EdgeTech

STARMUX III

USER HARDWARE MANUAL

0016903_REV_B

July 2016

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ATTENTION – READ THIS FIRST!

All personnel involved with the installation, operation, or maintenance of the equipment described in this manual should read and understand the warnings and cautions provided below.

CAUTION! This equipment contains devices that are extremely sensitive to static electricity. Therefore, extreme care should be taken when handling them. Normal handling precautions involve the use of anti-static protection materials and grounding straps for personnel.

WARNING! High Voltage may be present in all parts of the system. Therefore, use caution when the electronics are removed from their containers for servicing.

CAUTION! Operation with improper line voltage may cause serious damage to the equipment. Always ensure that the proper line voltage is used.

HARDWARE VARIATIONS AND COMPATIBILITY

The STARMUX III contains both standard and proprietary hardware. At times, EdgeTech may change the standard components due to their availability or performance improvements. Although the component manufacturers—along with their models and styles—may change from unit to unit, replacement parts will generally be interchangeable.

EdgeTech will make every effort to see that replacement components are interchangeable and use the same software drivers (if applicable). At times, however, direct replacements may not exist. When this happens, EdgeTech will provide the necessary drivers with the replacement part, if applicable.

EdgeTech may also change certain hardware per customer requirements. Therefore, portions of this manual, such as parts lists and test features, are subject to change. These sections should be used for reference only. When changes are made that affect system operation, they will be explicitly noted. Also, some options and features may not be active in the customer's unit at time of delivery. Upgrades will be made available when these features are implemented.

Contact EDGETECH CUSTOMER SERVICE with any questions relating to compatibility.

ABOUT THIS DOCUMENT

We, the employees at EdgeTech, would like to thank you for purchasing STARMUX III. At EdgeTech, it is our policy to provide high-quality, cost-effective products and support services that meet or exceed your requirements. We also strive to deliver them on-time, and to continuously look for ways to improve them. We take pride in the products we manufacture, and want you to be entirely satisfied with your equipment.

Purpose of this Manual

The purpose of this manual is to provide the user with information on the setup and use of EdgeTech's STARMUX III. Although this manual encompasses the latest operational features of the STARMUX III, some features may be periodically upgraded. Therefore, the information in this manual is subject to change and should be used for reference only.

Liability

EdgeTech has made every effort to document the STARMUX III in this manual accurately and completely. However, EdgeTech assumes no liability for errors or for any damages that result from the use of this manual or the equipment it documents. EdgeTech reserves the right to upgrade features of this equipment, and to make changes to this manual, without notice at any time.

Warnings, Cautions, and Notes

Where applicable, warnings, cautions, and notes are provided in this manual as follows:

> **WARNING!** Identifies a potential hazard that could cause injury or death.
>
> **CAUTION!** Identifies a potential hazard that could damage equipment or data.
>
> **NOTE:** Recommendations or general information that is particular to the material being presented.

Revision History

Revision	Notes	Date	Approval
A	Release to Production	04/13/2015	TS
B	Updated images and technical description	07/11/2016	TS

WARRANTY STATEMENT

All equipment manufactured by EdgeTech is warranted against defective components and workmanship for a period of one year after shipment. Warranty repair will be done by EdgeTech free of charge.

Shipping costs are to be borne by the customer. Malfunction due to improper use is not covered in the warranty, and EdgeTech disclaims any liability for consequential damage resulting from defects in the performance of the equipment. No product is warranted as being fit for a particular purpose, and there is no warranty of merchantability. This warranty applies only if:

    i.   The items are used solely under the operating conditions and in the manner recommended in Seller's instruction manual, specifications, or other literature.

    ii.   The items have not been misused or abused in any manner, nor have repairs been attempted thereon without the approval of EdgeTech Customer Service.

    iii.   Written notice of the failure within the warranty period is forwarded to Seller and the directions received for properly identifying items returned under warranty are followed.

    iv.   The return notice authorizes Seller to examine and disassemble returned products to the extent Seller deems necessary to ascertain the cause for failure.

The warranties expressed herein are exclusive. There are no other warranties, either expressed or implied, beyond those set forth herein, and Seller does not assume any other obligation or liability in connection with the sale or use of said products. Any product or service repaired under this warranty shall be warranted for the remaining portion of the original warranty period only.

Equipment not manufactured by EdgeTech is supported only to the extent of the original manufacturer's warranties.

