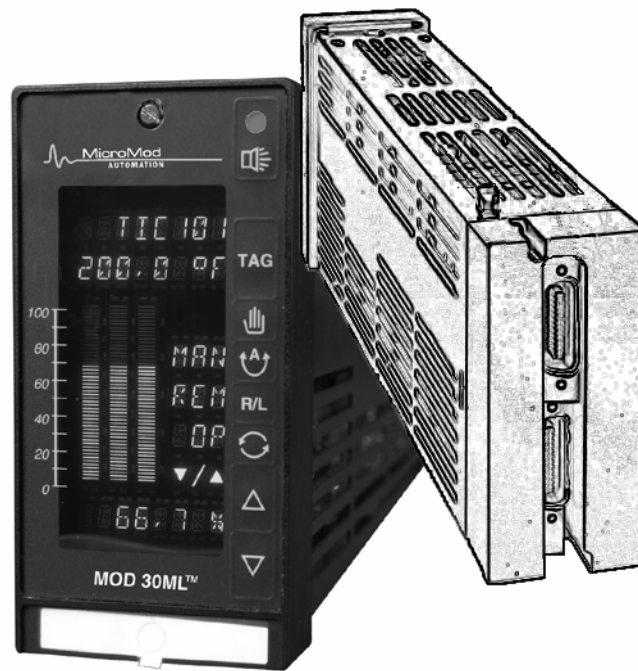


# MOD 30ML™ Multiloop Controller Replacement for MOD 30 Instruments

## Installation

Product Description, Installation and Wiring for  
1800R Model A with MOD 30 Termination Assembly  
and Associated Hardware



# MicroMod Automation, Inc.

## The Company

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MicroMod Automation is dedicated to improving customer efficiency by providing the most cost-effective, application-specific process solutions available. We are a highly responsive, application-focused company with years of expertise in control systems design and implementation.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivaled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

## Use of Instructions

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**⚠ Warning.** An instruction that draws attention to the risk of injury or death.

**📌 Note.** Clarification of an instruction or additional information.

**⚠ Caution.** An instruction that draws attention to the risk of the product, process or surroundings.

**i Information.** Further reference for more detailed information or technical details.

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it must be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process system performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

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## Health and Safety

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To ensure that our products are safe and without risk to health, the following points must be noted:

The relevant sections of these instructions must be read carefully before proceeding.

1. Warning Labels on containers and packages must be observed.
2. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given or injury or death could result.
3. Normal safety procedures must be taken to avoid the possibility of an accident occurring when operating in conditions of high
4. pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals, ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual may be obtained from the Company address on the back cover, together with servicing and spares information.

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## SECTION 1

### PRODUCT DESCRIPTION

#### 1.1 OVERVIEW

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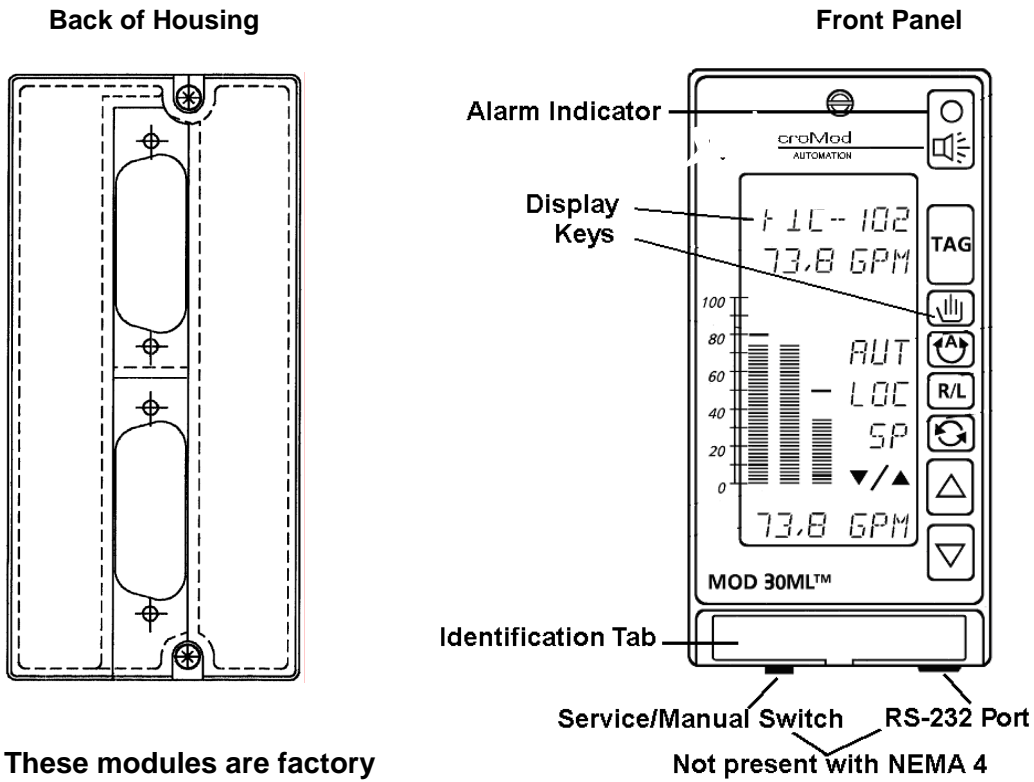
##### 1.1.1 The Product

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The MOD 30ML Replacement Instrument, Figure 1-1, can be used to replace an installed MOD 30 instrument, or to expand an existing MOD 30 installation. The replacement is a microprocessor based instrument which can be configured to perform all the PID, mathematical, sequencing, and logic functions available in MOD 30 instruments. The front panel display presents process variable, set-point, output, and other operational data in a format similar to the MOD 30 instrument displays.

Features of the MOD 30ML replacement instrument are as follows:

- Can be installed in existing MOD 30 bezels or panel cutouts.
- Accepts Mod 30 plug-in cable connections.
- Can match all MOD 30 controller and indicator I/O configurations and many math unit configurations with a combination of built-in I/O circuits and plug-in I/O modules.
- Communicates on the ICN.
- Front panel data base configuration capability.
- Provides extended data base configuration capability using Application Builder software running on a personal computer and communicating via the ICN.
- An RS-232 port in the front panel permits easy connection of a portable computer for data base configuration.
- An optional plug-in memory module provides the same data base backup and data base transfer function as the MOD 30 memory module.



- These modules are factory installed when ordering option package 2.

