

**MODEL 716AN
SSI
REMOTE DISPLAY**

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GENERAL

The model 716AN is a 6-digit remote readout, which accepts outputs from an optical or shaft encoder, with a synchronous serial interface(SSI), and displays the reading. A programmable six digit multiplier and divider scales the meter to the desired reading. Standard power is 115VAC 50-400Hz, 8 Watts Max, applied to J1 pins 1 and 2. Remote start, stop, and tare allow activation from the rear connector. These signals are in parallel with the front switches.

FEATURES

- 6 digit .56” red alphanumeric LEDs
- Optional 2 Limit set points
- Programmable decimal points
- Programmable SSI number of bits, format, mask, and parity
- Programmable offset and sign
- Optional RS-232 or RS-485 interface
- Optional 10BASE-T/100BASE-TX Ethernet Interface
- Optional analog out, (0-10 volts) 12 BIT or 16 BIT
- Front panel and remote inputs for start, stop and tare
- Programmable input multiplier and divider (0 to 999999)
- Programmable baud rate 125KBPS to 1MBPS
- All aluminum case size “A”
- I/O Screw Terminal connector
- 5VDC Excitation Output for encoder
- Through zero counting and indication.

SPECIFICATIONS:

Accuracy: +/- 1 count

Temperature Range: -20° to +60° Celsius

Display: 6 digits.56" tall, 14 segment red LED with decimals and 2 limit LED's.
The display range is from -199999 to +999999.

Inputs:

SSI input: Differential RS422 Clock and Data (MAX491) Maximum SSI rate is 1MBPS.

Remote start/stop/tare: Requires closure to logic common or TTL logic zero. Input loading 1 LPTTL load.

Logic level inputs: 0 to 5 volt.

Input Power:

115VAC 50-400hz, 8 watts max (standard).

5 VDC, @ 500 mA max

230VAC, 50-400hz, 8 watts max

9-18 VDC, @ 500 mA max

18-36 VDC, @ 400 mA max

Outputs:

Limits: Two form C output relays, with a maximum current of 0.4A @ 125VAC, or 2A @ 30 VDC (optional)

Analog output: 0-10 VDC scalable, 12 BIT resolution, 4,096 counts 2.45mV (Option 09), or 16 BIT resolution, 65,536 counts 0.15mV (Option 16), and a maximum current of 5mA

Excitation output: 5VDC on J1 pin 14 &15 can be used to power an encoder.

I/O:

Serial output: RS 232 or 485 with baud rate selectable for 2.4, 4.8, 9.6, 14.4, or 19.2K

Network Address: Selectable from 1 to 255 and 0 = off.

Ethernet Output: 10BASE-T/100BASE-TX

OPTIONS:

- 01 ASCII RS232 serial interface. Baud rates of 2400, 4800, 9600, 14400, 19200.
- 02 ASCII RS485 serial interface. Baud rates of 2400, 4800, 9600, 14400, 19200.
- 03 Ethernet interface.
- 05 5 Volt DC Input power @ 500mA maximum
- 09 Analog output. 0-10 Volt DC scaleable, 5 milliamps max, 12 BIT
- 10 2 set points with form C relay outputs and LED indication
- 12 9-18 Volt DC input
- 16 Analog output. 0-10 Volt DC scaleable, 5 milliamps max, 16 BIT
- 19 No front panel switches
- 22 230 Volt AC, 50-400Hz, 8 watts maximum.
- 24 18-36 Volt DC input power @ 400mA maximum
- 25 Logo and/or nomenclature change, (Special artwork to be supplied).
- 26 No logo
- 28 Blank lens
- 36 "COUNTER" legend
- 37 "RPM" legend
- 38 "DEGREES" legend
- XXX= 3 digit # indicates custom software or hardware

SETUP:

After installing and wiring unit to power and proper inputs (ref: page 13) the next step is to program the desired configuration. Remove the lens to obtain access to the 10 dip switches located between the start and stop switches. The two button head screws holding the lens may be removed with a 1/16" hex key. When switch #4 is off (down) the display will count 1 for 1 with the count input. When switch #4 is on (up), the multiplier and divider enabled. When switch #9 is off (down), the setup parameters are disabled. The limits (option 10) are not disabled. This is useful to lock in the parameters after the lens is replaced. When switch #9 is on (up) the setup parameters are enabled.

