

SECTION VI

500 SERIES I/O DEVICES

6.0 INTRODUCTION

This section describes the discrete I/O modules, register I/O devices, and their associated housings, which form part of the 500 Series I/O System.

The 500 Series I/O System is designed to provide a low profile, reliable, and highly modular I/O system, at a low cost-of-goods sold. Performance of user side I/O circuits is equivalent to the high-performance attainable with similar 200 Series I/O devices. 500 Series I/O Modules are designed for compatible operation with each other, and with 200 Series I/O Modules of the same type.

The overall I/O system is designed for direct connection to the 484 Series of controllers. By using a suitable interface assembly, the system may also be used with 184, 384, and 584 Controllers.

The discrete I/O modules plug into I/O housings which contain the user wiring terminal connections and which interface the I/O modules to the controller system. There are two sizes of I/O housings available: B545, one to eight modules, and B546, one to four modules.

The I/O housings are connected to an I/O duct (W55X). A variety of these ducts are available. Choice depends on the system size. The duct forms the mechanical intercommunication among the I/O housings and the controller and serves to support and shield the I/O bus cable assembly.

An I/O channel consists of a maximum of 128 input points and 128 output points, or a total of 256 Input/Output points or 64 modules. An I/O channel can be driven by any one of three possible units: 484 Controller, 484 Discrete I/O Expander, or J540 184/384 Adapter.

A 484 Controller equipped with an optional I/O expander may control a maximum of 256 inputs and 256 outputs for a total of 512 I/O points.

An Input/Output point is referenced by the programmer with a number which depends on:

- (1) Which point on the module it is (1 through 4, top to bottom).
- (2) Which module on the I/O housing is involved (1 through 8, top to bottom on 8 module housings; 1 through 4, top to bottom on 4 module housings).

- (3) Which I/O housing select code has been selected for that I/O housing.

Each module has eight terminal connection points for user wiring. Each terminal connection point can accommodate up to 2 #12 wires. User wiring is fed to these connection points via a wiring tray provided in each I/O housing from underneath the system.

Data is transferred between the I/O modules and the controller via an 8 bit, open-collector, twelve-volt data bus. When an input module pair is selected by the controller, the input data is applied through the signal-conditioning electronics directly onto the 8-bit data bus. When an output module pair is selected by the controller, the data on the bus is loaded into storage latches on the output modules, where outputs are controlled until updated.

All opto-isolator power in the I/O modules is supplied through an independent power bus. This power is controlled by the controller such that in the event of a problem (lack-of-line power) the controller will first shut off the opto-isolator power. This forces all outputs off as part of the shut-down procedure. On start up, the opto-isolator power will remain off until the controller has established control over the outputs.

The height of an installed 8-module housing and duct is 32 inches. Additional room must be provided for wire runs. The height of an installed 4-module housing is 18 inches. Each I/O housing requires 5 inches in mounting surface width.

The I/O system will operate in standard NEMA cabinets and internal ambient air temperatures from 0 to 60° centigrade provided that nothing restricts the free flow of convection air currents.

Table VI-1 shows the signal conditioning module options. Input/Output Module terminal assignments are shown in Table VI-2.

Table VI-1. Signal Conditioning Module Options

Model	Type	Color Code
B550	conditions 115 VAC outputs	red
B551	conditions 115 VAC inputs	pink
B552	conditions 9-56 VDC outputs Universal DC Module -True High*	dark blue
B553	conditions 9-56 VDC inputs Universal DC Model -True High*	light blue
B554	conditions 220 VAC outputs	orange
B555	conditions 220 VAC inputs	melon
B556	conditions 5 VTTL outputs	violet
B557	conditions 5 VTTL inputs	light purple
B558	conditions 9-56 VDC outputs Universal DC Module -True Low*	turquoise
B559	conditions 9-56 VDC inputs Universal DC Module -True Low*	blue
B560	conditions 90-150 VDC outputs	blue
B561	conditions 90-150 VDC inputs	blue

* The term "True High" means that the controller sees the input as "True" (ON) when the input is "High" (+VDC). Using true high input module, the input device (outside the controller) should be wired to the +VDC source. The same terminology is used for outputs but in this case the output device (outside the controller) is wired to the -VDC (or grounded) since the switching (inside the module) is done on the "High" line of the source. The "True Low" modules are vice versa.

Table VI-2. Input/Output Module Terminal Assignments

Terminal	B550-115 VAC B554-220 VAC AC OUTPUTS	B551-115 VAC B555-220 VAC AC INPUTS	B552-True High B558-True Low DC OUTPUTS	B553-True High B559-True Low DC INPUTS	B556 TTL OUTPUTS	B557 TTL INPUTS	B560 120 VDC OUTPUTS	B561 120 VDC INPUTS
1	AC IN GROUP A	AC IN INPUT 1	DC IN (+) GROUP A	DC IN (+)	DC IN (+)	DC IN (+)	OUTPUT 1	DC IN (+) INPUT 1
2	AC RETURN GROUP A LAMP COMMON	AC RETURN INPUT 1	DC RETURN GROUP A	DC RETURN	DC RETURN	DC RETURN	RETURN 1	DC RETURN INPUT 1
3	OUTPUT 1	AC IN INPUT 2	OUTPUT 1	INPUT 1	OUTPUT 1	INPUT 1	OUTPUT 2	DC IN (+) INPUT 2
4	OUTPUT 2	AC RETURN INPUT 2	OUTPUT 2	INPUT 2	OUTPUT 2	INPUT 2	RETURN 2	DC RETURN INPUT 2
5	AC IN GROUP B	AC IN INPUT 3	DC IN (+) GROUP B	NOT USED	NOT USED	NOT USED	OUTPUT 3	DC IN (+) INPUT 3
6	AC RETURN GROUP B LAMP COMMON	AC RETURN INPUT 3	DC RETURN GROUP B	NOT USED	NOT USED	NOT USED	RETURN 3	DC RETURN INPUT 3
7	OUTPUT 3	AC IN INPUT 4	OUTPUT 3	INPUT 3	OUTPUT 3	INPUT 3	OUTPUT 4	DC IN (+) INPUT 4
8	OUTPUT 4	AC RETURN INPUT 4	OUTPUT 4	INPUT 4	OUTPUT 4	INPUT 4	RETURN 4	DC RETURN INPUT 4

6.1 DISCRETE I/O SYSTEM

The Discrete I/O System has the following major features:

- o 4 points per module.
- o Fits in an 8-inch deep NEMA cabinet.
- o Module easily replaceable without disturbing any wiring.
- o User wiring connections easily available at the front of the system.
- o Each user connection point will accept up to 2 #12 wires.
- o Active indicator (LED) on each point.
- o Output active indicators are on Load side.
- o Each output point is fused.
- o Each output point has an open fuse indicator.
- o AC output points turn on at zero-crossing.
- o Each DC input point thresholds at approximately one-half the supply voltage.
- o Each input point is filtered for spike rejection.
- o Each input and output point is optically isolated.
- o User Labeling surfaces are provided on the I/O housings.