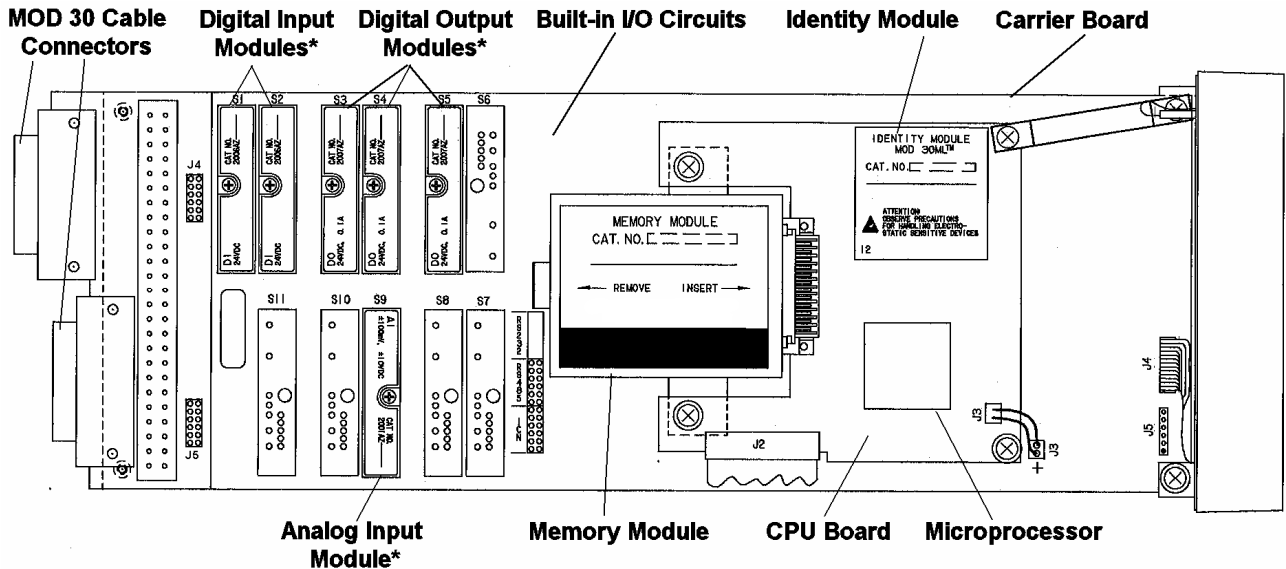


Figure 1-1. Location of Controller Components

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## 1.1.2 Related Documents

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Instructions on the operation and setup activities performed at the front panel of the replacement instrument are found in the following document:

- IB-1800R-OPR Operation/Setup, MOD 30ML

Reference information on the data base structure and configuration parameters for the replacement instrument can be found in the following documents:

- IB-1800R-APP Data Base Reference for MOD 30ML Functions
- IB-23G600 Data Base Reference for System, Logic, I/O and Communication Functions
- IB-23G601 Data Base Reference for Advanced Control Functions
- IB-23G602 Data Base Reference for Algorithms, Sequencers, and Table Functions
- IB-23H141 User's Guide for Application Builder Software

Reference information on ICN/Link communications for this instrument can be found in the following documents.

- IB-23A160 ICN Planning
- IB-23C001 ICN Communication Link Instruction Book for 1720N
- IB-23C003 ICN Mini Link Board Instruction Book for 1731N, 1732N
- IB-23C004 ICN Mini Link External Instruction Book for 1733N, 1732N

The following set of books is supplied as a bound set with the Application Builder Software for the MOD 30ML:

- 98280-418 MOD 30ML Multiloop Controller User's Guide  
(includes binder, tabs, IB-1800R-INS, IB-1800R-OPR, IB-1800R-APP, IB-23G600, IB-23G601, IB-23G602 and IB-23A160)

**PRODUCT DESCRIPTION**

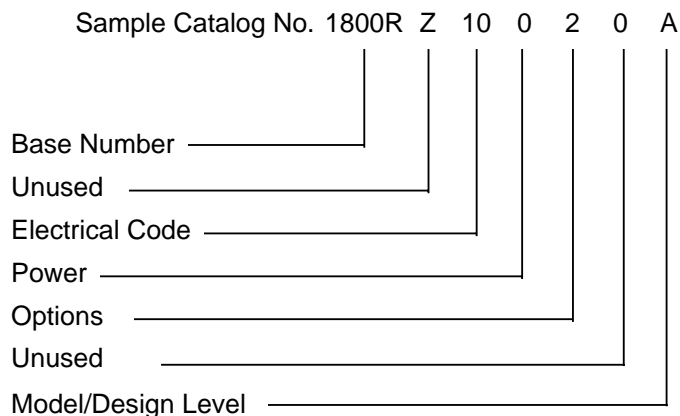
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**1.2 EXPLANATION OF CATALOG NUMBERS**

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The products described in this book have catalog numbers that help identify specific features. In addition, some products are assigned a serial number which can be used to track manufacturing data. The general format of the catalog number is described in this section. Specific product descriptions are provided in the following sections.

The catalog number stamped on the product data plate contains a series of single and multiple-character codes. These codes provide specific information concerning various electrical and/or structural options. Certain code combinations are not allowed, and options and combinations are subject to change. An example of a typical catalog number is as follows:



**1.3 BASIC HARDWARE**

---

**1.3.1 1800R With MOD 30 Termination Assembly.**

---

The 1800R with MOD 30 termination assembly, Figure 1-1, is designed specifically for replacement of installed MOD 30 instruments, or expansion of existing MOD 30 installations. The replacement instrument mounts in a MOD 30 bezel or panel cutout using a mounting scheme that is essentially identical to that of the MOD 30 instruments. Two cable connectors which accept the MOD 30 instrument cables are provided at the back of the replacement instrument.



**PRODUCT DESCRIPTION**

The MOD 30 complement of analog and digital inputs and outputs are supported by a combination of built-in and modular I/O in the replacement instrument. The built-in circuits reside on the carrier board and provide two analog inputs and two analog outputs. The modular I/O circuits are contained in plug-in I/O modules; they provide digital inputs, digital outputs, and additional analog inputs. The carrier board provides the connection locations for eleven I/O modules. Thus, a total of 15 I/O points (4 built-in and 11 modular) are available in the replacement instrument. The modular I/O provides flexibility to vary the mix of digital inputs, digital outputs, and analog inputs to fit specific replacement requirements. The parameters of each replacement I/O point can be configured to match the parameters of the corresponding MOD 30 point. A form of the replacement instrument is available with factory installed I/O modules. The I/O complement of this form matches the full I/O complement of the MOD 30 controller and controller XL.

Built-in ICN communications circuitry is provided on the carrier board. When required, the replacement instrument can communicate on the ICN in the same manner as any MOD 30 instrument. When using a Communications Link to provide data to a personal computer, a link firmware upgrade may be required to handle some new mnemonics from the replacement instrument.

The built-in communications circuit can be used to support the RS-232 port in the front panel instead of the ICN. This provides direct communication with a personal computer for data base configuration. In this case, ICN communication can be provided by installing a 2030N ICN Communications Module.

The replacement instrument CPU is based on the 16MHZ 68302 microprocessor. An identity module (1800P) provides the functionality that gives the instrument the capability to execute a user-configured database. The CPU supports 64K bytes of nonvolatile RAM for database storage, and a time-of-day clock with battery support. A high speed communications channel is used between the CPU and both the built-in I/O and any I/O modules installed on the instrument. The CPU board provides for connection of a plug-in memory module.

**Catalog Number Description for 1800R**

BASE NUMBER	<b>1800R</b>	MOD 30ML Multiloop Controller
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
POWER SUPPLY	<b>0</b>	24 Vdc (20 – 50 Vdc)
OPTIONS	<b>1</b>	MOD 30 Termination Assembly
	<b>2</b>	Option 1 plus: <ul style="list-style-type: none"> <li>• 1 Voltage Input Module</li> <li>• 2 Non-Isolated Digital Input Modules</li> <li>• 3 Non-Isolated Digital Output Modules</li> </ul>
UNUSED	<b>0</b>	Unused Character
MODEL	<b>A</b>	Design Level
Sample Number	<b>1800RZ10020A</b> (Product is serialized)	

**PRODUCT DESCRIPTION**

---

**1.3.2 1800P MOD 30ML Identity Module**

---

The identity module, Figure 1-1, gives the instrument a specific level of process and communications functionality. The 1800P module is factory installed and provides the capability to execute a user-configured database which consists of built-in and modular I/O handling capabilities, PID functionality, and a collection of other control related functions. which are available in MOD 30 instruments. These functions reside in a group of basic data base elements called function blocks.