SOFTWARE SERVICE OVERVIEW

EdgeTech provides software services free of charge. This software agreement does not address customer-specified modifications or enhancements. These services may be ordered separately. Furthermore, EdgeTech software upgrades are meant for the sole use of EdgeTech customers. Any reproduction of EdgeTech-supplied software or file sharing is strictly prohibited.

Software Updates and Enhancements

EdgeTech customers can download new software releases with all modifications and enhancements from the EdgeTech ftp site. Major software issues, should they occur, will be reported directly to the customer. New software releases consist of the following:

- Software enhancements that are not on the price list
- Software fixes and changes
- Product integration
- Documentation updates to on-line help
- Tests for compatibility with other modules

Software patches consist of software that has undergone the following:

- Minor software enhancements
- Software fixes and changes
- Software Telephone, Facsimile, and E-mail Support

EdgeTech customers are entitled to contact EDGETECH CUSTOMER SERVICE by telephone, facsimile, or e-mail to report a difficulty, to discuss a problem or to receive advice on the best way to perform a task. When contacted, EdgeTech Customer Service will do the following:

- Respond within 24 hours
- Immediately attend to serious problems affecting operations
- Attempt to find an immediate work-around

RETURNED MATERIAL AUTHORIZATION

Prior to returning any equipment to EdgeTech, a Returned Material Authorization (RMA) number must be obtained. The RMA will help us identify your equipment when it arrives at our receiving dock and track the equipment while it is at our facility. The material should be shipped to the address provided in the EDGETECH CUSTOMER SERVICE section. Please refer to the RMA number on all documents and correspondences as well.

All returned materials must be shipped prepaid. Freight collect shipments will not be accepted. EdgeTech will pay freight charges on materials going back to the customer after they have been evaluated and/or repaired.

> **CAUTION!** If your product is a portable topside, never attempt to it in its Storm Case™ alone. Although rugged, these cases are not intended to be used as shipping containers, and the delicate internal components could be damaged if used in this manner.

The following steps apply only to material being returned from outside the Continental United States. Follow them carefully to prevent delays and additional costs.

1. All shipments must be accompanied by three copies of your proforma invoice, showing the value of the material and the reason for its return. If the reason is for repair, it must be clearly stated in order to move through customs quickly and without duties being charged. Whenever possible, please send copies of original export shipping documents with the consignment.

2. If the value of the equipment is over $1000, the following Shipper's oath must be sent with the invoice. This oath can be typed on the invoice, or on a separate letterhead:

> "I, _____, declare that the articles herein specified are the growth, produce, or manufacture of the United States; that they were exported from the United States from the port of _____, on or about _____; that they are returned without having been advanced in value or improved in condition by any process of manufacture or any other means; and that no drawback, or allowance has been paid or admitted hereof."
>
> Signed _____

3. If there is more than one item per consignment, a packing list must accompany the shipment. It is acceptable to combine the proforma invoice and packing list as long as the contents of each carton are clearly numbered and identified on the invoice.

4. Small items can be shipped prepaid directly to EdgeTech by FedEx, DHL, UPS, Airborne, etc.

5. If the equipment is the property of EdgeTech (formerly EG&G Marine Instruments Division), please insure for full value.

6. Fax one invoice, packing list, and a copy of the airway bill to EdgeTech upon shipment.

CUSTOMER SERVICE

Customer service personnel at EdgeTech are always eager to hear from users of our products. Your feedback is welcome, and is a valuable source of information which we use to continually improve these products. Therefore we encourage you to contact EdgeTech Customer Service to offer any suggestions or to request technical support:

> **NOTE:** Please have your system Serial Number available when contacting Customer Service.

E-mail: service@edgetech.com

Mail: 4 Little Brook Road
West Wareham, MA 02576

Telephone: (508) 291-0057

Facsimile: (508) 291-2491

24-Hour Emergency
Technical Support Line: (508) 942-8043

For more information please go to www.EdgeTech.com.

COMPANY BACKGROUND

EdgeTech (formerly EG&G Marine Instruments) traces its history in underwater data acquisition and processing back to 1966. EdgeTech has designed, developed, and manufactured products, instruments, and systems—for the acquisition of underwater data, including marine, estuarine, and coastal applications—for over 45 years.

The company has responded to the needs of the scientific, Naval, and offshore communities by providing equipment—such as sub-bottom profilers, side scan sonar, acoustic releases, USBL positioning systems, and bathymetric systems—that have become standards in the industry.

EdgeTech has also consistently anticipated and responded to future needs through an active research and development program. Current efforts are focused on the application of cutting-edge CHIRP and acoustic technology.

