

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Features

- ❑ Network Watch-dog supervisor
- ❑ 9 digital outputs  
one output with 20 KHz PWM mode  
all outputs are short protected
- ❑ 9 digital inputs
- ❑ 3 analog inputs
- ❑ Hardware motion / stop control
- ❑ 6 outputs and 5 inputs Serial I/O
- ❑ 32-bit counter/timer with prescaler
- ❑ 18 to 32VDC power supply voltage range
- ❑ Communication speed 19.2Kbps ÷ 1.25Mbps
- ❑ Command rate up to 1000/sec

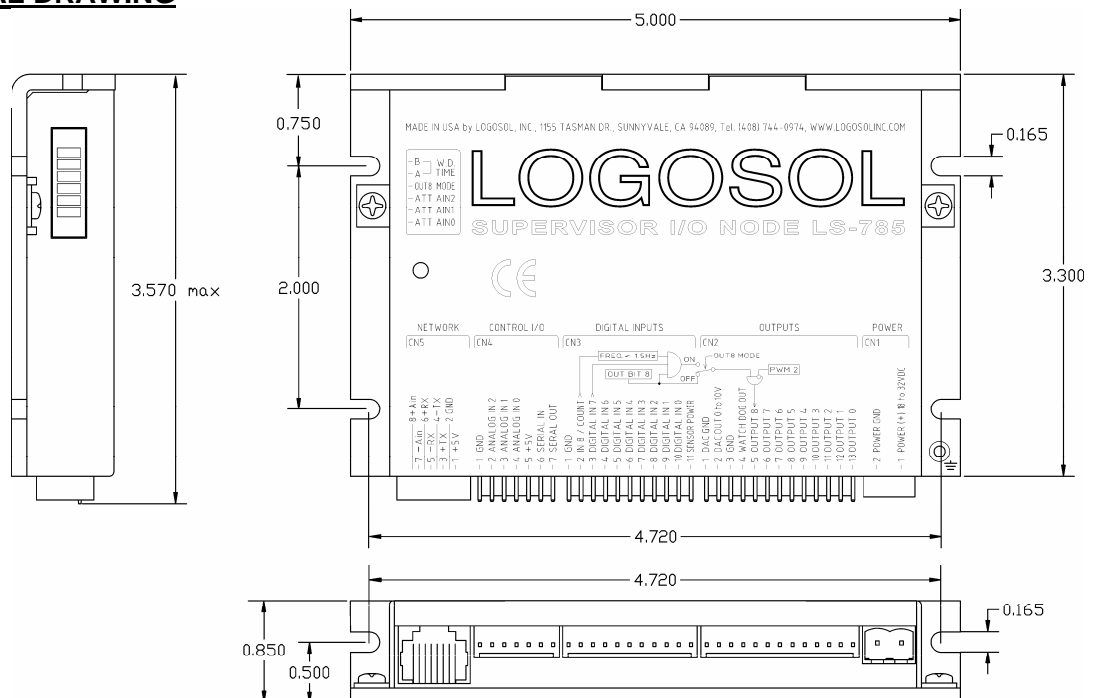


## Description:

LS-785 is a multifunctional, network supervisor I/O node designed as a member of Logosol Distributed Control Network (LDCN).

Up to 30 LDCN nodes can be supervised by a LS-785 over a multi-drop full duplex RS-485 network.

## DIMENSIONAL DRAWING



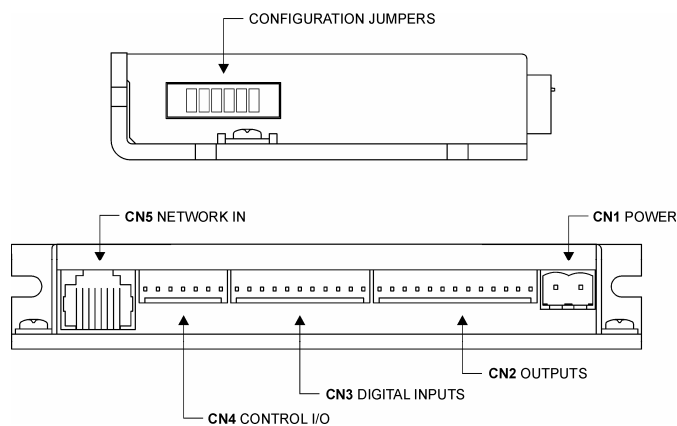
# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## **TECHNICAL SPECIFICATIONS** rated at 25°C ambient, POWER (+)=24VDC

POWER SUPPLY VOLTAGE	+18 to +32VDC, 35VDC Absolute Maximum
DIGITAL OUTPUTS Max current OUTPUT 0 to OUTPUT 5 Max current OUTPUT 6 to 8 and WATCH-DOG OUT Output Short protection Inductive load protection WATCH-DOG time-out PWM switching frequency (OUTPUT 8)	NPN open emitter with saturation voltage up to 2VDC 0.5A 0.25A Digital output to GND Clamp diode to GND 35mS, 150mS, 600mS, or 1200mS jumper selectable 20KHz
DIGITAL INPUTS Logic HIGH Logic LOW Hysteresis (min) Input current Max. count frequency (IN 8 / COUNT)	Active HIGH with 4.7K to GND Logic HIGH +15VDC to 32VDC Logic LOW -2VDC to +5VDC 5V min 6mA max at 24VDC 100KHz
SENSOR POWER Voltage Protection	POWER (+) 0.5A resettable fuse
ANALOG OUTPUT	0-10V
ANALOG INPUTS	0-5V or 0-10V Jumper selectable range
INDICATOR LED	Low intensity – after Power up High intensity – after Set Address command
FIRE-SAFETY Internal fuse on POWER (+)	3A Quick blow
THERMAL REQUIREMENTS Storage temperature range Operating temperature range	-30 to +85 °C 0 to 45 °C
MECHANICAL Size Weight	L=5.00", H=3.30", D=0.85" 0.55 lb. (0.250 kg)
MATING CONNECTORS Power Supply Outputs Inputs Control I/O	Magnum EM2565-02-VL or Phoenix contact MSTB 2.5/2-ST-5.08 Molex 22-01-3137 housing with 08-50-0114 pins (13 pcs.) Molex 22-01-3117 housing with 08-50-0114 pins (11 pcs.) Molex 22-01-3077 housing with 08-50-0114 pins (7 pcs.)

