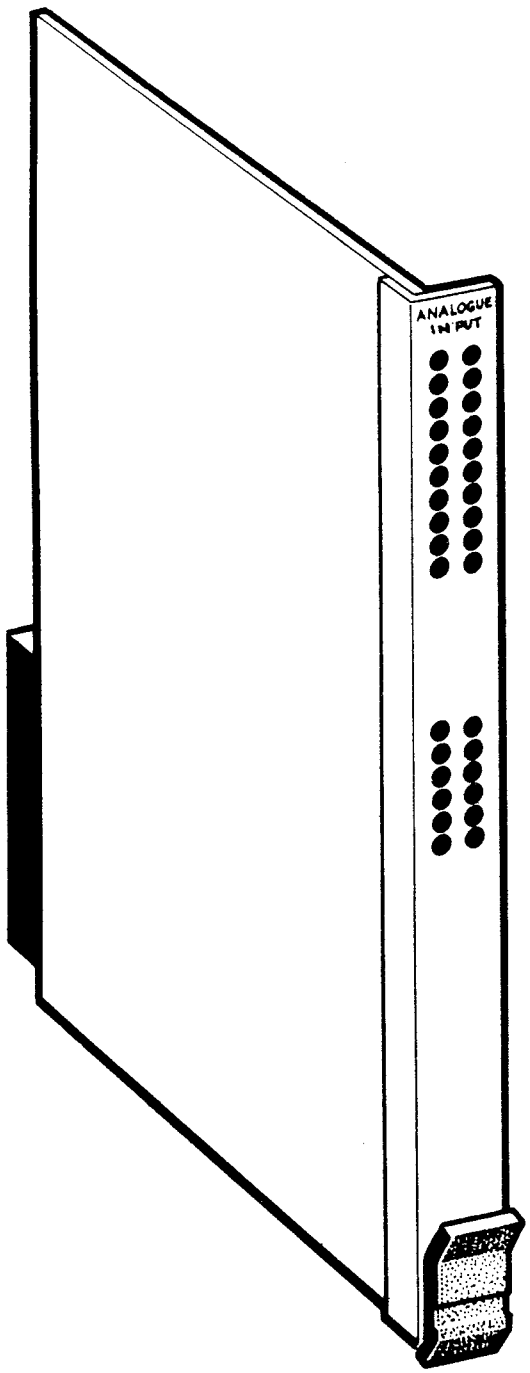
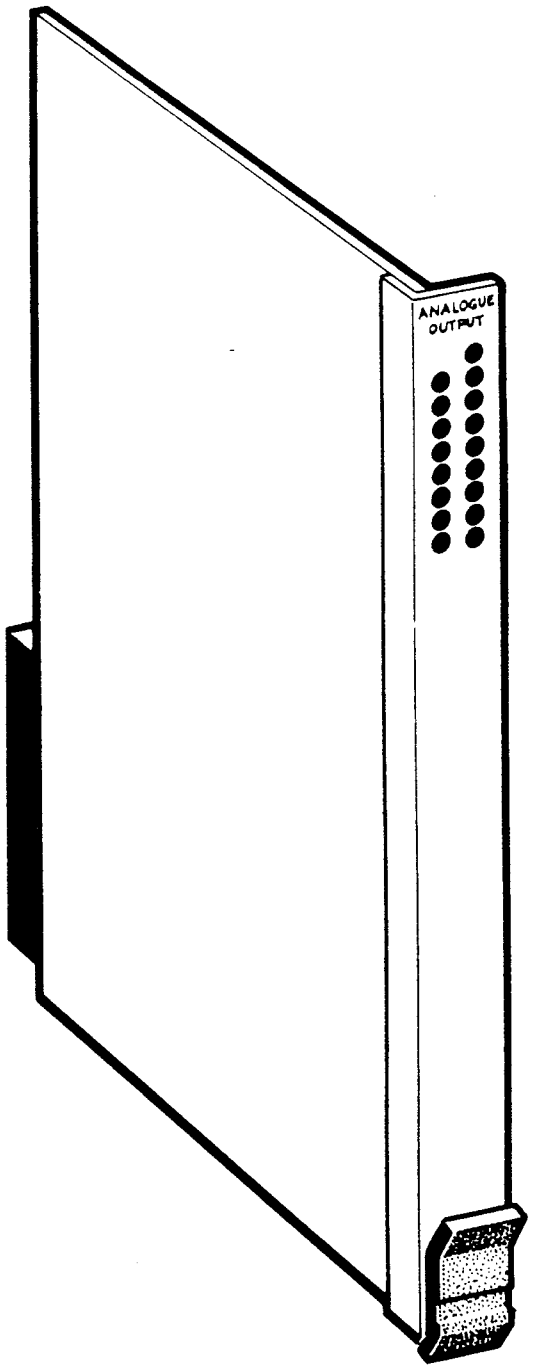
CEGELEC
INDUSTRIAL CONTROLS

Analog Input
Analog Output

8840
8841





GEM 80 USER INFORMATION

GEM 80

CONTENTS

1. INTRODUCTION

Designed for high speed analog conversion, the 8840 Analog Input Equipment has 16 channels capable of interfacing signals from a variety of plant equipment to a GEM 80 Controller. The 8841 Analog Output Equipment interfaces a GEM 80 Controller to 16 analog plant devices.

