User's Guide

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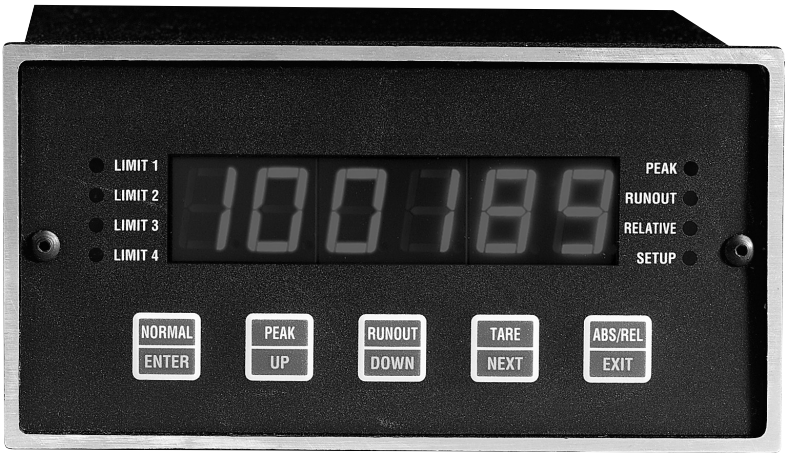

DP7700 SERIES
Dual Input Voltmeter

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TABLE OF CONTENTS

SPECIFICATIONS 1

DESCRIPTION 4

SWITCH FUNCTIONS 4

LED INDICATORS 5

SETUP 6
- Limit Programming. 7
- Limit One Delay 7
- Decimal Point Position 8
- Filter Setup. 8
- Baud Rate Selection. 8
- Echo Setup 8
- Linefeed Setup 8
- Unit Address Setup 8
- Legend Setup 8
- Continuous Update 9
- Device Code 9
- Serial Command 9

CALIBRATION. 9
- Protection Code 10
- Protection Code Programming. 10
- Channel Selection Programming 10
- Span Number Programming 10
- Dead Weight Zero 10
- Dead Weight Stay 10

SERIAL COMMUNICATIONS 11
- Echo 12
- Line Feed 13
- Address Enable 13
- Address Disable 13
- Read Display 13
- Set Limit 13

TABLE OF CONTENT

Peak and Runout 13
Remote Tare 13
Test Message 14
Continuous Reading 14
Set Legend 14
Remote Serial Command 14
Decimal Position 14
Reading Mode 15
Absolute or Relative 15
Set Filter 15
Calibration Span Number 15
Serial Reading Mode 15
Limit Mode 15

REMOTE INPUTS 16

INPUT CONNECTIONS 17

DP7700 BACK VIEW 17

DP7700 RANGE SETTINGS 17

DP7700 REAR TERMINATIONS and HOOKUP 18, 18a 18b, 18c, 18d

SCHEMATIC (DP7700 Top Board) 19

SCHEMATIC (DP7700 Bottom Board) 22

SCHEMATIC (DP7700 Analog Input Option Board) 24

SCHEMATIC (DP7700 Output Option Board) 25

SCHEMATIC (DP7700 RS232/RS485 Option Board) 26

DIMENSIONS 27

MOUNTING & WARRANTY 28

SPECIFICATIONS

Accuracy:

- ±.01% of reading (1 counts of A/D @ 25°C. Temperature coefficient 50ppm/degree Celsius.

Display:

- -32768 to +32767 with programmable decimal points.
- .56" Red LED

NMRR:

- 70db

A/D Converter:

- 16 bits (65,536 counts) 1,000 reading per second maximum.

Input Analog Filter:

- 4 pole active anti-alias
- 500Hz cutoff on single channel unit, 250Hz cutoff on dual channel unit.

Rollover Error:

- ±50 NA maximum, (100 pA/C (per input channel)

Input Bias Current:

- ±50 NA maximum, (1200pA/C (per input channel)

Input Impedance:

Range	Input Impedance
±200mVDC	$10^{12}\Omega$
±5VDC	1MΩ
±10VDC	1MΩ
4 - 20mA	10Ω

Excitation:

- ±15VDC, ±.5VDC @ 50mA

Range Selection:

- Selectable by DIP switch on rear of unit.

Calibration:

- Digital calibration via front panel switches
- No potentiometer adjustments
- Calibration switches can be disabled with access code to prevent unauthorized access to calibration parameters.

Front Panel Controls:

- Five push button switches for programming digital filter, offset, span, limits and recall of peak reading or run out from storage.

Channels:

- One channel standard with second channel optional.

Reading Rate:

- Limited to 1000 per second divided by number of channels.

Digital Filter:

- Programmable cutoff frequency 1Hz to 500Hz.
- Display updates 3 time per second.

Peak Detector:

- Update at rate selected by digital filter. Peak is normally stored in memory and recalled via front panel switch, over the serial interface or by selecting peak detect display mode on rear connector. If peak display mode is selected an internal timer can be programmed to give limit #1 output up to 100 seconds after a programmed limit is reached. This output can be used to reset the peak reading by tying limit #1 output to remote input.

Run Out Mode:

- Updated at rate selected by digital filter. Runout is normally stored in memory and recalled via front panel switch, over the serial interface, or by selecting runout display mode on rear connector. If runout display mode is selected an internal timer can be programmed to give Limit #1 output up to 100 seconds after a programmed limit is reached. This output can be used to reset the runout reading by tying Limit #1 output to remote input.

Analog Output:

- 0 - 10VDC, 0 - 5VDC, 4 - 20mA, tracks display reading.
- Voltage outputs will sink or source 1mA.
- 300V isolation between analog outputs and instrument ground
- 12 bit D/A converter updated at selected digital filter rate.

Convert/Hold Input:

- Normally high, if pulled low will hold display.
- Requires 1 millisecond positive pulse for single conversion.

Limit Outputs:

- Four isolated open collector transistor outputs rated 30VDC maximum.
- Will sink up to 50mA.
- 300V isolation between limit outputs and system ground.
- Limit #1 can be programmed to be delayed from 1 to 100 second in one second increments. Optional: Two form “A” relay contacts, rated 2.5 A @ 115VAC.

• Isolated transistor outputs not available when relays are installed. Limit 1 and Limit 2 activated the relay contacts.

I/O Method:

• Quick disconnect screw terminal block, RJ11 Jack for serial interface.

Power:

• 115/230VAC Selectable by switch on rear of unit.
• 8 watts maximum
• Optional 10-30VDC @ 600mA

Remote Inputs:

• Active low TTL compatible, 50 millisecond negative pulse required.
• Tare
• Display peak reading
• Display run out.
• Reset peak reading or run out reading.

Operation Temperature Range:

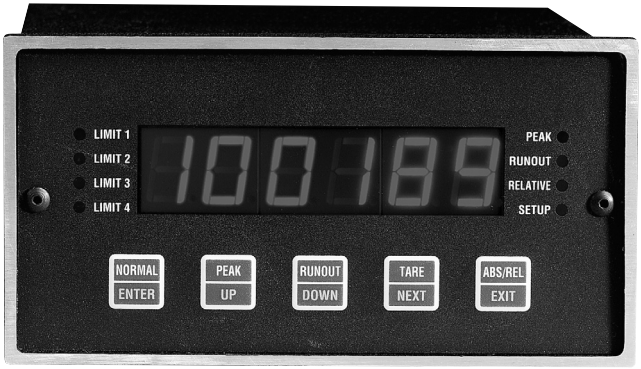
• -20°C to +60°C

Serial Interface:

• ASCII RS232 or RS485 compatible (optional).
• 300V isolation to system ground.

Options:

• -S2	ASCII RS232 serial interface
• -S4	ASCII RS485 serial interface
• -Dual	Second input channel
• -A05	Analog output 0 - 5VDC
• -R	Two relay outputs rated at 2.5A @ 115VAC, These relay outputs take the place of the open collector outputs.
• -DC$^{9}/_{18}$	9-18VDC @ 600mP
• -DC$^{18}/_{36}$	18-36VDC @ 500mA



DESCRIPTION:

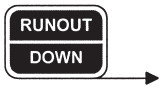
The Model DP7700 is a new high speed, high resolution panel meter that has the power of a small stand alone computer. The unit can perform 1000 conversions per second with 65000 counts of accuracy. It has an optional two channels 500 times per second. It can detect and store a peak reading or the difference between the peak and valley reading. Limits are programmable via the five front panel switches as well as the span and gain setting. Tare (zero) of up to 50% is done via a single front panel switches can be disabled to prevent unauthorized access and violation of calibration of unit.