**Catalog Number Description for 1800P**

BASE NUMBER	<b>1800P</b>	MOD 30ML Identity Module
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
FUNCTION	<b>1</b>	Advanced Control
FIRMWARE VERSION	<b>01</b>	Version 1
MODEL	<b>A</b>	Design Level
Sample Number	<b>1800PZ10101A</b> (Product is serialized)	

**1.3.3 2010P Memory Module**

---

The optional memory module plugs directly into the CPU board, Figure 1-1, and provides a mechanism for porting a database from one replacement instrument to another. An instrument with this option can upload from or download to this module. The memory module has a write protect setting to prevent accidental erasures. When a memory module is installed in an instrument with the write protection off, the operating software keeps the module up-to-date with all real time changes in the instrument. Enhanced security is thereby provided through this backup database copy. Data retention is more than 10 years with instrument unpowered.

**Catalog Number Description for 2010P**

BASE NUMBER	<b>2010P</b>	Memory Module
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
UNUSED	<b>000</b>	Unused Characters
MODEL	<b>A</b>	Design Level
Sample Number	<b>2010PZ10000A</b> (Product is serialized)	

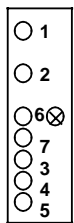
## 1.4 I/O MODULES

The descriptions included in this section give a brief overview of the functions and features of the I/O modules which can be used in a replacement instrument..

### 1.4.1 2001A Voltage Input Module

The voltage input module provides dual ranges of  $\pm 10\text{V}$  dc and  $\pm 100\text{ mV}$  dc. The 10V dc range can be selected and scaled for 1 to 5 V dc by configuration to match the input of MOD 30 instruments. Input to the module is scaled and then applied to an integrating analog to digital converter. Line cycle integration can be performed at integrals of either 50 or 60 Hz line frequencies to reject any line frequency noise. Transformer isolation from the +5 volt supply is used to derive all the internal voltages to run the isolated front end. Optical isolation is used to transfer the information from the A/D converter serially to the microprocessor. The microprocessor takes the raw A/D voltage, compares it to the reference, and then presents it to the host as requested over the serial communications bus. This module uses the Voltage/Current Input Module (VCIM) Block for configuration of input parameters. The default configuration of this block provides the 1 to 5 V dc input range.

#### VCIM



#### Catalog Number Description for 2001A

BASE NUMBER	<b>2001A</b>	Voltage Input Module
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
INPUT RANGE	<b>10</b>	$\pm 100\text{ mV}$ or $\pm 10\text{ Vdc}$
ISOLATION	<b>1</b>	Isolated
MODEL	<b>A</b>	Design Level
Sample Number	<b>2001AZ10101A</b>	

**PRODUCT DESCRIPTION**

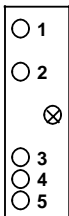
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**1.4.2 2006A Nonisolated Digital Input Module**

---

The Nonisolated Digital Input Module accepts switch contact closures without external power requirements. It is functionally equivalent to a digital input circuit in a MOD 30 instrument. This module uses the Digital Input Module (DIM) Block for configuration of input parameters.

**DIM**



**Catalog Number Description for 2006A**

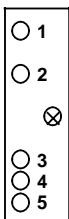
BASE NUMBER	<b>2006A</b>	Nonisolated Digital Input Module
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
INPUT RANGE	<b>10</b>	2.2 V to 24 VDC
UNUSED	<b>0</b>	Unused Character
MODEL	<b>A</b>	Design Level
Sample Number	<b>2006AZ10100A</b>	

**1.4.3 2007A Nonisolated Digital Output Module**

---

The Nonisolated Digital Output Module is primarily intended for instrument-to-instrument signaling. The module interfaces 24-volt on/off signals with no isolation or works as an open collector switch that also supports 5V TTL. This module uses the Digital Output Module (DOM) Block for configuration of output parameters.

**DOM**



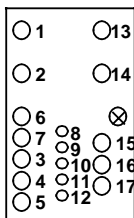
**Catalog Number Description for 2007A**

BASE NUMBER	<b>2007A</b>	Nonisolated Digital Output Module
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
OUTPUT RANGE	<b>10</b>	24 V, 50 mA TTL
UNUSED	<b>0</b>	Unused Character
MODEL	<b>A</b>	Design Level
Sample Number	<b>2007AZ10100A</b>	

**1.4.4 2030N ICN Communication Module**

The ICN Communication module provides Instrument Communication Network (ICN) communications capability for the instrument when the built-in communications circuit is used to support the RS-232 communications port on the instrument front panel. The ICN is a proprietary network that allows peer-to-peer communications between the replacement instrument and MOD 30 Instruments. It also uses a communication link to a computer running the Application Builder, or PC-30 Series Software or other operator interface software. The ICN Baud rate is 31,250 bits per second. The Model B ICN requires an external ICN terminator such as the 2030F ICN Terminator.

**ICN**



**Catalog Number Description for 2030N**

BASE NUMBER	<b>2030N</b>	ICN Communication Module
UNUSED	<b>Z</b>	Unused Character
ELECTRICAL CODE	<b>10</b>	General Purpose, Kent-Taylor standard
UNUSED	<b>000</b>	Unused Character
MODEL	<b>A</b>	Design Level (includes termination relay)
	<b>B</b>	Design Level (removes termination relay)
Sample Number	<b>2030NZ10000B</b>	

**PRODUCT DESCRIPTION**

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## SECTION 2

### REPLACEMENT CONSIDERATIONS

#### 2.1 GENERAL

---

This section provides information for planning the replacement of installed MOD 30 instruments using the MOD 30ML Replacement Instrument. The principal factors to be considered when making a replacement are as follows:

- The replacement applies to the instruments only. Most MOD 30 associated equipment such as termination panels, field input boards, power supplies, etc. are required for operation of the replacement instrument.
- A single MOD 30ML instrument (Catalog No. 1800R) is used to replace any MOD 30 Controller, Controller XL, Indicator, Math Unit or Sequence and Logic Unit.
- Two forms of the replacement instrument are available:
  - Catalog No. 1800RZ\_\_1\_A is supplied without I/O modules. The user must specify the modules required for the specific application, and install the modules as part of the replacement procedure.
  - Catalog No. 1800RZ\_\_2\_A is supplied with factory installed I/O modules to fully match the I/O complement of the 1700R and 1701R controllers.
- The maximum possible I/O count for a MOD 30 instrument using both cables (i.e., a 1700N Math Unit) is 22 points. The maximum possible I/O count for the MOD 30ML is 15 points of which 11 points are provided by plug-in I/O modules. The modular nature of these 11 points provides I/O flexibility to cover many replacement requirements.
- Some I/O module locations in the MOD 30ML can accept either an analog or digital signal. When these locations are used for digital inputs, the corresponding analog input negative terminal must be grounded to the power supply negative at the termination panel (specific connection instructions are provided in **Section 3**).
- The output holder used with the MOD 30 controllers is not supported by the replacement instrument.
- The replacement instrument is an indicating device; it cannot replace the MOD 30 recorder.
- If it is necessary to obtain both ICN communication and RS-232 communication for data base configuration via the port in the front panel, a 2030N ICN module must be installed.
- After completing installation of a replacement instrument, its data base must be configured to match the functional requirements of the application. Configuration information is provided in other documents; see **Section 1.1.2**.

## REPLACEMENT CONSIDERATIONS

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### 2.2 COMMUNICATIONS AND I/O SIGNALS

---

#### 2.2.1 COMMUNICATIONS

---

A built-in communications circuit supports either the RS-232 port in the front panel or communication over the ICN. If the built-in circuit is used for the RS-232 port, an ICN module must be installed to support ICN communication. The communication options are selected by positioning two jumpers. Specific instructions for locating the jumpers are provided in **Section 3.4**.

