LON 078

User's Manual

LonWorks Interface Board

LON 078-US-04
EFFECTIVE 10/1/94

ABB Drives

ABB

LON 078
LonWorks Interface Board
For ACS 500, ACH 500, Series B

User's Manual

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EFFECTIVE 10/1/94

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Chapter 1 – Introduction

This chapter describes the purpose and contents of this manual, describes the intended audience, explains conventions used in this manual, and lists related publications.

How to Use this Manual

The purpose of this manual is to provide you with the information necessary to install, start-up, and use the LonWorks interface board for the ACS 500™ and ACH 500™ drives.

Chapter 1 – Introduction, the chapter you are reading now, introduces you to the *LonWorks interface User's manual*, and conventions used throughout the manual.

Chapter 2 – Overview gives an overview of the Echelon LonWorks network. This also gives information of how to use the LonWorks network on a typical installation.

Chapter 3 – Hardware Installation guides through the steps required for a successful installation of the LonWorks card to the drive.

Chapter 4 – Programming, describes how to program the drive to be used with the LonWorks interface card. This chapter also describes in detail every network variable available on the LonWorks interface.

Chapter 5 – Start-up Procedure, gives step by step instructions for the start up of the LonWorks network with the ACH 500 drives.

Chapter 6 – Fault Tracing describes typical troubleshooting procedures to be used for finding the root causes for lack of communication.

Intended Audience

The audience for this manual has:

- Knowledge of standard electrical wiring practices, electronic components, and electrical schematic symbols.
- Minimal knowledge of ABB product names and terminology.
- Previous experience in installing, operating, and programming the ACS 500 or ACH 500 drives.

The audience for this manual will install, start-up, and/or diagnose the LonWorks connection and the drives.

Safety Precautions

Before installing board, observe the following:

Parts within the inverter are at DC Bus potential (1.35 x V_{SUPPLY}) when the drive is connected to supply voltage. This voltage is extremely dangerous and can cause death or serious injury.

When the supply voltage is disconnected from the input terminal block, it will take about five minutes before the DC Bus capacitors are discharged to a safe voltage.

To ensure that the voltage level is safe, measure the voltage between positive (+) and negative (-) on DC Bus Terminals, labeled "Brake." Meter must be rated for 1000 VDC.

Note: If the internal brake option is installed, measure between the input power terminals and the positive (+)DC Bus terminal.

The Control Interface Card and Option Cards are isolated from the main circuit, but dangerous voltages may be present at relay contact terminals. Always check for high voltage at Terminals X50:21 – 29 before working on the Control Interface or Option Cards.

WARNING! When the drive is connected to the line power, the Motor Terminals U_2, V_2, and W_2 are live even if the motor is not running. Do not make any connections when the ACS 500 is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause death or serious injury.

CAUTION: Electrostatic Discharge (ESD) can damage electronic circuits. Do not handle any components without following the proper ESD precautions.

Conventions Used in this Manual

Listed below are some terms and language conventions used in this manual. For terms and conventions used generally with the drive, please see the *Programming Manual Including Application Macros*, or to the *Installation Manual* for the drives.

Bound variables

To transfer data on the LonWorks network, the network variables need to be bound using the network installation tool. Every network variable has a distinctive data-type and information, whether it is an incoming or outgoing variable.

One or many input network variables can be bound to one output network variable. Once this is done, every time there is change of data on the outgoing network variable, the data is sent to every network input variable it is bound to.

kBit/s

Kilobits per second. This term refers to the raw communication speed used by the protocol. This is specifying how many bits (0 or 1) can be transferred on the wire each second.

LonTalk

The protocol used on LonWorks networks.

LonWorks

A set of tools and components for implementing control networks. This is also used as a name for the communication network.

Network variable

The LonWorks network communication is based on entities called network variables. Every device on the network has a predefined, fixed set of network variables.

Each one of the network variables has a data type, a value, and information whether the variable is incoming from the network (input variable) or outgoing to the network (output variable).

These variables can be 'bound' during the installation time for data transfer. Any input variable can receive value from one output variable of exactly the same type. One output variable can be connected to one, or multiple input variables. This binding is done during the installation time, and is not dynamic.

Service Button

The button on the board is used during the installation time for identifying the LonWorks node for the installation tool.