## **CONNECTORS AND CONTROLS LAYOUT**

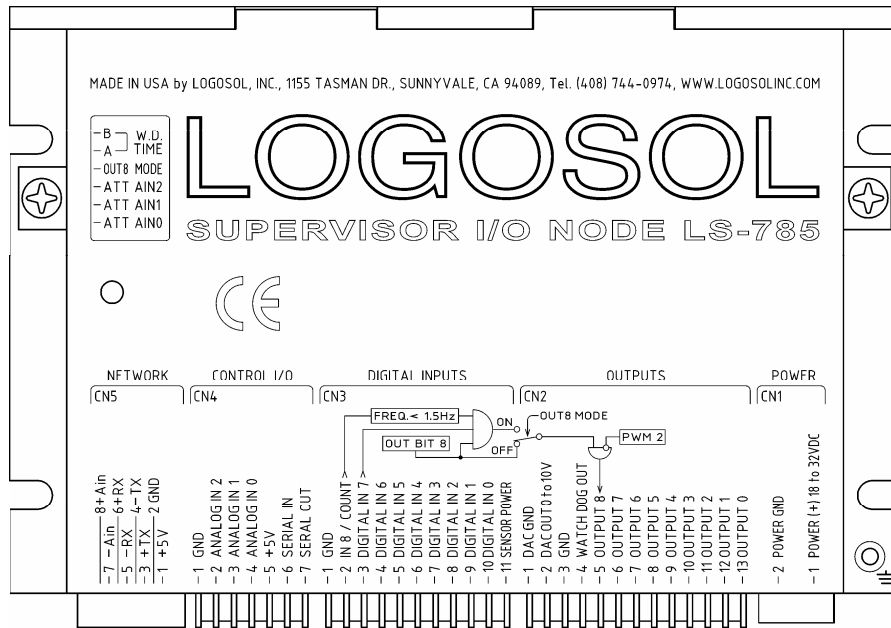


## **ORDERING GUIDE**

PART NUMBER	MODEL	DESCRIPTION
912785002	LS-785	Supervisor I/O Node
230601023	LS-785-CN	Mating connector kit

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008



## CONFIGURATION JUMPERS

	NAME	DESCRIPTION
1	B W.D.TIME	WATCH-DOG TIME-OUT SELECT
2	A W.D.TIME	
3	OUT 8 MODE	OUTPUT 8 MODE SELECT
4	ATT AIN2	ANALOG IN2 attenuator
5	ATT AIN1	ANALOG IN1 attenuator
6	ATT AIN0	ANALOG IN0 attenuator

## CN1 – POWER AND MOTOR CONNECTOR

PIN	SIGNAL	DESCRIPTION
1	POWER (+) 18 to 32VDC	+18 to +32VDC power supply, positive terminal
2	POWER GND*	Power supply ground

## CN2 – OUTPUTS

PIN	SIGNAL	DESCRIPTION
1	DAC GND*	Analog ground
2	DAC OUT 0 to 10V	Analog output 0V ( <i>PWM 1=0</i> ) to 10V ( <i>PWM 1=255</i> )
3	GND*	Power supply ground
4	WATCH-DOG OUT	Open emitter 0.25A max with clamp diode to GND
5	OUTPUT 8	
6	OUTPUT 7	
7	OUTPUT 6	Open emitter 0.5A max with clamp diode to GND
8	OUTPUT 5	
9	OUTPUT 4	
10	OUTPUT 3	
11	OUTPUT 2	
12	OUTPUT 1	
13	OUTPUT 0	

\* POWER GND, DAC GND and GND are electrically connected. Drive case is isolated from drive circuitry and can be grounded externally.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## CN3 – DIGITAL INPUTS

PIN	SIGNAL	DESCRIPTION
1	GND*	Signal ground
2	IN 8 / COUNT	Active HIGH with 4.7KOhm to GND Logic HIGH +15VDC to +32VDC Logic LOW -2VDC to +5VDC Hysteresis 5V min Max. count frequency 100KHz (IN 8 / COUNT)
3	DIGITAL IN 7	
4	DIGITAL IN 6	
5	DIGITAL IN 5	
6	DIGITAL IN 4	
7	DIGITAL IN 3	
8	DIGITAL IN 2	
9	DIGITAL IN 1	
10	DIGITAL IN 0	
11	SENSOR POWER	Wired to POWER (+) with 0.5A resettable fuse.

## CN4 – CONTROL I/O

PIN	SIGNAL	DESCRIPTION
1	GND*	Signal ground
2	ANALOG IN 2	Analog inputs 8bit 0-5V or 0-10V jumper selectable
3	ANALOG IN 1	
4	ANALOG IN 0	
5	+5V	REMOTE I/O power supply output
6	SERIAL IN	Proprietary Serial interface for REMOTE I/O
7	SERIAL OUT	<i>CN4 pin 6 and pin 7 should be shorted if REMOTE I/O is not used</i>

## CN5 – NETWORK IN

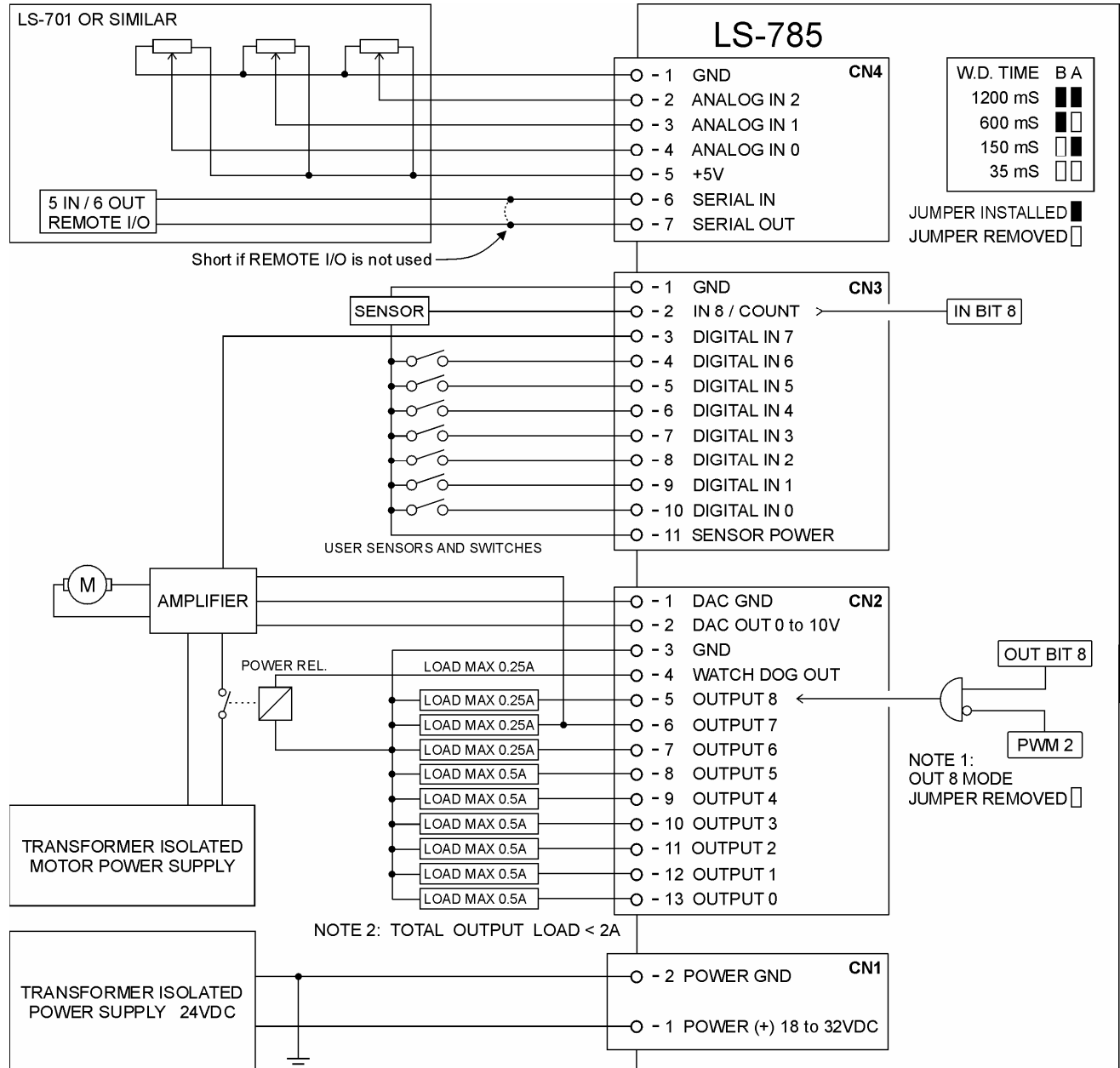
PIN	SIGNAL	DESCRIPTION
1	+5V	RS-232 adapter power supply
2	GND*	Interface ground
3	+TX	(+) Transmit data
4	-TX	(-) Transmit data
5	-RX	(-) Receive data
6	+RX	(+) Receive data
7	-A in	(-) Address input
8	+A in	(+) Address input