SWITCH FUNCTIONS:

There are five switches located behind the front lens of the model DP7700. The front panel switches appear as shown below. The text located at the top half of each switch (i.e., NORMAL, PEAK, RUNOUT, TARE, ABS/REL) indicates that particular switch's function when the unit is in data acquisition and display mode. The text located in the lower half (i.e., ENTER, UP, DOWN, NEXT, EXIT) indicates the switch's function during setup and calibration. A complete description of each switch is as follows:

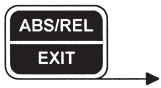
Data Acquisition & Display
: Press to set the display mode for actual reading.
Setup & Calibration Modes
: Press to record a complete setting and advance to the next setup.

Data Acquisition & Display
: Press to set the display mode for peak.
Setup & Calibration Modes
: Press to increment the digit/parameter being set.



Data Acquisition & Display
: Press to set the display mode for runout.
Setup & Calibration Modes
: Press to decrement the digit/parameter being set.

Data Acquisition & Display
: Press to record the current reading as the tare value.
Setup & Calibration Modes
: Press to advance to the next digit to be set.



Data Acquisition & Display
: Press to toggle between absolute and relative reading mode.
Setup & Calibration Modes
: Press to exit the setup or calibration mode at any time (all prior changes are saved).

LED INDICATORS:

Limit 1 Illuminates when the display reading exceeds the set limit, and in the setup mode when establishing the limit.

Limit 2 Illuminates when the display reading exceeds the set limit, and in the setup mode when establishing the limit.

Limit 3 Illuminates when the display reading exceeds the set limit, and in the setup mode when establishing the limit.

Limit 4 Illuminates when the display reading exceeds the set limit, and in the setup mode when establishing the limit.

Peak Illuminates when the display is set in the peak mode.

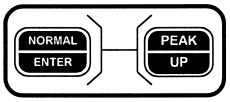
Runout Illuminates when the display is set in the runout mode.

Relative Illuminates when the display is set in the relative mode.

Setup Illuminates when the display is in the setup mode.

SETUP:

Meter setup is accomplished by using all five of the front panel switches. The setup mode is entered by pressing the Normal [Enter] and Peak [Up] switches simultaneously.



will flash on the display for a second and the setup LED indicator will illuminate. While in the setup mode, programming of the meter functions is accomplished by setting individual digits of the various parameters (with the exception of baud rate and decimal point programming). A flashing digit indicates that it is the active digit being set. The flashing digit can be incremented by pressing the UP switch; conversely, it can be decremented by pressing the DOWN switch. Once a particular digit has been set to the desired value the NEXT switch can be pressed to advance to the next

digit. Once all the digits have been set to the proper value the ENTER switch can be pressed to advance to the next parameter. At any time during the setup sequence the EXIT switch can be pressed to leave the setup mode and save the current settings. If the setup sequence is completed the unit will save all settings and automatically return to data acquisition and display mode. If a meter setup is started, and a long period (approximately 100 seconds) of inactivity is detected by the meter, the meter will return to data acquisition and display mode without saving any new settings.

Limit Programming:

All four limits are programmed in succession (1 through 4) immediately after entering the setup mode. The corresponding LED illuminates to indicate which limit is being programmed.
The limit number for each limit is programmed first. It can be set for any number within the display span (as determined by the meter calibration). How the unit will use that number for limit detection and activation is determined by the limit mode, which is programmed following the limit number.

Will indicate that you are now programming the limit operating mode. A definition of how the digits of the mode number affect operation of a limit follows:

1XX - Channel # 1
2XX - Channel # 2
X0X - High Limit
X1X - Low Limit
XX0 - Reading
XX1 - Peak
XX2 - Runout

Each limit (1 through 4) has it's own limit number and limit mode to be entered.

Limit One Delay:

The limit one delay is a programmable delay, from 0 - 100 seconds, between the time a reading exceeding the limit one number is detected and when the limit one output will be activated. Using the delay feature, the limit one output can be tied to the REMOTE RESET input on the rear of the unit to reset the peak reading so that the next peak can be properly detected in a process sequence.

Decimal Point Position:

The calibration span number is displayed with the decimal point shown in its selected position. The decimal point can be moved across the display to the desired position using the UP and DOWN switches.

Filter Setup:

FiLtEr The digital filter determines the rate at which the limits are checked for output activation, peak/runout tracking, and analog output updates. The digital filter is programmable from 1 to 500Hz. When stability is more an issue than speed the filter should be set closer to 1Hz; conversely, when quick detection and activation is more important the filter should be set closer to 500Hz. Note: Unless the serial option is installed, the setup sequence is now finished and the unit will return to acquisition and display mode.

Baud Rate Selection:

bAUd Program the desired baud rate using the UP or DOWN switches to toggle through the available settings (300, 600, 1200, 2400, 4800, 9600, 19200, and 38400). Once the proper baud rate is selected press the ENTER switch to advance to the next setup.

Echo Setup:

ECHO The model DP7700 can be programmed to automatically re-transmit (echo) characters received on its serial communications input. A value of one enables the echo feature; conversely, programming a zero will disable it.

Linefeed Setup:

LF The unit can be programmed to transmit linefeed characters in addition to the carriage return that is transmitted at the end of data strings. Programming a one will enable transmission of linefeed characters, while programming a zero will prevent their transmission.

Unit Address Setup:

u Addr Multiple DP7700 units can be networked together on a serial bus using the addressing capability of the unit. Each unit can have a unique address from 0 to 250 (Note: 0 disables the address feature since the unit will respond to all incoming commands/queries).

Legend Setup:

LEGEnd The DP7700 can append a user selectable engineering units string to readings transmitted from the unit. This feature allows direct terminal readout in engineering units, or easier unit identification in multi-unit applications. Program the legend number to the number corresponding with desired units as shown in the following table.

Legend Table	
0 - No Legend	4 - kpa.
1 - lbs.	5 - mV.
2 - kgs.	6 - mA.
3 - psi.	7 - V.

Continuous Update:

EU The model DP7700 can be programmed to automatically transmit the display reading at selectable time intervals. The update interval can be programmed from 20 times per second (-1) up to a maximum of 3600 seconds (3600). A value of zero disables the automatic update function.

Device Code:

dC A non-printable device code allows units to take turns on a serial bus when daisy chained to a printer or some other data recording device. A value of one enables transmission of the device code following the reading string; conversely, a value of zero disables transmission of the device code.

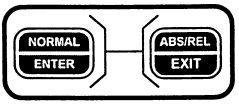
Serial Command:

SC A serial command can automatically be executed upon receipt of a non-printable code (see device code above). A table of numbers associated with each serial command can be found in the serial communications section of the manual (on page 8). Program to the number associated with the command to be executed when the unit receives a device code character on its serial communications input.

donE

CALIBRATION:

donE The calibration mode is entered by pressing the Normal [Enter] and ABS/REL [Exit] switches simultaneously. Note: This is the only method to check or change the calibration of this unit externally.



Protection Code:

Before any calibration can be performed on the unit a unique security code must be entered. If the code is not entered correctly the unit will automatically revert to display and acquisition mode; otherwise, the user is allowed to proceed with the calibration sequence. To enter the code use the Peak[Up] or the Runout[Down] switches to enter the code any were from 0 - 255. The unit is shipped from the factory with a programmed code of 10.

Protection Code Programming:

A different protection code can be programmed at this time. The code can be anywhere in the range 0 - 255. If a new code is not required simply press ENTER to continue with the calibration sequence.

Channel Selection Programming:

The display will now show one (1) to indicate that the calibration is to be performed on channel #1 as the default. If channel number two calibration is required, select number two (2). To select the channel number use the Peak[Up] or Runout[down] switch to toggle the number. Press enter to continue with calibration.

Span Number Programming:

The span number is the display reading that is associated with the input obtained during the DEAD WEIGHT STAY portion of the calibration sequence. The span number can be programmed to a maximum of 32767 display counts.