Transformer Coupled

The LonWorks interface is connected to the actual twisted pair cable using a transformer. This transformer will ensure a galvanic isolation in between the LonWorks wiring and the drive.

Wink

The LonWorks interface board has one led on it. With the installation tool it is possible to illuminate this for identifying the exact node on the LonWorks network.

Warranty and Liability Information

The warranty for your ABB drive covers manufacturing defects. The manufacturer carries no responsibility for damage due to transport or unpacking.

In no event and under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation, or abnormal conditions of temperature, dust, or corrosives, or failures due to operation above rated capacities. Nor shall the manufacturer ever be liable for consequential and incidental damages.

The period of manufacturer's warranty is 12 months, and not more than 18 months, from the date of delivery.

Extended warranty may be available with certified start-up. Contact your local distributor for details.

Your local ABB Drives company or distributor may have a different warranty period, which is specified in their sales terms, conditions, and warranty terms.

If you have any questions concerning your ABB drive, contact your local distributor or ABB Drives office.

Chapter 2 – Overview

This chapter gives an overview of the LonWorks communication. This chapter is intended for people who have no or limited knowledge of the LonWorks network.

Introduction

LonWorks is a network developed by Echelon company. The target of the LonWorks network is to provide a common, vendor independent, communication network for intelligent devices.

These devices can be of a wide variety of types, starting from simple limit switches, going into complex electrical drives and building automation systems.

Network Variables

Devices which are connected to the LonWorks network typically have a predefined set of network variables.

Each one of the network variables is either an input network variable (data is coming from the LonWorks network into the device) or a network output variable (data is going out from the device into the LonWorks network).

Also each one of the variables has a predefined data-type, which defines in what units the data is being transferred.

Network variables make it easy to develop networked control applications by eliminating all of the low-level and tedious work of building and sending outgoing messages, and receiving and responding to incoming messages.

Network Variable Types

Each one of the network variables has a predefined data-type which allows easier sharing data of between different device vendors. The use of these Standard Network Variable Types (SNVTs) enables data to be transferred without any question of scaling or units.

ABB LonWorks interface uses only Standard Network Variable Types for the data types.

Bound Variables

The network variables on the device are available for communication. To transfer data between devices, these variables must be cross referenced together. This is done using an installation tool, which will tell to devices what network variables are sent to the network, and which nodes are receiving the data.

For details on binding the variables, see the *Chapter 4 – Programming.*

Service Button

Each one of the LonWorks devices have a push button on it. This is needed during the network installation. When this button is pressed, the LonWorks node sends its unique number ID to the network. This ID number is received by the installation tool, and is used for identifying the hardware device.

Wink LED

Every LonWorks device has a status LED on it. This LED has multiple uses.

It is possible to send a 'wink' command from the installation tool down to one LonWorks interface board for identifying the exact device which corresponds to an Application Node on the configuration.

Also the Status LED will be blinking if the configuration is either missing or is invalid on the LonWorks interface board. In this case the installation tool must reload the configuration to the board.

Media

LonWorks networks can be implemented on many different physical media. The most common one is the transformer coupled 78 kBit/s network. In addition to this, a 1.25 MBit/s transformer coupled network is available.

Both of these are daisy chained buses, typically without any drop-out lines.

Flexible Topology network uses the same wiring as the transformer coupled network, but does not have any restrictions on the wiring. It is possible to make the network as a star, ring, or a bus with drop-out lines using this medial. This is limited to 78 kBit/s communication speed.

ABB ACH 500 interface is based on a 78 kBit/s transformer coupled interface as this is the most widely accepted media for LonWorks communication.

Chapter 3 – Hardware Installation

This chapter goes through the step by step instructions for the installation of the LonWorks interface option board, and for the LonWorks network wiring. This chapter is intended for everybody who will be doing or planning this installation.

Introduction

The LonWorks interface for ACH 500 and ACS 500 drives is implemented using an option board. This board contains the Echelon network driver, and the host board for connectors and for the external components.

LonWorks communication protocol supports multiple physical media for communication. These include

- Transformer coupled twisted pair
- Power line carrier
- Free topology
- Fiber optic link, RS-485, ...

The ACH 500 option card supports as its main media the transformer coupled 78 kBit/s communication.

