOR |
|---|---|---|---|---|---|
| 1 | 1 EA | 133570-3 | A | ENCLOSURE ASS'Y, ARBITRATOR, HIGH POW | |
| 2 | 4 EA | 119478-5 | D | CABLE ASS'Y, RJ-45 SERIAL, 60 IN. | |
| 3 | 1 EA | 119479-10 | B1 | CABLE ASS'Y, CAT5 JUMPER, 10 FT. | |
| 4 | 1 EA | 120643-25 | B | CABLE ASS'Y, RS232, 9-WIRE, STRAIGHT, | |
| 6 | 3 EA | 111079-6 | G1 | CABLE ASS'Y, SMA(M)-N(M), 6 FT. | |
| 7 | 1 EA | 127833-10BLU | A4 | CABLE ASS'Y, RG-179 COAX, F(M) TO SMA | |
| 8 | 1 EA | 116700-6 | F | CABLE ASS'Y, RG223, N(M)-F(M), 6 FT. | |
| 9 | 2 EA | 116255-6 | B | CABLE ASS'Y, RG-214, N(M) TO N(M), 6F | |
| 10 | 1 EA | 135192-1 | A | CABLE ASSEMBLY, RJ45 - BARE WIRE, 72 | |
| 11 | 1 EA | 135512 | X1 | CUSTOMER DOC KIT, ARBITRATOR | |

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KIT, ARBITRATOR TX/RX, HIGH POWER

| PROD FAMILY | EFF. DATE | SHT | DRAWING NUMBER | REV |
|---|---|---|---|---|
| COMMON | 9/13/2011 | 1 OF 1 | 133804-3 | A |

## SINGLE LEVEL ENGR BILL OF MATERIAL

| FIND | QTY | PART NO | REV | DESCRIPTION | REFERENCE DESIGNATOR |
|---|---|---|---|---|---|
| 1 | 2 EA | 127545-7 | A | EXTENSION SLIDE, CLB-203-22, 22 IN | |
| 2 | 4 EA | 135221-1 | X1 | MOUNTING BRACKET, RACK SLIDE | |
| 50 | 2 EA | 114588-825 | | SCREW, PAN HD, PHIL, 10-32 x 1/4, S.S. | |
| 51 | 2 EA | 114588-818 | | SCREW, PAN HD, PHIL, 10-32 x 7/16, S.S. | |
| 52 | 10 EA | 114588-830 | | SCREW, PAN HD, PHIL, 10-32 x 5/8, S.S. | |
| 53 | 6 EA | 135692-127 | X1 | CAGE NUT, SQUARE STYLE, 10-32, ZINC P | |
| 54 | 6 EA | 135693-343 | X1 | CAGE NUT, G-STYLE, 10-32, ZINC PLATED | |
| 58 | 14 EA | 114580-230 | | WASHER, FLAT, M4, S.S. | |
| 59 | 2 EA | 135691-1 | X1 | BAR NUT, RACK SLIDE MOUNTING, 10-32, | |
| 60 | 4 EA | 119745-222 | | SCREW, PAN HD, PHIL, M4 X 12, S.S. | |
| 70 | 2 EA | 119745-420 | | SCREW, PAN HD, PHIL, M6 x 10, S.S. | |
| 71 | 10 EA | 119745-426 | | SCREW, PAN HD, PHIL, M6 x 16, S.S. | |
| 78 | 14 EA | 114580-250 | | WASHER, FLAT, M6, S.S. | |
| 79 | 1 EA | 117319-4 | E | LOCTITE PRODUCTS, 242 THREADLOCKE | |