Selection of the jumper positions is based on one of the following requirements:

- *Both ICN and RS-232 communication is required* - The jumpers are located to provide modular ICN communication, and RS-232 communication via the built-in circuit. A 2030N ICN Communications module must be installed in module locations S7 and S8 to support the ICN. Note that use of this module reduces the number of I/O signals which can be accepted as shown in Tables 2-2 and 2-3.
- *Only ICN communication is required* - The jumpers are located to provide ICN communication via the built-in circuit. Installation of an ICN module is not required. The RS-232 port is not active.
- *Only RS-232 communication is required* - The jumpers are located to provide RS-232 communication via the built-in circuit. Installation of an ICN module is not required because the ICN is not being used.

#### 2.2.2 I/O Signal Availability

---

The I/O points available in the replacement instrument are distributed between built-in and modular circuits as follows:

- Built-in circuits provide 4 points; 2 analog inputs, 2 analog outputs.
- I/O Modules provide the following points:
  - 3 module locations are dedicated to digital input numbers 1, 2, and 3.
  - 4 module locations are dedicated to digital output numbers 1, 2, 3, and 4.
  - When the built-in communications circuit is used for the ICN, 4 module locations can be used for analog inputs, digital inputs or digital outputs on a shared basis.
  - When a communications module is used for the ICN, 2 module locations can be used for analog inputs, digital inputs or digital outputs on a shared basis.

The MOD 30 I/O signals which are assigned to a specific I/O module or built-in circuit are identified in Table 2-1. The signals which share assignment to an I/O module location with 1 or 2 other signals are as identified in Tables 2-2 and 2-3. The user must select one shared signal for each module depending on the requirements of the application. As shown in Table 2-3, the modules available to accept shared signals is reduced when an ICN module is used.



**REPLACEMENT CONSIDERATIONS**

*Table 2-1. I/O Signals Assigned to Dedicated Locations*

<b>Signal</b>	<b>Location</b>
Digital Input No. 1	Module Location S1
Digital Input No. 2	Module Location S2
Digital Input No. 3	Module Location S11
Digital Output No. 1	Module Location S3
Digital Output No. 2	Module Location S4
Digital Output No. 3	Module Location S5
Digital Output No. 4	Module Location S6
Analog Input No. 1	Built-in Volt Input No. 1
Analog Input No. 2	Built-in Volt Input No. 2
Analog Output No. 1	Built-in milliamp Output No. 1
Analog Output No. 2	Built-in milliamp Output No. 2

*Table 2-2. I/O Signals Which Share a Module Location - No ICN Module Installed*

<b>Communications</b>	<b>Analog Input</b>	<b>Digital Input</b>	<b>Digital Output</b>	<b>I/O Module Location</b>
////////	No. 5	No. 7	/////	Location S7
////////	No. 6	No. 6	No. 7	Location S8
////////	No. 3	No. 5	No. 6	Location S9
////////	No. 4	No. 4	No. 5	Location S10
Built-in ICN	////////	////////	////////	////////

*Table 2-3. I/O Signals Which Share a Module Location - ICN Module Installed*

<b>Communications</b>	<b>Analog Input</b>	<b>Digital Input</b>	<b>Digital Output</b>	<b>I/O Module Location</b>
ICN Module	////////	////////	////////	Locations S7&S8
////////	No. 3	No. 5	No. 6	Location S9
////////	No. 4	No. 4	No. 5	Location S10
RS-232 Port	////////	////////	////////	////////

## REPLACEMENT CONSIDERATIONS

---

### 2.2.3 I/O Signal Specification Differences

---

In general the specifications for the replacement instrument are compatible with the MOD 30 instrument specifications. The following differences should be noted:

Specification	MOD 30	Replacement
<b>Current Requirements</b>		
Controller	0.55A max	0.63A max
Indicator	0.50A max	0.63A max
Math Unit	0.58A max	0.63A max
<b>Digital input</b>		
High Level (Logic 1)	4.0V dc min	2.2V dc min
Low Level (Logic 0)	1.5V dc max	0.65V dc max
current load	3mA	2.5mA max
<b>Digital Output</b>		
Voltage	30V dc max	24V dc max
Current	50mA max	100mA dc max

## 2.3 CONTROLLERS

---

The MOD 30 Controller and Controller XL require a single interconnecting cable to carry power, ICN communication, and I/O signals between the instrument and the termination panel. The replacement instrument uses this same cable. The full complement of 10 I/O points and one communications point can be accommodated by the replacement instrument. The controller I/O signals are as follows:

- 3 Analog Inputs
- 2 Analog Outputs
- 2 Digital Inputs
- 3 Digital Outputs

If the full I/O complement is required, the replacement instrument with factory installed I/O modules (Catalog No. 1800RZ\_\_ \_2\_A) should be used. The locations of the factory installed modules, their catalog numbers, and I/O signals are shown on the planning form, Figure 2-1. This form of the instrument simplifies the replacement procedure because the user does not need to plan for and specify the required modules, and install the modules when making the replacement.

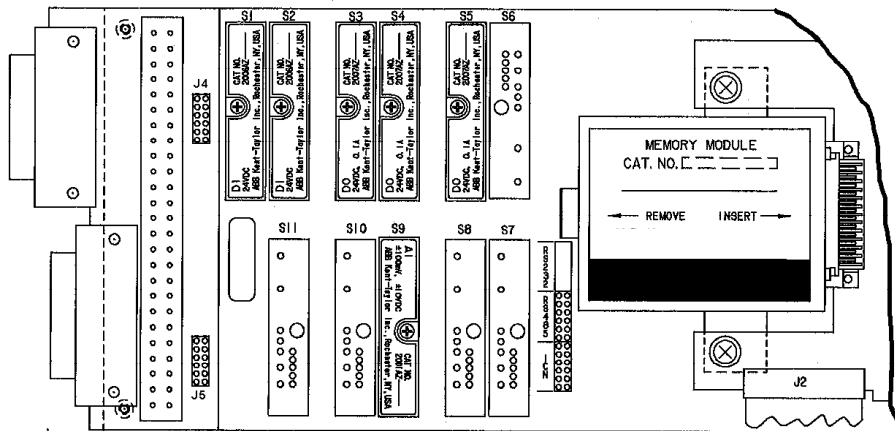
If the full I/O complement is not required, the required I/O modules must be selected and installed when making the replacement. Use the controller I/O module planning form to record the selected modules and their locations. An example of the form filled in for a controller having one digital input and 2 digital outputs is shown in Figure 2-1. Note that an ICN communications module is specified so that both ICN and RS-232 communication are supported (see **Section 2.2.1**). See **Appendix A** for a blank copy of the planning form.

I/O MODULE PLANNING FORM FOR MOD 30 CONTROLLER

MOD 30ML Replacement for Controller No. FIC-102

Signal	I/O Module Location	I/O Module Catalog No.	Module Package* (option 2)	No Module Package (check if used)
Digital Input No. 1	S1	2006A		✓
Digital Input No. 2	S2	2006A		
Digital Output No. 1	S3	2007A		✓
Digital Output No. 2	S4	2007A		✓
Digital Output No. 3	S5	2007A		
Analog Input No. 3	S9	2001A		✓
Analog Input No. 1 & 2	Built-in	-----	////////	////////
Analog Output No. 1 & 2	Built-in	-----	////////	////////
Built-in Communication	Built-in	-----	////////	RS-232
ICN Module	S7 & S8	2030N		✓

\* Factory installed package.