Option Board Installation

If the LonWorks interface board is not mounted at the factory in the drive, the board must be mounted into the lower option card slot on the drive. The diagrams in this chapter show the ACS 501 hardware. On other ACS/ACH drives the mounting is done behind the drive panel into the same location.

The LonWorks option board is a static sensitive part. Follow ESD procedures when handling the board during installation, and while touching the board.

Board Placement

The LonWorks option board is designed to be mounted to the lower option card slot on the drive. This option card slot is behind the control interface card immediately behind the discrete I/O terminal blocks.

For the board mounting, you will need the following pieces:

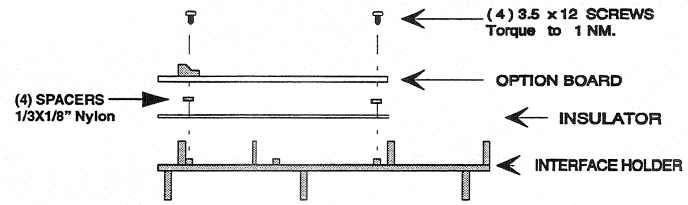
- LonWorks interface board,
- 4 Phillips screws, and
- isolator shield.

Installation

If the LonWorks Interface Board was supplied from the factory, it will already be installed in the drive; you may skip this section and proceed to the next section *"Wiring Connections"*. To determine if the board has been installed by the factory, look at the Part Number on the product nameplate. The optional LonWorks Interface Board is identified by "B" in the 15th digit in an ACS 501 or ACH 501 standard unit (i.e. ACH501-010-4-0BP2), and by the 10th digit in an ACS/ACH 502 unit or an ACS/ACH 501 w/Optionpack (H50101040BP2BABQ0).

To install the optional LonWorks Interface Board, be sure that input power is removed and the drive is safe to open. The placement for the board is shown in *Figure 3-1, "Mounting."*.

Figure 3-1 Mounting.



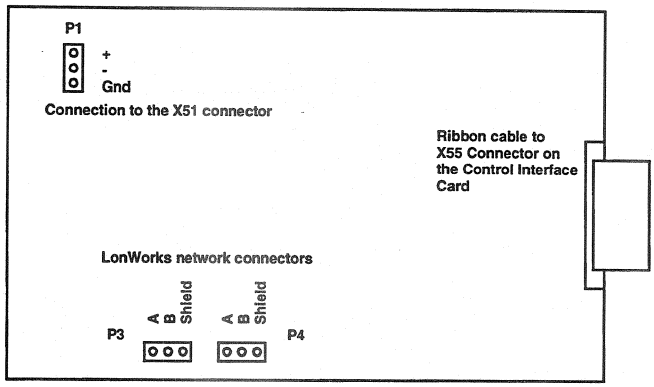
To Install the board, follow these steps:

- Remove the cover of the drive or open the door.
- In ACS 502 and ACH 502 units (floor standing units), locate the control unit which is mounted on the door. The control unit, which contains the control interface board and display/keypad, is hinged. Access the control interface board by removing the two screws securing the assembly.
- Remove the Control Interface Board by disconnecting the cable connected to X54, the ground wire at the lower left hand corner, and removing the screws around the edge of the board.
- Using the four (4) screws supplied, mount the board at the bottom of the control interface holder, installing the nylon spacers supplied between the board and the insulator.
- Connect wires to the X51 connector from the interface card to the control interface card on the drive. This is described in section *"Wiring Connections"*.
- Connect the ribbon cable to the X55 connector on the control interface card. This is described in section *"Wiring Connections"*.
- Replace the control interface board, securing with the six screws that were removed previously, and reconnect the ground wire and cable.

Wiring Connections

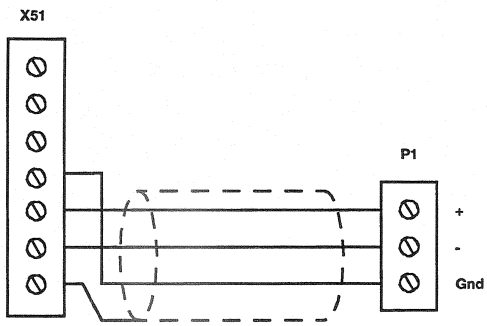
The LonWorks interface board needs to be connected to the control interface card on the drive. The two connections are shown in *Figure 3-2, "Board connections"*.

