



ORMEC

A-B Ethernet Communications

A-B Ethernet
Communications MBX & Adapters



ORMEC's MotionBASIC® Extension (MBX) for Allen-Bradley Ethernet communications adds to the network capability of the ORION® controller. A-B Ethernet provides a fast and low cost method to send and receive application data between controllers on an Ethernet network using A-B Ethernet communications. The MBX adds MotionBASIC® statements that make it simple to use Ethernet to communicate between ORION® controllers, Allen-Bradley PLCs and PCs running popular HMI packages.

Features and Benefits

Using the A-B Ethernet MBX as a communication method provides a number of key advantages:

- ❑ Interface an ORION® controller directly to SLC-5/05 PLCs and PLC5 family PLCs that support Ethernet.
- ❑ Connect an ORION® controller to popular HMI packages that use A-B Ethernet to transfer of integers and floating point variables as object tags for operator input and output.
- ❑ Using standard Ethernet cards provides a low cost physical interface to the ORION® controller.
- ❑ Based on standard Internet technologies ... TCP/IP protocol is layered on high speed 10base Ethernet networks.
- ❑ Enhances the flexibility and performance of message transfers by allowing peer-to-peer connections between network nodes.

Overview

The A-B Ethernet MBX extends the MotionBASIC® operating system to provide connectivity between ORION® controllers, Allen-Bradley PLCs and PCs running popular HMI packages by using A-B Ethernet communications. An ORION® controller with an Ethernet link installed and configured with the A-B Ethernet MBX, can open an A-B connection to send application data to any A-B server node on the network. The ORION® controller also has the ability to start a server node that will accept any connection from another A-B node and receive application data.



ORMEC provides standard Ethernet installation hardware for the ORION® A-B Ethernet MBX option.

Multiprotocol capability

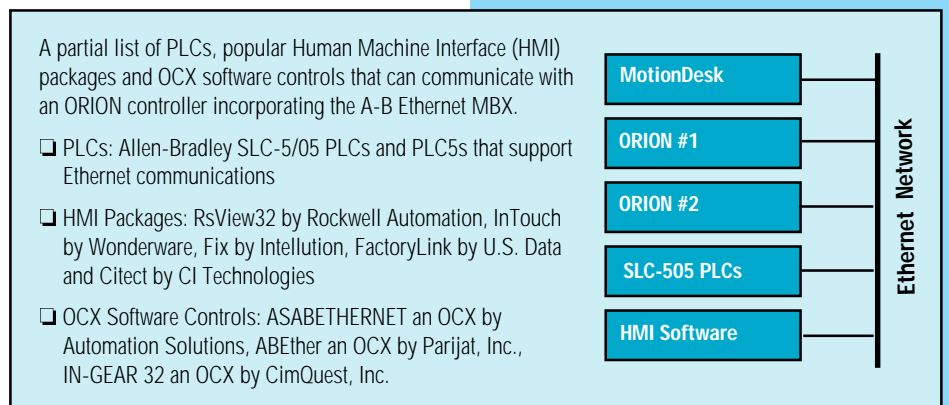
Software development for a system with multiple ORION® controllers using the full capabilities of A-B communications can now be performed with one PC. Since Ethernet is a multiprotocol network, any PC connected to the network can establish a TCP/IP connection, communicate to an ORION® and run the MotionDesk™ for program development over the same wire at basically the same time A-B communications are also going on.

A-B Ethernet Architecture

ORION® A-B Ethernet consists of a physical layer based on 10baseT, 10base2, or 10base5 type Ethernet communication standards along with a

client/server transport protocol (TCP/IP stack) to provide reliable peer-to-peer communications in the ORION® controller. At the application level the MBX-ABE uses a protocol developed for PLC networking to transfer register data as messages between controllers. All transfers happen as a background task concurrent with the user's main application program.

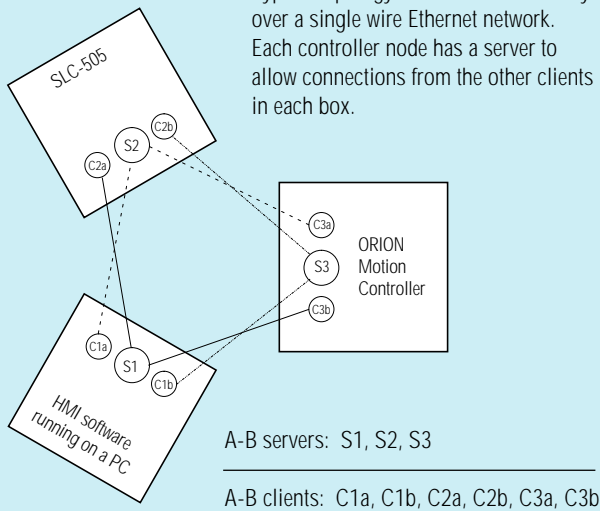
User access at the application programming interface level consists of MotionBASIC® extensions for making the connection to the destination server and the specifying source and destination registers for a read or a write multiple register transfer to that connected server. Concurrent multiple connections can be made to multiple servers on the network for a



Physical layer of the Ethernet connections between multiprotocol network nodes.