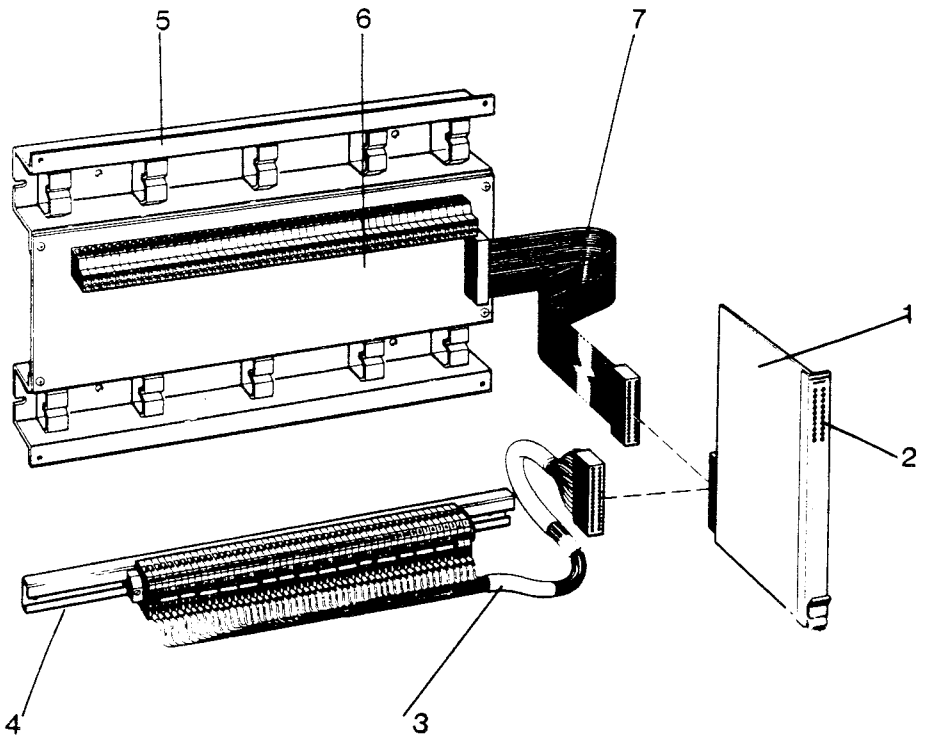
Signal magnitude resolution is better than one part in four thousand for both types of equipment (with the exception of the current output version, whose resolution is better than one part in two thousand).

Connection to the plant signals is via a termination panel or rail. The analog input or analog output module itself plugs into the subrack of a GEM 80 Controller and connects to the fast I/O highway.

This User Information Sheet gives installation and connection data to supplement the 8840 and 8841 Product Data Sheet.

2. SPECIFICATIONS

Refer to the 8840 and 8841 Product Data Sheet for detailed specifications.



1. Analog input or output module
2. Signal monitoring sockets
3. Cable harness
4. Terminal rail option
5. Terminal panel mounting kit (2 off)
6. Terminal panel option
7. Ribbon cable

Note: The Analog Input and Analog Output Modules each occupy a single slot width in GEM 80 subrack

Fig. 1 - Analog Input or Output Equipment

4. OPERATION

4.1 Description of Operation - Analog Input

The 8311 Analog Input module selects each of the analog input signals in turn and, after a settling period, converts it into a number. The module stores these numbers in an on-board memory area. This conversion process operates continuously under the control of a free-running oscillator, taking 1.5 ms to convert all 16 input channels. The numbers obtained from conversion are in the range ±32752, incrementing in steps of 16, i.e. the four least significant bits are not used but are set to zero.

The contents of the memory are transferred to the C-table in the GEM 80 controller on every Controller input scan. The data placed in the C-data table therefore represents the states of the analog inputs within 1.5 ms of the transfer.

Each channel has a dedicated location in the C-table, determined by the channel number, and by the slot that the analog input module occupies in the GEM 80 Controller subrack.

4.2 Description of Operation - Analog Output

During each controller plant output scan, digital output data is transferred from 16 consecutive D-table locations to the 8312 or 8313 analog output module, where it is stored in an on-board memory area.

The data for each channel is read in turn from the local memory, and converted to an equivalent analog voltage on the 8312 module, or to an equivalent analog current on the 8313 module. The digital-to-analog conversion ignores the four least significant bits of the value from D-table, so that a change of 16 or more in the value is required to guarantee an increment in the analog output. The analog value is stored in a hold circuit, continuously maintaining the channel output voltage or current between controller plant output scans.

The conversion process is controlled by a free-running oscillator. The output response time is 10 ms maximum.

Each channel has a dedicated location in the D-table, determined by the channel number, and by the slot that the analog output module occupies in the GEM 80 Controller subrack.

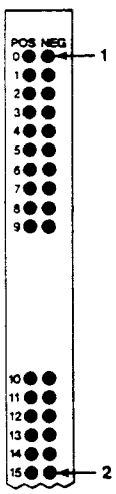
4.3 Signal Monitoring

Fig. 2 shows the pairs of monitoring sockets on the 8311 Analog Input module front panel where you can measure each of the incoming signals. The sockets connect to the same wires as the terminals on the termination panel or rail. The voltages you can measure across the monitoring sockets are therefore the same as those between the input terminals.

All inputs are differential inputs where neither line is necessarily at the same potential as the signal ground of the Controller. Further, where one side of a signal is grounded, then, depending on where it is grounded, the ground potentials for the different channels may not be precisely the same. You therefore need to measure voltages between the two monitoring points for the relevant channel.

For the voltage input options, you may plug in a voltmeter to obtain a direct reading of the input voltage.

For the current input option, a voltmeter at the monitoring sockets will sense the voltage drop due to the input current flowing through a 50 ohm shunt resistor. The terminal panel or rail carries one such resistor per input channel. These resistors drop 1 V for full scale input current of 20 mA. You should TAKE CARE to use a high resistance voltmeter to avoid loading errors. For instance, a 20 kilohm/V multimeter will introduce a 0.25% error. Where a current input signal is the feedback signal for a closed loop control system, connecting a voltmeter whose resistance is too low could affect the performance, and give an UNINTENDED INCREASE in the output signal to the plant.