Figure 3-2 Board connections



- The ribbon cable on the right side of the interface card mounts directly to the X55 connector on the drive.
- The P1 connector is wired to the X51 Connector on the drive. The wiring should be done using a twisted shielded pair cable. Excessive wire lengths are to be avoided. The wiring is shown in *Figure 3-3, "P1 Wiring"*.

Figure 3-3 P1 Wiring



Network Wiring

The LonWorks network is wired using a twisted shielded pair cable. The interface is a transformer coupled with two conductors to the option board. Because of the transformer coupling, the two signal wires can be connected either way to the connectors P3 and P4.

The LonWorks network should be a daisy chained bus. The LonWorks option board has been designed for this kind of installation with the two connectors P3 and P4. These are electrically connected together on the board, allowing an easy daisy chaining of the bus.

Without any stubs, the specifications for the 78 kBit/s LonWorks network is shown in *Table 2-1, "Performance Specification,"*.

Table 2-1 Performance Specification

Performance Specification	TP/XF-78
Transmission Speed	78 kBit/s
Nodes per Channel	64
Network Bus Wiring	UL Level IV, 22 AWG (0.65mm) twisted pair
Network Stub Wiring	UL Level IV, 22 or 24 AWG (0.5mm) twisted pair
Network Bus Length (With no Stubs)	6000ft (2000m)
Maximum Stub Length	9ft (3m)
Network Terminators	Required at Both Ends of the Network
Isolation between Network and I/O Connectors 0 - 60 Hz (60 seconds) 0 - 60 Hz (continuous)	 1,000 VRMS 277 VRMS

Cable

The LonWorks network cable should be a twisted shielded pair cable with a wire gage of 22.

The maximum length of the network from end-point to end-point is 6000 ft.

Connectors

The LonWorks interface board is supplied with two connectors for the LonWorks network. These are located at the bottom of the interface board, and are marked as P3 and P4. The connections on these two terminals are electrically connected together to simplify the daisy-chained bus wiring. Incoming and outgoing wires can be connected to different terminals, thus eliminating the need for placing two wires under one screw.

On the LonWorks twisted pair cable, one signal wire needs to be connected to the terminal marked A, and the other one to the terminal marked B. The shield is to be connected to the terminal marked Shield.

It does not matter which one of the signal wires is connected to A and B. These are interchangeable.

Chapter 4 – Programming

This chapter describes how to program the drive parameters for the LonWorks interface option card. This chapter also goes through in detail all the network variables available through the interface. This chapter is intended to everybody who is either commissioning the LonWorks network, or is customizing the drive functionality while using the LonWorks network.

Introduction

The LonWorks interface is built on the user friendly and flexible ACH 500 and ACS 500 drive interface. This has the advantage that the drive operation can be customized for the specific application by simply modifying the parameter values on the drive.

To get the most out of the interface, some control place parameters have to be set correctly for the LonWorks interface. It is also possible to mix discrete control and feedback using the Analog and Digital I/O with the control and feedback through LonWorks. All of this selection is done through the drive parameters.

To understand the drive setup, it is necessary to understand the available network variables on the drive. These are explained in the following paragraphs.

Network Variables

Network variables are pre-defined variables, which the LonWorks interface board can either transmit or receive. Each network variable has a unique name and pre-defined data type.

These network variables can be 'bound' during the system installation time using an installation tool. This binding connects one output variable from one device to one or multiple input variables on other devices.

Once this binding is done, the installation tool can be removed from the network, and every time the output variable changes, it is automatically sent to every input variable to which it has been 'bound' to.

The ACH 500 drive has a pre-defined set of these variables. These are divided to Network Input variables which are coming into the drive, and to Network Output variables which are going out from the drive.

The Network variables which are not bound are not used and will not cause any communication overhead to the system.

ACS500.XIF

The installation tool knows the complete and accurate list of the Network Variables from the `ACS500.XIF` file which is provided with the LonWorks interface board. This is a necessary file for the installation.

Input Variables

The complete list of the network input variables for the LON 078 board is shown in *Table 4-1, "Network Input Variables"*. The ACH 500 drive can receive data using these variables. To use these variables, the control place logic parameters on the drive must be programmed correctly. See the section *"Drive Setup"* for details.

