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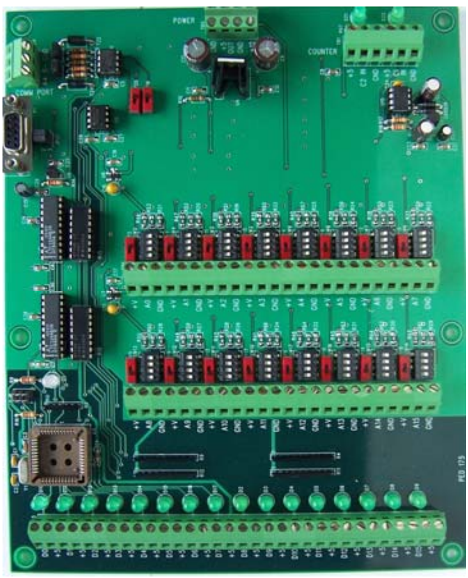


485M4AOLT

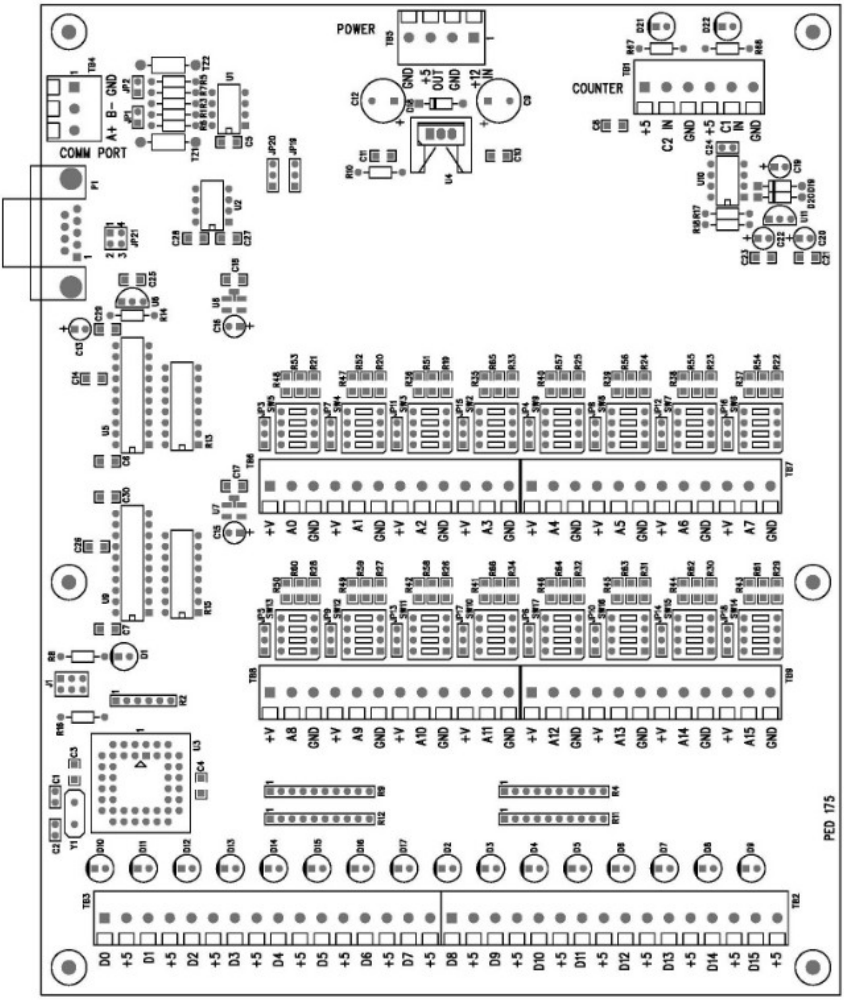
DIGITAL I/O
ANALOG

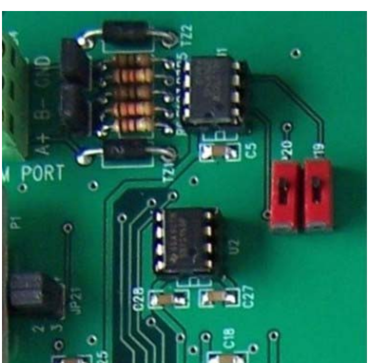
Introduction

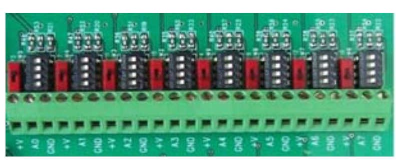
The 485M4AOLT module uses RS-485 communications. In addition there is a DB9 connector using RS-232 communications which is meant to supply a rf module for wireless communications. The communications format is switched from RS-485 to RS-232 via slide switch position. In addition the RS-232 port can be configured for either DTE or DCE.

