

APPENDIX B

I/O MODULES

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APPENDIX B I/O MODULES

GENERAL INFORMATION

The MODICON input/output modules convert and condition signals from user equipment into logic voltage levels used by the Controller's processor and vice-versa. Each standard (non-isolated) module is capable of conditioning up to sixteen input/output signals. Voltages other than 5 Vdc used by the processor internally are supplied to the module housings by the user. The following signal-conditioning module options are available.

Model	Type
B230	Conditions 115 Vac outputs
B231	Conditions 115 Vac inputs
B232	Conditions 24 Vdc outputs
B233	Conditions 24 Vdc inputs
B234	Conditions 230 Vac outputs
B235	Conditions 230 Vac inputs
B236	Conditions 5 Vdc outputs for TTL logic
B237	Conditions 5 Vdc inputs for TTL logic
B238	Conditions 24 Vdc High Current outputs
B239	Counts High Speed Pulse Signals
B243	Conditions Analog (0-10 Vdc, 1-5 Vdc, or 4-20 mA) inputs
B244	Conditions 230 Vac Isolated outputs
B245	Conditions 230 Vac Isolated inputs
B246	Conditions 115 Vac Isolated outputs
B247	Conditions 115 Vac Isolated inputs
B248	Conditions 10-60 Vdc Outputs
B256/258	Controls Sixteen Analog Inputs
B260	Conditions Analog Voltage (0-10 Vdc or 0-5 Vdc) outputs
B262	Conditions Analog Current (4-20mA only) outputs
B266/268 274/276	Conditions Reed isolated outputs
B270	Conditions 48 Vac outputs
B271	Conditions 48 Vac inputs
B275	Conditions 10-60 Vdc Inputs
B680	Conditions ASCII/O

All modules are 3 in. x 8-7/8 in. by 12-5/8 in. and weigh approximately 5 lb. Each input or output is electrically isolated from the 184/384 Controller through optical couplers or isolation transformers and will withstand severe voltage transients without damage or adverse affect on the Controller. (The modules are designed to withstand 25,000V spark noise from a Tesla Coil type device.)

User connections are made to standard barrier strips on the B240 Input/Output Housing. A module is plugged into the housing and secured by two screws, one at the top and one at the bottom of each module. This configuration permits a replacement of modules without disturbing the field wiring.

Terminals are numbered from one at the top of the barrier strip. Table B-1 is a matrix showing terminal assignments for commonly used I/O modules. The following descriptions show input/output terminal numbering and connections. Note that, for ac-conditioning modules, terminals 2, 7, 12, and 17 are not connected together internally; while, for dc-conditioning modules, these terminals are connected internally.

When a module is secured in the housing, each output or input wire has, adjacent to it, the appropriate status indicator (input or output) and a marking strip for labels.

In addition, each module is provided with a status lamp (Active Indicator) which remains lit when the module is being monitored by the processor during normal operation. This light only indicates processor scanning, it does not show whether input signals are being communicated to the processor. On the other hand, if output signals are not being sent to the module by the processor, both signal lights and the status lights will be off.

ENVIRONMENTAL CONDITIONS

The following applies to all input/output modules.

Temperature:	0° to 60°C ambient
Humidity:	0% to 95% relative (non-condensing)

Terminal	B230	B231	B232	B233	B234	B235	B236	B237	B238	B243
1	115 Vac Outputs	115 Vac Inputs	24 Vdc Outputs	24 Vdc Inputs	230 Vac Outputs	230 Vac Inputs	5V TTL Outputs	5V TTL Inputs	24 Vdc High-Current Outputs	B243 Analog Inputs
2	Lamp Common Group 1 Line	Not Used Group 1 Common	Bias Input • Common	Bias Input • Common	Lamp Common Group 1 Line	Not Used Group 1 Common	Bias Input • Common	Bias Input • Common	Bias Input • Common	Not Used + Input 1
3	Output 1	Input 1	Output 1	Input 1	Output 1	Input 1	Output 1	Input 1	Output 1	- Input 1
4	Output 2	Input 2	Output 2	Input 2	Output 2	Input 2	Output 2	Input 2	Output 2	Shield 1
5	Output 3	Input 3	Output 3	Input 3	Output 3	Input 3	Output 3	Input 3	Output 3	Not Used
6	Output 4	Input 4	Output 4	Input 4	Output 4	Input 4	Output 4	Input 4	Output 4	Not Used
7	Group 2 Line	Group 2 Common	• Common	• Common	Group 2 Line	Group 2 Common	• Common	• Common	• Common	+ Input 2
8	Output 5	Input 5	Output 5	Input 5	Output 5	Input 5	Output 5	Input 5	Output 5	- Input 2
9	Output 6	Input 6	Output 6	Input 6	Output 6	Input 6	Output 6	Input 6	Output 6	Shield 2
10	Output 7	Input 7	Output 7	Input 7	Output 7	Input 7	Output 7	Input 7	Output 7	Not Used
11	Output 8	Input 8	Output 8	Input 8	Output 8	Input 8	Output 8	Input 8	Output 8	Not Used
12	Group 3 Line	Group 3 Common	• Common	• Common	Group 3 Line	Group 3 Common	• Common	• Common	• Common	Not Used
13	Output 9	Input 9	Output 9	Input 9	Output 9	Input 9	Output 9	Input 9	Output 9	+ Input 3
14	Output 10	Input 10	Output 10	Input 10	Output 10	Input 10	Output 10	Input 10	Output 10	- Input 3
15	Output 11	Input 11	Output 11	Input 11	Output 11	Input 11	Output 11	Input 11	Output 11	Shield 3
16	Output 12	Input 12	Output 12	Input 12	Output 12	Input 12	Output 12	Input 12	Output 12	Not Used
17	Group 4 Line	Group 4 Common	• Common	• Common	Group 4 Line	Group 4 Common	• Common	• Common	• Common	Not Used
18	Output 13	Input 13	Output 13	Input 13	Output 13	Input 13	Output 13	Input 13	Output 13	+ Input 4
19	Output 14	Input 14	Output 14	Input 14	Output 14	Input 14	Output 14	Input 14	Output 14	+ Input 4
20	Output 15	Input 15	Output 15	Input 15	Output 15	Input 15	Output 15	Input 15	Output 15	Shield 4
21	Output 16	Input 16	Output 16	Input 16	Output 16	Input 16	Output 16	Input 16	Output 16	Not Used

*NOTE: DC commons are internally jumpered on the DC modules and require only one connection per module

Table B-1. I/O Module Terminal Assignments

ALTERNATING CURRENT MODULES

115V MODULES

INPUTS-B231 MODEL

Each input draws sufficient 'wetting' current to inhibit the buildup of contaminants on the surface of silver contacts used in pushbuttons, limit switches, pressure switches, etc.

Following are the input signal requirements for each of the 16 inputs.

ON

Condition: Input at high level
Input indicator ON
Controller input ON

Level: 115 ± 15 Vac,
Source in series with 0 to 1000 ohms
48 to 62 Hz

OFF

Condition: Input at low level
Input indicator OFF
Controller input OFF

Level: 0 to 30 Vac, or 0 to 130 Vac
Source in series with greater than 25,000
ohms; 48 to 62 Hz.

Switch Level: Approximately 65 Vac

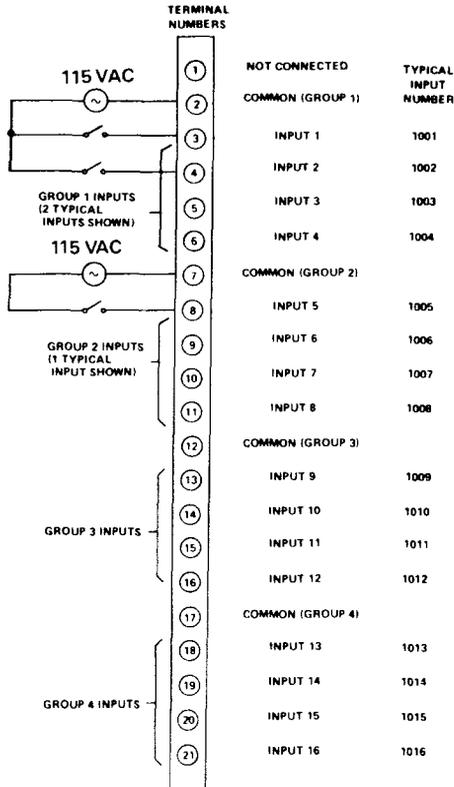
Input Impedance: 510 ohms in series, with $0.56 \mu\text{f}$
(approximately 4,700 ohms, -90° at 60 Hz)

Input Current: 25 mA at 115V (contact wetting current at
60 Hz)

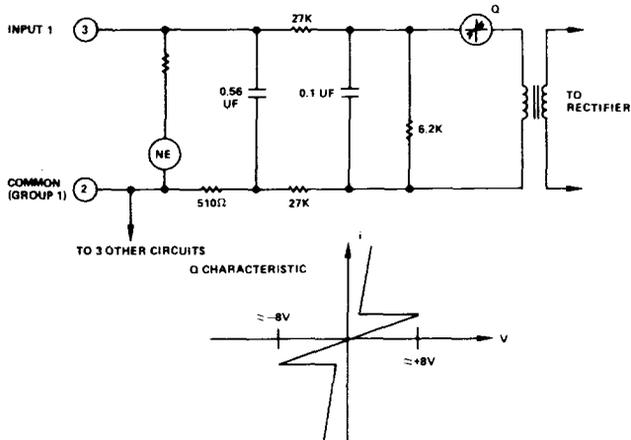
Common Mode Voltage: 200 Vac steady state (60 Hz)
1500V for 10 ms

Maximum Input Voltage: Not to exceed 400 volts peak on any input

Output Response Time: OFF to ON - 10 ms at 60 Hz
maximum 12 ms at 50 Hz
ON to OFF - 30 ms maximum



**B231 115 Vac Input Module
Terminal Numbering and Input Connection**



B231 115 Vac Input Module Simplified Schematic

OUTPUTS - B230 MODEL

The MODICON B230 Output Module conditions the signals used internally in the Controller to sixteen independent 115 Vac output capable of driving solenoids, motor starters, and other loads up to two amperes. Each module uses sixteen triac devices to switch the loads of the user-supplied Vac line.

Self-contained damping networks and voltage-limiting thyrectors or varistors surpress line voltage spikes and prevent false triggering. The module is also fused to protect its circuitry from overload currents and voltages.

The following are the electrical characteristics of the B230 Output Module.

Load Current

OFF Current:	5 mA maximum 115 Vac, at 60 Hz
ON Current:	2 amperes maximum per output; 5 amperes maximum per group of four outputs
ON Holding Current:	60 mA maximum for B230, 0.5 mA max. for B230-1.
Inrush Load Current:	5 amperes maximum for 100 ms 15 amperes maximum for 10 ms
Fuse Rating:	5 amperes (one fuse per output)

Load Voltage

Working Voltage:	115 ± 35 Vac 48 to 62 Hz
Transient:	200V maximum; thyrector limited
ON Voltage Drop:	2 Vac at 2 amperes current
Common Mode Voltage	Working 200 Vac, 1500 Vac maximum for 10 ms

Response Time

B230:
OFF to ON - 0.3 - 2 ms
ON to OFF - 0.3 - 8 ms
B230-1:
OFF to ON - 0.3 - 10 ms
ON to OFF - 0.3 - 8 ms

Output Status Indicator

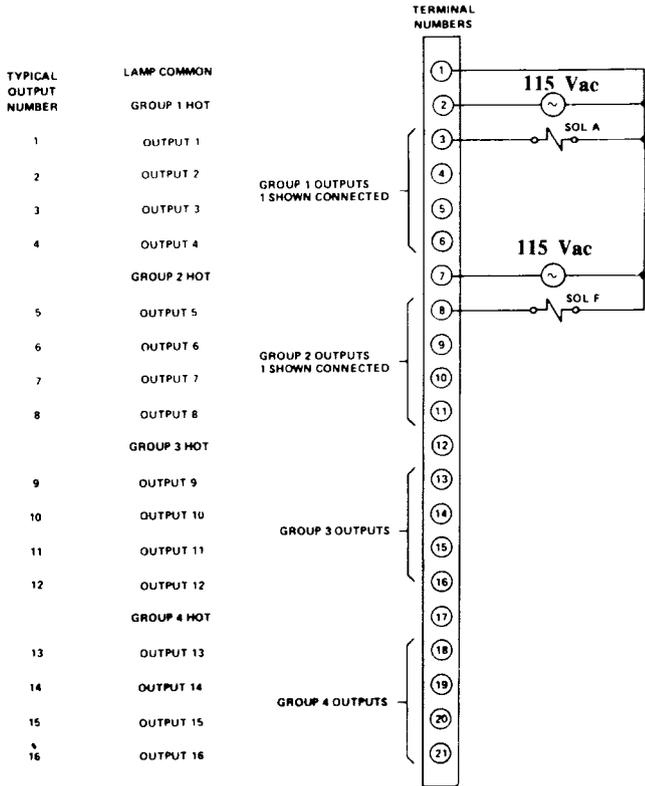
A neon lamp is provided for each output. The lamp will be ON when the output is ON.

