



# ***SYSTEM SUPPORT SERVICES***

## **FUNCTIONAL SPECIFICATION**

40-0077 Coaxial Switch Assembly

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## FUNCTIONAL SPECIFICATION

### 1.0 SCOPE

This document provides a functional description of the Coaxial Switch, part number 40-0077. It is intended to assist Plant Engineering personnel in evaluating the form, fit, and function of the 40-0077 as a replacement for the obsolete 30-0069-1 Coaxial Switch assembly currently in use in CONTROL 1, CONTROL 2, and Megaplex™ installations.

### 2.0 SUMMARY OF SPECIFICATIONS

The 40-0077 Coaxial Switch is a sub-component of the reconfigurable bus network unique to the CONTROL and Megaplex™ Multiplexing systems. This reconfigurable bus network provides the capability to maintain communication with all nodes on the coaxial cable network in the event of a fault in the coaxial cable.

The main function of the coaxial switch is to allow the system to move the terminations of the network as required to switch out the defective cable segment. The coaxial switch contains relays which are controlled from the Failure Detect Module, part number 30-0016-3. These relays control the terminations of the J1 and J2 connectors, as well as the "direction" of the multiplexer's modem connection.

The other function of the coaxial switch is to provide surge protection for the modem and other components of the multiplexer.

Several major improvements have been made to the coaxial switch over the original design. First, the reed relays have been replaced with miniature electro-mechanical relays. This was done to eliminate the "sticking" problem common to the original 30-0069-1 Coaxial Switch. Consequently, the new switch does not have to be periodically replaced as a preventive maintenance function, and should operate error-free for the life of the multiplexing system.

Second, the surge suppression circuit has been improved to lower the series resistance of the network. This increases the signal strength to the modem, thus increasing the dynamic range of the system and reducing communication errors.

In addition, the relay control lines from the 30-0016-3 Failure Detect Module have been protected with positive temperature coefficient (PTC) resettable fuses.

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Following is a summary of the specifications of the 40-0077 Coaxial Switch.

BASE PART NUMBER: 40-0077

OPTIONS: NONE

PHYSICAL SPECIFICATIONS:

Module Size, inches (LxWxH): 4.65 x 1.75 x 1.40 (Max)

Weight (Module only): 0.75 LB (estimate)

Shipping Weight: 2 LB

Connections:	J1 and J2	PL-259 Female UHF Coaxial Connectors
10" Harness Assembly:	P1	BNC Plug
	P2	3 Pin Amp Plug

ELECTRICAL SPECIFICATIONS:

DC Voltage Requirement: +5VDC, +/- 2%

DC Current Requirement: 36 mA maximum @ 5 VDC

Control Signals: 2 Active Low signals, COPN\* and MSW\*

Source Current (Low level): 16 mA nominal, 18 mA Max

Coaxial Cable Terminations:

Pass-through Mode:

J1/J2 to ground: 1 Megohm Minimum

J1 to J2: 50 mΩ Maximum

J1/J2 to P1: 2.1 Ω Maximum

Terminated Forward:

J1/J2 to ground: 75 Ω ± 1%

J1 to J2: 150 Ω ± 1%\*

J1 to P1: 2.1 Ω Maximum

J2 to P1: 148.5 – 153.6 Ω\*

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Terminated Reverse:

J1/J2 to ground:	75 Ω ± 1%
J1 to J2:	150 Ω ± 1%*
J1 to P1:	148.5 – 153.6 Ω*
J2 to P1:	2.1 Ω Maximum

\* These values are static values caused by the termination resistors being connected to a common ground and do not reflect the signal isolation capabilities of the unit.

Surge Suppression:

Coaxial cable protection:	3-stage suppression utilizing clamping diodes, a positive temperature coefficient (PTC) resettable fuse, and a gas discharge suppressor
Maximum Clamping Voltage:	12.5 Volts @ 10 Amps
Maximum Surge Current (8x20):	20 kA
Maximum Turn-on Time:	5 Nanoseconds
Signal Line Protection:	positive temperature coefficient (PTC) resettable fuse

ENVIRONMENTAL SPECIFICATIONS:

Operating Temperature (°C):	0 - 50
Operating Humidity:	5 - 90 % Relative, <i>Non condensing</i>
Storage Temperature (°C):	0 - 140
Shelf Life:	Unlimited

HANDLING REQUIREMENTS:

The unit should be stored in its protective packaging until just prior to installation. This will eliminate dust and help reduce oxidation of the connector mating surfaces. The unit is not static sensitive, nor is it particularly delicate. Care should be taken, however, to avoid pinching, nicking, or straining the harness assembly during installation or use.

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**3.0 MECHANICAL SPECIFICATIONS**

**3.1 Physical Dimensions**

The following figure illustrates the dimensions of the 40-0077 Coaxial Switch.

