

What is the 1756-SYNCH module?

This chapter describes the ControlLogix SynchLink module. It also describes what you must know and do before using the SynchLink module.

Table 1.1

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What is the ControlLogix SynchLink Module?

A ControlLogix SynchLink module, through the use of fiber optic communication technology, allows you to implement:

- time synchronization
- distributed motion control
- coordinated drive control

based on the ControlLogix and PowerFlex 700S platforms. In distributed control system, the SynchLink module broadcasts reference data and synchronizes time from a single ControlLogix chassis to multiple other chassis at a high speed.

What Data Does the SynchLink Module Transfer?

The SynchLink module transfers multiple types of reference data between chassis, including:

- Produced axis data for chassis to chassis remote axis control
- High speed drive reference data for chassis to drive control
- General control information that requires transfer at a high speed and in a synchronized manner

Why Synchronize Time Between Chassis?

In synchronizing time between chassis, the SynchLink module allows you to:

- share motion data from chassis to chassis because a consistent time reference is available among chassis for interpolation of velocity and position data.
- timestamp I/O in multiple chassis and have a common time reference with which to compare the timestamps.

For more information on how the SynchLink module impacts the time references between ControlLogix chassis, see Chapter 2, Time Synchronization in the ControlLogix System.

What Are Some of the Features Available On the ControlLogix SynchLink Module?

The following are some of the features available on the ControlLogix SynchLink module:

- Support of multiple SynchLink system configurations - Star, daisy chain and ring

For more information on these functions, see Chapter 2, Time Synchronization in the ControlLogix System.

For more information on how to configure the module with RSLogix 5000, see Chapter 5, Configuring the SynchLink Module.

- Removal and insertion under power (RIUP) - This system feature allows you to remove and insert the module while power is applied. For more information on RIUP, see page 1-6.
- Communication of remote axis data in a timely and deterministic manner
- Communication of direct and buffered data
- Class I Division 2, UL, CSA, and CE Agency Certification

Connecting a SynchLink Module to a SynchLink System

ControlLogix SynchLink modules mount in a ControlLogix chassis and connects to other SynchLink node through a fiber optic cable system.

For more information on the available fiber optic cables, see Table 1.2.

Table 1.2 Fiber Optic Cables Available with the 1756-SYNCH Module

Catalog number:	Cable length	Cables per box:
1403-CF001	1m (3.28ft)	2
1403-CF003	3m (9.84ft)	
1403-CF005	5m (16.4ft)	
1403-CF010	10m (32.8ft)	1
1403-CF020	20m (65.6ft)	
1403-CF050	50m (164ft)	
1403-CF100	100m (328ft)	
1403-CF250	250m (820ft)	

When you install the SynchLink module in a Star Configuration, you need to use hubs as well as fiber optic cables. A hub is a combination of one base block with up to four splitter blocks. A bypass switch block is also available for use in the daisy chain configuration. For more information on the Star Configuration, see 2-6.

For more information the hub components available for use with the SynchLink module, see Table 1.3

Table 1.3 Hub Components Available with the 1756-SYNCH Module

Catalog Number:	Hub Type:
1751-SLBA	SynchLink Fiber Base Block
1751-SL4SP	SynchLink Fiber 4-Port Splitter Block
1751-SLBP	SynchLink Fiber Bypass Switch Block

For more information on SynchLink fiber optic cable systems, see The SynchLink Design Guide, publication 1756-TD008.