NOTE

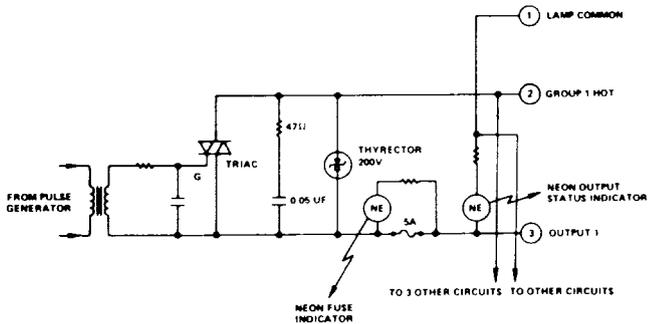
B230 only, the lamp will be ON when no output load is present.

Fuse Indicator

A neon lamp is provided for each output. The lamp will be ON when the fuse is blown.



**B230 115 Vac Output Module
Terminal Numbering and Output Connection**



B230 115 Vac Output Module Simplified Schematic

230V MODULES

INPUTS - B235 MODEL

Each input draws sufficient 'wetting' current to inhibit the buildup of contaminants on the surface of silver contacts used in pushbuttons, limit switches, pressure switches, etc.

Following are the input signal requirements for each of the 16 inputs.

ON

Condition: Input at high level
Input indicator ON
Controller input ON

Level: 230 \pm 30 Vac
Source in series with 0 to 1000 ohms
48 to 62 Hz

OFF

Condition: Input at low level
Input indicator OFF
Controller input OFF

Level: 0 to 60 Vac, or 0 to 260 Vac
Source in series with greater than 50,000 ohms; 48 to 62 Hz.

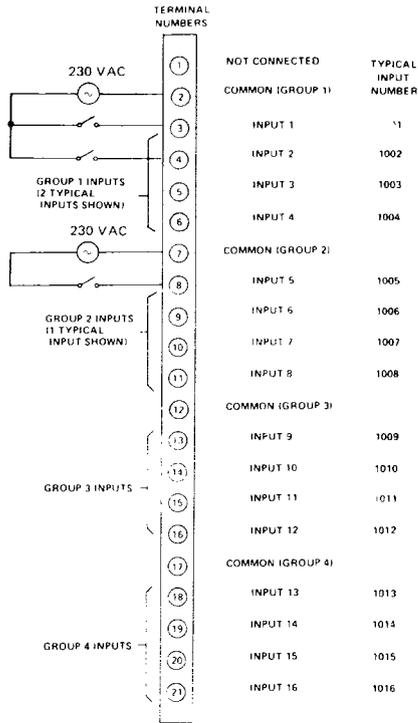
Switch Level: Approximately 130 Vac

Input Impedance: 1K ohms in series, with 0.33 mF (approximately 8,000 ohms, -90° at 60 Hz)

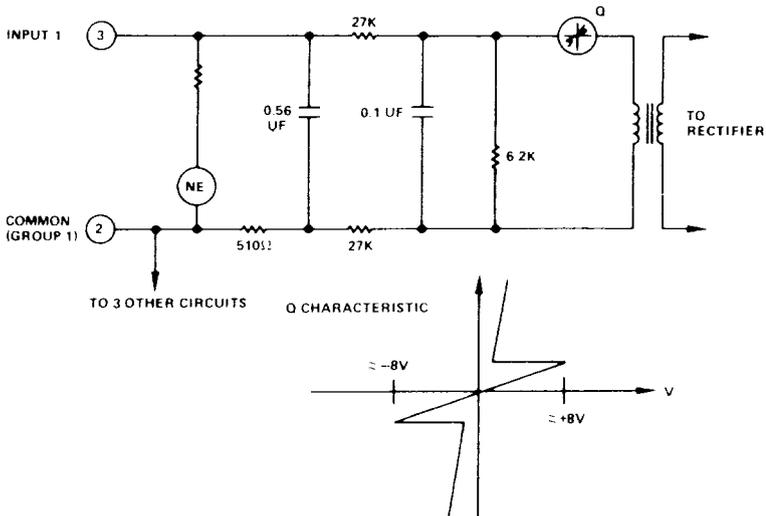
Input Current: 28 mA at 220V (contact wetting current at 60 Hz)

Common Mode Voltage: 400 Vac steady state (60 Hz); 1500V for 10 ms

Output Response Time: a. OFF to ON - 10 ms at 60 Hz maximum
12 ms at 50 Hz
b. ON to OFF - 30 ms maximum



B235 230 Vac Input Module Terminal Numbering and Input Connection



B235 230 Vac Input Module Simplified Schematic

OUTPUTS - B234 MODEL

The MODICON B234 (230 Vac) Output Module conditions the signals used internally in the Controller to 16 independent 230 Vac outputs capable of driving solenoids, motor starters, and other loads up to two amperes. Each module uses 16 triac devices to switch the loads of the user-supplied Vac line.

Self-contained damping networks and voltage-limiting thyrectors suppress line voltage spikes and prevent false triggering. The module is also fused to protect its circuitry from overload currents and voltages.

Following the electrical characteristics of the B234 Output Module.

Load Current

OFF Current:	5 mA maximum
ON Current:	2 ampres maximum per output; 5 amperes maximum per group of four outputs
ON Holding Current:	60 mA maximum for B234, 0.5 mA max. for B234-1.
Inrush Load Current:	5 amperes maximum for 100 ms 15 amperes maximum for 10 ms
Fuse Rating:	5 amperes (one fuse per output)

Load Voltage

Working Voltage:	230 \pm 50 Vac; 48 to 62 Hz
Transient:	400V maximum; thyrector limited
ON Voltage Drop:	2 Vac at 2 amperes current
Common Mode Voltage	Working 400 Vac, 1500 Vac maximum for 10 ms

Response Time

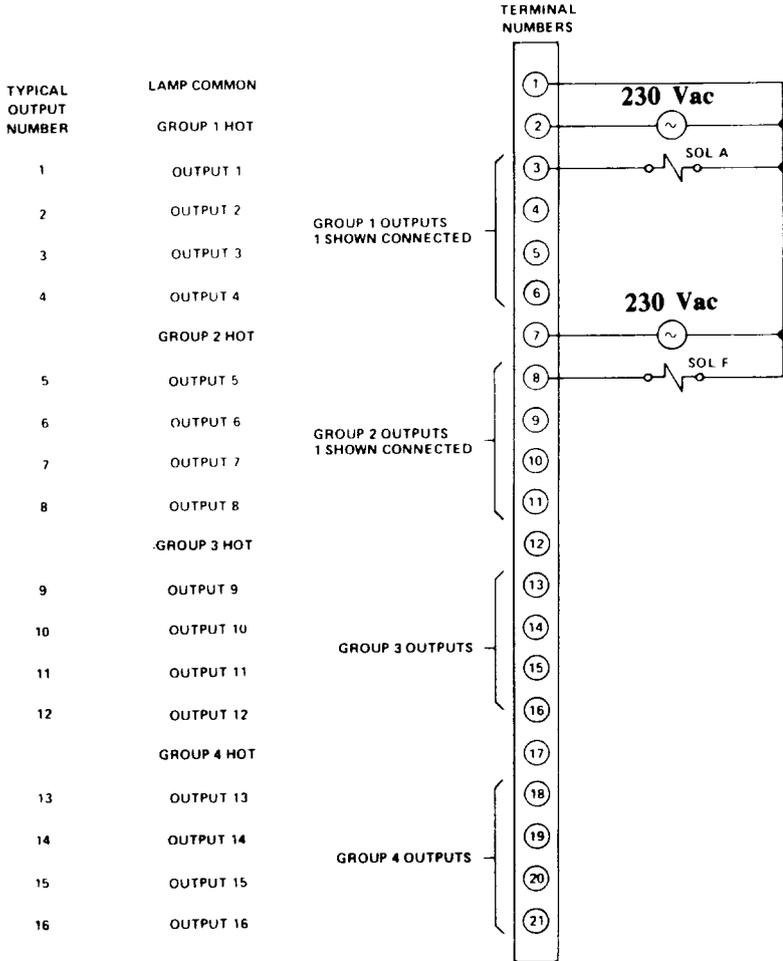
B234:
OFF to ON - 0.3 - 2.0 ms
ON to OFF - 0.3 - 8.0 ms
B-234-1:
OFF to ON - 0.3 - 10 ms
ON to OFF - 0.3 - 8 ms

Output Status Indicator A neon lamp is provided for each output. The lamp will be ON when the output is ON.

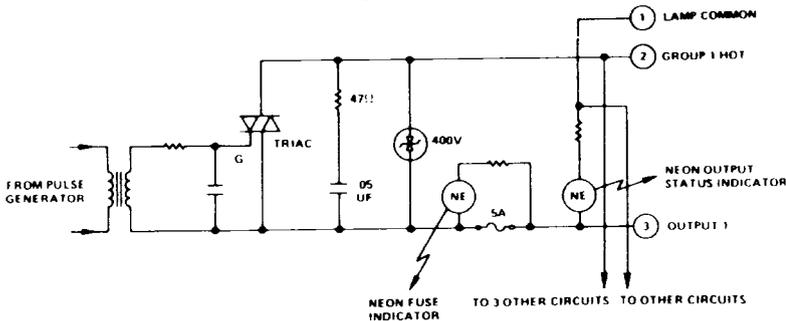
NOTE

B234 only, the lamp will be ON when no output load is present.

Fuse Indicator A neon lamp is provided for each output. The lamp will be ON when the fuse is blown.



**B234 230 Vac Output Module
Terminal Numbering and Output Connection**



B234 230 Vac Output Module Simplified Schematic

48V MODULES

INPUTS-271 MODEL

Each input draws sufficient 'wetting' current to inhibit the buildup of contaminants on the surface of silver contacts used in pushbuttons, limit switches, pressure switches, etc.

Following are the input signal requirements for each of the 16 inputs.

ON

Condition: Input at high level
Input indicator ON
Controller input ON

Level: 48 ± 12 Vac,
Source in series with 0 to 500 ohms
48 to 62 Hz

OFF

Condition: Input at low level
Input indicator OFF
Controller input OFF

Level: 0 to 15 Vac, or
0 to 60 Vac source in series with greater
than 20,000 ohms; 48 to 62 Hz.

Switch Level: Approximately 24 Vac

Input Impedance: 220 ohms in series, with 0.56 mF (approximately 4,700 ohms, -90° at 60 Hz)

Input Current: 10 mA at 48V (contact wetting current at 60 Hz)

Common Mode

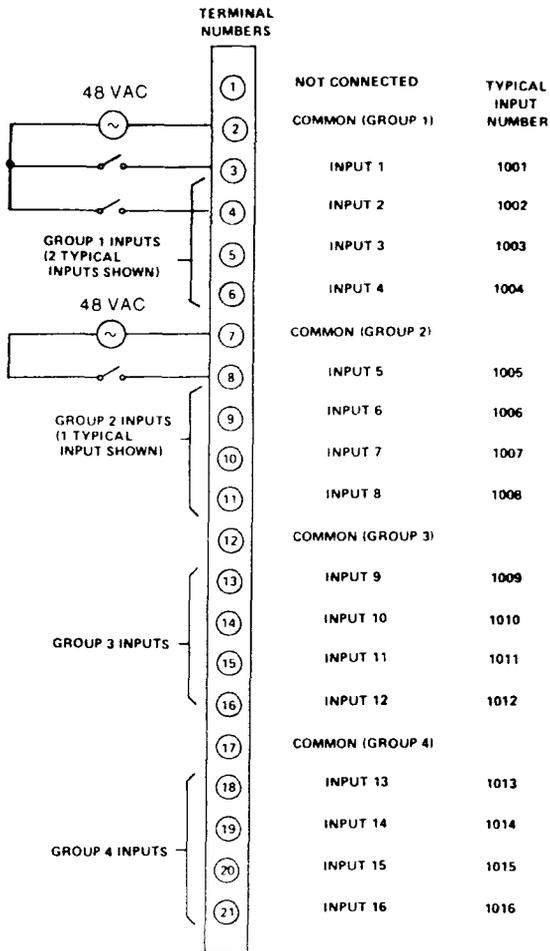
Voltage: 200 Vac steady state (60 Hz)
1500V for 10 ms

Maximum Input

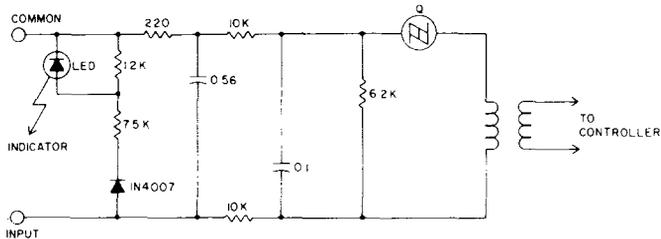
Voltage: Not to exceed 400 volts peak on any input

Output Response

Time: OFF to ON - 10 ms at 60 Hz maximum 12 ms
at 50 Hz
ON to OFF - 30 ms maximum



B271 48 Vac Input Module Terminal Numbering and Input Connection



B271 48 Vac Input Module Simplified Schematic

OUTPUT-B270 MODEL

The MODICON B270 Output Module conditions the signals used internally in the Controller to sixteen independent 48 Vac outputs capable of driving solenoids, motor starters, and other loads up to two amperes. Each module uses sixteen triac devices to switch the loads of the user-supplied Vac line.

Self-contained damping networks and voltage-limiting thyrectors suppress line voltage spikes and prevent false triggering. The module is also fused to protect its circuitry from overload currents and voltages.

Following are the electrical characteristics of the B270 Output Module.