\* POWER GND and GND are electrically connected. Drive case is isolated from drive circuitry and can be grounded externally.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

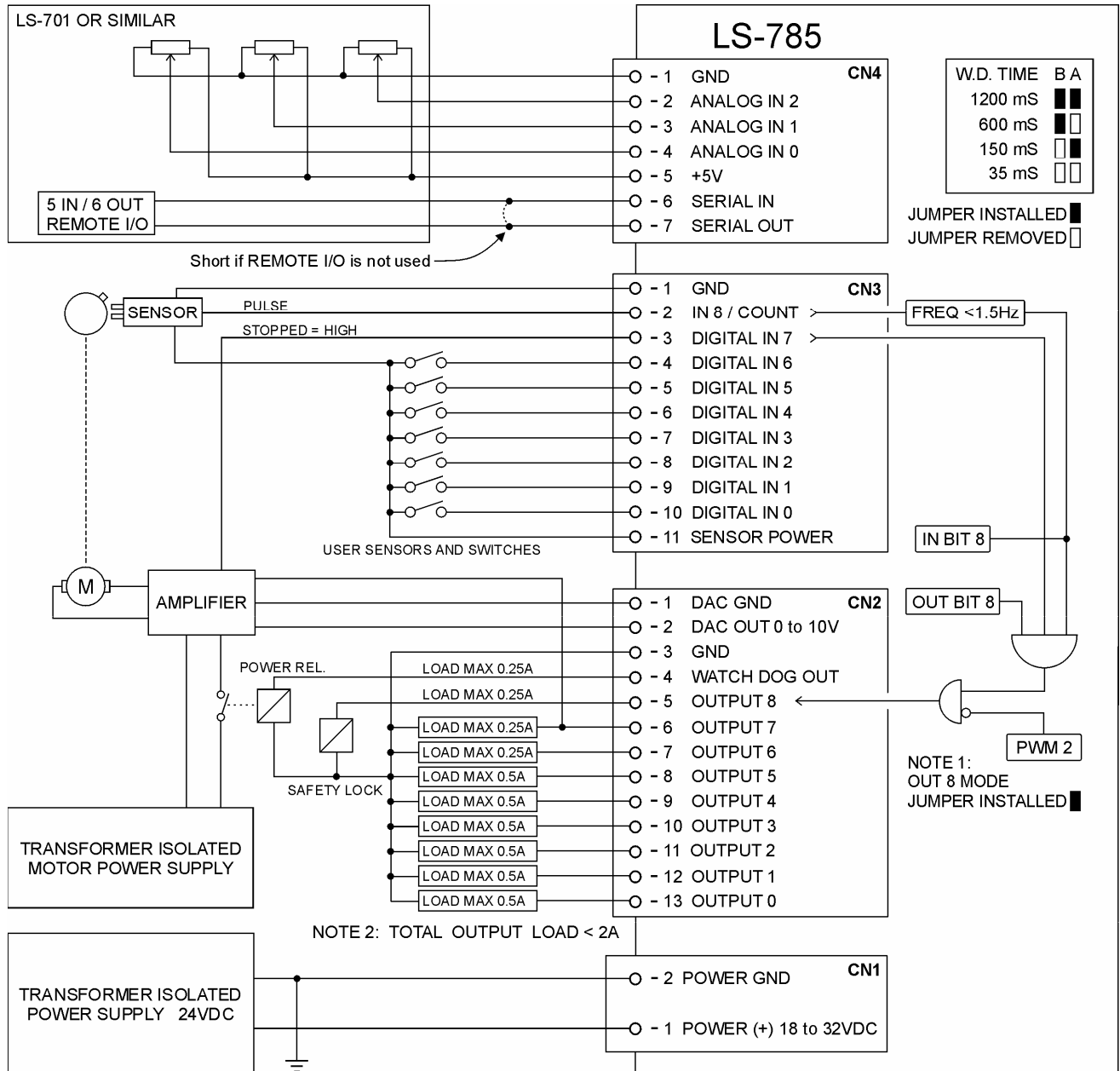
## SAMPLE APLICATION



# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## APPLICATION WITH HARDWARE MOTION / STOP CONTROL



# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## LOGOSOL LS-785 QUICK START GUIDE

### Hardware Setup

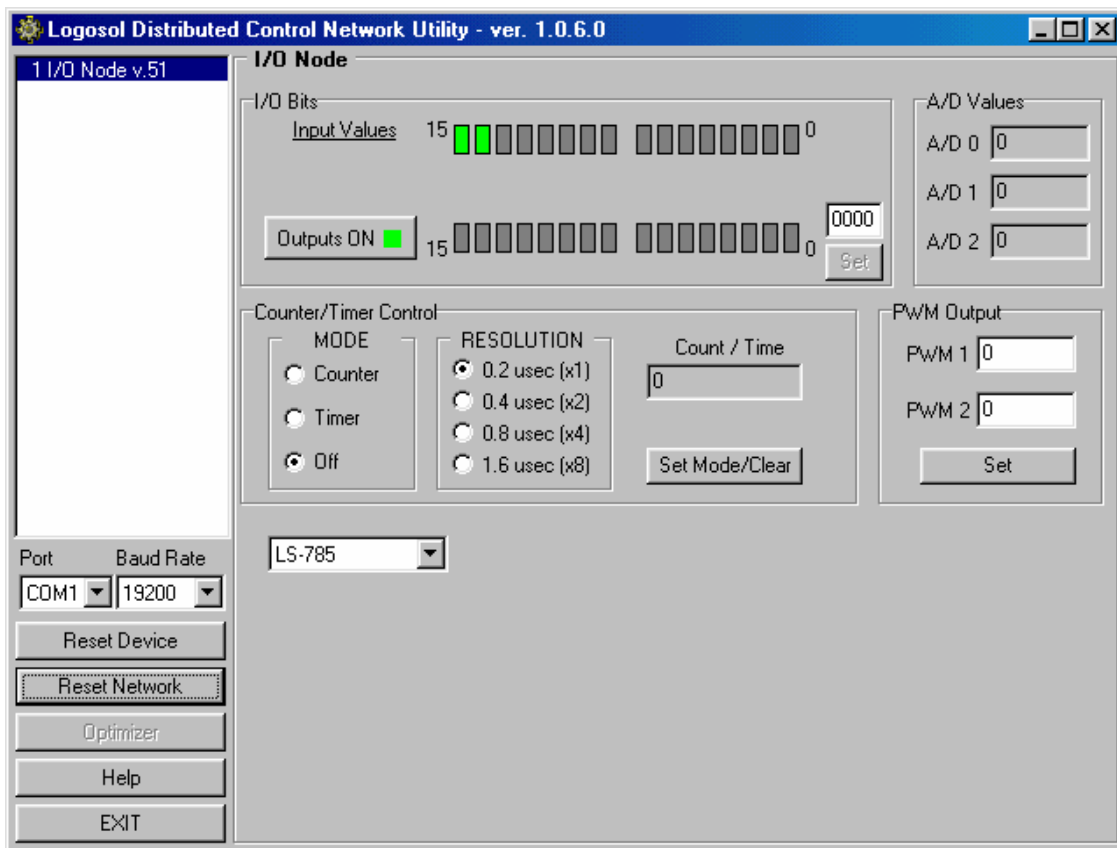
Connect power supply (18 to 32VDC) to LS-785.  
Connect your I/O devices to LS-785 inputs and outputs.  
Make sure that CN4 pin 6 and pin 7 are shorted if REMOTE I/O is not used.  
Connect RS-232 adapter and RJ-45 network cable between LS-785 and your host computer.