ENTERING SETUP MODE:

Press the S1 (INCREMENT) and S2 (NEXT) switches at the same time to enter Setup Mode.

SETUP MODE:

There are three types of parameters to be set, defined as follows:

STRINGS:

Generally these answer simple questions like YES/NO, ON/OFF, and so forth, though there can be more than a few choices, sometimes including numbers (e.g., setting a baud rate). Use the INCREMENT switch to index through the set of string options. Press the S3 (ENTER) switch momentarily to advance to the next setup parameter.

SMALL INTEGERS:

These are smaller numbers between -128 and +127. Use the INCREMENT switch to increment the number, and the NEXT switch to decrement it. Press the ENTER switch momentarily to advance to the next setup parameter.

LARGE INTEGERS:

These are larger numbers that can, theoretically, fill the entire display. You will see a number on the display with leading zeros and a flashing digit. Press INCREMENT to increment the flashing digit's value. Press the NEXT switch to advance to the next digit. After you have programmed all six digits, the sign indicator will flash allowing you to change the sign by pressing the INCREMENT switch. Press the ENTER switch momentarily to advance to the next setup parameter.

EXITING SETUP MODE:

Press and hold ENTER to exit SETUP MODE at any time.

SETUP PARAMETER SEQUENCE:

LIMIT1 VALUE (“LIMIT1”)	OPTION 10 ONLY
LIMIT1 FUNCTION (“L1MODE”)	OPTION 10 ONLY
LIMIT2 VALUE (“LIMIT2”)	OPTION 10 ONLY
LIMIT2 FUNCTION (“L2MODE”)	OPTION 10 ONLY
DISPLAY MULTIPLIER (“MULT “)	
DISPLAY DIVIDER (“DIV “)	
DECIMAL POINT (“DP “)	
LEADING ZERO BLANKING (“LZBLNK“)	
SSI BIT RATE (“SSI BR“)	
SSI NO. BITS (“# bits“)	
SSI FORMAT (“FORMAT“)	
SSI HIGH BIT MASK (“MASK H“)	
SSI LOW BIT MASK (“MASK L“)	
SSI PARITY BIT NUMBER (“PBIT “)	
SSI PARITY TYPE (“PTYPE“)	
ENCODER COUNT DIRECTION (“DIRECT“)	
DISPLAY OFFSET (“OFFSET“)	
DISPLAY OFFSET SIGN (“SIGN “)	
ANALOG OUTPUT ZERO (“AO 0“)	OPTION 09, 16 ONLY
ANALOG OUTPUT FULL SCALE (“AO SP“)	OPTION 09, 16 ONLY
BAUD RATE (“BAUD “)	OPTION 01, 02 ONLY
UNIT ADDRESS (“ADDR “)	OPTION 01, 02 ONLY
CHARACTER ECHO (“ECHO “)	OPTION 01, 02 ONLY
SEND LINE FEED (“LF “)	OPTION 01, 02 ONLY
CONTINUOUS READING (“CR “)	OPTION 01, 02 ONLY
READING LEGEND (“LEGEND“)	OPTION 01, 02 ONLY

Note: Parameters belonging to uninstalled options are skipped and do not appear in the sequence.

DETAILS FOR INDIVIDUAL PARAMETERS:

Limit X Value (LARGE INTEGER): This is the display number beyond or below which the limit output triggers. This may be a positive or negative value.

Limit X Function (STRING): The limit's function can be either “HI” or “LO,” meaning the limit triggers either when the display is either above the limit value or below the limit value, respectively.

Display Multiplier (LARGE INTEGER): The encoder input is multiplied by this number prior to its being displayed. (Default: 1)

Display Divider (LARGE INTEGER): The encoder input is divided by this number prior to its being displayed. (Default: 1)

Decimal Point (STRING): Programs the decimal point position for the display (“XXXXXX” to “X.XXXXX”).

Leading Zero Blanking (STRING): Turns leading zero blanking on or off. The display readout will show leading zeros (e.g., 000001) if this is turned off.

SSI Bit Rate (STRING): Sets the data rate for the SSI encoder interface. This is programmed in steps from 125kbps to 1Mbps. In general, longer cable runs require lower data rates.