Table 4-1 Network Input Variables

Drive Parameter	Network Variable	Type	Min. Value	Max. Value	Units
Frequency Reference	Freq_Ref Freq_Ref_Cnt	SNVT_freq_hz SNVT_count	0.0 0.00	120.0 120.00	0.1 Hz 0.01 Hz
% Reference (R2)	Ref2 Ref2_Cnt	SNVT_lev_percent SNVT_count	-163.84 0.00	163.84 655.35	0.005 % 0.01 %
Current Limit	Curr_Limit	SNVT_amp	-3276.8	3276.7	0.1 A
Accel Time 1	Accel_Time1	SNVT_count	0.1	1800.0	0.1 s
Decel Time 1	Decel_Time1	SNVT_count	0.1	1800.0	0.1 s
PI Gain	PI_Gain	SNVT_count	3.0	800.0	0.1 s
PI I-Time	PI_ITime	SNVT_count	0.02	320.00	0.01 s
Drive Run/Stop	Drive_Run	SNVT_lev_disc	STOP	START	logical
Heart-Beat Bit	Heart_Beat	SNVT_lev_disc	0	1	logical
Panel Lock	Lock_Panel	SNVT_lev_disc	OPEN	LOCKED	logical
Fault Reset	Reset_Fault	SNVT_lev_disc	n/a	RESET	logical
Drive Direction	Direction	SNVT_lev_disc	FORWARD	REVERSE	logical

Output Variables

The complete list of the network output variables for the LON 078 board is shown in *Table 4-2, "Network Output Variables"*. These parameters are available always. Only the drive communication must be programmed correctly. This is described in details in section *"Drive Setup"*.

Table 4-2 Network Output Variables

Drive Parameter	Network Variable	Type	Min. Value	Max. Value	Units
Output Frequency	Freq_Act Freq_Act_Cnt	SNVT_freq_hz SNVT_count	0.0 0.00	120.0 120.00	0.1 Hz 0.01 Hz
Speed	Speed_Act	SNVT_count	0	65,535	
Motor Current	Current_Act	SNVT_amp	-3276.8	3276.7	0.1 A
% Torque	Torque Torque_Cnt	SNVT_lev_percent SNVT_count	-163.84 -300	163.835 300	0.005 % 1 %
% Power	Power Power_Cnt	SNVT_lev_percent SNVT_count	-163.84 -300	163.835 300	0.005 % 1 %
Drive Temperature	Drive_Temp	SNVT_temp	-274.0	6279.5	0.1 °C
Cumulative Energy	KWH WH_Float	SNVT_elec_kwh SNVT_elec_wh_f	0 0	65535 $1.0 * 10^{38}$	1 kWh 1 Wh
Cumulative Runtime	Run_Time	SNVT_count	0	65535	1 H
Fault Latest	Fault1	SNVT_count	0	49	enum
Fault Middle	Fault2	SNVT_count	0	49	enum
Fault Oldest	Fault3	SNVT_count	0	49	enum
Current Limit	Curr_Limit_Act	SNVT_amp	-3276.8	3276.7	0.1 A
Accel Time 1	Accel_Time1_Act	SNVT_count	0.1	1800.0	0.1 s
Decel Time 1	Decel_Time11_Act	SNVT_count	0.1	1800.0	0.1 s
PI Gain	PI_Gain_Act	SNVT_count	3.0	800.0	0.1 %
PI I-Time	PI_ITime_Act	SNVT_count	0.02	320.00	0.01 s
Drive Run/Stop	Running	SNVT__lev_disk	STOP	RUN	logical
No Fault/Fault	Faulted	SNVT_lev_disc	OK	FAULT	logical
Forward/Reverse	Reverse	SNVT_lev_disc	FORWARD	REVERSE	logical
Drive Read OK	Drive_Read	SNVT_lev_disc	OK	FAILED	logical
Drive Write OK	Drive_Write	SNVT_lev_disc	OK	FAILED	logical
Digital Output 1	Digital_Out_1	SNVT_lev_disc	OFF	ON	logical
Digital Output 2	Digital_Out_2	SNVT_lev_disc	OFF	ON	logical
Digital Output 3	Digital_Out_3	SNVT_lev_disc	OFF	ON	logical

Digital Outputs

All the digital outputs are defined as network output variables for the LonWorks interface.