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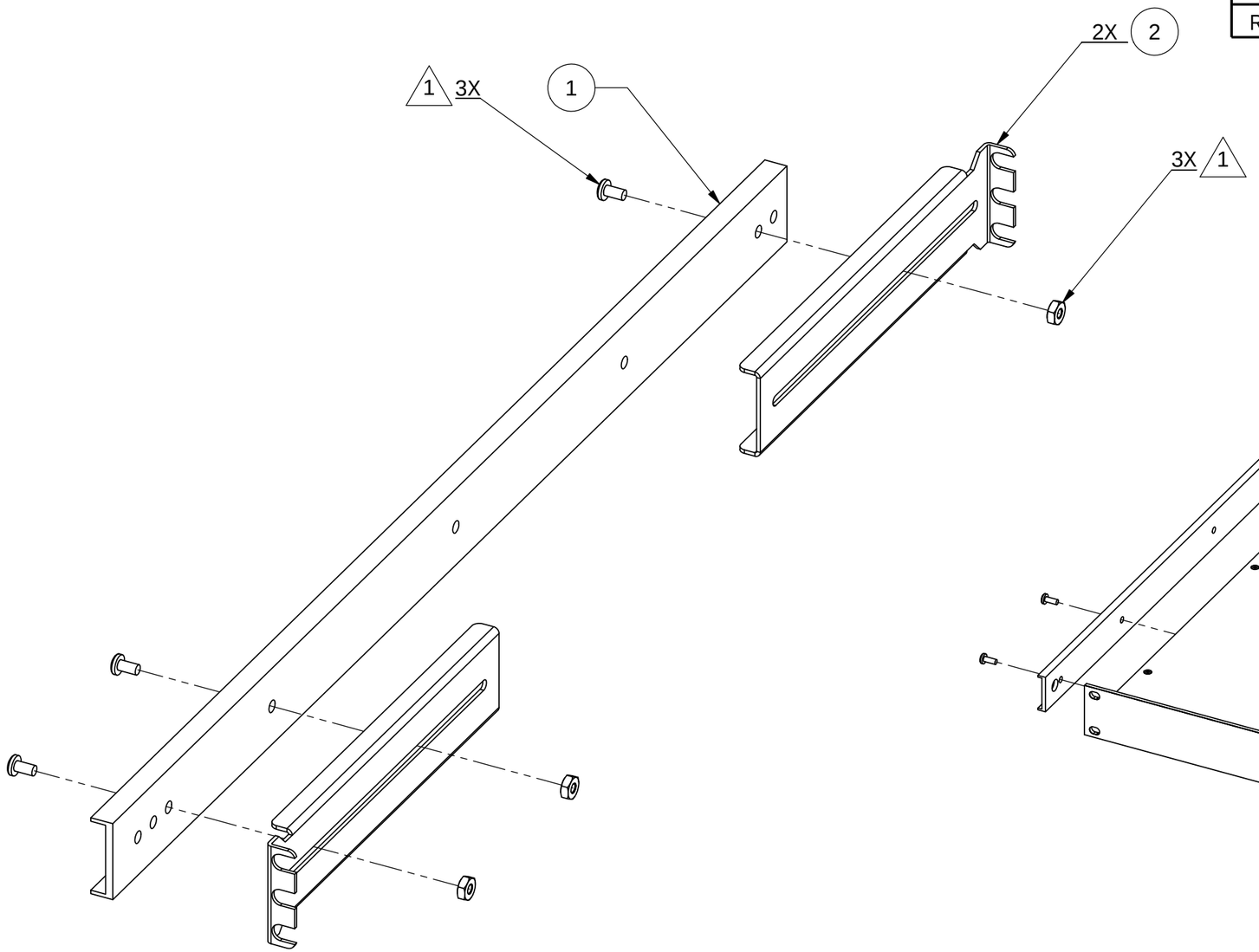
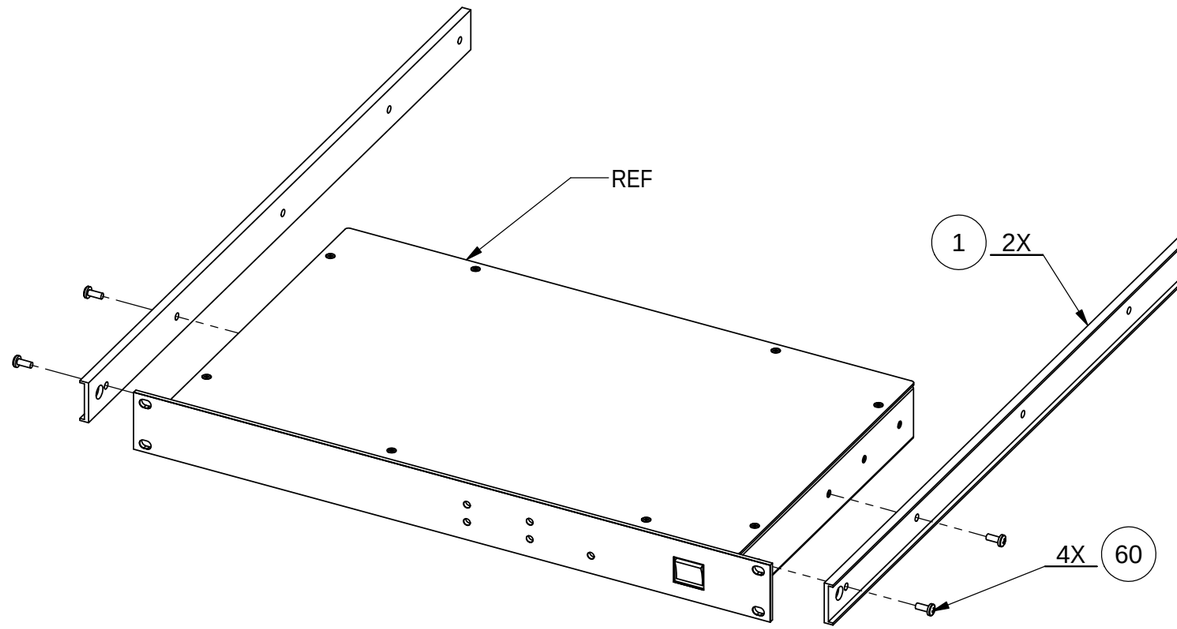
**RACK MOUNT SLIDE KIT, 22 IN**

| PROD FAMILY | EFF. DATE | SHT | DRAWING NUMBER | REV |
|---|---|---|---|---|
| COMMON | 16-Nov-11 | 1 OF 1 | **135681-7** | **A** |