**Note:** Locations S6, S10 and S11 are not used for a controller.

Figure 2-1 Example of an I/O Planning Form for a Controller Replacement

## REPLACEMENT CONSIDERATIONS

---

### 2.4 INDICATOR

---

The MOD 30 indicator requires a single interconnecting cable to carry power and I/O signals between the instrument and the termination panel. The replacement instrument uses this same cable. The full complement of 5 I/O points can be accommodated by the replacement instrument. The I/O signals are as follows:

- 3 Analog Inputs
- 3 Digital Outputs (Model B only)

The replacement instrument accepts analog inputs No. 1 and No. 2 via built-in input circuits 1 and 2 as indicated in Table 2-1. An analog input module (Catalog No. 2001A) must be installed in location S4 to provide the third analog input. Digital output modules (2007A) must be installed in locations S3, S4 and S5 to provide digital outputs No. 1, No. 2, and No. 3.

Since the MOD 30 Indicator does not communicate over the ICN, the replacement instrument must be configured via the RS-232 port in the front panel (see **Section 2.2.1**).

### 2.5 MATH UNIT

---

The MOD 30 math unit requires two interconnecting cables to carry power, ICN communication, and I/O signals between the instrument and the termination panel. The replacement instrument uses both of these cables. The full I/O complement for the math unit is as follows:

- 6 Analog Inputs
- 2 Analog Outputs
- 7 Digital Inputs
- 7 Digital Outputs

The 22 I/O points available in a math unit are not fully covered by the replacement instrument which can accommodate only 15 I/O points. The combination of built-in and modular I/O in the replacement instrument does accommodate many math unit I/O combinations. For example, a possible arrangement using all 15 available points can provide an I/O combination as follows:

- 4 Analog Inputs
- 2 Analog Outputs
- 5 Digital Inputs
- 4 Digital Outputs

In this example, 2 analog inputs and 2 analog outputs are accommodated by the built-in I/O circuits. The remaining 11 points are handled by the modular I/O.

Use the Math Unit I/O planning form to record the required modules and their locations for a specific application. An example of the form filled in to document the above example is shown in Figure 2-2. Note that the built-in circuit is specified for the ICN so that all module locations are available for I/O signals (see **Section 2.2.1**). See **Appendix A** for a blank copy of the planning form.

## I/O MODULE PLANNING FORM FOR MOD 30 MATH UNIT

MOD 30ML Replacement for Math Unit No. FT-101

Signal	I/O Module Location	I/O Module Catalog No.	Module Package* (option 2)	No Module Package (check if used)
Digital Input No. 1	S1	2006A		✓
Digital Input No. 2	S2	2006A		✓
Digital Input No. 3	S11	2006A		✓
Digital Output No. 1	S3	2007A		✓
Digital Output No. 2	S4	2007A		✓
Digital Output No. 3	S5	2007A		✓
Digital Output No. 4	S6	2007A		✓
Analog Input No. 1 & 2	Built-in	Volt Input	////////	////////
Analog Output No. 1 & 2	Built-in	mA Output	////////	////////
Built-in Communication	Built-in		////////	ICN
ICN Module	S7 & S8	2030N		

Commu- nication	( )	Analog Input	( )	Digital Input	( )	Digital Output	Module Location	I/O Module Catalog No.
<b>Using Built-in Circuit</b>	✓	No. 3*		No. 7		////	S7	2001A
	✓	No. 4		No. 6		No. 7	S8	2001A
		No. 5	✓	No. 5		No. 6	S9	2006A
		No. 6	✓	No. 4		No. 5	S10	2006A
<b>Using ICN Module</b>		No. 3*		No. 5		No. 6	S9	
		No. 4		No. 4		No. 5	S10	

\* Factory installed package.

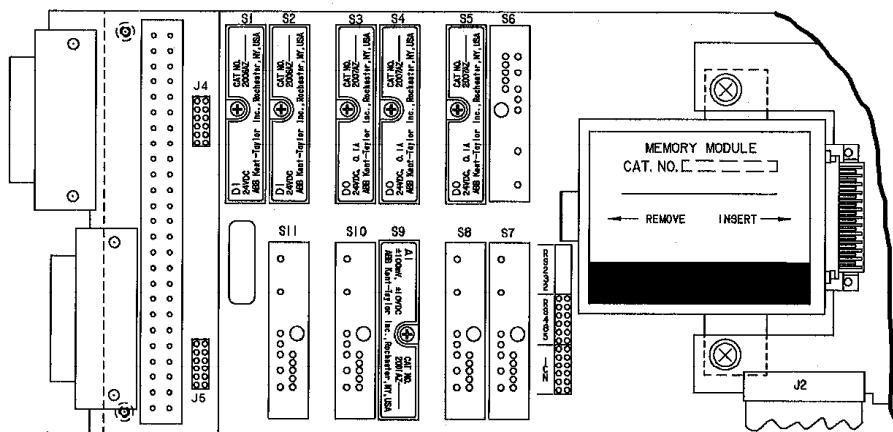


Figure 2-1 Example of an I/O Planning Form for a Math Unit Replacement

**REPLACEMENT CONSIDERATIONS**

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---

## SECTION 3 REPLACEMENT PROCEDURE

### 3.1 GENERAL

---

Read these instructions thoroughly before starting this procedure. Installation personnel should be qualified technicians.

The replacement procedure involves:

- Unpacking the replacement instrument (**Section 3.2**)
- Installing I/O modules and optional memory module if used (**Section 3.3**)
- Setting up communications (**Section 3.4**)
- Removing the old MOD 30 instrument(**Section 3.5**)
- Installing the new replacement instrument (**Section 3.6**)

#### 3.1.1 Display

---

The display is protected by an overlay that can be removed after installation. The face of the display, while made of scratch-resistant plastic, can be abraded by harsh materials such as paper towels and industrial wipes. Lens cleaning tissues and soft cloths are suitable for cleaning displays.

#### 3.1.2 Storage

---

The ambient temperature for any equipment kept in storage must be between  $-40$  and  $+75^{\circ}\text{C}$  ( $-40$  and  $167^{\circ}\text{F}$ )

### 3.2 UNPACKING THE REPLACEMENT INSTRUMENT

---

Unpack and visually inspect the instrument housing, instrument, and associated modules for any damage. Save packing materials for any reshipment, or to support any claim of shipment damage. All damage claims are made against the carrier and are the responsibility of the customer.

Included in the shipping container is a bag containing the following items:

- Mounting brackets and retaining screws
- Static drain clip
- Cable connector mounting screws
- Information package

Instructions for assembly of the mounting bracket, static drain clip, and cable connector mounting screws are provided in **Section 3.6.1**. The information package includes a card containing several copies of a writeable instrument identification tag. Write required data on the tag and insert it under the translucent strip at the bottom of the front panel after the replacement instrument is installed.

## REPLACEMENT PROCEDURE

---

### 3.3 INSTALLING MODULES

---

The I/O modules mount on the carrier board, and the optional memory module mounts on the processor board as shown in Figure 1-1. The I/O modules must be installed before placing the controller into operation.

Each I/O module must be installed in a location which receives or transmits the appropriate MOD 30 signal. The following procedure is based on the assumption that the number of modules, the module types, and the location of each module has been determined as described in **Section 2**.

\* **NOTE:** If a MOD 30 controller is being replaced by the MOD 30ML Replacement Instrument with factory installed I/O (Catalog No. 1800R Z\_\_\_2\_A), this procedure is not required. Proceed to **Section 3.4**.