6.1.1 MODULES

B550 115 VAC OUTPUT MODULE

The MODICON B550 115 VAC Output Module conditions the signals used internally in the controller to four independent 115 VAC outputs capable of driving solenoids, motor starters and other loads up to two amperes. The four output circuits in the module are divided into two groups. Each group, contains two output circuits and is fully isolated. This module can be referred to as an Isolated Output Module in a group of two points. Different 115 VAC sources can drive each group. Each module uses four triac devices to switch the loads of the user supplied VAC line.

Self contained damping networks and voltage limiting varistor suppress line voltage spikes and prevent false triggering. Each output circuit is provided with a fuse to protect its circuitry from overload current (Figure VI-1 and VI-2).

Electrical Characteristics:

Load Current:

OFF Current:	5MA max.
ON Current:	2 amps continuous for each output (8 amps per module).

Recommended minimum Load:	10mA
ON Holding Current:	0.5mA
Inrush Load Current:	15 amps maximum for 10 ms. 5 amps maximum for 100 ms.
Fuse Rating:	5 amps normal blow (one fuse per output).
Load Voltage:	
Working Voltage:	80 VAC to 130 VAC continuous 40 to 70 Hz.
Transient Voltage:	150V max for 10 seconds. 200 V max for 1 cycle (varistor limited).
ON Voltage Drop:	Approximately 1 VAC at 2 amps current.
Common Mode Voltage:	Working 200 VAC, 1500 max for 10 ms.
Response Time:	OFF to ON 0.3 to 10 ms max. ON to OFF 0.3 to 8.3 ms max (at 60 Hz).
Output Status Indicator:	A neon lamp is provided for each output. The lamp will be ON when output is ON.
Fuse Indicator:	A neon lamp is provided for each output. The lamp will be ON when the fuse is blown.
Compatibility with input Modules:	The B550 is capable of interconnection with the MODICON B551 and B231 115 VAC Input Modules without the use of additional components.

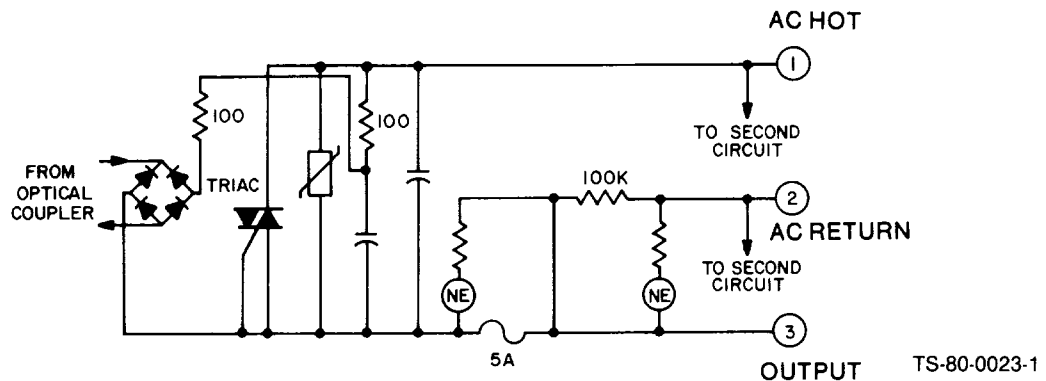
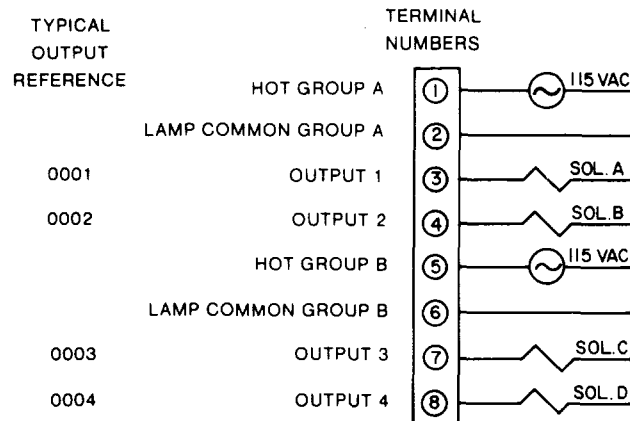


Figure VI-1. B550 115 VAC Output Module
Simplified Schematic



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*Figure VI-2. B550 115 VAC Output Modules
Terminal Numbering and Connections*

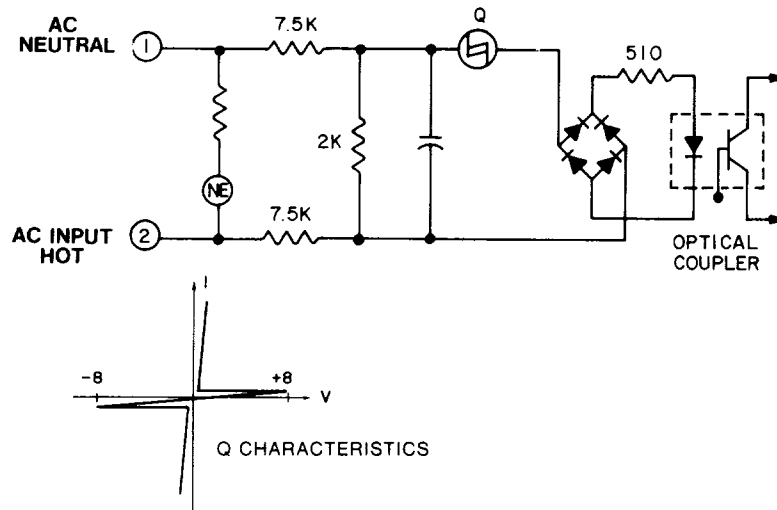
B551 115 VAC INPUT MODULE

The MODICON B551 115 VAC Input Module (Figure VI-3 and VI-4) contains four 115 VAC isolated inputs. Each input draws sufficient "wetting" current to inhibit the buildup on contaminants on the surface of silver contacts used in pushbuttons, limit switches, pressure switches, etc. The input signal requirements for each of the 4 inputs are as follows:

Electrical Characteristics:

ON Condition:	Input at high level. Input indicator ON (neon lamp).
ON level:	Controller input ON. Input voltage greater than 80 VAC and less than 130 VAC continuous. Source impedance less than 1K ohms. 40 to 70 Hz.
OFF Condition:	Input at low level or open circuit. Input indicator OFF (neon lamp). Controller input OFF.
OFF level:	Input voltage less than 48 VAC or less than 150 VAC with source impedance greater than 40K ohms. 40 to 70 Hz.