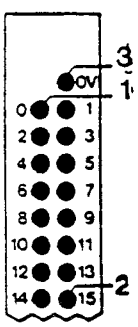
1. Pair of sockets for measuring input signal, channel 0 (corresponds to inputs C0 or C32 at Fig. 6)

2. Pair of sockets for measuring input signal channel 15 (corresponds to input C15 or C47 at Fig. 6)

Fig. 2 - Front Panel of Analog Input Module

Fig. 3 shows the monitoring points on the 8312 Analog Output module. Each channel has only a single monitoring socket. All output voltages are relative to 0V (signal ground of the GEM 80 Controller). You can check an output by measuring between the monitoring socket of the relevant channel number and the monitoring socket labelled '0V'. The monitoring point labelled 'VR' is not used and should be ignored.

For the 8313 Analog Output module, which provides 0-20 mA current output signals, monitoring points are fitted as for the 8312. With these, you can measure a voltage which is proportional to the output current, and which will be 5V when the output is 20 mA. A voltmeter at the monitoring sockets will sense the voltage drop due to the output current flowing through a 250 ohm shunt resistor. The module carries one such resistor per input channel. These resistors drop 5 V for full scale input current of 20 mA. You should TAKE CARE to use a high resistance voltmeter to avoid loading errors. For instance, a 20 kilohm/V multimeter will introduce a 0.25% error. Where a current output signal is the control signal for a closed loop control system, connecting a voltmeter whose resistance is too low could affect the performance, and give an UNINTENDED TRANSIENT in the measured value from the plant when you connect or disconnect the meter.



1. Socket for measuring output signal, channel 0 (corresponds to output D0 or D32 at Fig. 7)
2. Socket for measuring output signal, channel 15 (corresponds to output D15 or D47 at Fig. 7)
3. 0V socket. All output voltages must be measured with respect to this socket.

Fig. 3 - Front Panel of Analog Output Modules

4.4 Behaviour on Controller Power-Up

With 8312 and 8313 Analog Output modules, the output conversion process starts immediately the Controller is powered up. The random contents of the on-board memory can therefore cause spurious outputs during the Controller's initial self test cycle (typically taking 2 to 3 seconds after power up). However, during this time, all the channel outputs will be reset to zero.

If your model of Controller is one where you need to define the type of module fitted by data in P-table (see Section 8.1), this will only happen if you have set the correct code. If the code is incorrect, then the initial self-test cycle will ignore the analog output module and will not reset the outputs to zero.

If the self-test procedure detects an error elsewhere in the system, then the analog outputs may not be reset to zero.

Once the self-test cycle is complete, then the analog output module thereafter takes its data from the appropriate D-table locations.

4.5 Behaviour Under Controller HALT and RUN Conditions

With an 8311 analog input module, when the Controller is set to the RUN mode, the first data input to the C-table will accurately represent the state of all analog input channels, even when the Controller is powered up into the RUN mode.

When the Controller goes to the HALT mode, transfer of data from the analog input module to the C-table continues, as does the scanning and conversion of input channels by the analog input module. Thus, when the Controller is restored to the RUN mode, there is up-to-date data in the C-tables.

With an 8312 or 8313 analog output module, when the Controller is set to HALT mode, the channel output voltages or currents are still maintained in accordance with the relevant D-table data.

4.6 Behaviour Under Fault Conditions

Where a fault occurs externally to the 8311 Analog Input module on any one channel, the other channels will not generally be affected. The exception is where a voltage exceeding ±14V is applied to the affected channels, in which case the accuracies of other channels will be impaired for the duration of the fault (provided that it is non-destructive).

Should a fault occur inside the Analog Input module, there is a very high probability that all channels will be affected. therefore, use of the active verification system outlined in Section 4.7 will detect the majority of analog input module faults.

With the 8312 Analog Output module, a continuous short circuit of a channel output is non-destructive, and does not impair the accuracy of other channels.

In the worst case, if two channel negative (-) terminals share a common connection, and if their positive (+) terminals become shorted together, then attempting to fully drive the two channel outputs to opposite limits will not result in damage, and will not affect the performance of other channels.

In this case, the composite output voltage would assume a value between the two intended output voltages, and could not exceed the greater of the two in magnitude.

Should a fault occur within the 8312 Analog Output module, there is a very high probability that all channels will be affected. Use of the active verification system outlined in Section 4.7 will detect the majority of Analog Output module faults.

4.7 Test Facilities

We recommend that, where possible, you use a system of active verification by connecting a spare analog output channel to a spare analog input channel at the termination panels or terminal rails. (If you do not have both an analog input module and an analog output module, or no spare channels, then this will not be possible).

You can then arrange your program to select one of a number of pre-determined outputs, and check that the resultant inputs are of the correct value. If they come outside the expected tolerance, you can then arrange for your program to take appropriate action. Note that it is better to occasionally change the output value, rather than use just a single fixed output value, as the natural tendency of an output module is to hold its output at the last D-table value received.

With the 8311 analog input module, two test voltages, +0.3V and +3.3V are available on the backplane connector assembly. You can use these, if you want to, to check the operation of an analog input channel by connecting it to the appropriate connector pins. However, as the pins are not very accessible and the test voltages not very accurate, they are of somewhat limited use.

Backplane pin	Output voltage	
L/a7	0V	)
L/c8	+0.3	) ±5%
L/a8	+3.3	)

These outputs are short circuit proof.

With the 8312 or 8313 analog output modules, you can readily check the functioning of any output channel by placing the Controller in HALT mode, then setting the appropriate D-table location, and measuring the channel output voltages on the module front panel monitoring sockets.

5. POWER SUPPLIES

All supplies to the 8840 Analog Input and 8841 Analog Output Equipments are provided via the Fast I/O Highway.