Dead Weight Zero:

This is the zero (null) point calibration step. Set the transducer or calibrator for zero output, allow sufficient time for the reading to stabilize, then press the ENTER switch to store the new zero calibration data.

Dead Weight Stay:

This is the span point calibration step. Check to make sure that the span setting is selected to match the desired input range. Set the transducer or calibrator for full-scale output, allow sufficient time for the reading to stabilize, then press the ENTER switch to store the new span calibration data.

SERIAL COMMUNICATIONS:

With the serial communications option installed, the model DP7700 can easily be interfaced to a computer, terminal, or printer. The unit can operate in stand-alone mode or in networked applications. Both RS232 and RS485 serial communication options are available, for the DP7700. The baud rate is user selectable, and can range from 300 to 38.4K baud. The unit uses a N,8,1 character data format (no parity, 8 data bits, 1 stop bit). All data is transmitted/received as ASCII characters. Characters strings are transmitted/received with the leftmost character first and are terminated with a carriage return [CR]. Incoming linefeeds are ignored by the unit, and it is optional to have the unit transmit them. Leading zeros are acceptable for numeric data transmitted to the unit. Decimal points are ignored by the unit, and are transmitted, when required, to conform with the selected display format.
Listed below are the available commands for the model DP7700 (with the associated command numbers). Following this is a discussion of how commands are interpreted by the unit along with a brief description for each command.

1	EH	Set Echo Mode	35	PV	Set Display Mode
2	LF	Set Line Feed Mode	36	AR	Absolute or Relative
3	AE	Address Enable	37	SF	Program Filter
4	AD	Address Disable	38	SN	Calibration Span Number
5	RD	Read Display	39	NOT USED	
6	NOT USED		40	NOT USED	
7	NOT USED		41	SM	Serial Read Mode
8	S1	Set Limit One	42	LM	Limit Mode
9	S2	Set Limit Two			
10	S3	Set Limit Three			
11	S4	Set Limit Four			
12	SP	Peak and Runout			
13	NOT USED				
14	SZ	Remote Tare			
15	NOT USED				
16	NOT USED				
17	NOT USED				
18	NOT USED				
19	TM	Test Message			
20	NOT USED				
21	NOT USED				
22	CR	Set Continuous Reading Mode			
23	NOT USED				
24	NOT USED				
25	NOT USED				
26	LR	Set Legend			
27	SC	Remote Serial Command			
28	DP	Set Decimal Point Position			
29	NOT USED				
34	NOT USED				

Each DP7700 command consists of two upper-case alpha ASCII characters. In most instances, commands can be sent to the unit with a numeric value (ASCII format) attached for parameter setting. When the unit receives and executes a valid command it responds by transmitting "ok[CR]". Commands can also be sent to the unit without a parameter attached to interegate the current setting for the parameter associated with that command. In this instance, the unit responds with the equivalent lower-case characters for that particular command along with an ASCII representation for the numeric value of the parameter in question. The following is an example of a possible exchange sequence between a model DP7700 and a host computer:

Exchange 1:	HOST SENDS	: "AE0[CR]"
	DP7700 RESPONDS WITH	: "HELLO ae 0[CR]"
	(Note: The unit address is assumed to be set at zero.)	
Exchange 2:	HOST SENDS	: "RD[CR]"
	DP7700 RESPONDS WITH	: "99.99lbs[CR]"
(Note: It is assumed the display reading is 99.99 and that the legend is set for lbs.)		
Exchange 3	HOST SENDS	: "S1 1000[CR]"
	DP7700 RESPONDS WITH	: "ok[CR]"
Exchange 4	HOST SENDS	: "S1[CR]"
	DP7700 RESPONDS WITH	: "11 1000[CR]"
Exchange 5	HOST SENDS	: "AD0[CR]"
	DP7700 RESPONDS WITH	: "BYE ad 0[CR]"

Note: Remember [CR] represents a carriage return character.

The following is a list of the serial commands available on the DP7700. Each command string is shown in quotes, a parameter/number field is represented by X (first) or Y (second), the sign, where needed, is shown as a lower case s(s). A brief description is given for each command along with any particular programming instructions.

ECHO: "EH X[CR]"

The echo command allows enabling or disabling of the unit's echo feature. When the echo feature is turned on the unit automatically echo's all received characters.

X = 1 echo ON
X = 0 echo OFF

LINE FEED: “LF X[CR]”

The unit can be set to send a line feed character following each transmitted string.

X = 1 line feeds are transmitted.
X = 0 line feeds are not transmitted

ADDRESS ENABLE: “AE XXX[CR]”

The address enable command, in conjunction with the address disable command, can be used to network multiple DP7700 units. Once a unit’s address has been enabled it will respond to all incoming commands until the unit’s address is disabled. When the address enabled command is executed by a DP7700 it responds with “HELLO an XXX[CR].” Note: a unit address of zero (0) disables the addressing feature and the address enable command is not required.

ADDRESS DISABLE: “AD XXX[CR]”, or “AD[CR]”

This command disables the unit at the specified address, or when an address in not attached, all units on the network. When the command is successfully executed, the unit will respond with “BYE ad XXX[CR]”.

READ DISPLAY: “RD[C.R.]”

Requests transmission of the current DP7700 display reading. The type of reading returned (i.e. peak, runout, or current input) will depend upon the display reading mode selected. The unit will format the reading with sign and decimal point as needed.

SET LIMIT: “S# XXXXX[CR]”

Allows remote setting of the DP7700 limit numbers. The # should be replaced in the string with the number of the limit to be set (1 through 4).

PEAK AND RUNOUT: “SP[CR]”

When this command is received the peak and runout reading are then reset.

REMOTE TARE: “SZ X[CR]”

The remote tare command allows tare “capture” similar to that performed by the front panel TARE switch. When a number is attached to the command a new tare value is captured.

TEST MESSAGE: “TM[CR]”

The test message is primarily a diagnostic aid. When the test message command is received the unit will respond by outputting information particular to the model number and software version/revision.

CONTINUOUS READING: “CR XXXX[CR]”

The continuous reading command allows setting of the automatic update feature of the DP7700.

X = -1 - readings are transmitted 20 times per second
X = 0 - automatic updates disabled
XXXX = 1 - 3600 -number of seconds between updates

SET LEGEND: “LR X[CR]”

The set legend command allows a unit indicator to be attached to readings transmitted by the unit.

X = ? legend number (from the table on page 9) for reading units.

REMOTE SERIAL COMMAND: “SC X YY[CR]”

In data logging applications, involving several units daisy-chained together, a problem arises when it is desired to have several units automatically transmit readings at the same time interval (since contention could result in scrambled data at the printer). To compensate for this, the model DP7700 allows unit to “take turns” on the same serial bus. This is done by enabling transmission of a special non-printable character at the end of a reading string; which, when received by the following unit will cause it to execute a serial command (RD would be most common). The second unit can have the device code enabled and so on. **Note: all units should have the echo function enable so that messages will pass along to the following units in the chain.**

DECIMAL POSITION: “DP X[CR]”

The display decimal point can be positioned using this command.

X = 0 88888 (no decimal point)
X = 1 8888.8
X = 2 888.88
X = 3 88.888
X = 4 8.8888
X = 5 .88888

READING MODE: “PV X[CR]”

The display reading mode can be set using this command.

X = 0: Display is set for reading only
X = 1: Display is set for peak
X = 2: Display is set for runout

ABSOLUTE OR RELATIVE “AR X[CR]”

Allows changing of the display mode between absolute and relative.

X = 0 Absolute measurement only (tare is disabled)
X = 1 Relative measurement (tare enabled)

SET FILTER “SF XXX[CR]”

The set filter command can be used to remotely set the rate at which limit detection, peak/runout tracking, and analog output updates are performed.

XXX = 1 - 500 (Hz)

CALIBRATION SPAN NUMBER “SN X YYYY[CR]”

X = Channel number (1 or 2)
YYYY = Calibration span number

SERIAL READING MODE “SM X[CR]”

X = 0 : Serial read outputs channel #1 (display reading)
X = 1 : Serial read outputs channel #2 reading
X = 2 : Serial read outputs channel #2 peak
X = 3 : Serial read outputs channel #2 runout

LIMIT MODE “LM X N[CR]”

X = Limit number
N = Limit mode, bit defined as follows:

Normal - 01	HEX	
Peak	- 02	HEX
Runout	- 03	HEX
Channel #2	- 04	HEX
High limit	- 08	HEX

Example: Assume we want a high limit, normal (reading), active on channel one; then, YY = 01 OR'ed 08 = 09 HEX (NOTE: unlike most serial command parameters, this is not ASCII).