| REVISION HISTORY | | | | |
|---|---|---|---|---|
| REV | ECO# | DATE | DESCRIPTION | BY |




DETAIL A




DETAIL B

| DASH # | SLIDE RAIL P/N | SLIDE RAIL LENGTH |
|---|---|---|
| -7 | 127545-7 | 22 IN |

NOTES: UNLESS OTHERWISE SPECIFIED

1 HARDWARE INCLUDED IN 124757

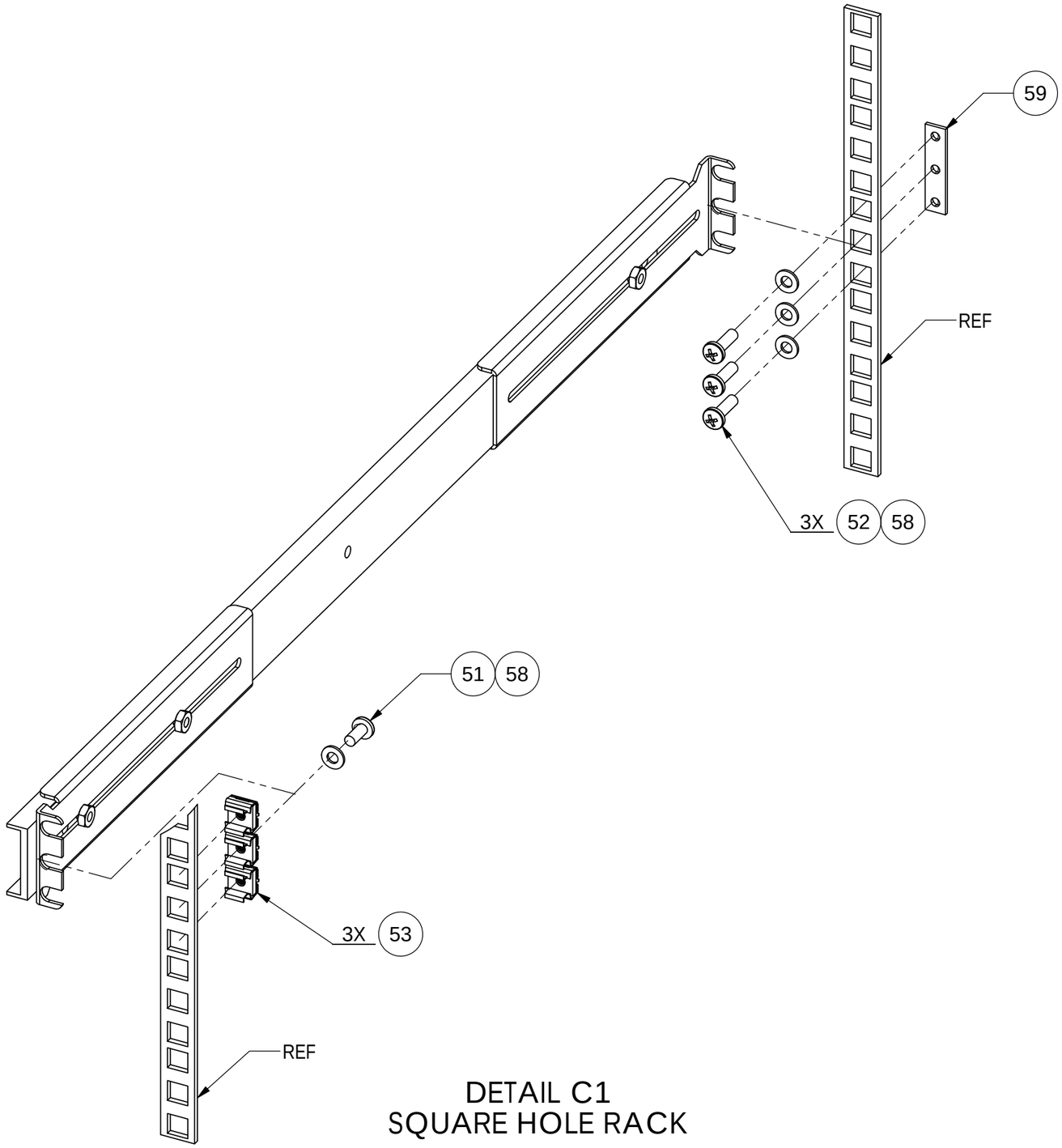
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°