Power requirements are:

	8840	8841
Voltage	Analog Input	Analog Output
+5V	150 mA	70 mA
+15V	180 mA	150 mA + load
-15V	80 mA	140 mA

6. INSTALLATION

6.1 Procedure

The 8840 Analog Input Equipment and 8841 Analog Output Equipment will generally be installed with the module and backplane already fitted in your GEM 80 Controller when you receive it, with the module fitted in the slot in the subrack that you specified.

The installation process consists of the following steps:

a) Mount the analog input or output termination panel or rail as required. To distinguish it from other panels or rails, fit the address/cable identification buttons. Connect the SCREEN terminal to the system 0V terminal blocks. (See Section 7 for connection details).

b) Again, to distinguish it from other ribbon cables or harnesses, fit it with identification numbers. Use it to connect th backplane connector assembly to the analc input or output termination panel or terminal rail.

For details of making up and labelling ribbon cables, refer to the relevant appendix in the Technical Manual for your model of Controller, or else to the GEM 80 Installation and Maintenance Manual.

c) If not already fitted, insert the 8311 analog input or 8312 analog output module in the correct slot. Check the mechanical coding fingers before pushing the module fully home.

d) Unplug the ribbon cable or wiring harness from the 8062 or 8064 backplane behind the module in the subrack, and secure it if necessary. This is in readiness for making plant connections to the termination panels or terminal rails, after which you can plug in the ribbon cabl connector again.

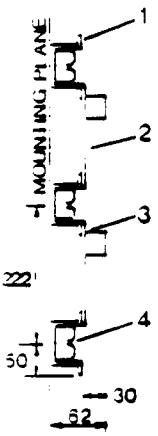
6.2 Mounting

Depending on whether you are using termination panels or terminal rails, you can use either of the two mounting methods given below:

(a) Termination Panel Mounting Kit

This kit consists of a length of channel section, complete with cable retaining clips and mounting screws. The channel can be 19" rack mounted, and supports a termination panel in front of the plane of the rack. The channel holds the plant cables behind the plane of the panel terminals, leaving clear access to the terminals.

Fig. 4 shows how a mounting channel is shared between adjacent panels. The cables are accommodated above each panel. A group of adjacent panels requires one more mounting kit than there are panels.

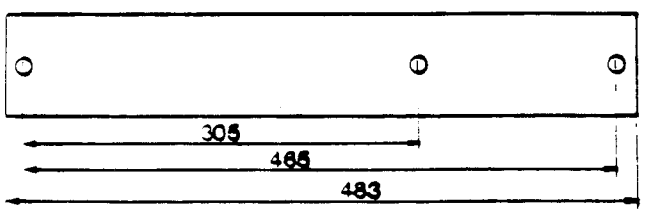


1. Mounting channel
2. Analog input termination panel
3. Plant terminals
4. Cable clip

Fig. 4 - Side View Showing Mounting Details

(b) Termination Rails

These use less space than Termination Panels. Equipments supplied with Terminal Rails include a wiring harness with connector.



Holes A are 6mm Dia.

Fig. 5 - Front View of Rail Fixings

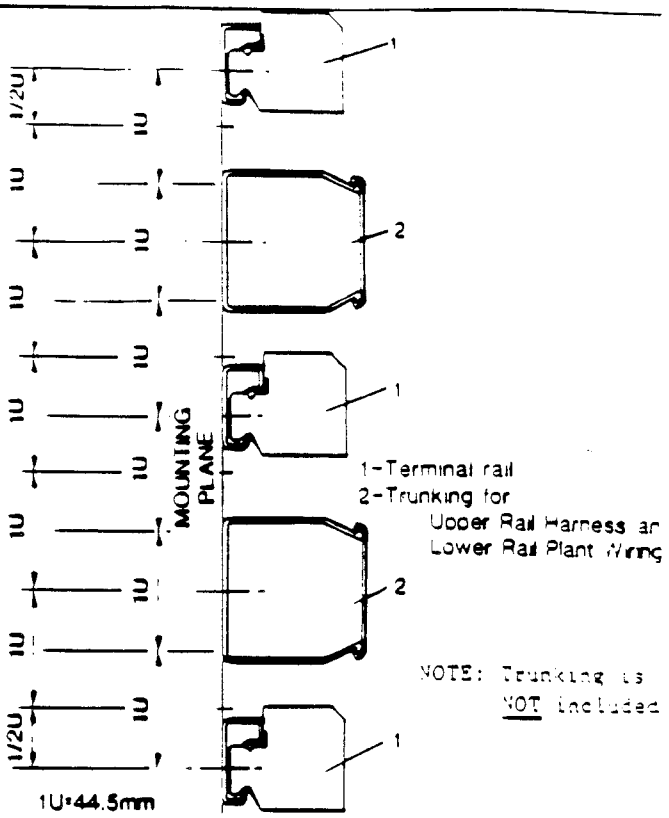
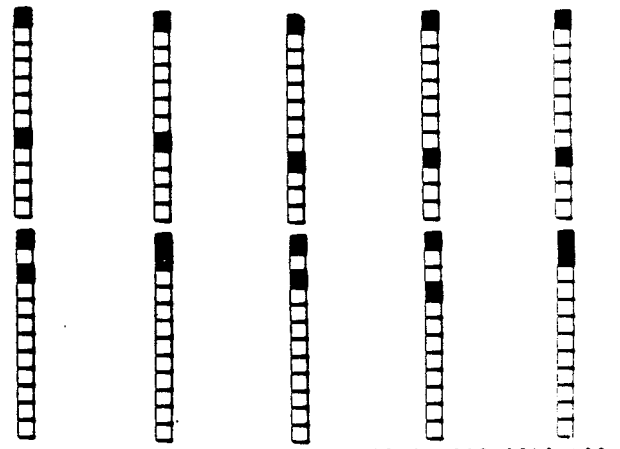


Fig. 6 - Termination Rail Mounting Details

6.3 Mechanical Coding

The mechanical coding fingers on each analog input and analog output module have been factory preset and are not adjustable. Similarly, the subrack mechanical code has been set to the same code by placing stop pegs in the positions indicated in Fig. 7.