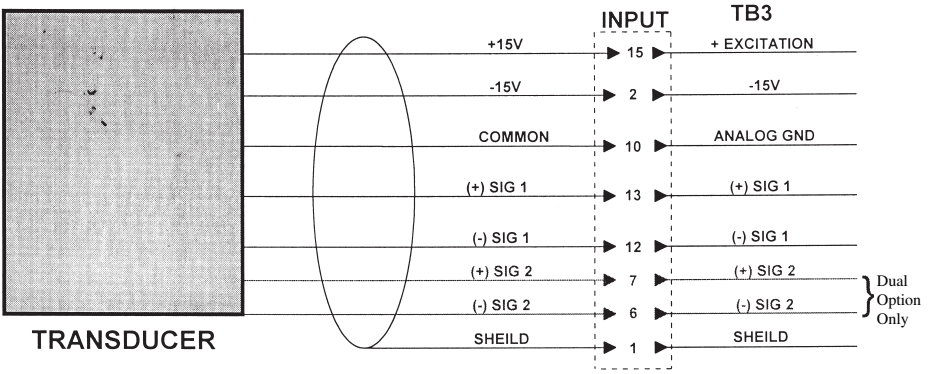
REMOTE INPUTS:

Seven logic level, active-low, remote inputs are located on the rear of the unit for interfacing to programmable logic controllers etc.. The remote inputs can be used to duplicate many of the front panel switch functions of the unit. A brief description of each input follows below:

NORMAL MODE	(remote input #1) -	sets the display mode to reading only.
DATA REQUEST	(remote input #2) -	requests a serial transmission of the display reading
RESET P/R	(remote input #3) -	resets the peak and runout readings
DATA HOLD	(remote input #4) -	A/D samples are ignored while this input is active
RUNOUT MODE	(remote input #5) -	sets the display mode to runout
PEAK MODE	(remote input #6) -	sets the display mode to peak
CAPTURE TARE	(remote input #7) -	sets the tare value to the current display reading

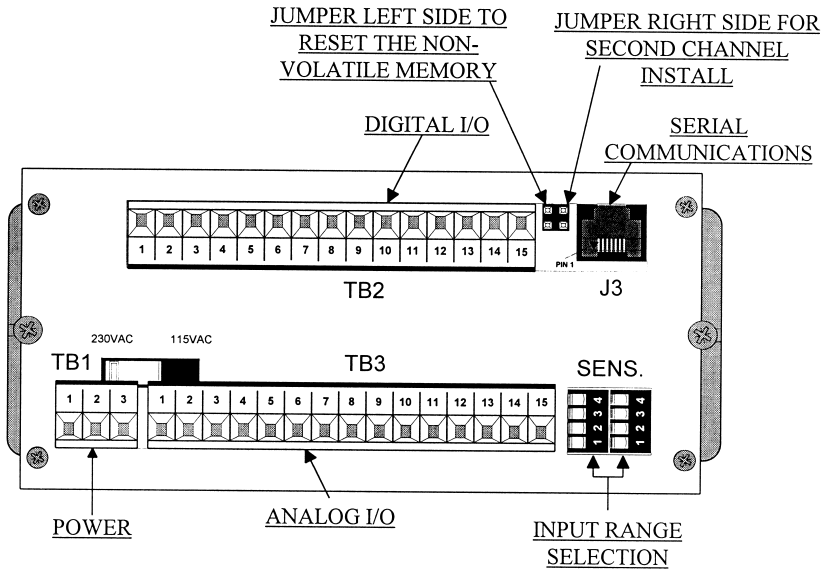
All remote inputs must be active for a minimum of 50mS (with the exception of DATA HOLD which only needs to be held active a minimum of 1mS for detection).

INPUT CONNECTIONS - TRANSDUCER TO TB3



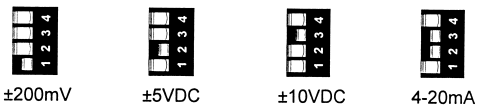
USING INTERNAL ±15VDC SUPPLY

DP7700 BACK VIEW



NOTE: ONLY ONE RANGE SELECTOR SWITCH WOULD BE INSTALLED UNLESS DUAL OPTION IS ORDERED.

DP7700 RANGE SETTINGS



DP7700 REAR TERMINATIONS

TB1 (POWER INPUT - BOTTOM BOARD)

(1) AC LINE
(2) AC NEUTRAL
(3) EARTH GROUND

TB2 (TOP BOARD)

(1) LIMIT 1
(2) LIMIT 2
(3) LIMIT 3
(4) LIMIT 4
(5) NORMAL MODE
(6) DATA REQUEST
(7) RESET P/R
(8) DATA HOLD
(9) RUNOUT MODE
(10) PEAK MODE
(11) CAPTURE TARE
(12) +5V
(13) ISOLATED POWER
(14) ISOLATED GROUND
(15) INSTRUMENT GROUND

TB3 (BOTTOM BOARD)

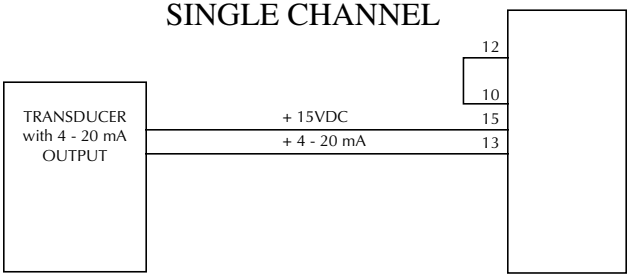
(1) SHIELD
(2) -15V
(3) ANALOG OUTPUT
(4) N/C
(5) N/C
(6) -SIGNAL2
(7) +SIGNAL2
(8) N/C
(9) N/C
(10) COMMON
(11) N/C
(12) -SIGNAL1
(13) +SIGNAL1
(14) N/C
(15) +15VDC

J3 (RJ11 - TOP BOARD)

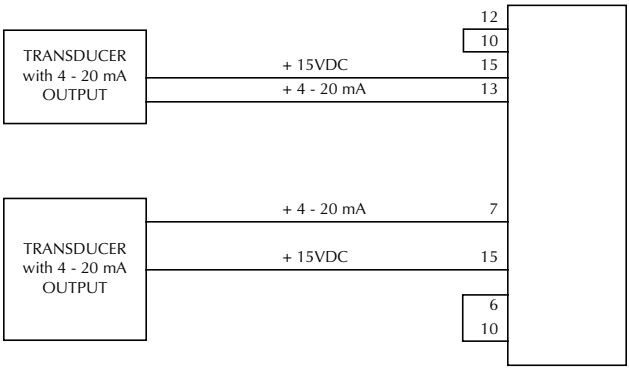
(1) RS485 SERIAL
(2) RS485 TERMINATION RESISTOR
(3) RS232 RX
(4) RS232 TX
(5) RS232 - GROUND
(6) RS485 ~SERIAL