Switching Level:	Approximately 60 VAC.
Input Impedance:	Approximately 16K ohms at working frequency.
Input Current:	Approximately 8 mA at 115 VAC.
Common Mode Voltage:	200 VAC steady state (60 Hz), 1500V for 10 ms.
Maximum Input Voltage:	150 VAC for 10 seconds. 200 VAC for 1 cycle (16.7 ms. at 60Hz).
Response Time:	OFF to ON 10 ms. max. ON to OFF ms. max.
Compatibility with output modules:	The B551 is capable of interconnection with the MODICON B550 and B230 115 VAC Output Modules without the use of additional components.



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Figure VI-3. B551 115 VAC Input Module Simplified Schematic

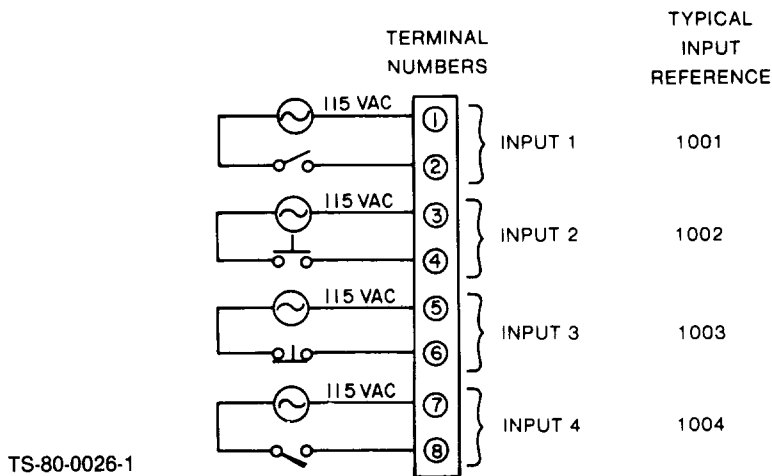


Figure VI-4. B551 115 VAC Input Module Terminal Numbering and Connections

B552 UNIVERSAL DC OUTPUT MODULE (TRUE HIGH)

The MODICON B552 Universal DC Output Module (True High) (Figures VI-5 and VI-6) converts the signals used internally in the controller to four independent DC outputs capable of driving relays, pilot lamps, motor starters, solenoids of any other load up to 2 amperes. The module uses transistor switches to control loads connected to the user DC source. The four output circuits are divided into two groups of two circuits each. Two different VDC sources can be used for each group.

The "True High" output module requires user load connection to the negative VDC source. The positive VDC is wired directly to the module since the "hot" line is switched by the module logic. For lamps common, the negative VDC is also wired directly to the module.

Self-contained clamp diodes suppress transient voltages when inductive loads are driven. Each output circuit is fused to protect its circuitry against overload currents. LED indicators are provided to indicate ON status for each output as well as separate LED's for blown fuse indication.

Electrical Characteristics:

Load Current:

OFF Current: 5 mA max.

Steady State ON Current: 2 amps per output (8 amps for four outputs).

Recommended Minimum Load: 10 mA.
 Inrush Current: 7 amps max for 10 ms.
 5 amps max for 100 ms.
 5 amps, normal blow per each output.

Fuse Rating:
 Load Voltage:
 Working Voltage: 9 to 56 VDC (different sources can be used for each group to two outputs in one module).

Peak Voltage: 60 VDC max.
 Output Voltage Drop: 1.2 VDC at 2 amps.
 Bias Current: Each source (two required per module) should provide the following current:

Source Voltage	Outputs OFF	Outputs ON
24 VDC	6 ma	26 ma
56 VDC	13 ma	32 ma

NOTE

If one source provides power to both pairs of outputs on a module, the above values should be doubled to obtain the correct load for that module.

Common Mode Voltage: 200 VAC steady state.
 1500V for 10 ms.
 Response Time: OFF to ON 1 ms max.
 Output Status Indicator: A LED is provided for each output. The light is ON when the output is ON.
 Fuse Indicator: A LED is provided for each output. The LED will be ON when the fuse is blown.

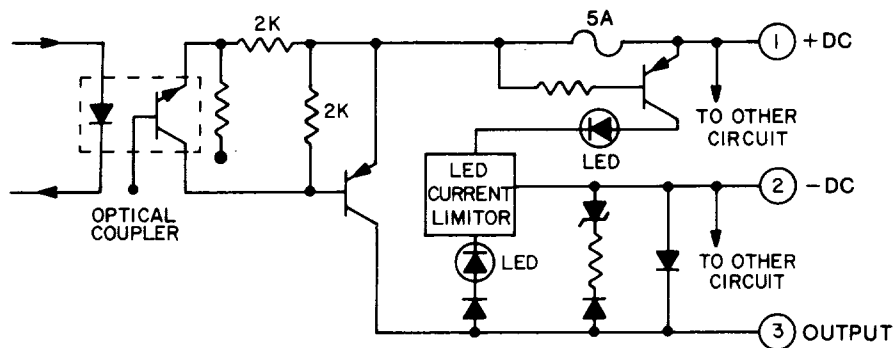
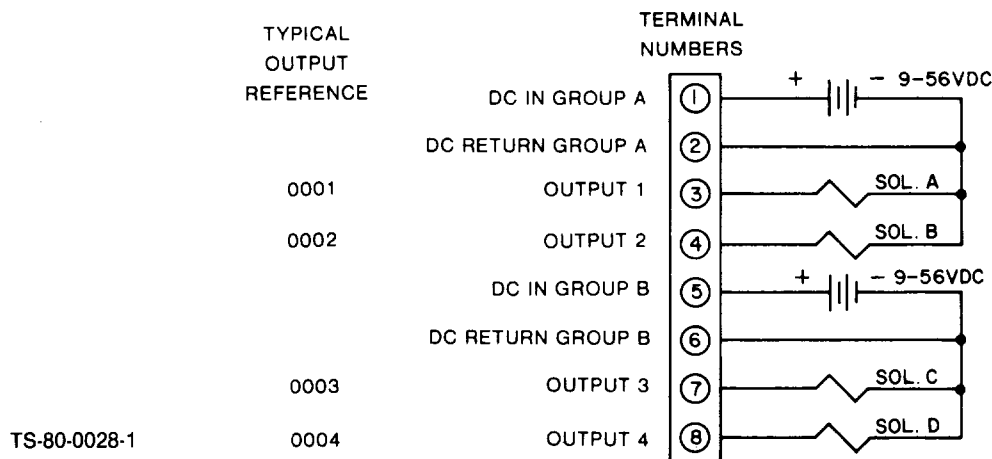


Figure VI-5. B552 Universal DC Output Module (True High) Simplified Schematic



*Figure VI-6. B552 Universal DC Output Module
(True High) Terminal Numbering and Connections*

B553 UNIVERSAL DC INPUT MODULE (TRUE HIGH)

The MODICON B553 Universal DC Input Module (True High) (Figures VI-7 and VI-8) conditions four independently useable DC input signals (sharing common source and "return") to the signals used internally in the controller. This module provides the capability of using discrete input voltages varying from 9 to 56 volts DC. The "True High" module requires the inputs to be wired to positive VDC since the module defines an ON condition (true) as "high" voltage level.