### Software Installation

#### 1. Installation and using Logosol Distributed Control Network Utility

##### A. Installation

Insert the Logosol Distributed Control Network Utility installation disk into the floppy drive.  
Select "Run" from the Windows 95/98/NT/XP Start menu.  
Type a:\dcnsetup and then click OK (a: represents the drive letter).  
The installation wizard will guide you through the setup process.



##### B. Initial Connection to the Host

Turn on the power supply.  
Run the Logosol Distributed Control Network Utility.  
Choose the proper COM port.  
You will see the I/O node specific screen. More information about using LDCN utility is available in LDCN Help.

### LS-785 ARCHITECTURE

# Logosol Supervisor I/O Node LS-785

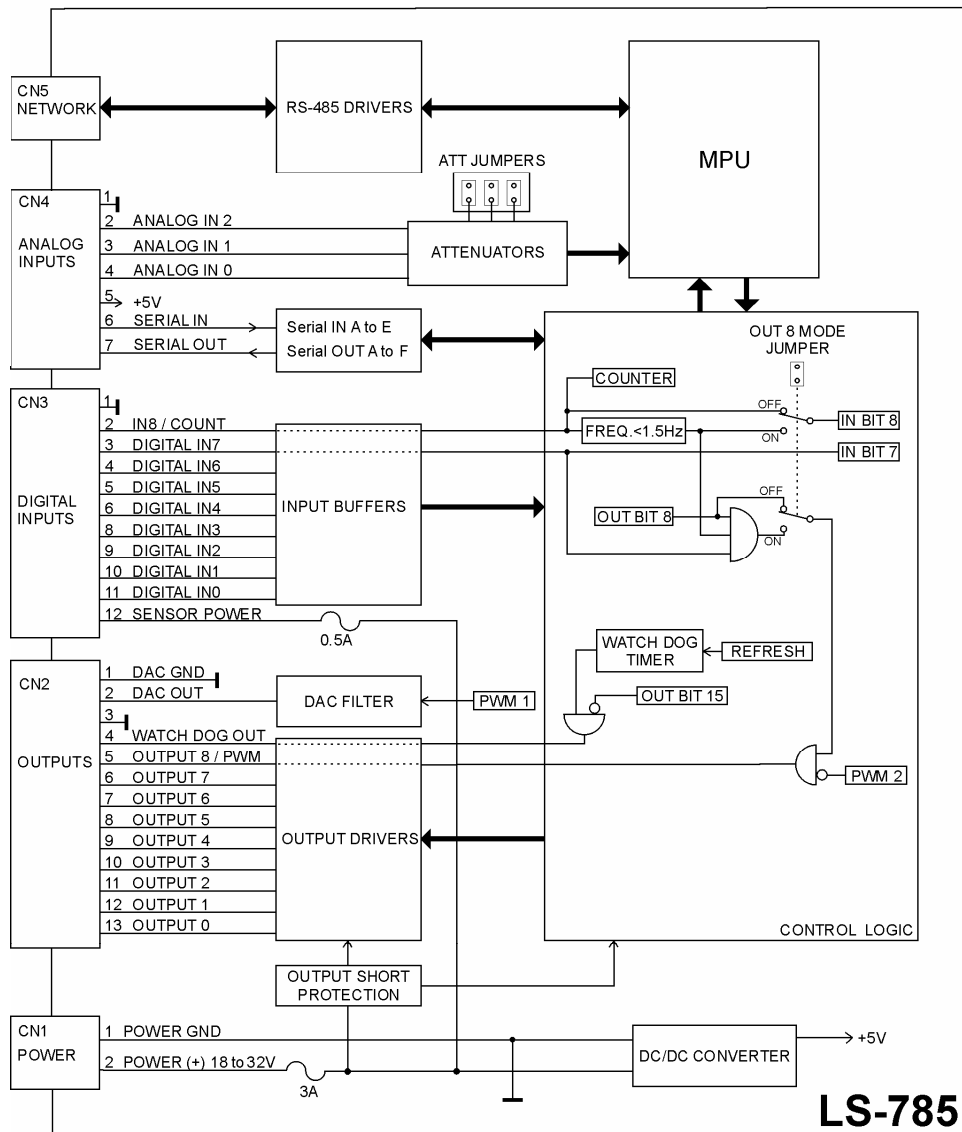
Doc# 712785001, Rev. 1.1, 01/14/2008

## Overview

Supervisor I/O Node LS-785 provides the following capabilities:

- One Watch-dog output (0.25A),
- One multi-mode output - OUTPUT 8 (0.25A),
- Two general-purpose outputs - OUTPUT 6 and OUTPUT 7 (0.25A),
- Six general-purpose outputs - OUTPUT 0 to OUTPUT 5 (0.5A).
- One multi-mode input - IN8 / COUNT,
- Eight general-purpose inputs - DIGITAL IN 0 to DIGITAL IN 7.
- Six output bit's - Serial OUT A to Serial OUT F for remote I/O,
- Five input bit's – Serial IN A to Serial IN E for remote I/O,
- Three 8 bit analog inputs

Up to 30 LDCN nodes can be supervised by a LS-785 over a multi-drop full duplex RS-485 network.



Functional Diagram



# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Serial Command Interface

The serial communication with the LDCN Nodes adheres to a full-duplex (4 wire) 8 bit asynchronous protocol with one start bit, followed by 8 data bits (lsb first), followed by a single stop bit.

The communication protocol also supports a full-duplex multi-drop RS-485 interface which allows multiple LDCN Nodes to be controlled over a single RS-485 port. In this case, the host sends commands over its RS-485 transmit line and receives all status data back over the shared RS-485 receive line. The command protocol is a strict master/slave protocol in which the host master sends a command packet over the command line to a specific LDCN Node. The Node sends back a status packet. Typically, the host does not send another command until a status packet has been received to insure that it does not overwrite any previous command data still in use.