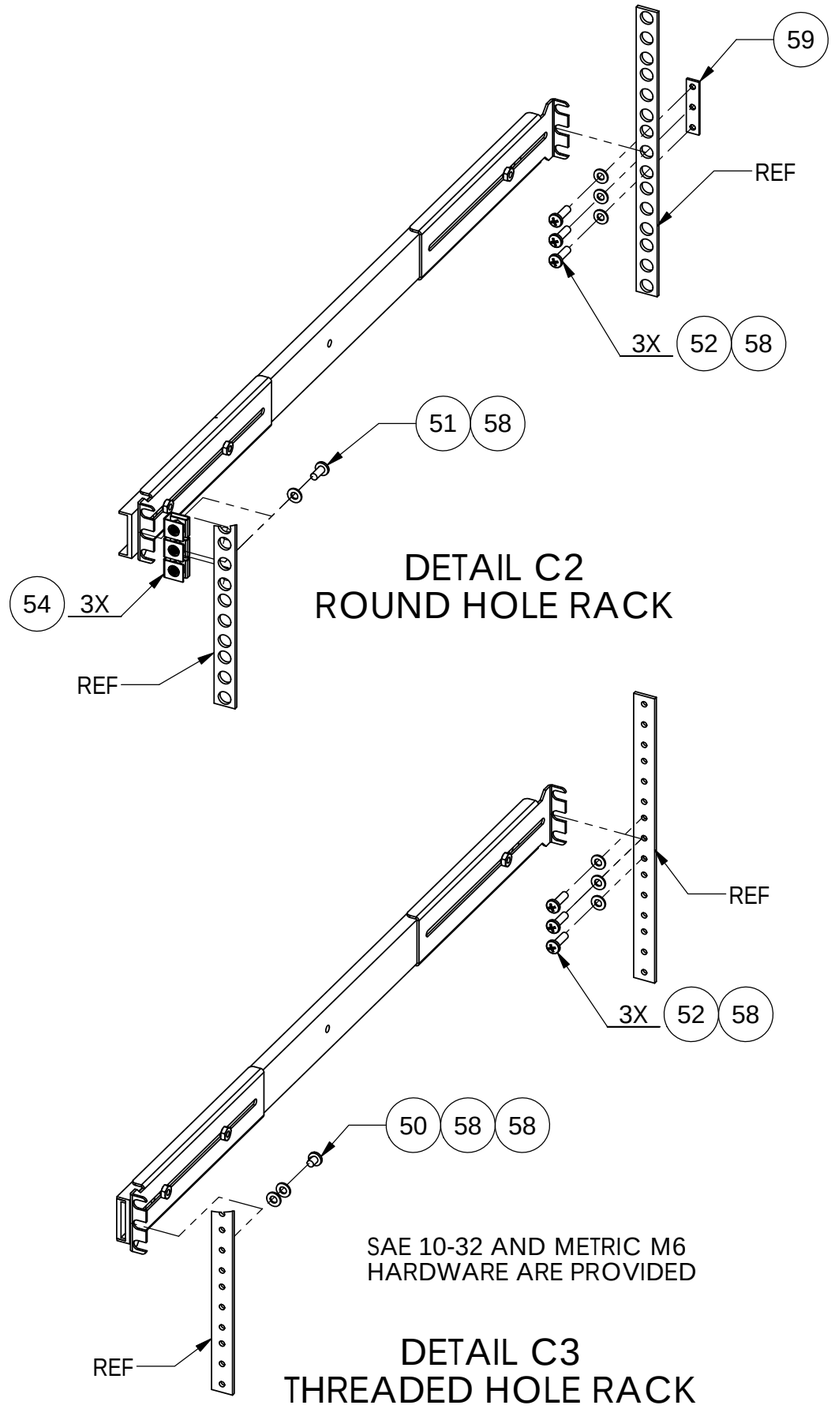
INTERPRET TOLERANCING PER ASME Y14.5 - 2009



| | | | |
|---|---|---|---|
| DESIGNER/ENGINEER: RANDERSON | DRAWN BY: RANDERSON | Sea Tel COBHAM<br>Tel. 925-798-7979 Fax. 925-798-7986 | |
| WEIGHT: 7.7 LBS | DRAWN DATE: 09/15/2011 | | |
| MATERIAL: | APPROVED BY: | TITLE: KIT, SLIDE, RACK MOUNT | |
| FINISH: | APPROVED DATE: | | |
| SURFACE ROUGHNESS: | SIZE: B / SCALE: 1:2 | DRAWING NUMBER: 135681 | REV: A |
| 3rd ANGLE PROJECTION | FIRST USED: 133570 | SHEET NUMBER: 1 OF 3 | |