Electrical Characteristics:

Input signal requirements for each of the four inputs:

ON Condition:	Input "High" (short circuit to positive VDC). Input in "ON". Control input line "ON".
ON Level:	9 to 56 VDC reference to common (one source per module). Input is "ON" when greater than 60% of source voltage.
ON Current:	Approximately 0.75 mA at 24 VDC. Approximately 1.6 mA at 48 VDC.
OFF Condition:	Input "low" (short circuit to common or open circuit). Input indicator "OFF". Control input line "OFF".

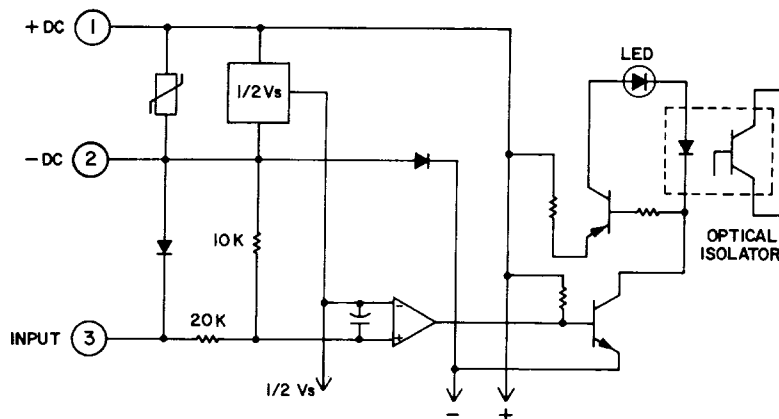
OFF Level:	Less than 40% of VDC source.									
Switching Level:	40-60% of the supply voltage.									
Common Mode Voltage:	200 VAC steady state. 1500V for 10 ms.									
Response Time:	OFF to ON 7 ms. max. ON to OFF 14 ms. max.									
Input Status Indicator:	A LED is provided for each input. A LED is ON when input is ON.									
Bias Current:	<table border="0"> <thead> <tr> <th>Source Voltage</th> <th>Inputs OFF</th> <th>Inputs ON</th> </tr> </thead> <tbody> <tr> <td>9 VDC</td> <td>6 mA</td> <td>25 mA</td> </tr> <tr> <td>56 VDC</td> <td>22 mA</td> <td>60 mA</td> </tr> </tbody> </table>	Source Voltage	Inputs OFF	Inputs ON	9 VDC	6 mA	25 mA	56 VDC	22 mA	60 mA
Source Voltage	Inputs OFF	Inputs ON								
9 VDC	6 mA	25 mA								
56 VDC	22 mA	60 mA								

Compatibility with output modules:

The B553 is capable of interconnection with the B552 Universal DC Output Module (True High) without the use of additional components.

Protection:

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



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Figure VI-7. B553 Universal DC Input Module (True High) Simplified Schematic

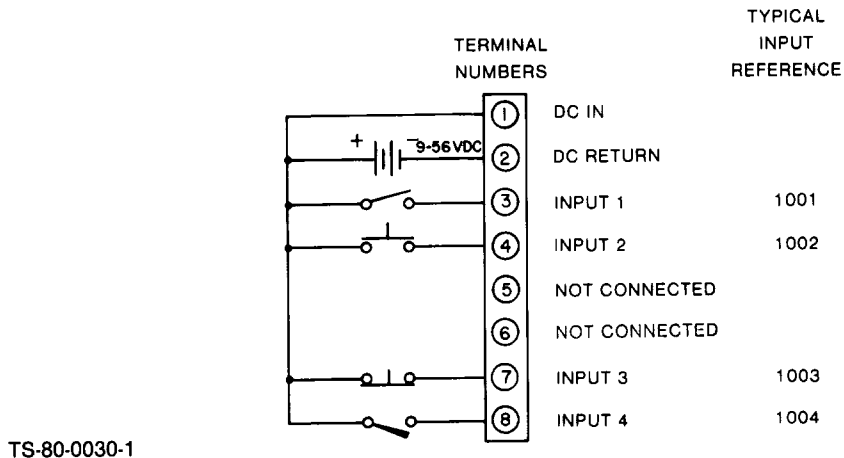


Figure VI-8. B553 Universal DC Input Module
(True High) Terminal Numbering and Connections

B554 220 VAC OUTPUT MODULE

The MODICON B554 220 VAC Output Module (Figures VI-9 and VI-10) conditions the signals used internally in the controller to four independent 220 VAC outputs capable of driving solenoids, motor starters or other loads, up to two amperes each. The four output circuits in the module are divided into two groups. Each group containing two output circuits is fully isolated. This module can be referred to as an ISOLATED OUTPUT MODULE in a group of two points. Different 220 VAC sources can drive each group. Each module uses four triac devices to switch the loads of the user supplied VAC line.

Self contained damping networks and voltage limiting varistor suppress line voltage spikes and prevent false triggering. Each output is provided with a fuse to protect its circuitry from overload current. The following are the electrical characteristics of the B554 output module.

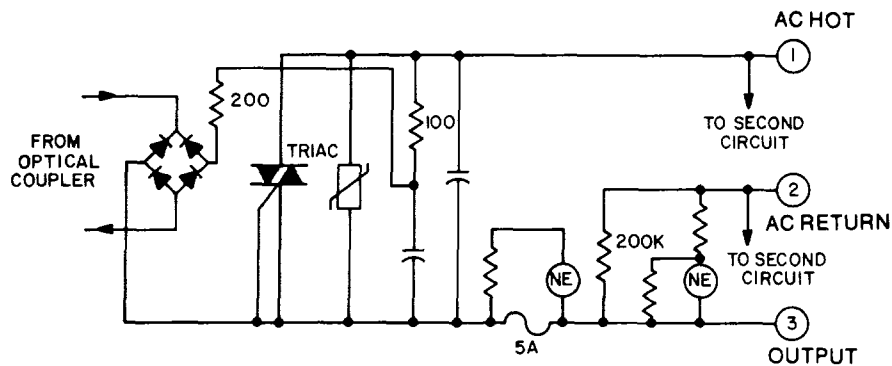
Electrical Characteristics:

Load Current:	
OFF Current:	5 mA max.
ON Current:	2 amps continuous (8 amps per module).
Recommended Minimum Load:	10 mA.
ON Holding Current:	0.5 mA.
Inrush Load Current:	15 amps for 10 ms. 5 amps for 100 ms.
Fuse Rating:	5 amps normal blow (one fuse per output).
Load Voltage:	

Working Voltage:	160 to 260 VAC. 40 to 70 Hz.
Transient Voltage:	300 VAC max. for 10 secs. 400 VAC max. for 1 cycle.
ON Voltage Drop:	Approximately 1 volt at 2 amps current.
Common Mode Voltage:	Working 400 VAC, 1500 volts max for 10 ms.
Response Time:	ON to OFF 0.3 to 8.3 ms. max. (at 60 Hz). OFF to ON 0.3 to 10 ms. max.
Output Status Indicator:	A neon lamp is provided for each output. The lamp will be ON when the output is ON.
Fuse Indicator:	A neon lamp is provided for each output. The lamp will be ON when the fuse is blown.