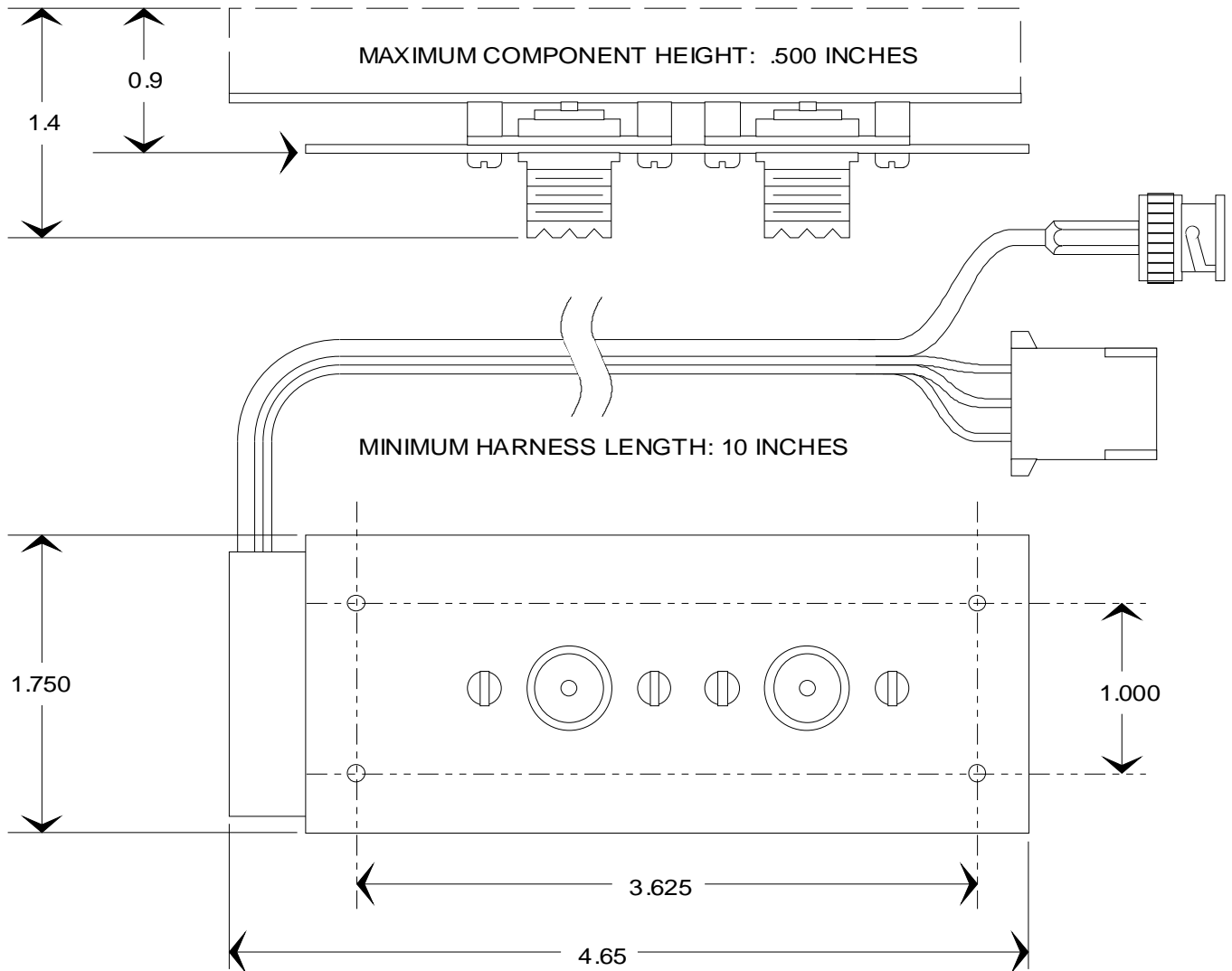


Figure 1  
 Coaxial Switch Dimensions

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The 40-0077 Coaxial Switch is designed to mount on the same side- or rear-mount brackets which are used for the existing 30-0069-1 Coaxial Switch. Maximum overall dimensions and mounting hole placement have been designed for direct replacement of the 30-0069-1.

The minimum harness length is ten (10) inches, which is long enough to reach the backplane connectors from either mounting configuration, while maintaining an adequate service loop.

Placement of the J1 and J2 connectors has also been maintained, to support existing coaxial cable layouts.

### 3.2 Connectors

J1 and J2 are PL-259 type UHF coaxial connectors. Placement of the connectors has been maintained to promote compatibility with the existing coaxial switch. J1 is connected to P1 when the switch is Terminated Forward, and J2 is connected to P1 when the switch is Terminated Reverse.