DETAIL C1
SQUARE HOLE RACK



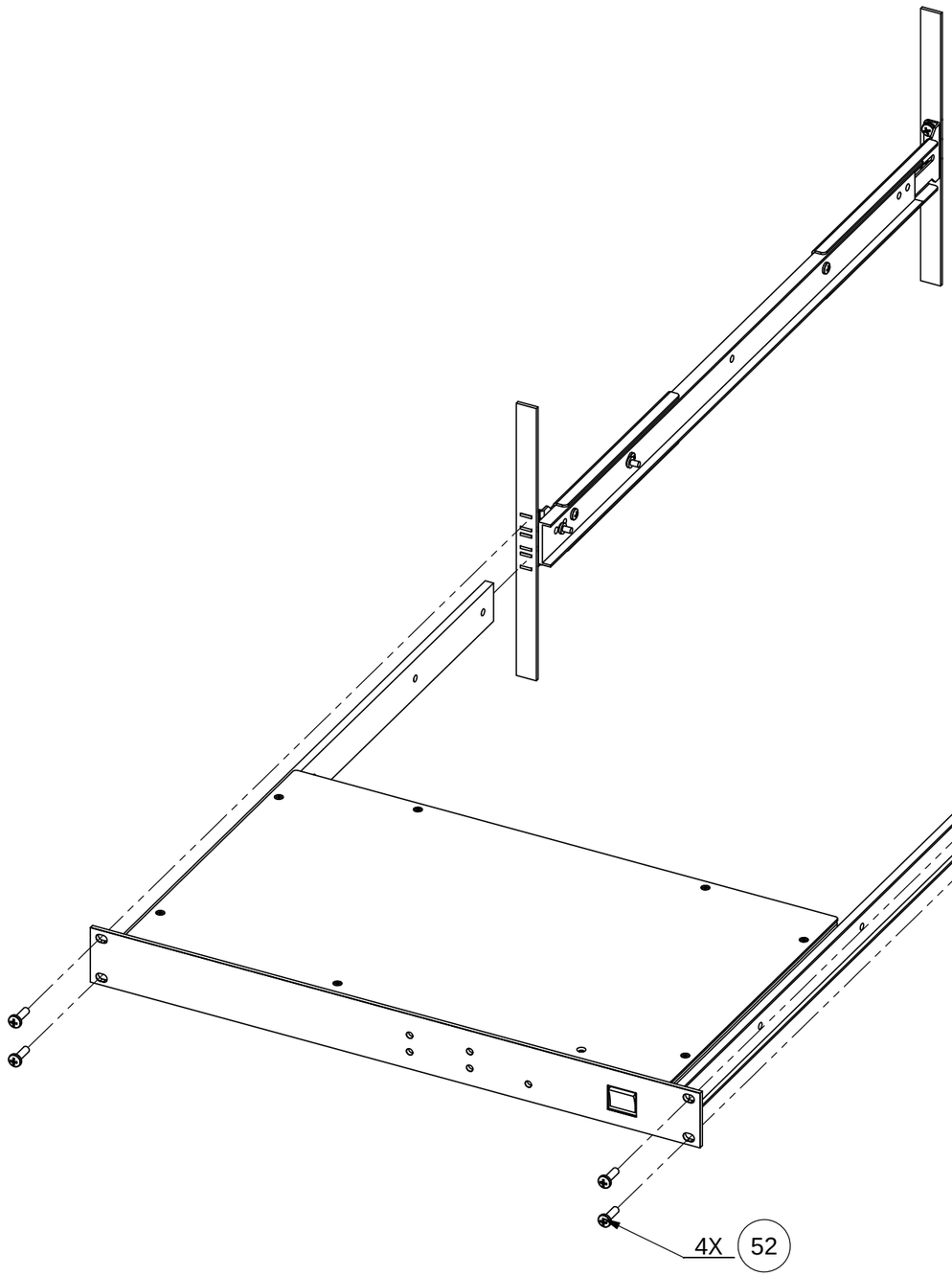

DETAIL C2
ROUND HOLE RACK



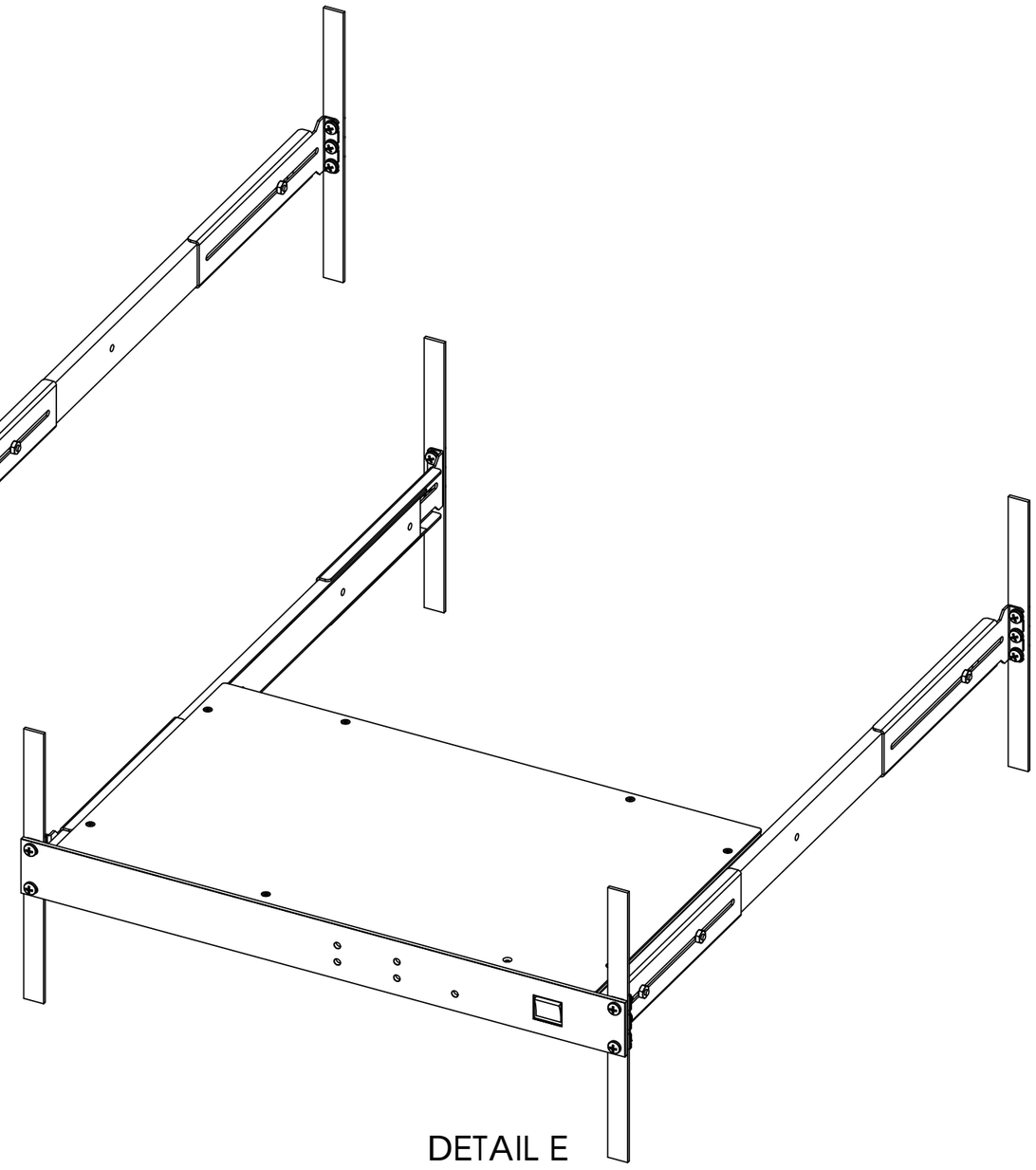

SAE 10-32 AND METRIC M6
HARDWARE ARE PROVIDED

DETAIL C3
THREADED HOLE RACK

| SIZE | SCALE: | DRAWING NUMBER | REV |
|---|---|---|---|
| B | 1:4 | 135681 | A |
| | | SHEET NUMBER 2 OF 3 | |



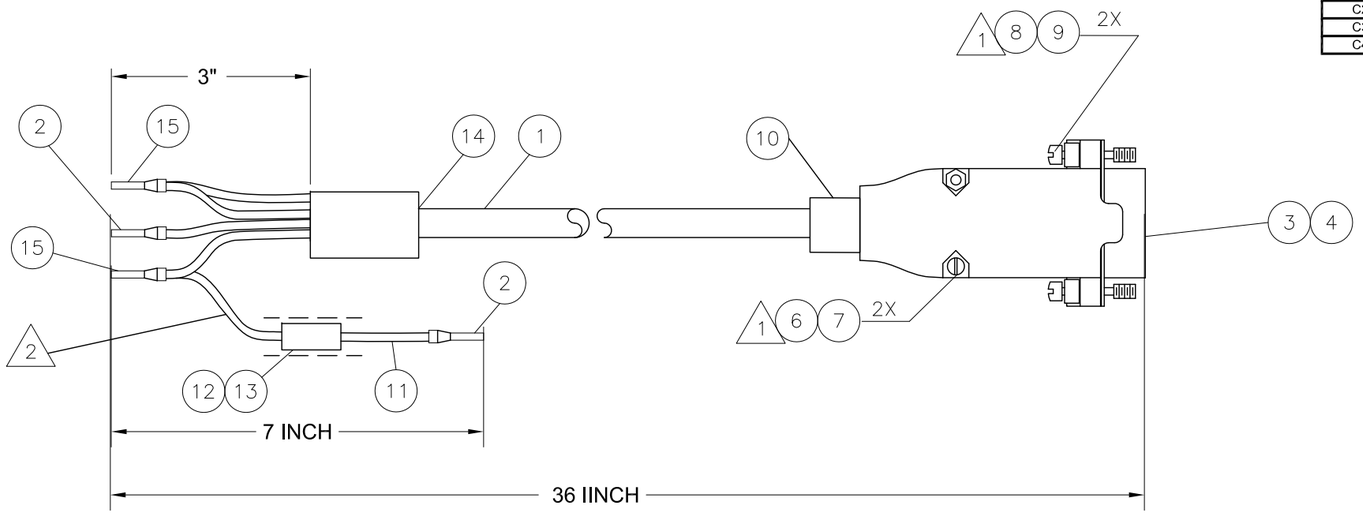

DETAIL D

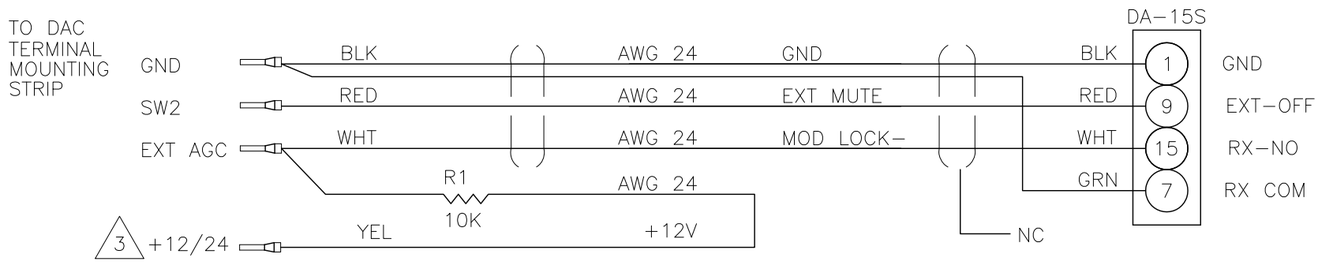


DETAIL E

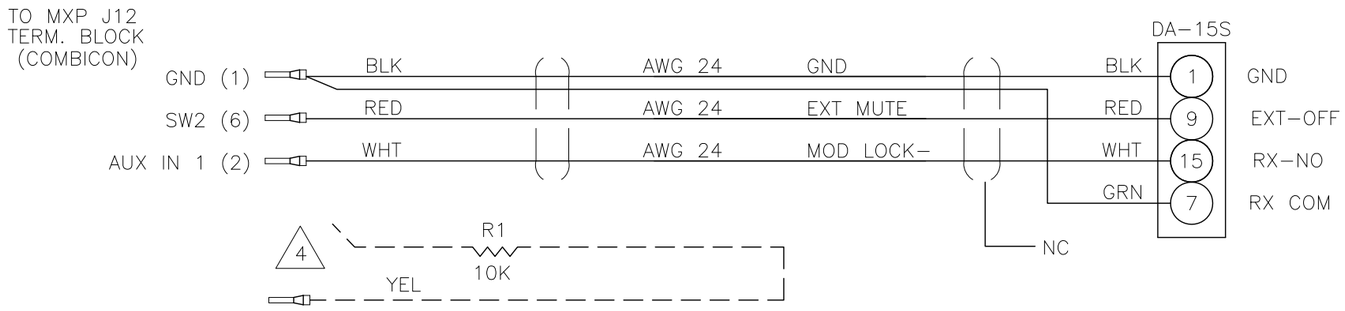
| SIZE | SCALE: | DRAWING NUMBER | REV |
|---|---|---|---|
| B | 1:4 | 135681 | A |
| | | SHEET NUMBER 3 OF 3 | |

| REVISION HISTORY | | | | |
|---|---|---|---|---|
| REV | ECO# | DATE | DESCRIPTION | BY |