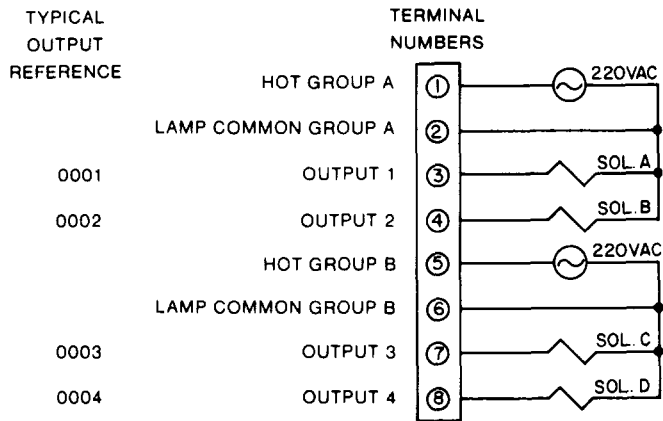
Compatibility with input
modules:

The B554 is capable of inter-connection with the MODICON B555 and B235 220 VAC Input Modules without the use of additional components.



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Figure VI-9. B554 220 VAC Output Module
Simplified Schematic



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*Figure VI-10. B554 220 VAC Output Module
Terminal Numbering and Connections*

B555 220 VAC INPUT MODULE

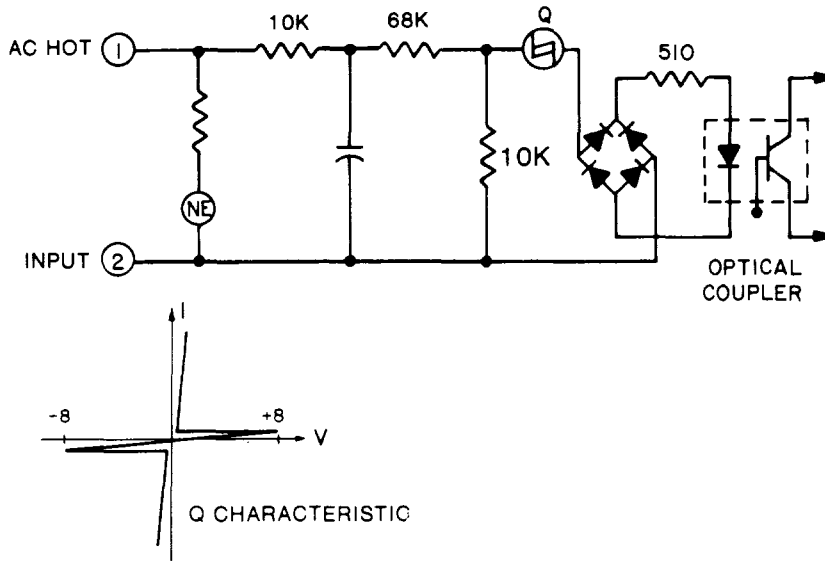
The MODICON B555 220 VAC Input Module (Figure VI-11 and VI-12) contains four 220 VAC isolated inputs. Each input draws sufficient "wetting" current to inhibit the buildup of contaminants on the surface of silver contacts used in pushbutton, limit switches, pressure switches, etc. The input signal requirements for each of the four inputs are as follows:

Electrical Characteristics:

ON Conditions:	Input at high level. Input indicator ON (neon lamp). Controller input ON.
ON Level:	140 to 260 VAC, source in series with impedance less than 1K ohm. 40 to 70 Hz.
OFF Condition:	Input at low level or open circuits. Input indicator OFF. Controller input OFF.
OFF Level:	Input voltage less than 90 VAC or less than 150 VAC with source impedance greater than 80K ohms.
Switching Level:	Approximately 120 VAC.
Input Impedance:	Approximately 32K ohms at working frequency.
Common Mode Voltage:	400 VAC steady state (60Hz) 1500 volts for 10 ms.
Response Time:	OFF to ON 10 ms. max. ON to OFF 20 ms. max.

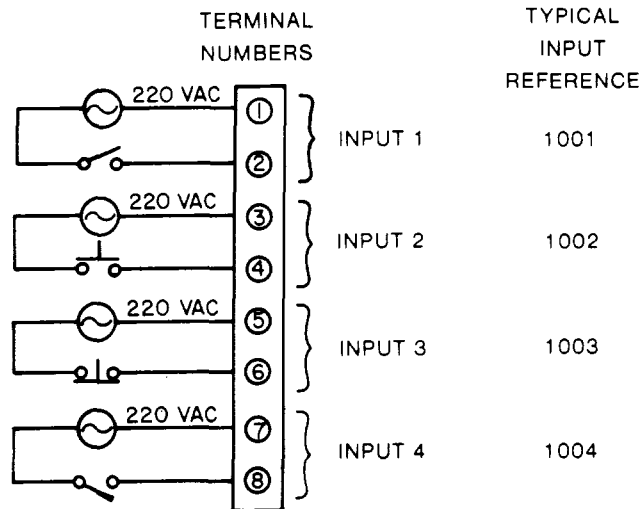
Compatibility with output modules:

The B555 is capable of interconnection with the MODICON B554 and B234 220 VAC Output Modules without the use of additional components.



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Figure VI-11. B555 220 VAC Input Module Simplified Schematic



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Figure VI-12. B555 220 VAC Input Module Terminal Numbering and Connections

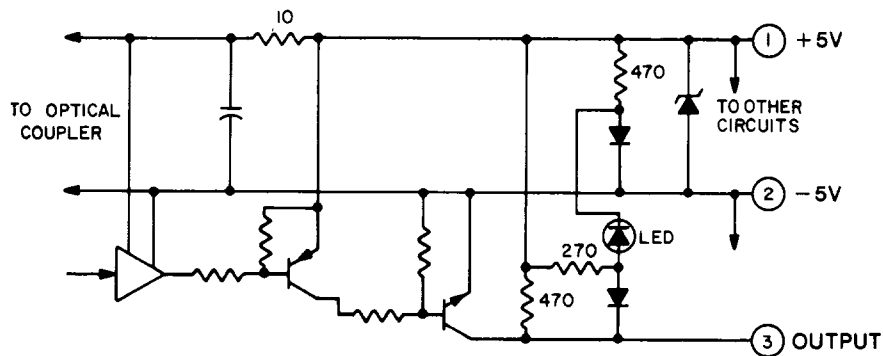
B556 VDC TTL OUTPUT MODULE

The MODICON B556 VDC TTL Output Module (Figure VI-13 and VI-14) conditions the signals used internally in the controller to four independent outputs capable of driving up to 75 mA of TTL or DTL loads. The module uses four transistor drives to control logic loads associated with an externally applied 5 VDC source.

