DESCRIPTION
The Model 380Y Integrator Module converts a dc input voltage into a pulse train output for the integration and totalization of the input. The module can operate in either a linear mode or a square root mode. In the linear mode, the output pulse frequency is directly proportional to the input signal. In the square root mode, the output frequency is proportional to the square root of the signal. Linear or square root mode selection is by means of positioning a jumper wire on the circuit board.

The module accepts 1 to 5 Vdc or 0 to 4 Vdc inputs. Input range selection is accomplished by a jumper wire on the circuit board. Current inputs are accommodated by placing precision resistors across the input terminals in the Card Cage Enclosure.

A zero drop-out circuit blocks low rate pulses from the output. This eliminates spurious counts resulting from residual zero errors of preceding equipment.

Two LED's at the front of the module give visual indication of output pulses and zero drop-out operation.

SPECIFICATIONS
Input:
Standard.............. Selectable: 1 to 5 Vdc or 0 to 4 Vdc. Input protected to 40V normal mode and 100V common mode.
Alternate.............. 1 to 5 mA
(with optional input) 4 to 20 mA
resistors 10 to 50 mA
Offset Adjust........... ± 5% of span (nominal)
Function................ Selectable: Linear or Sq. Rt.

Output:
Pulse................... Voltage: 24 Vdc
Width: 50 mSec.
Rate: 25 to 25,000 CPH (F.S.)
Load: 150 Ohms Resistive
(Min.)
Zero Drop Out........... Adjustable, 0 to 20% of input span
Accuracy................ ± 0.15% of span (Linear or Square Root)

INSTALLATION
GENERAL
The Integrator Module must be installed in the Card Cage Enclosure. It can be plugged into any of the numbered slots in the enclosure. Refer to your drawings for the designated slot, or choose a slot for the module.

SAFETY KEYS
The safety keys in the Card Cage Enclosure must be set before the module is plugged in. Service Instructions SD3801 identifies these safety keys and gives the procedure for setting them. The positions of the keys for the integrator module are as follows:

Left Key: V (vertical)
Right Key: V (vertical)

WIRING
Input and output wiring connections are made on the terminal strips in the Card Cage Enclosure. There is a terminal strip for each module slot; the terminal strips are numbered to correspond to the slot numbers. Signal conditioning resistors for milliampere inputs are identified in Service Instructions SD3801. Refer to the Connection Diagram in this instruction and to the Service Instructions SD3801.

Caution
The module input is protected to 40V normal mode and 100V common mode. Exceeding these limits may damage the module.

JUMPER PLACEMENT
GENERAL
The jumper positions should be checked before the module is plugged into the Card Cage Enclosure.

Because of the numerous jumper combinations for the various ranges of this module, the jumpers are prepositioned for the input/output ranges specified on your purchase order. Refer to the sticker on the module for the input/output data.

Use the following procedures to verify the jumper positions or to change the range of the module.

Function Selection (Jumper X)
Select the mode of integration by placing jumper plug “X” (see Component Location Drawing) as follows:
Jack “L” — for linear inputs.
Jack “S” — for square root inputs.

Input Range Selection (Jumper J1)
Jumper wire “J1”, on the foil side of the circuit board, is in place for 1 to 5 Volt inputs, and is removed for 0 to 4 Volt inputs.

Output Range Selection (Jumper Y)
Position jumper plug “Y” (see Component Location Drawing) as follows:
1. Locate, in the Output Range column of the Divider

MOORE PRODUCTS CO., Spring House, Pa. 19477
Jumper Table, the range which includes the Full Scale Count Rate of the module being set up.