4 - 20 mA TWO WIRE HOOKUP

SINGLE CHANNEL

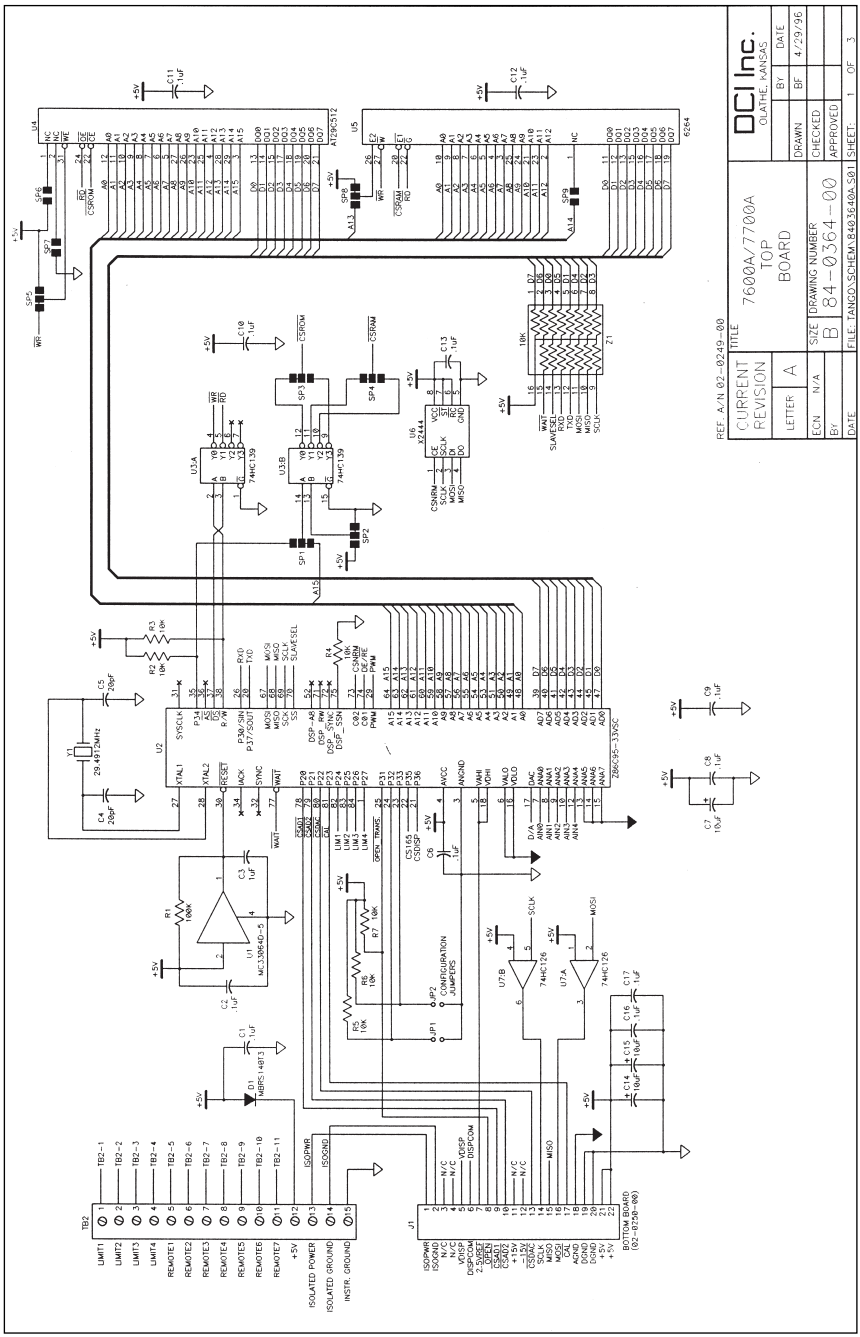


DUAL CHANNEL

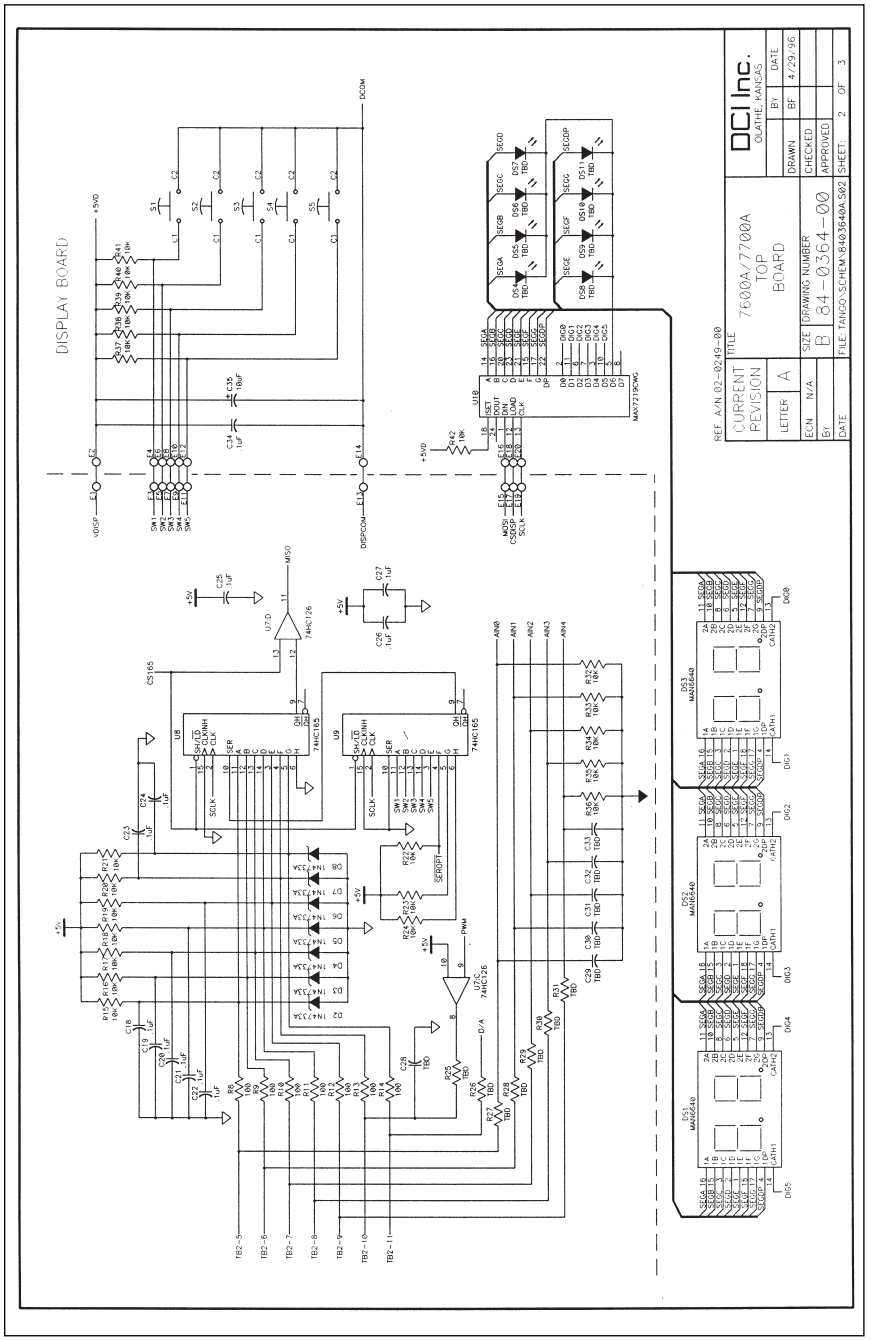


Note: (+) (-) signal input level is selectable by switch(s) on rear of unit.
Input range 0 to + 20mVDC, + 5VDC, + 10VDC, and 4-20 mA.