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1.0: OVERVIEW

The STARMUX III Digital Link provides power for the towfish, while acting as an interface between an external topside processor and an EdgeTech tow vehicle such as a 4200, 2000-DSS, or 2000-TVD towfish.

1.1   Applications

The STARMUX III unit can be used in conjunction with the systems above for the following applications:

- Fisheries research
- Mine countermeasures
- Hydrographic surveys
- Cable and pipeline surveys
- Channel conditioning/clearance surveys
- Geo-hazard surveys
- Geological/geophysical surveys
- Route surveys
- Archaeological surveys
- Search and recovery

2.0: SPECIFICATIONS

The specifications for the STARMUX III are shown in TABLE 2-1:

SPECIFICATION	VALUE
Size:	8.3 cm (3.25 in) high 48.5 cm (19.0 in) wide 43.2 cm (17.0 in) deep
Weight:	6.4 kg (14 lb)
Case Type:	EIA RS-310C 19-inch rack mount
Case Construction:	Aluminum 19-inch rack mount
Case Finish:	Anodized
Mounting:	Standard 19-inch rack with provisions for mounting rack slides (not provided)
Input Power:	90-260 VAC, 50/60 Hz, 1200 watts max, auto sensing
Power to ROTC and Side Scan Sonar:	375 VDC
External Trigger INPUT:	5 VDC TTL positive or negative leading edge triggered, selectable in DISCOVER
I/O Ports:	(1) Ethernet (1) Trigger

Table 2-1: STARMUX III Specifications

3.0: SETUP AND ACTIVATION

The setup of a particular system depends upon the configuration. However, the following general guidelines may be used for most systems. For instructions specific to the user's system, consult with the provided hardware manual that came with the tow vehicle.

3.1   Unpacking and Inspecting

Carefully unpack the STARMUX III and check the packing list to ensure that all items are present. If any items are missing, report it to EDGETECH CUSTOMER SERVICE. Likewise, if any items have been damaged during shipping, do not install them. Instead, contact EdgeTech for further instructions.

Save the original packaging that the system came with, as these containers can and should be used for when the system is not in use for extended periods of time.

3.2   Installing the Digital Link

Install the STARMUX III Digital Link in a standard 19" rack. This should be in an area free from sea spray, precipitation, and potentially-damaging UV rays (sunlight). Furthermore, the unit should be located in close proximity to the topside and in an area where the operator can see the deck crew deploying the towfish for easy communication.

3.2.1 Controls, Indicators, and Connections

FIGURE 3-1 shows the front and rear panels of the STARMUX III and labels its controls, indicators, and connections. Descriptions for each of these are below:

LINE: Rocker switch. Switches AC power to the POWER switch on the front panel of the STARMUX Digital Link. This switch can be left in the on position at all times.

POWER: Rocker switch. Turns the STARMUX Digital Link on or off.

PWR: Green indicator. Illuminated when the STARMUX Digital Link is on.

LAN: Green indicator. Flashes continuously when an Ethernet connection is established.

LINK: Green indicator. Flashes while the STARMUX Digital Link is establishing a reliable communications link with the side scan sonar. Illuminates continuously when a reliable communications link with the sonar is established.

FISH POWER: Red indicator. Illuminated when the STARMUX Digital Link is on and the side scan sonar is

SEA CABLE: SubConn MCBH4F female connector to sea cable going out to tow vehicle.

DATA CONN.:   RJ-45 Standard Ethernet connection for connecting to external topside processor.

LINE VAC: Connection for AC power cord.

SYNC CONN: Provides input connection for a TTL external trigger that is sent to the towfish.

> **NOTE:** The STARMUX III Digital Link will automatically switch off power in the event of an extreme overcurrent. To reactivate the power, turn the POWER switch off and then on again. To prevent this from happening, only use a designated, uninterrupted power source.

3.2.2 Connecting the STARMUX III

Place the unit in a 19" rack as described in sub-section **3.2**, then connect and plug in the STARMUX III power cable. Then connect the unit to the topside processor and any other data sources such as a navigation system.

With the topside processor and the STARMUX III still powered off, connect the tow cable to the tow vehicle and then to the SEA CABLE connector located in the rear of the STARMUX III unit.

3.3   Activating the Unit

With everything connected, turn on the STARMUX III (ensure both rocker switches on the front and rear of the unit are in the ON position) and the topside processor.

