MC-4011-ET
SURFACE INTERFACE
MODULE MANUAL

Manual Part Number 180-0572

December 7, 2006

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1. INTRODUCTION

1.0. General

The American Mine Research MC-4011-ET Surface Interface Module performs two functions:
1) It provides the interface between the Mine Monitoring System Master Station and the fiber back-bone servicing the mine monitoring system and;
2) It provides the hardware to allow the Master Station to activate an "outside" audible/visual alarm .
The Interface Module contains an Ethernet to Fiber Media Converter, a 24 VDC Power Supply, an ADAM 6060 Ethernet 6 Channel Digital Input/Output Module and two relays. The Media Converter translates the standard Ethernet compliant signals from/to the copper ports from/to the fiber ports. The power supply provides 24 VDC to the Media Converter and the Digital I/O Module. The Digital I/O Module accepts Ethernet Modbus TCP/IP commands from the Master Station via the Media Converter to activate a set of audible/visual alarms.

1.1. Features

The features of the MC-4011-ET Surface Interface Module are summarized below:

1.1.1. Power

- 120 VAC @ 0.3 amperes with fully charged battery and no devices connected to the Gateway output ports.

1.1.2. Power Supply (IDEC PS5R-B24)

- Switching-mode power supply.
- Universal AC Input (100 to 240 VAC).
- DC compatible input (110 to 340 V).
- LED Power ON indicator.
- Output voltage adjustable +/- 10 %.
- Spring-up, finger safe wire terminals.
- Auto-resetting output over-current protection.
- UL508 Listing.
- DIN Rail Mounting.

1. INTRODUCTION (cont.)

1.1.3. ADAM-6060 Ethernet Digital I/O Module

- 24 VDC @ 2 watts.
- Ethernet distributed I/O.
- 6 (form A) relay outputs.
- 6 dry contact inputs.
- Ethernet compliant 10/100 Base T(x) Auto-detection shielded RJ45 port.
- DIN Rail Mounting.

1.1.4. Sixnet 5 Port Media Converter

- 10 to 30 VDC @ 6 watts.
- LED power indicator.
- Two full/half duplex , 100 Base FX fiber ports.
- Three 10/100 Base T(x) Auto-detection shielded RJ45 ports.
- Communication "Activity" and "Link" LEDs for each port.
- DIN Rail Mounting.

1.1.5. Allen-Bradley (700-HLT1Z24) Relays

- 24 VDC @ 0.2 watts.
- LED ON indicator.
- DIN Rail Mounting.
- Relay easily replaced.
- Form C contact.

2. SPECIFICATIONS

2.1. Enclosure
- Size, 14 in. x 12 in. x 6.5 in. (outside dimensions).
- Dual, snap latch hinged cover.
- NEMA Type 4, 4X, 12 construction.
- Molded fiberglass reinforced polyester construction.
- Closed cell neoprene cord encased gasket.

2.2. Power Supply (IDEC PS5R-B24)

- Size, 3 in. x 3.5 in. x 3.75 in.
- Input voltage, 100 to 240 VAC, 110 to 340 VDC.
- Input current, 300 milliamperes.
- Fuse, 2 ampere, internal.
- Output current, 600 milliamperes.
- Over current protection, Auto-reset, 105% minimum.
- Operating temperature, -10 to +60 degrees Cent.
- Weight, 6 oz..

2.3. ADAM-6060 Ethernet Digital I/O Module

- Size, 4.75 in. x 2.75 in. x 1.5 in.
- Power Requirements, 10 to 30 VDC@2Watts
- Number of Digital Input Channels, 6
    - Dry Contact:
        - Logic Level 0: close to GND
        - Logic Level 1: open
    - Wet Contact:
        - Logic Level 0: +3 VDC max
        - Logic Level 1: +10 to 30 VDC
- Number of Digital Output Channels, 6 (Form A)
    - Contact Rating:
        - AC: 120V@0.5A
        - DC: 30V@1A

