Owner's Manual

Moscad-L Remote Terminal Unit

68P02951C50-B

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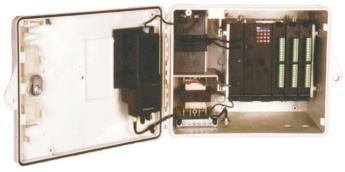

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INTRODUCTION

Scope of this Manual

This manual provides instructions for the installation and operation of the MOSCAD-L™ Remote Terminal Unit (RTU). It also provides on-site replacement instructions for RTU elements that do not necessarily require shop level assistance.

This manual covers the basic RTU and most communications and I/O options. The online help of the MOSCAD RTU Programming Tool Box (Model F23 16) contains additional information on the RTU.

For servicing the MOSCAD-L refer to the Service Manual on CD-R p/n 98-08901C08.

General Description

The RTU is a remotely located terminal used for monitoring and control of local equipment. The unit can operate in a stand-alone mode as well as serve as an intelligent node on a distributed processing system.

The RTU is a modular unit, consisting of the following items installed in a housing: transformer, battery, CPU, power supply module, up to three I/O modules, radio (optional) and interface equipment. The following chapters of this manual describe both basic and optional modules.

The RTU housing is suitable for either direct or plate wall mounting.

The MOSCAD-L RTU is enclosed in a IP66 standard plastic housing. Figure 1 provides a general view of a basic MOSCAD-L RTU.

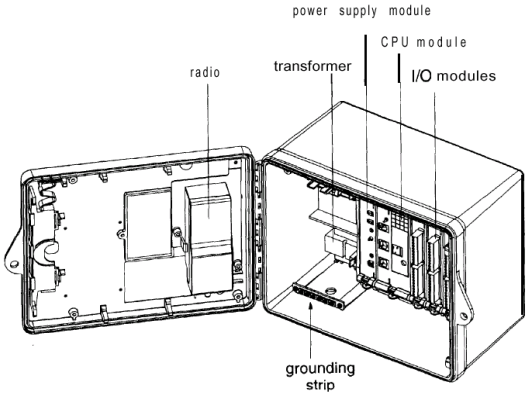


Figure 1
MOSCAD-L RTU - General View with Housing

Model Options

I/O Modules

The MOSCAD-L RTU can incorporate up to three modules, installed in three I/O slots. All modules interface with other user equipment through wire line.

The following type of modules are available:

- 16 DI module (Vll5)
- Mixed I/O module, 2EE, 8DI,2AI (4-20 mA) (V436) (V245 with 2ML)
- 8 D0 module (V608 EE) (V508 ML)
- 8 open collector DO module (V314)
- 16 DI (110VAC) module (V349)
- 16 open collector DO module (V616)
- 24 DI and 8 DO module (V380)
- 6 analog inputs module (V278)
- 4 analog outputs module (V118)

The MOSCAD-L RTU is supplied with a special transparent Label in which information pertaining to the I/O modules can be inserted.

Line, RS232 and RS485 Communication Interfaces

A variety of Line, RS232 and RS485 communication interfaces are available:

- RS232 asynchronous modem (V345)
- RS232 synchronous modem (V340)
- RS485 adaptor (V186)
- RS232 multiplexer (V184)
- INTRAC interface modem (V393)
- 2400 bps line modem, 2/4 wire full duplex (V404)
- 300/1200/2400 bps line modem, dial up (V226)
- 1200 bps line modem, 2 wire half duplex multidrop (V219)

Power Supply and Battery

The power supply and backup battery options are:

- 230 V AC power supply (instead of 117 V) (V251)
- 20-28 V AC, 21-50 V DC operation (V240)
- 3AH backup battery (instead of 1.2 AH) (V328)
- External 12V DC (Solar Panel) (V274)

Miscellaneous

The MOSCAD-L RTU can be supplied with a metal wall mount and with a tamper switch. These options are as follows:

- Wall Mount (V056)
- Tamper Switch (V224)
- Less Housing Mount (V231)
- Panel Mount (V229)
- Metal Housing (V279)

INSTALLATION

General

MOSCAD-L SAFETY SUMMARY

Warning

The MOSCAD-L should be installed by qualified and authorized technicians. If the installation involves high-voltage connections, technicians must be specifically qualified to handle high voltage.

Power Connections:

1. The customer shall be responsible to use a 6A disconnect device (circuit breaker) in series to the AC power cable, according to the local electrical standards and requirements.
2. The AC power lines shall have a cross area of 0.75mm square minimum.
3. The triangle label with the broken arrow inside, means “Be aware, No double insulation”.

4. The customer shall be responsible to use a conduit with a 16mm diameter for the AC power lines connection.

This chapter covers the following installation procedures:

Wall mounting

Connections

Module Replacement

Wall Mounting

The following housing installation procedures refer to NEMA4 type plastic housing. The dimensions of the housing are: width – 37.6 cm (14.8"), height – 28 cm (10.92"), depth – 21.6 cm (8.42") (see Figure 2).

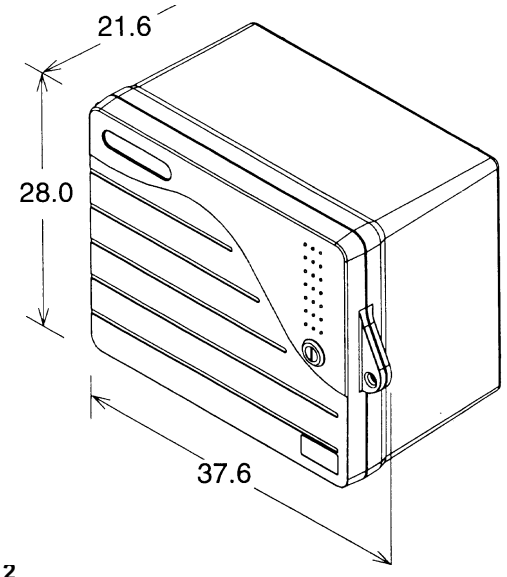


Figure 2
Dimensions of MOSCAD-L RTU Plastic Housing

The housing can be installed directly, using the four supplied brackets, or with a metal mounting plate (optional).

Before installing the MOSCAD-L RTU with the housing, verify that there is sufficient space around the housing.The space required depends on the manner of installation and direction of the brackets (see Figure 4 and Figure 5).

Wall Mounting With Brackets

Four mounting brackets are provided, one for each corner of the RTU (see Figure 4 and Figure 5). To mount the RTU using the mounting brackets, proceed as follows:

1. Fasten the mounting brackets to the back corners of the housing (see Figure 3). The brackets can be mounted horizontally or vertically.

2. Choose the means of mounting appropriate for the site (type of screws, etc.) and mount the RTU on the wall, using the mounting brackets. The length of the screws used should not exceed 14 mm.

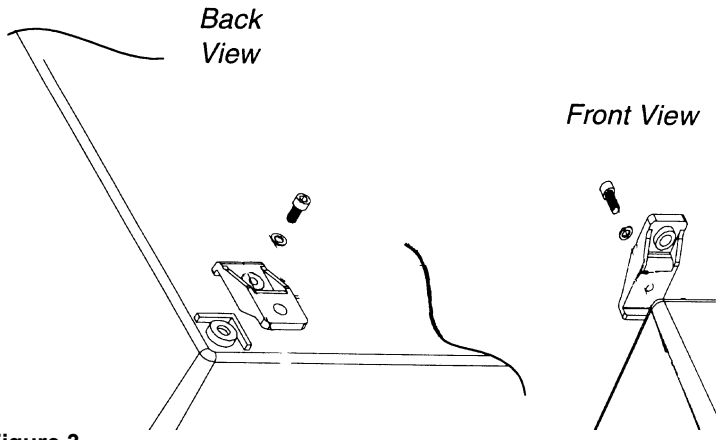


Figure 3
Installation of Mounting Brackets

The part numbers of the parts required for wall mounting with brackets are:

0780559K01	Corner Mounting Bracket
0380346L01	Screw, Hex Head M 6.0 x 1, L=14M
FHN5840A	Four corner mounting brackets with screw kit

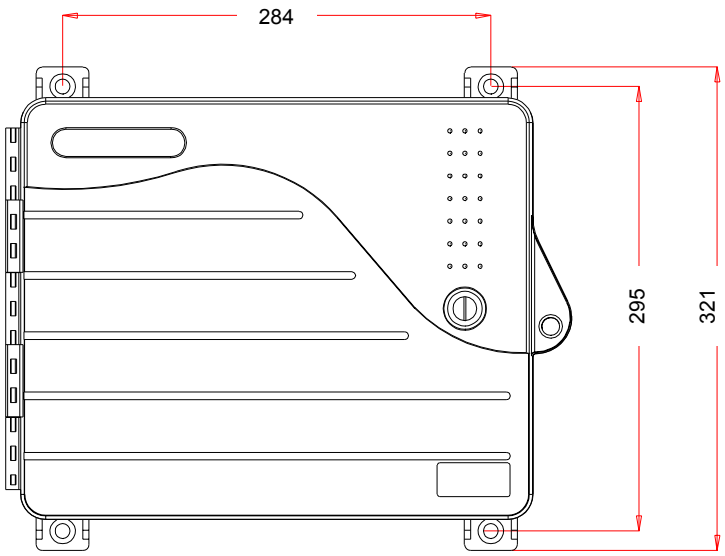


Figure 4
Bracket Installation Dimensions, with Vertical Brackets (mm)

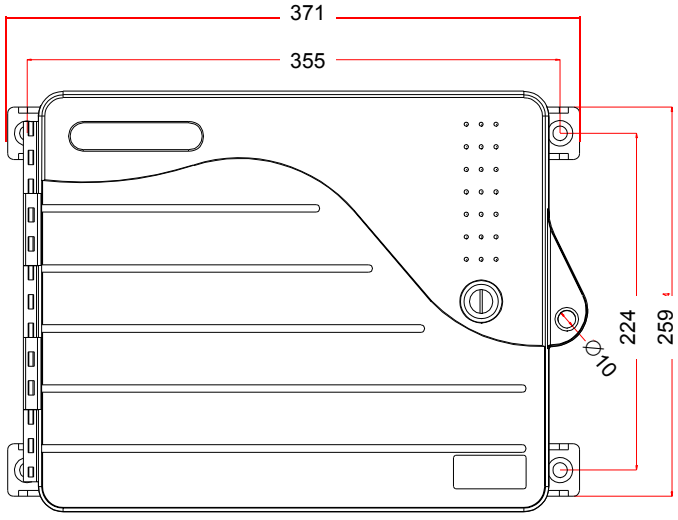


Figure 5
Bracket Installation Dimensions, with Horizontal Brackets (mm)

Wall Mounting With Mounting Plate

A mounting plate can be ordered for wall mounting of the RTU (see Figure 6). To mount the RTU using a mounting plate, proceed as follows:

1. Fasten the wall mounting plate to the wall.
2. Lift the RTU housing above the plate, and slide the mounting plate into place (see Figure 6).

Note

You must leave at least 28 cm free space above the mounting plate for insertion of the RTU housing.

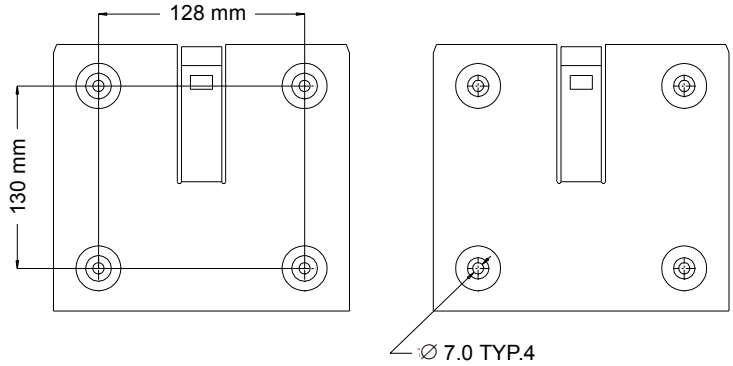


Figure 6
Mounting Plate

The part number of wall mounting kit is FHN5889A.

Wall Mounting On a Panel

Convenient installation of the MOSCAD-L RTU on a panel requires the following available space:

Width: 35cm (14”)

Height: 38cm (15”)

Depth: 25cm (10”)

Four holes are provided, one in each corner of the RTU, for wall mounting of the RTU. Figure 7 shows the distance between the holes.

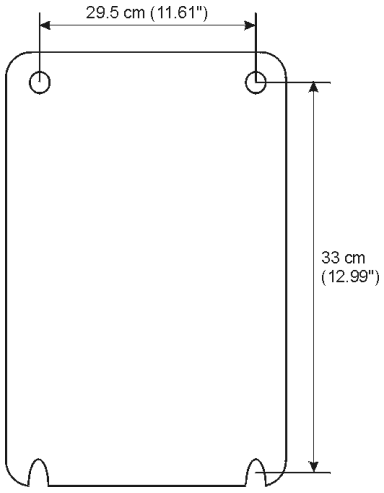


Figure 7
RTU Chassis Installation Dimensions

Choose the mounting means (screws, etc.) appropriate for the site and mount the RTU on the wall.

Wall Mounting With Housing

The following housing installation procedure refer to the NEMA4 type housings.

The NEMA4 housing size is:

Width: 38cm (15”)

Height: 38cm (15”)

Depth: 21cm (8.26”)

Convenient installation of the MOSCAD-L RTU with the NEMA4 housing requires the following available space.

Width: 44cm (17.5”)

Height: 44cm (17.5”)

Depth: 28cm (11”)

Four mounting brackets are provided, one in each corner of the RTU, for wall mounting of the RTU (see Figure 8). To mount the RTU on the wall proceed as follows:

1. Fasten the mounting brackets at the housing back corners. Use the brackets and the screws supplied in the plastic bag.
2. Choose the mounting means (screws, etc.) appropriate for the site and mount the RTU on the wall using the mounting brackets.

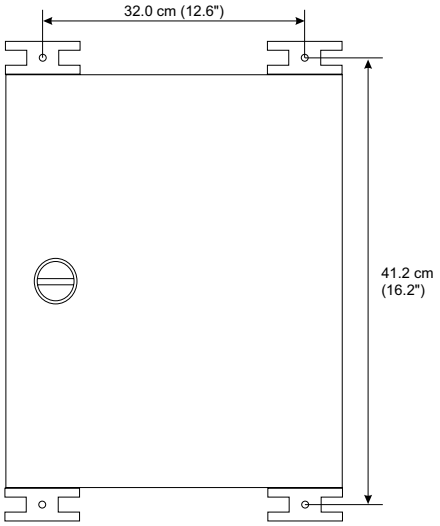


Figure 8
NEMA4 Housing - Installation Dimensions

Connections


Note

Verify that all power and ground connections are made in accordance with local standards.

To comply with CE standards, the ferrites must be installed on I/O cables and/or at communication port 3 and on grounding wire FKN 4463.

Ground Connection

Connect the grounding cable directly to the protective grounding strip located at the bottom left corner of the housing (see Figure 1).

Power Connections

The transformer is installed in the bottom left hand part of the housing (see Figure 1).

Use the supplied cable connectors to connect the live wire to the live input and neutral wire neutral input.

For further details, refer to the separate chapter in this manual pertaining to power connection instructions.


Note

Verify that the voltage of the transformer unit is compatible with the local power supply.


Caution

If you have a 20-28VAC or 21-50VDC power supply, use cable FKN4466 to connect directly to the PWR IN of the Power Supply Module. If you need to power the unit from a 12VDC source, cable FKN4469 is the proper cable for this source of power. Please note that the wiring of the two cables are different (see 68P02951C50 Appendix A).

Do not apply 24VAC or 24VDC to a 12VDC input, as this will damage electrical components

For instructions regarding power supply connections, refer to the separate chapter in this manual.

User Connections to I/O Modules

For instructions regarding user connections to the I/O modules, refer to the separate chapter in this manual pertaining to the specific module.

Battery Connection

The RTU is supplied with the battery disconnected in order to prevent battery leakage. Connect the battery cable to BAT on the power supply module.

Radio Connection

Connect the radio (when supplied) to AUX connector on the power supply module. Verify that the radio button is set to ON.

Interconnection Diagram

The RTU is supplied with all internal electrical connections pre-installed. For your convenience, the following basic interconnection diagram is also provided (see Figure 9).