This enables the user to specify conditional logical values, which can be used for multiple purposes. Each one of the digital outputs can be programmed for different functions using the parameters in the group 10.6 Relay Outputs. This status information can be used with the LonWorks even if the relay outputs are not physically connected to anything.

Examples of status information available using the relay output network variables include: Over Temperature Warning, Reference 2 is Selected, Drive is at Current Limit, or Drive is at Speed to mention a few.

Communication Errors

The LON 078 board has two diagnostics variables for diagnosing the interface in between the LON 078 board and the ACH 500 drive. These are: `Drive_Read` and `Drive_Write`.

When a communication error occurs while reading from the drive the `Drive_Read` network variable is set to `FAILED` (`ST_ON`). No other action is taken, and all the network output variables remain at their last known values. When ever the drive responds again to the read with the actual data, the `Drive_Read` network variable is set to `OK` (`ST_OFF`).

When a write operation fails, the `Drive_Write` network variable is set to FAILED (ST_ON). No other action is taken. The `Drive_Write` network variable is set to OK (ST_OFF) when the next successful write operation completes.

When the drive is in `KEYPAD R1` or in `KEYPAD PI` mode, the LonWorks interface board is unable to write any data to the drive. The drive must be in `EXTERNAL` control for the network input variable use.

SNVTs Used

The LonWorks interface board uses only the Standard Network Variable Types (SNVTs). This is done to allow the easiest integration to other systems.

On the LonWorks system, all the network variables which are bound together have to be of the same type. This strict type checking requirement combined with the limitations of the SNVT data types forced the LonWorks interface board to have multiple variables for the same purpose with different data-types.

For an example, the Frequency Actual is represented with two network variables: Freq_Act and Freq_Act_Cnt. The Freq_Act is in the standard units of Hertz, while the Freq_Act_Cnt is in unsigned integer.

The Freq_Act has the display resolution of only 0.1 Hz, for this is the resolution of the standard network frequency variable type. If a higher resolution is required, the network variable Freq_Act_Cnt could be used. This is an unscaled integer, where a value of 1 corresponds to 0.01 Hz, and 100 to 1.00 Hz. This variable has the resolution of 0.01 Hz.

The same duality is visible on the reference input network variables. Except for the data-type and the resolution, these variables are identical in their use.

Drive Setup

For the proper operation of the LON 078 board, the ACH 500 drive must be setup properly. The drive programming is described in this manual for the ACH 500 drives only, but the setup is similar for the ACS 500 drives.

Common Setup

Every time the LON 078 board is used with the ACH 500 drives, the following parameters must be checked, and setup correctly.

Table 4-3 Common Parameter Setup

Parameter	Value
10.8.1 DRIVE ID-NUMBER	1
10.8.2 PROTOCOL	MODBUS
10.8.3 BIT RATE SELECT	9600 BIT/s
10.8.4 PARITY	NONE

Note: *If any one of these parameters was changed, the power to the drive must be disconnected after all the changes are made. The power needs to be disconnected until the local panel display is 'blank'.*

Control Place Setup

The control place variables must be setup properly, if there is a need to use corresponding network input variables.

Every time there is a need to use any of the network input variables, the operational data parameter 9 Control Location must be set to EXTERNAL as shown in *Table 4-4, "Network Input Variable Setup"*.

Table 4-4 Network Input Variable Setup

Parameter	Value
9 CONTROL LOCATION	EXTERNAL

Frequency Reference R1

To use the Freq_Ref or Freq_Ref_Cnt network input variables, the drive must be using the reference R1, and the source for the external reference R1 must be selected to STD COMM using the parameters shown in *Table 4-5, "Frequency Reference R1"*.

Verify the settings for the parameters 10.2.1 EXT 1 / EXT 2 SELECT and operational data parameter 12 EXT REF 1 OR 2. The setting of these depends on specific application needs. An example of how to set these up for the use of Reference R1 is shown in *Table 4-5, "Frequency Reference R1"*.

Table 4-5 Frequency Reference R1

Parameter	Value
10.2.2 EXTERNAL REF1 SEL	STD COMM
Reference selection	
12 EXT REF 1 OR 2	REF1
10.2.1 EXT 1/EXT 2 SELECT	OP DATA 12

There are two network input variables for the Reference R1 value. These have an identical function for the drive, both of these will receive a value from the LonWorks network, and will receive this as a new reference value.

