DESCRIPTION

The Model Series 380L Signal Limiter Module accepts a 1 to 5 Vdc input signal and provides a current output proportional to the input. The output will remain within a defined band fixed by the high and low limit adjustments. When the input exceeds the levels established by either the high or low limit adjustments, the output will be clamped at the limiting value.

Current input signals may be used when precision resistors are placed across the input terminals in the Card Cage Enclosure. This permits removal of the Module without interrupting the input current loop.

The standard output range is 4 to 20 mA. A 10 to 50 mA output can be achieved by placing a jumper wire on the foil side of the Module’s circuit board; refer to OUTPUT RANGE SELECTION.

The Signal Limiter Module provides a 1 to 5 Vdc feedback signal which can be used with SYNCRO 350 Control Stations. The feedback signal also remains within the limits established by the high and low limit adjustments.

MODEL DESIGNATION

Function Module Designation
Signal Limiter Module

Trip-Point Configuration
1 - Blind trip-points with 22 turn trimpots.
2 - Graduated dial trip-points with single turn pots.

SPECIFICATIONS

INPUT
Range (Standard): 1 to 5 Vdc
Range (With signal conditioning resistors): 1 to 5 mA dc
4 to 20 mA dc
10 to 50 mA dc

Input Impedance (Standard): 5 Megohms (Min.)
Isolation: NONE. The negative input terminal is common with the cage power supply and the negative output terminal.

OUTPUT

<table>
<thead>
<tr>
<th>Field Selectable Load</th>
<th>Permissible Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC Powered Enclosures</td>
</tr>
<tr>
<td>4 to 20 mA</td>
<td>0 to 900 Ohms</td>
</tr>
<tr>
<td>10 to 50 mA</td>
<td>0 to 360 Ohms</td>
</tr>
</tbody>
</table>

Load Effect: Less than 0.1% within the allowable load range
Current Limiting: Output will not exceed 150% of full scale when input is overdriven

FEEDBACK OUTPUT: 1 to 5 Vdc (@ 5 mA max.)

ADJUSTMENTS
Zero: ±5% of span (Approx.)
Span: ±5% of span (Approx.)
Low Limit: 0 to 100% of span
High Limit: 0 to 100% of span

NOTE: The limit controls cannot be crossed over. Minimum operating deadband is 2%.

Output Range Selector: Wire Jumper J1
4 to 20 mA: Removed
10 to 50 mA: Installed

ACCURACY
Input-Output Transfer: ±0.15% of span (max.)
High/Low Limit: ±0.15% of setting (max.)

RESPONSE TIME: 150 mSec to reach 98% of span (typical)

OPERATING TEMP.: 32 to 122°F (0 to 50°C)

INSTALLATION

The Signal Limiter Module must be installed in a Model Series 380 Card Cage Enclosure. It can be plugged into any of the slots in the enclosure. Refer to customer drawing for the designated slot or assign a convenient slot for it.
The safety keys of the designated slot in the card cage enclosure must be set before the Module can be plugged in. Service Instruction SD3801 identifies these safety keys and gives the procedure for setting them. The positions of the keys for the Signal Limiter Module are as follows:

Left Key: V (Vertical)
Right Key: V (Vertical)

The input and output connections are made to the terminal strips provided at the front or the rear of the Card Cage Enclosure (depending on model). Each terminal strip is identified with a number that matches a corresponding slot number. Refer to the Connection Diagram (Figure 1) in this Instruction and to Service Instruction SD3801.

**WARNING**

Ensure that power is OFF on all wires being connected.

To convert a current signal to a voltage signal, select an appropriate conditioning resistor listed below and connect it across the required input or output terminals.

<table>
<thead>
<tr>
<th>Current Signal</th>
<th>Conditioning Resistor (to obtain 1 to 5 Volts)</th>
<th>MPC Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 mA</td>
<td>1000 Ohms ± 0.1%</td>
<td>35037-228</td>
</tr>
<tr>
<td>4 to 20 mA</td>
<td>250 Ohms ± 0.1%</td>
<td>35037-229</td>
</tr>
<tr>
<td>10 to 50 mA</td>
<td>100 Ohms ± 0.1%</td>
<td>35037-230</td>
</tr>
</tbody>
</table>

**NOTE**

All plug-in modules in a card cage share the same SIGNAL COMMON bus line due to their common power supply. Be careful when connecting various signal lines to avoid possible ground loops or shorts.

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**TERMINAL STRIPS ON SERIES 380 RACK ENCLOSURES**

1. INPUT (NOTE 1)
2. NC
3. NC
4. NC
5. OUTPUT \( R_1 \) (NOTE 2)
6. NC
7. NC
8. NC
9. FEEDBACK (1 to 5V dc) \( (E_c) \)

**NOTES:**
1. 1-5 Vdc signals are standard inputs. For process current inputs, refer to the INSTALLATION section for the available conditioning resistor selection.
2. See output specifications for load limits.