If you ever need to alter the mechanical coding (e.g. if you need to change from a 0.5 ms time constant input module to a 5 ms one), then you can withdraw or insert stop pegs by the careful use of a pair of fine nosed pliers.



8311-4002	8311-4001	8312-4002	8312-4003	8313-400
Input, 5 ms Filter	Input, 0.5 ms Filter	Output, ±10V	Output, ±5V	Output, 0-20 mA

Fig. 7 - Module Mechanical Coding

7. CONNECTIONS

7.1 Termination Details

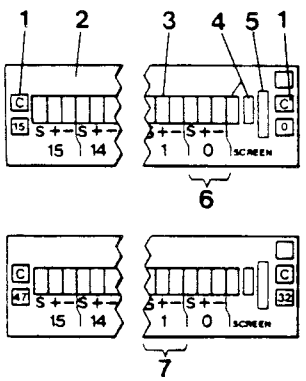
All plant connections are made to terminations on the termination panel or terminal rail.

Termination panel to Ordering Code 8033-4001 is suitable for voltage inputs and for voltage outputs. On the panel, three adjacent terminals are provided for each input channel, two for the signal and one for the screen (shield).

Termination panel to Ordering Code 8033-4002 is similar, but suitable only for current inputs. The source or sources of power for the current signals must be provided externally.

See Fig. 8 for panel and terminal identification for panels to either of the above Ordering Codes.

Termination panel to Ordering Code 8033-4007 is again similar, but suitable only for current outputs. The terminal identifications are the same as those in Fig. 8 except that the '+' and '-' markings are reversed, to suit the current output signals from the 8313 Analog Output module.



1. Panel labels
2. Termination panel
3. Row of plant terminals
4. Terminals for wire to connect screens to earth
5. Ribbon cable connector
6. Terminals for input CO or output DO
7. Terminals for input C33 or output D33

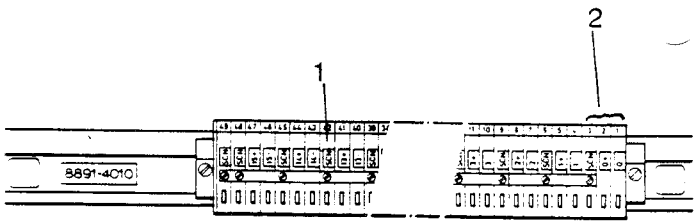
Terminal marking:

+/- = signal

S = screen

Fig. 8 - 8033 Panel and Terminal Identification

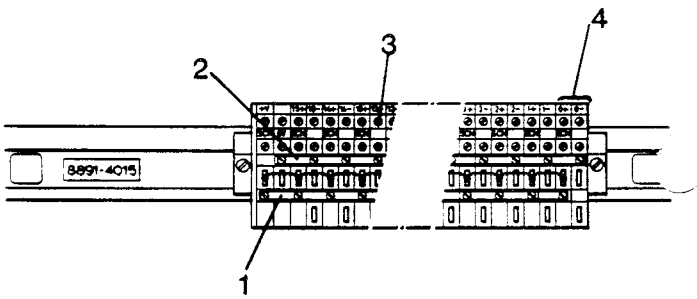
Terminal rail to Ordering Code 8891-4010 is suitable for voltage input signals, and for voltage or current output signals. Like the termination panels, it provides three adjacent terminals per channel. See Fig. 9 for details.



1. Plant terminal
2. Input or output terminal group

Fig. 9 - 8891-4010 Rail and Terminal Identification

Terminal rail to Ordering Code 8891-4015 is suitable for current input signals only. Unlike the current input version of termination panel, this rail is designed for use where all channels have one side of the signals common, and where the power source is connected across two terminals on the rail. The terminals used are of the 'double decker' type in which two terminals are accommodated in one housing. Two of these housings, giving four terminals, are provided for each channel. Two terminals are for the input signals, one is for the cable screen and the fourth is not connected. See Fig. 10 for connections.



1. +v rail
2. 0V rail
3. Plant terminal
4. Input terminal group

Fig. 10 - 8891-4015 Rail and Terminal Identification

For any of the termination panels and terminal rails listed above used for input signals, the signal polarity is the same as the termina markings, then a positive number will be placed in the C-table. Polarity reversal gives a negative number.

7.2 Typical Circuits

Figs. 11 and 12 show typical connections to an 8033-4001 or 8033-4002 termination panel when used for voltage or current inputs respectively.

Each input signal is expected to come from a source which is locally grounded. The 8311 analog input module, having differential inputs, caters for the local ground being a few volts different from the GEM 80 signal ground.

If, however, any input signal is floating, then you MUST make a connection from one side of it to ground (either locally at its source or from the termination panel). If you don't do this, the signal wires may tend to charge up, causing the input circuits on the module to saturate, and giving spurious values in C-table.

Cable screens should be grounded at one end only. If a screen is already grounded elsewhere, then you should not terminate it on the terminal provided on the termination panel.