Load Current

OFF Current:	5 mA maximum 48 Vac, at 60 Hz
ON Current:	2 amperes maximum per output; 5 amperes maximum per group of four outputs
ON Holding Current:	0.5 mA maximum
Inrush Load Current:	5 amperes maximum for 100 ms 15 amperes maximum for 10 ms
Fuse Rating:	5 amperes (one fuse per output)

Load Voltage

Working Voltage:	48 \pm 12 Vac 48 to 62 Hz
Transient:	200V maximum; thyrector limited
ON Voltage Drop:	2 Vac at 2 amperes current

Common Mode

Voltage:	200 Vac maximum working 1500 Vac maximum for 10 ms
Response Time:	OFF to ON - 0.3 - 10 ms ON to OFF - 0.3 - 8 ms

Output Status

Indicator:

A LED (light emitting diode) is provided for each output. The light will be ON when the output is ON.

Fuse Indicator:	A LED is provided for each output. The light will be ON when the fuse is blown.
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DIRECT CURRENT MODULES

24V MODULES

INPUT-MODEL B233

The Modicon B233 Input Module conditions 16 independent 24 Vdc signals to the signals used internally in the Controller.

ELECTRICAL CHARACTERISTICS

Input Signal Requirements—for each of the 16 inputs:

ON

Condition: Input "Low" or short circuit to common
Input Indicator ON
Control Input Line ON

Level: Less than +1 Vdc referenced to common or
less than 200 ohms to common
Maximum current: -15 mA

OFF

Condition: Input "High" or open circuit
Input Indicator OFF
Controller Input OFF

Level: +24 \pm 6V or open circuit (greater than
10,000 ohms)

Switching Level

Approximately 7 volts

Common Mode Voltage

200 Vac
1500V for 10 ms

+ 24 Bias Supply

Voltage: 15-30 Vdc
Current: 200 mA maximum

Maximum Input Voltage

Not to exceed 500V for 3 ms

Output Response Time

High to Low: 13 ms maximum
Low to High: 4 ms maximum

Input Status Indicator

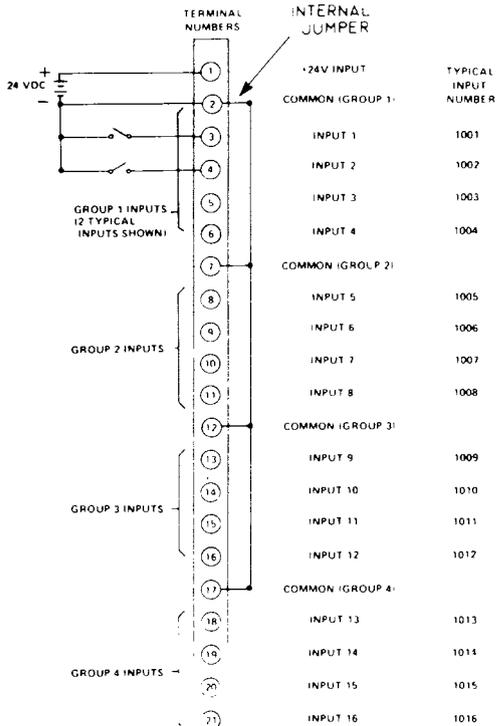
A LED (light-emitting diode) is provided for
each input. The light will be ON when that
input is ON.

Compatibility with Output Module

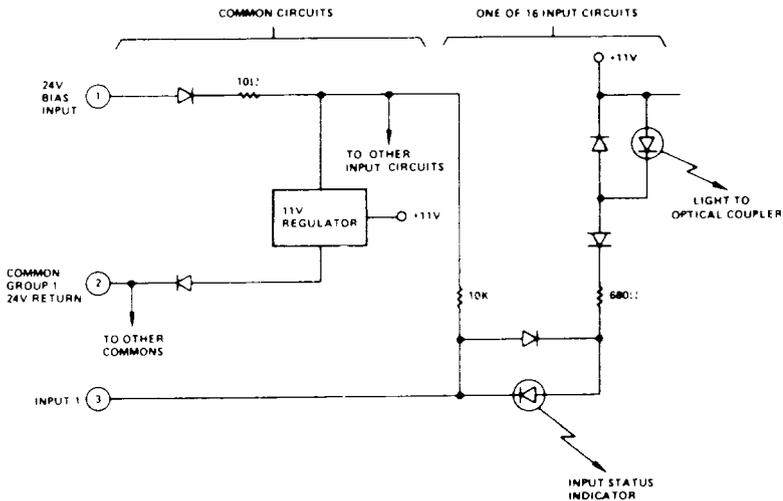
The B233, 24 Vdc Input Module is capable of interconnection with the B232 or B238 24 Vdc Output Module without the use of additional components.

Protection

Polarity reversal of bias supply or operation with parallel unclamped inductive loads shall not cause circuit failure.



B233 24 Vdc Input Module Terminal Numbering and Input Connections



B233 24 Vdc Input Module Simplified Schematic

OUTPUT-MODEL B232 (24 Vdc, 1/4 Amp)

The Modicon B232 Output Module converts the signals used internally in the Controller to 16 independent 24 Vdc outputs capable of driving relays, pilot lamps, or other loads up to 250 mA. The module uses 16 transistor switches to control loads connected to the user-supplied 24 Vdc source.

Self-contained clamp diodes suppress transient voltages when inductive loads are driven. The B232 module is also fused to protect its circuitry against overload currents and accidental polarity reversal.

ELECTRICAL CHARACTERISTICS

Load Current

OFF Current:	0.5 mA maximum at maximum voltage
Steady State ON Current:	250 mA maximum per output
Inrush Current:	1.0 ampere maximum per output for 10 ms
Fuse Rating:	7A (one fuse per module)

Load Voltage

Working Voltage:	15-30 Vdc
Peak Voltage:	40 Vdc
ON Voltage:	0.5 Vdc at 250 mA
24 VDC Supply (supplied by user):	Voltage: 15-30 Vdc Current: 0.5 amp maximum

Common Mode Voltage

200 Vac steady state maximum (at 60 Hz)
1500Vdc for 10 ms

Response Time

OFF to ON - 14 ms maximum
ON to OFF - 13 ms maximum

Output Status Indicator

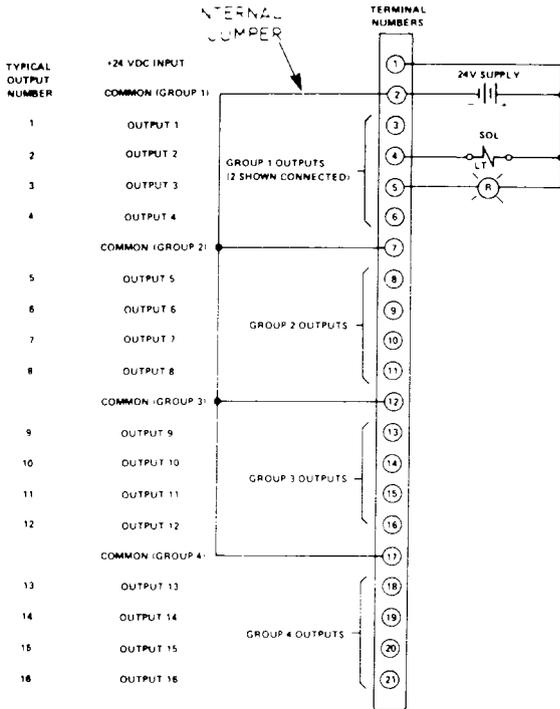
A LED (light-emitting diode) is provided for each output. The light is ON when the output is ON.

Compatibility with Input Module

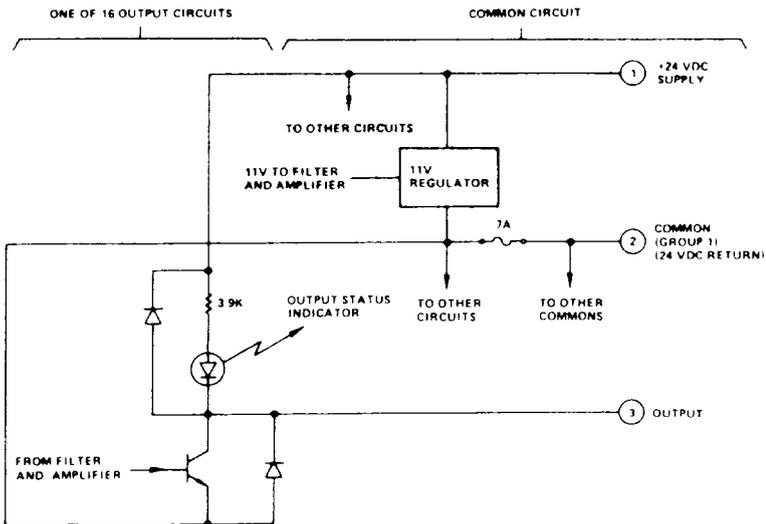
The B233, 24 Vdc Input Module is capable of interconnection with the B232 24 Vdc Output Module without the use of additional components.

Protection

Polarity reversal of 24 Vdc supply or input voltage will not cause circuit failure (the protective fuse may be blown, however). Operation with parallel unclamped inductive loads will not cause circuit failure.



B232 24 Vdc Output Module Terminal Numbering and Output Connections



B232 24 Vdc Output Module Simplified Schematic

OUTPUT-MODEL 238 (24 Vdc, 2-1/2 Amp)

The MODICON B238 Output Module is a high-current version of the B232 module; each of 16 independent 24 Vdc outputs is capable of driving relays, pilot lamps, or other loads up to 2.5A. The module uses 16 transistor switches to control loads connected to the user-supplied 24 Vdc source.

Self-contained clamp diodes suppress transient voltages when inductive loads are driven. Each circuit on the B238 module is fused to protect its circuitry against overload currents and accidental polarity reversals.

ELECTRICAL CHARACTERISTICS

Load Current

OFF Current:	20 mA maximum at maximum voltage
Steady State ON Current:	2.5A maximum per output
Inrush Current:	10.0 ampere maximum per output for 10 ms
Fuse Rating:	3A (one fuse per circuit) plus one for bias supply

Load Voltage

Working Voltage:	15-30 Vdc
Peak Voltage:	35 Vdc
ON Voltage:	0.7 Vdc at 2.5A
24 VDC Supply (supplied by user):	Voltage: 15-30 Vdc Current: 1.5 amp max

Common Mode Voltage 200 Vac steady state maximum (at 60 Hz)
1500 Vdc for 10 ms

Response Time OFF to ON - 14 ms maximum
ON to OFF - 13 ms maximum

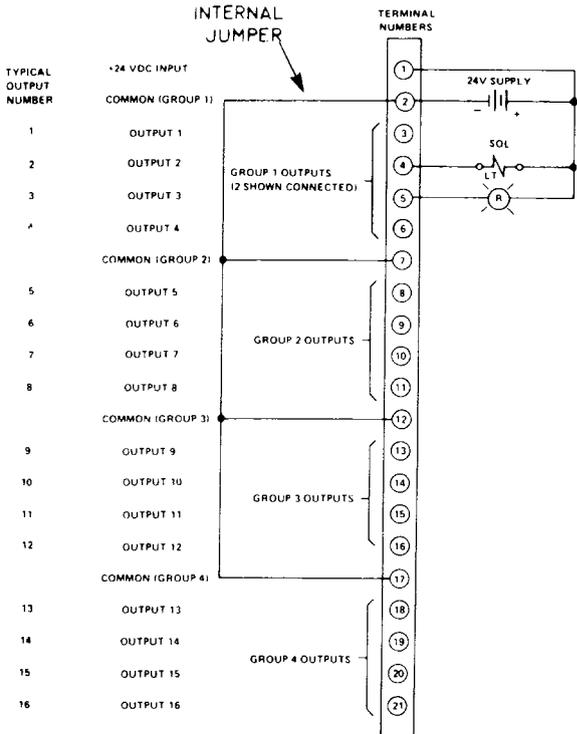
Output Status Indicator A LED (light-emitting diode) is provided for each output. The light is ON when the output is ON.

Compatibility with Input Module

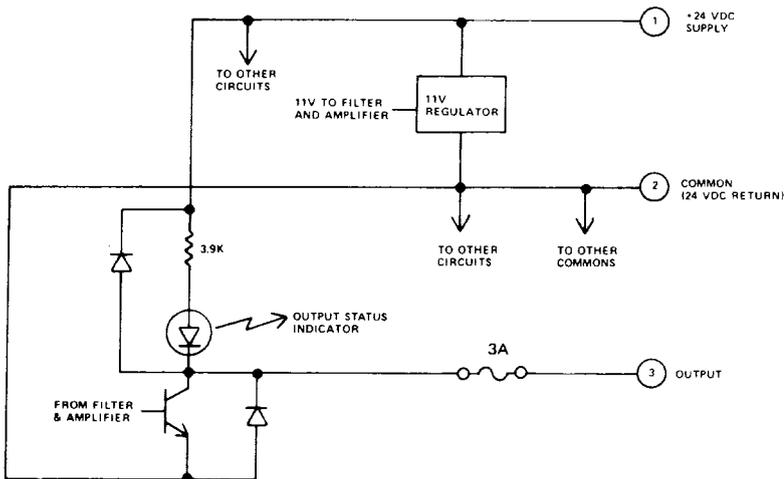
The B238, 24 Vdc High-Current Output Module is capable of interconnection with the B233, 24 Vdc Input Module without the use of additional components.