Electrical Characteristics:

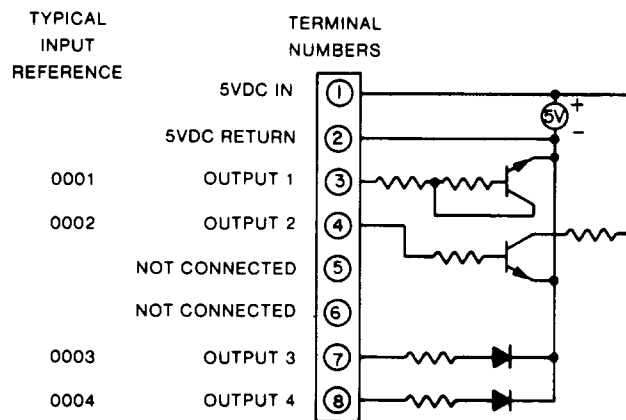
Logic One State:

Line output ON.
 Output transistor OFF.
 Output indicator ON.
 Output voltage: 4.0V minimum
 at 1 mA current and + 5V
 supply at 4.75 VDC.



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Figure VI-13. B556 VDC TTL Output Module
Simplified Schematic



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Figure VI-14. B556 VDC TTL Output Module
Terminal Numbering and Connections

Logic Zero State:	Line output OFF. Output transistor ON. Output indicator OFF. Output voltage 0.4V max. at 75 mA. Rated current: 75mA continuous, 100 mA peak (10 ms., 20% duty cycle).
+ 5V Supply (Supplied by User):	Voltage: 5.0± 0.25 VDC. Current: 325 mA max. current (all outputs ON). 200 VAC steady state max. (50/60 Hz). 1500 VDC for 10 ms.
Common Mode Voltage:	OFF to ON 4 ms. max. ON to OFF 13 ms. max.
Response Time:	A LED is provided for each output. The light is ON when the Output is in logic one state.
Output Status Indicator:	
Compatibility with input modules:	The B556 is capable of inter- connection with the MODICON B557 and B237 Input Modules without the use of additional components.

B557 VDC TTL INPUT MODULE

The MODICON B557 VDC TTL Input Module (Figures VI-15 and VI-16) conditions up to four independent +5 VDC input signals to the signals used internally by the controller.

Electrical Characteristics:

Input signal requirements for each of the four inputs:

Logic One State:
Conditions:

Level:

Input "High" or open circuit.
Input indicator ON.
Controller input ON.
VIH = 2.0V minimum.
II = 0.1 mA max. at VIH 5.5V:
V source = 5.0V.
Maximum input voltage + 8.0
volts.
Maximum positive clamp cur-
rent: 25 mA.

Logic Zero State:
Conditions:

Level:

Common Mode Voltage:

+ 5V Supply (Supplied
by User):

Response Time:

Input Status Indicator:

Compatibility with output
modules:

Input "low".
Input indicator OFF.
Controller input OFF.
 $V_{IL} = 0.8V$ max.
 $I_{IL} = 1.1$ mA max at V source
 $= 5.25V$ and $V_{IL} = 0V$.
Max negative input voltage:
 -2 volts.
Max negative clamp: 15 mA.
200 VAC steady state max
(50/60 Hz). 1500 for 10 ms.

Voltage: $5.0 + 0.25$ VDC.
Current: 65 mA max.
OFF to ON 4 ms. max.
ON to OFF 13 ms. max.
A LED is provided for each
input. The light is ON when
input is logic one state.

The B557 is capable of inter-
connection with the MODICON
B556 and B236 Output Modules
without the use of additional
components.

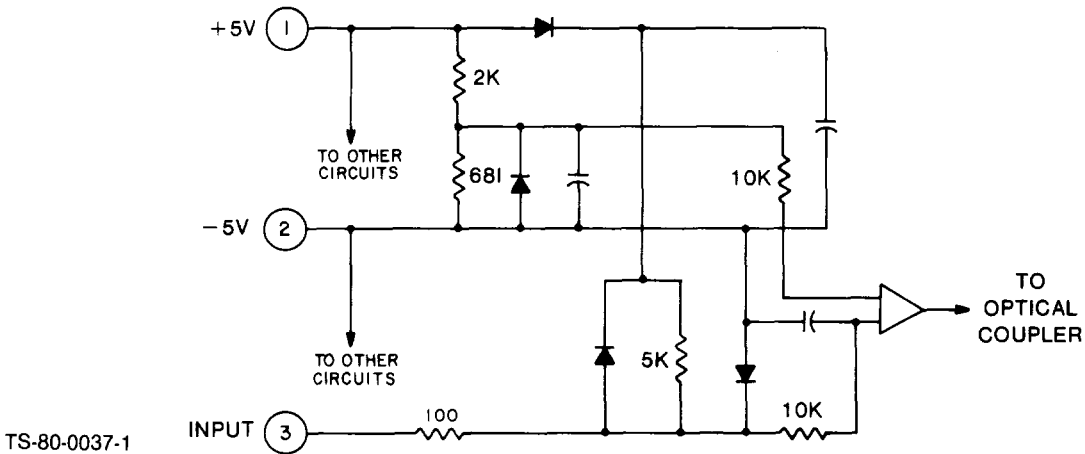
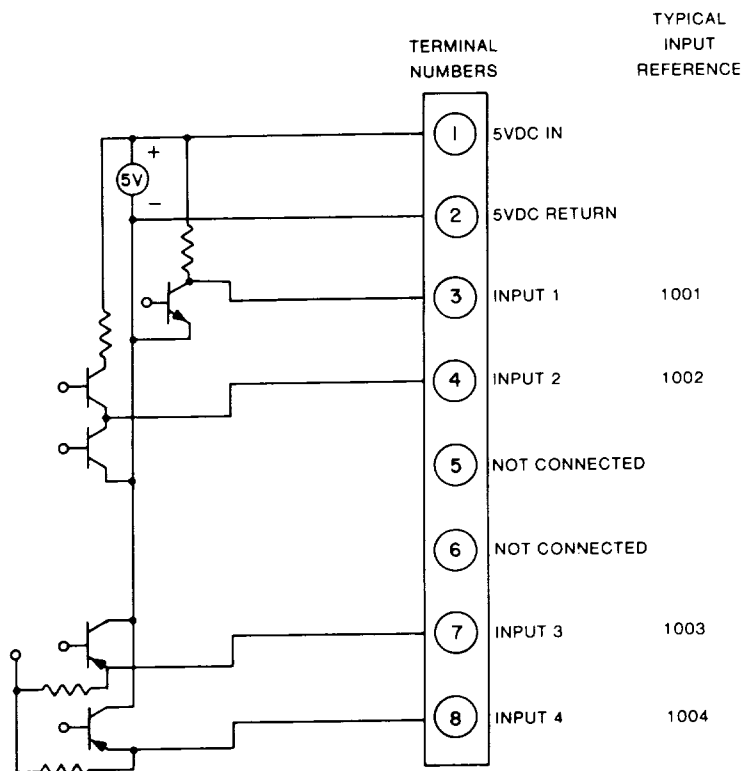


Figure VI-15. B557 VDC-TTL Input Module
Simplified Schematic



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Figure VI-16. B557 VDC TTL Input Module Terminal Numbering and Connections

B558 UNIVERSAL DC OUTPUT MODULE (TRUE LOW)

The MODICON B558 Universal DC Output Module (True Low) (Figures VI-17 and VI-18) converts the signals used internally in the controller to four independent DC outputs capable of driving relays, pilot lamps, motor starters, solenoids or any other load up to two amps. The module uses transistor switches to control loads connected to the user DC source. The four output circuits are divided into two groups of two circuits each. The two groups are fully isolated and the module can be referred to as an ISOLATED OUTPUT MODULE in groups of two points.