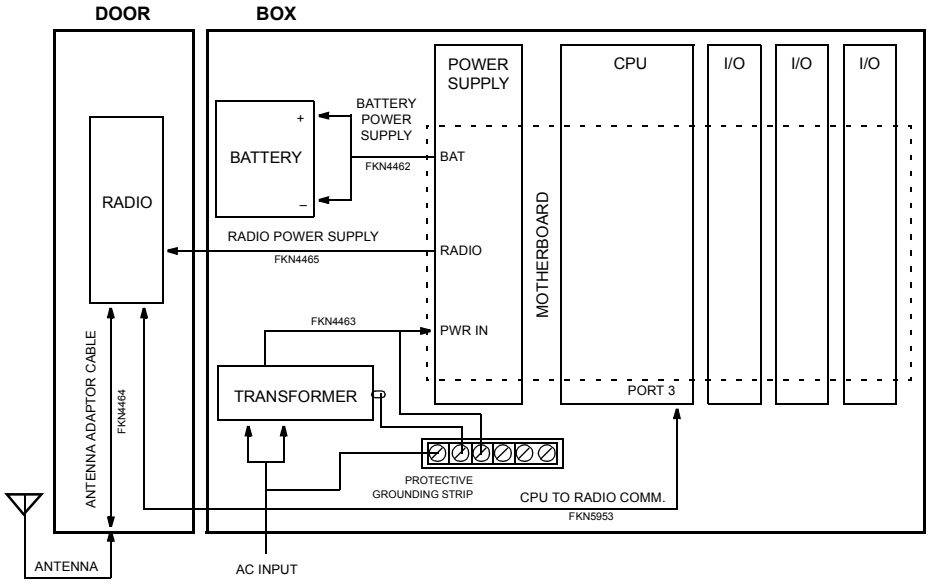


Figure 9
MOSCAD-L RTU – Interconnection Diagram

Installation of Plug-in Modules

There are five vertical slots for plug-in module installation. The power supply module is installed in the first vertical slot from the left. The CPU module is installed in the second vertical slot from the left, and optional I/O modules are installed in the remaining three

vertical slots, in accordance with the site configuration instructions provided in the Programming Tool Box. A Line Interface Unit, RS232 Multiplexer or RS485 adaptor can be installed in the horizontal space (above the vertical slots). All modules ordered are pre-installed in the factory.

Label Panel

The MOSCAD-L RTU is supplied with a transparent label panel in which information pertaining to the various I/O modules can be inserted. Pull the label panel out of its slot and swing it into place in front of the I/O modules. You can now insert labels detailing the connections of each module into the relevant slot.

Replacement of Plug-in Modules

For details on the installation and replacement of the CPU module, 16 DI modules, Mixed I/O modules, Line Interface Unit modules, RS232 Multiplexer module or RS485 adaptor, see the relevant sections.

Warning

Verify that the DC power is off before removing or installing a module.

Miscellaneous

Closing the Housing Door

The door of the housing does not latch shut when the lock is in a horizontal position. To close the housing properly, use a coin or screwdriver to turn the latch 90 degrees counter-clockwise to a vertical position. In the vertical position, the door latches shut when swung closed. Once the door is latched, verify that the lock is exactly vertical.

Closed

Open

Antenna Placement

The antenna should not be placed on top of the plastic housing.

Warning

An antenna placed on top of the plastic housing produces strong electromagnetic fields that could be harmful to the electronics of the MOSCAD-L RTU and to people in the vicinity.

POWER CONNECTIONS

Electrical Connection

Warning

Verify that the line power is off before connecting it to the RTU.

Proceed as follows to connect the power supply:

1. Verify that this voltage matches your line voltage. The operating (input) voltage of the RTU is printed on the transformer, above the TB.
2. The power supply cable should be inserted into the housing through the round openings provided at the bottom of the housing.
3. Connect the power supply cable with the cable connectors supplied with the RTU.

Notes

Verify that the cable colors and connections comply with local standards.

4. Connect the power wiring in accordance with Figure 10.

Notes

Use the dedicated strip in the RTU as the source for the line ground input.

5. Verify that the DC cable of the radio is connected to the AUX connector of the Power Supply module.
6. Connect the cable from the battery to the BAT connector of the Power Supply module. This cable is deliberately disconnected at the factory in order to prevent battery leakage during shipment.

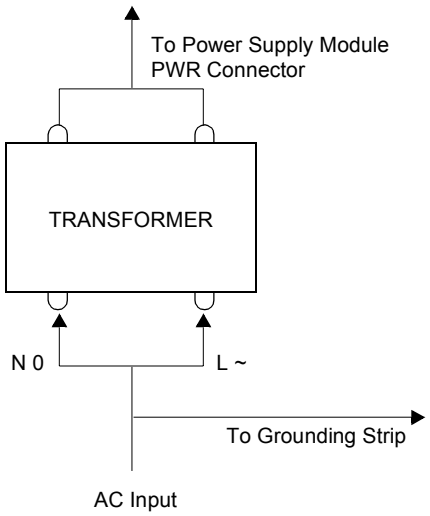


Figure 10
Connection of the 230 VAC/24 VA or 117 VAC/24 VAC Transformer

If you have a 20-28 VAC or 21-50 VDC power supply or solar panel, you can connect this input directly to the PWR connector on the Power Supply module, without using a transformer.

For detailed cable connections - see appendix A.

Operation

To turn the RTU on, set the DC switch on the front panel of the Power Supply module to the ON position.

Note

There are three fuses inside the Power Supply module front panel, to protect the input and output circuits. If the unit is not operating, one of the fuses may have burnt out.

Controls, Indicators and Connectors

The controls, indicators and connectors of the Power Supply module are described in Figure 11 below:

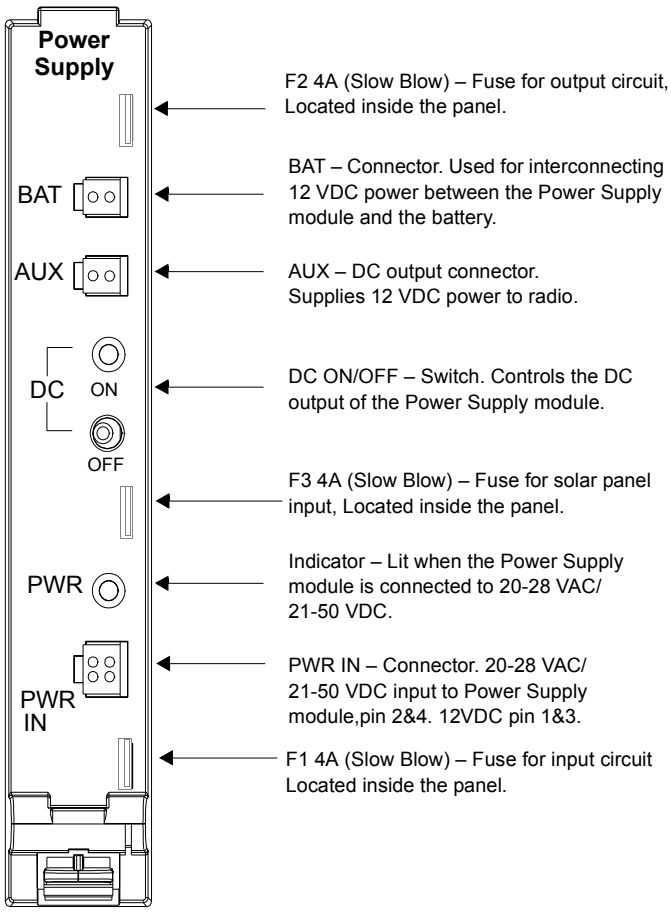


Figure 11
Power Supply Module Front Panel

Removal and Installation

Warning

Verify that the DC power is turned off before removing or replacing modules in the RTU.

Removing the Power Supply Module

To remove the Power Supply module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect all connections from the Power Supply module.
3. Pull out the module by pressing the bottom snap.

Installing the Power Supply Module

To install a Power Supply module into the RTU, proceed as follows:

1. Turn off the DC power
2. Slide the Power Supply module into the left RTU slot until the snaps click into place.
3. Reconnect all power supply connections.
4. Turn on the DC power.

Replaceable Parts

Part No.	Description
6502069C09	Fuse F1/F2/F3 4A T 5 x 20

CPU MODULE FRN2341

Overview

The main element of the MOSCAD-L RTU is the CPU module (see Figure 12). The CPU controls the I/O modules, processes the data gathered and communicates with external devices. The module is based on the Motorola 68LC302 microprocessor and includes on-board memory, communication circuits, I/O bus drivers and other circuits.

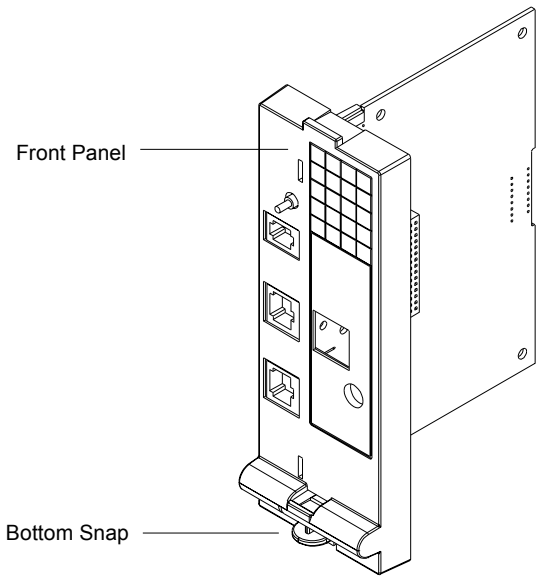


Figure 12
CPU Module – General View

Location of the CPU Module

The CPU module is pre-installed in the second slot from the left.

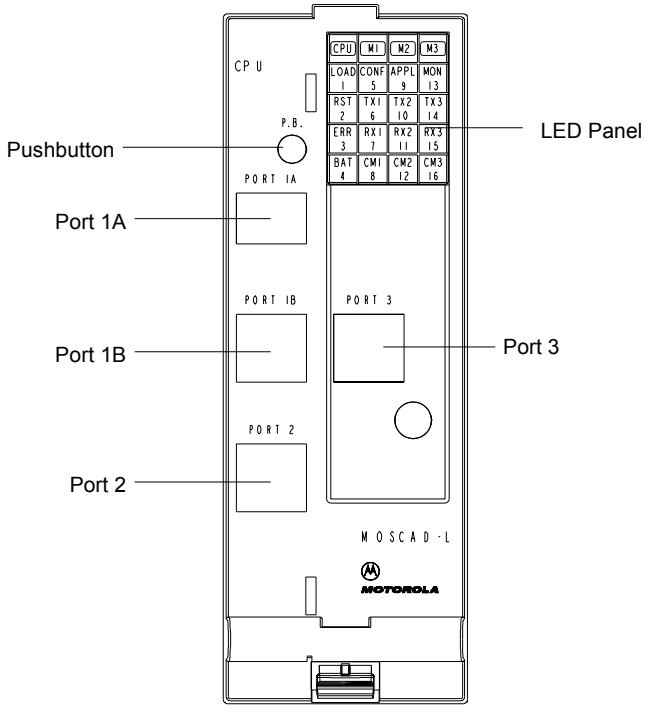


Figure 13
CPU Module – Front Panel

Connections

The specific connections depend on the model ordered and on the various options (radio, line, etc.). See the relevant sections for further instructions.

Controls and Indicators

The push-button is used to activate the LED panel, to toggle the LED panel so that it displays the status of the CPU or of one of the optional modules, to initiate software downloading to the CPU, and to erase user flash memory.

LED Control

Display On/Advance

When the display is off, pressing the pushbutton once, momentarily, activates the display. Every consecutive momentary depression of the pushbutton advances the display to the next module, in the following order: CPU > M1 (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU.

Display Off

When the display is programmed to turn off after a pre-defined time-out (set through the Toolbox Site configuration), if the pushbutton is not pressed for this timeout the display will turn off automatically.

LED Test

When the pushbutton is pressed continuously for a few seconds, all LEDs light up simultaneously. When the pushbutton is released, the LEDs turn off.

User Flash Erase

After power-up, all LEDs light up. To erase User Flash, press the pushbutton while the LEDs are lit. All the LEDs flash three times.Now, release the pushbutton.

Alternatively, press the pushbutton continuously for at least 40 seconds at any time to erase the User Flash.

Software Downloading

During power up, press the push-button continuously. This will cause the CPU to enter bootstrap downloading mode in which the FLASH is programmed from a PC connected to Port 2 of the CPU module. The CPU LED will begin to blink at 1 Hz, indicating that the CPU module has entered bootstrap downloading mode. If after 120 seconds no bootstrap software is loaded and executed, the normal power-up procedure is performed.

CPU Reset

To reset the CPU, turn the Power Supply switch off and on again.

LED Display Indications

A matrix of 5 × 4 LEDs is used for diagnostics and testing of the CPU module and I/O modules (see Figure 14). The top row indicates to which module (CPU, M1, M2 or M3) the LED panel is set.

Note

The blue numerals on the LED panel are I/O indications. Refer to the appropriate I/O module section for more details on these LEDs.

Connectors

The CPU ports are designed for the following uses:

PORT 1A– Data port (RS-485)
PORT 1B– Data port (RS-232)
PORT 2 – Data port (RS-232)
PORT 3 – Data port (RS-232), radio or line connection.

Ports 2 and 3 can work simultaneously with each other and with either port 1A or port 1B. Ports 1A and 1B cannot work simultaneously.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 14
LED Panel

The following table describes the functions of the diagnostic LEDs, controls and connectors, when set to the CPU module (CPU LED on):

Name	On / Flashing	Function / Indication
CPU	Flashing	CPU is in bootstrap mode.
M1	Flashing	Failure in M1 module.
M2	Flashing	Failure in M2 module.
M3	Flashing	Failure in M3 module.
LOAD	On	Configuration definition or application program is being downloaded to FLASH memory.
CONF	On	A site configuration definition has been loaded into FLASH memory.
APPL	On	An application program has been loaded into FLASH memory.
	Flashing	One of the following: – The program is in STOP SCAN state, for the Tool Box Application Programmer's monitoring program to perform diagnostics operations. – The application run-time is too long. Could be caused by an error in the Ladder diagram program, such as an infinite loop. – The application program is in STOP state. This occurs when the Programming Tool Box's Hardware Test & Calibration Program is performing a hardware test.
MON	On	The monitoring program of the Tool Box Application Programmer is executing on-line monitoring of the RTU.
TX1	On	The RTU is transmitting data via Port 1
TX2	On	The RTU is transmitting data via Port 2
TX3	On	The RTU is transmitting data via Port 3
RX1	On	The RTU is receiving data via Port 1
RX2	On	The RTU is receiving data via Port 2
RX3	On	The RTU is receiving data via Port 3
CM1	On	The communication channel used by Port 1 is busy.
CM2	On	The communication channel used by Port 2 is busy.
CM3	On	The communication channel used by Port 3 is busy.

Name	On / Flashing	Function / Indication
RST	Flashing	The CPU is resetting (usually by the watchdog timer), i.e. indicates that the software is not running properly.
ERR	On	One of the following malfunctions: – Illegal state detected in the software – Module/board missing – Other malfunctions
ERR	Flashing	CPU Failure. The type of failure is indicated by other LEDs in the matrix.
BAT	On	Low battery voltage.

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module

Removing the CPU module

To remove the CPU module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect all connections from the CPU ports.
3. Press the snap at the bottom of the CPU and pull the CPU out.

Installing a CPU module

To install a CPU module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the CPU module into the CPU slot until the snap clicks into place.
3. Connect the CPU ports.

16 DI MODULE FRN5823

Overview

The 16 Digital Input (DI) (see Figure 15) can receive up to 16 isolated status inputs from the user equipment. The 16 DI module transfers the data to the CPU module.

Each of the 16 discrete inputs withstands high line noise due to software controlled filters. The discrete inputs can also be utilized as slow speed counters (up to 50 Hz).

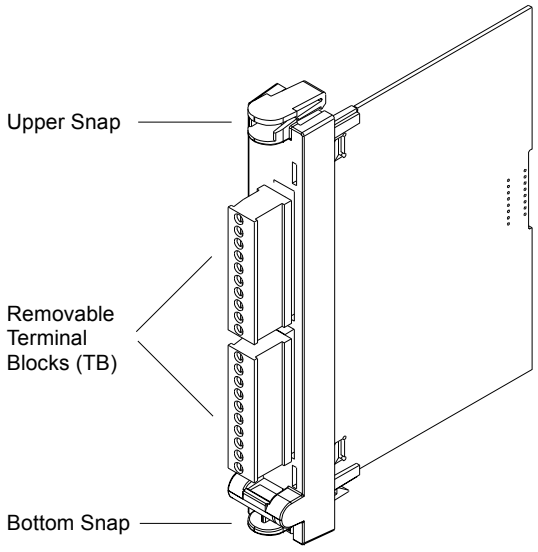


Figure 15
16 Digital Input (DI) Module

Installation

Module Location

The 16 DI module should be located in the slot designated by the Site Configuration Program (Programming Tool Box).