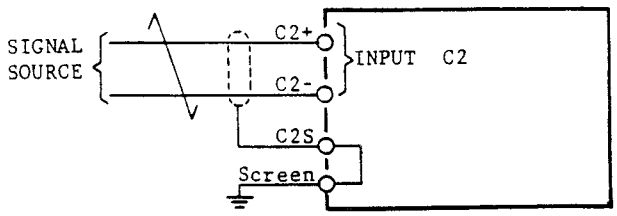


Fig. 11 - Individual Signal

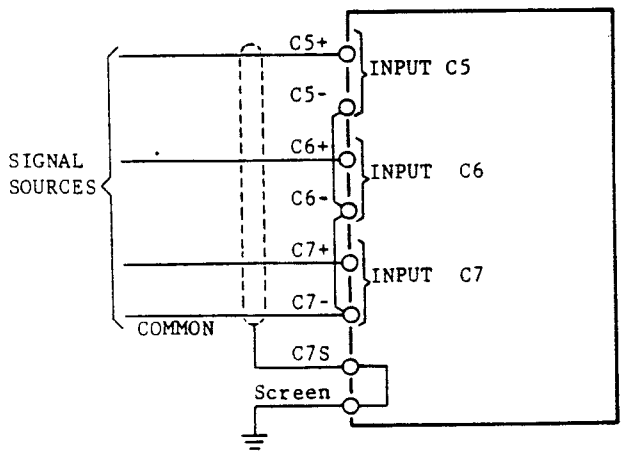


Fig. 12 - Signal Group with Common

Figs. 13 and 14 show typical connections to an 8033-4001 termination panel when used for voltage outputs.

With analog voltage output signals, one side of each signal is already connected to the GEM 80 Controller signal ground. You must NOT make any further connection of signals to ground.

Cable screens should be grounded at one end only. If a screen is already grounded elsewhere, then you should not terminate it on the terminal provided on the termination panel.

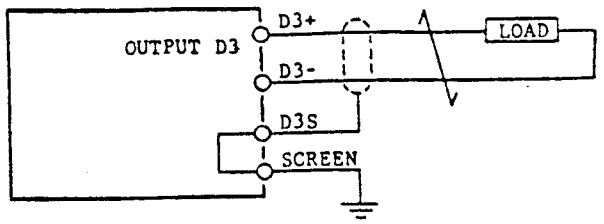


Fig. 13 - Individual Voltage Output

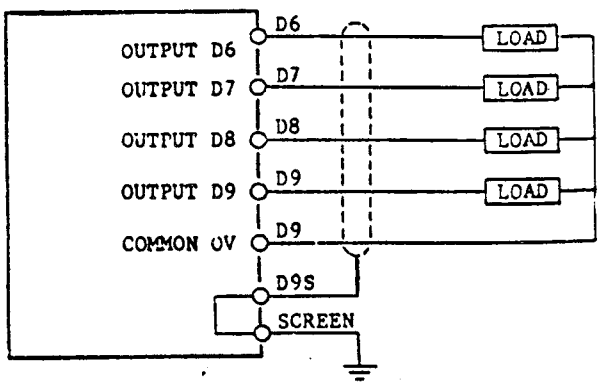


Fig. 14 - Group of Voltage Outputs with Common

Figs. 15 and 16 show typical connections to an 8033-4007 termination panel when used for current outputs.

With analog current output signals, one side of each signal is connected to the GEM 80 Controller +15V rail. You must NOT make any connection of signals to ground.

Note that the 8313 analog output module operates by sinking current.

Cable screens should be grounded at one end only. If a screen is already grounded elsewhere, then you should not terminate it on the terminal provided on the termination panel.

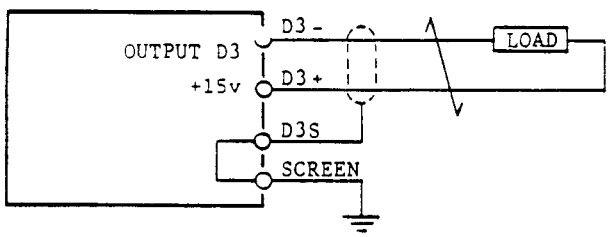


Fig. 15 - Individual Current Output

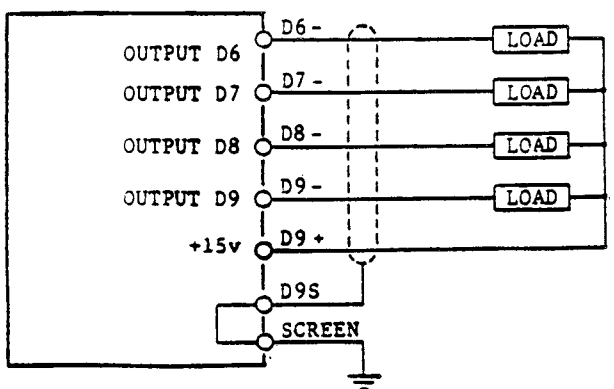
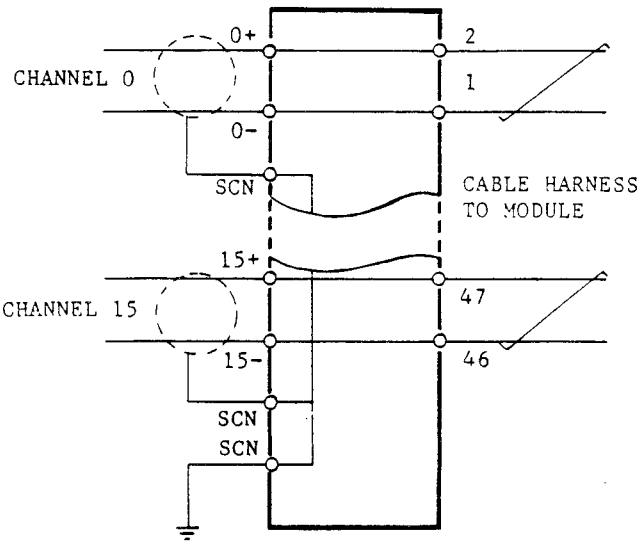


Fig. 16 - Group of Current Outputs with Common

Fig. 17 shows typical connections to an 8891-4010 terminal rail for voltage inputs, or for voltage or current outputs. Fig. 18 shows connections to an 8891-4015 terminal rail for current inputs with a power source connected.

Cable screens should be grounded at one end only. If a screen is already grounded elsewhere, then you should not terminate it on the terminal provided on the terminal rail.



NOTE: Terminal numbers reversed in pairs on wiring harness for current output only.

