

Features

- **Embedded 32bit Microprocessor Module**
 - Industrial Microprocessor
 - 1 x Full Duplex RS-232 Port
 - 3 x Full Duplex RS-422 Ports
 - 10 x 24VDC Digital Inputs
 - Real Time Clock
 - Non-Volatile Storage
 - Field Programmable
- **Dual CAN Network**
 - 1 x Copper CAN Channel (500kbs)
 - 1 x Fibre Optic CAN Channel (500kbs)
 - Up to 8 Fibre Optic Distribution Channels
 - CAN 2.0B Compatible
- **Embedded UHF Receiver Module**
 - Shielded UHF Receiver (458MHz/472MHz)
 - Integral Approved RF Barrier
- **Operates -10°C to +85°C**
 - All industrial components
- **Heavy Duty Enclosure**
 - Electro Nickel Plated
 - Rugged Construction

Description

The L0LD Industrial Remote Control Module is of the Obelix genus designed to directly control Obelix Modules and to provide a remote control link to L0KN Remote Consoles.

Importantly, by providing Fibre Optic communication interfaces, this module can be directly connected to Intrinsically Safe Modules without the use of barriers.



Obelix

Industrial Remote
Control Module

Type L0LD



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Typical Applications

- Continuous Bolter/Miners
- Continuous Haulage
- Long Wall Shearers
- Mobile Bolters
- Mobile Roof Supports
- Remote Control Scoops
- Remote Control Loaders
- Any industrial remote control application

Ordering Information

Part Number	Description
L0LD0101	Remote Control Module (DBT)
L0LD0201	Remote Control Module Single Fibre Optic Hub (VAB)
L0LD0301	Remote Control Module Dual Fibre Optic Hub (VAB)
L0LD0401	Remote Control Module (Generic)
L0LD0501	Remote Control Module Single Fibre Optic Hub (DBT)
L0LD0601	Remote Control Module Single Fibre Optic Hub (Waratah)
L0LD0701	Remote Control Module Single Fibre Optic Hub (Generic) with TTL CAN
L0LD0801	Remote Control Module (DBT Shearer) (No Receiver)
L0LD0901	Remote Control Module (Generic) (CAN Copper/Fibre Optic Bridge)
L0LD1001	Remote Control Module (Generic) (No Receiver)
H0LD0101	Connector Assembly A1
H0LD0401	Connector Assembly A3
H0LD0501	Connector Assembly A4

Interface Description

The Type L0LD Remote Control Module utilizes industrial connectors that are unique when configured for use with the Obelix Control System via type, gender or keying physically preventing improper installation.

Note: A2 connector assemblies are daisy chain assemblies and are custom made to suit application.



Wiring Assignments

Connector A1 Burndy Female 4 Way		
PIN	Description	Signal
A1-A	RS-232 Receive	Communications
A1-B	RS-232 Transmit	Communications
A1-C	RS-232 Reference Ground	Supply Reference
A1-D	-	-

Connector A2 Burndy Female 8 Way		
PIN	Description	Signal
A2-A	Supply Input	24VDC Supply Input
A2-B	Supply Input	0VDC Supply Input
A2-C	CAN A (Positive)	Communications
A2-D	CAN A (Positive)	Communications
A2-E	CAN A (Negative)	Communications
A2-F	CAN A (Negative)	Communications
A2-G	Termination Link 1 - 1	Termination Link Input
A2-H	Termination Link 1 - 2	Termination Link Input

Connector A3 Burndy Female 12 Way		
PIN	Description	Signal
A3-A	RS-422 Channel 1 Receive Negative	Communications
A3-B	RS-422 Channel 1 Receive Positive	Communications
A3-C	RS-422 Channel 1 Transmit Negative	Communications
A3-D	RS-422 Channel 1 Transmit Positive	Communications
A3-E	RS-422 Channel 2 Receive Negative ¹	Communications
A3-F	RS-422 Channel 2 Receive Positive ²	Communications
A3-G	RS-422 Channel 2 Transmit Negative ³	Communications
A3-H	RS-422 Channel 2 Transmit Positive ⁴	Communications
A3-J	RS-422 Channel 3 Receive Negative	Communications
A3-K	RS-422 Channel 3 Receive Positive	Communications
A3-L	RS-422 Channel 3 Transmit Negative	Communications
A3-M	RS-422 Channel 3 Transmit Positive	Communications