Protection

Polarity reversal of 24 Vdc supply or input voltage will not cause circuit failure (the protective fuse may be blown, however). Operation with parallel unclamped inductive loads will not cause circuit failure.



B238 24 Vdc Output Module Terminal Numbering and Output Connections



B238 24 Vdc Output Module Simplified Schematic

5V MODULES

INPUT-MODEL B237

The Modicon B237 Input Modules conditions up to 16 independent +5 Vdc input signals to the signals used internally by the Controller.

ELECTRICAL CHARACTERISTICS

Input Signal Requirements—for each of the 16 inputs:

Logic One State

Conditions:

Input "High" or open circuit
Input Indicator ON
Controller Input Line ON

Level:

$V_{IH} = 2.0V$ minimum $I_I = 0.1$ mA maximum
at $V_{IH} = 5.5V$; $V_{CC} = 5.0V$
Maximum Input Voltage: +8.0 Volts
Maximum Positive Clamp Current: 50 mA

Logic Zero State

Conditions:

Input "Low"
Input Indicator OFF
Controller Input OFF

Level:

$V_{IL} = 0.8V$ maximum
 $I_{IL} = 14.0$ mA maximum at $V_{CC} = 5.25V$
(9 TTL load equivalent) $V_{IL} + 0V$
Maximum Negative Voltage: -2 Volts
Maximum Negative Clamp: 50 mA

Common Mode Voltage

200 Vac steady state maximum (at 60 Hz)
1500V for 10 ms

+5V Supply
(supplied by user)

Voltage: 5.0 ± 0.25 Vdc
Current: 0.3 amp maximum

Response Time

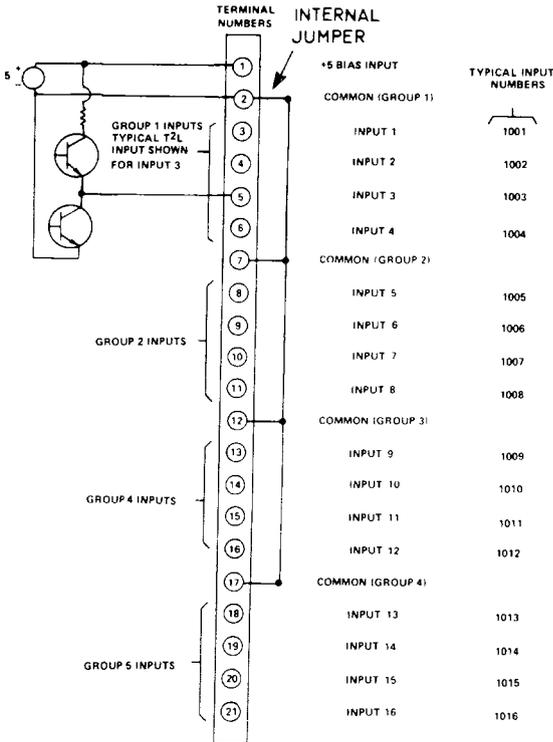
OFF to ON - 4 ms maximum
ON to OFF - 13 ms maximum

Input Status Indicator

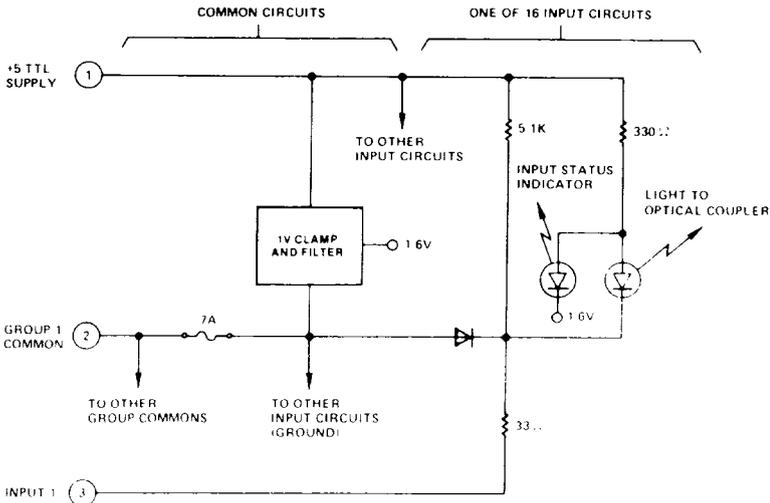
A light (light-emitting diode) is provided for each input. The light is ON when the input is in the Logic One state.

Compatibility with Output Module

The B237, 5 Vdc TTL Input Module is capable of interconnection with the B236, 5 Vdc TTL Output Module without the use of additional components.



B237 5 Vdc TTL Input Module Terminal Numbering and Input Connection



B237 5 Vdc TTL Input Module Simplified Schematic

OUTPUT MODULE B236 (5 Vdc)

The MODICON B236 Output Module conditions the signals used internally in the Controller to 16 independent outputs capable of driving up to 50 mA of TTL or DTL loads. The module uses 16 transistor drivers to control logic loads associated with an externally applied 5 Vdc source. The B236 Output Module is fused to protect its circuitry against overload currents and accidental polarity reversal.

ELECTRICAL CHARACTERISTICS

Logic One State	Line Output ON Output transistor OFF Output indicator ON Output Voltage: 4.V minimum at 0.5 mA current, and +5V supply at 4.75 Vdc
Logic Zero State	Line Output OFF Output transistor ON Output indicator OFF Output Voltage: +0.4V maximum at 50 mA Rated Current: 50 mA continuous, 100 mA peak (10 ms, 20% duty cycle)
+5V Supply (supplied by user):	+ 5 Vdc \pm 0.25 Vdc 200 mA maximum current
Common Mode Voltage	200 Vac steady state maximum (at 60 Hz), 1500 Vdc for 10 ms
Response Time	a. OFF to ON - 4 ms maximum b. ON to OFF - 13 ms maximum
Output Status Indicator	A LED (light-emitting diode) is provided for each output. The light is on when the output is in the Logic One state.

NOTE

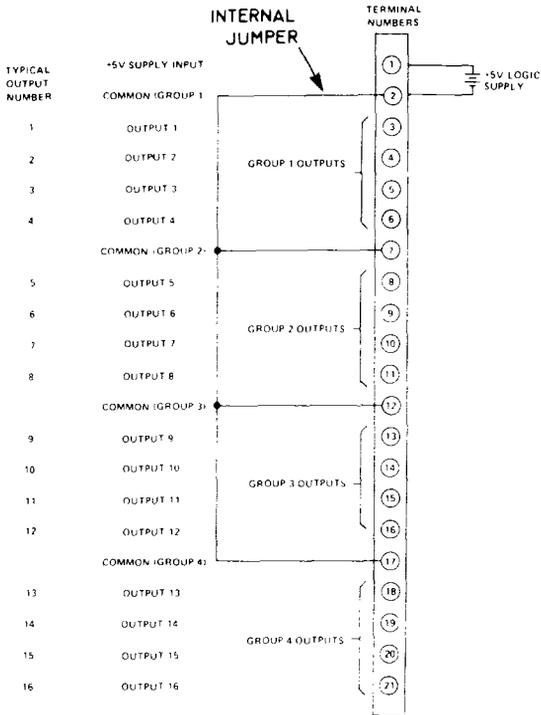
When controller or B236 Output Module is not operating all outputs will assume the ON state.

Compatibility with Input Module

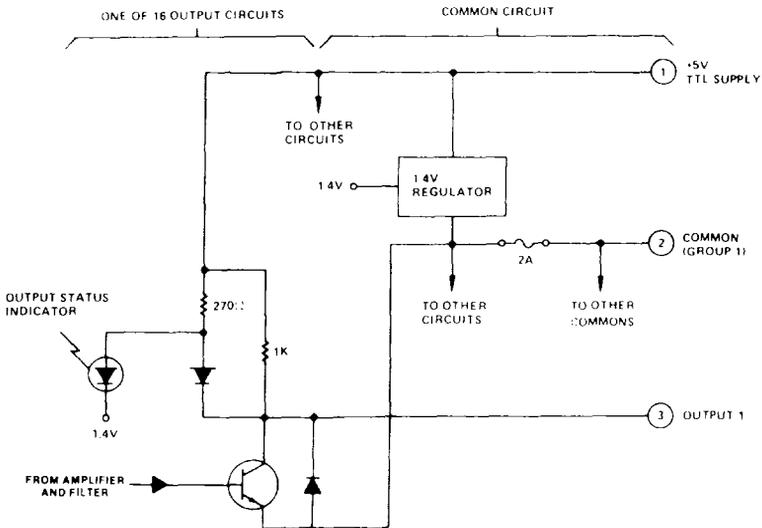
The B236, 5 Vdc TTL Output Module is capable of interconnection with the B237, 5 Vdc TTL Input Module without the use of additional components.

Protection

Polarity reversal of the +5 Vdc supply will not cause circuit failure. (The protective fuse may be blown, however.)



B236 5 Vdc TTL Output Module Terminal Numbering and Output Connections



B236 5 Vdc TTL Output Module Simplified Schematic

10-60V MODULES

INPUT — MODEL B275

The Modicon B275 Input Module conditions 16 independent signals each between 10 and 60 Vdc, to the signals used internally in the Controller.

ELECTRICAL CHARACTERISTICS

Input Signal Requirements - for each of the 16 inputs:

ON

Condition:	Input "Low" or short circuit to common Input Indicator ON Control Input Line ON
Level:	Less than 25% of voltage connected to terminal 1. Maximum current: -22 mA (+60 Vdc) -8 mA (+10 Vdc) (B275 supplies current)

OFF

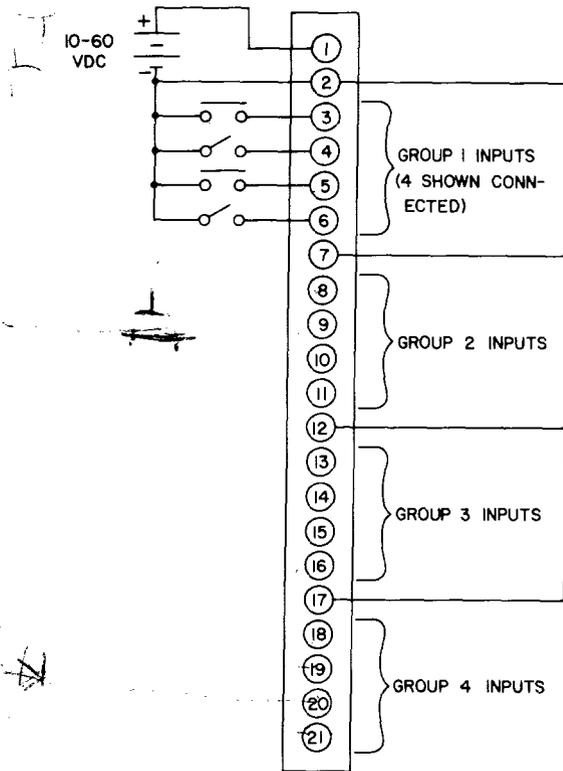
Condition:	Input "High" or open circuit Input Indicator OFF Controller Input OFF
Level:	75% of voltage connected to terminal 1 or open circuit (greater than 10,000 ohms)
Switching Level	40 - 60% of voltage connected to terminal 1
Common Mode Voltage	300 Vac maximum (at 60 Hz) 1500 Vdc for 100 ms
Bias Supply	400 mA at +60 Vdc, 150 mA at +10 Vdc
Maximum Input Voltage	Not to exceed 500 V for 3 ms
Output Response Time	High to Low: 12 ms maximum Low to High: 12 ms maximum
Input Status Indicator	A LED (light-emitting diode) is provided for each input. The light will be ON when that input is ON.

Compatibility with Output Module

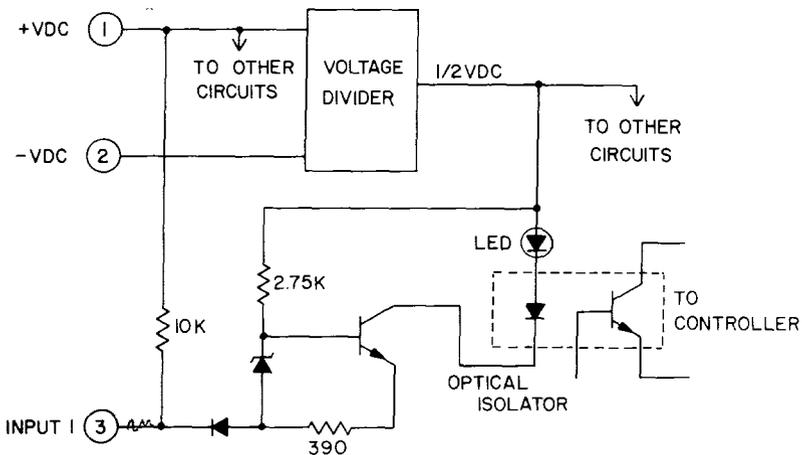
The B275, 10 - 60 Vdc Input Module is capable of interconnection with the B248 10 - 60 Vdc Output Module without the use of additional components.

Protection

Polarity reversal of bias supply or operation with parallel unclamped inductive loads shall not cause circuit failure.