Connections

Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening. These wires are connected to the user interface TB located at the front of the 16 DI module.

After defining the sensors, controls and I/O module locations using the Site Configuration Program (Programming Tool Box), connect all input connections and TB pin definitions according to this configuration.

Pull out the transparent Label Panel located to the right of the module slots and insert the label with the TB pin connections and definitions into the appropriate slot.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB and that the plug with connections 11-20 is inserted into the lower TB.

Figure 16 illustrates the 16 DI TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

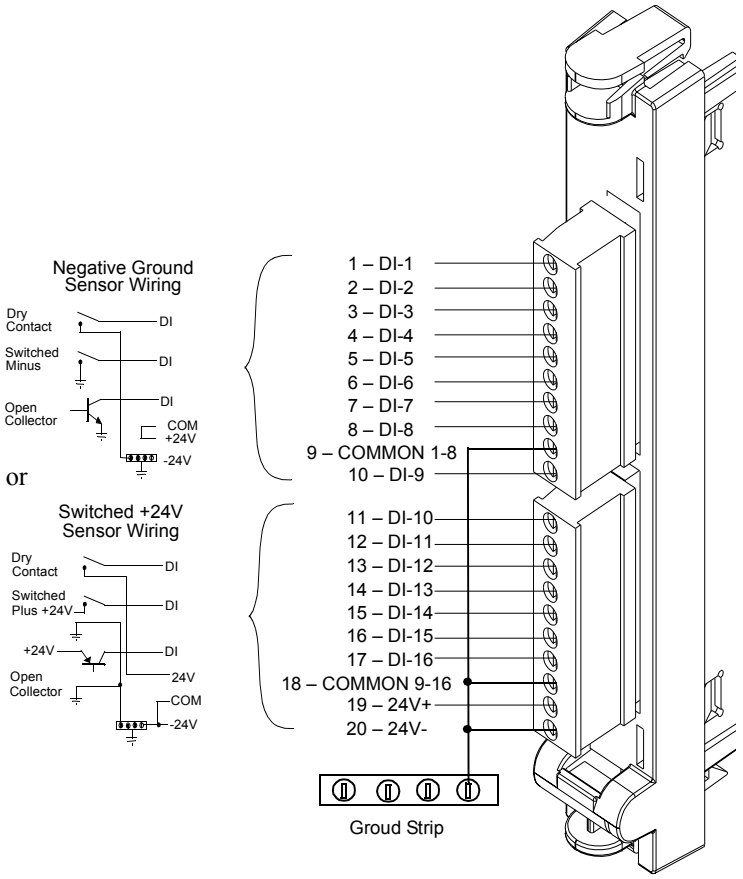


Figure 16
16 DI Module – User Connections

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 16 DI Module

To remove a 16 DI module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Open the label panel and slide it into place.
3. Disconnect the plugs from the module TBs.
4. Pull out the module by pressing the top and bottom snaps.

Installing a 16 DI Module

To install a 16 DI module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1-10 and 11-20 are in the correct order.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and I/O modules (see Figure 17). The top row indicates to which module (CPU, M1, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the display is off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > M1 (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	**CONF** 5	**APPL** 9	**MON** 13
RST 2	**Tx1** 6	**Tx2** 10	**Tx3** 14
ERR 3	**Rx1** 7	**Rx2** 11	**Rx3** 15
BAT 4	**CM1** 8	**CM2** 12	**CM3** 16

Figure 17
LED Panel

The table below describes the functions of the diagnostic LEDs when set to the 16 DI module, i.e. the relevant LED in the top row (M1, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel

LEDNo.	Indication	LED No.	Indication
1	DI-1	9	DI-9
2	DI-2	10	DI-10
3	DI-3	11	DI-11
4	DI-4	12	DI-12
5	DI-5	13	DI-13
6	DI-6	14	DI-14
7	DI-7	15	DI-15
8	DI-8	16	DI-16

Replaceable Parts

Part No.	Description
3108509G18	User connections plug 10-pin

MIXED I/O MODULE FRN5819A, FRN5820A

Overview

The Mixed I/O module (see Figure 18) is designed to provide a combination of different functions, as follows:

- It can receive up to two optically isolated analog inputs (AI). The module converts the input analog data into digital format and transfers the digital data to the CPU module.
- It can receive up to eight isolated status inputs (DI). The data is transferred to the CPU module.
- It can provide two relay outputs for controlling user devices. Relays K1 and K2 are Single Pole Single Throw (SPST), normally open (NO) relays.

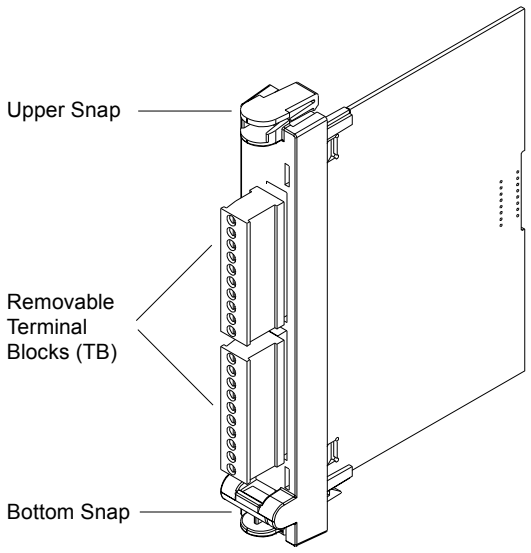


Figure 18
Mixed I/O 8 DI, 2 Relay EE/2 Relay ML, 2AI 4-20mA

Model Options

Available Mixed I/O module standard options:

- 2EE, 8DI, 2AI (4-20 mA)
- 2ML, 8DI, 2AI (4-20 mA)

Installation

Module Location

The Mixed I/O module should be located in the slot designated by the Site Configuration Program (Programming Tool Box).

Connections

Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening. These wires are connected to the user interface TB located at the front of the Mixed I/O module.

After defining the sensors, controls and I/O module locations using the Site Configuration Program (Programming Tool Box), connect all input connections and TB pin definitions according to this configuration.

Pull out the transparent Label Panel located to the left of the module slots and insert a label with the TB pin connections and definitions into the appropriate slot.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB and the plug with connections 11-20 is inserted in the lower TB.

Figure 19 illustrates the Mixed I/O TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

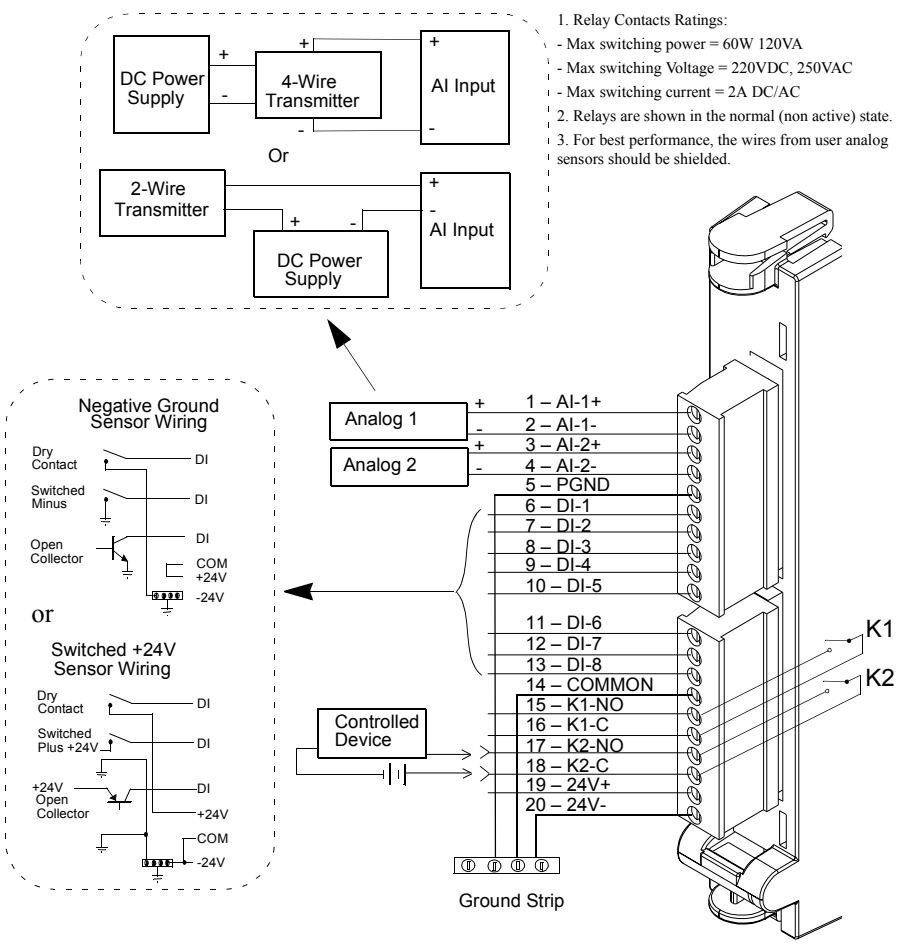


Figure 19
Mixed I/O Module – 8DI,2EE/2ML Relay, 2AI - User Connectors

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a Mixed I/O Module

To remove a mixed I/O module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Open the label panel and slide it into place.
3. Disconnect the plugs from the module TBs.
4. Pull out the mixed I/O module by pressing the top and bottom snaps.

Installing a Mixed I/O Module

To install a Mixed I/O module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1-10 and 11-20 are in the correct order.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and I/O modules (see Figure 20). The top row indicates to which module (CPU, M1, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the LEDs are off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > M1 (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 20
LED Panel

The following table describes the functions of the diagnostic LEDs, controls and connectors, when set to the 16 DI module, i.e. the relevant LED in the top row (M1, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel.

LED No.	Indication	LED No.	Indication
1	DI-1	9	DO-1
2	DI-2	10	DO-2
3	DI-3	11	
4	DI-4	12	
5	DI-5	13	UDF-1
6	DI-6	14	OVF-1
7	DI-7	15	UDF-2
8	DI-8	16	OVF-2

Replaceable Parts

Part No.	Description
3108509G18	User connections plug

8 DO MODULE FRN5825, FRN5826

Overview

The 8 DO (Digital Output) module (see Figure 21) has 8 relay outputs to drive user equipment.

The module is controlled by the CPU module and transfer feedback signals, generated by the auxiliary relays contacts.

Four of the relays (Kl to K4) are Single Pole Double Throw (SPDT), with one normally open contact (NO) and one normally closed contact (NC), and are referred as “Form C” relays.

The other four relays, namely KS to K8, are Single Pole Single Throw (SPST) normally open (NO), and are referred as “Form A” relays.

The outputs of the relays Kl to K8 are either Magnetically Latched (ML) FRN5826A or Electrically Energized (EE) FRN5825A, depending on the module option. The outputs of the magnetically latched relays maintain their state in case of power off or module failure, while the outputs of the electrically latched relays return to the non energized state in case of power off or module failure.

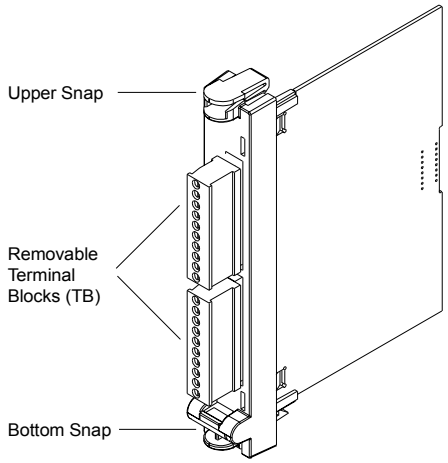


Figure 21
8 Digital Output (DO) Module - General View.

Installation

Module Location

The 8 DO module should be located in the slot designated by the Site Configuration Program (Programming Tool Box).

Connections

Connect wires from the relay output TB, located on module front panel, to user equipment.

For NEMA4X housing, thread the wires through the opening at the bottom of the box.

Pull out the transparent Label Panel located to the right of the module slots and insert the label with the TB pin connections and definitions into the appropriate slot.

Note

Ensure that the plug with connections I-I 0 is inserted into the upper TB and that the plug with connections 11-20 is inserted into the lower TB.

Figure 22 illustrates the 8 DO TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

1. Relay Contacts Ratings:
- Max switching power = 60W 125VA
- Max switching Voltage = 220VDC, 250VAC
- Max switching current = 2A DC/AC
2. Relays status shown by the LEDs correspond only to NO contact.

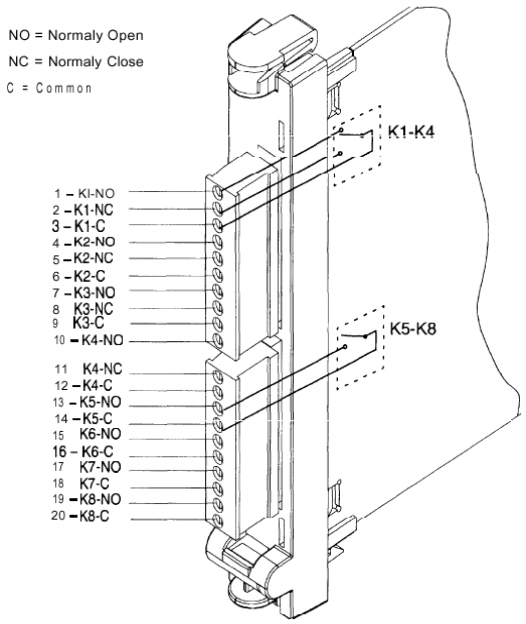


Figure 22
8 DO Module - User Connections.

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 8 DO Module

To remove a 8 DO module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Open the label panel and slide it into place.
3. Disconnect the plugs from the module TBS.
4. Pull out the module by pressing the top and bottom snaps.

Installing a 8 DO Module

To install a 8 DO module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1- 10 and 1 l-20 are in the correct order.

LED Panel

A matrix of 5 x 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and I/O modules (see Figure 23). The top row indicates to which module (CPU, Ml, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the display is off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > Ml (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 23
LED Panel

The table below describes the functions of the diagnostic LEDs when set to the 8 DO module, i.e. the relevant LED in the top row (Ml, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel.

LED lit - contact is connected to Common.

LED off - contact is disconnected from Common

LED No.	Indication	LED No.	Indication
1	Kl -NO	9	Not Used
2	K2-NO	IO	Not Used
3	K3-NO	11	Not Used
4	K4-NO	1 2	Not Used
5	K5-NO	1 3	Not Used
6	K6-NO	1 4	Not Used
7	K7-NO	1 5	Not Used
8	K8-NO	1 6	Not Used

Replaceable Parts

Part No.	Description
3108509618	User connections plug 1 O-pin

8 OPEN COLLECTOR DO FCN6045A

Overview

The 8 Open Collector Digital Output (OCDO) module (see Figure 24) has 8 transistor outputs to drive user equipment.

The module is controlled by the CPU module and transfer feedback signals.

The other four relays, namely K1 to K8, are Single Pole Single Throw (SPST) normally open (NO), and are referred as “Form A” relays.
The transistors Kl to K8 are Electrically Energized (EE) FCN6045A, The outputs of the electrically energized transistor return to the non energized state in case of power off or module failure.

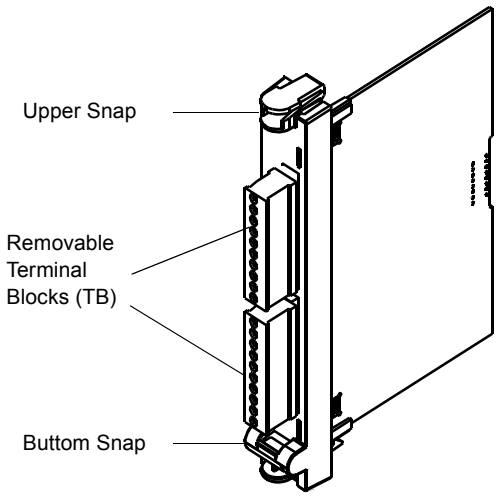


Figure 24
8 Open Collector Digital Output (OCDO) Module

Installation

Module Location

The 8 (OCDO) module should be located in the slot designated by the Site Configuration Program (Programming Tool Box). Same as the 8DO EE relays output.

Connections

Connect wires from the relay output TB, located on module front panel, to user equipment.

For NEMA4X housing, thread the wires through the opening at the bottom of the box.