Install the modules as follows:

1. Loosen the 2 retaining screws in the front panel, Figure 1-1, and pull the instrument out of its housing.

**! CAUTION** *Support the instrument from the front and bottom or from the insulator plate whenever the instrument is outside its housing. Do not allow the full weight of the circuit boards to be suspended unsupported from the front panel as this may overstress the brackets at that end.*

2. Place the instrument on a flat surface with the front panel overhanging the edge of the surface so that the black insulator plate is firmly supported. This positioning assures that the instrument is not damaged by the force applied when inserting I/O modules.
3. Plug each I/O module into its required location on the carrier board and tighten the retaining screw.
4. If the optional memory module is being used, it can be plugged into the location provided on the CPU board.
5. If ICN or RS-232 communication is to be used, go to **Section 3.4**, otherwise continue with Step 6.
6. Insert the instrument into its housing and tighten the screws to draw the front panel tight against the housing.

### 3.4 SETTING UP COMMUNICATIONS

---

Use this procedure to make the required communications available. See **Section 2.2.1** for detailed information about communication options.

1. If the instrument is in its housing, loosen the 2 retaining screws in the front panel, Figure 1-1, and pull the instrument out of the housing.
2. If a 2030N ICN Communications module is required, install the module in locations S7 and S8 using the procedure described in **Section 3.3**



REPLACEMENT PROCEDURE

3. Position the communication jumpers, Figure 3-1, as follows:
  - If an ICN module is installed, place the jumpers as shown for ICN and RS-232.
  - If the ICN is to use the built-in communication circuit (no ICN module), place the jumpers as shown for ICN ONLY.
  - If the ICN is not being used, place the jumpers as shown for RS-232 ONLY.
4. Insert the instrument into its housing and tighten the screws to draw the front panel tight against the housing.

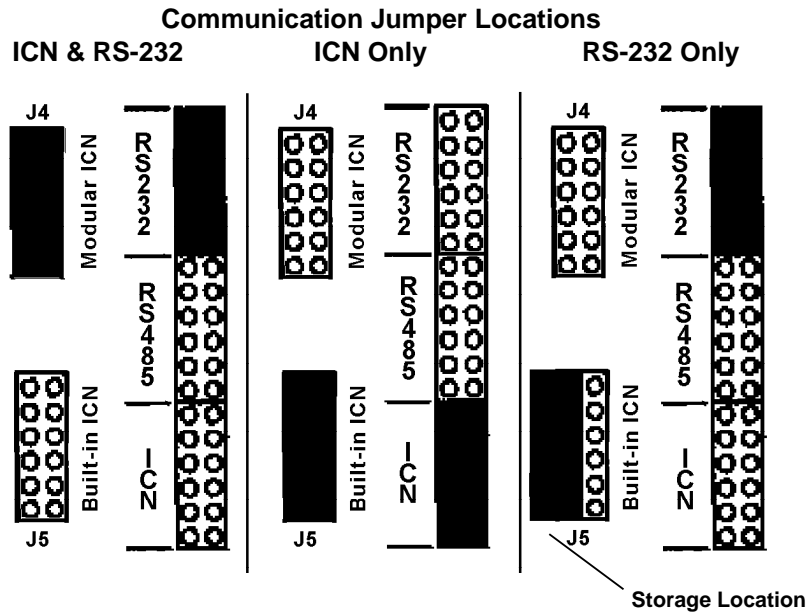
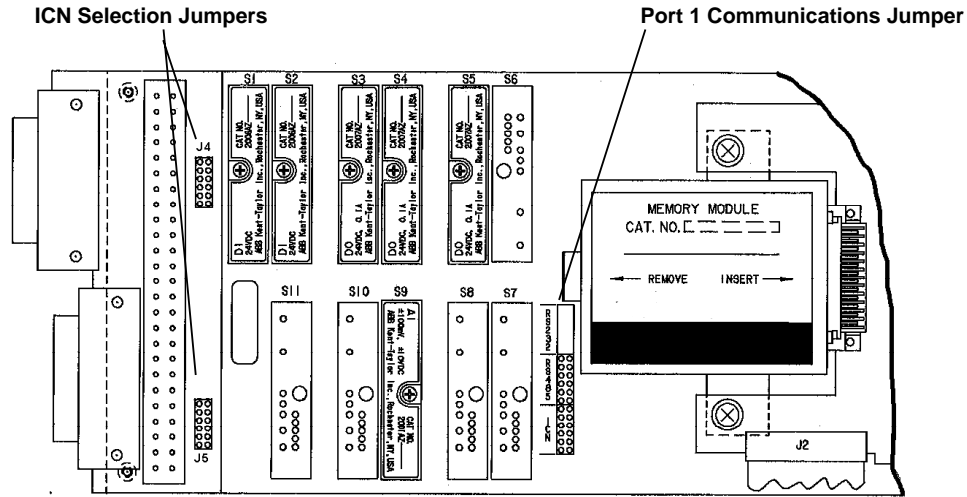


Figure 3-1. Communication Jumper Locations

## REPLACEMENT PROCEDURE

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### 3.5 REMOVING OLD MOD 30 INSTRUMENT

---

The replacement instrument uses the cables in the existing installation. If there is a MOD 30 instrument installed in the location planned for the replacement, remove the MOD 30 instrument and its housing as follows:

1. Be sure the process is in a safe condition before removing the instrument.
2. Pull the MOD 30 instrument out of its housing.
3. Remove the back cover, Figure 3-2, from the housing.
4. Disconnect the drain wire from the static drain clip. If the drain wire is connected to other MOD 30 instruments which are to remain installed, the wire must remain in place to connect each of these instruments together and to ground.
5. Remove the cable mounting screws to disconnect the cable(s) from the back cover.
6. Loosen the retaining screws and remove mounting brackets from the top and bottom of the housing.
7. From the front of the panel, remove the housing.