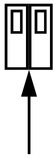
I/O Module features:

MPU:	Microchip PIC118F8422
EEPROM:	Internal to MPU
MPU Clock:	14.7456 Mhz
Interface:	RS-485 (multidrop up to 255 nodes) or Rs-232
Baud:	9600 fixed
LED:	Bicolor diagnostic LED
Watchdog:	MPU has built-in watchdog timer
POR:	MPU contains timed Power On Reset circuitry
Brownout:	MPU brownout detection ciruictry built-in
Temperature:	-40° to +85°C (40° to 185°F)
PCB:	FR4
Power Input:	12.0 Vdc, approximately 50 ma digital load dependent
+5 VDC	.1% Regulated
Terminals	5.08 35° Screw clamp
Digital I/O	Leds for status input or output
Counters	Led for status, 2.2K resistor on input to ground

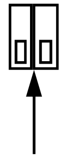

POWER
GND
+5
OUT
GND
+12
IN
COUNTER
+5
C2 IN
GND
+5
C1 IN
GND
A+ B- GND
COMM PORT
+V A0 GND +V A1 GND +V A2 GND +V A3 GND +V A4 GND +V A5 GND +V A6 GND +V A7 GND
+V A8 GND +V A9 GND +V A10 GND +V A11 GND +V A12 GND +V A13 GND +V A14 GND +V A15 GND
D0 +5 D1 +5 D2 +5 D3 +5 D4 +5 D5 +5 D6 +5 D7 +5 D8 +5 D9 +5 D10 +5 D11 +5 D12 +5 D13 +5 D14 +5 D15 +5
PED 175


A+ B- GND
PORT
C5
C28
C27
C25
C18
JP21
U2
20
19





SWITCH JP19 & JP20 IN
RS-485 POSITION



SWITCH JP19 & JP20 IN
RS-232 POSITION

SWITCH JP19 AND JP20

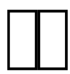
The jumper switches JP19 and JP20 control which communication output is enabled. In the upper position the RS-485 communications is enabled through the terminal position. In the down position the RS-232 communications is enabled through the DB 9 connector. These switches must be set in the same position, or no communications will occur

JUMPERS JP1 AND JP2

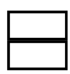
The jumpers JP1 and JP2 are for the RS-485 communications termination. When on the RS-485 communications is terminated.

JUMPER JP21

Jumper JP21 controls the configuration for the DB9 RS-232 communications port.



When the jumpers are in the vertical position shown the RS-232 port is configured to connect to DTE equipment.



When the jumpers are in the horizontal position shown the RS-232 port is configured to connect to DCE equipment.

The jumper position swaps the RX and TX between pin 2 and 3 of the DB9 connector.

The jumper switches for each of the 16 analog inputs can be set to have 2 different voltages, +5 at 1% or +12 available at the +V position of the terminal.

DEFAULT

When the switch is in the upper position the +5 volts is at the +V terminal.

When the switch is in the lower position the +12 volts is at the +V terminal.

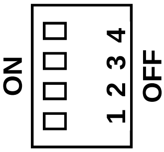
There is a 4 position dip switch for each of the 16 analog inputs.

You can select straight input, 10K to +5 1% on the input, or a 0 to +10VDC input which is voltage divided to one half.

The tables below show the switch positions for the conditions required.

NOTE

ANY COMBINATION OF SWITCH POSITIONS NOT SHOWN CAN RESULT IN ERRATIC OPERATION, AND MAY DAMAGE THE CIRCUITRY!



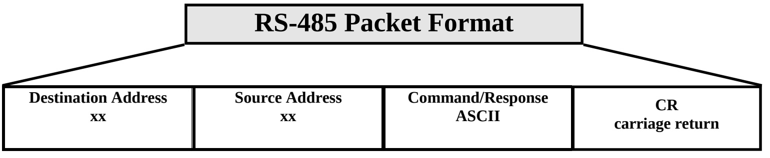
SWITCHES SHOWN IN “ON” POSITION

DEFAULT

STRAIGHT INPUT	ON	OFF
SWITCH 1		X
SWITCH 2		X
SWITCH 3	X	
SWITCH 4		X

10K ON INPUT	ON	OFF
SWITCH 1	X	
SWITCH 2		X
SWITCH 3	X	
SWITCH 4		X

+10 VDC INPUT	ON	OFF
SWITCH 1		X
SWITCH 2	X	
SWITCH 3		X
SWITCH 4	X	



x = ASCII Hexadecimal Digit

Address **0x00** Host Device (IBM-PC, micro-controller, etc.)
Address **0x01-0xFE** I/O Module Address
Address **0xFF** Broadcast Address (used to configure an I/O