Physical Features of the ControlLogix SynchLink Module

Figure 1.1

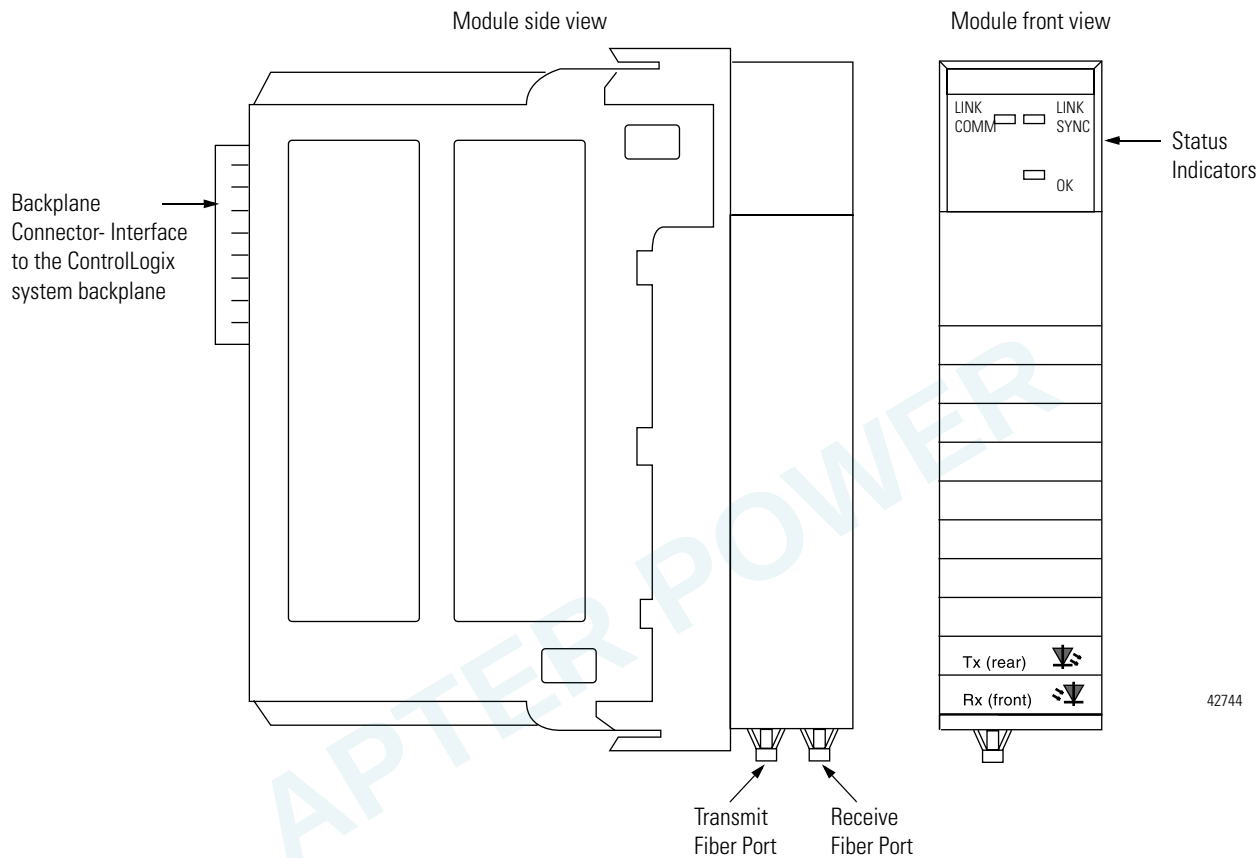


Table 1.4 lists descriptions of the physical features shown in Figure 1.1.

Table 1.4

Physical Feature:	Description:
Backplane connector	The backplane connector connects the module to the ControlLogix chassis backplane.
Status indicators	The status indicators display the module's communications and SynchLink system status.
Transmit fiber port	The transmit fiber port allows connection (via fiber optic cables) to other SynchLink modules so the module can send data.
Receive fiber port	The receive fiber port allows connection (via fiber optic cables) to other SynchLink modules so the module can receive data.

Using the Coordinated System Time (CST)

The Coordinated System Time (CST) is the clocking mechanism used to achieve time synchronization in a ControlLogix chassis. The ControlLogix Coordinated System Time (CST) clock is a 64-bit clock on the backplane of the ControlLogix chassis. It has a 1 μ S resolution and is used as the main time reference for all modules plugged into a chassis backplane.

For more information on how the ControlLogix CST affects the operation of other ControlLogix products, see the ControlLogix System User Manual, publication 1756-UM001.

Time Synchronization in a Distributed Control System

The same CST mechanism described above is also used to synchronize ControlLogix chassis in a distributed control system. In such a system, SynchLink transfers the CST value from the CST Master chassis to CST Slave chassis.

Each chassis must be equipped with a SynchLink module and, depending on what version of RSLogix 5000 the system is using, each chassis may or may not require that a controller reside in remote chassis. This distributed control system is identified as a SynchLink system.

The 1756-SYNCH module provides synchronization of CSTs between ControlLogix chassis provides with no more than +/-5 μ s drift between chassis.

Time Synchronization in the SynchLink System

Time synchronization within a SynchLink system is required to:

- transfer a CST value from the CST Master chassis to CST Slave chassis.
- transfer motion and drive control data.
- support time synchronization between ControlLogix chassis and non-ControlLogix products (e.g. PowerFlex 700S products).

The SynchLink Node Clock is integral to all devices that contain the SynchLink circuitry. It is the clocking mechanism on the fiber optic side of the SynchLink system. This clock has a resolution of 1 μ S.

During system configuration, you establish one SynchLink node clock as the master system clock on the SynchLink fiber. By design, the ControlLogix chassis that is configured as the SynchLink master also acts as the CST master of the system. In this manner, one SynchLink node acts as a Time Master for the entire system. This chapter gives more detail on how this functionality is accomplished.

Multiple Rockwell Automation products can be synchronized with SynchLink. In addition to the SynchLink module, the PowerFlex 700S and the 1756-DMxxx series products (both used for drive control) also use SynchLink to achieve drive to drive synchronization. While all of these products maintain interoperability, not all SynchLink features are incorporated into every product that uses SynchLink; the 1756-SYNCH module, however, uses all of the SynchLink features.

SynchLink Node Clock

The SynchLink node clock is integral to the SynchLink circuit design. Any product incorporating SynchLink incorporates the SynchLink node clock as a base-line requirement. The SynchLink node clock has a 1 μ S resolution and is synchronized from node to node when the SynchLink system is configured.

SynchLink uses a Time Master-Slave mechanism to achieve time synchronization. During system configuration, you configure one SynchLink node as the Time Master and all other nodes as Time Slaves. The SynchLink node that is configured as Time Master becomes the system clock for the entire SynchLink system. As such, the SynchLink Time Master broadcasts its time reference to the SynchLink Time Slaves which adjust their node clocks to be in phase with the master clock.

Because SynchLink is a unidirectional, broadcasting mechanism, the master is always placed at the beginning of SynchLink systems using the star or daisy chain configurations.

Figure 2.1