Pull out the transparent Label Panel located to the right of the module slots and insert the label with the TB pin connections and definitions into the appropriate slot.

Note

Ensure that the plug with connections I-I 0 is inserted into the upper TB and that the plug with connections 11-20 is inserted into the lower TB.

Figure 25 illustrates the 8 DO TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

1. Transistor outputs Ratings:
- Max switching power = 15W
- Max switching Voltage = 30VDC
- Max switching current = 0.5A DC
2. Transistor status shown by the LEDs correspond only to NO contact.

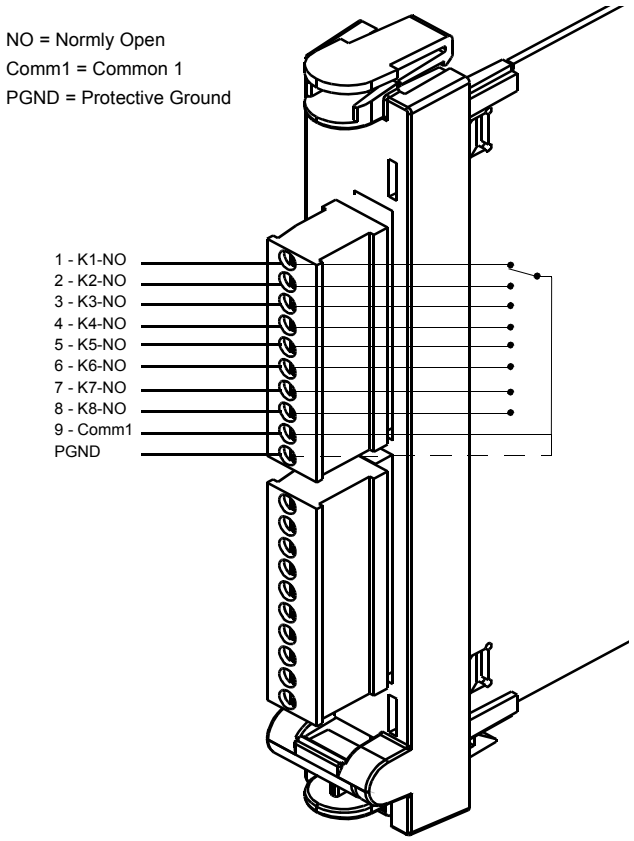


Figure 25
8 OCDO Module - User Connections.

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 8 DO Module

To remove a 8 OCDO module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Open the label panel and slide it into place.
3. Disconnect the plugs from the module TBS.
4. Pull out the module by pressing the top and bottom snaps.

Installing a 8 DO Module

To install a 8 OCDO module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1- 10 and 1 l-20 are in the correct order.

LED Panel

A matrix of 5 x 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and I/O modules (see Figure 26).

The top row indicates to which module (CPU, Ml, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the display is off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > Ml (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 26
LED Panel

The table below describes the functions of the diagnostic LEDs when set to the 8 OCDO module, i.e. the relevant LED in the top row (Ml, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel.

LED lit - contact is connected to Common.
LED off - contact is disconnected from Common

LED No.	Indication	LED No.	Indication
1	Kl -NO	9	Not Used
2	K2-NO	IO	Not Used
3	K3-NO	11	Not Used
4	K4-NO	1 2	Not Used
5	K5-NO	1 3	Not Used
6	K6-NO	1 4	Not Used
7	K7-NO	1 5	Not Used
8	K8-NO	1 6	Not Used

Replaceable Parts

Part No.	Description
3108509618	User connections plug 1 O-pin

16 DI (110VAC) FRN5939

Overview

The 16 Digital Input (DI) (see Figure 27) can receive up to 16 isolated status inputs from the user equipment. The 16 DI module transfers the data to the CPU module.

Each of the 16 discrete inputs withstands high line noise due to software controlled filters.

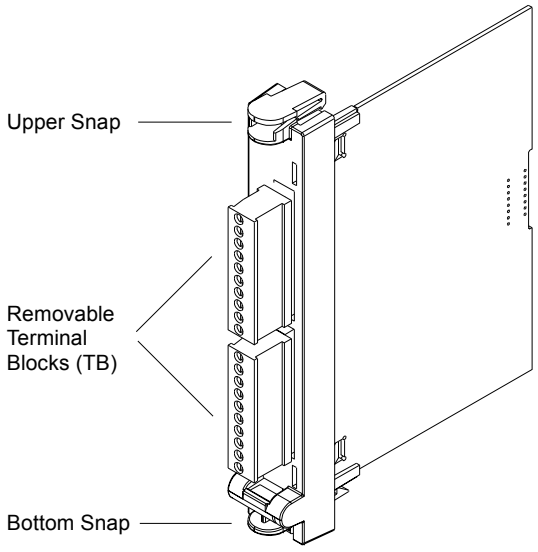


Figure 27
16 Digital Input (DI) Module

Installation

Module Location

The 16 DI module should be located in the slot designated by the Site Configuration Program (Programming Tool Box).

Connections

Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening. These wires are connected to the user interface TB located at the front of the 16 DI module.

After defining the sensors, controls and I/O module locations using the Site Configuration Program (Programming Tool Box), connect all input connections and TB pin definitions according to this configuration.

Pull out the transparent Label Panel located to the right of the module slots and insert the label with the TB pin connections and definitions into the appropriate slot.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB and that the plug with connections 11-20 is inserted into the lower TB.

Figure 28 illustrates the 16 DI TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

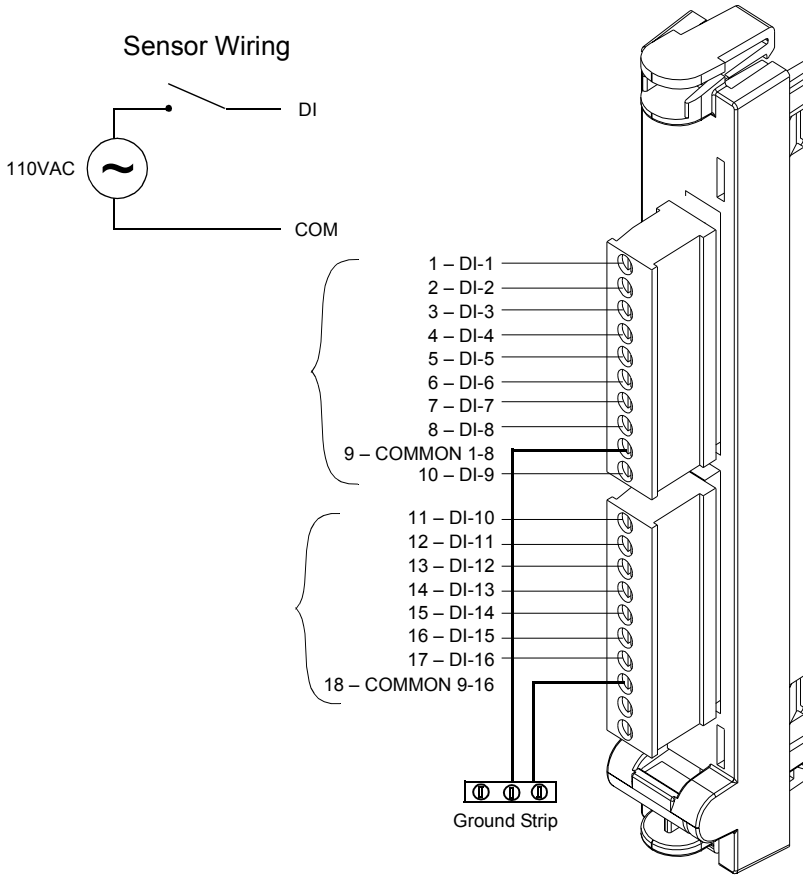


Figure 28
16 DI Module – User Connections

Removal and Installation

Verify that the DC power is turned off before removing or installing a module.

Do not connect the110V input lines to the module before installing the module in the MOSCAD-L unit. Follow local regulations regarding high Voltage when handling the MOSCAD-L unit.

Removing a 16 DI Module

To remove a 16 DI module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Open the label panel and slide it into place.
3. Disconnect the plugs from the module TBs.
4. Pull out the module by pressing the top and bottom snaps.

Installing a 16 DI Module

To install a 16 DI module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1-10 and 11-20 are in the correct order.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and I/O modules (see Figure 29). The top row indicates to which module (CPU, M1, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the display is off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > M1 (I/O Module 1) > M2 (I/O Module 2) >

M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 29
LED Panel

The table below describes the functions of the diagnostic LEDs when set to the 16 DI module, i.e. the relevant LED in the top row (M1, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel

LED No.	Indication	LED No.	Indication
1	DI-1	9	DI-9
2	DI-2	10	DI-10
3	DI-3	11	DI-11
4	DI-4	12	DI-12
5	DI-5	13	DI-13
6	DI-6	14	DI-14
7	DI-7	15	DI-15
8	DI-8	16	DI-16

Replaceable Parts

Part No.	Description
3108509G18	User connections plug 10-pin

16 OPEN COLLECTOR DO FCN6046A

Overview

The 16 Open Collector Digital Output (OCDO) module has 16 transistor outputs to drive user equipment. (See Figure 30) The module is controlled by the CPU module and transfer feedback signals.

The 16 open collector transistors, namely K1 to K16, are Single Pole Single Throw (SPST) normally open (NO), and are referred as “Form A” relays.

The transistors Kl to K16 are Electrically Energized (EE). The outputs of the electrically energized transistor return to the non-energized state in case of power off or module failure.
16 Open Collector Digital Output (OCDO) Module

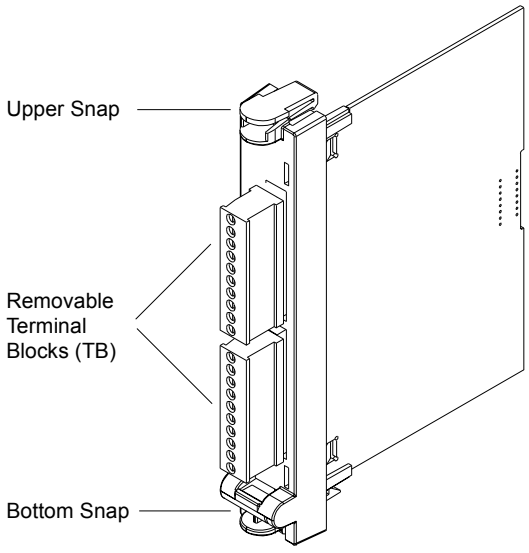


Figure 30
16 Open Collector Digital Output (OCDO) Module

Installation

Module Location

The 16 (OCDO) module should be located in the slot designated by the Site Configuration Program of the MOSCAD Programming ToolBox) (System V8.04 and above + ToolBox V8.50 Service Pack 1 and above.)

Connections

Connect wires from the output TB, located on module front panel, to user equipment.

For NEMA4X housing, thread the wires through the opening at the bottom of the box.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB and that the plug with connections 11-20 is inserted into the lower TB. Use wire gauge < 16 AWG.

Figure 31 illustrates the 16 DO TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

1. Transistor outputs Ratings:
- - Max switching power = 15W
- - Max switching Voltage = 30VDC
- - Max switching current = 0.5A DC

2. Transistor status shown by the LEDs correspond only to NO contact.

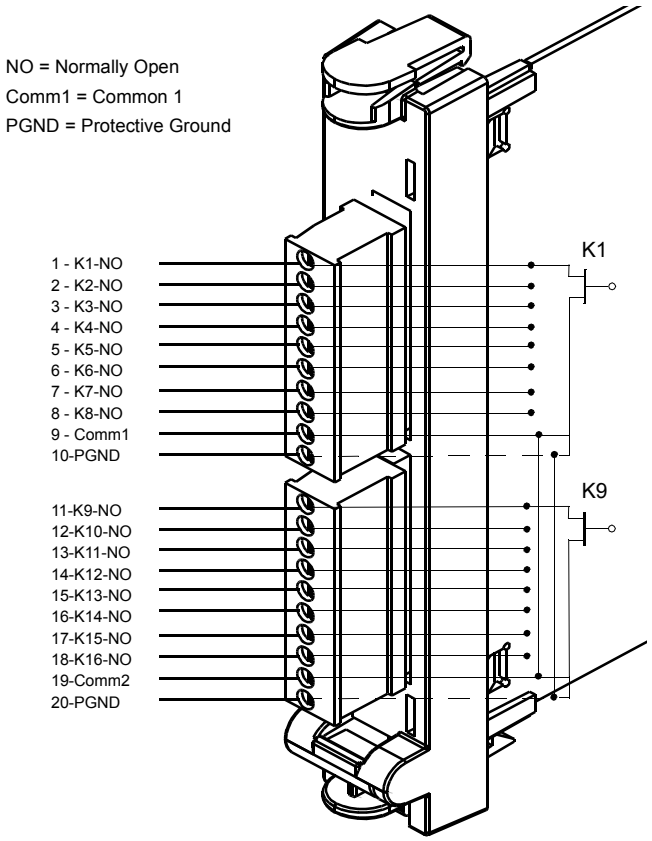


Figure 31
16 OCDO Module - User Connections

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 16 DO Module

To remove a 16 OCDO module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect the plugs from the module TBS.
3. Pull out the module by pressing the top and bottom snaps.

Installing a 16 DO Module

To install a 16 OCDO module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1- 10 and 1l-20 are in the correct order.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and I/O modules (see Figure 32).

The top row indicates to which module (CPU, Ml, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the display is off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > Ml (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 32
LED Panel

The table below describes the functions of the diagnostic LEDs when set to the 16 OCDO module, i.e. the relevant LED in the top row (Ml, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel

LED lit - collector is connected to Common.
LED off - collector is disconnected from Common

LED No.	Indication	LED No.	Indication
1	Kl -NO	9	K9 - NO
2	K2-NO	I0	K10 - NO
3	K3-NO	11	K11 - NO
4	K4-NO	12	K12 - NO
5	K5-NO	13	K13 - NO
6	K6-NO	14	K14 - NO
7	K7-NO	15	K15 - NO
8	K8-NO	16	K16 - NO

Replaceable Parts

Part No.	Description
3108509G18	User connections plug 10-pin

24 DI & 8 DO FCN6102A

Overview

The 24 Digital Input/8 Digital Output (Open Collector) module (see Figure 33) can receive up to 24 isolated status inputs from the user equipment and activate up to 8 EE (Electrically Energized) Open Collector outputs. The module transfers the data to the CPU module.

Each of the first 16 discrete inputs withstands high line noise due to software controlled filters. The other eight inputs are hardware filtered only. The first 16 discrete inputs can also be utilized as slow speed counters up to 50 Hz, using an interrupt mechanism.

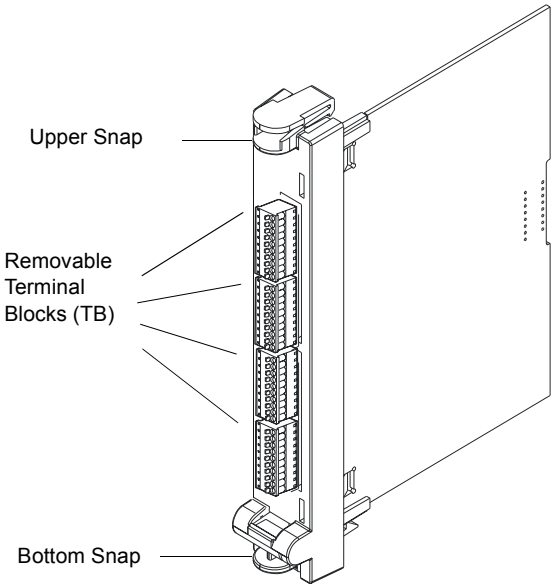


Figure 33
24 DI/8 DO Module

Installation

Module Location

The 24 DI/8 DO module should be located in the slot designated by the Site Configuration Program of the MOSCAD Programming ToolBox (System V8.04 and above + ToolBox V8.50 Service Pack 1 and above.)

Connections

Punch a hole of the appropriate size at the relevant location in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening. These wires are connected to the user interface TB located at the front of the module.

After defining the sensors, controls and I/O module locations using the Site Configuration Program (MOSCAD Programming Tool Box), connect all input connections and TB pin definitions according to this configuration.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB, that the plug with connections 11-20 is inserted into the second TB, that the plug with connections 21-30 is inserted into the third TB, and that the plug with connections 31-40 is inserted into the fourth TB. Use wire gauge 20-24 AWG.

Figure 34 illustrates the 24 DI/8 DO TB connections. These connections also appear on the label designed to be inserted in the transparent label panel, where you can add a note regarding the function of each connection.