- Optical Isolation, 2000Vrms

2. SPECIFICATIONS (cont.)

2.4. Allen-Bradley (700-HLT1Z24) Relays

- Size, 3.5 in.x 3 in. x .25 in.
- Operating Coil Voltage, 24VDC.
- Operating Coil Current, 12 ma. (Typically) @ 24VDC.
- Contacts, 1 Pole Form A
    - 120 VAC@30A, Open
    - 120 VAC@3A, Close

3. INSTALLATION

The MC-4011-ET Surface Interface Module is completely assembled and ready for service. The user simply connects 120 VAC power, connects the mine fiber optic cable to the Media Converter, connects the Ethernet cable from the Master Station to the Media Converter and connects the Audible/Visual Alarm. The following instructions provide details for installation and setup of the MC-4011-ET Surface Interface Module.

Note 1: Use Figure 1, MC-4011-ET Surface Interface Module Interconnect Drawing; and Figure 2, MC-4011-ET Surface Interface Module Layout as an aid in making connections.

3.1. AC Power

Connect the 120 VAC power to TB1-4. Connect the 120 VAC return to TB1-6. Connect the 120 VAC Ground to TB1-7.

3.2. Fiber Optic Cable

Connect the mine fiber optic Tx and Rx cables to either of the Sixnet Media Converter fiber optic ports.

3.3. Copper Wire Ethernet Cable

Connect the Ethernet cable from the Mine Monitoring System Master Station to either of the remaining RJ-45 ports

3.4. Audible/Visual Alarm

The MC-4011-ET Surface Interface Module will supply two sources of 120 VAC to activate an Audible/Visual Alarm device. This Audible/Visual device will be activated by the Master Station when pre-programmed conditions are met.
Connect the Audible Alarm 120 VAC line to TB1-8. Connect the Audible Alarm 120 VAC RTN to TB1-6. Connect the Visual Alarm 120 VAC line to TB1-9. Connect the Audible Alarm 120 VAC RTN to TB1-6.

3. INSTALLATION (cont.)

3.5. Setup Connections

Before applying power to the MC-4011-ET Surface Interface Module , insure the following connections are made as shown in Figures 1 and 2.
1) The Sixnet Media Converter Ethernet port RJ45 connector cable is connected to the ADAM-6060 Ethernet Digital I/O Module Ethernet port RJ45 connector.
2) +24 VDC and RTN wires from TB1 are connected to the Sixnet Media Converter.
3) +24 VDC and RTN wires from TB1 are connected to the ADAM-6060 Ethernet Digital I/O Module.
4) ADAM-6060 Ethernet Digital I/O Module relay output wires are connected to K1 and K2.
5) 120 VAC wires from TB1 are connected to the IDEC Power Supply.
6) +28 VDC and GND from the IDEC power supply module are connected to TB1.

3.6. Power ON

1) Apply 120 VAC to the MC-4011-ET Surface Interface Module.
2) The IDEC power supply DC ON LED should be ON.
3) The Sixnet Media Converter Power ON LED should be ON.
4) Measure 24 VDC at the IDEC DC output terminals.
5) Measure 24 VDC at the Sixnet Media Converter P1 and (-) terminals.
6) Measure 24 VDC at the ADAM-6060 Ethernet Digital I/O Module TB1-12 and TB1-13 terminals.

3.7. Verify Operation

1) Configure the Master Station to request data from Modbus devices that are a part of the mine monitoring system. This includes the ADAM-6060 Ethernet Digital I/O Module installed in the MC-4011-ET. The Digital I/O Module is shipped with a CD supplied from the manufacture. Insert the supplied CD into the computer's CD drive and follow the instructions to set the Digital I/O Module's IP address.
2) The Activity (A) LED assigned to the Sixnet Media Converter Ethernet port that is connected to the Mine Monitoring System Master Station should be blinking.
3) The Activity (A) LED assigned to the Sixnet Media Converter Ethernet port that is connected to the ADAM-6060 Ethernet Digital I/O Module should be blinking.
4) The Activity (A) LED assigned to the Sixnet Media Converter fiber port that is connected to the Mine Monitoring System fiber cable should be blinking.
5) The Master Station Graphics Station should now display data returned from the Modbus devices.
6) Use the Master Station to command the Audible/Visual Alarms ON and OFF.