SSI No. Bits (SMALL INTEGER): Sets the number of bits per encoder transmission packet. This includes start and stop bits, unused bits, and parity/error bits.

SSI Format (STRING): Sets the data format, which may be either gray scale or binary.

SSI High Bit Mask (SMALL INTEGER): Sets the number of bits at the start of the packet that should not be counted as data bits. For example, set to '1' if your encoder outputs only a single start bit prior to its data.

SSI Low Bit Mask (SMALL INTEGER): Sets the number of bits at the end of the packet that should not be counted as data bits. For example, set to '2' if your encoder outputs one dummy bit and one parity bit following its data.

SSI Parity Bit Number (SMALL INTEGER): Set the position of the parity bit in the packet. Program to zero when there isn't a party bit. When the encoder does output a parity bit, this would typically be the last bit in the packet, so the bit number equals the total number of bits.

SSI Parity Type (STRING): Sets the type of parity bit. This may be either “ODD,” “EVEN,” “SPACE” (always low), or “MARK” (always high).

Encoder Count Direction (STRING): Set the encoder count direction. This may be either “CW” (clockwise) or “CCW” (counter-clockwise).

Display Offset (LARGE INTEGER): Sets the display offset, which acts as a hard-coded tare.

Display Offset Sign (STRING): Enables the display of negative values. When turned off, the display cycles through only positive values.

Set Analog Interface (Option 08 or 09)

Analog Output Zero (LARGE INTEGER): Analog out has two set up parameters, the display number for 0 volts and the display number for span or full scale or 10 volts.

Analog Output Full Scale (LARGE INTEGER): The display reading when +10V is coming out of the Analog Output. **Note:** both the 0 and the full scale can be set to either a negative or positive number. However, the full-scale number must be larger than the 0 number.

SET SERIAL INTERFACE (Option 01 or 02)

Serial Baud Rate (STRING): Sets the serial baud rate. Available selections are 2400, 4800, 9600, 14400, and 19200.

Serial Unit Address (LARGE INTEGER): Sets the unit address, range is 0 to 255. A value of 0 will disable address selection.

Serial Character Echo (STRING): When echo is on all characters received by the unit will be echoed back.

Serial Send Line Feed (STRING): When line feed is on the unit will always append a carriage return at the end of each serial transmission.

Set Continuous Reading Update (LARGE INTEGER): Sets the interval at which data is automatically transmitted from the unit. This number may be from –10 to 127. –10 being 10 readings a second, to 127 being 1 reading every 127 seconds.

Set Reading Legend (SMALL INTEGER): Sets the legend which is output at the end of each display reading.

COMMUNICATION (SERIAL COMMAND SET):

AD---disable network address	MP--- set display multiplier
AE---enable network address	DV--- set display divider
EH---turn receive character echo ON/OFF	DO--- set display offset
LF--- turn linefeeds ON/OFF	OS--- set display offset sign
RD--- read display	AZ--- set analog output zero
S1--- set limit #1	AS--- set analog output span
S2--- set limit #2	NB--- set SSI number of bits
TM--- output model and firmware revision	BR--- set SSI bit rate
ZB--- leading zero blanking ON/OFF	EH--- set SSI encoder format
CR--- continuous reading -10 to 127	HM--- set SSI high bit mask
LR--- set legend 0 to 10	LM--- set SSI low bit mask
DP---set decimal point 0-6	CD--- set SSI encoder count direction

SERIAL COMMUNICATION

The serial data is transmitted as ASCII characters, using the selected baud rate. Each word or character is made up of eight data bits, one stop bit and no parity bit. The format of data transmitted depends on the command, and is expected to be transmitted or received left most character first and terminated with a carriage return (c.r.) when an additional number is required leading zeros or place holders may be omitted. Plus sign is optional but must precede the number. Received numbers will have the decimal point ignored. Transmitted numbers will have a period to conform to the display format. In the command descriptions below the command string will be shown within brackets

{[]}, the sign if required will be shown as a lower case (s), and the number as upper case (X). Each command will be executed when received and only once except for display data which may be enabled to continuously update until disabled. Most all commands that set some parameter can be sent to the unit without that parameter and it will respond with the current value of that parameter. This allows the user to check those values to be sure the unit received the parameter properly.

Address Enable [AEXXXc.r.]