The difference is in units. Freq_Ref is in SNVT units of Hertz, while the Freq_Ref_Cnt is in unsigned integer. The reason for this is resolution, the SNVT Hertz has a resolution of 0.1 Hz, while the count allows the resolution to be 0.01 Hz.

The Freq_Ref is directly in Hertz. The Freq_Ref_Cnt is in multiples of one hundreth of a Hertz (100 corresponds to 1.00 Hz as the reference value).

Frequency Reference R2 (PI)

To use the Ref2 or Ref2_Cnt network input variables, the drive must be using the reference R2, and the source for the external reference R2 must be selected to STD COMM using the parameters shown in *Table 4-6, "Frequency Reference R2"*.

Verify the settings for the parameters 10.2.1 EXT 1/EXT 2 SELECT and operational data parameter 12 EXT REF 1 OR 2. The setting of these depends on specific application needs. An example of how to set these up for the use of Reference R2 is shown in *Table 4-6, "Frequency Reference R2"*.

Table 4-6 Frequency Reference R2

Parameter	Value
10.2.7 EXTERNAL REF2 SEL	STD COMM
Reference selection	
12 EXT REF 1 OR 2	REF2
10.2.1 EXT 1/EXT 2 SELECT	OP DATA 12

There are two network input variables for the Reference R2 value. These have an identical function for the drive, both of these will receive a value from the LonWorks network, and will receive this as a new reference value.

The difference is in units. Ref2 is in SNVT units of Hertz, while the Ref2_Cnt is in unsigned integer. The reason for this is resolution, the SNVT Hertz has a resolution of 0.1 Hz, while the count allows the resolution to be 0.01 Hz.

The Ref2 is directly in Hertz. The Ref2_Cnt is in multiples of one hundreth of a Hertz (100 corresponds to 1.00 Hz as the reference value).

Start / Stop Control

The setup for the Drive_Run network input variable depends on which reference is in use.

For the Reference R1 follow the settings shown in *Table 4-7, "Reference R1 Start / Stop"*, and for the Reference R2 follow the settings shown in *Table 4-8, "Reference R2 Start / Stop"*.

Table 4-7 Reference R1 Start / Stop

Parameter	Value
10.1.1 EXT 1 STRT/STP/DIR	STD COMM.

Table 4-8 Reference R2 Start / Stop

Parameter	Value
10.1.2 EXT 2 STRT/STP/DIR	STD COMM.

Heart-Beat Bit

The Heart-Beat Bit network input variable Heart_Beat can be used for detecting the loss of controlling device on the LonWorks network side. The way the heart beat bit communication loss detection works, is that if this bit does not change its value during any 10 second interval, a communication loss is generated. If on the other hand the controlling device will generate a toggling bit, and successfully transmits the bit value down to the drive within each 10 second interval, the drive will not generate a communication loss condition.

This kind of communication loss detection will also find out whether the controlling automation device is in program mode, and not in run mode.

The drive setup is shown in *Table 4-9, "Heart-Beat Bit Setup"*.

Table 4-9 Heart-Beat Bit Setup

Parameter	Value
10.8.5 COMMS FAULT FUNCT	FAULT (For Warning) FAULT+STOP (For Stop)

Panel Lock

The network input variable `Lock_Panel` can be used to disable any parameter changes from the drive local panel. To use this feature, the drive setup is shown in *Table 4-10, "Panel Lock"*.

Table 4-10 Panel Lock

Parameter	Value
10.4.3 PARAM. LOCK SEL	STD COMM.

Fault Reset

The network input variable `Reset_Fault` can be used to clear faults on the drive. To use this feature, the drive setup is shown in *Table 4-11, "Fault Reset"*.

Table 4-11 Fault Reset

Parameter	Value
10.4.2 FAULT RESET SELECT	STD COMM.

Drive Direction

The network input variable `Direction` can be used for controlling the running direction of the drive. To use this feature, the drive must be setup as shown in *Table 4-12, "Drive Direction Control"*.