> **WARNING!** Never power up the STARMUX III with the tow cable disconnected from the tow vehicle. Severe electric shock could occur. This also applies to post-recovery, as disconnecting the towfish while the power is still on could result in bodily injury or death.

At this point, perform any pre-deployment checks as prescribed by the particular configuration's hardware manual, such as a rub test. Operation instructions for the topside and towfish can also be found in the supplied user manuals.
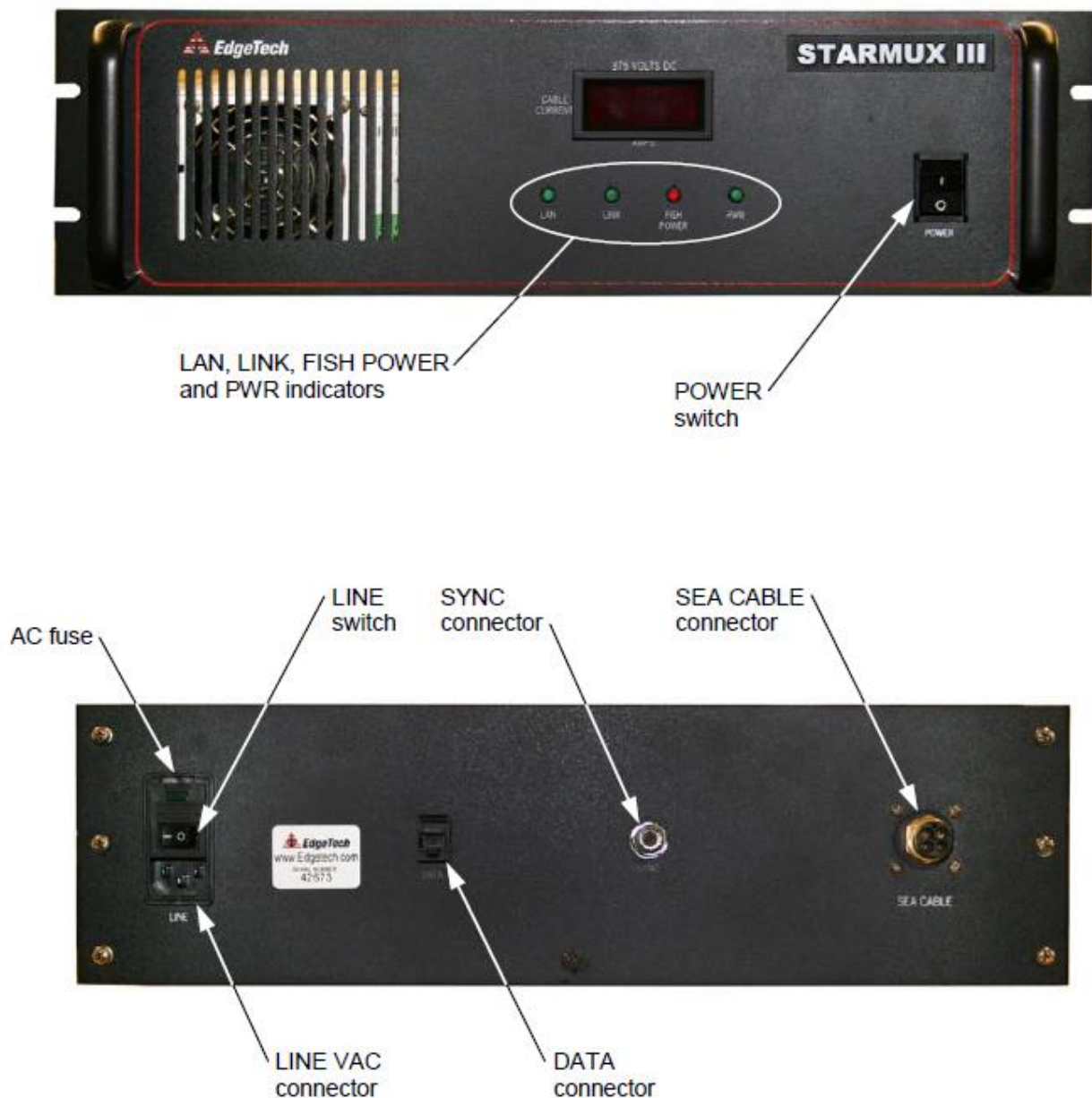
Figure 3-1: Front and Back Panels of STARMUX III

3.4   Post-Recovery

After recovering a tow vehicle from a survey, power down the topside processor and STARMUX III. The unit can then be safely disconnected from the tow vehicle. If the next survey is not for an extended period of time, EdgeTech recommends storing the unit in its original shipping container in a safe and dry environment

4.0: TECHNICAL DESCRIPTION

This section provides an overall general description of the hardware elements of the STARMUX III DIGITAL LINK. This information, which includes block diagrams, board descriptions, chassis photos, component callouts, and wiring diagrams, can be useful for troubleshooting purposes and installing optional equipment.