Each command packet consists of the following:

*Header byte (0xAA)*

*Address byte - individual or group (0x00 - 0xFF)*

*Command byte*

*0 - 15 data bytes*

*Checksum byte*

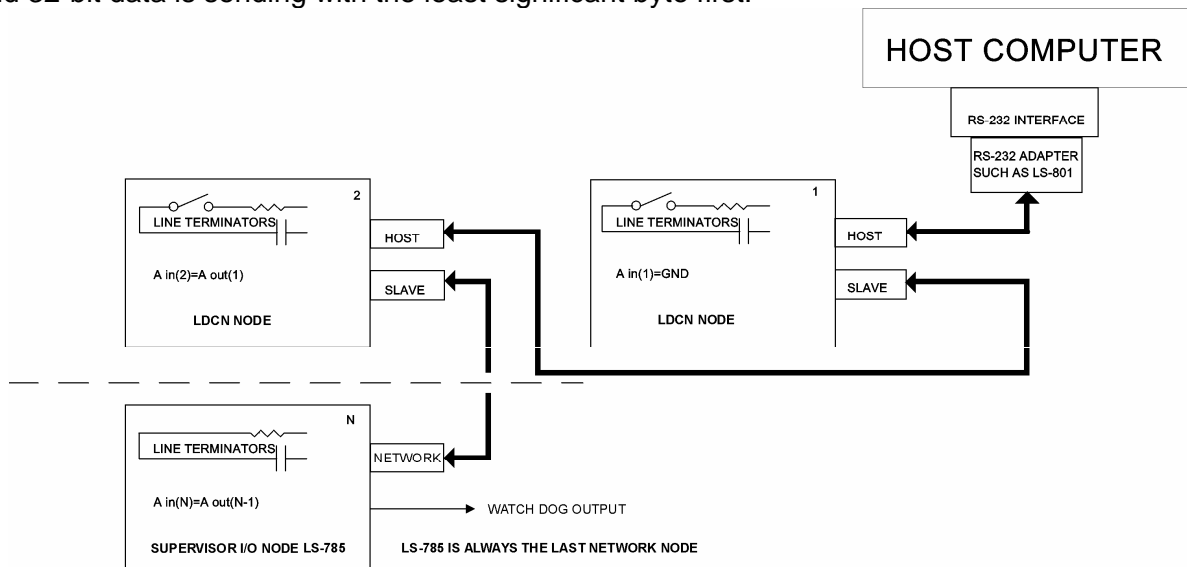
The command byte is divided into upper and lower nibbles: the lower nibble is the command value; the upper nibble is the number of additional data bytes, which will follow the command byte. The checksum byte is 8-bit sum of the address byte, the command byte and the data bytes. The number of data bytes depends on the particular command chosen. After a command is issued, the corresponding node will send back a status packet consisting of:

*Status byte*

*Optional bytes of status data*

*Checksum byte*

The Status Byte contains basic status data about the LDCN Node, including a checksum error flag for the command just received. The number and the meaning of Optional Status Data Bytes are programmable by the user and may include any, none or all of data available from the module. The checksum byte is the 8-bit sum of the status byte and the additional optional status data bytes. All 16-bit and 32-bit data is sending with the least significant byte first.



Multiple Controller Configuration

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Addressing

Rather than using hard-wired or switch-selected address of each LDCN Node, the host dynamically sets the address of each node with the aid of the daisy-chained "A in" and "A out" lines. This allows additional LDCN Nodes to be added to an RS-485 network with no hardware changes. On Power-up, "A in" of the first LDCN Node is pulled low, its communication is enabled and the default address is 0x00. When the *Set Address* command is issued to give this node a new unique address, it will lower its "A out" line. Connecting "A out" to the "A in" of the next node on the network will enable its communication at default address of 0x00. Repeating this procedure allows a variable number of nodes present to be given unique addresses. **LS-785 is always the last node of the network.**

## Group Addresses

In addition to the individual address, each node has a secondary group address. Several LDCN nodes may share a common group address. This address is useful for sending commands, which must be performed simultaneously by a number of nodes (e.g. *Set Baud Rate*, etc.). When a node receives a command sent to its group address, it will execute the command but not send back a status packet. This prevents data collisions on the shared response line. When programming group addresses, however, the host can specify that one member of the group is the "group leader". The group leader will send back a status packet just like it would for a command sent to its individual address. The group address is programmed at the same time as unique individual address using the *Set Address* command.

## Changing Communications Rates

The default baud rate after Power-up is 19.2 Kbps. Baud rates up to 1.25 Mbps may be used. After communication has been established with all nodes on a single network, the baud rate may be changed to a higher value using *Set Baud Rate* command.

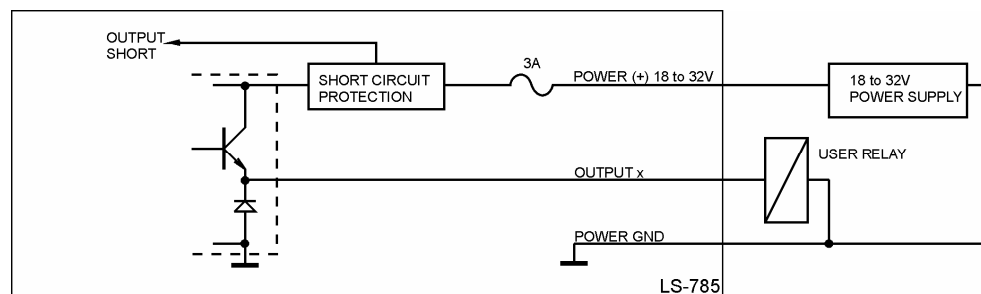
## Digital Outputs

LS-785 features:

- one Watch-dog output (0.25A),
- six output bit's - Serial OUT A to Serial OUT F for REMOTE I/O,
- one multi-mode output - OUTPUT 8 (0.25A),
- two general-purpose outputs - OUTPUT 6 and OUTPUT 7 (0.25A),
- six general-purpose outputs - OUTPUT 0 to OUTPUT 5 (0.5A).

All the hardware outputs are equipped with protective diodes for inductive loads.

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1	WD Lock bit	Serial OUT F	Serial OUT E	Serial OUT D	Serial OUT C	Serial OUT B	Serial OUT A	OUT bit 8
Byte 0	OUTPUT 7	OUTPUT 6	OUTPUT 5	OUTPUT 4	OUTPUT 3	OUTPUT 2	OUTPUT 1	OUTPUT 0

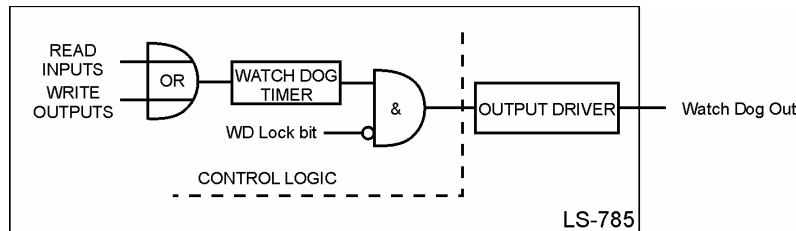


Digital Outputs schematics

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

The Watch-dog output = ON if  
the Watch-dog timer is refreshed *AND* WD Lock bit is cleared



The Watch-dog timer is refreshed with any update of the digital inputs or digital outputs.

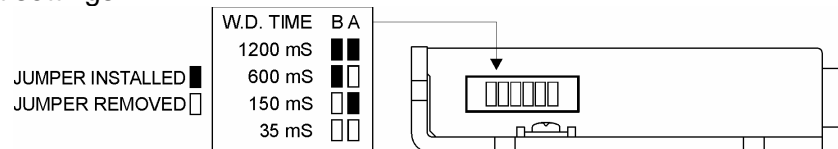
*Set Outputs* command.