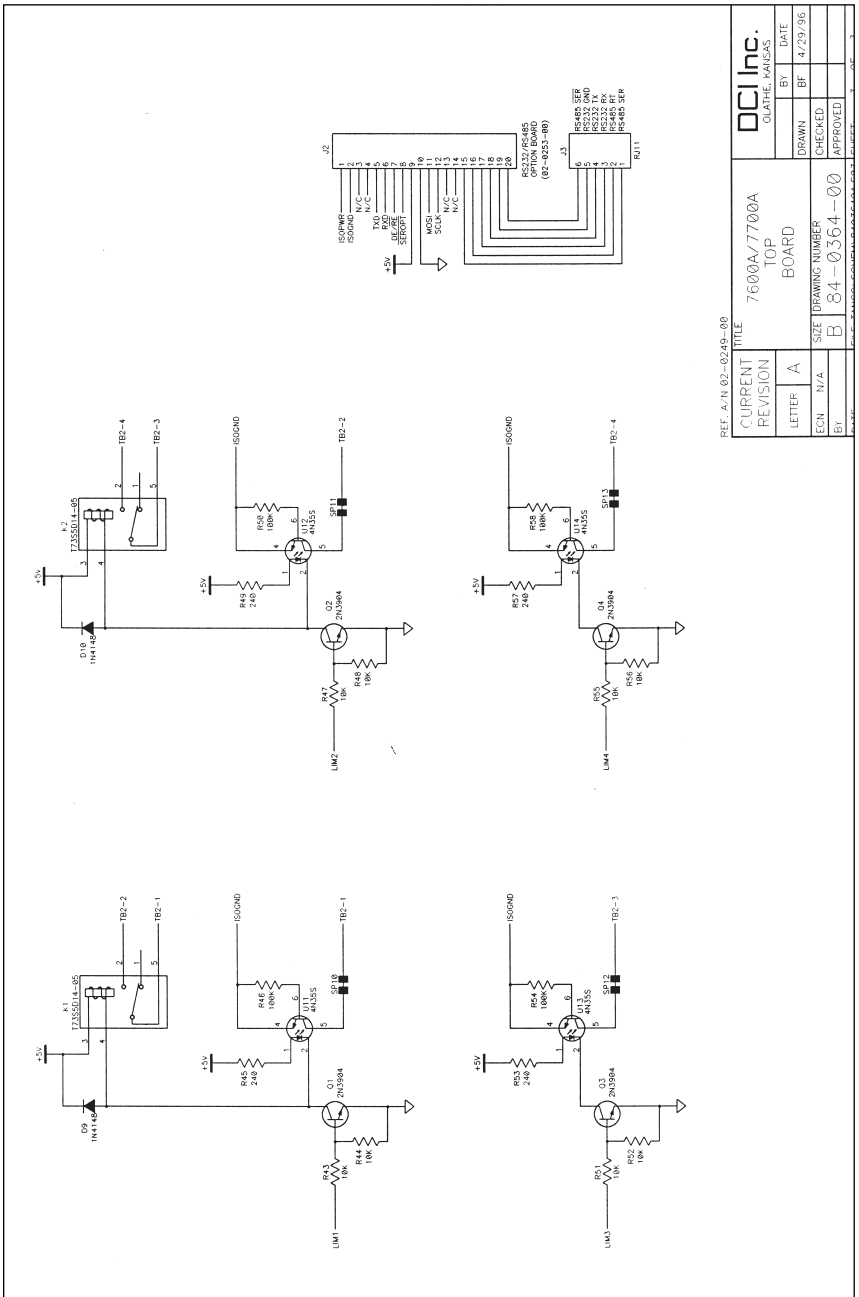
SCHEMATIC (DP-7700 Top Board)



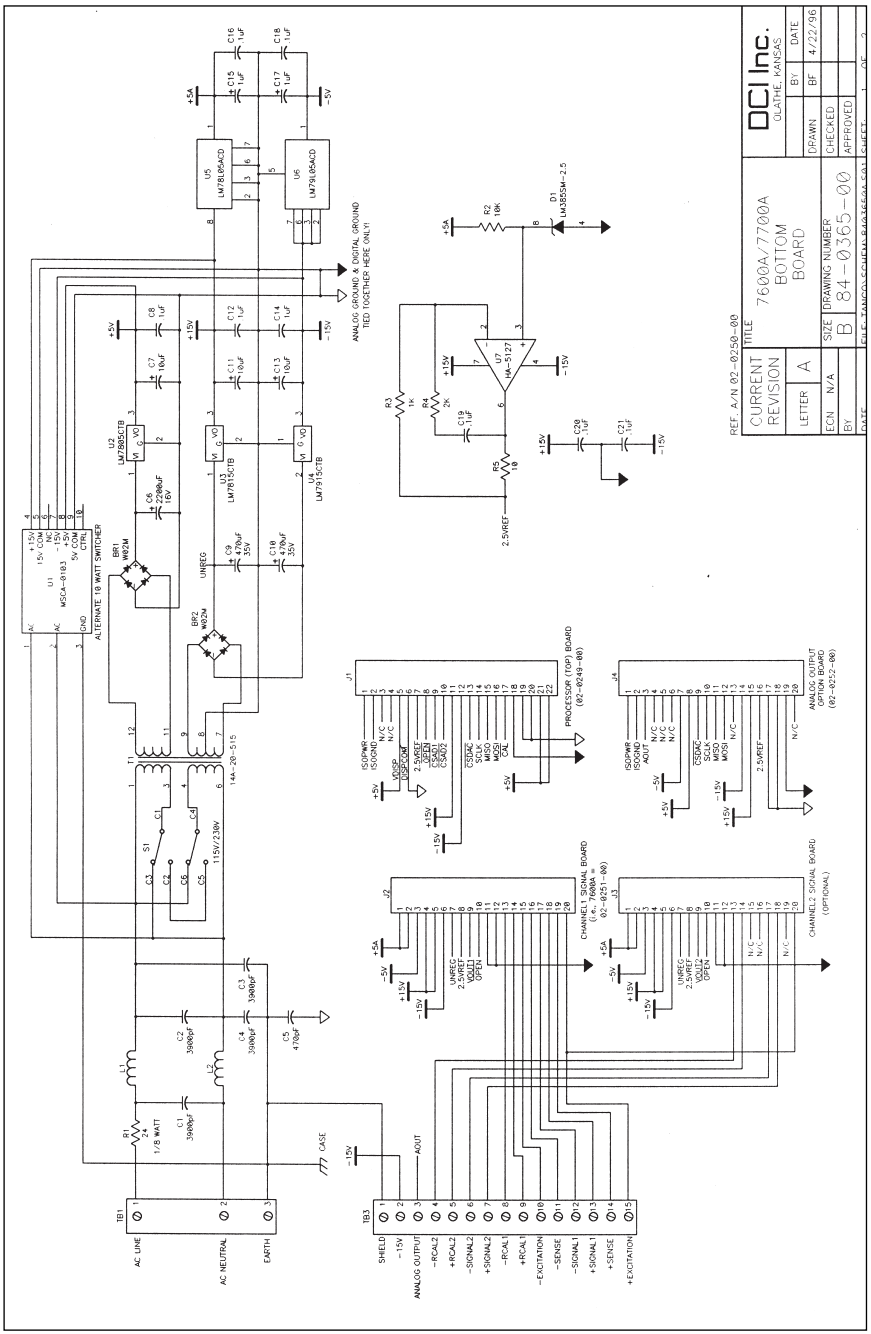
SCHEMATIC (DP-7700 Top Board)



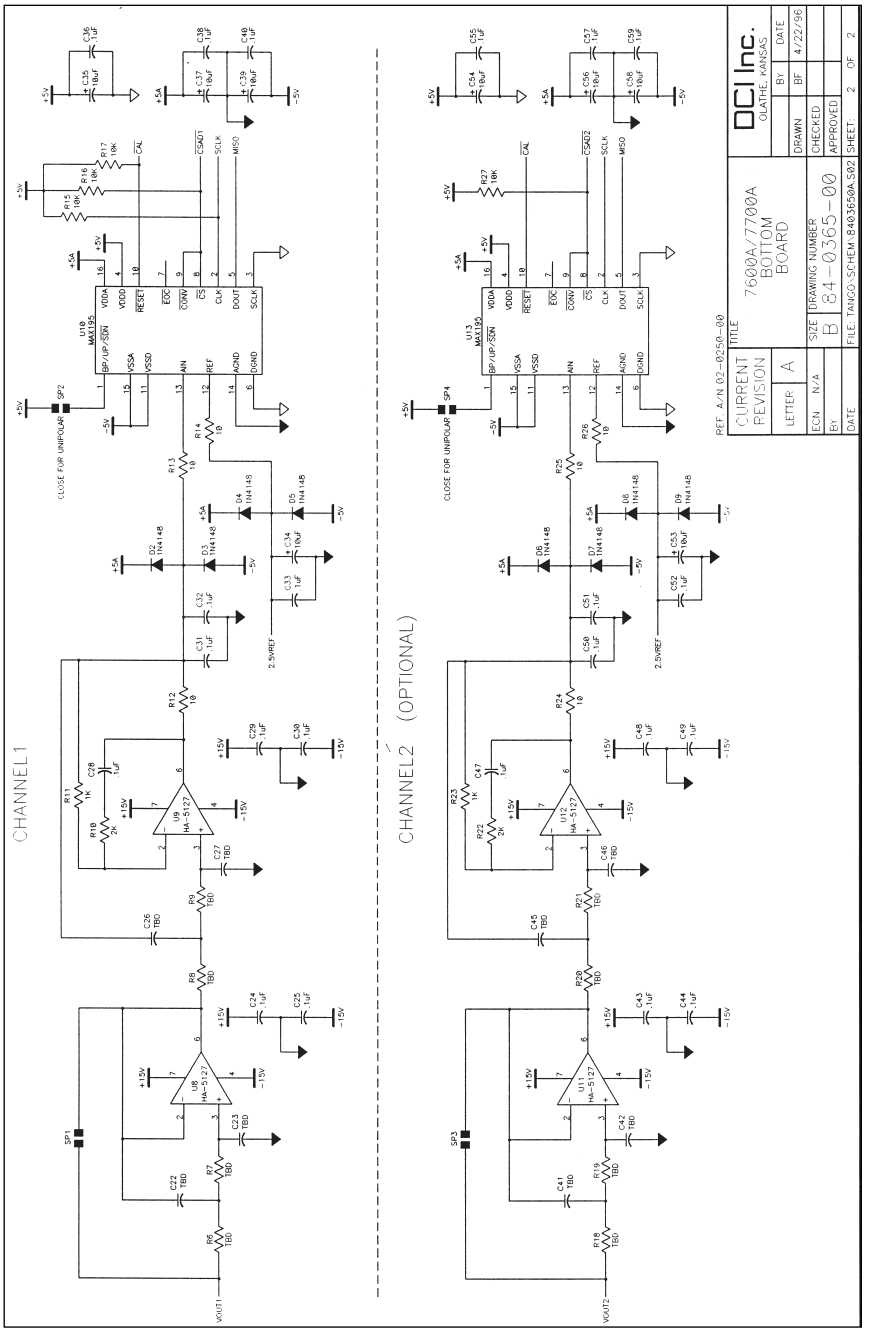
SCHEMATIC (DP-7700 Top Board)