Address enable is a command used with the RS-485 serial interface when several units will be in parallel on the serial buss, or with RS-232 when several units are connected in series, to enable the unit. This command allows the unit specified by the address number XXX to be turned on or enabled, the address must be in the range of 0 to 255. When the address is set to 0 the unit will respond to any command without first receiving the address enable command. When enabled the unit will respond with [HELLOc.r.].

Address Disable [ADXXc.r.], [ADc.r.]

Address disable is a command used with the RS-485 serial interface when several units will be in parallel on the serial buss, or with RS-232 when several units are connected in series, to disable the unit. This command allows the unit specified by the address number XX to be turned off or disabled. The address must be in the range of 1 to 255.

If no number is supplied all units on the serial buss will be turned off or disabled. If the unit is disabled by unit address number, the unit will respond with [BYEc.r.].

Echo: [EHXc.r.]

The echo command is used to turn the echo on and off. When the echo is on the unit will send back out anything that comes in. A zero in place of the X turns the echo off and a one turns the echo on.

Line Feed: [LFXc.r.]

The line feed command is used to turn the line feed on and off. When the line feed is on the unit will follow every message with a line feed character. A zero in place of the X turns the line feed off and a one turns the line feed on.

Read Display: [RDc.r.]

Read display is a command that will return the normal display reading, (display mode when not in Peak, Valley, Span check, etc.). The returned data format will be [sXXX.XXXc.r.] where (s) is the sign if minus, (X) is the number, and (.) is the decimal point if in the display.

Set Limit: [S#XXXXXc.r.]

The set limit command is used to program a limit number for the high or low limit. The first number following the command (#) specifies whether the high limit or low limit is being programmed. A one in this field specifies the high limit, while a two specifies the low limit. The number following this (XXXXX) is the actual limit number to be entered.

Set Analog Output Zero: [AZXXXXXXc.r.]

Set analog output zero is a command that will set the analog output zero. This number is what the display reads when the analog output is at zero volts or 4mA. "AZ" is the command. "X" is the numeric value from 1 to 999999. X may be preceded by a "+" or a "-". The "+" is optional. The unit will respond with [OKc.r.]

Set Analog Output Span: [ASXXXXXXc.r.]

Set analog output span is a command that will set the analog output span. This number is what the display reads when the analog output is at its full-scale point; this can be 10 volts, 5 volts, or 20mA. "AS" is the command. "X" is the numeric value from 1 to 999999. X may be preceded by a "+" or a "-". The "+" is optional. The unit will respond with [OKc.r.]

Test Message: [TMC.r.]

The test message command is a diagnostic aid. When the test message command is received the unit will output all current settings, readings and the model number with software revision.

Continuous Reading: [CFXXXXc.r.]

The continuous reading command allows the auto serial update mode to be selected. It

updates all the units with corresponding display data at the selected time interval. The attached number (XXXX) is the numeric value from -1 to 3600. A value of 0 will disable the auto update function. A value of -1 will output data once for every conversion (2.5 times per second). A value of one or greater indicates the number of seconds between updates up to maximum of 3600 seconds between updates.

Set Legend: [LRXXc.r.]

The set legend command allows the selection of a unit indicator, which will be added onto the reading update from the serial output. The number (X) applied to the command indicated which unit from the legend table (on page XX) would be appended to the serial reading.

Display Multiplier: [MPXXXXc.r.] The encoder input is multiplied by this number prior to its being displayed. (Default: 1)

Display Divider: [DVXXXXc.r.] The encoder input is divided by this number prior to its being displayed. (Default: 1)

Display Offset: [DOXXXXXXc.r.] The display offset, acts as a hard-coded tare. The attached number (XXXXXX) is the numeric value from -19999 to 999999.

Display Offset Sign: [OSXc.r.] Enables the display of negative values. When turned off, the display cycles through only positive values. A zero in place of the X turns the offset sign off and a one turns the offset sign on.

Decimal Position: [DP Xc.r.]

The display decimal point can be positioned using this command.

X = 0 888888 (no decimal point)

X = 1 888888.

X = 2 88888.8

X = 3 8888.88

X = 4 888.888

X = 5 88.8888

X = 6 8.88888

X = 7 .888888

Display Zero Blanking: [ZBXc.r.] Turns leading zero blanking on or off. The display readout will show leading zeros (e.g., 000001) if this is turned off. A zero in place of the X turns zero blanking off and a one turns zero blanking on.