Fig. 17 - Voltage Input, Voltage Output, or Current Output Connections to an 8891-4010 Terminal Rail

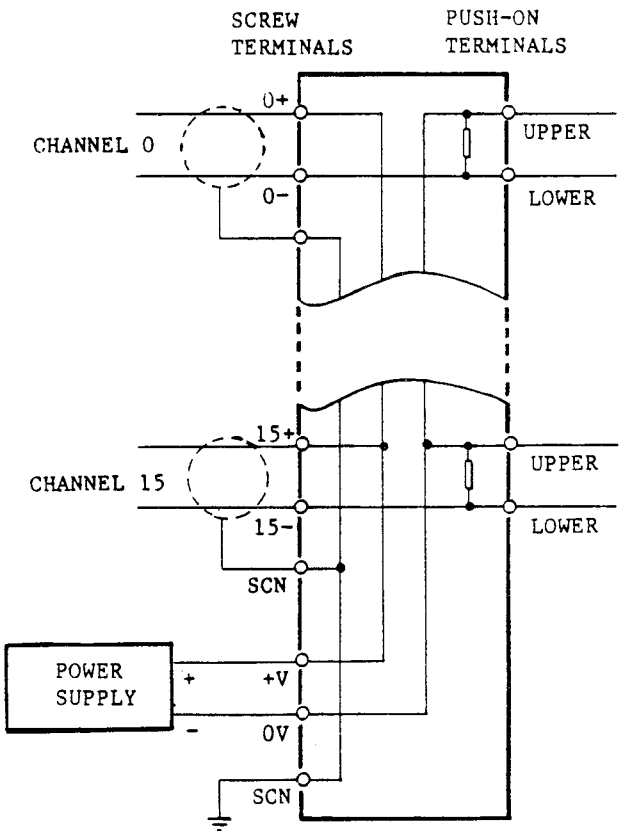


Fig. 18 - Current Input Connections to an 8891-4015 Terminal Rail

7.3 Harness Connections

Where you have ordered versions of 8840 Analog Input or 8841 Analog Output Equipment with terminal rails, we supply wiring harnesses as part of the equipment.

Each harness is fitted with a socket at one end and flying leads at the other. You can connect the socket into the plug on the 8062 or 8064 backplane behind the module in the subrack, and terminate the flying leads on the terminal rail.

The wiring harness consists of 16 colour-coded twisted-pairs of wires. Each channel is distinguished by the colours in the pair, which use the standard resistor colour code; i.e.:

Black*/Black is 00
Brown*/Black is 10

*with white stripe

Table 1 - Harness/Terminal Rail Connections

WIRING HARNESS 8891-4068		TERMINAL RAIL 8891-4010		8891-4015
		Connect to Terminal Number:-		
Wire Colour	Twisted Pair Number	For Voltage I/P or O/P	For Current output only	For Current Input only
Black	00	1 (0-)	2 (0+)	0V
Black/White		2 (0+)	1 (0-)	0-
Brown	01	4 (1-)	5 (1+)	0V
Black/White		5 (1+)	4 (1-)	1-
Red	02	7 (2-)	8 (2+)	0V
Black/White		8 (2+)	7 (2-)	2-
Orange	03	10 (3-)	11 (3+)	0V
Black/White		11 (3+)	10 (3-)	3-
Yellow	04	13 (4-)	14 (4+)	0V
Black/White		14 (4+)	13 (4-)	4-
Green	05	16 (5-)	17 (5+)	0V
Black/White		17 (5+)	16 (5-)	5-
Blue	06	19 (6-)	20 (6+)	0V
Black/White		20 (6+)	19 (6-)	6-
Violet	07	22 (7-)	23 (7+)	0V
Black/White		23 (7+)	22 (7-)	7-
Grey	08	25 (8-)	26 (8+)	0V
Black/White		26 (8+)	25 (8-)	8-
White	09	28 (9-)	29 (9+)	0V
Black/White		29 (9+)	28 (9-)	9-
Black	10	31 (10-)	32 (10+)	0V
Brown/White		32 (10+)	31 (10-)	10-
Brown	11	34 (11-)	35 (11+)	0V
Brown/White		35 (11+)	34 (11-)	11-
Red	12	37 (12-)	38 (12+)	0V
Brown/White		38 (12+)	37 (12-)	12-
Orange	13	40 (13-)	41 (13+)	0V
Brown/White		41 (13+)	40 (13-)	13-
Yellow	14	43 (14-)	44 (14+)	0V
Brown/White		44 (14+)	43 (14-)	14-
Green	15	46 (15-)	47 (15+)	0V
Brown/White		47 (15+)	46 (15-)	15-

7.4 Direct Connections

In some cases, you can make direct connections by ribbon cable to locally-mounted units, such as signal conditioning equipment, without connecting via a termination panel or terminal rail.

In rare cases, you might find it easier to directly connect by wire wrap connections to the pins of the module connector that project at the back of the 8062 or 8064 backplane.

In either case, make sure that this wiring is sufficiently segregated from noise-generating cables and equipment to avoid spurious signals. See the data on wiring segregation given in the Technical Manual for your Controller, or in the GEM 80 Installation and Maintenance Manual.

The table below lists the module connector pin numbers and the ribbon cable connector pin numbers corresponding to the various channels for analog inputs, or for analog voltage outputs.

Module Pin No.	Ribbon Pin No.	Signal
a7	1	0V
-	2	Inter-lock
c9	3	-
a9	4	+ 0
c11	5	-
a11	6	+ 1
c12	7	-
a12	8	+ 2
c14	9	-
a14	10	+ 3
c15	11	-
a15	12	+ 4
c17	13	-
a17	14	+ 5
c18	15	-
a18	16	+ 6
c20	17	-
a20	18	+ 7

Module Pin No.	Ribbon Pin No.	Signal
c21	19	-
a21	20	+ 8
c23	21	-
a23	22	+ 9
c24	23	-
a24	24	+ 10
c26	25	-
a26	26	+ 11
c27	27	-
a27	28	+ 12
c29	29	-
a29	30	+ 13
c30	31	-
a30	32	+ 14
c32	33	-
a32	34	+ 15

The table below lists the module connector pin numbers and the ribbon cable connector pin numbers corresponding to the various channels for analog current outputs only.