ADAM
6060 MODBUS
DIGITAL I/O

IDEC
PS5R-B24

15w

-V

+V

L

N

TB1

1

K1 K2

120 VAC

120 VAC RTN

FRAME GND

WARN

ALARM

RL1-
RL1+
RL0-
RL0+
GND
+Vs

TB1

1

FROM
MASTER
STATION

TO MINE
FIBER CABLE

TX   RX   TX   RX
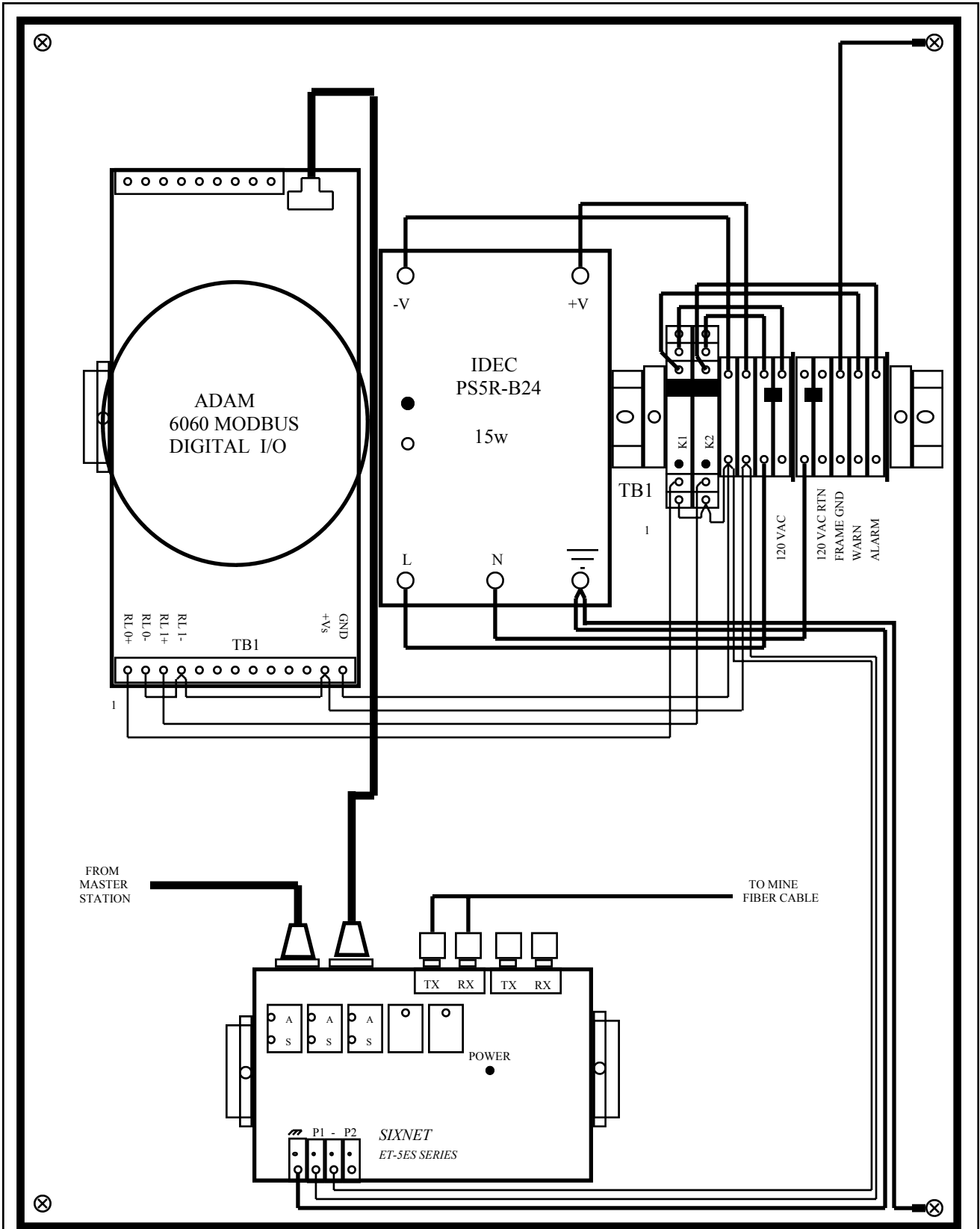
A
S

A
S

A
S

POWER

P1 - P2

SIXNET

ET-5ES SERIES

FIGURE 2, MC-4011-ET SURFACE INTERFACE
MODULE LAYOUT DRAWING

4. TROUBLESHOOTING

4.1. Getting Power To The MC-4011-ET Surface Interface Module

1) Insure that the MC-4011-ET Surface Interface Module is installed properly according to the manual installation section 3.
2) Insure that 120 VAC is supplied to the Module TB1.
3) Insure that the IDEC power supply DC power ON LED is ON.
4) Insure that 24 VDC is available at the IDEC power supply DC output terminals.
5) Verify that the Sixnet Media Converter power ON LED is ON.
6) Insure that 24 VDC is available at the ADAM-6060 Ethernet Digital I/O Module TB1-12 and TB1-13 terminals.

4.2. Sixnet Media Converter

1) Confirm 24 VDC is connected to P1 and (-) of the Sixnet module power connector and the Power LED is ON.
2) Confirm that the mine fiber cable is connected to one of the module's fiber ports. If there is ACTivity on the fiber cable, the port ACT LED should blink.
3) Confirm that one of the Sixnet Media Converter module RJ45 Ethernet ports is connected to the Master Station computer. The ACTivity LED associated with that RJ45 port should blink.
4) Confirm that one of the Sixnet Media Converter module RJ45 Ethernet ports is connected to the ADAM-6060 Ethernet Digital I/O Module. The ACTivity LED associated with that RJ45 port should blink.

4.3. ADAM-6060 Ethernet Digital I/O Module

1) Verify that 24 VDC is applied to the ADAM-6060 Ethernet Digital I/O Module TB1-12 and TB1-13 terminals.
2) In order to use the Digital I/O Module to activate the Audible/Visual Alarms the Module must be assigned an IP address. The Digital I/O Module is shipped with a CD supplied from the manufacture. Insert the supplied CD into the computer's CD drive and follow the instructions to set the Digital I/O Module's IP address.
3) Use the Master Station to command the Audible/Visual Alarms ON and OFF.

5. REPLACEMENT PARTS

Part Number	Description
310-0204	ADAM-6060 Ethernet Digital I/O Module
320-0023	IDEC P5SR-B24 Power Supply
310-0189	Sixnet Media Converter
162-0052	Allen-Bradley Relay