The "True Low" output module requires user load connection to the positive VDC source. The negative VDC is wired directly to the module, since the "return" line is switched by the module logic. Note that for bias of the electronic circuits inside the module, the positive VDC is also wired directly to the module.

Self contained clamp diodes suppress transient voltages when inductive loads are driven. Each output circuit is fused

to prevent its circuitry in the case of overload currents. LED's are provided for each circuit to indicate blown fuses. Separate sets of LED's are provided to indicate ON status of each output.

Electrical Characteristics:

Load Current:
 OFF Current: -5 mA max.
 Steady State ON Current: 2 amperes max (8 amps per module).
 Recommended Minimum Load: 10 mA.
 Inrush Current: 7 amps max for 10 ms.
 5 amps max for 100 ms.
 5 amps, normal blow per each output.
 Fuse Rating: 5 amps, normal blow per each output.
 Load Voltage:
 Working Voltage: 9 to 56 VDC (different source can be used for each group of two outputs in one module).
 Peak Voltage: 60 VDC max.
 Output Voltage Drop: 1.5V max at 2 amps current.
 Bias Current: Each source (two required per module) should provide the following current:

<u>Source Voltage</u>	<u>Outputs OFF</u>	<u>Outputs ON</u>
24 VDC	6 mA	26 mA
56 VDC	13 mA	32 mA

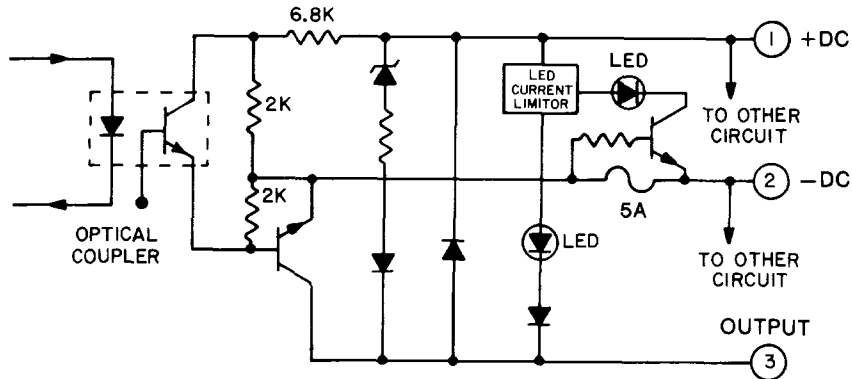
NOTE

If one source provides power to both pairs of outputs on a module, the above values should be doubled to obtain current load for that module.

Common Mode Voltage: 200 VAC steady state.
 1500 Volts for 10 ms.
 Response Time: OFF to ON - 1 ms. max.
 ON to OFF - 1 ms. max.
 Output Status Indicator: A LED is provided for each output. The light is ON when the output is ON.
 Fuse Indicator: A LED is provided for each output. The LED will be ON when the fuse is blown.

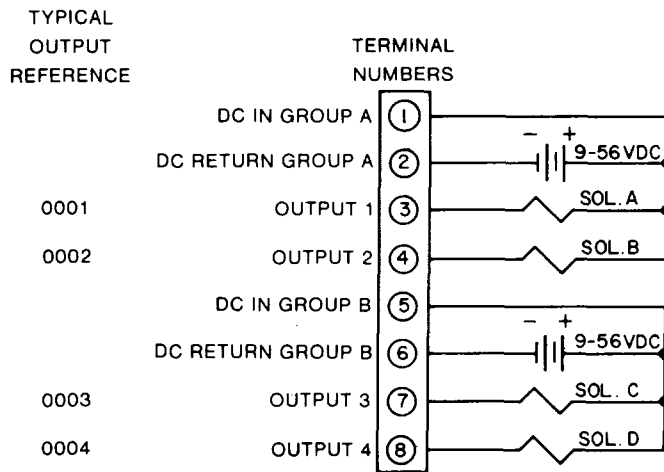
Compatibility with input modules:

The B558 is capable of interconnection with the MODICON B559 and B233 DC Input Modules without the use of additional components.



TS-80-0039-1

Figure VI-17. B558 Universal DC Output Module (True Low) Simplified Schematic



TS-80-0040-1

Figure VI-18. B558 Universal DC Output Module (True Low) Terminal Numbering and Connections

B559 UNIVERSAL DC INPUT MODULE (TRUE LOW)

The MODICON B559 Universal DC Input Module (True Low) (Figures VI-19 and VI-20) conditions four independently useable DC input signals (sharing common and "return") to the signals

used internally in the controller. This module provides the capability of using discrete input voltages varying from 9 to 56 VDC.

The "True Low" module requires the inputs to be wired to the negative line of the source since the logic defines "low" voltage level on an ON condition (true).

Electrical Characteristics:

Input signal requirements for each of the four inputs:

ON Condition: Input "Low" (short circuit to negative VDC).
Input indicator ON.
Control input line ON.

ON Level: Source 9 to 56 VDC.
Input ON when less than 40% of supply voltage.

ON Current: Approximately 1.2 mA at 24 VDC source and input at zero volt.

OFF Condition: Input "High" or open circuit.
Input indicator OFF.
Control input line OFF.

OFF Level: Input greater than 60% of supply voltage.

Switching Level: 40 - 60% of supply voltage.

Common Mode Voltage: 200 VAC steady state.
1500V for 10 ms.

Response Time: OFF to ON 7 ms. max.
ON to OFF 14 ms. max.

Input Status Indicator: A LED is provided for each input. The LED is ON when input is ON.