SSI Number of Bits: [NBXXc.r.] Sets the number of bits per encoder transmission packet. This includes start and stop bits, unused bits, and parity/error bits. The range of allowable number of bits is 8-32.

SSI Bit Rate: [BRXc.r.]

Sets the data rate for the SSI encoder interface.

X = 0 125kbps

X = 1 250kbps

X = 2 500kbps

X = 3 1Mbps

SSI Encoder Format: [EFXc.r.]

Sets the data format, which may be either gray scale or binary. A zero in place of the X sets the format to gray code and a one sets the format to binary.

SSI High Bit Mask: [HMXXc.r.] Sets the number of bits at the start of the packet that should not be counted as data bits. The range of the mask is 0-31.

SSI Low Bit Mask: [LMXXc.r.] Sets the number of bits at the end of the packet that should not be counted as data bits. The range of the mask is 0-31.

SSI Encoder Count Direction: [CDXc.r.]

Set the encoder count direction. This may be either “CW” (clockwise) or “CCW” (counter-clockwise). A zero in place of the X sets the direction to clockwise and a one sets the direction to counter-clockwise.

Ethernet Communication

Design Concepts is using the Lantronix XPort module (www.lantronix.com) for the Ethernet option. This device takes the serial data inside the unit which is normally output over the RS-232 or RS-485 interfaces and redirects it to the Ethernet port. This allows all but two commands outlined above in the Serial Communication section to also be used with the Ethernet Interface. Those two commands are Address Enable and Address Disable, these commands are simply not needed with the Ethernet interface due to the inherent addressing built into the Ethernet port. There are no setup options available from the front panel for the Ethernet option.

Configuring the Ethernet Module:

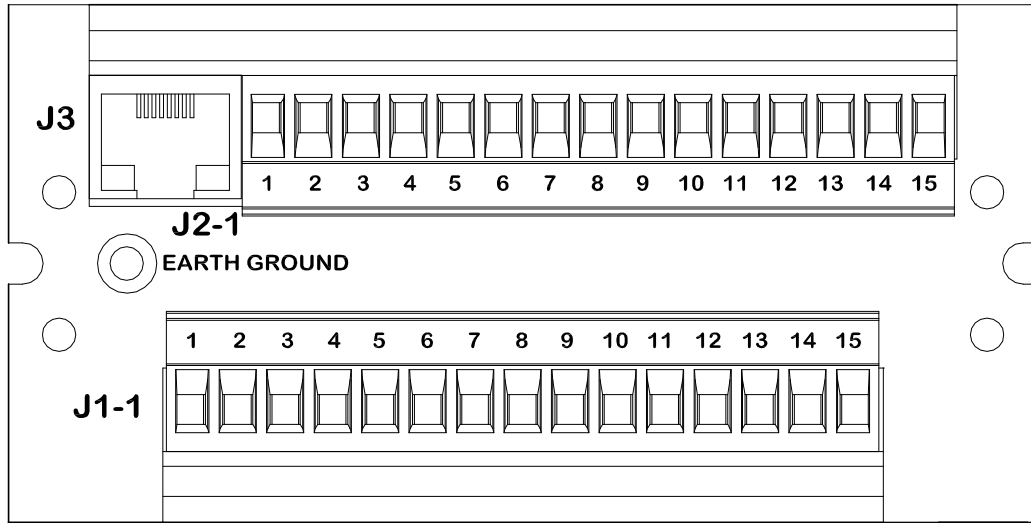
In order to communicate with the 716AN over the Ethernet, you must first discover or assign it an IP address. Lantronix provides a setup software called DeviceInstaller that will scan the local network for XPort devices and then allows you to setup the IP address as well as the serial settings. The serial setup of the XPort must match the serial setup of the 716AN. The default serial setup is 9600, N, 8,1.

The IP address can also be set using ARP as in the following instructions.