Table 4-12 Drive Direction Control

Parameter	Value
10.1.1 EXT 1 STRT/STP/DIR or 10.1.2 EXT 2 STRT/STP/DIR	STD COMM.
10.1.3 LOC&EXT DIRECTION	REQUEST

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Chapter 5 – Start-up Procedure

This chapter gives an introduction to the steps necessary for a successful start-up of the LonWorks interface board. The reader of this chapter is expected to be familiar with his installation tool and with ACH 500 drives.

System Installation

The LonWorks network must be physically wired together. Additionally, the communication configuration must be done before the network is actually transferring any data.

On a typical LonWorks installation, this is done by 'binding' together network variables between multiple devices. This binding is done mainly using a PC-based software, which is available from multiple vendors.

Since ABB does not know which tool is being used for the installation, no specific instructions for a specific tool will be provided in this manual.

As an overview, the typical software network variable cross-referencing is done following these steps:

- Network media and communication speed is defined for the installation.
- All the devices on the network are 'introduced' to the system.
- Necessary bindings are done. There can be multiple bindings on one LonWorks network, but the following rules must be followed:
  - There must be exactly one network output variable, and one or multiple network input variables on one binding.
  - All the network variables bound together must be exactly the same type.
- The actual hardware device IDs are introduced to the installation software. This is done using an on-line connection to the network. One by one the installation software must be set to Identify the ID number, and the service button on the LonWorks interface board must be pressed. This will send the physical board ID number to the installation software for an exact identification of the interface board.
- The network binding information must be downloaded into every device on the network.

This will complete the installation.

Hardware Information

For the proper configuration of the channel and of the hardware types, there is some configuration information which is required and specific for the ACH 500 LonWorks interface board.

Channel:

- Transceiver Type : Twisted Pair
- Minimum Clock : 5 MHz
- Data Rate : 78 kBit/s
- Packet size : 12 minimum, typically 20
- Max Priority : Node does not use priority messages

Hardware Types:

- Neuron Type : 3150
- Clock : 5 MHz

Chapter 6 – Fault Tracing

This chapter gives an introduction to fault diagnostics steps to be used while installing the LonWorks interface board, or for diagnosing errors after the system is commissioned. This chapter is intended for anyone who needs to do fault diagnostics on the ACH 500 LonWorks interface.

Installation

Before continuing with any fault tracing, please verify that the board has been installed properly, and that both cables between the LonWorks interface board and the ACH 500 control interface board have been connected properly.

Firmware

The LonWorks interface board has been designed to be used with the standard firmware revision of E or later (CRH03E or CRU03E).

If the parameter setup does not correspond to this manual the firmware revision could be incorrect. The firmware revision can be verified from the group `30.4 INFORMATION` parameter `30.4.1 CRI PROG VERSION`. This should read `CRH03E` or `CRU03E`.

Ribbon Cable

The ribbon cable must be connected properly to the control interface board. The LonWorks board receives its power through this interface. To test this cable connection, press the `INSTALL` button on the board. If the LED on the board lights up, the connection is ok, otherwise please check the ribbon cable connection.

Common Setup

The drive common setup (Group 10.8 EXT COMMUNICATION) and the wiring from the P1 connector to the X51 connector must be done correctly.

To verify this, verify the parameter setting for the group 10.8 (*Chapter – 4 section "Common Setup"*). If any of these is not correct, change the parameter value from the panel, and disconnect the power to the drive. After the power has been re-connected, check the operation again.

Verify the parameters 10.8.7 GOOD MSG COUNTER and 10.8.6 BAD MESSAG COUNTER. The GOOD MSG COUNTER should be advancing continuously, and the BAD MESSAG COUNTER should be standing at a low number.

If the GOOD MSG COUNTER is not advancing, but the BAD MESSAG COUNTER is advancing, check the Common Setup and the wiring from P1 to X51. If neither of these is advancing, check the Common Setup and the wiring.

No Control

If the output network variables are updated, but none of the network input variables are updating the drive, check parameter 9 CONTROL LOCATION. This must be set to EXTERNAL.

Partial Control

If some of the network input variables are sent down to the drive, but some of the network input variables are not received (Reference, Start, Stop, or Direction), check the parameter settings for the drive corresponding to these functions. Reprogram the drive as shown in the *Chapter – 4*.

Blinking LED

If the LED on the LonWorks interface board is blinking, this means that the board has not been properly configured, or that the configuration tool has removed the application setup from the LonWorks interface board.

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