B275 10-60 Vdc Input Module Terminal Numbering and Input Connections



B275 10-60 Vdc Input Module Simplified Schematic

OUTPUT - MODEL B248 (10 - 60 Vdc)

The Modicon B248 Output Module converts the signals used internally in the Controller to 16 independent 10 - 60 Vdc outputs capable of driving relays, pilot lamps, or other loads up to 2.5 amps. The module uses 16 transistor switches to control loads connected to the user supplied DC voltage source.

Self-contained clamp diodes are available on each circuit for use with inductive loads. Since multiple DC power sources can be used with this output module, connect the highest voltage source to terminal one (+) to utilize clamping diodes.

ELECTRICAL CHARACTERISTICS

Load Current

OFF Current:	5 mA maximum at maximum voltage
ON Current	
Steady State:	2.5 A maximum per output
Inrush Current:	10.0 A maximum per output for 10 ms
Fuse Rating:	3 A (one fuse per circuit)

Load Voltage

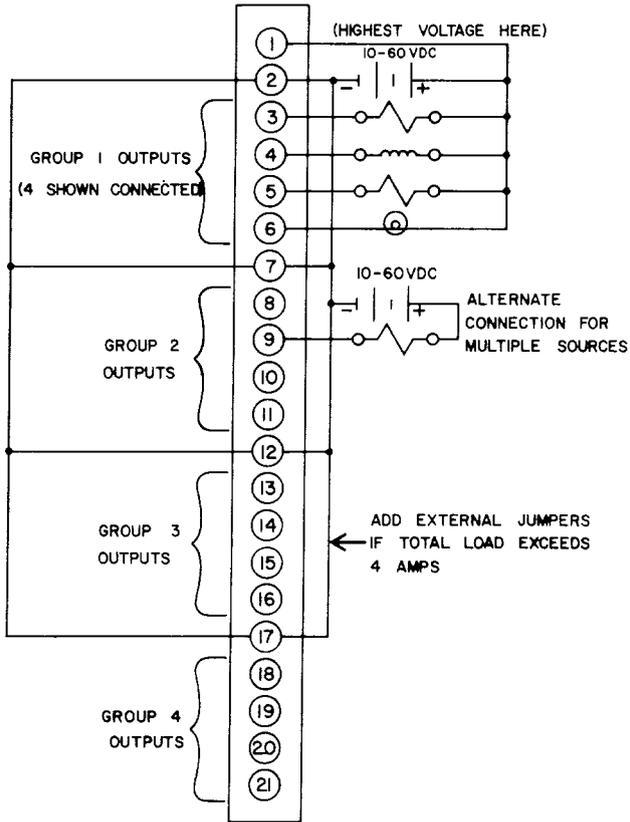
Working Voltage:	10 - 60 Vdc
Peak Voltage:	80 Vdc
ON Voltage	1.5 Vdc at 2.5A
Common Mode Voltage	300 Vac steady state maximum (at 60 Hz) 1500 Vdc for 10 ms
Response Time	OFF to ON - 1 ms maximum ON to OFF - 1 ms maximum
Output Status Indicator	A LED (light-emitting diode) is provided for each output. The light is ON when the output is ON.

Compatibility with Input Module

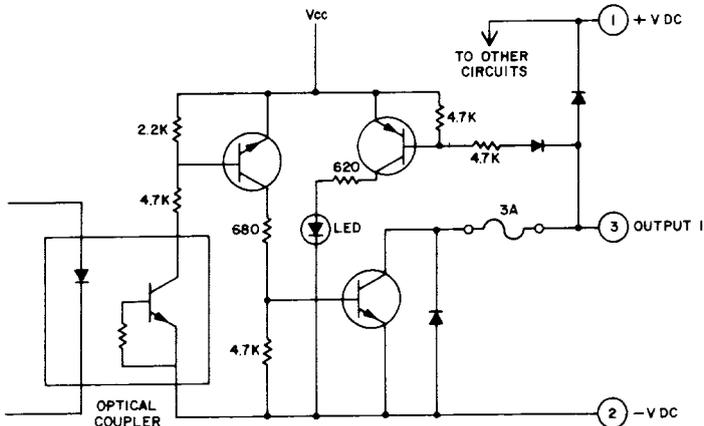
The B248 10 - 60 Vdc Output Module is capable of interconnection with the B275 10 - 60 Vdc Input Module without use of additional components.

Protection

Polarity reversal of supply voltage will not cause circuit failure; however, the protective fuse may be blown. Operation with parallel unclamped inductive loads will not cause circuit failure when properly connected to clamping diodes.



B248 10-60 Vdc Output Module Terminal Numbering and Output Connections



B248 10-60 Vdc Output Module Simplified Schematic

ANALOG MODULES

INPUTS - B243 MODEL

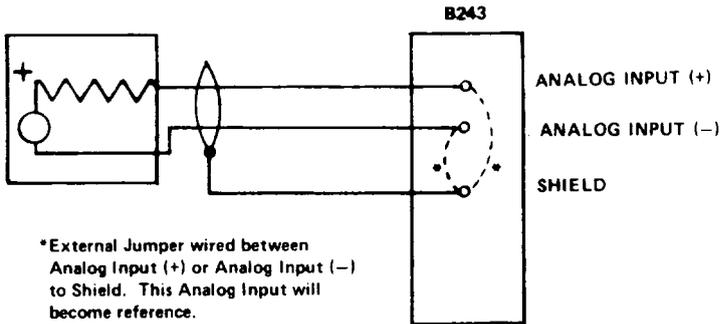
The B243 Analog Input Module accepts four DC voltages between 1V and 5V or 0V and 10V, and converts them to four register inputs. Any mix of 1-5V or 0-10V inputs are allowed on the B243 module, if specified at time of ordering. All input conversions are made once per controller sweep and the resulting numbers are presented in four consecutive input registers.

The B243-105 and B243-110 are revised and improved versions of the B243. The B243-105 accepts four 1-5V or 4-20 ma inputs and the B243-110 accepts four 0-10V or -10 to +10V inputs. Intermixing different voltage levels on one B243-105 or B243-110 is NOT possible.

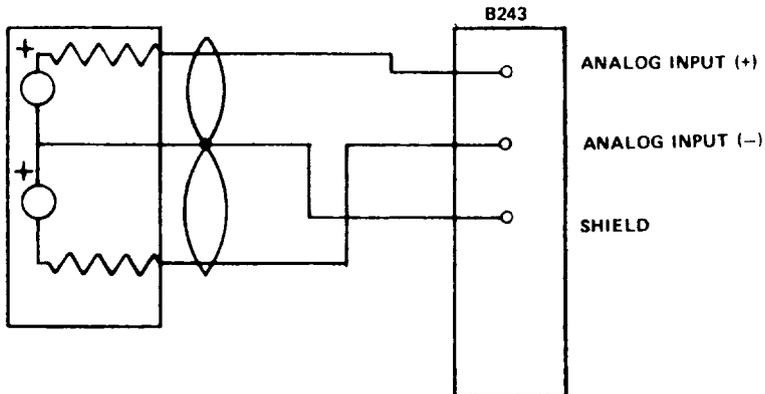
CONNECTION

User connections are made to standard barrier strips on the B240 Input/Output Housing. The B243 Analog Input Module is plugged into the B240 Input/Output Housing and secured by two screws. This configuration allows for quick replacement of the modules without disturbing the field wiring. The input module may be mounted in any slot of the B240 Input/Output Housing.

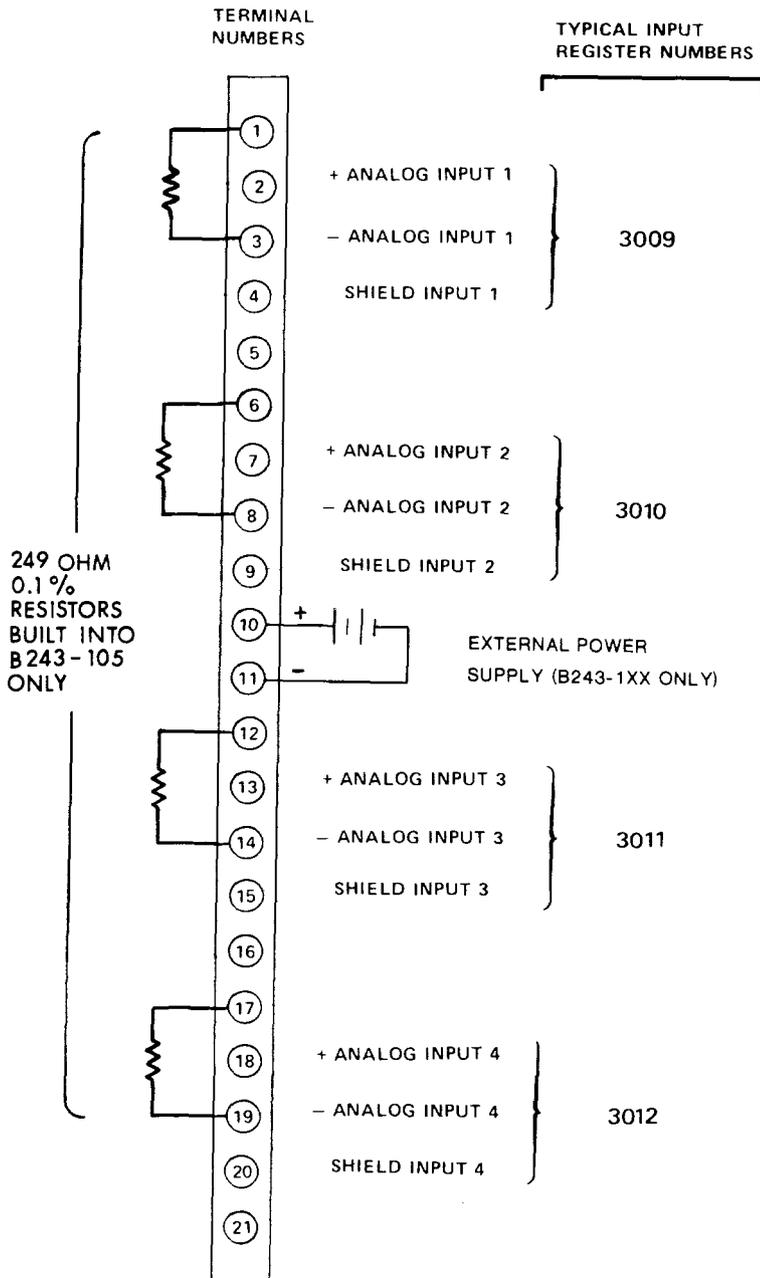
However, it must be referenced by the module address as number one or five and the next three input sequence numbers may not be used by other



Single-Ended Connection



Differential Connection



B243 Analog Input Module Terminal Numbering and Input Connections

input modules. Any I/O Module can be installed in the other three slots of the B240 Housing.

Terminals are numbered from one at the top of the barrier strip and assigned as shown. Note that terminals 4, 9, 15, and 20 are connected internally in the module.

ELECTRICAL CHARACTERISTICS

Input Range:	B243-000: 0-10V or 1-5V. B243-105: 1-5V or 4-20 ma. B243-110: 0-10V or -10 to +10V.
Output:	A number between 0 and $2^{12}-1$ linearly related to the input, deposited in four input registers numbered sequentially from the sequence number selected on the B240 Input/Output Housing.
Sample Timing:	All four inputs are updated on each controller scan.
Resolution (12 bit word):	Two bits in 4096 binary counts (B243). One bit for model B243-1xx.
Absolute Accuracy:	One-half percent.
Linearity Error:	Less than 0.1% of full scale referenced to a straight line through maximum and minimum points. (0.05% for 243-1xx)
Common Mode Rejection:	Greater than 1000 (60 dB)
Maximum Common Mode Signal:	$\pm 5V$ peak referenced to shield, $\pm 12 Vdc$ on 0-10V range and $\pm 6 Vdc$ on 1-5V range.
Maximum Input Signal: (for linear operation)	Voltage Input: $\pm 15V$ (including common mode) no foldover inside of this range.
(Voltage):	$\pm 10 Vdc$ for B243-1xx
(Current):	$\pm 6 Vdc$ for B243-105
Input Impedance:	Voltage Input: more than 10^6 ohms.
Temperature Coefficient:	Gain: less than 0.1%/°C. (0.007%/°C for B243-1xx) Offset: less than 0.1%/°C. (0.007%/°C for B243-1xx)
Crosstalk:	One input shall not couple more than 0.01% of its signal into any other input
Frequency Response:	60 Hz notch filter, 135 dB at 60 Hz
Noise:	Less than 0.3% of full scale (rms). (All unused inputs should be externally shorted to the Shield/Module Circuit Ground.)
Power Requirements:	B243: None B243-1xx: 28 Vdc \pm 4 Vdc 250 ma.
Isolation:	a. Input to Input — None b. Input to Controller — 230 Vac continuous and 1500 Vdc for 10 ms maximum.

FUNCTIONAL OPERATION

Each of the four analog inputs is connected to a multiplex switch which will automatically address each input during the controller scan. As each input is addressed, the analog-to-digital converter places a 12-bit binary number proportional to the input signal in the transmitter buffer. When the input register is addressed by the controller input/output processor, the latest sample is placed in the controller.

APPLICATION NOTES

Since the B243 Analog Input module provides the binary equivalent of analog input voltages, for proper operation the input registers (four per module) must be coded as binary in the I/O Allocation Table. When directly monitoring the input register with the Programming Panel, convert the display to its binary equivalent to obtain the correct magnitude (see Table 13).