4.1   Internal Components

A block diagram of the STARMUX III Digital Telemetry Link electronics is shown in FIGURE 4-2. The wiring diagram is shown in FIGURE 4-3, and the electronics chassis is shown in FIGURE 4-1. The main hardware elements in the 2000 Digital Telemetry Link include the following components and circuit boards:

Sea Cable Interface	The Sea Cable Interface consists of the Sea Cable connector (P2 on rear panel of STARMUX III) and a common mode choke. The common mode choke is connected in series between the FSIU (J6) and the Sea Connector on the rear panel (P2).
12 VDC Power Supply	The 12 VDC Power Supply (PS2) receives AC power from the Power Entry module to generate +12 VDC which is used to power the ADSL Modem.
375 VDC Power Supply	The 375 VDC Power Supply (PS1) receives AC power from the Power Entry module to generate +375 VDC. The 375 VDC Power is output to the FSIU. The PS1 Power Supply also provides a 24 VDC power output to power the digital and analog circuits located within the FSIU.
Power Entry	The Power Entry module filters the AC power and connects it to the +12 and 375 VDC Power Supply through the front panel power switch.
ADSL Modem	The ADSL Modem board converts the uplink data ADSL signals received from the tow vehicle and input on the ADSL connector from the FSIU into Ethernet 10/100/1000BaseT signals which are output to the 4200/2000 Topside Processor. Similarly, the ADSL Modem board converts the downlink Ethernet 10/100/1000BaseT based command signals from the 4200/2000 Topside Processor into the ADSL downlink command signals which are output on the ADSL connector to the FSIU for transmission to the tow vehicle thru the Sea Cable Interface (FSIC) . The ADSL Modem also provides the status for power

applied to the modem, status of the ADSL communication link and the Ethernet LAN connection. +12 VDC power is input on the DC connector from the +12 VDSC Power Supply.