Ethernet connectivity: multiple servers and multiple clients

Typical topology of TCP/IP connectivity over a single wire Ethernet network. Each controller node has a server to allow connections from the other clients in each box.



Register mapping; sending application variables as one message

Example:
ABE.OPEN 16, "192.168.12.40, PLC5"
ABE.WRITE 8 FROM 7000 TO "\$N07:000"

LABEL	MAP REGISTER	MESSAGE DATA
(int) speed.t	7000	3000 450 45.000 100000 96.000
(int) accel.t	7001	
(float) dist.t#	7002	
	7003	
(long) time.t&	7004	
	7005	
(float) pos.t#	7006	
	7007	

TCP/IP packet [3000 450 45.000 100000 96.000]

Send to IP address **192.168.12.40:2222**

flexible and efficient arrangement for updating application data between a variety of system components.

For constructing messages, the ORMEC includes MotionBASIC® mapping methods (MBX-MAP) to simplify data organization at the PLC register level for the user.

ORION® Variable Mapping

MBX-MAP extends the capability of MotionBASIC® by providing a method to map PLC register values to any MotionBASIC® variable in the controller. Typically, PLC registers are addressed numerically but MotionBASIC® uses symbolic labels to address variables. With mapping the MotionBASIC® variable's symbolic label can be simultaneously defined as a PLC register address value. Register mapping values can range from 0 to 32367. The main purpose of this mapping feature is to allow the MBX to quickly assemble the content of various variables such as integers, and floats that reside in different areas of the controller's memory, into an ordered list of data and transferred over the network as one message.

MBX-MAP also provides the ability to monitor the changes in selected variables. Any change in the data contained in the variable selected, can result in an event interrupt. The event interrupt, if enabled, will in execute a user defined subroutine designed to respond to the changes in the data as a result of receiving the message.

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A-B Ethernet MotionBASIC® Extensions

MBX-ABE Statements

ABE.OPEN <device%>,"IP_address,PLC5"	Open client connection to a PLC5 server.
ABE.OPEN <device%>,"IP_address,SLC"	Open client connection to a SLC-505 server.
ABE.OPEN <device%>,"IP_address,server"	Open server connection to accept PLC5 or SLC.
ABE.READ [qty of reg(s)] FROM <starting src_register> TO <starting dest_register>	
ABE.WRITE [qty of reg(s)] FROM <starting src_register> TO <starting dest_register>	
ABE.CLOSE [<device%>]	Close one connection or all connections.

MBX-ABE Control functions and access variables

ABE@ = ON	Set mapped register access enabled.
ABE.SOCKOPEN@ (device%)	Get status of TCP/IP connection.
ABE.DEST@ = device%	Set destination connection for next client command.
ABE.MSG@ (device%)	Get client reply received status.
ABE.LED@ = <led value>	Set MBX-ABE to use the front panel MB LED indicator.
ABE.CTR@ (ctr%)	Get 1 of 32 error status counts of client and server connection activity during data transfers.
ABE.STS@ (device%)	Get the response code for last exception that occurred.

Diagnostic Commands that display to the Direct Mode window in MotionDesk

ABE.TRACE@ = ON	Enable real-time display of message transfer activity.
ABE.DUMP	Display the current settings and information for all current connections.
PING <IP address>	Check to make sure that the destination IP address is available and listening on the network.

MBX-MAP MotionBASIC® Mapping Statements

MAP <regnum> TO <variable>	Relate a register number 0 to 32767 to a MotionBASIC® variable name.
ON EVENT MAP@ (regnum) GOSUB [label]	Call subroutine when value mapped to regnum changed.

ORDERING GUIDE

MotionBASIC® Extension (MBX) and Network Adapter selection for A-B Ethernet

MBX-ABE-5	MotionBASIC® Extension for ORION® A-B Ethernet, peer-to-peer communications. The MBX-ABE requires 500 ORION® MotionCredits.
ORN-ENE2000	Ethernet ISA Adapter, with RJ45 & BNC connectors
ORN-E3C509B	Ethernet ISA Adapter, with RJ45, BNC & AUI connectors
PCC-E3C589C	Ethernet PC Card Adapter, with extension cable for RJ45 & BNC connectors

Use utilities provided in the MotionDesk™ development software to assist in the hardware and software installation procedures for an ORION® MBX.