1. Transistor outputs Ratings:
   - Max switching power = 6W
   - Max switching voltage = 30V DC
   - Max switching current = 0.2A DC
2. Transistor status shown by the LEDs corresponds only to NO contact.

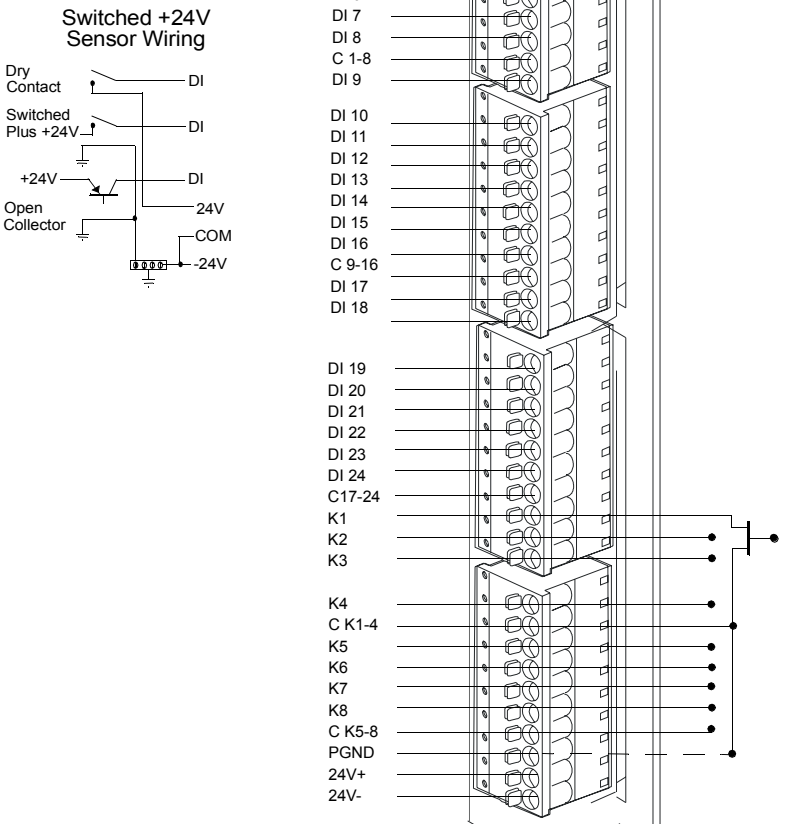


Figure 34
24 DI/8 DO Module - User Connections

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 24 DI/8 DO Module

To remove a 24 DI/8 DO module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect the plugs from the module TBS.
3. Pull out the module by pressing the top and bottom snaps.

Installing a 24 DI/8 DO Module

To install a 24 DI/8 DO module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections are in the correct order. (no. 1- 10 in the upper TB, 1l-20 in the next TB, etc.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used fordiagnostics and testing of the CPU and I/O modules (see Figure 35).

The top row indicates to which module (CPU, Ml, M2 or M3) the LED panel is set, and the blue numerals on the LED panel are I/O indications.

Setting the LED Display to the Relevant Module

If the display is off, press the pushbutton once, momentarily, to activate the LED panel. Every consecutive momentary depression of the pushputton will advance the display to the next module, in the following order: CPU > Ml (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the push-button will return the display to the CPU. Verify that the relevant LED is lit.

CPU	M1	M2	M3
LOAD 1	CONF 5	APPL 9	MON 13
RST 2	Tx1 6	Tx2 10	Tx3 14
ERR 3	Rx1 7	Rx2 11	Rx3 15
BAT 4	CM1 8	CM2 12	CM3 16

Figure 35
LED Panel

The table below describes the functions of the diagnostic LEDs when set to the 24 DI/8 DO module, i.e. the relevant LED in the top row (Ml, M2 or M3) is on. These indications also appear on the label designed to be inserted in the transparent Label Panel.

LED No.	Indication	LED No.	Indication	LED No.	Indication
13 & 1	DI - 1	14 & 1	DI - 13	15 & 1	K - 1
13 & 2	DI - 2	14 & 2	DI - 14	15 & 2	K - 2
13 & 3	DI - 3	14 & 3	DI - 15	15 & 3	K - 3
13 & 4	DI - 4	14 & 4	DI - 16	15 & 4	K - 4
13 & 5	DI - 5	14 & 5	DI - 17	15 & 5	K - 5
13 & 6	DI - 6	14 & 6	DI - 18	15 & 6	K - 6
13 & 7	DI - 7	14 & 7	DI - 19	15 & 7	K - 7
13 & 8	DI - 8	14 & 8	DI - 20	15 & 8	K - 8
13 & 9	DI - 9	14 & 9	DI - 21		
13 & 10	DI - 10	14 & 10	DI - 22		
13 & 11	DI - 11	14 & 11	DI - 23		

LED No.	Indication	LED No.	Indication	LED No.	Indication
13 & 12	DI - 12	14 & 12	DI - 24		

Digital Inputs Overview

The 24 Digital Input (DI) entries provide wet digital inputs that may also be used as low-speed counters under application control. The FCN6102A low-voltage module accepts voltage inputs in the 10-56V DC range and provides an isolated 24V DC wetting voltage so the open/closed state of dry-contact sensors may be determined. (See Figure 2 for the wiring suggestions.) Each of the inputs are opto-isolated from the remaining circuitry on the module to provide the highest possible input surge immunity. The module utilitzes connectors with the FK-MC 0,5-ST plugs based on spring energy technology.

Digital Outputs Overview

The 8 Open Collector Digital Output (OCDO) module has 8 transistor outputs to drive user equipment. The module is controlled by the CPU module and transfer feedback signals.

All transistors, namely K1 - K8, are open (NO) and are similar to Form A relays. The transistors K1 - K8 are Electrically Energized (EE). The outputs of the electrically energized transistor return to the non energized state in case of power off or module failure.

Replaceable Parts

Part No.	Description
3186607U07	User connections plug 10-pin

6 ANALOG INPUTS FRN5827, FRN5828, FRN5829, FRN5830

Overview

The 6 Analog Input (AI) module (see Figure 36) can receive up to 6 analog isolated inputs from the user equipment. The 6 AI module transfers the data to the CPU module for processing.

There are four types of 6 AI modules:

1. FRN5827A: activated by input current of 4-20mA.
2. FRN5828A: activated by input Voltage of +/-5V
3. FRN5829A: activated by input current +/-1mA
4. FRN5830A: activated by input Voltage of +/-1V

Each of the 6 analog inputs withstands high line noise due to built-in hardware low-pass filters.

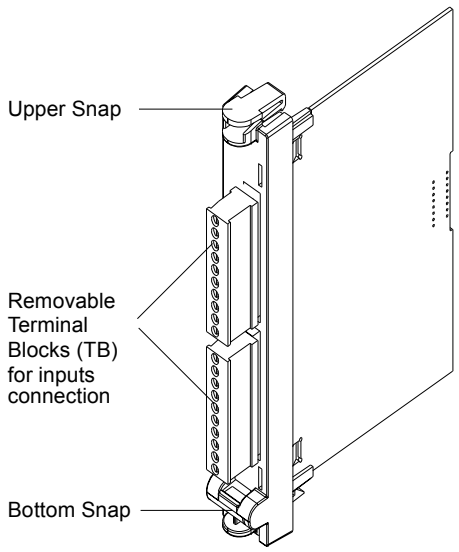


Figure 36
6 Analog Inputs (AI) Module

Installation

Module Location

The 6 AI Module should be located in the slot designated by the Site Configuration program (MOSCAD Programming Tool Box).

Connections

Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening. These wires are connected to the user interface TB located at the front of the 6 AI module.

Connect all the sensor connections to the TB terminals according to the configuration definition in the Site Configuration Program program (MOSCAD Programming Tool Box).

Specify the function of each TB pin on the label given in the transparent label panel.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB and that the plug with connections 11-20 is inserted into the lower TB.

Figure 37 illustrates the 6 AI TB connections.

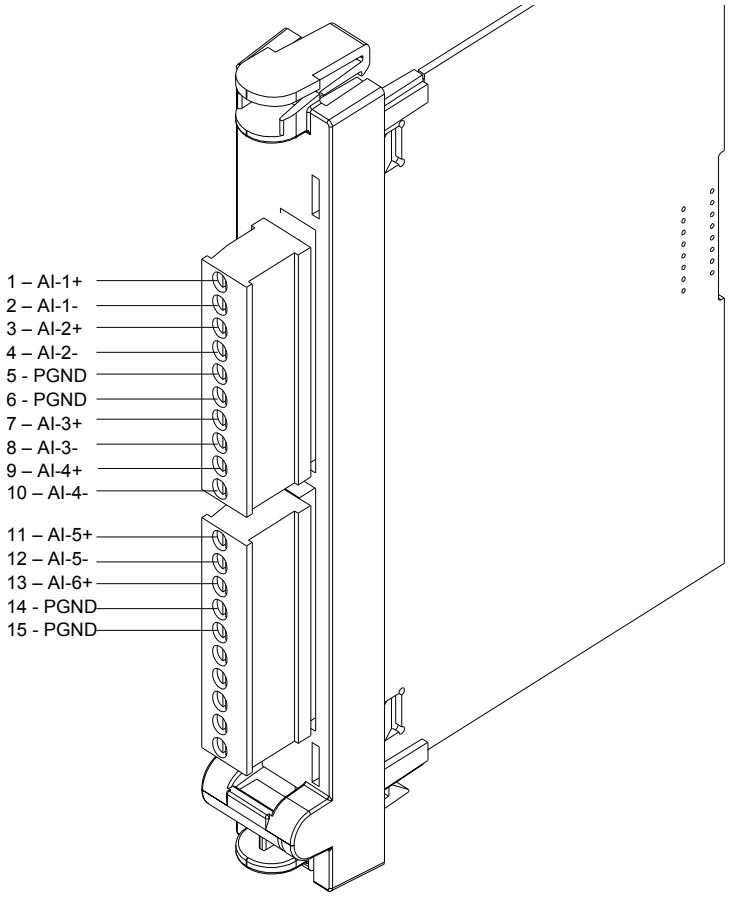


Figure 37
6 AI Module – User Connections

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 6 AI Module

To remove a 6 AI Module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Open the label panel and slide it into place.
3. Disconnect the plugs from the module TBs.
4. Pull out the module by pressing the top and bottom snaps.

Installing a 6 AI Module

To install a 6 AI Module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module TBs, verifying that connections no. 1-10 and 11-15 are in the correct order.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and the 6 AI modules (see Figure 38). The top row indicates to which module the LED display is set (CPU, M1, M2 or M3), and the blue numerals on the LED panel are the active input indications.

Setting the LED Display to the Relevant Module

If the display is off, press momentarily the pushbutton to activate the LED panel. Consecutive momentary depression of the pushputton advances the display to the next module, in the following order: CPU > M1 (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the pushbutton will return the display to the CPU.

CPU	M1	M2	M3
LOAD 1	**CONF** 5	**APPL** 9	**MON** 13
RST 2	**Tx1** 6	**Tx2** 10	**Tx3** 14
ERR 3	**Rx1** 7	**Rx2** 11	**Rx3** 15
BAT 4	**CM1** 8	**CM2** 12	**CM3** 16

Figure 38
LED Panel

The table below describes the functions of the diagnostic CPU module LEDs when set to the 6 AI module.

LED No.	Indication
1	AI-1 input current or Voltage is lower than specified
2	AI-1 input current or Voltage is higher than specified
3	AI-2 input current or Voltage is lower than specified
4	AI-2 input current or Voltage is higher than specified
5	AI-3 input current or Voltage is lower than specified
6	AI-3 input current or Voltage is higher than specified
7	AI-4 input current or Voltage is lower than specified
8	AI-4 input current or Voltage is higher than specified
9	AI-5 input current or Voltage is lower than specifieda
10	AI-5 input current or Voltage is higher than specified
11	AI-6 input current or Voltage is lower than specified
12	AI-6 input current or Voltage is higher than specified

Replaceable Parts

Part No.	Description
3108509G18	User connections plug 10-pin

4 ANALOG OUTPUTS FTN8039

Overview

The 4 Analog Outputs (AO) module (see Figure 39) provides 4 optically isolated analog channels for controlling user devices.

Each channel has two separate outputs: 4-20mA and 0-5V interface industry standard outputs. Only one of the outputs can be used in a particular channel - either current or voltage.

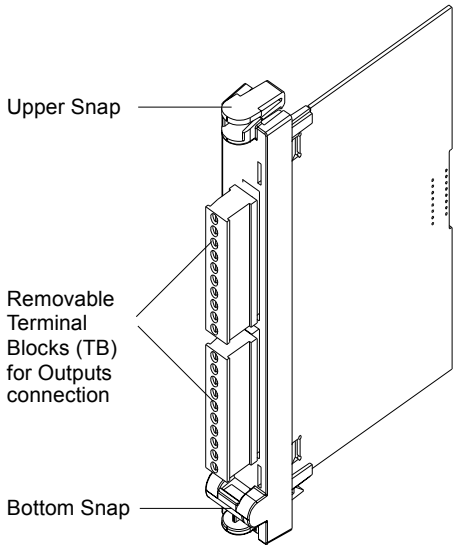


Figure 39
4 Analog Outputs (AO) Module

Installation

Module Location

The 4 AO Module should be located in the slot designated by the Site Configuration program (MOSCAD Programming Tool Box).

Connections

Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening. These wires (20 AWG gage, twisted pair wires are recommended) are connected to the TBs, located at the front of the 4 AO module (see Figure 40).

Connect the controlled equipment to the TBs according to the configuration definition in the Site Configuration program (MOSCAD Programming ToolBox).

Specify the function of each TB point on the label given in the transparent label panel.

Note

Ensure that the plug with connections 1-10 is inserted into the upper TB connector and that the plug with connections 11-20 is inserted into the lower TB connector.

This module supports both internal and external power supply sources to drive the analog outputs.

When the internal P.S option is set, and the MOSCAD-L AC power supply fails - all outputs that serve as current source are lowered to zero, to save battery energy. Outputs that serve as voltage source maintain normal operation.
When the battery power drops below 10.8 V the CPU shuts down, and after 16 seconds all outputs are lowered to zero.

When using an external P.S source (see Figure 40), all outputs resume normal operation during MOSCAD-L AC power supply fail. This can happen as long as the battery level remains above 10.8 V. When the battery power drops below 10.8 V the CPU shuts down and after 16 seconds all outputs are lowered to zero.

Perform the following steps to select external or internal P.S source:

1. To select an external P.S, place jumper P3 (see Figure 40) on pins 1 and 2 on the analog output board option, or pins 3 and 2 for internal P.S.

2. Configure the analog output module using the MOSCAD Programming ToolBox application.

Note

To ensure proper operation, verify that the GND terminal is grounded at all times (see Figure 40).

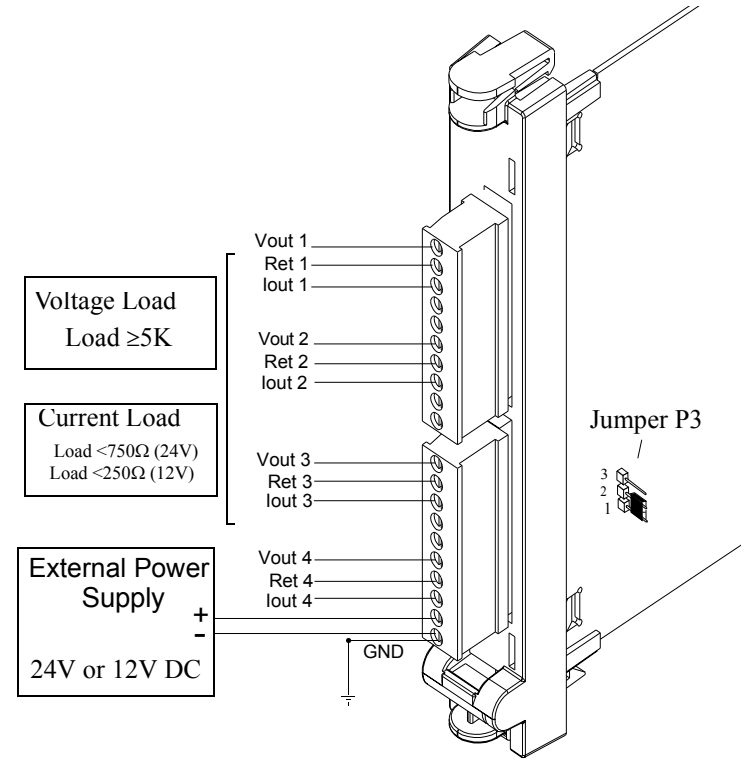


Figure 40
4 AO Module – User Connections

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module.