*Synch Output* command.

*Read Status* command with bit 0 set.

Any other valid command if the currently defined status packet includes Input byte 0 and 1.

Watch-dog time-out settings

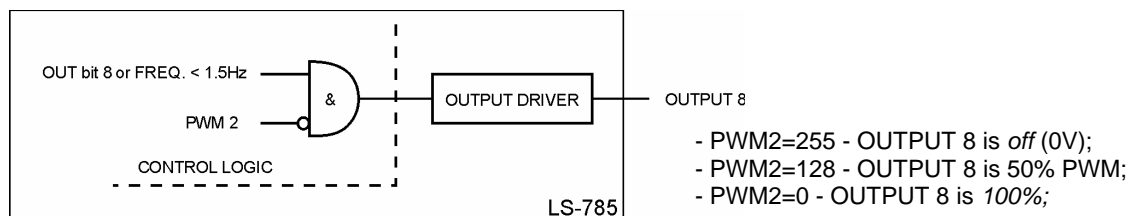


If the Watch-dog timer is not refreshed before time-out period, the Watch-dog output will be forced to OFF and both STATUS 1 and STATUS 0 bit's will be cleared.

To restore the normal operation the *Hard reset* and then *Set Address* command's should be send.

The multi-mode OUTPUT 8 may be used as:

PWM output. See *Functional Diagram*



Hardware MOTION / STOP control mode – OUT 8 MODE jumper = ON See *Functional Diagram*

OUTPUT 8 = ON if

OUT bit 8 = HIGH

AND DIGITAL IN 7 = HIGH

AND IN8 / COUNT frequency is less then 1.5 Hz

All output bits will be cleared after *power up*, *Hard reset* command or after *initializing* the network. To enable the outputs *Set Address* command should be send first.

If one or more active outputs are shorted to POWER GND, all outputs will be turned off, and STATUS 0 bit will be cleared (see *Digital inputs* section). To restore the normal operation the *Hard reset* and then *Set Address* commands should be send.

**Analog output**

8 bit digital to analog converter 0V (PWM1=0) to 10V (PWM1=255)

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

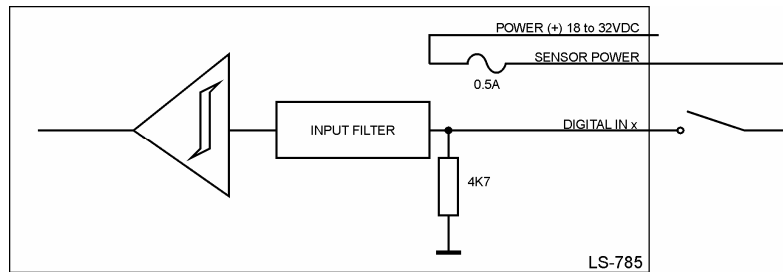
## Digital Inputs

LS-785 features:

- two status bit's – STATUS 1 and STATUS 0,
- five input bit's – Serial IN A to Serial IN E for remote I/O,
- one multi-mode input - IN8 / COUNT,
- eight general-purpose inputs - DIGITAL IN 0 to DIGITAL IN 7.

Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1	STATUS 1	STATUS 0	Serial IN E	Serial IN D	Serial IN C	Serial IN B	Serial IN A	IN bit 8
Byte 0	DIGITAL IN 7	DIGITAL IN 6	DIGITAL IN 5	DIGITAL IN 4	DIGITAL IN 3	DIGITAL IN 2	DIGITAL IN 0	DIGITAL IN 0

To activate an input the corresponding sensor must be able to source 6mA/24V.



Digital Inputs schematics

The multi-mode INPUT 8 can be used in three modes:

- general-purpose input – OUT 8 MODE jumper = OFF
- counter mode – refer to *Set Timer Mode* command in the *Command Description* section
- hardware MOTION / STOP control mode – OUT 8 MODE jumper = ON See *Functional Diagram*

IN bit 8 = HIGH if

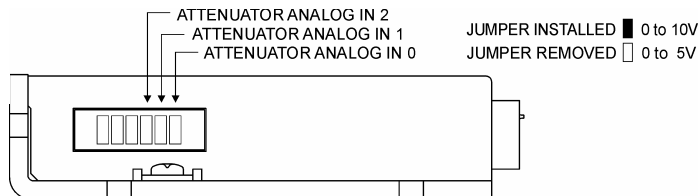
input frequency is less then 1.5 Hz.

STATUS 1 and STATUS 0 bits are used for diagnostics:

STATUS 1	STATUS 0	
0	0	Watch-dog
0	1	Serial I/O Error
1	0	Output Short
1	1	O.K.

## Analog Inputs

LS-785 has three 8 bit analog inputs. The input range may be set using jumpers as it is shown below:



## SERIAL IN and SERIAL OUT

Receive and transmit lines for interfacing with LOGOSOL's proprietary REMOTE I/O devices.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## COMMAND SPECIFICATION

The following section describes in detail the commands available for the LS-785.

Command	CMD Code	# Data bytes	Description
---	0X0	0	Not used
Set Address	0x1	2	Sets the individual and group addresses
Define Status	0x2	1	Defines which data should be sent in every status packet
Read Status	0x3	1	Causes particular status data to be returned just once
Set PWM	0x4	2	Immediately sets the PWM output values
Synch Output	0x5	0	Outputs previously stored output bits and PWM output values
Set Outputs	0x6	2	Immediately sets the states of the output bits
Set Synch Output	0x7	4	Stores output bit values and PWM values to be synchronously set with the <i>Synch Output</i> command
Set Timer Mode	0x8	1	Sets mode of the counter/timer and its prescaler
---	0x9	0	Not used
Set Baud Rate	0xA	1	Sets the baud rate (group command only)
---	0xB	0	Not used
Synch Input	0xC	0	Synchronously stores the input bit values and the counter/timer value
---	0xD	0	Not used
Nop	0xE	0	Simply causes the defined status data to be returned
Hard reset	0xF	0	Resets the controller to its power-up state.

## LS-785 Command Description

### **Set Address**

*Command value:* 0x1

*Number of data bytes:* 2

*Command byte:* 0x21

*Data bytes:*

1. *Individual address: 0x00-0x7F (initial value 0x00)*

2. *Group Address: 0x80-0xFF (initial value 0xFF)*

### Description:

Sets the individual address and group address. Group addresses are always interpreted as being between 0x80 and 0xFF. If a node is to be a group leader, clear bit 7 of the desired group address in the second data byte. The node will automatically set bit 7 internally after flagging itself as a group leader. (If bit 7 of the second data byte is set, the node will be by default a group member.) The first time this command is issued after power-up or reset, it will also enable communications for the next node on the network chain by lowering the it's "A out" signal.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Define Status

Command value: 0x2  
Number of data bytes: 1  
Command byte: 0x12

### Data bytes:

#### 1. Status items: (default: 0x00)

- |     |    |   |
|-----|----|---|
| Bit | 0: | send Input Byte 0 and Byte 1 (2 bytes)  |
|     | 1: | send ANALOG IN 0 value (1 byte)   |
|     | 2: | send ANALOG IN 1 value (1 byte)   |
|     | 3: | send ANALOG IN 2 value (1 byte)   |
|     | 4: | send counter/timer value (4 bytes, least significant first)                                   |
|     | 5: | send device ID, version number (2 bytes)<br>(LS-785 device ID = 2, version number = 50 to 59) |
|     | 6: | send input bit values captured with the Synch Input command (2 bytes)                         |
|     | 7: | send counter/timer value captured with the Synch Input command (4 bytes)                      |

### Description:

Defines what additional data will be sent in the status packet along with the status byte. Setting bits in the data byte will cause the corresponding additional data to be included in the status packet. The status data will always be sent in the order listed. For example if bits 0 and 3 are set, all subsequent status packets will consist of the status byte followed by two bytes of input bit data, followed by the ANALOG IN 2 input byte, followed by the checksum. The status packet returned in response to this command will include the additional data bytes specified. On power-up or reset, the default status packet will include only the status byte and the checksum byte.