ADAM
6060 MODBUS
DIGITAL I/O

GND
+Vs

TB1

RL 1-
RL 1+
RL 0-
RL 0+

ALARM

ALARM

WARN

A1   ALLEN-BRADLEY   NO
      700-HLT1Z24   COM
A2   K2   NC

WARN

A1   ALLEN-BRADLEY   NO
      700-HLT1Z24   COM
A2   K1   NC

IDEC
PS5R-B24

15w

+V
-V

N

L

FROM
MASTER
STATION

FIBER
PORT 2

TX
RX

FIBER
PORT 1

TX
RX

SIXNET
ET-ES5-4-ST
FIBER TO
MEDIA
CONVERTER

J1

+28V
RTN
GND

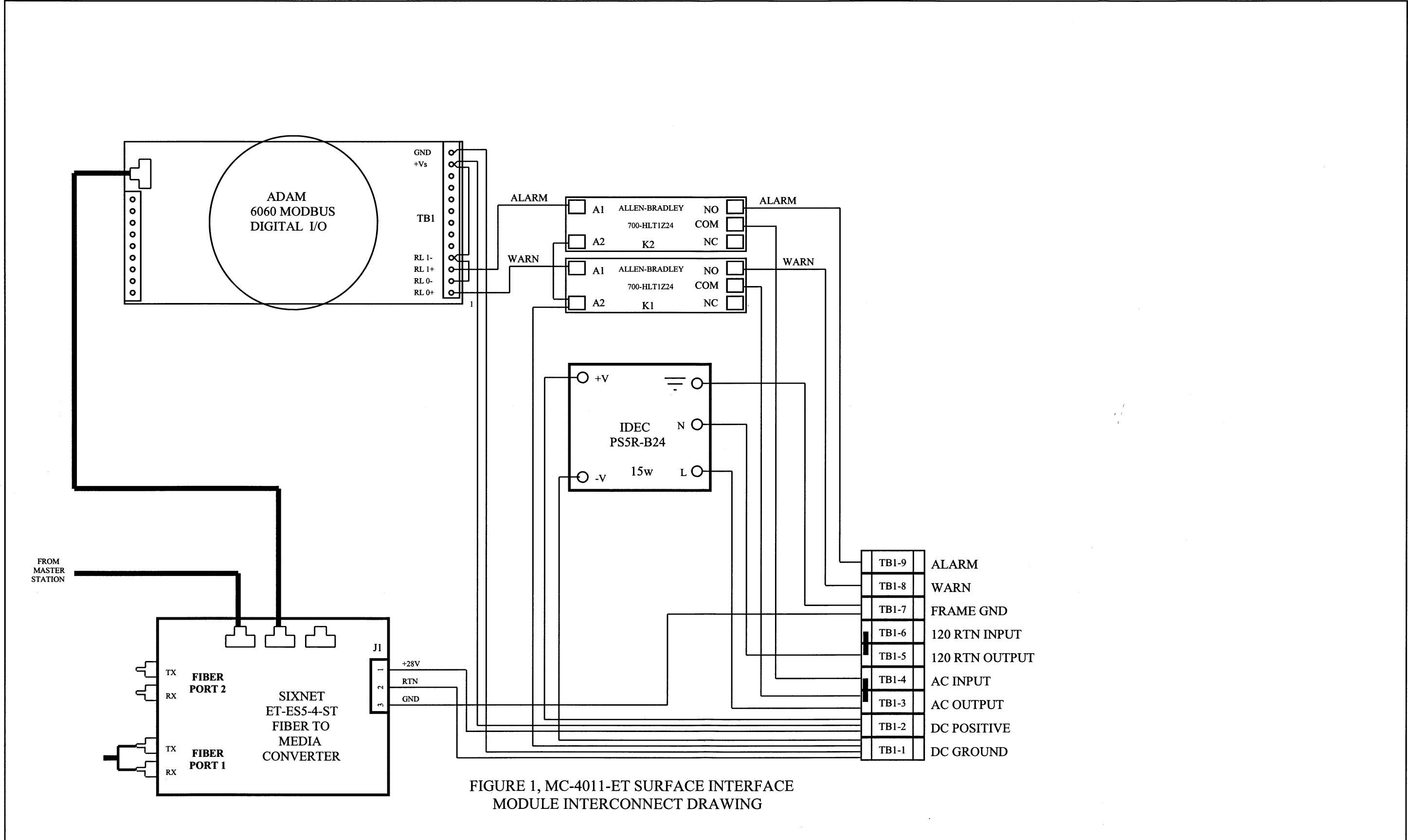|	
TB1-9	ALARM
TB1-8	WARN
TB1-7	FRAME GND
TB1-6	120 RTN INPUT
TB1-5	120 RTN OUTPUT
TB1-4	AC INPUT
TB1-3	AC OUTPUT
TB1-2	DC POSITIVE
TB1-1	DC GROUND

FIGURE 1, MC-4011-ET SURFACE INTERFACE
MODULE INTERCONNECT DRAWING