¹ Optional RS-232 RXD

² Optional RS-232 CTS

³ Optional RS-232 TXD

⁴ Optional RS-232 0V Reference



Wiring Assignments Continued

Connector A4 Burndy Female 19 Way		
PIN	Description	Signal
A4-A	CAN B (Positive)	Communications
A4-B	CAN B (Positive)	Communications
A4-C	CAN B (Negative)	Communications
A4-D	CAN B (Negative)	Communications
A4-E	Termination Link 2-1	Link ⁵
A4-F	Termination Link 2-2	Link
A4-G	Digital Input 1	24VDC Input
A4-H	Digital Input 2	24VDC Input
A4-J	Digital Input 3	24VDC Input
A4-K	Digital Input 4	24VDC Input
A4-L	Digital Input 5	24VDC Input
A4-M	Digital Input 6	24VDC Input
A4-N	Digital Input 7	24VDC Input
A4-P	Digital Input Reference	0VDC Reference
A4-R	-	-
A4-S	RS-232 (RTS) Optional	Communications
A4-T	Digital Input 8	24VDC Input
A4-U	Digital Input 9	24VDC Input
A4-V	Digital Input 10	24VDC Input

⁵ This link is fitted with a 120ohm terminating resistor and should be removed from within the plug assembly when modules are connected to this communications bus.



Electrical Characteristics

Supply	
Voltage	24VDC Nominal
Wattage ^{MIN}	1W
Wattage ^{MAX}	24W

Radio Module	
Supply	6.5VDC @ 100mA
Frequency	458MHz – 472MHz
Deviation	±2.6KHz
Sensitivity	-113dBm
Channels	32
Modulation	Frequency Shift Keyed FM (Narrow Band)
Range ^{MIN}	100 metres ⁶ "Line of Sight"
Range ^{MAX}	500 metres "Line of Sight"
Data Integrity	CCITT CRC (16 Bit)
Bandwidth	25KHz @ 1200bps
Antenna	Passive (Type L0LG or 'Ducky' Variant)
Classification	Receiver

Digital Inputs	
Installed	10
Voltage	24VDC
Minimum Voltage	18VDC
Maximum Voltage	30VDC

Communications	
Interface	CAN 2.0B
Throughput	500kbs (Supports Autobaud)
Protocol(s)	Message Oriented
Medium	Copper
Interface	CAN 2.0B
Throughput	500kbs (Supports Autobaud)
Protocol(s)	Message Oriented
Medium	Fibre Optic (62.5uM, ST-ST Duplex)
Interface	RS-232
Throughput	38,400bps
Protocol(s)	Packet Oriented
Medium	Copper
Interface	RS-422
Throughput	115,200bps
Protocol(s)	Packet Oriented
Medium	Copper

Environmental	
Operating Temperature	Minus 20°C to +85°C
Humidity	T.B.A.
MTBF	12,000 hours

⁶ Figure cited when matched with L0KN Remote Consoles.



UHF Receiver Abstract

The L0LD Control Module incorporates an electrically isolated, via way of DC/DC conversion, shielded UHF Narrow Band FM Receiver module which can be programmed to operate in either the 458MHz or 472MHz spectrum. Receiver sensitivity levels are factory tuned to specification, -113dBm, along with band filters which work to isolate the non-wanted spectrum.

A dedicated onboard microcontroller directly interfaces with a PLL synthesiser to generate the wanted frequency which is selected via dynamic high-level UART programming. An NRZ signal is directly transferred through capacitive filters via the onboard modem which works to decode/demodulate the data embedded within the radio frequency carrier. It is at this point that the raw data is passed onto the host microprocessor for integrity analysis.

UHF Antenna Barrier Abstract

The L0LD Control Module incorporates an approved⁷ radio frequency barrier designed to permit electrical connection of a passive antenna, in the hazardous zone, to the integral BNC antenna connector in the safe zone – that being the inside of a flameproof enclosure. The design of this barrier prevents AC/DC control voltages from appearing in the hazardous zone should an electrical fault appear in the control equipment.