REPLACEMENT PROCEDURE

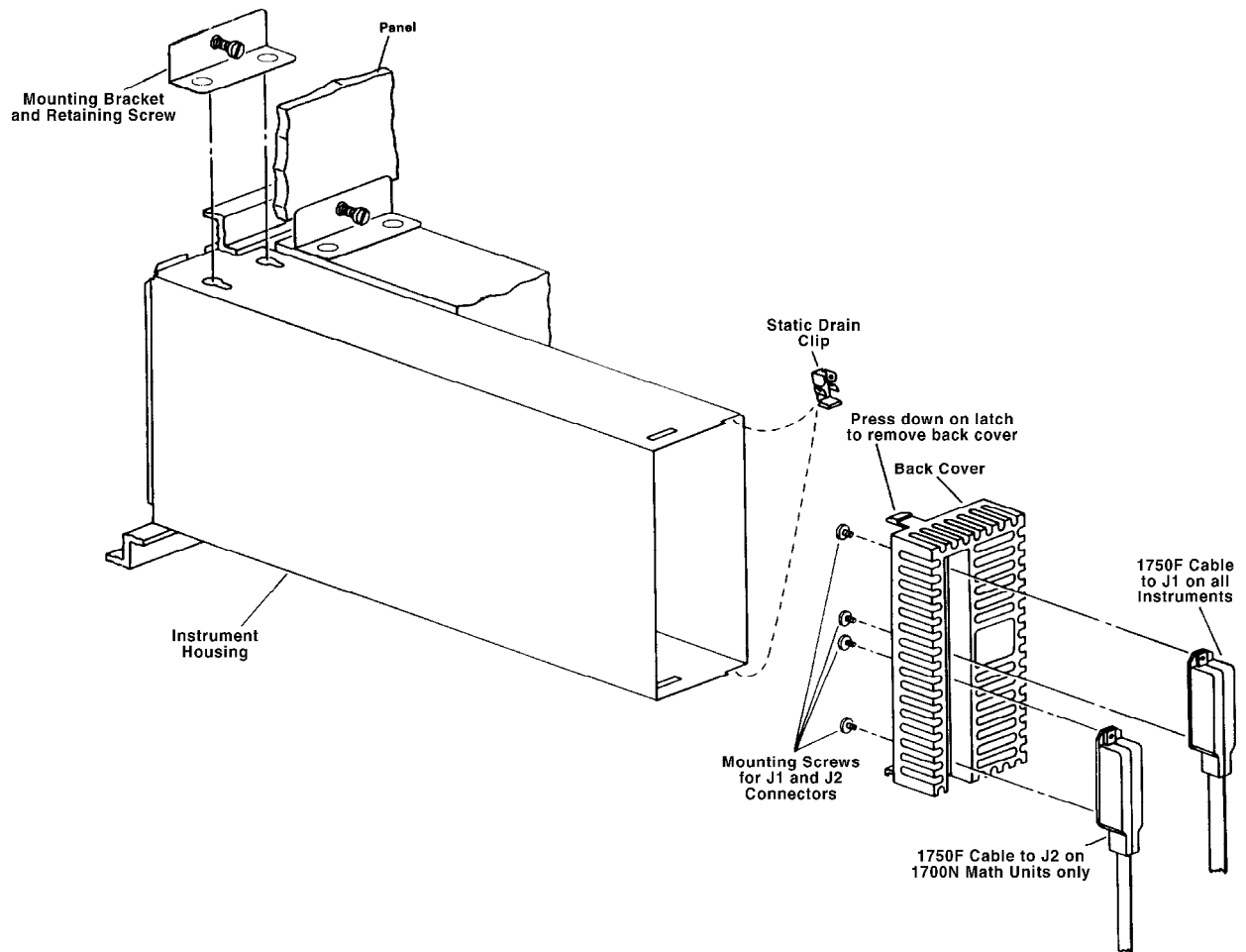


Figure 3-2. Removing MOD 30 Instrument Housing

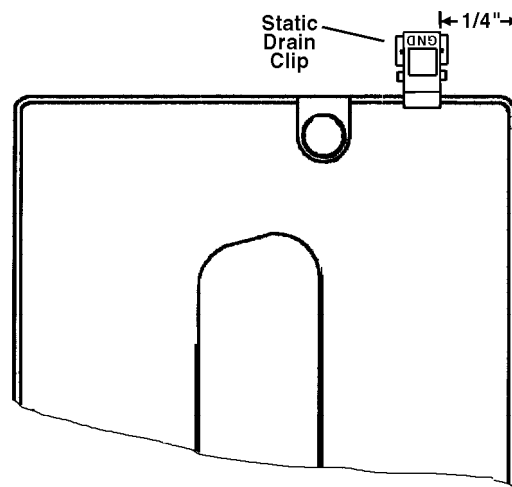


Figure 3-3. Location of Static Drain Clip On Replacement Instrument

## REPLACEMENT PROCEDURE

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### 3.6 INSTALLING NEW MOD 30ML REPLACEMENT INSTRUMENT

---

After removing a MOD 30 instrument, the replacement instrument can be installed in the same panel or bezel opening and connected to the existing MOD 30 cables using the following procedures.

#### 3.6.1 Mounting

---

1. If the replacement instrument is not in its housing, insert the instrument and tighten the screws to draw the front panel tight against the housing. It is recommended that the housing be mounted with the instrument installed. This improves the housing rigidity and helps prevent the possibility of distortion when the mounting screws are tightened.
2. From the front of the panel, insert the instrument into the panel or bezel opening.
3. From the back of the panel, insert mounting brackets into the slots in the top and bottom of the housing.
4. Tighten retaining screws to hold instrument in place. Use torque of 5 inch-pounds (0.6 Nm), or turn each screw 1-1/2 turns after contact is made with the back of the panel.
5. Remove the back cover from the mounted instrument and install the static drain clip on the back of the housing (the clip is supplied with the instrument). Locate the clip near the upper right corner as shown in Figure 3-3. This location aligns the clip with a recess in the back cover allowing the cover to seat properly against the back of the housing with the clip installed.
6. Connect the MOD 30 J1 cable to the J1 location in the back cover, Figure 3-4. The cable is attached to the cover using two mounting screws as shown in Figure 3-2 (cable mounting screws are supplied with the instrument). Two cables are used when a math unit is replaced; connect the second cable to location J2.
7. Mount the back cover with attached cable on the instrument housing. The cable connectors must mate with the connectors on the instrument circuit board.
8. Connect the existing drain wire to the static drain clip on the back of the replacement instrument. The drain wire must connect the replacement instrument to all other instruments and to ground.

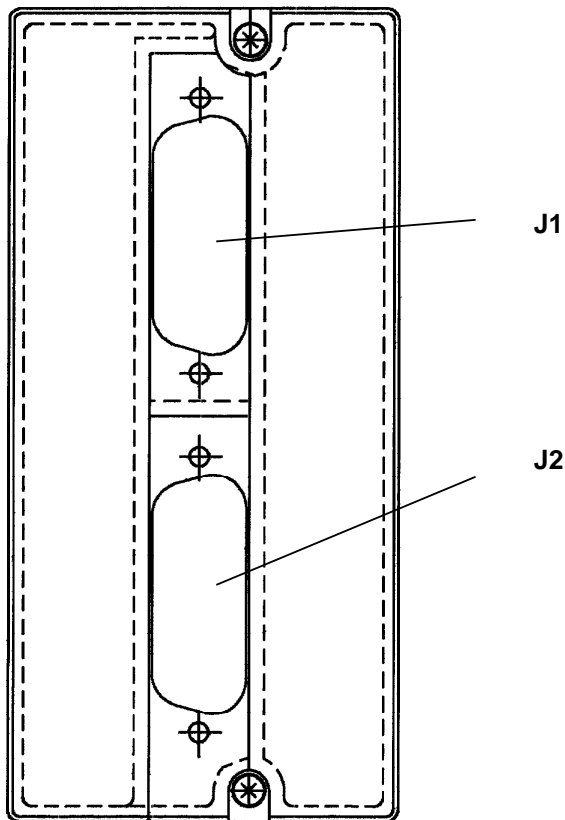


Figure 3-4. Cable Connector Locations In Back Cover

### 3.6.2 Electrical Connections

The required power, ICN communication, and I/O signal connections to the replacement instrument are made via the cables which are installed as part of the mounting procedure.

