



SERVICE MANUAL

BITRONICS



TRANSDUCER DISPLAY

INPUT OPTIONS

| | | |
|-----|-------|-----------------------------|
| No. | DOT11 | 4 - 20 mA dc INPUT OPTION |
| No. | DOT12 | 0 - 10 V dc INPUT OPTION |
| No. | DOT13 | OFFSET VOLTAGE INPUT OPTION |
| No. | DOT14 | OFFSET CURRENT INPUT OPTION |

CERTIFICATION

Bitronics, Inc. certifies that the calibration of its products are based on measurements using equipment whose calibration is traceable to the United States National Institute of Standards Technology (NIST).

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INSTALLATION AND MAINTENANCE

Bitronics' products are designed for ease of installation and maintenance. As with any product of this nature, however, such installation and maintenance can present electrical hazards and should only be performed by properly trained and qualified personnel.

WARRANTY AND ASSISTANCE

All Bitronics Single Phase True RMS instruments are warranted for one year against defects in materials and workmanship under normal use and service. Obligation under this warranty is limited to repairing or replacing, at Bitronics' factory, any part or parts which Bitronics' examination shows to be defective. There are no other warranties, obligations, liabilities for consequential damages, or other liabilities on the part of Bitronics except the warranty covering the repair of defective materials or workmanship. The warranties of merchantability and fitness for a particular purpose are expressly excluded.

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1.0 DESCRIPTION

1.1 Introduction

The most common configuration of Bitronics Transducer Display Instruments provides a scalable display with an input signal of zero to ± 1 mAdc. The instruments can also be factory configured to display a scalable signal on the basis of an input voltage or an offset input voltage or current. Typical examples include the following:

- o Scale and display 0 to 9999 with an input signal of 0-10 Vdc.
- o Scale and display 59.00 to 61.00 Hz with an input of 0-1 mAdc.
- o Scale and display 0 to 9999 with a 4-20 mAdc input signal.
- o Scale and display 90 to 150.0 with an input of 0-1 mAdc.

Other configurations are possible, but the factory should be consulted regarding the availability of instruments for special applications.

1.2 Features

Nearly all of the basic features of the family of Transducer Instruments are retained, including:

- o High accuracy, 4-1/2 digit LED displays with selectable decimal point.
- o Adjustable scaling and offset.
- o Interchangeable display modules (among a configuration type).
- o -20C to 70C operating temperature range.
- o Electrically isolated dual or single display models.
- o Attractive, durable metal 4" round housing.

2.0 PRINCIPLES OF OPERATION

Refer to the main Operator's Manual and its Appendices for a detailed description of the operation of the Bitronics Transducer Display Instruments. Only minor changes to the basic configuration are needed to accommodate a variety of slowly varying input signals. All modifications are made to the "front end" of the instrument, where the input signals are scaled by means of fixed and variable voltage dividers and load resistors.

Referring to Figure 1, the input signal is further scaled by means of the GAIN potentiometer VR1, so that a given input signal level produces the desired value on the instrument's digital display. Excellent linearity is maintained across the full range of input signal levels, provided the signal level measured at input pin 10 (IN HI) of the 7135 analog-to-digital (A/D) converter does not exceed approximately 2.0 Vdc.

Instruments configured to provide offset adjustment capability (including 4-20 mA dc units) use the 10K OFFSET potentiometer VR2 to provide an offsetting voltage to input pin 9 (LO input) of the 7135 A/D converter. The 7135 A/D converter operates on the differential voltage between the input pins 9 and 10. Therefore, if an offset voltage, V_{os} , is applied to pin 9 of the 7135, the output of the A/D converter will be negative until the voltage at pin 10 exceeds V_{os} . The offset voltage is obtained by dividing down, by means of resistor VR2 the extremely stable voltage obtained from the voltage reference U14.