| C | 9365 | 2-24-12 | CHG. QTY. OF CRIMP PINS ON THE BOM TO REFLECT ACTUAL USAGE. CHG. THE BACKSHELL GROMMET & THE HEATSHRINK TO A SMALLER DIAMETER. | MSF |
| C1 | N/A | 3/7/12 | ADD MXP SCHEMATIC CONNECTION INFORMATION AND NOTE 4. | RML |
| C2 | 10089 | 12/7/12 | ADD NOTE 6 | SL |
| C3 | 10440 | 04/29/13 | UPDATE NOTES AND ADD NOTE 7 | SL |
| C4 | 10714 | 6-14-13 | CORRECT GRAMMATICAL ERRORS IN NOTES | K.D.H. |




DAC – SCHEMATIC REFERENCE




MXP – SCHEMATIC REFERENCE 7

NOTES: UNLESS OTHERWISE SPECIFIED

1. DISCARD BACKSHELL HARDWARE AND REPLACE WITH STAINLESS STEEL HARDWARE INDICATED.
2. CRIMP ONE LEAD OF R1 IN WIRE TERMINATOR ALONG WITH WHT WIRE SOLDER YEL WIRE TO OTHER LEAD OF R1. COVER RESISTOR AND LEADS WITH HS TUBE ITEM 13.
3. WHEN INSTALLING THE HARNESS, FOR DUAL PCB TMS ASS'Y, CONNECT YEL WIRE TO 12/24 TERMINAL. ON 9 PIN TMS PCB. FOR SINGLE PCB TMS ASS'Y, INSTALL JP4 TO ENABLE PULL–UP ON 'EXT AGC'. REMOVE YEL WIRE AND R1. NOT APPLICABLE TO MFG OF HARNESS ASS'Y.
4. WHEN INSTALLING THE HARNESS, FOR MXP CONNECTION, REMOVE AND DISCARD YEL WIRE AND R1. NOT APPLICABLE TO MFG OF HARNESS ASS'Y.
5. IDENTIFY PER SEA TEL. SPEC. 122930 APP. D.
6. MFR PER SEA TEL SPEC. 122298.
7. SCHEMATIC IS FOR REFERENCE ONLY. APPLIES TO LATER ASSEMBLY WORK. MFR TO USE DAC SCHEMATIC FOR MFG OF THE HARNESS ASSEMBLY.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
<48" = ± 1"
<15' = ± 2"
<100' = ± 4"
>100' = ± 6"
INTERPRET TOLERANCING PER ASME Y14.5M - 1994