FSIU

The FSIU board mounts to the STARMUX III chassis. The FSIU connects between the Sea Cable Interface (FSIC) and the ADSL Modem in the STARMUX III chassis. The FSIU board inputs +24 VDC on J3 from the PS1 (24VDC) output to power the digital and analog circuitry. The FSIU board also inputs 375 VDC power from PS1. The 375 VDC power is output to the tow vehicle on J6 combined with the frequency shift keyed (FSK) responder trigger signal input from J1 and the ADSL downlink command and uplink data signals from J9. The ADSL command signals are input and the data signals are output on J9. The FSIU also provides the current sense output (J7) and the Fish Power ON status output (J4) which drives the Fish Power Indicator on the front Panel.
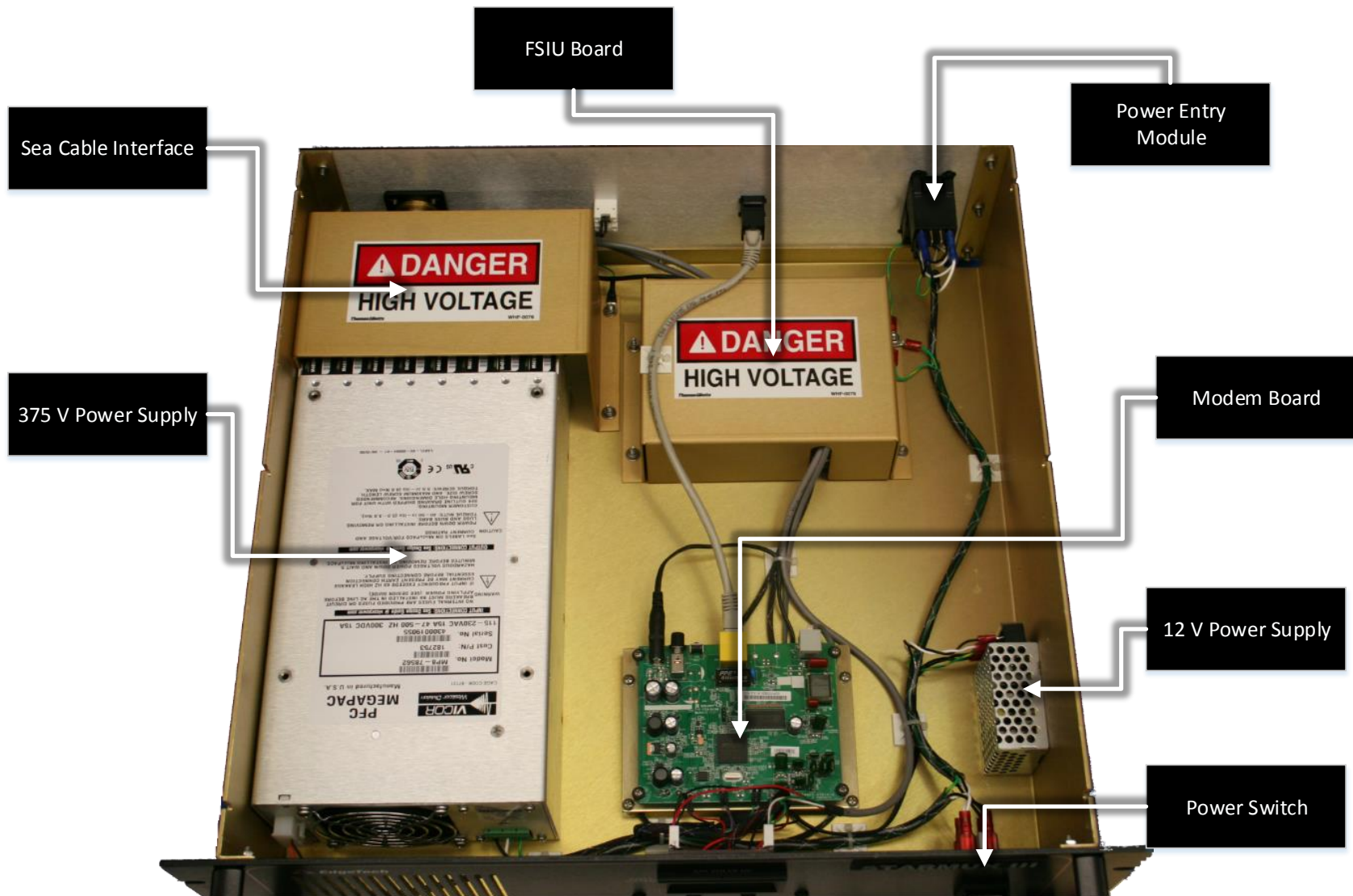
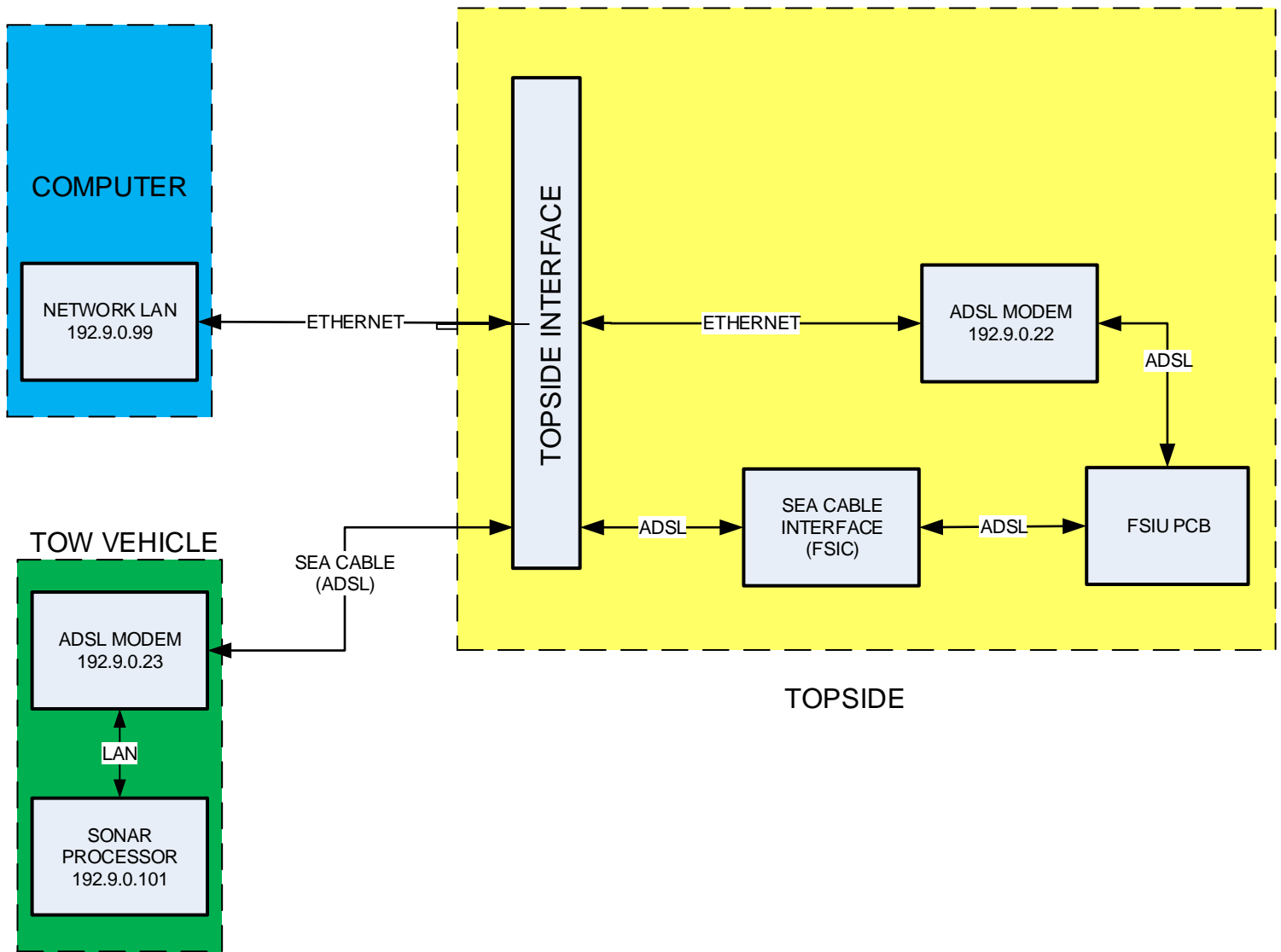*Figure 4-1: STARMUX III—Internal Components*