Removing a 4 AO Module

To remove a 4 AO Module from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect the plugs from the module.
3. Pull out the module by pressing the top and bottom snaps.

Installing a 4 AO Module

To install a 4 AO Module in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the module into the appropriate RTU slot until the snaps click into place.
3. Reconnect the plugs into the module, verifying that connections are in the correct order.

LED Panel

A matrix of 5 × 4 LEDs, located on the CPU module, is used for diagnostics and testing of the CPU and the 4 AO modules (see Figure 41). The top row indicates to which module the LED display is set (CPU, Module 1, Module 2 or Module 3), and the blue numerals on the LED panel are the active output indications.

Setting the LED Display to the Relevant Module

If the display is off, press momentarily the pushbutton to activate the LED panel. Consecutive momentary depression of the pushbutton advances the display to the next module, in the following order: CPU > M1 (I/O Module 1) > M2 (I/O Module 2) > M3 (I/O Module 3). The next depression of the pushbutton will return the display to the CPU.

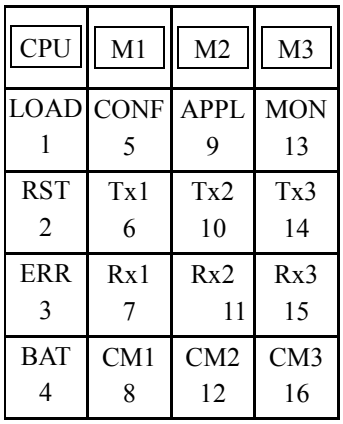


Figure 41
LED Panel

The table below describes the functions of the diagnostic CPU module LEDs when set to the 4 AO module.

LED No.	Indication
1	UPD1 - The UPD LED blinks when channel 1 is being updated.
2	UCAL1 - This LED turns ON when the output calibration factor (Vout or Iout) is out of range.
3	Vout1 output is active.
4	Iout1 output is active.
5	UPD2 - The UPD LED blinks when channel 2 is being updated.
6	UCAL2 -This LED turns ON when the output calibration factor (Vout or Iout) is out of range.
7	Vout2 output is active.
8	Iout2 output is active.
9	UPD3 - The UPD LED blinks when channel 3 is being updated.
10	UCAL3 -This LED turns ON when the output calibration factor (Vout or Iout) is out of range.
11	Vout3 output is active.

LED No.	Indication
12	Iout3 output is active.
13	UPD4 -The UPD LED blinks when channel 4 is being updated.
14	UCAL4 -This LED turns ON when the output calibration factor (Vout or Iout) is out of range.
15	Vout4 output is active.
16	Iout4 output is active.

Replaceable Parts

Part No.	Description
3108509G18	User connections plug 10-pin

HT1000 OR MTS2000 RADIO

Overview

The RTU can be supplied with a HTl000 or MTS2000 radio for transmission of data to a remote location.

The radio is pre-installed on the door of the RTU housing (refer to Figure 1).


Note

In case that another radio type is being used, refer to the dedicated instructions supplied with the radio.

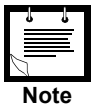
Connections

Verify that the radio DC cable is connected to connector (AUX) on the Power Supply.

Verify that the radio communication cable is connected to the connector on the panel of the radio adaptor unit on one end, and to Port 3 of the CPU at the other end. Screw the antenna cable into the antenna connector at the bottom of the RTU housing.

Operation

Set the radio ON/OFF knob to the ON position.


Note

The volume at which the radio is set is insignificant. However, to minimize battery power consumption in case of a power failure, it is recommended to set the volume to the minimum.

Removing the Radio

To remove the radio from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect the DC power and antenna cables from the radio.

3. Disconnect the communication cable.
4. Remove the screw securing the radio mounting bracket to the door.

Installing the Radio

To install the radio on the RTU, proceed as follows:

1. Turn off the DC power.
2. Place the radio and secure the screw of the radio mounting bracket to the door.
3. Reconnect the communication cable.
4. Reconnect the DC power and antenna cables to the radio.

GENERAL PORTABLE RADIO INTERFACE BOARD FRN5936A

Overview

The General Conventional Portable Radio Interface kit (FRN5936A) (see Figure 42) enables the MOSCAD-L unit to perform radio data communication by using other radio types that comply with the physical and data interface specifications detailed in this document.

The interface board uses an on-board power supply that serves the radio in use. The power supply provides various output voltages (6, 7.5, 9, 9.5 or 10.5 VDC) to enable the connection of wide range of radios. The output voltage is selected by setting a jumper on the interface board. The default voltage setting is 7.5 VDC.

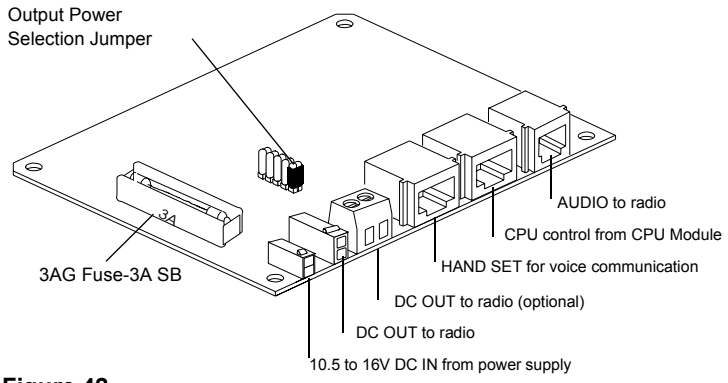


Figure 42
General Portable Radio Interface Board.

Installation

Unit Location

The interface board is held by the horizontal snaps, located on top of the modules in MOSCAD-L unit (see Figure 43).

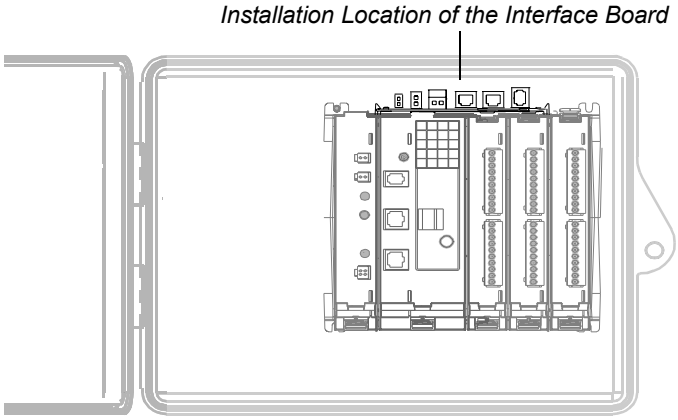


Figure 43
General Portable Radio Interface Board – Installation Location

Connections

Follow the instructions below for connecting the interface board. Note that the items mentioned in the brackets correspond to Figure 44.

1. Connect audio communication cable FKN4798A (see item 1) between the port marked “AUDIO” of the interface board and radio socket marked ‘EAR-MIC.
2. Connect control cable FKN5953A (see item 2) between the CPU port of the interface module and port 3 of the CPU module.
3. Connect DC Output cable FKN4468A (see item 3) from the interface board to the radio power input.

4. Connect DC Input cable FKN4800A (see item 4) from the power supply module (AUX connector) to DC IN input of the interface board.

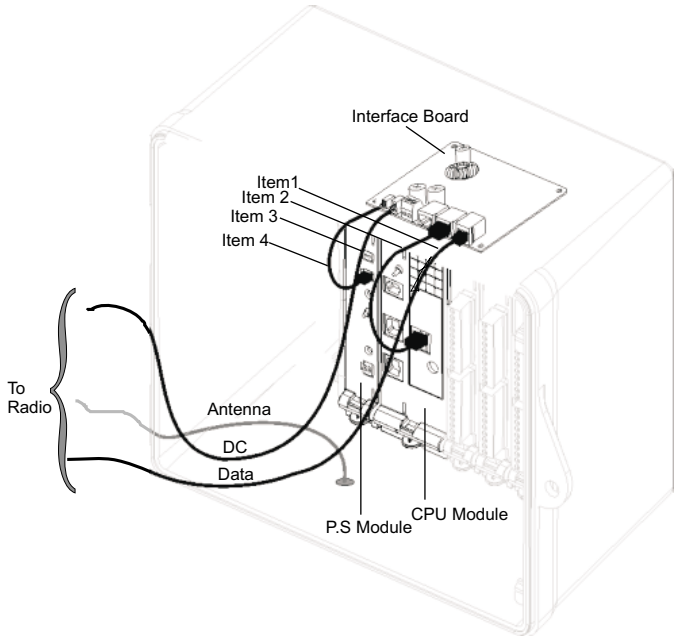


Figure 44.
General Portable Radio Interface Board - Wire Connections

Specifications

Input Voltage:	10.5 to 16 VDC.
Output Voltage:	7.5VDC @ 2A (Default) without jumpers. 6VDC @ 2A. 9VDC @ 2A @ 11.5 VDC minimum input. 9.5VDC @ 2A @ 11.5 VDC minimum input. 10.5VDC @1.5A @ 13 VDC minimum input.
P.S Standby Current:	30 mA typical without radio.
Current Limit:	2.5A ±10% typical (2.8 A maximum).
Line and Load Regulation:	±5% from nominal voltage.
Output ripple:	20mV RMS typ. 100mV RMS max.
PTT:	Current: Up to 200 mA. Active By (56 Ohm typical): low impedance between TX line and GND. Not active: high impedance between TX line and GND.
AGC Dynamic Range (on receive signal from the radio):	Input = 80mV to 1V pp; output = 1V pp ±20% (typical); 1.6 V maximum.
Channel Monitoring	Active “high” (DC level on receive signal ≥1.5 VDC to the radio supply Voltage.
Transmit Audio Output (to MIC radio input):	5 to 6mV (±10%) RMS. typ. for nominal TX deviation (1.3 to 2.2Khz @12.5 Khz or 2 to 4 Khz @ 25 Khz channel space radio).
Transmit Audio Input (modem output from MOSCAD):	130 to 190 mV RMS typical.

Connections:	Input voltage: one connector MOLEX 2 contacts. Output voltage: one connector MOLEX 2 contacts or one TB 2contacts. Handset (opt): one RJ45 8 contacts. Audio & Signal Inputs: one RJ45 8 contacts. GND, Rx&Tx Signals output: one RJ45 6 contacts.

Replaceable Parts

Part No.	Description
FRN5934A	General Conventional Portable Radio Interface Board.
FKN4798A	Communication Cable.
FKN5953A	Control Cable.
FKN4468A	DC Out Cable.
FKN4800A	DC Input Cable.
3108509G10	User connection plugs 2-pin.

Communication Cable

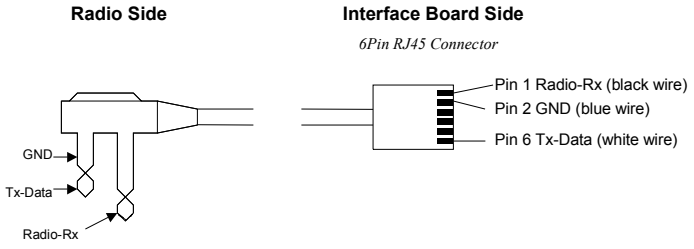


Figure 45
Communication Cable FKN4798 - Pin Description

LINE INTERFACE UNIT

Overview

The Line Interface Unit provides the interface required to connect the internal line modem (installed in the CPU) to various types of communication lines.

The unit transmitting level is –10 dBm into 600 Ω impedance. The receiving dynamic range is –3 dBm to –47 dBm. The unit's line impedance is 600 Ω in both receiving and transmitting states.

Options

There are several optional Line Interface Units, each of which supports a different type of communication line. The following table details the available options:

Type	Description
Tel Line (FRN1985)	Interface the internal modem to a telephone line. The telephone line interface operates in full-duplex mode.
Multi-drop (FRN1986)	This option allows the CPU internal line modem to communicate with several modems in other RTUs using a single pair of wires. The multi-drop interface operates in half-duplex mode. **Note**: Only the 1200 BPS internal line modem is supported by the multi-drop option.
Leased Line (FRN1987)	This option enables the connection of the CPU internal line modem to a communication line using a dedicated pair or two pairs of wires. The leased line interface operates in full-duplex mode.

Installation

Note

The Line Interface Unit can only be operated when the Internal Modem board (FRN5669A or FRN5639A) is installed in the CPU module.

Unit Location

The unit is pre-installed in the horizontal snap in at the top of the frame (above the CPU and I/O modules), see Figure 46.

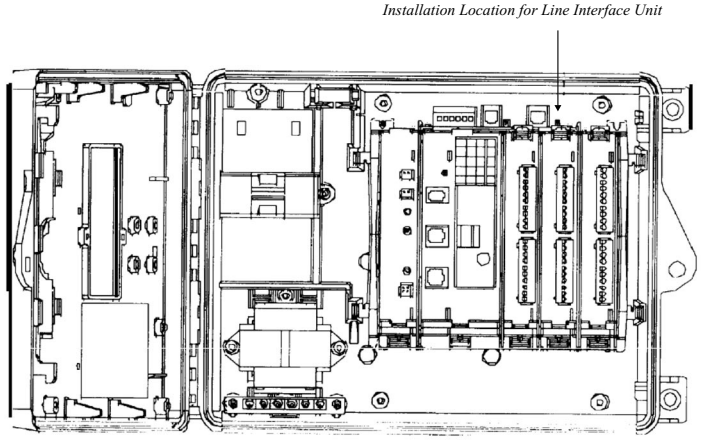


Figure 46
Line Interface Unit – Installation Location

Note

The RS232 Multiplexer, RS485 adaptor and Line Interface Unit are installed in the same place, and are mutually exclusive, i.e. only one of these modules can be installed in the RTU.

Connections

Follow the Internal Connection instructions below for all options, and the specific External Connection instructions corresponding to the option being installed.

- **Internal Connections**

1. Connect communication cable FKN5953 between the port marked “FROM MODEM” of the line interface unit and port 3 of the CPU.

2. Connect a grounding wire between terminal 6 of the TB connector located on the Line Interface Unit and the protective ground strip located at the left side of the RTU housing.

• External Connections

Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the wires through the opening.

Telephone Line Option (See Figure 47)

There are two options for connecting the line wire to the Line Interface Unit:

– If the telephone line has an RJ11 connector, plug it into the LINE connector on the unit's front panel.

or:

– If the telephone line is comprised of two wires, connect the wires to terminals 1 and 2 of the unit's front panel TB. The polarity is insignificant.

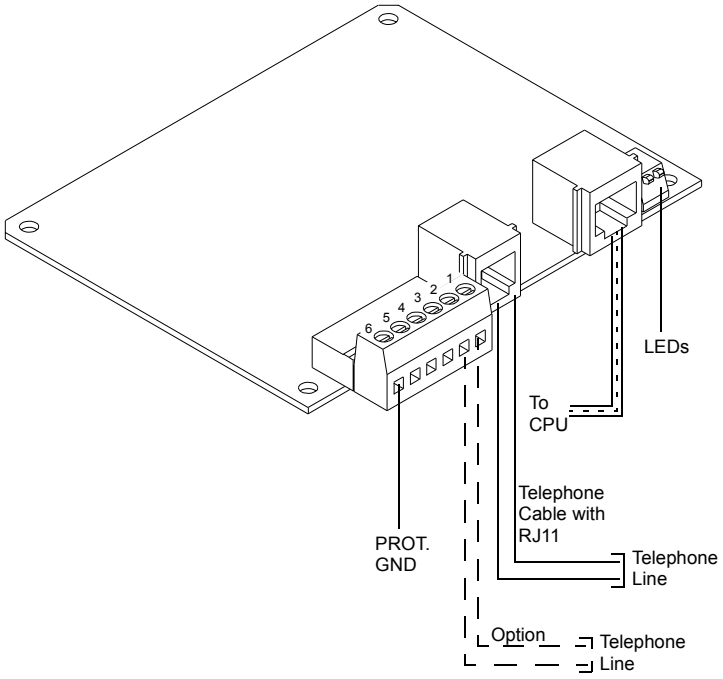


Figure 47
Line Interface Unit – Telephone Line Option Electrical Connections

Multi-Drop Option (See Figure 48)

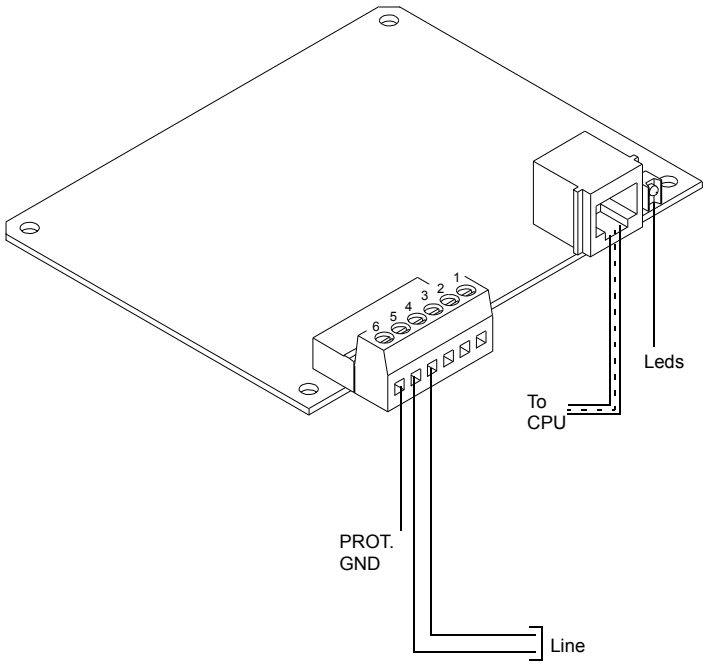


Figure 48
Line Interface Unit – Multi-Drop Option Electrical Connections

Connect the line wires to terminals 4 and 5 of the Line interface Unit's front panel TB.Leased Line Option (Figure 48)

This option supports both two and four wire connections. Follow the relevant instructions below.

