



**ADTECH**  
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# LIT 56 – SIT 58

## Linear – Squared Integrator

### Instruction Manual

#### 1.0 INTRODUCTION

These instructions refer to the above model. Supplementary sheets are attached if the unit has special options or features. For detailed specifications, see page 4 or refer to the Data Bulletin. All ADTECH instruments are factory calibrated and supplied with a label detailing the calibration. Adjustments are normally not necessary. A simple check should be performed to verify calibration before installation to ensure that it matches the field requirement.

#### 2.0 GENERAL DESCRIPTION

The ADTECH LIT 56 is a Linear Integrator that accepts an input signal of 1-5 vdc or 4-20 ma dc and converts it into a variable pulse rate output proportional to the input.

The ADTECH SIT 58 is a Squared Integrator that accepts an input signal of 1-5 vdc or 4-20 ma dc frequently from a D transmitter and converts it into a variable pulse rate output proportional to the square root of the input.

The output range is 0-10 to 0-70,000 pulses per hour full scale minimum; 50 millisecond pulse width nominal. A reed or mercury wetted relay contact output is optional.

#### 3.0 INSTALLATION

The instrument is supplied in a general purpose enclosure as standard. NEMA 4, 7 or 12 and plug in chassis enclosures are optionally available. Installation area/location must agree with the supplied instruments including operating temperature and ambient conditions.

##### Mounting

Refer to the appropriate outline drawing for mounting and clearance dimensions. The instrument is surface mounted with two #10-32 screws on 8.00 inch centers.

##### Electrical Connections

The wire used to connect the instrument to the control system I/O should be a twisted pair(s) and sized according to normal practice. Shielded cable is not normally necessary (if used, the shield must be grounded at the input negative of the ADTECH instrument and left floating at the sensor).

A 12 position barrier terminal block with #6-32 screws and 3/8" spacing is provided for I/O and power connection. A housing ground terminal marked G is also provided.

##### Controls

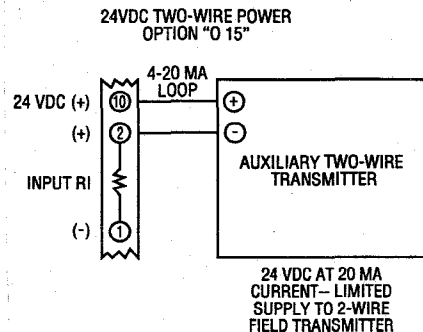
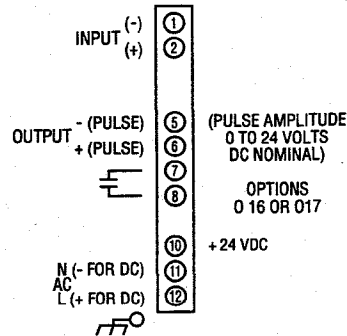
Multiturn ZERO, RATE and DROPOUT controls are provided to calibrate the instrument. The multiturn controls are accessible through the instrument front panel and are clearly marked for ease of use.

#### 4.0 MAINTENANCE

These instruments are electronic and require no maintenance except periodic cleaning and calibration verification. If the unit appears to be mis-operating it should be checked as installed per section 6.0 or removed for a bench check per sections 6.0-7.0. MOST problems are traced to field wiring and/or associated circuits. If the problem appears to be with the instrument, proceed to sections 6.0 and 7.0.

#### 5.0 CONNECTIONS

Standard connections are shown below and on the instrument face plate, Data Bulletin or on attached supplementary sheets.



## 6.0 CALIBRATION

To perform a calibration check or re-calibration of these alarms follow this procedure.