Command Sent by Host	**Response** Sent by I/O Module	**Description**
V	Vxy	Firmware version x.y
I	Ixxyy	Input digital port status xx = PORT1 yy = PORT2 ***Also returns current output port status***
Oxxyy	O	Output digital port: xx = PORT1 yy = PORT2)
Txxyy	T	Set digital direction: xx = PORT1 yy = PORT2 bit set(1) = Input, bit clear(0) = Output
G	Gxxyy	Get current digital direction: xx = PORT1 yy = PORT2 bit set(1) = Input, bit clear(0) = Output
Nx	Nxxxxxxxx	Get Pulse Counter x counter number 1 or 2 (xxxxxxxx 32 bit counter value)
Mx	M	Clear Pulse Counter X counter number 1 or 2
Uy	Uyxxx	Unipolar sample analog (y control niblle, xxx analog value)
UX	U	Unipolar sample analog (y control niblle, xxx analog value) ALL ANALOG INPUTS
K	Kxx	Get receive error count (xx current count)
J	J	Clear receive error count
Wyyxx	W	Write EEPROM (yy address, xx value)
Ryy	Rxx	Read EEPROM (yy address in command, xx value in reponse)
Z	Z	Reset CPU
	X	**Command error response**
FF00P	**U**	Master poll all units respond in time frame based on the module address all samples

NOTE

Command FF00P returns all signals like the UX command. The return signals are based on a 250 milliseconds time slot of the module address. Module 01 will return first, 250 ms later module 02 will return, 250 ms module 03 will return, etc. Note that module hex 64 (100 dec) will return 25 seconds after the master poll command.

RS-485 Interface Example Commands

The following table illustrates actual command and response data for an RS-485 interface.

NOTE

- All numeric data is represent as ASCII Hexadecimal integers
- Example **Host Address** = 0x00 and **Module Address** = 0x13
- The symbol ↵ equates to a carriage return (decimal 13, hex 0x0D)

Command Sent by Host	**Response** Sent by I/O Module	**Description**
1300V↵	0013V30↵	Module Firmware version 3.0
1300I↵	0013IFF00↵	Input digital port [PORT1 bits0-7 ON] [PORT2 bits0-7 OFF]
1300Nx↵	0013N0000000F↵	Get pulse counter: Current count = 15
1300Mx↵	0013M↵	Clear pulse counter: Current count = 0
1300U8↵	0013U840F↵	Unipolar analog control nibble = 0x8 Analog reading = 0x40F
1300K↵	0013K00↵	Current receive errors = 0
1300J↵	0013J↵	Clear receive error count: Current receive
1300W0410↵	0013W↵	Write EEPROM Address 0x04 with value 0x10
1300R04↵	0013R10↵	Read EEPROM Adress 0x04 (value is 0x10)
1300Z↵	0013Z↵	Reset CPU (forces a watchdog timeout after

EEPROM MAP

Address	**Description**
0x00	Module Address (RS-485 address) **[factory default = 0x01]**
0x02	Data Direction Port 1 Bit set (1) = Input Bit clear (0) = Output **[factory default = 0xFF]**
0x03	Data Direction Port 2 Bit set (1) = Input Bit clear (0) = Output **[factory default = 0xFF]**

Analog Control Nibble and Example

The **485M4AOLT** module utilizes the Linear Technologies LTC1296 analog to digital conversion chip. In the process of performing a data sample, the user sends a control nibble to the **485M4AOLT** module. The module in turn performs a data conversion using the control nibble and transmitts a response data sample back. The following table lists each of the 16 possible analog configurations.

NOTE

- All numeric data is represent as ASCII Hexadecimal integers
- The symbol ↵ equates to a carriage return (decimal 13, hex 0x0D)
-

Control Nibble Sent by Host	**Analog Sample**
0	Single Point: CH0
1	Single Point: CH1
2	Single Point: CH2
3	Single Point: CH3
4	Single Point: CH4
5	Single Point: CH5
6	Single Point: CH6
7	Single Point: CH7
8	Single Point: CH8
9	Single Point: CH9
A	Single Point: CH10
B	Single Point: CH11
C	Single Point: CH12
D	Single Point: CH13
E	Single Point: CH14
F	Single Point: CH15

WARRANTY

Integrity Instruments warrants **all** products against defective workmanship and components for the life of the unit. Integrity Instruments agrees to repair or replace, at it's sole discretion, a defective product if returned to Integrity Instruments with proof of purchase. Products that have been misused, improperly applied, or subject to adverse operating conditions fall beyond the realm of defective workmanship and are not covered by this warranty.