**OUTPUT RANGE SELECTION**

The Signal Limiter Module, as normally shipped from the factory, has a 4 to 20 mA output. It can be changed to have a 10 to 50 mA output. To do this, a jumper wire must be soldered on the foil side of the circuit board. The jumper is designated as J1; this designation appears on the circuit board as shown in Figure 2. Whenever the output range of the Module is changed, it must be followed by a complete calibration procedure.

**CALIBRATION**

The Signal Limiter Module is normally shipped factory calibrated for a specific customer application.

To assure continued accuracy, it is recommended to check the calibration after the first 30 days of operation and then at regular intervals dictated by the severity of the operating environment or whenever an inaccuracy is suspected.

Use the following procedure to perform periodic calibration checks or to calibrate the Module for a new application. Figure 2 shows the location of all jumper wires and trimpots.

**REQUIRED EQUIPMENT**

The following equipment is necessary to perform proper calibration.

1. Card Cage Enclosure, Model Series 380, with internal power supply.
2. Input Signal Source; it can be one of the following or similar devices:
   a) Voltage Source — typically 0 to 5 Vdc.
   b) Current Source - typically 0 to 20 mAdc
   c) Transmitter - adjustable over required range

   These devices must be adjustable to an accuracy of 0.1% or better.
3. Output Measuring Device; it can be a digital multimeter or any other device capable of measuring the required output signal to an accuracy of 0.1% or better.

**ZERO AND SPAN ADJUSTMENT**

1. Check the Module’s output range setting and if necessary change it. Refer to the OUTPUT RANGE SELECTION section.
2. Plug the Module into a card cage enclosure containing a power supply.
3. Connect the signal source to terminals 1 (+) and 3 (–) of the terminal strip on the card cage. If the signal source is a current, use an appropriate conditioning resistor across the input terminals to provide a 1 to 5V input.
4. Connect the output measuring device to terminals 4 (+) and 5 (–) of the terminal strip on the card cage. Refer to the SPECIFICATIONS section for output load restrictions. Use an appropriate conditioning resistor across the output terminals if a voltage measuring device is utilized.

**FIGURE 1 Connection Diagram**
5. Turn the HIGH LIMIT pot fully clockwise and the LOW LIMIT pot fully counterclockwise. The voltage readings at the HIGH and LOW test points should be +6 Volts and 0 Volts, respectively.

6. Set the signal source to provide +1,000 Volts across the input terminals. Adjust the ZERO trim-pot to obtain an output reading of 4 mA (or 10 mA if a 10 to 50 mA range is used).

7. Set the signal source to provide +5,000 Volts across the input terminals. Adjust the SPAN trim-pot to obtain an output reading of 20 mA (or 50 mA if a 10 to 50 mA range is used).

8. Repeat steps 6 and 7, since there is some interaction between these adjustments.

HIGH AND LOW LIMIT ADJUSTMENT

1. Perform steps 1 through 4 of the ZERO AND SPAN ADJUSTMENT section.

2. Set the signal source to provide +5.5 Volts across the input terminals. Adjust the HIGH LIMIT pot to obtain at the output the desired high limit value.

3. Set the signal source to provide +0.5 Volts across the input terminals. Adjust the LOW LIMIT pot to obtain at the output the desired low limit value.

NOTE

The high and low limit levels can also be set by measuring the required levels directly at the TP-HIGH and TP-LOW test jacks at the front of the Module as shown in Figure 2.

MAINTENANCE

GENERAL

Required maintenance for this Module should consist of periodic cleaning, visual inspection, and calibration checks. The severity of the environment in which the Module is located will determine the required frequency of maintenance.

CLEANING

The Module should be cleaned as often as operating conditions require. The accumulation of dust and dirt on components prevents efficient heat dissipation which can cause overheating and component breakdown.

Blow off accumulated dust and dirt with dry, low velocity air. Any dust or dirt that remains should be removed with a soft brush or cloth dampened with a mild detergent and water solution. Cotton-tipped swabs are useful for cleaning in narrow spaces.

CAUTION

Avoid the use of chemical agents which may damage plastic components or protective coatings.

VISUAL INSPECTION

The Module should be inspected occasionally for defects such as loose or broken connections, damaged circuit board, and heat-damaged components.

The corrective action for most visible defects is obvious. However, if a heat-damaged component is found, the cause of overheating must be corrected to prevent a recurrence of the damage.

CAUTION

Exceeding the specified ambient temperature limits can adversely affect performance and may cause damage.

TROUBLESHOOTING

If the Module does not operate properly when initially installed, check the terminal strip wiring. Most problems in new installations can be traced to wiring mistakes. Also, verify that the equipment associated with the input and output circuits is functioning and is properly calibrated.

If the trouble is traced to the Module, remove the Module and give it a full bench check. A complete schematic of the Module is given in Figure 3.

A Part No. 15378-27 Card Extender can be ordered. It extends the Module beyond the front edge of a card cage enclosure, providing easy access to both sides of the Module's circuit board.

IMPORTANT

Warranty repair and replacement requires the Module to be returned to Moore Products Co., Spring House, Pa. 19477. The warranty is null and void if repair is attempted at any other location.

RECOMMENDED SPARES

There are no recommended spare parts for the Signal Limiter Module.

One spare Module is recommended for every 1 to 10 in service.