- A. Make sure the unit I/O wiring is properly connected and that the correct power source per the label is also connected. The alarm must be at normal power for a minimum of 2 minutes before proceeding to B.
- B. The input signal source(s) must be adjustable from 0 to 100% in steps of 10% or at least 25%. The source(s) should be either precalibrated or an accurate meter must be used to monitor the input(s).
- C. The output may be monitored with an electronic frequency meter or pulse counter that can accept pulses up to 30 vdc amplitude.
- D. Set the input source to 10% of the input span and adjust the multiturn potentiometer marked ZERO to provide 10% of the span output pulse rate (31.62% for SIT 58).
- E. Set the input source to the maximum input value and adjust the multiturn potentiometer marked RATE to provide the maximum output calibrated pulse rate.
- F. Repeat steps D and E until the readings are within calibration.

NOTE: If the output pulse rate is very slow, count the number of pulses over a suitably longer period of time (e.g.) 10 seconds or 1 minute.

- G. The instrument should now be checked at 25-50-75% of input signal. For the SIT 58, use the I/O Relation Table in Section 8.0.
- H. To adjust the Drop Out set the input signal at the desired drop out level and adjust the multiturn potentiometer marked DROPOUT CW until the pulses just stop.
- I. This completes the calibration.

### NOTE:

If recalibration to a different input and/or output signal is required, proceed to the tables listed under Section 8.0.

## 6.1 RECALIBRATION TO A DIFFERENT RANGE

- A. Remove the instrument from the housing to gain access to Test Point TP1 and jumpers J11, 12, 13, 14 and 15 following normal safety and equipment precautions.
- B. Solder in the four jumpers J11, 12, 13 and 14 and open J15.
- C. From the Output Range table in Section 8.0 determine the ratio for the range next higher than the desired pulses/minute (e.g.) for 95 pulses per minute the closest range is 100 CPM and the ratio is 2048.
- D. Set the input source to the minimum calibration input signal and adjust multiturn potentiometer marked ZERO to provide 0.000 vdc at TP1 with reference to Terminal #1.

## 7.0 FIELD TROUBLE SHOOTING GUIDE

This section offers a simple, first level trouble-shooting aid for an apparent instrument malfunction.

### SYMPTOM      CORRECTIVE ACTION

- |           |  |
|-----------|--|
| No output | <ol style="list-style-type: none"> <li>1. Check the input and output connections carefully.</li> <li>2. Check that the power supply polarity is correct and that power is present on the instrument terminals.</li> <li>3. Check that the input source(s) is correct and that it changes magnitude between zero and full scale values when so adjusted.</li> </ol> |
|-----------|--|

All external checks are complete. Problem seems to be internal.

The following information is provided for a qualified technician or serviceman as check points for use in internal troubleshooting.

<u>CHECKPOINT/ COMPONENT</u>	<u>VOLTAGE/ RANGE</u>
(across) C3, C10	11 ± 0.6 vdc
(across) C22	26 ± 4 vdc
(across) C23	12 ± 0.6 vdc
(across) VR3	6.9 ± 0.35 vdc
from Term #1 to TP1	0-7.5 vdc
from Term #1 to Q3-base	0.69 vdc pulses

- E. Set the input source to the maximum calibration input and adjust the multiturn potentiometer marked RATE to provide the following calculated frequency output at terminals 6(+) 5(-).

$$\text{Freq} = \frac{\text{Desired Pulses/min} \times \text{Ratio}}{60}$$

$$\text{(e.g.) Freq} = \frac{95 \times 2048}{60} = 3242.66 \text{ Hz}$$

- F. From the Range table, note the status of jumpers J11, 12, 13, 14 and 15 corresponding to the range selected.
- G. Delete or add the appropriate jumper(s) (J11, 12, 13, 14 and 15). This will bring the output pulse rate down by the ratio number.
- H. Check the output pulse rate at 25-50-75% of the range. For the SIT 58 use the I/O Relation Table given in Section 7.0.
- I. This completes the calibration.