Two-Wire Line Connection

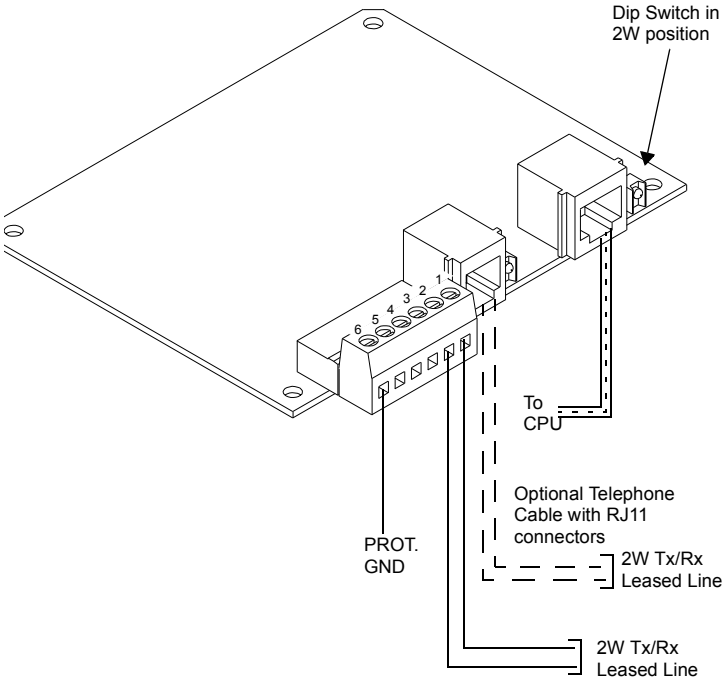


Figure 49
Line Interface Unit – 2W Leased Line Option Electrical Connections

1. Set both switches of dip-switch 2W/4W SELECT on the Line Interface Unit's front panel to position 2W.
2. There are two options to connect the line wire to the Line Interface Unit:

   – If the telephone line has an RJ11 connector, plug it into the 2-WIRE LINE connector on the unit's front panel.

or:

   – If the telephone line does not have an RJ11 connector, connect the wires to terminals 1 and 2 of the unit's front panel TB. The polarity is insignificant.

Four-Wire Line Connection

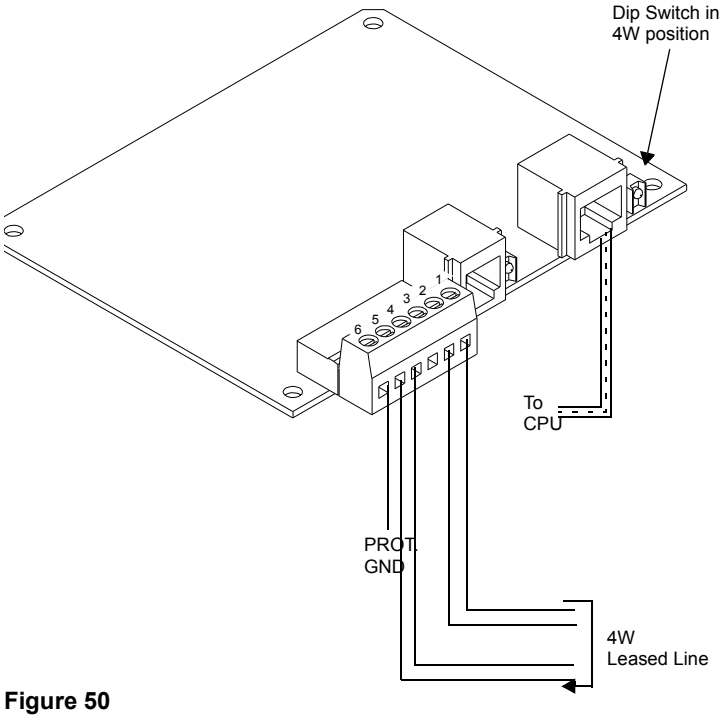


Figure 50
Line Interface Unit – 4W Leased Line Option Electrical Connections

1. Set both switches of dip-switch 2W/4W SELECT on the front panel of the Line Interface Unit to position 4W.
2. Connect the TX line wires to terminals 1 and 2 of the unit's front panel TB. The polarity is insignificant. Note that this line should be connected to the RX input of the line's interface (modem), at the other end of the line.

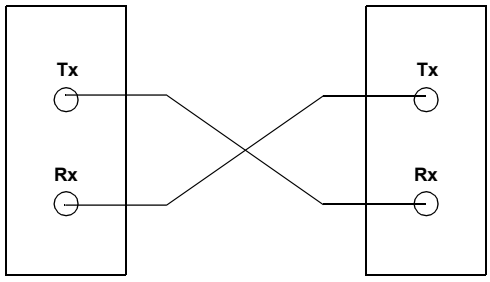


Figure 51
Typical 4-Wire Line Modem Interconnection

3. Connect the RX line wires to terminals 4 and 5 of the TB on the front panel of the unit. The polarity is insignificant. Note that this line should be connected to the TX input of the line interface (modem) at the other end of the line.

Removal and Installation

Warning

Verify that the DC power is turned off before removing or installing a module

Removing the Line Interface Unit

To remove the Line Interface Unit from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect the Line Interface Unit connections.
3. Pull out the module by pressing the side snaps.

Installing a Line Interface Unit

Note

If you are installing a new Line Interface Unit, remove it from the plastic cover and install the bare board in its place in the RTU housing.

To install a Line Interface Unit in the RTU, proceed as follows:

1. Turn off the DC power
2. Slide the module into its rack until the snaps click into place.
3. Reconnect the Line Interface Unit connections.

Diagnostic LEDs

The LED indications of the Line Interface Unit are described below:

Telephone Line Option

OFF HOOK – Indicates that the modem is in off-hook state (lit).

RING – Indicates an incoming call ring (lit).

Multi-Drop Option

TX – Indicates transmission from the modem (lit).

Replaceable Parts

Part No.	Description
FKN5953A	CPU-to-radio communication cable
2808508G10	Modem connection TB (6 contacts)

RS232 MULTIPLEXER

Overview

The RS232 Multiplexer provides RS232 serial port expansion from one input port to four expansion ports.

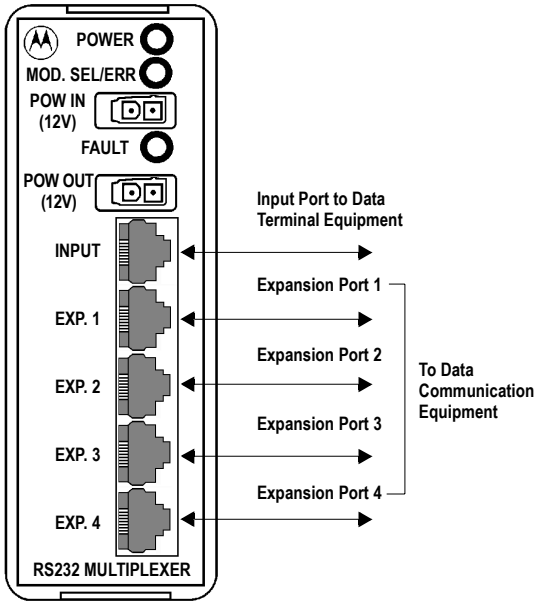


Figure 52
RS232 Multiplexer

The RS232 Multiplexer can be configured to 16 different operating modes. Eight operating modes are predefined and eight are reserved for future use. The RS232 Multiplexer can be programmed using the Programming Tool Box or any other program that can communicate by RS232.

The RS232 Multiplexer input port serves both as a data port and as a programming port. Input signals RTS and DTS distinguish between the data and programming modes.

The initial data transfer rate is 9600 bps. Once the RS232 Multiplexer is programmed, the data communication rate can be configured at a rate between 300 and 19200 bps.

Note

For additional information on the use and programming of the RS232 Multiplexer, see the RS232 Multiplexer Owner's Manual (68P02950C40).

Installation

Unit Location

The unit is pre-installed in the horizontal slot at the top of the frame (above the CPU and I/O modules), as shown in Figure 53.

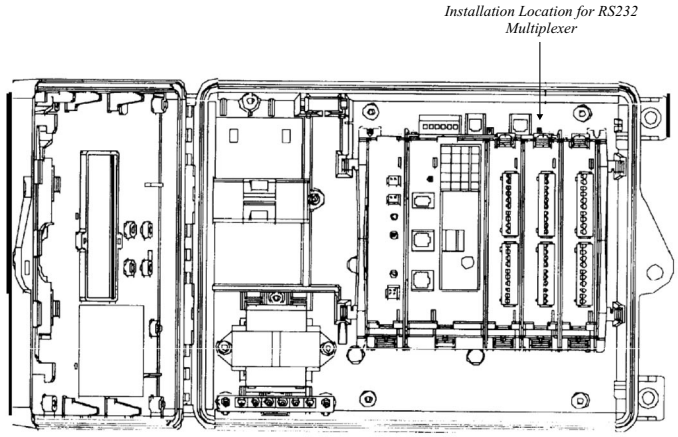


Figure 53
RS232 Multiplexer – Installation Location

Note

The RS232 Multiplexer, RS485 Multiplexer and Line Interface Unit are installed in the same slot, and are mutually exclusive, i.e. only one of these modules can be installed in the RTU.

Connections

Proceed as follows to connect the RS232 multiplexer:

1. Connect power cable FKN4090 from PS Module "AUX" to the PWR IN connector. The green POWER LED will turn on.
2. Connect communication cable FKN5953 between the Multiplexer Input port and the CPU RS232 port.
3. Connect additional communication cables from expansion ports EXP1, EXP2, EXP3 or EXP4 to the user.

Note

If the length of communication cable FKN5953 (80 cm) may not be sufficient for external connections, use a longer cable.

4. Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the external connection cables through the opening.
5. Connect the communication cables to your RS232 devices

Note

You can use the RS232 Power outlet to connect additional multiplexers.

Removal and Installation

Warning

Verify that the DC power is turned off before removing or replacing modules in the RTU.

Removing the RS232 Multiplexer

To remove the RS232 Multiplexer from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect all RS232 Multiplexer input and output connections.
3. Pull out the RS232 Multiplexer by pressing the side snaps.

Installing a RS232 Multiplexer

Note

If you are installing a new RS232 Multiplexer, remove it from the plastic cover and install the bare board in its place in the RTU housing.

To install a RS232 Multiplexer in the RTU, proceed as follows:

1. Remove the two protruding pins at the front of the rack where the RS232 Multiplexer is to be installed.
2. Turn off the DC power.
3. Slide the RS232 Multiplexer into its slot until the snaps click into place.
4. Reconnect the RS232 Multiplexer connections.

Diagnostic LEDs

The LED indications of the RS232 Multiplexer are described as follows:

LED Name	Color	Indication
POWER	green	Indicates that all board voltages exist
MOD SEL/ERR	yellow	Indicates one of the following: – Power Up testing – Unit is being programmed
FAULT	red	Indicates a fault condition

RS485 CONNECTION BOARD

Overview

The RS485 Connection Board provides RS485 serial port expansion from one input port to six expansion ports.

Installation

Unit Location

The unit is pre-installed in the horizontal slot at the top of the frame (above the CPU and I/O modules), see Figure 54.

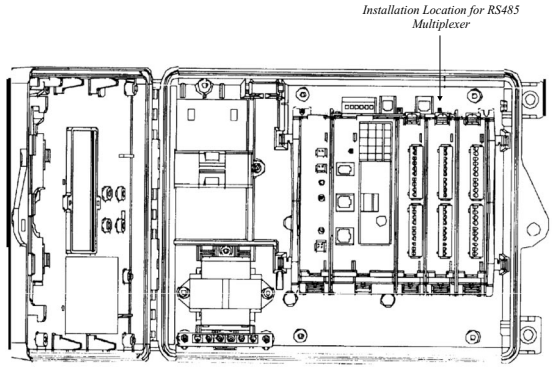


Figure 54
RS485 Connection Board - Installation Location

Note

The RS232 Multiplexer, RS485 Connection Board and Line Interface Unit are installed in the same place, and are mutually exclusive, i.e. only one of these modules can be installed in the RTU

Connections

To connect the RS485 Connection Board proceed as follows:

1. Connect communication cable between the Multiplexer Input port and the CPU RS485 port (port 1A).
2. Punch a hole at the relevant location and of the appropriate size in one of the perforated circles at the bottom of the RTU housing and thread the external connection cables through the opening.
3. Connect the communication cables (FKN4400) to your RS485 devices.

Removal and Replacement

Warning

Verify that the DC power is turned off before removing or replacing modules in the RTU.

Removing the RS485 Connection Board

To remove the RS485 Connection Board from the RTU, proceed as follows:

1. Turn off the DC power.
2. Disconnect all RS485 Connection Board input and output connections.
3. Pull out the RS485 Multiplexer by pressing the side snaps.

Installing a RS485 Connection Board

Note

If you are installing a new RS485 Connection Board, remove it from the plastic cover and install the bare board in its place in the RTU housing.

To install a RS485 Connection Board in the RTU, proceed as follows:

1. Turn off the DC power.
2. Slide the RS485 Connection Board into its slot until the snaps click into place.
3. Reconnect the RS485 Connection Board connections.

APPENDIX A: CABLES AND ADAPTORS

General

This appendix provides supplementary data on cables and adaptors used in various MOSCAD-L systems. The following applications are covered:

- RTU-to-computer/terminal connections
- RTU-to-modem connections
- RTU-to-RTU connections
- Connecting a user port to a printer
- Transformer to power supply module
- External 20-40VDC, 14-28VAC Cable
- Solar panel to power supply Cable

RTU-to-Computer/Terminal Connections

For a 25-pin or 9-pin D-type connector, use the FLN6457 cable kit, in order to connect one of the RTU RS-232 ports to a computer or terminal. The kit includes a cable with RJ45 modular jacks on both ends, a RJ45 to 25-pin female D-Type adaptor, and an RJ45 to 9-pin D-Type adaptor.

The RTU port configuration is as follows:

CPU Port No.	Used with Piggyback Board	Toolbox Definition
1B	–	RS-232 UART Local Computer (MDLC)
2	–	RS-232 UART Local Computer (MDLC)
3	FRN5655A	RS-232 UART Local Computer (MDLC)
3	FRN5724A	RS-232 UART Local Computer (MDLC)

Note

When a User Port is defined as Computer/Terminal with DTR support:

1. The RTU will not transmit unless it receives a DTR=on signal from the computer/terminal.
2. The RTU will not receive unless it receives a DTR=on signal from the computer/terminal.