Module Pin No.	Ribbon Pin No.	Signal
c10	1	n.c.
-	2	Inter-lock
a8	4	-
a5	3	+ 0
a10	6	-
a5	5	+ 1
a13	8	-
a5	7	+ 2
c13	10	-
a5	9	+ 3
a16	12	-
a5	11	+ 4
c16	14	-
a5	13	+ 5
a19	16	-
a5	15	+ 6
c19	18	-
a5	17	+ 7

Module Pin No.	Ribbon Pin No.	Signal
a22	20	-
a5	19	+ 8
c22	22	-
a5	21	+ 9
a25	24	-
a5	23	+ 10
c25	26	-
a5	25	+ 11
a28	28	-
a5	27	+ 12
c28	30	-
a5	29	+ 13
a31	32	-
a5	31	+ 14
c31	34	-
a5	33	+ 15

7.5 Input Range Options

The nominal input range of the 8840 Analog Input Equipment is determined by four wire wrapped links on the 8062 backplane connector behind the module. These links are factory preset to the input range option you have specified. The information given below is provided in case you ever wish to alter the option from what you originally ordered:

Input Range	Links
+10V to -10V	a1-a3, c1-c3, a4-a6, c4-c6
+5V to -5V	a1-c2, c1-c3, a4-c5, c4-c6
+1V to -1V	a1-a2, c1-c3, a4-a5, c4-c6
+0.5V to -0.5V	a1-a2, c1-c2, a4-a5, c4-c5
+20 mA to -20 mA	a1-a2, c1-c3, a4-a5, c4-c6

For information on wire wrapping techniques, refer to the GEM 80 Installation and Maintenance Manual.

Input filter time constants are built in when the module is manufactured, and cannot be changed. If you ever wish to change from the version you ordered to the other size of time constant, consult the factory about exchanging your module for one to a different Ordering Code.

8. APPLICATION DATA

Fast I/O input data is assigned to C-table in any GEM 80 Controller, and Fast I/O output data is taken from D-table. For the Analog Input Equipment, the data obtained by converting the 16 analog input signals occupies a block of 16 adjacent C-table locations. Similarly, for the Analog Output Equipment, the data for the 16 analog output signals comes from a block of 16 adjacent D-table locations. The lowest numbered location in this block (the "base" location) is determined by the position of the module in the subrack.

Example:

For a GEM 80/301 Controller, the fast I/O modules start at subrack slot position 17:

Module Position in Subrack	Data Location for Signal 0 (Base Location)	Data Location for Signal 15
Slot 17	C0/D0	C15/D15
Slot 18	C32/D32	C47/D47
Slot 19	C64/D64	C79/D79
Slot 20	C96/D96	C111/D111

With newer models of GEM 80 Controller, you do not need to specify any P-table data for the fast I/O modules, as the Controller deduces the data it requires from your ladder diagram program. For older models (e.g. GEM 80/235), then you need to specify code number 5 for the fast I/O configuration data for the particular slot position where an analog input module is mounted, and code number 21 for the slot position where an analog output module is mounted.

9. ORDERING CODES

9.1 Equipment for Direct Connection to Plant

Each of the following sets of equipment includes:

Analog module.
Backplane connector assembly.
Analog input termination panel or terminal rail.
2m ribbon cable with connectors (for termination panel), or 3m wiring harness with connectors (for terminal rail).

Analog Input Equipments

Input Signal Range	Filter Time Const.	Ordering Codes with Termination Panel	Ordering Codes with Terminal Rail
±10V	0.5 ms	8840-4001	8840-4006
±5V	0.5 ms	8840-4002	8840-4007
±1V	0.5 ms	8840-4003	8840-4008
±0.5V	0.5 ms	8840-4004	8840-4009
±20 mA	0.5 ms	8840-4005	8840-4010
±10V	5 ms	8840-4011	8840-4016
±5V	5 ms	8840-4012	8840-4017
±1V	5 ms	8840-4013	8840-4018
±0.5V	5 ms	8840-4014	8840-4019
±20 mA	5 ms	8840-4015	8840-4020

Analog Output Equipments

Signal Range	With Termination Panel	With Terminal Rail
±10V	8841-4001	8841-4004
0 to 20mA	8841-4012	8841-4011

9. ORDERING CODES

9.2 Equipment for use with Signal Conditioning (excludes termination panel)

Each of the following sets of equipment includes:

- Analog module.
- Backplane connector assembly.
- 2m ribbon cable with connectors.

Analog Input Range ±5V (5 ms filter)	8840-4022
Analog Output Range ±5V	8841-4002

9.3 Optional Extras

Mounting kit comprising: 1 length of steel channel 5 cable retention clips (plastic) 1 set of fixing screws	8959-0000

9.4 Spares

Analog input module (0.5 ms filter)	8311-4001
Analog input module (5 ms filter)	8311-4002
Analog output module (±10V range)	8312-4002
Analog output module (±5V range)	8312-4003
Analog output module (0 to 20 mA)	8313-4001
Analog termination panel for voltage inputs or voltage outputs	8033-4001
Analog termination panel for 20 mA current inputs	8033-4002
Analog termination panel for 20 mA current outputs	8033-4007
Analog terminal rail for voltage inputs, voltage outputs, or current outputs	8891-4010
Analog terminal rail for 20 mA current inputs and power source input	8891-4015
Wander plugs for connection to monitoring sockets Red Black	 80801/180 80801/181

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