2. Determine the corresponding Divider Jumper position from the Divider Jumper Position column of the table.

3. Insert the Divider Jumper "Y", on the circuit board, into the jack indicated by the table.

<table>
<thead>
<tr>
<th>Output Range</th>
<th>Divider Jumper Position</th>
<th>Divider Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>12,000 to 25,000 count/hr.</td>
<td>D</td>
<td>8</td>
</tr>
<tr>
<td>6,000 to 12,000 count/hr.</td>
<td>E</td>
<td>16</td>
</tr>
<tr>
<td>3,000 to 6,000 count/hr.</td>
<td>F</td>
<td>32</td>
</tr>
<tr>
<td>1,500 to 3,000 count/hr.</td>
<td>H</td>
<td>64</td>
</tr>
<tr>
<td>750 to 1,500 count/hr.</td>
<td>J</td>
<td>128</td>
</tr>
<tr>
<td>375 to 750 count/hr.</td>
<td>K</td>
<td>256</td>
</tr>
<tr>
<td>187 to 375 count/hr.</td>
<td>L</td>
<td>512</td>
</tr>
<tr>
<td>93 to 187 count/hr.</td>
<td>M</td>
<td>1024</td>
</tr>
<tr>
<td>47 to 93 count/hr.</td>
<td>N</td>
<td>2048</td>
</tr>
<tr>
<td>25 to 47 count/hr.</td>
<td>P</td>
<td>4096</td>
</tr>
</tbody>
</table>

5. Calculate the full-scale period that will be observed at TP+ and TP- by using the following formula:

\[ \text{F.S. Period (sec.)} = \frac{3600}{\text{F.S. Count Rate (CPH) \times Divider Ratio}} \]

**EXAMPLE**

Calibrate for 1000 CPH full scale count rate

1. Place Divider Jumper into position "U" (from Divider Jumper table).

2. Divider Ratio = 128 (from Divider Jumper table).

\[ \text{F.S. Period (Sec.) at TP+} = \frac{3600}{1000 \times 128} = 0.028 \text{ Sec.} \]

**CALIBRATION PROCEDURE**

1. Set the zero drop-out trim pot (ZDO) fully counter-clockwise.

2. Apply an input signal of 1.250 Vdc for a 1 to 5 Volt input range (0.25V for a 0 to 4 Volt input range).

3. Adjust the zero trimpot (Z) to produce a period of exactly 16 times the calculated full scale period for linear inputs or 4 times the calculated full scale period for square root inputs.

**IMPORTANT**

Do not use a 0% signal input for calibration because the zero drop-out circuit will operate and block the output pulses.

4. Apply an input signal of 5.000 Volts for a 1 to 5 Volt input range (0.250 Volts for a 0 to 4 Volt input range).

5. Adjust the Full-Scale (FS) trimpot to produce the calculated Full-Scale period.

6. Repeat steps 2 through 5 until no further adjustment is required.

7. Recheck the calibration by connecting the counter-timer in parallel with the electromechanical counter. The Full-Scale output period should now be the full-scale period at TP+ multiplied by the Divider Ratio (8, 16, 32 —— 4096).

**Caution**

Make sure the counter-timer minus (-) terminal is attached to the minus (-) output terminal.

8. Apply an input signal equivalent to the desired Zero Drop Out trip-point. Turn the ZDO trimpot adjustment clockwise until the ZDO LED lights. The ZDO circuit is now calibrated. Input signals falling below this trip-point value will activate the ZDO circuit and block the output pulses.
MAINTENANCE

Except for annual cleaning and periodic calibration checks, the module requires no routine maintenance.

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

If a problem is traced to the module, remove the module and give it a full bench check.

A PIN 15378-27 Card Extender can be ordered. This extender provides test jacks for all of the card-edge connections on the modules. It also provides access to a module’s circuit board for detailed troubleshooting.

RECOMMENDED SPARES

There are no recommended spare parts for the Integrator Module.

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

---

CONNECTION DIAGRAM

Terminal Strip on Series 380 rack enclosures.

1

2

3

NC

4

5

NC

6

NC

7

8

NC

9

NC

INPUT

INPUT

(output 1 & 2)

OUTPUT

$R_L$ (Note 3)

NOTES:

1. ±5 Vdc or 0-4 Vdc input signals are standard. For milliampere inputs, refer to Service Instruction SD3801 for the required input conditioning resistors.

2. The negative input and output terminals are common with the cage DC power supply common.

3. Output drives an external electromechanical counter with a coil resistance of 150 Ohms or more.