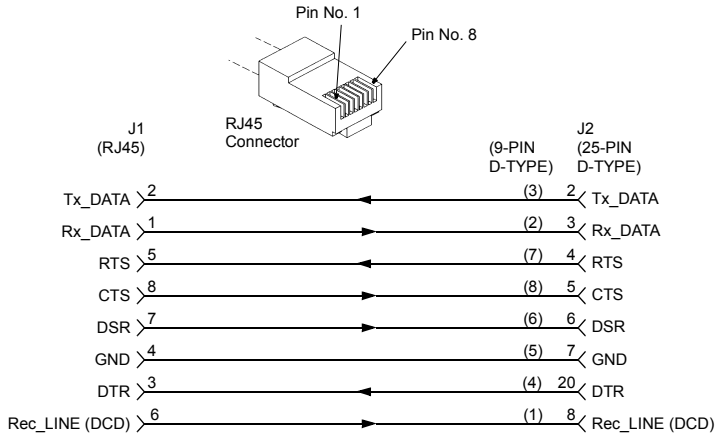


Figure 55
RJ45-to-D-Type Female Connector Adaptor

RTU-to-Modem Asynchronous Connection

For a 9-pin or 25-pin connections, use the FLN6458 cable kit to connect one of the MOSCAD-L RTU RS-232 ports asynchronously to a modem (The RTU serves as DTE). The kit includes a cable with RJ45 modular jacks on both ends and a RJ45 to 9-pin and 25-pin male D-Type adaptor (see Figure 56). The possible RTU configurations are detailed below:

CPU Port No.	Used with Piggyback Board	Toolbox Definition
2	–	RS-232 UART External Modem (MDLC)
3	FRN5655A	RS-232 Asynchronous External Modem, Full Duplex or Multi-Drop Half Duplex
3	FRN5724A	RS-232 Asynchronous External Modem, Full Duplex or Multi-Drop Half Duplex

Notes

1. Before transmitting, the RTU sends a RTS=on signal to the modem, and will not transmit unless it receives a feedback CTS=on signal from the modem.
2. The RTU will not receive unless it receives a DCD=on signal from the modem.
3. When using a modem in auto-answer mode (connected to a computer port) for remote service, the RTU does not support the RTS/CTS protocol, as the port is designed to operate with a local computer as well as with a modem. Refer to the jumper settings detailed in the Utilities section of the Programming Tool Box Operating Instructions manual.

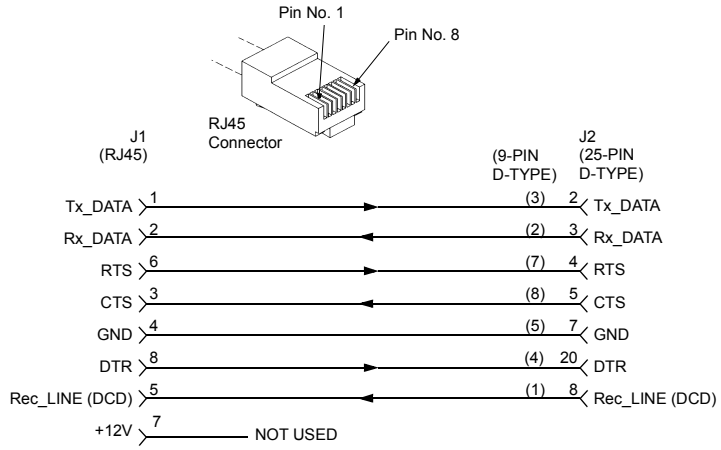


Figure 56
RJ45-to-D-Type Male Connector Adaptor

RTU-to-Modem Synchronous Connection (DTE-to-DCE)

Use the FLN6704A cable kit to connect one of the MOSCAD-L RTU RS-232 ports to a modem synchronously (the RTU serves as a DTE). The kit includes a cable with RJ45 modular jacks on both ends and a RJ45 to 25-pin female D-Type adaptor (see Figure 57). The possible RTU configurations are detailed below:

CPU Port No.	Used with Piggyback Board	Toolbox Definition
3	FRN5654A	RS-232 Synchronous External Modem, Full Duplex or Multi-Drop Half Duplex, Darcom Modem, Darcom Master/Repeater
3	FRN5724A	RS-232 Asynchronous External Modem, Full Duplex or Multi-Drop Half Duplex, Darcom Modem, Darcom Master/Repeater

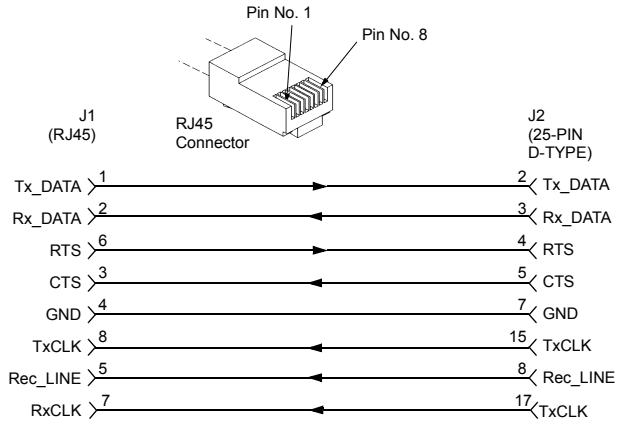


Figure 57
RJ45-to-D-Type Male Connector Adaptor

RTU-to-RTU Connection

RTU-to-Multiple RTUs Time Synchronization Using *SYNCH* Broadcast (via Port 1B)

The interconnection diagram below describes the Time Synchronization method which uses a SYNCH broadcast via port 1B (refer to Figure 58).

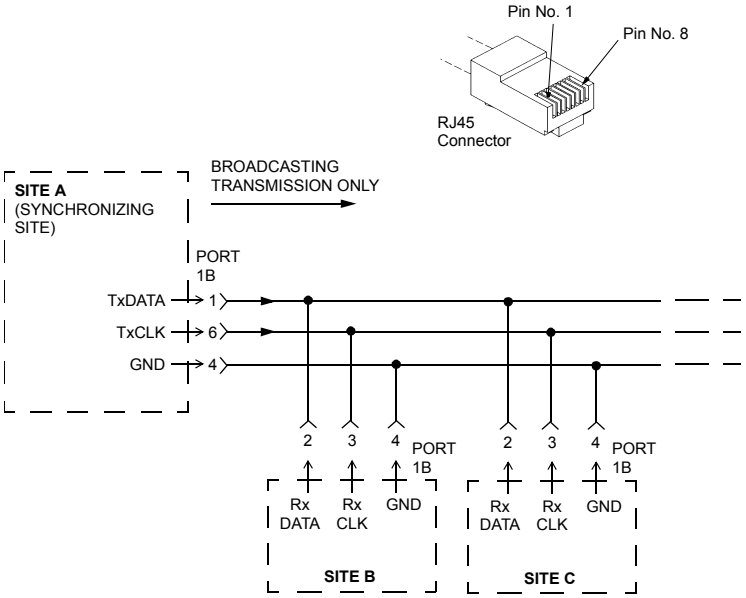


Figure 58
Time Synchronization using SYNCH Broadcast – Interconnection Diagram

RTU-to-RTU Asynchronous Communications Connection

This section provides data on the cable recommended for the RTU-to-RTU RS-232 asynchronous interconnection (not supplied) (refer to Figure 59). The following table defines the RTU port for this connection type.

CPU Port No.	Used with Piggyback Board	Toolbox Definition
1B	–	RS-232 UART RTU-to-RTU (MDLC)
2	–	RS-232 UART RTU-to-RTU (MDLC)
3	FRN5655A	RS-232 UART RTU-to-RTU (MDLC)
3	FRN5724A	RS-232 UART RTU-to-RTU (MDLC)

Note

When the connector is facing upwards, the lefthand pin is Pin No. 1, and the righthand pin is Pin No. 8.

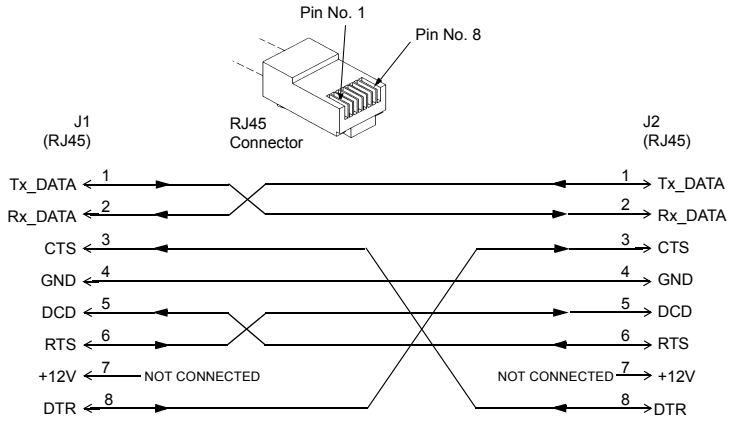


Figure 59
RTU-to-RTU RS-232 Asynchronous Communications Cable

RTU-to-RTU Synchronous Communications Connection (via port 1B)

This section provides data on the cable recommended for RTU-to-RTU RS-232 synchronous communications via RTU port 1B (not available) (see Figure 60). The cable should be connected to the CPU as follows:

CPU Port No.	Used with Piggyback Board	Toolbox Definition
1B	–	RS-232 Synchronous RTU-to-RTU (MDLC) Full Duplex or Half Duplex

Note

When the connector is facing upwards, the lefthand pin is Pin No. 1, and the righthand pin is Pin No. 8.

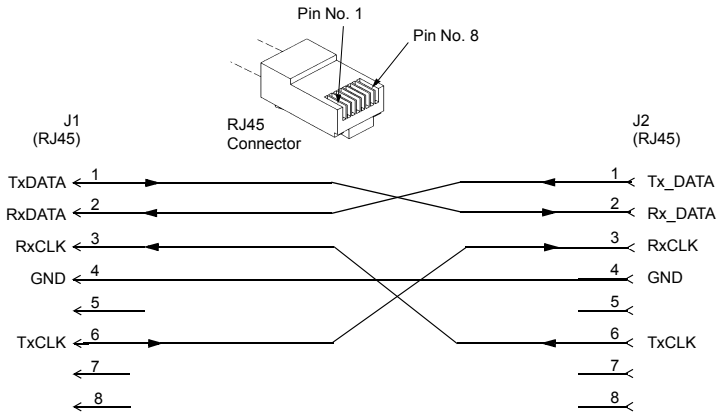


Figure 60
RTU-to-RTU Synchronous Communications Cable

RTU-to-RTU RS-232 Synchronous Communications Connection (via port 3)

This section provides data on the cable recommended for RTU-to-RTU RS-232 synchronous communications via RTU port 3 (not supplied) (see Figure 61). The cable should be connected to the CPU as follows:

CPU Port No.	Used with Piggyback Board	Toolbox Definition
3	FRN5654A	RS-232 Synchronous External Modem, Full Duplex or Multi-Drop Half Duplex
3	FRN5724A	RS-232 Synchronous External Modem, Full Duplex or Multi-Drop Half Duplex

Note

When the connector is facing upwards, the lefthand pin is Pin No. 1, and the righthand pin is Pin No. 8.

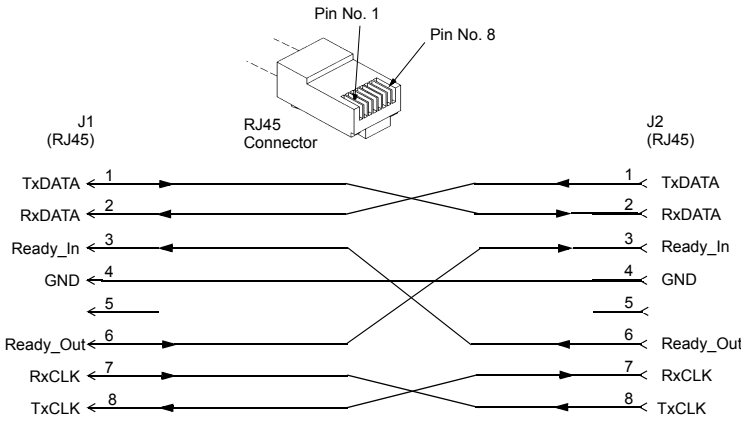


Figure 61
RTU-to-RTU Synchronous Communications Cable

Connecting a User Port to a Printer

To connect one of the MOSCAD-L RTU RS-232 ports defined as User Port to a printer, use either the FLN6457 or the FLN6458 cable. Since the printer connection is not defined by the RS-232 standard, different printer manufacturers have their on definitions for the connectors. Select the specific adaptor according to the functions defined in your printer for the various pins.

If the FLN6457 cable (with *female* 25-pin D-type connector) is used, refer to the following table:

RS232 Function	25-pin Female	Used As	Direction
RX-DATA	3	Printer Rx-Data	to Printer
DTR	20	Printer Ready	from Printer
GND	7	Ground	

If the FLN6458 cable (with *male* 25-pin D-type connector) is used, refer to the following table:

RS232 Function	25-pin Male	Used As	Direction
TX-DATA	2	Serial Data	to Printer
CTS	5	Printer Ready	from Printer
GND	7	Ground	

Transformer to Power Supply Cable FKN4463A

To connect the transformer to the power supply module, use the FKN 4463A kit (see Figure 62).

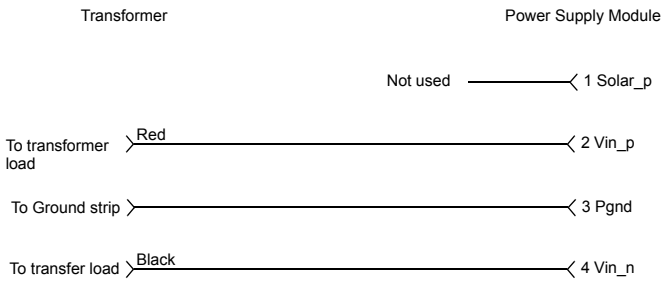
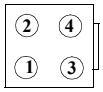


Figure 62
Transformer to Power Supply Cable FKN4463A



External 20-40VDC, 14-28VAC Cable FKN4466A

To connect external power AC/DC supply to the power supply module, use the FKN4466A kit (see Figure 63).

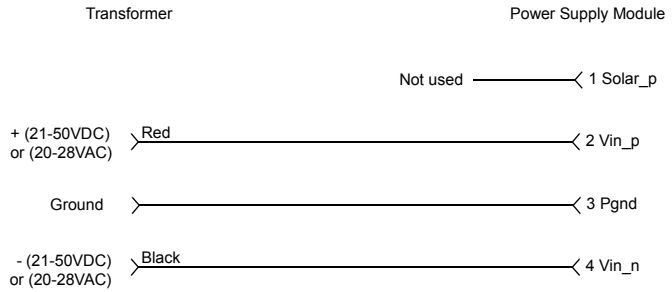
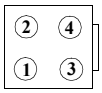


Figure 63
External 20-40VDC, 14-28VAC Cable FKN4466A



Solar Panel to Power Supply Module Cable FKN4469A

To connect the solar panel to the power supply, use the power supply module FKN4469A kit (see Figure 64).

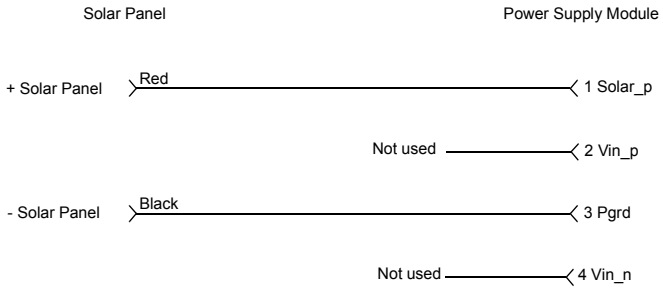
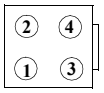


Figure 64
Solar Panel to Power Supply Module Cable FKN4469A



Suppression Core

The Suppression Core is used to reduce radiated emission, generated by conductors and to protect from fast transient events. The use of suppression core is required for the I/O cables to comply with 89/336 EEC directives.

Ordering part numbers:

Motorola - FLN9080A

Manufacturer: Fair Rite - 0443164251

Installation

For installing the suppression core, see Figure 65.

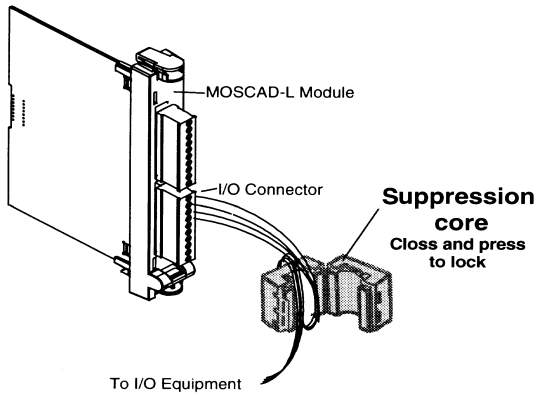


Figure 65
Suppression Core

MOTOROLA
intelligence everywhere™

68P02951C50-B

May 2002