COMPUTER

NETWORK LAN
192.9.0.99

ETHERNET

TOPSIDE INTERFACE

ETHERNET

ADSL MODEM
192.9.0.22

ADSL

ADSL

SEA CABLE
INTERFACE
(FSIC)

ADSL

FSIU PCB

TOPSIDE

TOW VEHICLE

SEA CABLE
(ADSL)

ADSL MODEM
192.9.0.23

LAN

SONAR
PROCESSOR
192.9.0.101

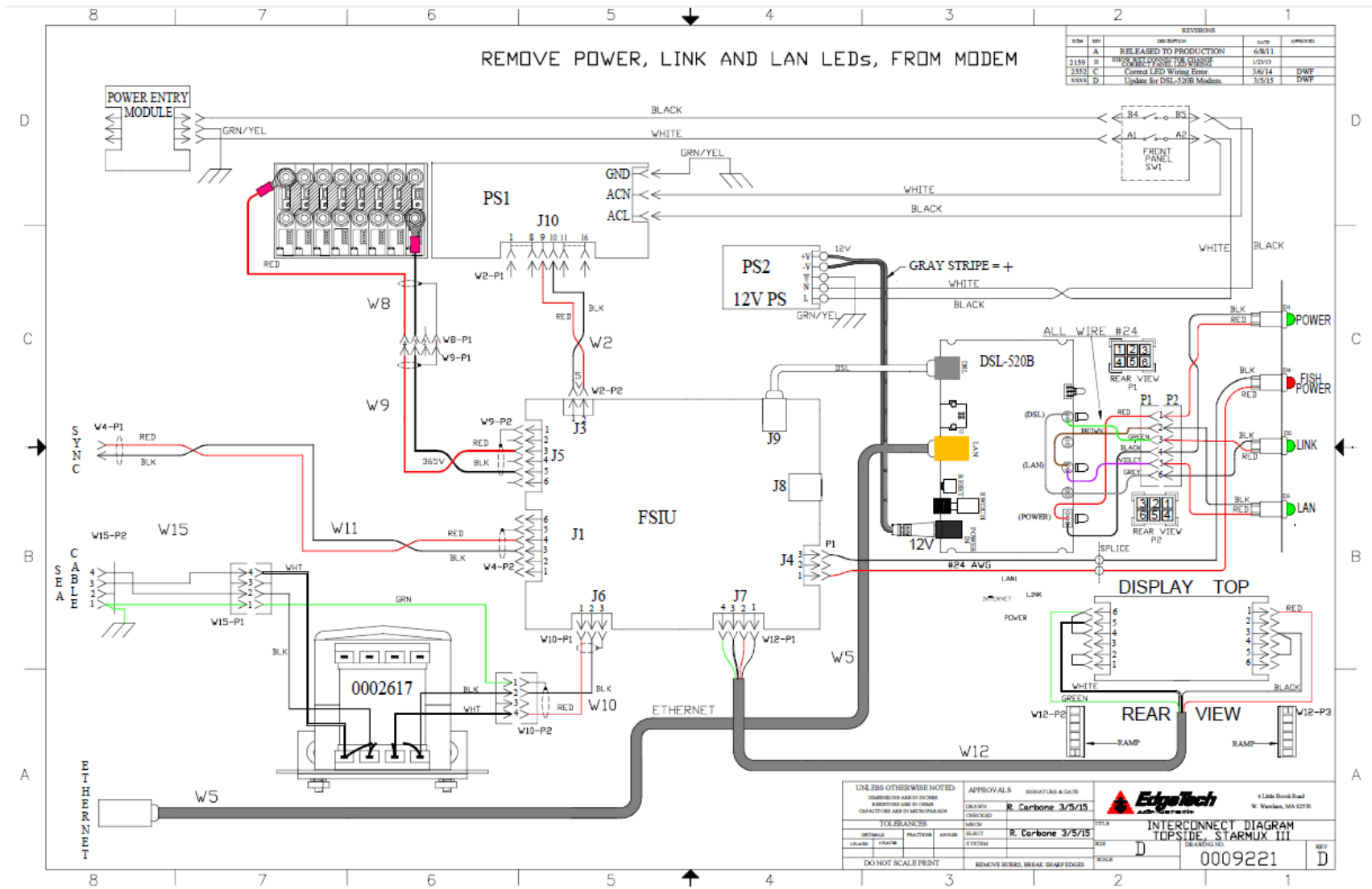*Figure 4-2: STARMUX III—Block Diagram*

Figure 4-3: STARMUX III—Wiring Diagram

5.0: MAINTENANCE

The STARMUX III is rigidly build, and therefore requires little maintenance. Occasionally cleaning its cooling fan may prevent overheating after years of dust build-up and extend the life of the unit. Beyond this, no maintenance is required.

6.0: TROUBLESHOOTING

The following guide can assist the user in resolving a few common issues that may arise. If this guide does not solve a particular problem, contact EDGETECH CUSTOMER SERVICE for assistance.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
The green POWER indicator does not illuminate when the unit is turned on.	The POWER switch in the front or rear of the unit is not turned on.	Verify that both POWER switches are on.
	No AC power. When using AC power connector.	Verify that the digital link is connected to AC power. Check the AC power source. Verify that the fuse is good.
	5 amp fuses on rear panel VAC connection are bad.	Check fuses for continuity. Replace if necessary.
	The indicator is not operating.	Open the unit and check the indicator LED and wiring.
The green LAN indicator does not illuminate when the unit is turned on.	There is no connection between the digital link and the external topside processor.	Check the LAN connections between the STARMUX III unit and the topside processor.
	The indicator is not operating.	Open the unit and check the indicator LED and wiring.
The green LINK indicator flashes when the STARMUX III is turned on. After 1 minute, flashing should stop and indicator should remain lit.	Tow cable between the digital link and the tow vehicle is disconnected or faulty.	Check connections and tow cable.
	Modem settings on the digital link are incorrect.	Contact EDGETECH CUSTOMER SERVICE
	Tow fish is faulty.	Check the unit using a different tow fish.

	LAN cable disconnected.	Check LAN cable connection.
The DISCOVER survey software (if used on external topside) reports "Cannot ping towfish"	Tow cable disconnected.	Check tow cable connection.
	Modem settings are incorrect.	Please contact **EDGETECH CUSTOMER SERVICE** for modem settings.
	Modem disconnected internally on digital link.	Check all connections to the modem are correct per the wiring diagram **FIGURE 4-3**.
	Improper settings in DISCOVER (if used on external topside).	Check that under "Configuration" pull down "Network" the displayed address is 192.9.0.101 with "Port" set to 1700.
	Tow vehicle is faulty.	Verify the tow vehicle using a different digital link. Verify the digital link with a different tow vehicle.

Table 6-1: STARMUX III Troubleshooting Guide