1. Open a windows command prompt (Start, Run, enter command or CMD depending on your operating system)
2. From the dos command prompt enter the IP address and MAC address as shown below:
C:\ARP -S 192.168.xxx.xxx 00-20-4A-xx-xx-xx (The IP address is of your choosing. The MAC address can be found on a sticker located on the back of the 716AN)
3. Hit return
4. At the next command prompt telnet to the same IP address using port 1

- e.g. C:\Telnet 192.168.xxx.xxx 1 (This command tells the 716AN to temporarily take the IP address shown.)
5. Hit return. (message 'failed to connect' should appear within 2 to 3 seconds)
 6. At the next command prompt telnet to the same IP address using port 9999
C:\Telnet 192.168.xxx.xxx 9999 (This command takes you into the configuration of the XPort module in order to set certain parameters.)
 7. Hit return. You will be prompted to "Press Enter to go into Setup Mode"
 8. Hit return again as soon as you see the prompt to access the configuration choices. The prompt will time out after ~ 3 seconds.
 9. Select 0 for server configuration.
 10. Manually enter the IP Address. This permanently assigns the IP address,
 11. Manually enter the gateway address (optional)
 12. Manually enter the host bits for the subnet mask (refer to XPort™ User Manual, section 4, Table 4.1 – Standard IP network Netmasks)
 13. Select 9 to save and exit
 14. The IP address is now set. Basic communications can now be established with the 716AN for testing purposes.
 15. At the next command prompt telnet to the same IP address using port 10001
C:\Telnet 192.168.xxx.xxx 10001
 16. Hit return. Anything entered from the keyboard will now be sent directly to the 716AN. Typing RD will return the display reading. Typing TM will return the model number and current software revision number.

Pin out

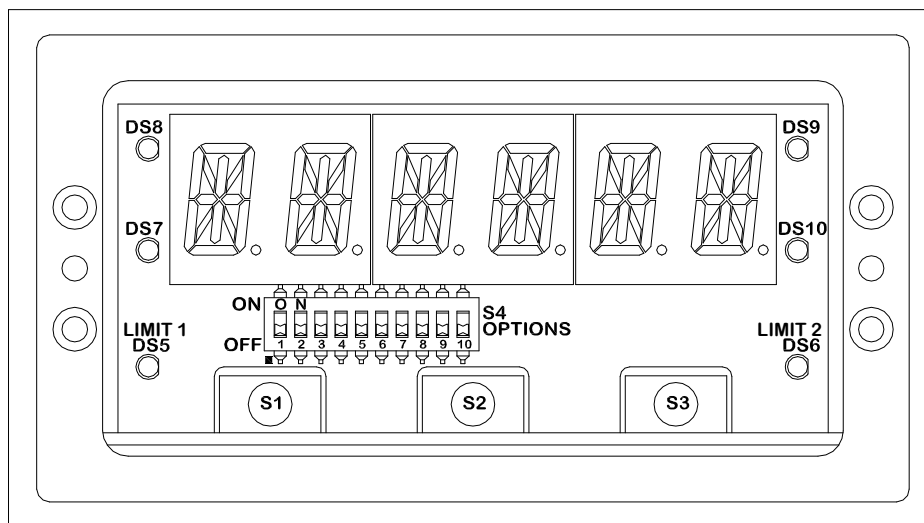


J1		J2	
1	115VAC Power	1	Limit 1 Relay NO
2	115VAC Neutral	2	Limit 1 Relay NC
3	Tare	3	Limit 1 Relay COM
4	Stop	4	Limit 2 Relay NO
5	Start	5	Limit 2 Relay NC
6	Common	6	Limit 2 Relay COM
7	RS232/485 TX (B) Opt. 01,02	7	Not Used
8	RS232/485 RX (A) Opt. 01,02	8	Not Used
9	Not Used	9	Not Used
10	Clock Output	10	Not Used
11	Clock Output	11	Not Used
12	Data In	12	Not Used
13	Data In	13	Analog Out
14	+5V Output	14	Analog Ground
15	Common	15	+5V Output

J3 – Ethernet Connector

INPUT POWER CONNECTIONS				
Input Power	Pin # / Input	Pin # / Input	Connector Number	Option Number
5VDC	15 = Common	14 = + Power	J1	05
9 to 18VDC	1 = Common	2 = + Power	J1	12
18 to 36VDC	1 = Common	2 = + Power	J1	24
230 VAC	1 = Line	2 = Neutral	J1	22
115 VAC	1 = Line	2 = Neutral	J1	Standard

SWITCH SETTINGS



Switch Functions

Normal Operation:

S1 – Display Channel

S2 – Display Mode: Direct, Peak, Valley

S3 – Soft Tare not saved in memory

S1+S2 – Setup Mode

S2+S3 - Reset Peak and Valley Reading

S4(4) – Direct Read Channel 1

S4(8) – Direct Read Channel 2

S4(9) – Setup Mode Enable

Setup Mode:

S1 - Increment

S2 - Next

S3 - Enter

LED Functions

DS5 – Limit 1 Active

DS6 – Limit 2 Active

DS7 – Channel 2 Displayed

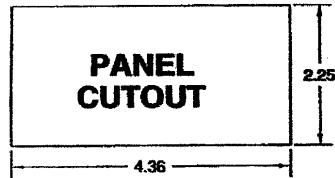
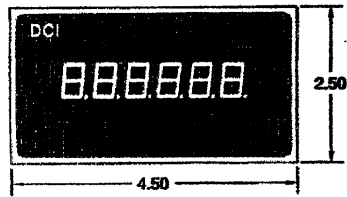
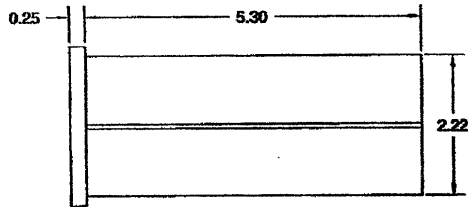
DS8 – Tare Displayed

DS9 – Peak Displayed

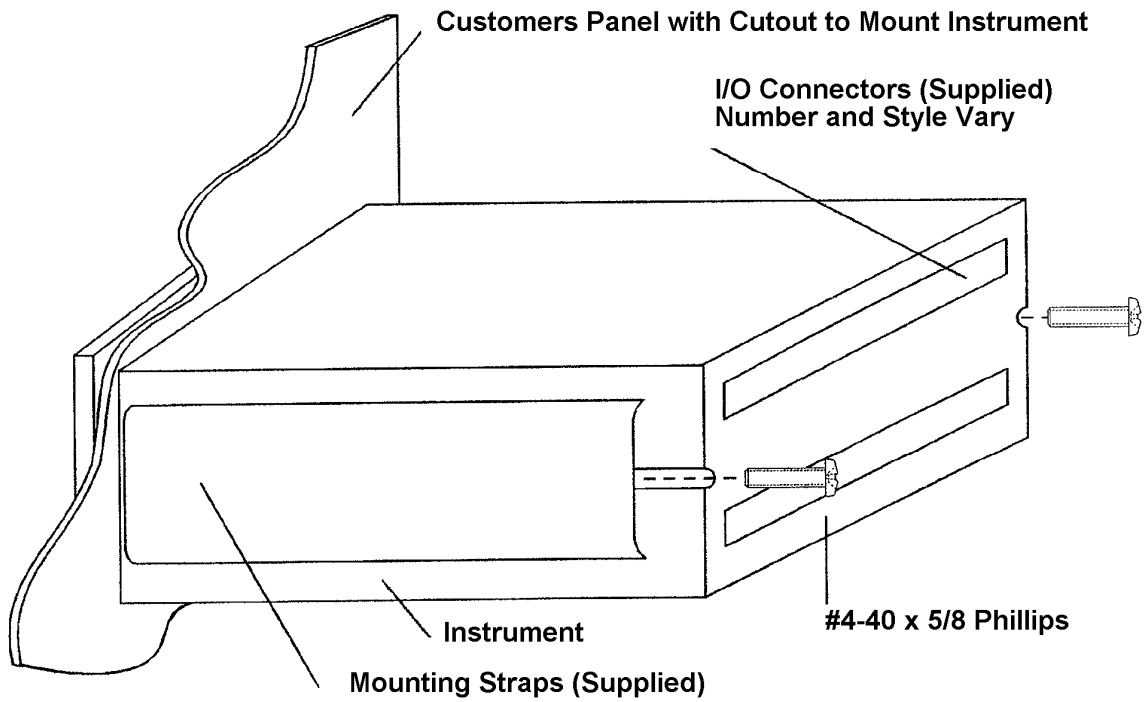
DS10 – Valley Displayed

FIGURE 3 Dimensions of case

CASE SIZE A



MOUNTING



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