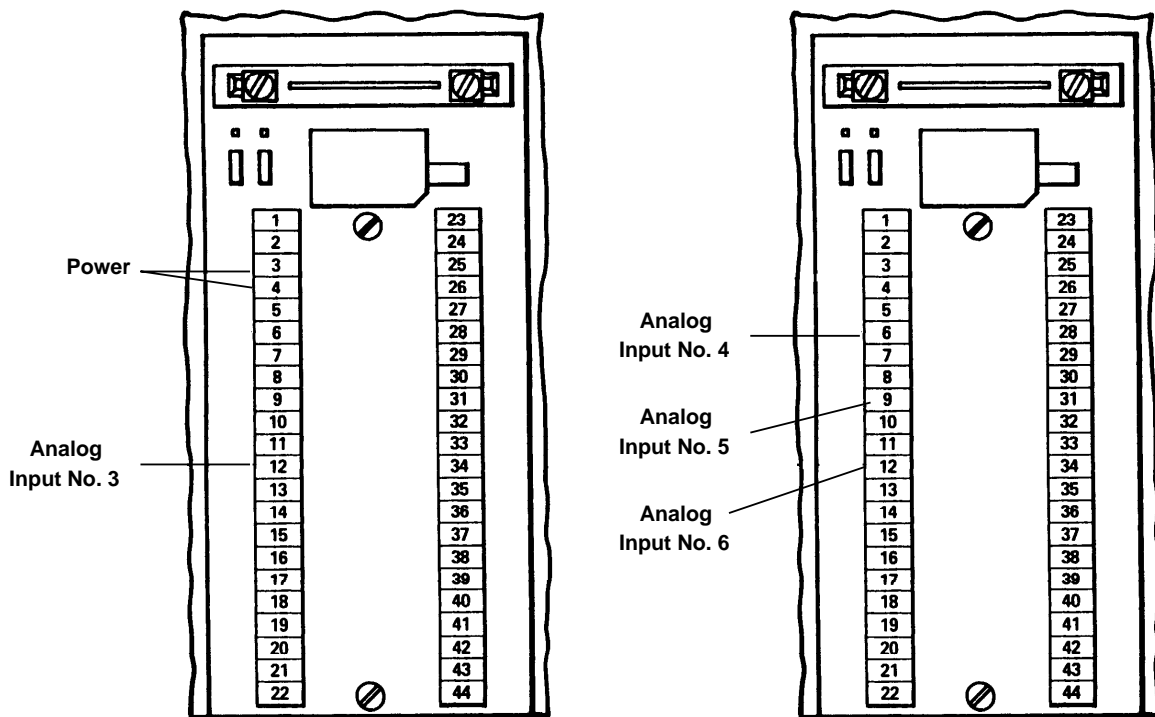
**! CAUTION** *If I/O module location S7, S8, S9, or S10 is used for a digital input or output, the negative terminal of the alternate analog signal which can use the location must be grounded to the negative power supply terminal at the termination panel, and the positive terminal of the analog signal must be open circuited.*

The negative analog and power terminals are identified in Figure 3-5. The required connections are as follows:

- To use module location S7 for a digital signal, ground Analog Input 5 negative.
- To use module location S8 for a digital signal, ground Analog Input 6 negative.
- To use module location S9 for a digital signal, ground Analog Input 3 negative.
- To use module location S10 for a digital signal, ground Analog Input 4 negative.

\* **NOTE:** Before putting the instrument into operation, it must be configured using either the front panel keys or the 2006S Application Builder software. See Section 1.1.2 for related documents.

REPLACEMENT PROCEDURE



1720F Termination Panel Section  
Connected to J1 on Instrument

1720F Termination Panel Section  
Connected to J2 on Instrument

Figure 3-5. Identification of Negative Terminals for Analog Input Numbers 3, 4, 5, 6, and Power

## APPENDIX A PLANNING FORMS

### A.1 GENERAL

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The forms included in this appendix may be copied as necessary to record the I/O module layout for MOD 30ML replacement instruments used to replace MOD 30 controllers and math units.

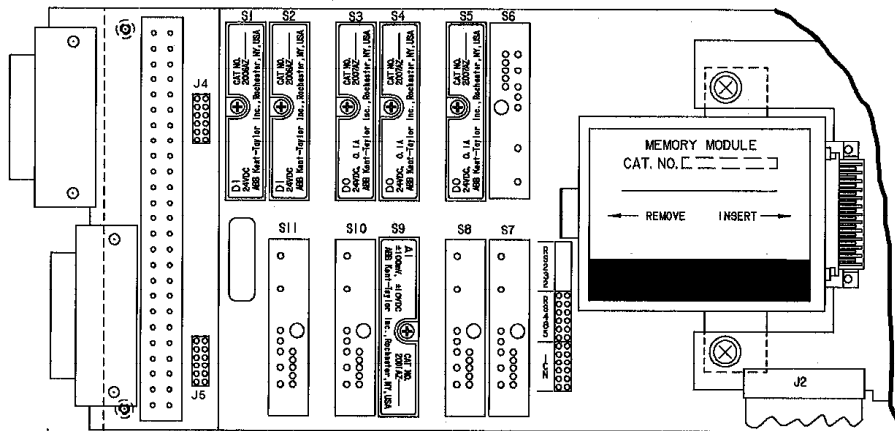
APPENDIX A

I/O MODULE PLANNING FORM FOR MOD 30 CONTROLLER

MOD 30ML Replacement for Controller No. \_\_\_\_\_

Signal	I/O Module Location	I/O Module Catalog No.	Module Package* (option 2)	No Module Package (check if used)
Digital Input No. 1	S1	2006A		
Digital Input No. 2	S2	2006A		
Digital Output No. 1	S3	2007A		
Digital Output No. 2	S4	2007A		
Digital Output No. 3	S5	2007A		
Analog Input No. 3	S9	2001A		
Analog Input No. 1 & 2	Built-in	-----	////////	////////
Analog Output No. 1 & 2	Built-in	-----	////////	////////
Built-in Communication	Built-in		////////	
ICN Module	S7 & S8	2030N		

\* Factory installed package.



Note: Locations S6, S10 and S11 are not used for a controller.



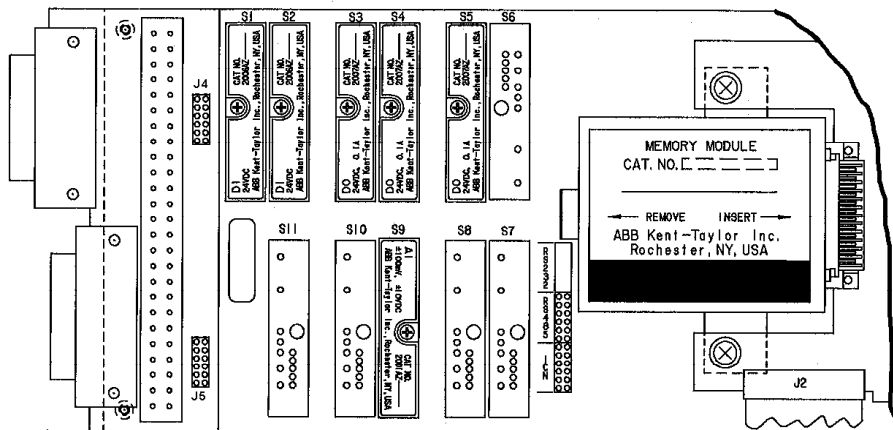
## I/O MODULE PLANNING FORM FOR MOD 30 MATH UNIT

### MOD 30ML Replacement for Math Unit No. \_\_\_\_\_

Signal	I/O Module Location	I/O Module Catalog No.	Module Package* (option 2)	No Module Package (check if used)
Digital Input No. 1	S1	2006A		
Digital Input No. 2	S2	2006A		
Digital Input No. 3	S11	2006A		
Digital Output No. 1	S3	2007A		
Digital Output No. 2	S4	2007A		
Digital Output No. 3	S5	2007A		
Digital Output No. 4	S6	2007A		
Analog Input No. 1 & 2	Built-in	Volt Input	////////	////////
Analog Output No. 1 & 2	Built-in	mA Output	////////	////////
Built-in Communication	Built-in		////////	
ICN Module	S7 & S8	2030N		

Commu- nication	( )	Analog Input	( )	Digital Input	( )	Digital Output	Module Location	I/O Module Catalog No.
Using Built-in Circuit		No. 5		No. 7		////	S7	
		No. 6		No. 6		No. 7	S8	
		No. 3*		No. 5		No. 6	S9	
		No. 4		No. 4		No. 5	S10	
Using ICN Module		No. 3*		No. 5		No. 6	S9	
		No. 4		No. 4		No. 5	S10	

\* Factory installed package.



**APPENDIX A**

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