## 8.0 TABLES, PCB LAYOUT

**INPUT TABLE**

INPUT SIGNAL FULL SCALE	INPUT SHUNT RI
50 ma dc	100 ohm, 1/2 W
20 ma dc	250 ohm, 1/2 W
10 ma dc	499 ohm
1 ma dc	4.99K ohm
10 vdc	See Note 1
5 vdc	None

All selected resistors are 1%, M.F., 1/4 W, 50 PPM, unless otherwise noted.

NOTE 1: R54 = 150 K,  
R53 = 100 K

NOTE A: Components as shown may or may not be present on the p.c. board due to design updates or options.

**OUTPUT TABLE**

PULSES/MINUTE	J15	J14	J13	J12	J11	(RATIO)
1600	-	X	-	-	-	128
800	-	-	X	X	X	256
400	-	-	X	X	-	512
200	-	-	X	-	X	1024
100	-	-	X	-	-	2048
50	-	-	-	X	X	4096
25	-	-	-	X	-	8192
12	-	-	-	-	X	16384
6.0	-	-	-	-	-	32768
3.0	X	-	X	X	X	65536
1.6	X	-	X	X	-	131072
0.8	X	-	X	-	X	262144
0.4	X	-	X	-	-	524288
0.2	X	-	-	X	X	1048576
0.1	X	-	-	X	-	2097152