The shield terminal on each operating input circuit must be connected to either the positive (+) or negative (-) input terminal to prevent a charge from accumulating on the input filter circuits. Any unused analog circuits should have their input terminal (including shield) jumpered together and connect to ground.

To monitor a 4-20 mA signal, a 250-ohm resistor should be placed on the I/O housing between the positive (+) and negative (-) input terminals. This resistor will convert the 4-20 mA signal into a 1 to 5V signal for monitoring by the analog module. A 100-ohm resistor will provide similar conversion for a 10-50 mA signal.

Each circuit on the module can be set for either 0-10V or 1-5V operation, by adjusting internal jumpers (not field changeable). Depending on the range selected, the magnitude of the number in the input register (0-4095) will reflect different voltages as follows:

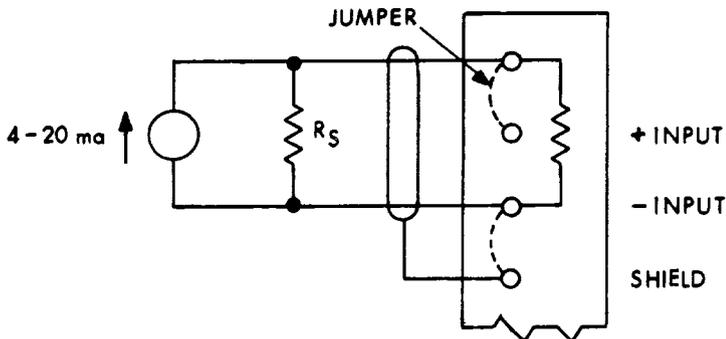
Value	Input Range			
	0-10V	1-5V	4-20 mA	10-50 mA
0 (Minimum Input)	0V	1V	4 mA	10 mA
2047 (Mid-Range)	5V	3V	12 mA	30 mA
4095 (Maximum Input)	10V	5V	20 mA	50 mA

NOTE

The analog input module always outputs values 0 to 4095; for values between these limits, use linear interpolation.

4-20 ma CONNECTIONS TO B-243-105

For user convenience, model B243-105 analog input module incorporates four 249 ohm precision ($\pm 0.1\%$) resistors to convert 4-20 mA into a 1-5V signal. To utilize these resistors, make connections shown below for each circuit, including external jumpers:



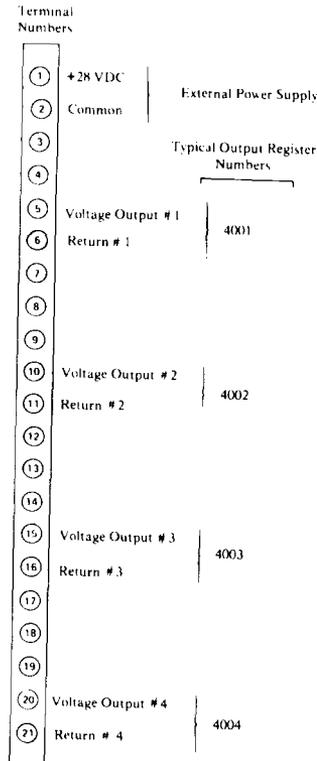
ANALOG OUTPUTS - GENERAL

The analog output modules convert values in four output registers into analog output signals. Separate modules are provided for voltage signals (0 to 10V or 0 to 5 Volts) and current signals (4 to 20 ma); each module provides four separate voltage or current circuits. All output conversions are made once per controller sweep and the resulting signals are available on four output terminals.

CONNECTION

User connections are made to standard barrier strips on the B240 Input/Output Housing. The analog output module is plugged into the B240 Input/Output Housing and secured by two screws. This configuration allows for quick replacement of the modules without disturbing the field wiring. The output module may be mounted in any slot of the B240 Input/Output Housing.

However, it must be referenced by the module address as number one or five and the next three output sequence numbers may not be used by other output modules. Any I/O module can be installed in the other three slots of the B240 Housing.



**B260 Analog Voltage Output
Module Terminal Connections
and Output Numbering**

* Current returns are referenced to +28 Vdc (Terminal 1).

CURRENT OUTPUT - B262 MODEL

The B262 Analog Output Module provides four separate 4-20 ma circuits per module. Also provided with each current circuit is a 1 to 5 Vdc signal that can be used to monitor the operation of the analog output. The input resistance of the voltmeter must be greater than 500K ohms for proper operation of this monitoring circuit.

Maximum Load Impedance: 1000 ohms with 28 Vdc available from external power supply.
800 ohms with 24 Vdc available from external power supply.

For any unused outputs, connect 250 ohm, ½ watt, ±5% resistor between current output terminal and +28 Vdc (terminal 1). This resistor also provides 1-5 Vdc signal.

ANALOG MULTIPLEXERS

These modules are designed to operate with the B243 Analog Input module to time share or multiplex one circuit on this input module. Up to sixteen separate independent analog signals can be connected to one analog multiplexer (MUX). Based upon the user's logic program, one of these 16 signals will be connected to the B243 input circuit at a time. Since there are four circuits on each B243 input module, up to four MUX's can be connected to one input module, allowing up to four analog signals out of 64 to be sampled each scan.

The B256 or B258 MUX can be placed anywhere in the controller's I/O structure and index to any slot position. However, it must be provided with the BCD content of an output register (40XX). The value in this register (0000 - 0015) will control which input signal is connected to the B243 input module.

NOTE

Signals are numbered starting at zero not one.

If more than one MUX is used and independent control of each is NOT required, they all can be controlled by the same output register (i.e. same index pin position). The only difference between the MUX models is the type of relay used in the switching circuit. The B256 used standard dry contacts and the B258 uses mercury wetted contacts for improved reliability.

ELECTRICAL CHARACTERISTICS

Number of Isolated Inputs:	16
Maximum Input Voltage:	10 Vdc for linear operation 100 Vdc on switch 200 Vdc between any two inputs
Maximum Input Current:	10 ma
Input Impedance:	1 Megohm
Maximum Transfer Time:	10 m Sec
Maximum Source Impedance:	1,000 ohms
Offset Voltage:	10 mv maximum at 25° 0.5 mv per °C drift
Transfer Accuracy:	0.05% at 25°C 0.01% per °C drift (B256) 0.005% per °C drift (B258)
Transfer Type:	Break before Make
Output Impedance:	100 ohms
Maximum Output Current:	5 ma
Input Isolation to Controller:	300 Vac 1500 Vdc for 100 m Sec
Input Isolation to Output:	300 Vac
External Power Required:	15 - 30 Vdc, 500 ma
Life Rating On Reed Relay:	B256 (Dry) 50,000,000 operations B258 (Wet) 50,000,000,000 operations

USER CONNECTIONS

All analog input signals are connected via a 37 pin Delta connector (Modicon part number 52-2119, Cannon number DC37S or equal) supplied with the MUX module. The following table relates the input signal controlled by the value in the holding register versus the pin numbers for wiring.

Input	Pins + -	Input	Pins + -	Input	Pins + -
0000	14,32	0005	28,10	0011	17,16
0001	21,23	0006	29,30	0012	34,15
0002	24,6	0007	31,33	0013	2,20
0003	25,26	0008	22,3	0014	1,4
0004	8,27	0009	7,5	0015	13,12
		0010	18,36		

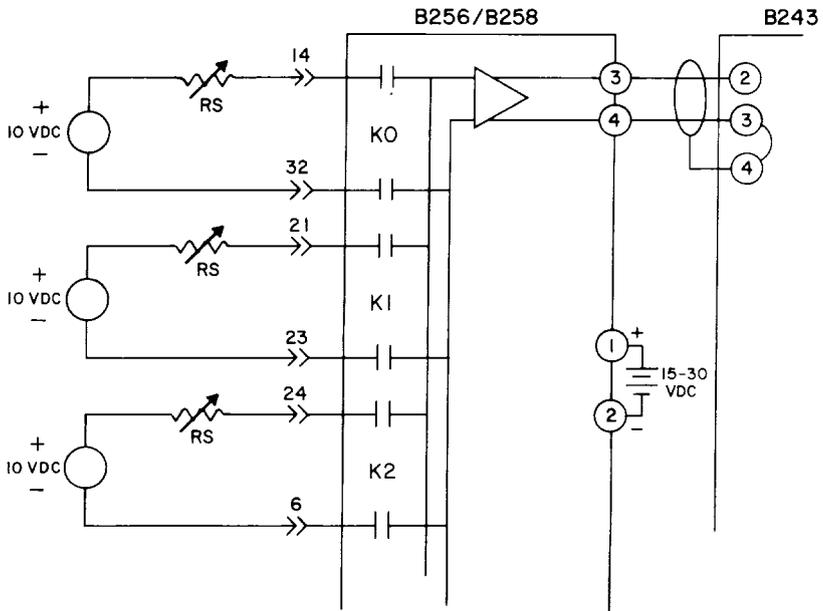
When activated, the input signal on the first pin listed above will be connected to I/O terminal 3 (positive) and the second pin will be connected to terminal 4 (negative).

PROTECTION

If the MUX is unable to communicate with the controller or if the BCD value received is greater than 15, all relays will be deenergized disconnecting all inputs from the output terminals. The 15 - 30 Vdc power input is protected against polarity reversal or over voltage, such that it can not damage the module; however, a one ampere fuse may blow. Loss of DC power will render the module non-operational with all inputs disconnected.

INDICATORS

In addition to the active light LED, which indicates valid communications with the controller, the B256/B258 module incorporates an over range indicator. This LED will be energized whenever the BCD value received exceeds 0015. There is also a two-digit numerical display that indicates which input (00 - 15) is currently connected to the output terminals. This display will be blank for all values about 15.



Typical B256/B258 Connections

ISOLATED AC MODULES

Since isolated AC modules require approximately twice as many I/O terminals than standard modules, only eight circuits are provided on each module. Using the eight index pin positions in each channel, this would normally reduce the I/O capacity to 64 points per channel in lieu of 128.

To provide the full channel capacity with isolated modules, each module is equipped with a 'first half' or 'last half' switch. Thus, two modules can be installed with the same index pin position, one module set for 'first half' and the other for 'last half', and all 16 usable references are provided. However, this does require more than the normal number of I/O modules and possibly more than four I/O housings per channel.

The only limitation on the number of isolated modules to be installed in any channel, is the I/O load applied to the power supply. The load cannot exceed 27 units per channel unless remote I/O is utilized to subdivide the channel, or special cables used.

INPUTS-B247 MODEL (115 Vac), B245 MODEL (230 Vac)

Each input draws sufficient 'wetting' current to inhibit the buildup of contaminants on the surface of silver contacts used in pushbuttons, limit switches, pressure switches, etc.

Following are the input signal requirements for each of the 8 inputs:

ON

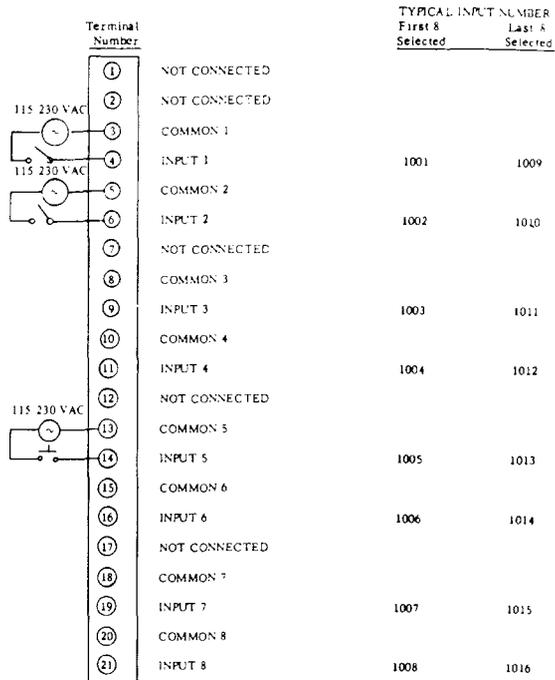
Condition:	Input at high level Input indicator ON Controller input ON
Level:	115 ± 15 Vac, or 230 ± 30 Vac Source in series with 0 to 1000 ohms 48 to 62 Hz

OFF

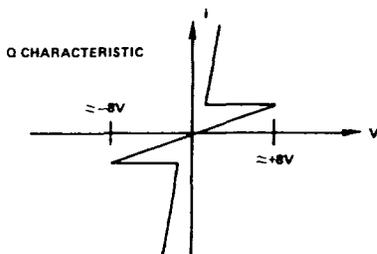
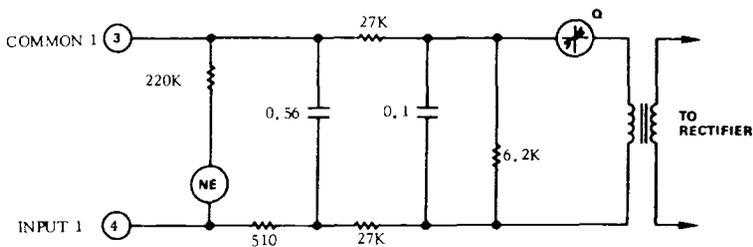
Condition:	Input at low level Input indicator OFF Controller input OFF
Level: (115 Vac)	0 to 30 Vac, or 0 to 130 Vac Source in series with greater than 25,000 ohms; 48 to 62 Hz
(230 Vac)	0 to 60 Vac, or 0 to 260 Vac Source in series with greater than 50,000 ohms; 48 to 62 Hz