P1 is a male BNC connector, located on the ten (10) inch harness assembly, which connects to the female BNC connector located on the COMTROL 1 or 2 backplane, or to the cable-mounted BNC female connector on Megaplex™ systems.

P2 is a 3-pin AMP plug, also located on the ten (10) inch harness assembly, which connects to the 3-pin AMP socket on the COMTROL or Megaplex™ backplane.

The ten (10) inch harness assembly is permanently attached to the Coaxial Switch assembly and cannot be removed under normal conditions.

### 3.3 Mounting Options

The 40-0077 Coaxial Switch can be mounted at the rear of the card cage using the Rear Mount Bracket, part number 60-0087, or, at the side of the card cage using the Side Mount Bracket, part number 60-0086.

Four #8 screws are used to secure the Coaxial Switch assembly to either bracket. When replacing the coaxial switch in the field, the existing screws can be used to mount the new switch.

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**4.0 ELECTRICAL SPECIFICATIONS**

**4.1 Supply Voltages**

The 40-0077 Coaxial Switch requires +5 Volts DC, supplied through Pin 3 of the 3-pin AMP connector P2. The required voltage is supplied when P2 is connected to the backplane of a powered CONTROL or Megaplex™ card cage.

The maximum current drawn by the Coaxial Switch from the 5 volt supply is 36 mA, with both relays energized.

**4.2 Control Signals**

The operating mode of the 40-0077 Coaxial Switch is controlled by two TTL-level control signals, which are normally provided by the 30-0016-3 Failure Detect Module. These signals are active low, and the device which drives them must be capable of sinking 16 mA of DC current. The following table summarizes the control signal names, states, and connections:

Table 1: Coaxial Switch Control Signals

<b>SIGNAL NAME</b>	<b>P2 PIN</b>	<b>STATE</b>	<b>FUNCTION</b>
COPN*	2	High	Sets Coaxial Switch to Pass-through Mode
		Low	Sets Switch to Terminated Forward/Reverse
MSW*	1	High	Sets switch to Terminated Forward (only when COPN* is low)
		Low	Sets switch to Terminated Reverse (only when COPN* is low)

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### 4.3 Coaxial Cable Configurations and Terminations

The 40-0077 Coaxial Switch can be configured for 3 modes of operation:

1. Pass-through Mode
2. Terminated Forward
3. Terminated Reverse

In Pass-through Mode, the two UHF connectors, J1 and J2, are connected together, and are connected to the BNC male connector, P1, in a "Tee" configuration. Neither of the UHF connectors is terminated. This mode of operation is used when the card cage is positioned in the center of the reconfigurable bus network.

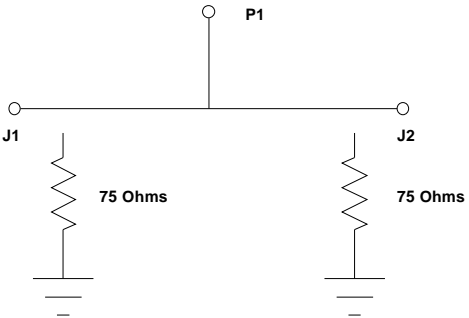
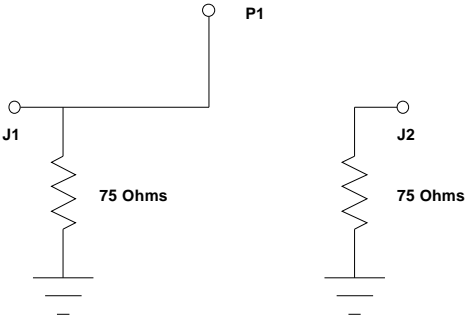
When the multiplexer is positioned at one end of the network, such that the connection to the network is via J1, the multiplexer is considered to be terminated forward. In this mode of operation, the UHF connectors are NOT connected together, thus breaking the cable's continuity at the multiplexer location. Each UHF connector is terminated with a 75 ohm resistor. The modem connection, P1, is connected to the forward UHF connector, or J1.

When the multiplexer is at the other end of the network, such that the connection is via J2, the multiplexer is considered to be terminated reverse. This mode is similar to the forward mode, except that the modem connection, P1, is connected to the reverse UHF connector, J2, instead of to J1.

Figure 2 depicts the effective schematic diagram that the coaxial switch assumes for each mode of operation.

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Figure 2  
 Coaxial Cable Configurations

SIGNAL	STATE	CONFIGURATION
<p><b>COPN*</b></p> <p><b>MSW*</b></p>	<p><b>H</b></p> <p><b>X</b></p>	
<p><b>COPN*</b></p> <p><b>MSW*</b></p>	<p><b>L</b></p> <p><b>H</b></p>	
<p><b>COPN*</b></p> <p><b>MSW*</b></p>	<p><b>L</b></p> <p><b>L</b></p>	