(X) = Present (-) = Absent

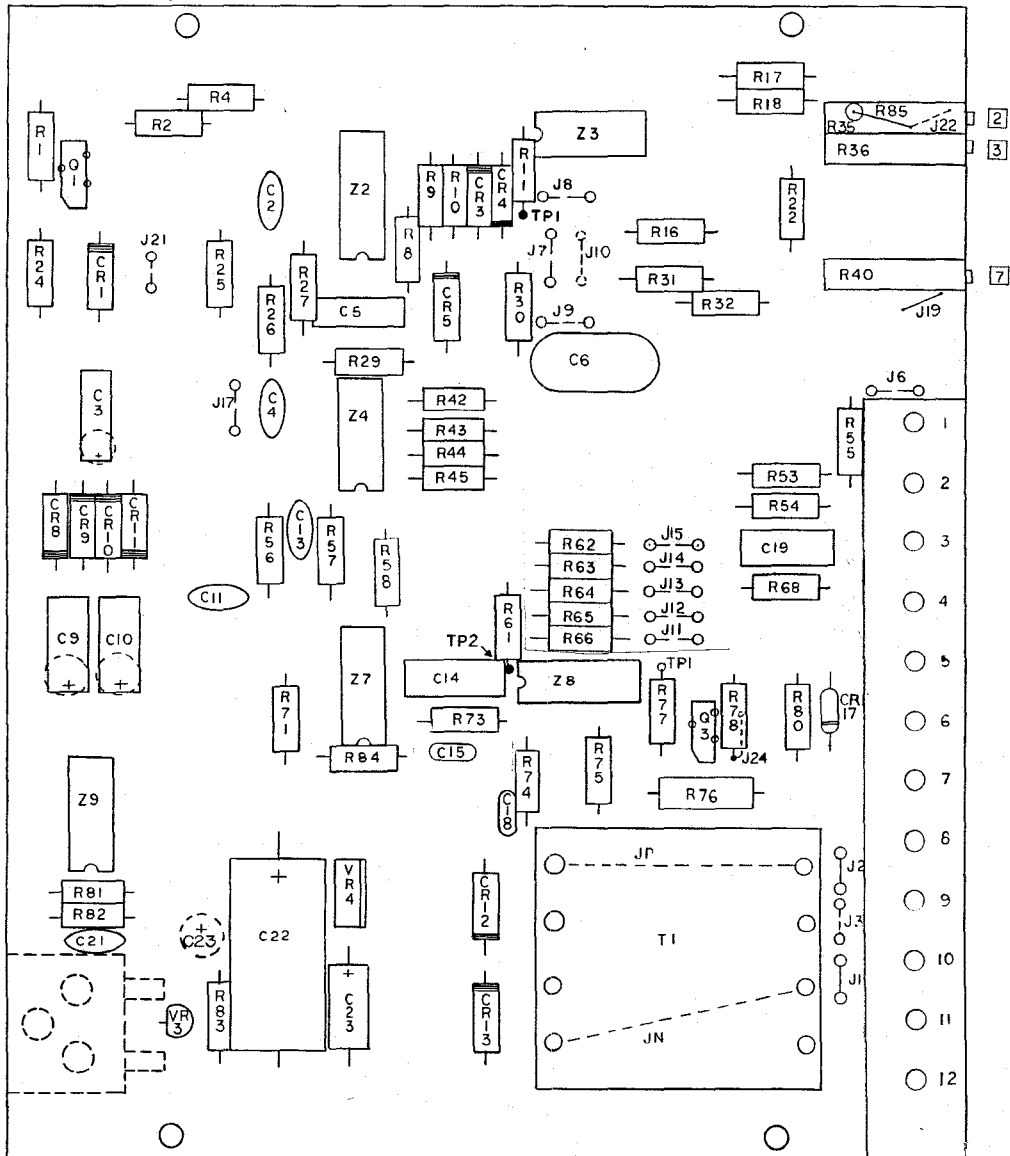
**SIT 58**

**INPUT/OUTPUT RELATION**

% INPUT	% OUTPUT
1.00	10.00
10.00	31.62
20.00	44.72
40.00	63.24
60.00	77.46
80.00	89.44
100.00	100.00

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RI = R55



## 9.0 SPECIFICATIONS

### INPUT/OUTPUT

#### INPUT SIGNALS

- 4-20 ma dc (Z in 250 ohms)
- 10-50 ma dc (Z in 100 ohms)
- 0-1 ma dc (Z in 5K ohms)
- 0-10 ma dc (Z in 500 ohms)
- 1-5 vdc (Z in 10 megohms)
- 0-5 vdc (Z in 10 megohms)
- 0-10 vdc (Z in 100K ohms)
- Other zero based current and voltages available
- Low impedance current inputs, 1/10 standard (Option I 18)

#### OUTPUT SIGNALS

- Output pulse rate 0-10 to 0-70,000 per hour full scale
- 24 vdc nominal into 100  $\Omega$  minimum, 50 millisecond pulse width nominal
- Voltages lower than 24 vdc: Specify (Option O 21)
- 10 to 1,000 counts per second output: (Option O 59)

### PERFORMANCE

- Calibrated Accuracy:**  $\pm 0.1\%$
- Linearity:**  $\pm 0.1\%$  maximum,  $\pm 0.04\%$  typical
- Repeatability:**  $\pm 0.05\%$  maximum
- Temperature Stability:**  $\pm 0.01\%/^{\circ}\text{F}$  maximum,  $\pm 0.004\%/^{\circ}\text{F}$  typical
- Load Effect:** Not applicable
- Response Time:** 150 milliseconds
- Temperature Range:** 0° to 140°F (-18° to 60°C) operating  
-40° to 185°F (-40° to 85°C) storage
- Power Supply Effect:**  $\pm 0.05\%$  for a  $\pm 10\%$  power variation

Note: All accuracies are given as a percentage of span

### POWER

- 115 vac:  $\pm 10\%$ , 50/60 Hz, 3 watts, 0.7 Pf (standard)
- 24 vdc:  $\pm 10\%$  non-isolated, 3 watts (Option P1)
- 24 vdc:  $\pm 10\%$  isolated, 3 watts (Option P2)
- 48 vdc:  $\pm 10\%$  isolated, 3 watts (Option P3)
- 125 vdc: Nominal (105-140 vdc) isolated, 3 watts (Option P4)
- 230 vac:  $\pm 10\%$ , 50/60 Hz, 3 watts, 0.7 PF (Option P5)

## 10.0 OUTLINE & MOUNTING