115 Vac (B247 Module)

Switch Level:	Approximately 65 Vac
Input Impedance:	510 ohms in series, with 0.56 mF (approximately 4,700 ohms, -90° at 60 Hz)
Input Current:	25mA at 115V (contact wetting current at 60 Hz)
Common Mode Voltage:	400 Vac steady state (60 Hz) 1500V for 10 ms
Maximum Input Voltage:	Not to exceed 800 volts peak on any input
Output Response Time:	a. OFF to ON - 10 ms maximum b. ON to OFF - 15 ms maximum



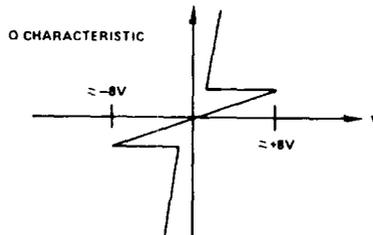
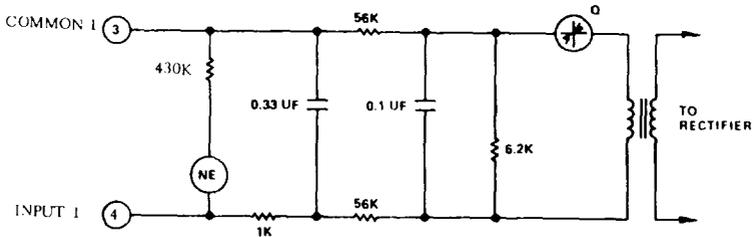
**B247 115 Vac and B245 230 Vac Isolated Input Module
Terminal Numbering and Input Connections**



**B247 115 Vac Isolated Input Module
Simplified Schematic**

230 Vac (B245 Module)

Switch Level:	Approximately 130 Vac
Input Impedance:	1K ohms in series, with 0.33 mF (approximately 8.000 ohms, -90° at 60 Hz)
Input Current:	28mA at 230V (contact wetting current at 60 Hz)
Common Mode Voltage:	400 Vac steady state (60 Hz) 1500V for 10 ms
Maximum Input Voltage:	Not to exceed 800 volts peak on any input for 1.0 ms
Output Response Time:	a. OFF to ON - 10 ms maximum b. ON to OFF - 15 ms maximum



B245 230 Vac Isolated Input Module Simplified Schematic

Each input circuit is provided with its own common terminal, thus isolating each input from any other connected to the module. A two-position rotary switch is provided on each module to select either the first eight or last eight input references from the 16 assigned to the module by the address index pin. Two active lights are provided on the front of the module to indicate which of the two groups of inputs are being provided to the processor.

OUTPUTS -B246 MODEL (115 Vac), B244 MODEL (230 Vac)

The MODICON B246 (115 Vac) and B244 (230 Vac) Output Modules condition the signals used internally in the Controller to eight isolated outputs capable of driving solenoids, motor starters, and other loads up to four amperes. Each module uses eight triac devices to switch the loads to the user-supplied Vac line; maximum continuous loads controlled by any one isolated output module is 20 amperes.

Self-contained damping networks and voltage-limiting varistors suppress line voltage spikes and prevent false triggering. The module is also fused to protect its circuitry from overload currents and voltages.

Following are the electrical characteristics of the B246/B244 Isolated Output Modules;

Load Current

OFF Current:	5 mA maximum
ON Current:	4 amperes maximum per output; 20 amperes maximum per module, continuous
ON Holding Current:	B244 and B246: 60 mA maximum B244-1 and B246-1: 0.5 mA maximum
Inrush Load Current:	5 amperes maximum for 100 ms 15 amperes maximum for 10 ms
Fuse Rating:	7 amperes (one fuse per output)

Load Voltage

Working Voltage:	115 ± 35 Vac or 240 ± 50 Vac; 48 to 62 Hz
Transient:	200V or 400V maximum; varistor limited
ON Voltage Drop:	2 Vac at 2 amperes current
Common Mode Voltage	200 or 400 Vac maximum working; 1500 Vac maximum for 10 ms

Response Time

B244 and B246:
OFF to ON - 0.3 - 2 ms
ON to OFF - 0.3 - 8 ms
B244-1 and B246-1:
OFF to ON - 0.3 - 10 ms
ON to OFF - 0.3 - 8 ms

Fuse Indicator

A neon lamp is provided for each output circuit. The lamp will be ON when the fuse is blown.

Output Status Indicator

A neon lamp is provided for each output operated from a common lamp supply. The lamp will be ON when the output is ON.

NOTE

On B244 and B246 only, the lamp will be ON when no output load is present.

Indicator Lamp Supply	10 ma at 230 Vac, 60 Hz (B244) or 115 Vac, 60 Hz (B246). Fused at 1/4 amperes.
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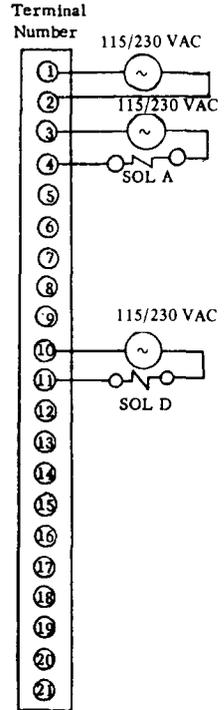
A two-position rotary switch is provided on each module to select either the first eight or last eight outputs from the 16 outputs provided to the module from the processor. Two active lights are provided on the front of the module to indicate which of the two groups of outputs are being driven by the output circuits.

TYPICAL INPUT NUMBER
 First 8 Last 8
Selected Deleted

1	9
2	10
3	11
4	12
5	13
6	14
7	15
8	16

Function

Indicator Lamp Supply
 Indicator Lamp Common
 Supply 1
 OUTPUT 1
 Supply 2
 OUTPUT 2
 NOT Connected
 Supply 3
 OUTPUT 3
 Supply 4
 OUTPUT 4
 NOT Connected
 Supply 5
 OUTPUT 5
 Supply 6
 OUTPUT 6
 NOT Connected
 Supply 7
 OUTPUT 7
 Supply 8
 OUTPUT 8



**B246 115 Vac and B244 230 Vac
 Isolated Output Module Terminal Numbering
 and Output Connections**

SPECIAL PURPOSE MODULES

B239—Dual High Speed Counter

This module provides the capability to count DC pulses up to 30,000 pulses per second. The counting is done on logic within the I/O module and does not depend upon the scanning of the controller. Start, stop, and reset signals are provided to the module and outputs are received from the module directly. The controller provides to the counter the preset value as an output register (40xx) and receives its current count as an input register (30xx). These registers must be BCD coded and are four digits long (maximum value 9999). There are two separate circuits on each module which utilize consecutive registers in the I/O structure. The module is placed in a single slot in an I/O housing, type B240 or B241, and must be indexed as module number 1, 3, 5, or 7.

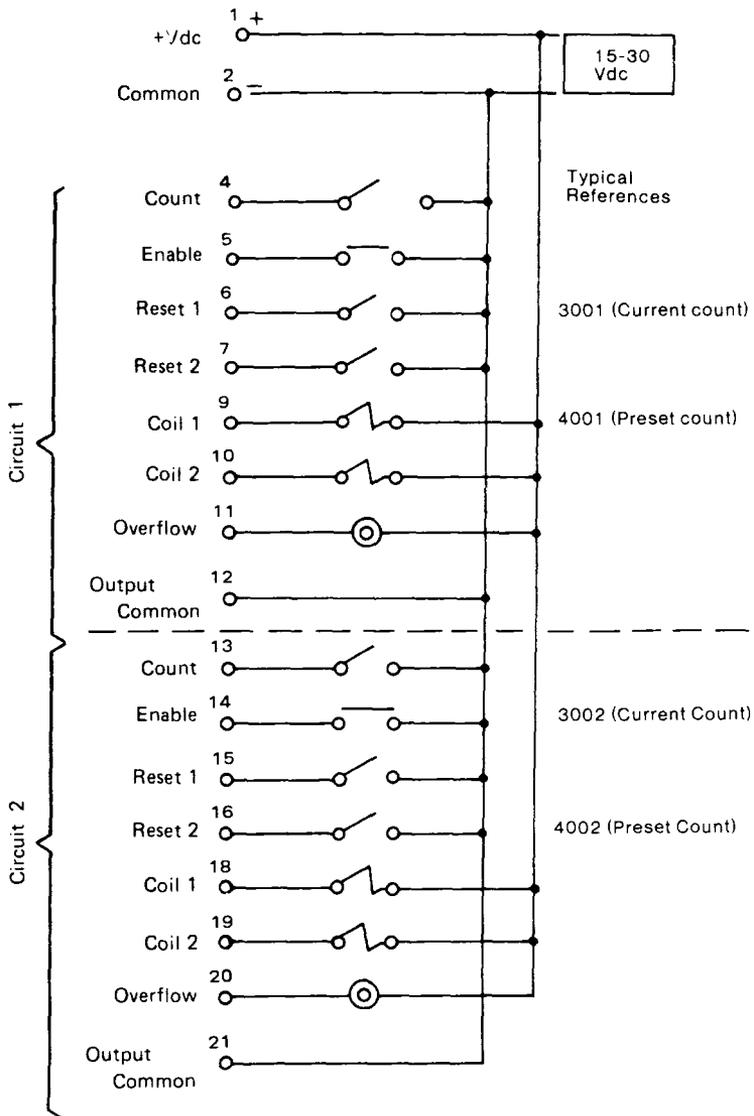
Indicators are provided to indicate the ON/OFF status of all inputs and outputs. The count input signal can be a pulse train up to either 200 pulses per second or 30,000 pulses per second. The slower speed is designed for dry contact closures such as reed switches where contact bounce must be rejected. This signal must be ON for at least 4 mSec and OFF for at least 1 mSec for the B239 to increment its count on the OFF to ON transition. The higher speed is for Solid state generated signals where only noise must be rejected. This signal must be ON for at least 25 μ Sec and OFF for at least 8 μ Sec. The selection of low or high speed is made separately for each circuit by a customer settable switch. Each count input signal can be between 5 and 30 VDC and must be capable of sinking between 3 and 6 ma of current.

The enable input allows the counter to count; without this signal, the counter will not count, but will hold its current value. The counter will respond to this input within 10 μ Sec of receipt at its terminals. The enable signal can be either a maintained level or a short pulse (at least 10 μ Sec wide). If it is a pulse, it will be held internally until the circuit is reset. The selection of type of enable signal is made separately for each circuit by a customer settable switch. Each input can be between 5 and 30 VDC and must be capable of sinking between 3 and 6 ma.

Basically, there are two outputs from each circuit, coil 1 and coil 2. Each will be between 5 and 30 VDC and be capable of sinking up to 500 ma. They will respond within 10 μ Sec of the count reaching its preset; their ON voltage is less than 0.4 VDC and OFF current is less than 1 ma. Coil 1 comes ON whenever the counter reaches or exceeds its preset count; the counter will continue to count after its preset is reached. If the preset is changed such that it is greater than the current count, coil 1 will be OFF; if the counter is reset to zero, coil 1 will go OFF. Coil 2 comes ON whenever the counter reaches its preset and remains ON until reset by reset 2, regardless of changes to the count or preset. Both of these coils are energized by the counter and *do not* depend upon the controller's scan.

Another output with the same characteristics (voltage, current and speed) as the coils, is the overflow bit. This output is energized whenever counter exceeds 9999. If the counter has a current count of 9999 exactly, this bit is not ON; it will come ON with the next pulse following 9999. The counter will count up to 9999 and reset itself to zero with the next pulse (10,000th) regardless of the preset, unless it is reset externally prior to reaching 9999. The overflow bit is reset by either reset signal.

Two resets are available to each circuit; both have the same characteristics (voltage, current, speed) as the enable/count signals. Reset 1 clears the count to zero, clears the overflow bit, and clears the enable if it is a pulse type enable. Reset 2 on the other hand, clears only coil 2 and the overflow bit. Unless the preset is zero, Reset 1 will also clear coil 1 since the current count is no longer equal to the preset.



B239 Typical I/O Connections

When installed, the B239 module requires an external power supply of 15-30 VDC (250 ma, 10% regulation, and PARD less than 250 mv). All inputs and outputs are isolated from the controller's internal circuits by optical isolators; these inputs and outputs are compatible with MODICON's 24 VDC and 5 VTTL modules and can be interfaced between each other. Outputs have protection diodes for switching inductive loads and polarity reversal.

All outputs on each circuit are protected by a single 1½ fuse, such that, if one output is overloaded, all outputs on that circuit will be de-energized. If the controller stops communicating with the module, its active light goes out. As long as external power and inputs are maintained, the counter will continue to count using its last preset and drive outputs as discussed above (coils 1 & 2 as well as overflow). If the external power fails, the module will provide its last count to the controller and its outputs will go OFF.

SPECIFICATIONS

Maximum Count Speed 30,000 pulses per second (optionally 200 pulses per second)

Minimum Level	ON (0 VDC)	OFF (5-30 VDC)
30,000 pps	25 μ Sec	8 μ Sec
200 pps	4 mSec	1 mSec

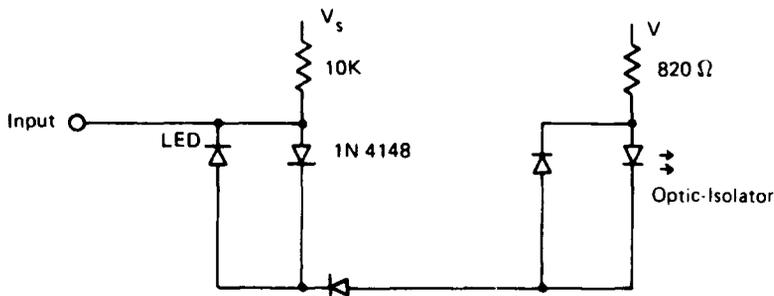
INPUTS

5-30 VDC, sinking 3-6 ma, > 10 μ Sec duration

Enable — Allows counter to start, either level or pulse input. Pulse input cleared by Reset 1.