The barrier consists of two high quality, high voltage disk ceramic capacitors in series with the radio frequency signal. These capacitors are enclosed in a metal case and are silicone rubber potted. Each of the capacitors must be capable of withstanding twice the nominal control voltage + nominal machine voltage.

In accordance with clause 7.5.1 in "Criteria for Evaluation and Test of Intrinsically Safe Apparatus and Associated Apparatus", MSHA, rev.8/8/95 "this barrier can be considered *not* subject to fault".

The barrier can be classified as a capacitive circuit and the capacitive circuit graphs shall apply. (See fig.11.4, page 53 of "Criteria for Evaluation and Test of Intrinsically Safe Apparatus and Associated Apparatus", MSHA, rev.8/8/95).

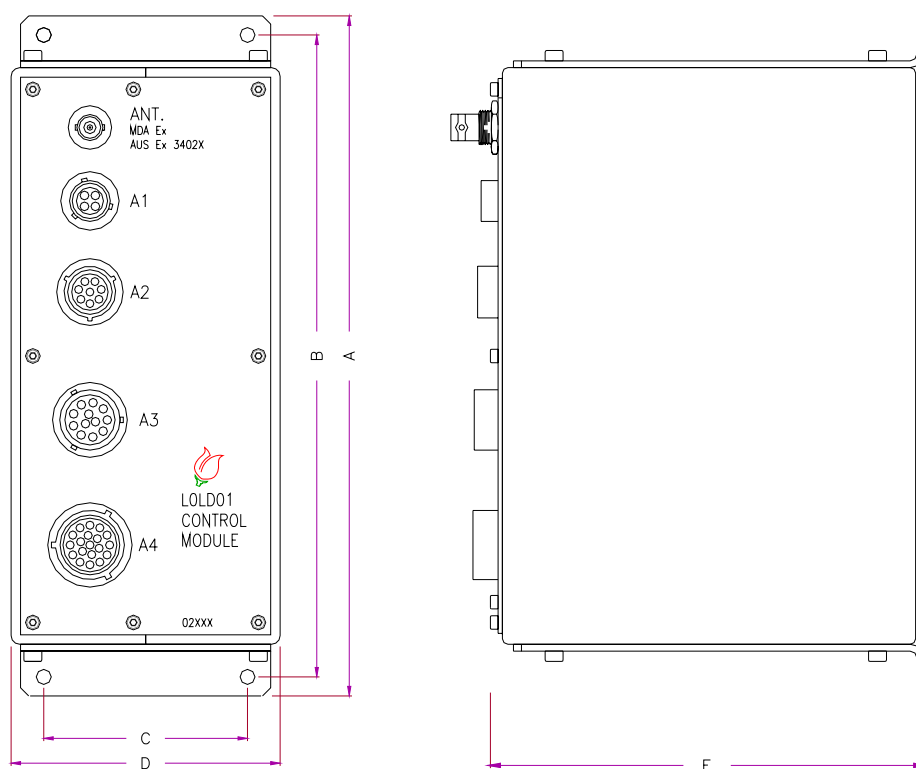
Using the curve "C+0R" with 0.01uF capacitance (lower values of C are not represented in the figure) we can see that the output of the barrier is safe if the input voltage is not greater than 350V AC/DC amplitude.

Therefore, given that control voltage is nominally 110VAC, under fault conditions should mains control voltage be applied to the barrier input, the output will remain electrically safe.

⁷ A derivative of the L09W Genus; AusEx 3402X, MSHA IA-20851



Mechanical Characteristics



Dimension	Measurement	Description
A	250	Height
B	236	Height Mounting Centre
C	75	Width Mounting Centre
D	99	Width
E	159.5	Depth

Notes

- All dimensions are in millimetres.

Material

- Enclosure is Electroless nickel plated mild steel.
- Facia is stainless steel.
- Mounting brackets are stainless steel.

Fasteners

- M5 x 10mm x 4
- M4 x 10mm x 8
- M3 x 10mm x 8

Mass

- 2.5kg (5.5lb)