## Read Status

Command value: 0x3  
Number of data bytes: 1  
Command byte: 0x13

### Data bytes:

#### 1. Status items: (default: 0x00)

- |     |    |   |
|-----|----|---|
| Bit | 0: | send Input Byte 0 and Byte 1 (2 bytes)  |
|     | 1: | send ANALOG IN 0 value (1 byte)   |
|     | 2: | send ANALOG IN 1 value (1 byte)   |
|     | 3: | send ANALOG IN 2 value (1 byte)   |
|     | 4: | send counter/timer value (4 bytes, least significant first)                                   |
|     | 5: | send device ID, version number (2 bytes)<br>(LS-785 device ID = 2, version number = 50 to 59) |
|     | 6: | send input bit values captured with the Synch Input command (2 bytes)                         |
|     | 7: | send counter/timer value captured with the Synch Input command (4 bytes)                      |

### Description:

This is a non-permanent version of the *Define Status* command. The status packet returned in response to this command will incorporate the data bytes specified, but subsequent status packets will include only the data bytes previously specified with the *Define Status* command.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Set PWM

Command value: 0x4

Number of data bytes: 2

Command byte: 0x24

Data bytes:

1. PWM 1 output value (0 to 255)

2. PWM 2 output value (0 to 255)

### Description:

Immediately set the two PWM output values. To use OUTPUT 8 in PWM mode, set output byte bit 8 (*Set Output* command) to 1.

## Synch Output

Command value: 0x5

Number of data bytes: 0

Command byte: 0x05

Data bytes:

None

### Description:

Synchronously set the output bit values and PWM values previously stored with the *Set Synch Output* command.

## Set Output

Command value: 0x6

Number of data bytes: 2

Command byte: 0x26

Data bytes:

1. Output Byte 0

2. Output Byte 1

### Description:

Immediately sets the values for the output bits.

## Set Synch Output

Command value: 0x7

Number of data bytes: 4

Command byte: 0x47

Data bytes:

1. Bit values for Output bits 0-7

2. Set this byte to 0x00

3. PWM 1 output value (0 to 255)

4. PWM 2 output value (0 to 255)

### Description:

Stores output bit values and PWM values in internal registers to be set synchronously with the *Synch Output* command.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Set Timer Mode

Command value: 0x8  
Number of data bytes: 1  
Command byte: 0x18  
Data bytes:

### 1. Timer mode configuration byte

Bit 0: 0 = Counter/timer disabled, 1 = Counter/timer enabled

Bit 1: 0 = Select timer mode, 1 = Select counter mode

Bits 5,4: 00 = No prescaler (count every event)

01 = 2:1 prescaler (every other event counted)

10 = 4:1 prescaler (every 4<sup>th</sup> event counted)

11 = 8:1 prescaler (every 8<sup>th</sup> event counted)

Bits 2,3,6,7: are not used

## Description:

Sets the operating mode of the counter/timer. In counter mode, each active (high to low) transition of DIGITAL IN 9/ COUNT will be counted. In timer mode, the counter counts the node's 5.0 MHz internal clock. The prescaler applies to both the counter and the timer modes.

## Set Baud Rate

Command value: 0xA  
Number of data bytes: 1  
Command byte: 0x1A  
Data bytes:

### 1. Baud rate divisor, BRD

sample values:

9600 BRD = 0x81

19200 BRD = 0x3F

57600 BRD = 0x14

115200 BRD = 0x0A

125000 BRD = 0x27

312500 BRD = 0x0F

625000 BRD = 0x07

1250000 BRD = 0x03

## Description:

Sets the communications baud rate. All control nodes on the network must have their baud rates changed at the same time, therefore this command should only be issued to a group including all of the modules on the network. A status packet returned from this command would be at the new baud rate, so typically, there should be no group leader when this command is issued. (Note that the host's baud rate must also be changed for subsequent communication.)

## Synch Input

Command value: 0xC  
Number of data bytes: 0  
Command byte: 0x0C  
Data bytes:  
None

## Description:

Causes the current Input bit values and the counter/timer value to be synchronously stored in the node's internal registers. These values can be read using the *Read Status* or the *Define Status* commands.



# Logosol Supervisor I/O Node LS-785

---

Doc# 712785001, Rev. 1.1, 01/14/2008

## No Operation

Command value: 0xE  
Number of data bytes: 0  
Command byte: 0x0E

### Description:

Does nothing except that causes a status packet with the currently defined status data to be returned.

## Hard Reset

Command value: 0xF  
Number of data bytes: 0  
Command byte: 0x0F

### Description:

Resets modules to their power-up state. No status will be returned. Typically, this command is issued to all modules on the network, although if the baud rate is set to the default value, it is possible to reset and re-initialize the addresses of a contiguous sub-chain of modules.

## Status Byte

The first byte of each status packet is the status byte. This node has only one bit defined: *if bit 1 of the Status Byte is set, in was a checksum error detected in most recently command packet recieved.* Bits 0, 2, 3, 4, 5, 6 and 7 are undefined and can be ignored.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Initializing Procedure and Programming Examples

To ensure a proper operation of LDCN nodes connected to the network, the addresses for all connected units must be set.

### **Understanding the Serial Communication with LDCN node**

The Serial Communication with LDCN nodes is strictly master-slave and includes repeatedly two elements:

- Sending a command to the specified node's address;
- Receiving answer to the sent command – Status Byte(s).

Note: During the communication all bytes are sent with LSB first.

### **Commands**

There are 12 commands controlling this node (refer to Command Description). Each command includes header, address, command, data bytes and one checksum byte. Checksum does not include the header byte.

### **Structure of Read Status command**

Byte 1	Byte 2	Byte 3		Byte 4	Byte 5
Header	Address (Individual or Group)	Command Code		Data Byte	Checksum = Byte 2 + Byte 3 + Data Byte
		High 4 bits number of data bytes	Low 4 bits command code		
AA	01	1	3	01	15

### **Examples**

Cmd. Bytes	Byte 1	Byte 2	Byte 3	Byte 4 – N	Byte N+1
Command	Header	Address	Cmd. Code	Data Byte(s)	Checksum
No operation	AA	01	0 E		0F
Define Status	AA	05	1 2	05	1C
Set Address	AA	01	2 1	07 FF	28
Set Synch Output	AA	01	4 7	07 01 80 00	D0

### **Status Data**

The structure of the returned status information depends on *Define Status* or *Read Status* commands (refer to Command Description). By default only the Status byte and Checksum are returned to the host. Normally the returned Status Byte is 00h.