| | |
|---|---|
| DRAWN BY: | PGB |
| DRAWN DATE: | 7-25-07 |
| APPROVED BY: | |
| APPROVED DATE: | |

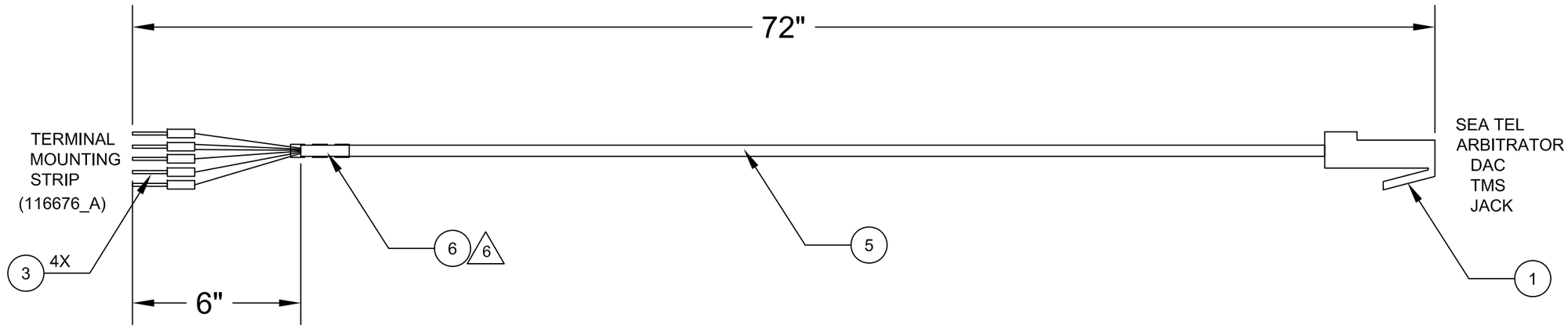
Sea Tel COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

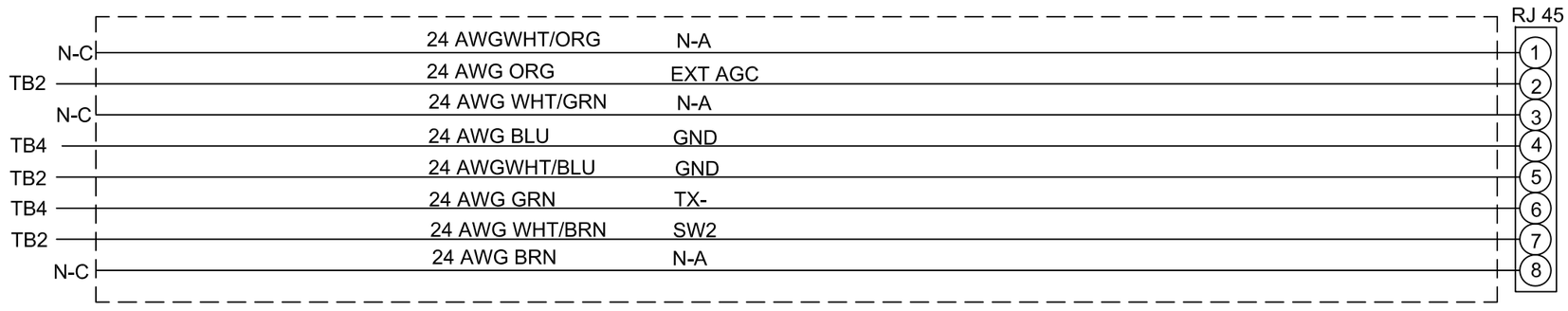
TITLE: HARNESS ASS'Y, COMTECH MODEM INTERFACE

| SIZE | SCALE: | DRAWING NUMBER | REV |
|---|---|---|---|
| B | NONE | 126877 | C4 |

FIRST USED: SHEET NUMBER 1 OF 1

| REVISION HISTORY | | | | |
|---|---|---|---|---|
| REV | ECO# | DATE | DESCRIPTION | BY |
| A | 8618 | 8-29-11 | RELEASE TO PRODUCTION WAS REV. X2. | MSF |
| A | " | " | ADD LABLE (116676_A) TO TERMINAL MOUTING STRIP. REMOVE NOTE 2 AND REORDER NOTES. | SL |
| B | 9049 | 12/22/11 | DELEATED ITEM 4 AND REPLACE ITEM 5 WITH119679 AND REPLACE ITEM 1 WITH 118169-5. | SL |
| B | " | " | INCREASE ITEM 3 TO QTY 5 AND UPDATE SHCEMATIC AND NOTES. | SL |




NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CABLE ASSEMBLY PARTS AND REWORK SHALL BE ROHS COMPLIANT.
2. ALL CABLE ASSEMBLY AND REWORK SHALL COMPLY WITH IPC/WHMA-A-620 CLASS 2.
3. TEST PER SEA TEL SPEC 131852.
4. IDENTIFY CABLE/HARNESS ENDS PER SEA TEL SPEC 122930 APP. D AS DETAILED IN SCHEMATIC..

   IDENTIFY PER SEA TEL SPEC 122930, APP. D.

△6 TRIM THE NON-CCONNECTED WIRES AT THE CABLE BREAKOUT AND APPLY HEAT SHRINK (ITEM 6) OVER THE WIRE BREAKOUT PRIOR TO INSTALLING THE RJ 45 CONNECTOR (ITEM 1).

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
<48" = ± 1"
<15' = ± 2"
<100' = ± 4"
>100' = ± 6"
INTERPRET TOLERANCING PER ASME Y14.5M - 1994



DRAWN BY: Simon L
DRAWN DATE: 07-13-11
APPROVED BY:
APPROVED DATE:

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE:
CABLE ASSEMBLY
RJ45-BARE WIRE

| SIZE | SCALE: | DRAWING NUMBER | REV |
|---|---|---|---|
| B | NONE | 135192 | B |

FIRST USED: SEA TEL ARBITRATOR SHEET NUMBER 1 OF 1

DOCUMENT No. 123924-2 REV. A