3.0 CALIBRATION

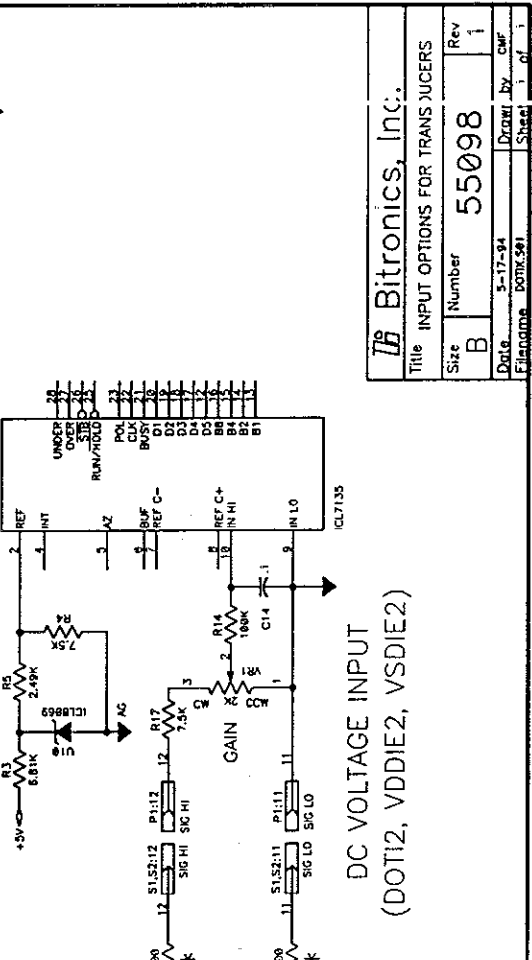
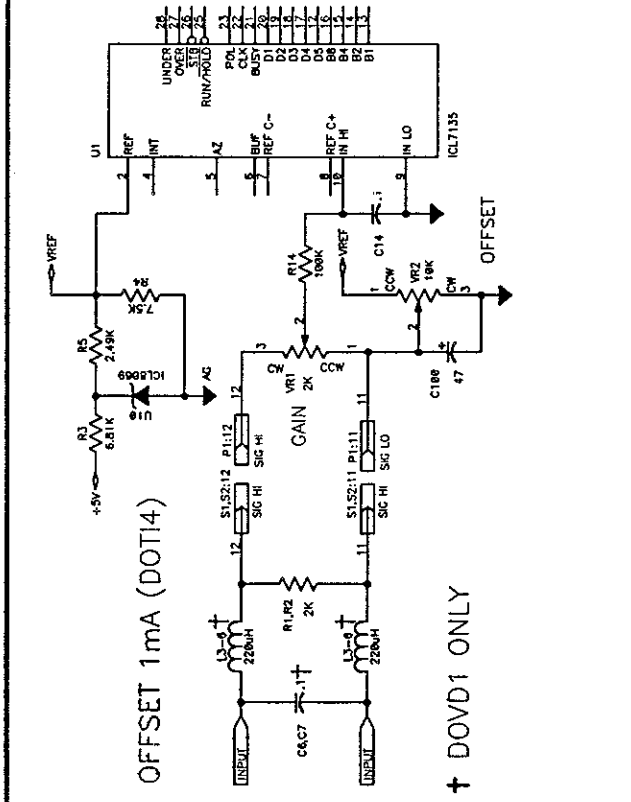
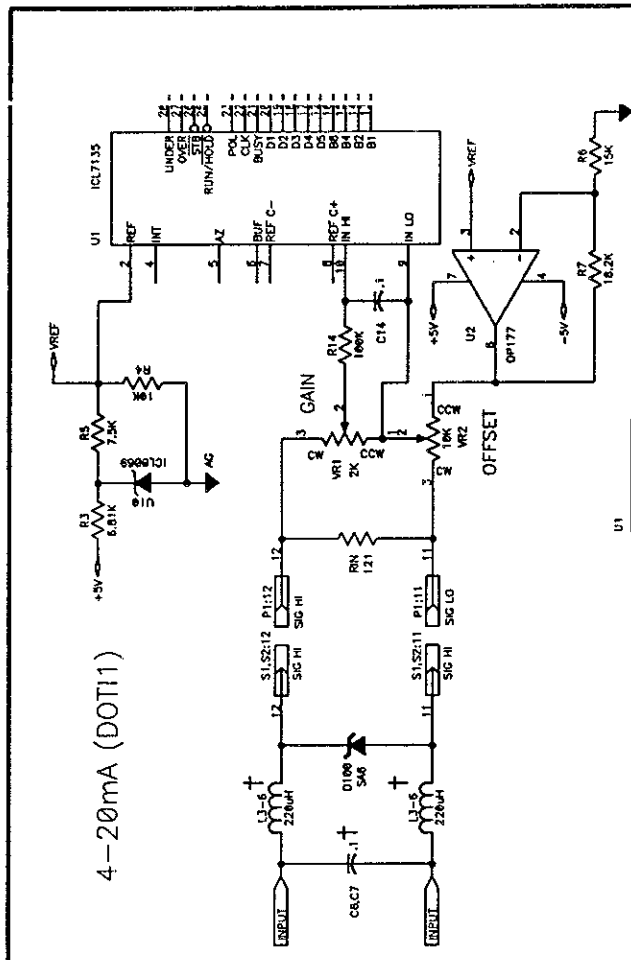
All instruments contain a GAIN adjustment potentiometer, VR1, accessed through the hole in the front panel of the display module of the instrument. All instruments also contain a second potentiometer, VR2, located near the right rear of the display module. **NOTE THAT VR2 DOES NOT PERFORM THE SAME FUNCTION IN ALL INSTRUMENTS.** See the following Sections.

3.1 Voltmeters Not Equipped with Offset Adjust

Routine recalibration is not required. In the case of an instrument with no offset requirements, let the instrument warm up for at least 5 minutes so that it is stabilized. Apply a dc voltage, using an accurate calibrator, to the input terminals. Set the calibration signal to the value corresponding to the desired full scale of the transducer display. Adjust potentiometer VR1 (accessed through the hole in the front face of the display module) so that the instrument displays the full scale value. Check linearity by applying an input signal corresponding to half-scale on the instrument. If the value displayed at half-scale is 50% of the full scale value, the instrument is functioning as designed. Alter decimal point jumpers if required.

3.2 Voltmeters and Milliammeters Equipped with Offset Adjust

Procedures are similar to that described in Section 3.1, except that potentiometer VR1 (accessed through the hole in the front of the display module) is used to adjust the GAIN of the instrument, and VR2 (the vertical potentiometer near the back, rear corner, is used to adjust the OFFSET of the instrument. It is necessary to remove the case tube of the instrument to fully calibrate these configurations. First short out the signal input terminals and adjust the VR2 to obtain the required display value with "zero" input signal. Then, using an accurate dc calibrator, apply a signal corresponding to full scale signal, and adjust VR1. Check a third point (may be a negative input value) to verify linearity, keeping in mind the linearity limitations of the calibration equipment. Alter decimal point jumpers if required.



| INPUT | OPTION | R100 | C6, C7? |
|-----------|--------|-------|---------|
| 150Vdc | V?DIE2 | 82.5K | NO |
| 10Vdc | DOT12 | 7.87K | YES |
| 4-20mA | DOT11 | --- | NO |
| 60Hz | DOT14 | --- | NO |
| 1 mA EXT. | DOT14 | --- | NO |

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