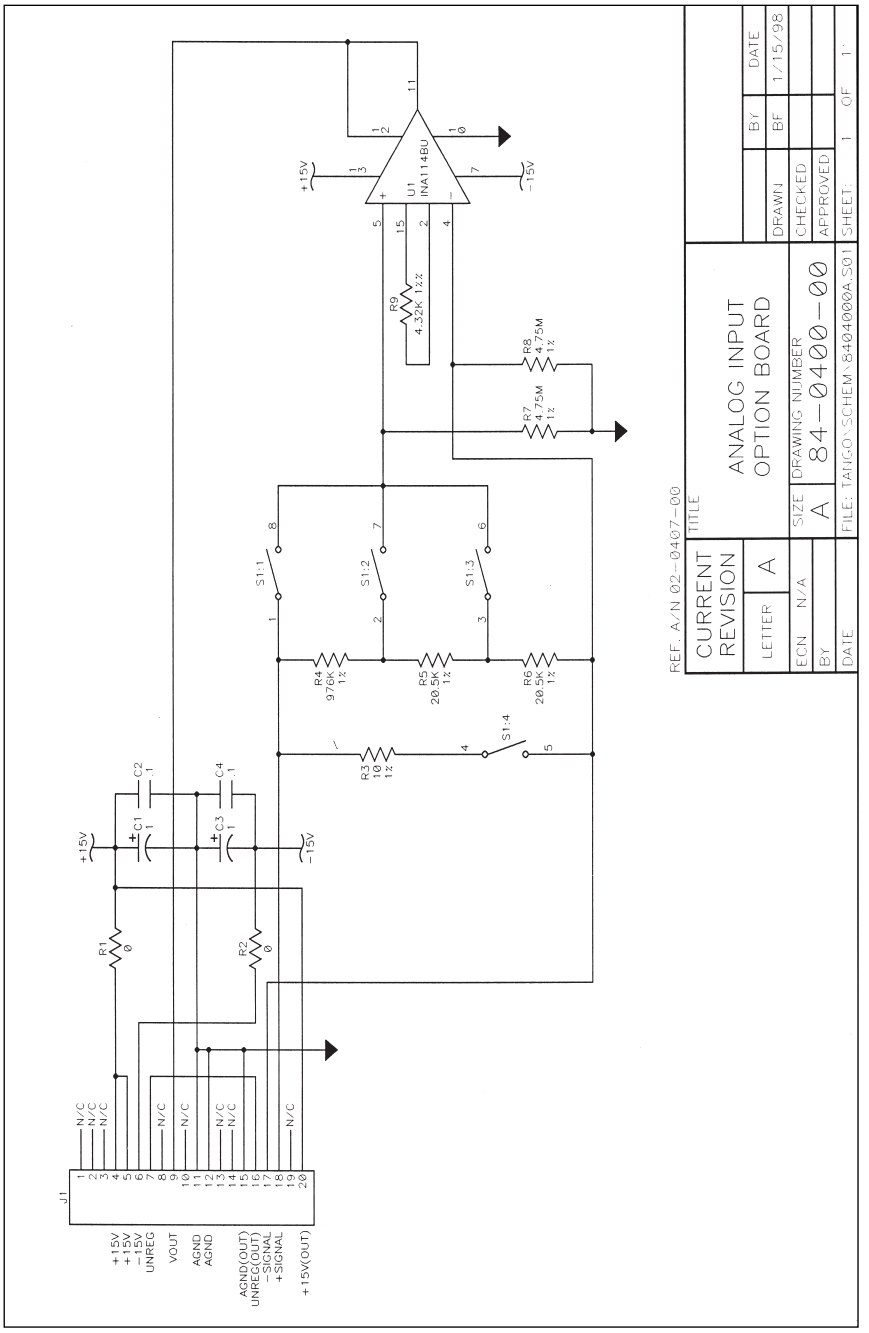
SCHEMATIC (DP-7700 Bottom Board)



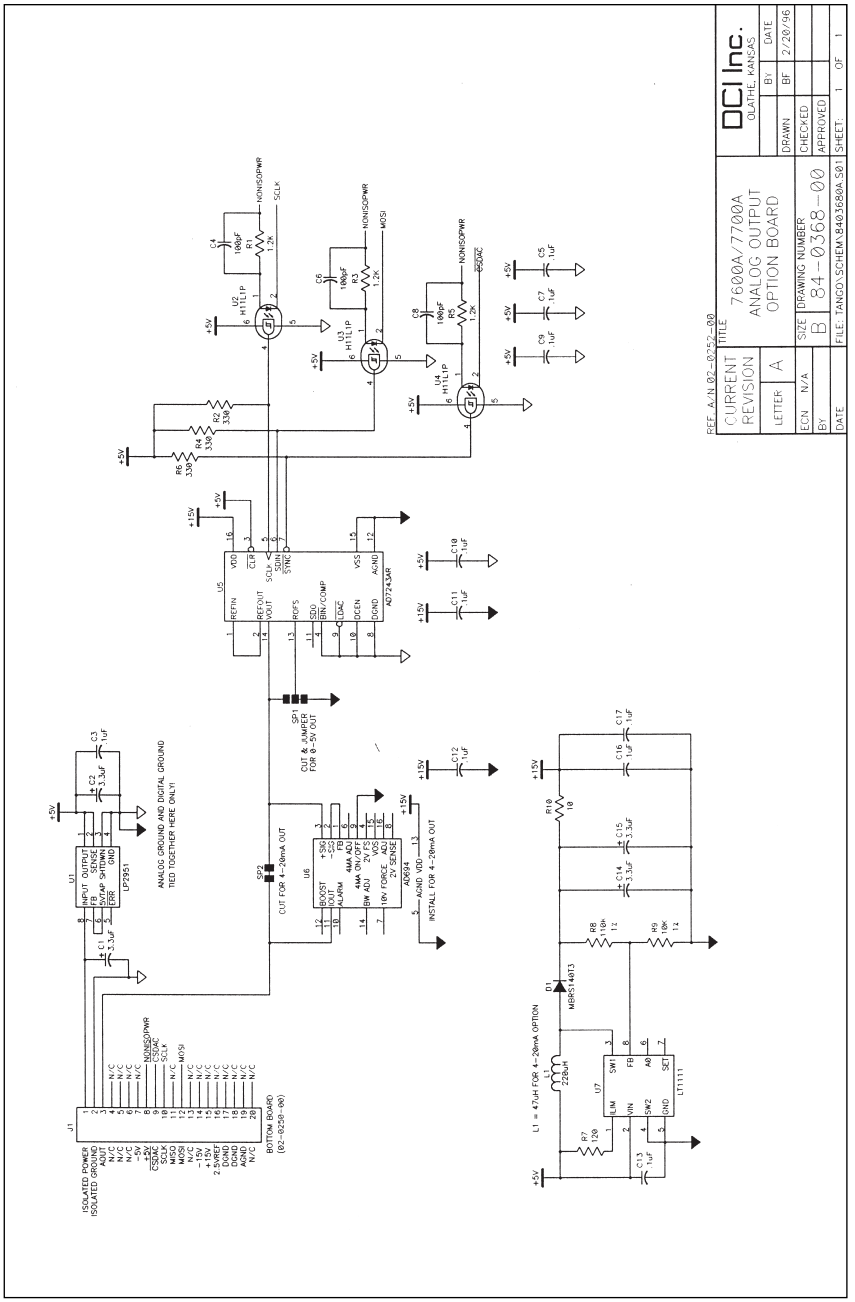
SCHEMATIC (DP-7700 Bottom Board)