Reset 1 — Clears counter to zero.
Clears Overflow bit.
Clears pulse enable circuit.

Reset 2 — Clears Overflow bit.
Clears Coil 2.



Typical Input Circuit
Count, Enable, and Reset Signals

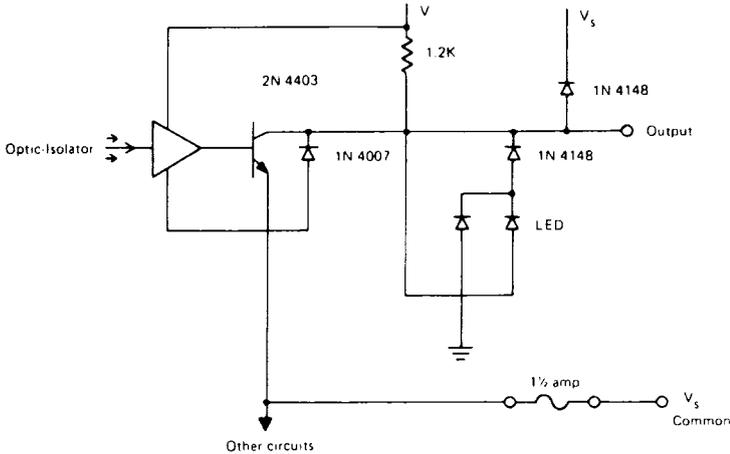
OUTPUTS

5-30 VDC, capable of sinking 500 ma (continuously), 10 μ Sec response time, ON voltage < 400 mv, OFF current < ma.

Coil 1 — ON if count is equal to or greater than preset (counter will continue to increment with coil 1 ON).

Coil 2 — ON once count equals preset and cleared *only* by Reset 2.

Overflow — ON if count exceeds 9999 and remains ON until cleared by either Reset 1 or 2. Counter reset to zero at 10,000 and can continue to count.



Typical Output Circuit

POWER REQUIREMENTS

External Power Supply

15-30 VDC, 250 ma maximum, 10% regulation, and PARD < 250 mv.

Two circuits per module, each protected by a 1 1/2 amp fuse.

The external power supply is protected by a 1/2 amp fuse.

B266/B268/B274/B276 - Reed Relay Output Modules

These modules provide eight isolated dry contact output circuits. Each B266/B268 circuit is a normally open contact, whose coil is controlled by eight consecutive discrete outputs. The B266 utilizes 115 Vac power for the Reed relay coils and the B268 utilizes 220 Vac power; otherwise the two modules are identical. The following are the specifications for these modules:

Switching Capability

Voltage:	400 V maximum
Current:	2.0 A maximum
Power:	100 VA maximum

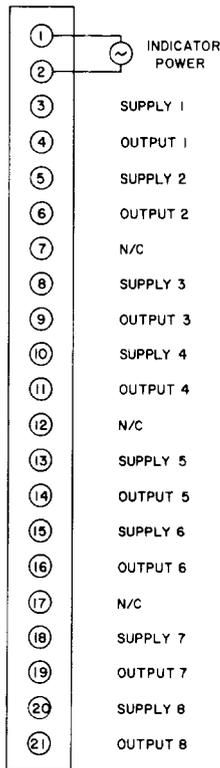
Current Carrying

(after closure);	5.0 A maximum
Fuse (each circuit):	3A

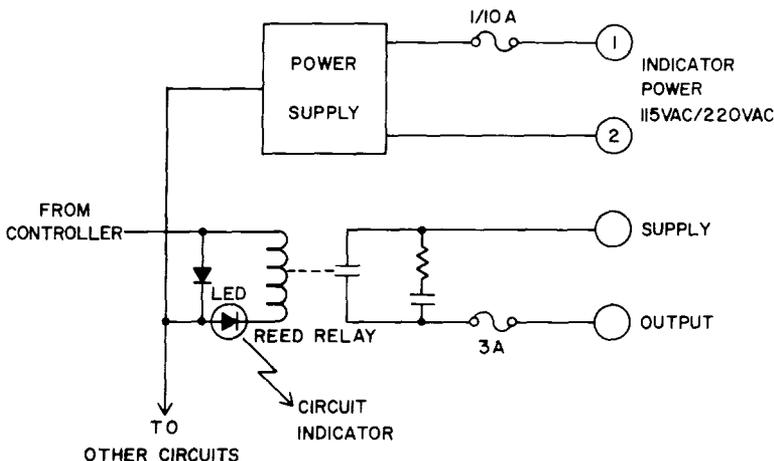
Operating Times:	2mSec (typical)
External Power	
B266:	115 Vac, 10 VA, 48-63 Hz
B268:	220 Vac, 10 VA, 48-63 Hz
Contact Material:	Mercury-wetted Reed relay contacts
Contact Life:	100 million operations at rated load
Circuit Resistance:	0.1 ohms (typical)
Open-Circuit Impedance:	25K capacitive reactive at 60 Hz
Circuit Isolation:	2000 Vdc

Each module has a selection switch that can be set in the field to establish which group of eight outputs control the Reed coils. Since each output slot number is provided with sixteen coils, the module can be set to respond to either the first eight or last eight coils. Two modules can be addressed to the same slot number and thus provide all sixteen outputs (one module set for first eight, the other for last eight). Two active lights are provided to indicate which group the module is responding to, when installed in the I/O housings.

For proper operation, the module must be placed in an upright position. This module is useful to provide unique voltage outputs, to multiplex analog values, or to interface to circuits requiring a dry contact. A pair of modules



B266 Terminal Numbering



B266 Typical Output Circuit

with normally closed reed relay contacts are also available. These modules have the same characteristics as discussed above; module B274 is 115 Vac type, equivalent to B266, and module B276 is 220 Vac version with normally closed contacts.

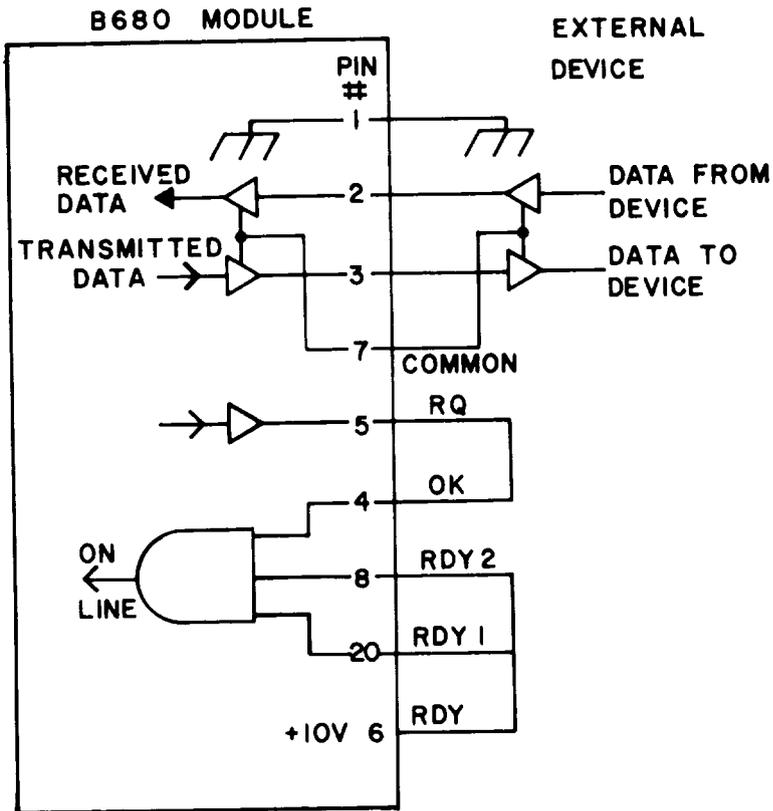
B680/B684 - ASYNCHRONOUS (ASCII) I/O

The ASCII I/O module provides an interface to any standard ASCII device, such as card readers, CRT's, badge readers, teletypes, etc. The module requires only one B240 or B241 I/O housing slot and can be addressed to any index pin; however, it must be placed in the I/O structure where registers are utilized. The ASCII module electrically represents both one input register and one output register, as selected by its index pin. Data can be transmitted asynchronously; that is, it can be sending data to the ASCII device as well as receiving data simultaneously.

The ASCII module requires an external AC power source, regardless of type of connections used (EIA or TTY). This voltage can be either 115V or 230V; the only difference between module types is that the B680 requires 115 Vac and the B684 230 Vac. The AC voltage is applied to terminals 1-3 of the I/O housing, and the selection voltage level is made by factory installed internal jumpers. All input and output signals are completely isolated from the controller's internal logic by optical couplers.

Both EIA voltage connections as well as TTY current signals are available from the ASCII module. The EIA connections are made from a 25 pin female connector on the front of the module, wired per RS-232C specification as follows:

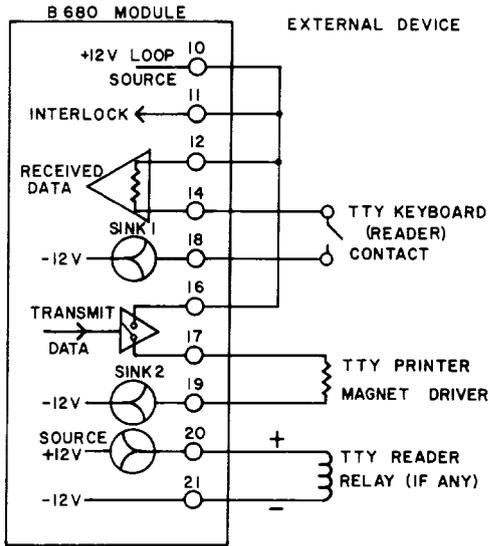
Pin	Circuit	Function (Relative to Module)
1	AA	Protective Ground
2	BA	Transmitted Data (to module)
3	BB	Received Data (from module)
7	AB	Signal Ground
4	CA	Request to Send (to module)
5	CB	Clear to Send (from module)
6	CC	Data Set Ready (from module)
20	CD	Data Terminal Ready (to module)
8	CF	Carrier Detect (to module)



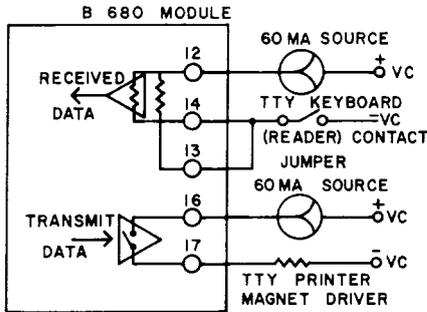
Typical EIA Connections

The teletype (TTY) connections are made to the standard field terminals available on the I/O housing. These signals are provided for standard ASR and KSR teletypes with either 20 or 60 ma loops. 20 ma is provided by the ASCII module; 60 ma current must be provided by external device. connections are made as follows:

Terminal	Function
1	AC power neutral
2	AC power hot
3	AC power ground (connected to chassis as well as pin 1 of EIA connector)
10	Current loop source (driven from +12VDC)
11	TTY Interlock
12	TTY Input
13	TTY 60 ma Input Return
14	TTY Input Return
16	TTY Output
17	TTY Output Return
18	20 ma Sink No. 1
19	20 ma Sink No. 2
20	Reader Relay (+)
21	Reader Relay (-)



Typical 20ma Loop Connections



Typical 60ma Loop Connections

LED indicators are provided on the front of the module to indicate the operation of this module. These indicators monitor the following five functions:

RUN	—	Illuminated whenever the module is serviced by the controller.
TRANSMIT	—	Flashes each time a character is transmitted by module.
RECEIVE	—	Flashes each time a character is received by module
ON LINE	—	Illuminated whenever the module is capable of operating
POWER	—	Illuminated whenever AC power is applied to module.

Each module has a number of options which the user can select. This selection is made by adjusting a rotary 16 position switch and eight ON/OFF switches located on the left side of the module. Normally, the module must be removed from the I/O Housing to adjust the options; however, access to these switches is provided from the outside of the module. The rotary switch sets the baud rate for the asynchronous communication as follows:

Position	Baud Rate	Position	Baud Rate
0	9600	8	600
1	7200	9	300
2	4800	10	150
3	3600	11	134.5
4	2400	12	110
5	1800	13	75
6	1200	14	50
7	900	15	None

The ON/OFF switches establish other options as follows (left to right, 0 = open, X = closed).

S1-S3 Eighth bit option

- 00X = Even Parity
- 000 = Odd parity
- X00 = Mark
- XX0 = Space
- XXX = Transparent

S4 Controls echo mode

- ON causing incoming serial data to be placed on outgoing serial data signal
- OFF for full duplex (transmitter and receiver are independent)

S5 Controls number of stop bits

- ON for one stop bit
- OFF for two stop bits

S6 Controls interlock

- ON for bypass
- OFF for normal

S7 and S8 are not used at present time.