Bias Current:

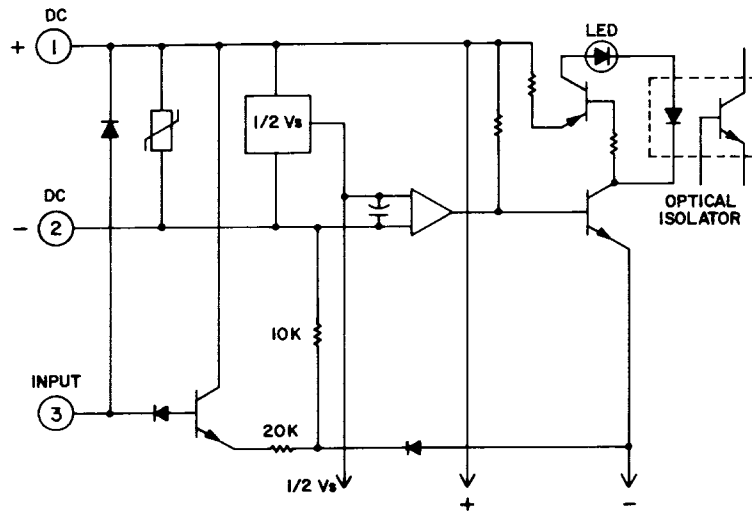
Source Voltage	Inputs OFF	Inputs ON
9 VDC	8 mA	25 mA
56 VDC	30 mA	60 mA

Compatibility with output modules:

THE B559 is capable of inter-connection with the B558 and B232 DC Output Modules without the use of additional components.

Protection:

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



TS-80-0041-1

Figure VI-19. B559 Universal DC Input Module (True Low) Simplified Schematic

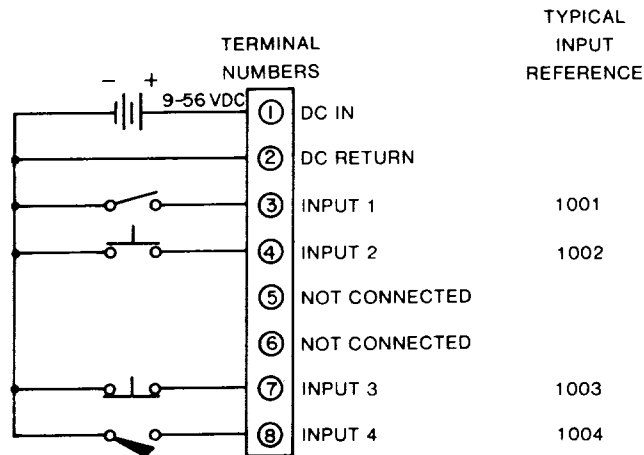


Figure VI-20. B559 Universal DC Input Modules (True Low) Terminal Numbering and Connections

B577 ANALOG INPUT MODULE

The MODICON B577 Analog Input Module is available in three options, each capable of servicing up to four analog signals. Model B577-005 is designed to handle 1-5 VDC signals, model B577-010 handles 0-10 VDC, and model B577-015 handles -10 to +10 VDC signals (factory established selection). Any analog input module can be addressed to one of four groups of four consecutive input registers. This selection is made by setting one of four switches on the rear of the module as follows:

<u>Switch (Group A)</u>	<u>Input Registers</u>
S1A	3001-3004
S2A	3009-3012
S3A	3017-3020
S4A	3025-3028

A second set of four switches allows specific input registers to be "Locked out" or not serviced by this module. Registers not serviced can be used by other properly addressed modules; if another module is not servicing them, these registers will contain zero at the CPU. The exact register effected by each of these four switches is also controlled by the module address as follows:

<u>Switch (Group B)</u>	<u>S1A</u>	<u>S2A</u>	<u>S3A</u>	<u>S4A</u>
S1B	3001	3009	3017	3025
S2B	3002	3010	3018	3026
S3B	3003	3011	3019	3027
S4B	3004	3012	3020	3028

Electrical Characteristics:

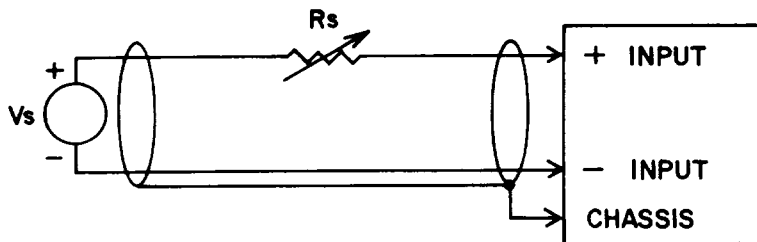
Input Voltage:	1-5 VDC (Model 005). 0-10 VDC (Model 010). -10 to + 10 VDC (Model 015).
Maximum Input Voltage:	220 VAC.
Common Mode Rejection:	-70 dB.
Cross Talk (between inputs):	-70 dB.
Input Impedence:	2 Mohms.
Frequency Response:	DC to 100 Hz (-2 dB points).
Setting Time (within 0.01% of final value):	10 msec.
Resolution:	1 bit in 1024.
Linearity Error:	Less than 0.05% of full scale.
Accuracy:	0.05% of full scale at 25°C. 0.25% of full scale at 0-65°C.
Temperature Coefficient:	
Offset and Linearity:	0.005% per °C of full scale.
Gain:	0.005% per °C of input voltage.
External Power Requirements:	15-30 VDC at 250 ma.
Isolation:	
Input to input:	1 mohm.
Input to Controller:	300 VAC continuous. 1500 V for 100 msec.
Input to External Power Supply:	500 VDC.

Each analog input will be converted and new data presented to the controller each scan. The numerical value supplied to the controller will vary linearly from 000 to 999 as the analog input signal varies from minimum to maximum. The following illustrates typical numerical values:

<u>Voltage</u>	<u>- 005</u>	<u>- 010</u>	<u>- 015</u>
- 10 VDC	000	000	000
- 5 VDC	000	000	250
0 VDC	000	000	500
1 VDC	000	100	550
2.5 VDC	500	250	625
5 VDC	999	500	750
10 VDC	999	999	999

Each B577 Analog Input Module incorporates an Active indicator. The Active LED will be ON as long as the CPU communicates to the module at least once each 100 msec. The external power supply is protected by a single 1/2 amp Pico fuse (MODICON Part No. 57-0024. Little Fuse number 276.500 or equal). Wiring to the B577 module is made via a 30-pin connector (MODICON Part No. 52-2109. Buchanan Part NO. PCB2B30A616798) supplied with the module. This connector can be removed for replacement of the module without disturbing field wiring; to facilitate removal of the module, a service loop of field wiring should be left. Connections (Figure VI-21) to this connector are as follows:

<u>Circuit</u>	<u>+ Input</u>	<u>- Input</u>	<u>Shield</u>
1	1	2	3
2	4	5	6
3	7	8	9
4	10	11	12
(external Power 15-30VDC)	29	30	



TS-80-0043-1

Figure VI-21. B577 Analog Input Module
Typical Connections

6.2 REGISTER I/O DESCRIPTIONS

The following 500 Series Register I/O descriptions will be supplied later:

B579-001	Hi Speed Counter Module
B581-001	Absolute Encoder Input - Single-Ended Module
B583-001	Latched Int Safe Prox Sw Input Module
B585-001	Incremental Encoder Input Module
B586-001	Ramping Prog. Stepper Drive Module
B587-001	Latched Prox Sw Input Module