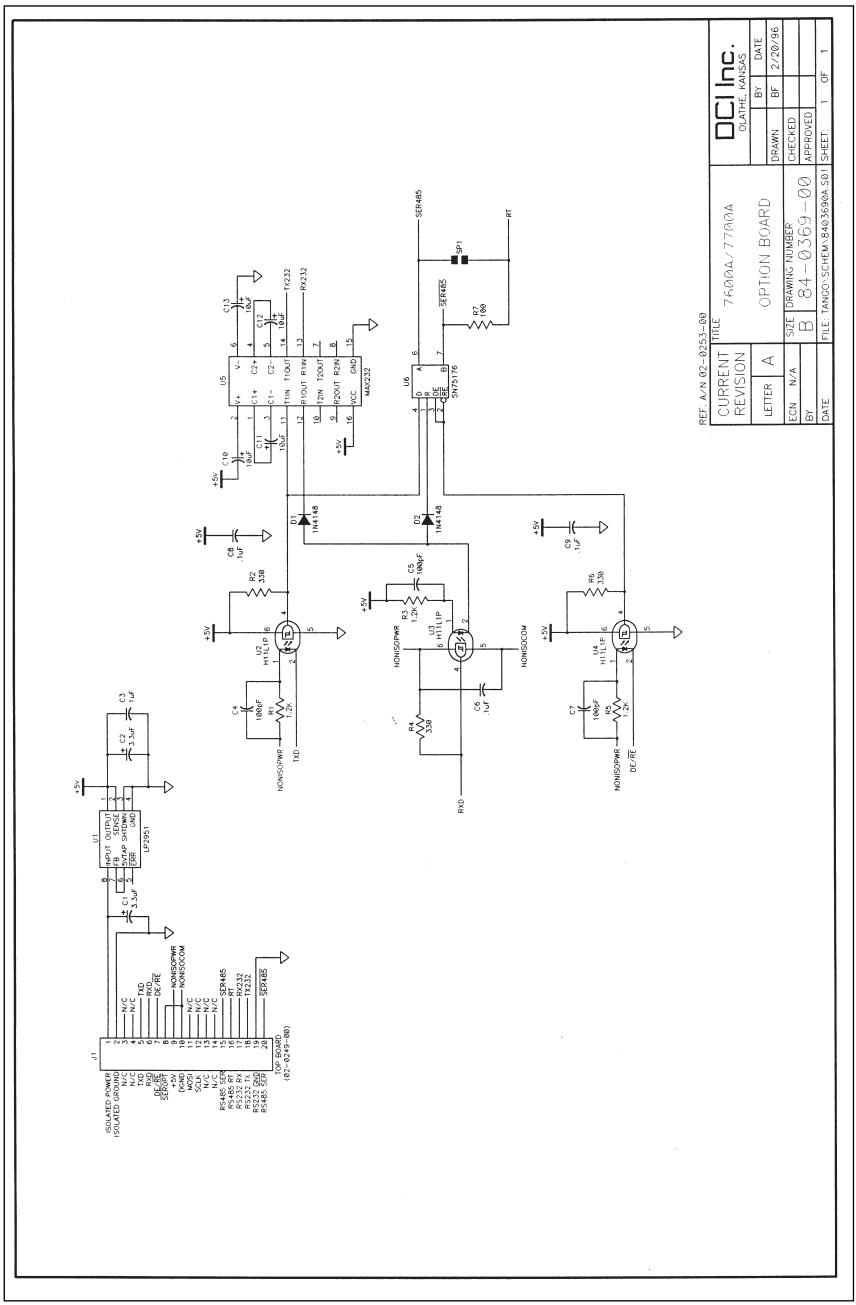
SCHEMATIC (DP-7700 Analog Input Option Board)



SCHEMATIC (DP-7700 Output Option Board)

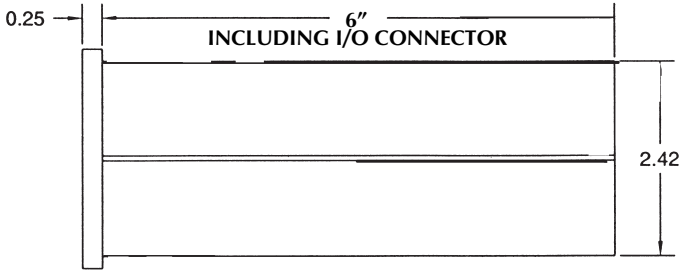


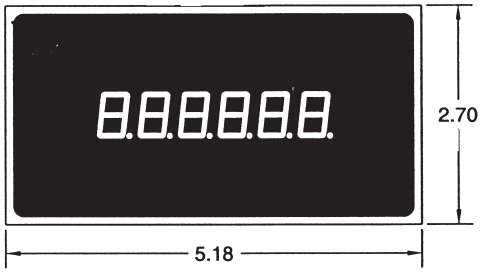
SCHEMATIC (DP-7700 RS232/RS485 Option Board)

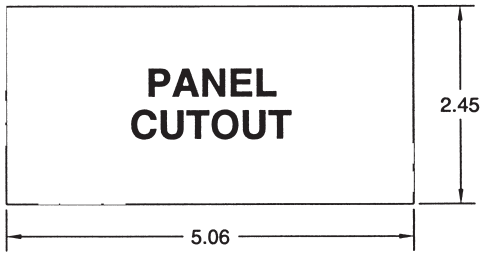


DIMENSIONS

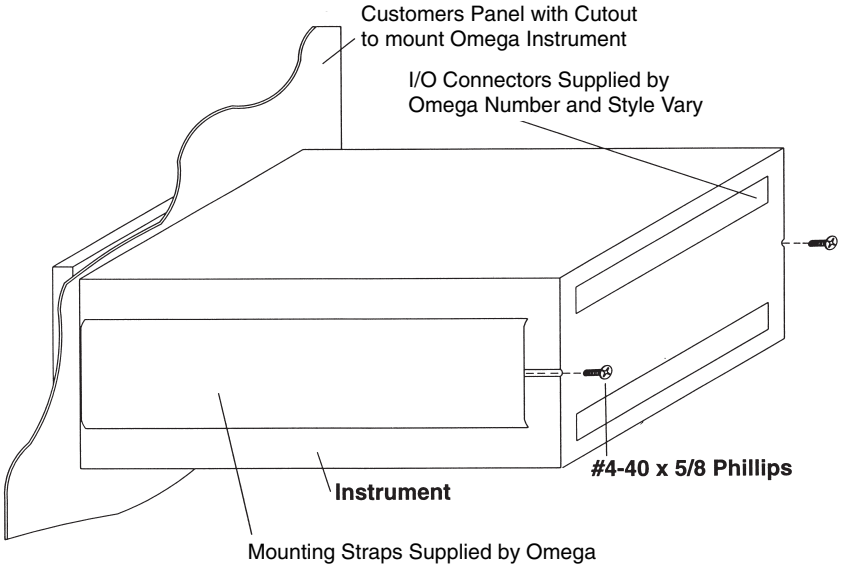
CASE SIZE B







MOUNTING



Note: Use Corner Screw of Case for Case Ground

NOTES:

MADE IN USA

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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