### **Examples**

Byte 1	Optional Bytes 0-16	Checksum
Status Byte	Additional Status Bytes as inputs, A/Ds, counter / timer, version, etc.	Checksum = Byte 1 + Optional Bytes
00	no additional status bytes requested	00
00	01 23 05 10 – four additional status bytes	39

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

## Addressing

Each node on the daisy-chained network has two addresses:

- Individual address - for individual control of each node. It is from 01h to 7Fh.
- Group address - for simultaneous control of all group members by sending a single command to their group address. It is between of 80h to FFh.

Both individual and group addresses have to be set during the initialization process.

The group may have Group leader responsible to send status data. Its address is:

Group leader address = Group address - 80h.

If there is no group leader - no status data will be send after a group command.

*Set Baud Rate* command must be sent only as a group command with no group leader, otherwise communication problems may occur.

## Set Address Command:

Next table presents the structure of *Set Address* command. The preset address 00h is set by the firmware after power-up.

Example of *Set Address* command

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Header	Preset Address	Command code	Individual Address	Group Address	Checksum
AA	00	21	01	FF	21

## Setting the Addresses

After power-up and *Hard Reset* command all nodes have their address set to 00h and only the first node (starting from the host) has its communication enabled. Consecutive *Set Address* commands are sent to address 00h until all nodes are addressed. This procedure can be executed once after *Hard Reset*. The table below shows the steps to address 3-nodes network.

## Example of sequential addressing for three LDCN nodes

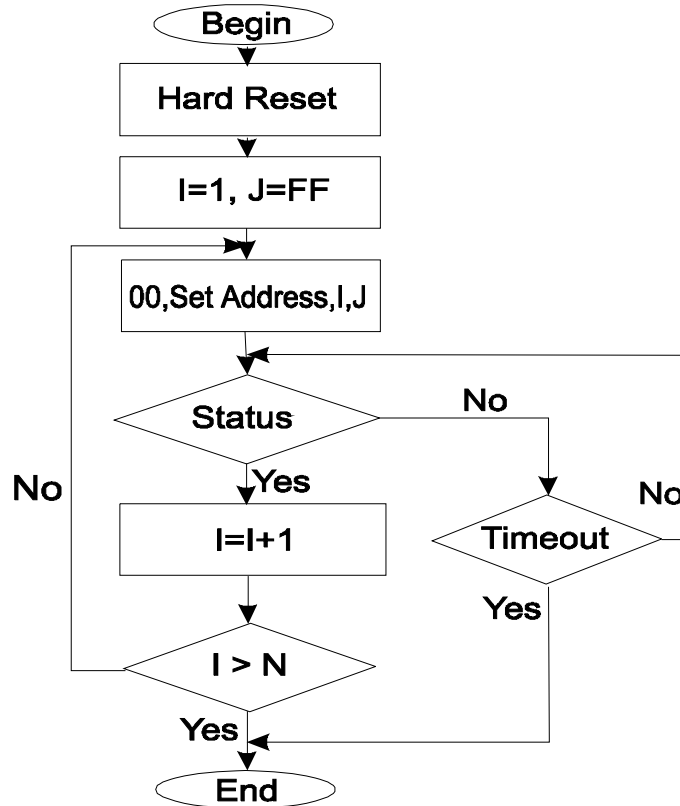
Step	Command	Set address Hexadecimal Code	Node 1		Node 2		Node 3	
			Individual address	Group address	Individual address	Group address	Individual address	Group address
0	Power-up							
1	Hard Reset	AA FF 0F 0E	address=00 communication enabled		address=00 communication disabled		address=00 communication disabled	
2	Set Address Node1 = 01	AA 00 21 01 FF 21	01	FF	address=00 communication enabled		address=00 communication disabled	
3	Set Address Node2 = 02	AA 00 21 02 FF 22	01	FF	02	FF	address=00 communication enabled	
4	Set Address Node3 = 03	AA 00 21 03 FF 23	01	FF	02	FF	03	FF

Note: Before start addressing *Hard Reset* command must be issued.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

The flowchart shows the addressing procedure of N drives network. There is no group leader and the group address is FF.



*I* - Individual Address; *J* - Group Address = FF;  
*Status* - Status Data sent to the Host; *Timeout* - Greater than one servo circle.

# Logosol Supervisor I/O Node LS-785

Doc# 712785001, Rev. 1.1, 01/14/2008

Examples of Managing Two LDCN I/O nodes

# 1 – Resets all nodes with group command.

# 2 and # 3 - Sets the addresses of node1 and 2.

# 4, # 5 - Reads the inputs of node 1, node 2.

# 6, # 7 - Reads analog inputs of node 1, node 2.

# 8, # 9 - Sets the outputs of node 1, node 2.

# 10 and # 11 - Sets PWM values of node 1.

# 12 and # 13 - Sets PWM values of node 2.

# 14 and # 15 - Sets timer mode for node 1 and read four timer's bytes.

# 16 and # 17 - Sets counter mode for node 2 and read four counter's bytes.

## Examples

#	Hexadecimal code of command	Comments
1	AA FF 0F 0E	<i>Hard Reset</i>
2	AA 00 21 01 FF 21	Sets address 01h for node 1. Group address is FFh.
3	AA 00 21 02 FF 22	Sets address 02h for node 2. Group address is FFh.
4	AA 01 13 01 15	Reads inputs of node 1. Use <i>Read Status</i> command. Set Command Byte to 01h to read the inputs.
5	AA 02 13 01 16	Reads inputs of node 2. Use <i>Read Status</i> command. Set Command Byte to 01h to read the inputs.
6	AA 01 13 0E 22	Reads analog inputs' values of node 1. Use <i>Read Status</i> command. Set Command Byte to 0Eh. When Command Bits 1, 2 and 3 are set to 1 the analog inputs' values are requested.
7	AA 02 13 0E 23	Reads analog inputs' values of node 2. Use <i>Read Status</i> command. Set Command Byte to 0Eh.
8	AA 01 26 07 00 2E	Sets outputs 0, 1 and 2 of node 1. Second output byte is 00h.
9	AA 02 26 33 00 5B	Sets outputs 0, 1, 4 and 5 of node 2. Second output byte is 00h.
10	AA 01 26 00 10 37	Sets output 8 of node 1, before to set PWM2.
11	AA 01 24 80 56 FB	Sets PWM for node 1 – PWM1=80h, PWM2=56h.
12	AA 02 26 00 10 38	Sets output 8 of node 2, before to set PWM2.
13	AA 02 24 00 FF 25	Sets PWM for node 2. – PWM1=00h, PWM2=FFh.
14	AA 01 18 01 1A	Sets timer mode for node 1. Use <i>Set Timer Mode</i> command. Command Bit 0 is set to 1. Command Bits 5 and 4 are set to 0 (no prescaler).
15	AA 01 13 10 24	Reads timer bytes from node 1. Use <i>Read Status</i> command with Command Byte to 10h.
16	AA 02 18 03 1D	Sets counter mode for node 2. Use <i>Set Timer Mode</i> command for node 2. Command Bits 0 and 1 are set to 1. Command Bits 5 and 4 are set to 0 (count every event).
17	AA 02 13 10 25	Reads counter bytes from node 2. Use <i>Read Status</i> command. Set Command Byte to 10h.