

9729 Optical Wavelength Division Multiplexer



# Operator's Manual



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**Note**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page ix.

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This edition applies to the IBM 9729 Optical Wavelength Division Multiplexer Version 1 Release 3.

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**Danger:** Before you begin to install this product, read the safety information in *Caution: Safety Information—Read This First*, SD21-0030. This booklet describes safe procedures for cabling and plugging in electrical equipment.



**Perigo:** Antes de iniciar a instalação deste produto, leia as informações de segurança *Cuidado: Informações de Segurança — Leia Primeiro*, SD21-0030. Este documento descreve como efectuar, de um modo seguro, as ligações eléctricas dos equipamentos.



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**Danger:** Avant de procéder à l'installation de ce produit, lisez d'abord les consignes de sécurité dans la brochure *ATTENTION: Consignes de sécurité—A lire au préalable*, SD21-0030. Cette brochure décrit les procédures pour câbler et connecter les appareils électriques en toute sécurité.



**Perigo:** Antes de começar a instalar este produto, leia as informações de segurança contidas em *Cuidado: Informações Sobre Segurança—Leia Isto Primeiro*, SD21-0030. Esse folheto descreve procedimentos de segurança para a instalação de cabos e conexões em equipamentos elétricos.



**Danger :** Avant d'installer le présent produit, consultez le livret *Attention : Informations pour la sécurité — Lisez-moi d'abord*, SD21-0030, qui décrit les procédures à respecter pour effectuer les opérations de câblage et brancher les équipements électriques en toute sécurité.



**Fare!** Før du installerer dette produkt, skal du læse sikkerhedsforskrifterne i *NB: Sikkerhedsforskrifter—Læs dette først* SD21-0030. Vejledningen beskriver den fremgangsmåde, du skal bruge ved tilslutning af kabler og udstyr.



**Pericolo:** prima di iniziare l'installazione di questo prodotto, leggere le informazioni relative alla sicurezza riportate nell'opuscolo *Attenzione: Informazioni di sicurezza — Prime informazioni da leggere* SD21-0030, in cui sono descritte le procedure per il cablaggio ed il collegamento di apparecchiature elettriche.



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**VAARA:** Ennen kuin aloitat tämän tuotteen asennuksen, lue julkaisussa *Varoitus: Turvaohjeet—Lue tämä ensin*, SD21-0030, olevat turvaohjeet. Tässä kirjasessa on ohjeet siitä, miten sähkölaitteet kaapeloidaan ja kytketään turvallisesti.



**Gevaar:** Voordat u begint met de installatie van dit produkt, moet u eerst de veiligheidsinstructies lezen in de brochure *PAS OP! Veiligheidsinstructies—Lees dit eerst*, SD21-0030. Hierin wordt beschreven hoe u elektrische apparatuur op een veilige manier moet bekabelen en aansluiten.



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위험: 이 제품을 설치하기 전에 반드시  
"주의: 안전 정보-시작하기 전에"  
(SD21-0030) 에 있는 안전 정보를  
읽으십시오.



危険： 導入作業を開始する前に、安全に関する  
小冊子SD21-0030 の「最初にお読みください」  
(Read This First)の項をお読みください。  
この小冊子は、電気機器の安全な配線と接続の  
手順について説明しています。



危險：安裝本產品之前，請先閱讀  
"Caution: Safety Information—Read  
This First" SD21-0030 手冊中所提  
供的安全注意事項。這本手冊將會說明  
使用電器設備的纜線及電源的安全程序。



Opasnost: Prije nego što počnete sa instalacijom produkta, pročitajte naputak o pravilima o sigurnom rukovanju u  
Upozorenje: Pravila o sigurnom rukovanju - Prvo pročitaj ovo, SD21-0030. Ovaj privitak opisuje sigurnosne postupke za priključivanje kabela i priključivanje na električno napajanje.



**Upozornění:** než zahájíte instalaci tohoto produktu, přečtěte si nejprve bezpečnostní informace v pokynech „Bezpečnostní informace“ č. 21-0030. Tato brožurka popisuje bezpečnostní opatření pro kabeláž a zapojení elektrického zařízení.

\*\*\*\*\*



Uwaga:  
Przed rozpoczęciem instalacji produktu należy zapoznać się z instrukcją: "Caution: Safety Information - Read This First", SD21-0030.  
Zawiera ona warunki bezpieczeństwa przy podłączaniu do sieci elektrycznej i eksploatacji.

\*\*\*\*\*



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Nebezpečnosť: Pred inštaláciou výrobku si prečítajte bezpečnosť predpisy v  
Výstraha: Bezpečnosť predpisy - Prečítaj ako prvé,  
SD21 0030. V tejto brožúrke sú opísané bezpečnosť postupy pre pripojenie elektrických zariadení.



Pozor: Preden začnete z instalacijo tega produkta preberite poglavje: "Opozorilo: Informacije o varnem rokovanju-preberi pred uporabo," SD21-0030. To poglavje opisuje pravilne postopke za kabliranje,



危險：

開始安裝此產品之前，請先閱讀安全資訊。

注意：

請先閱讀 - 安全資訊 SD21-0030

此冊子說明插接電器設備之電纜線的安全程序。

---

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### Avis de conformité aux normes d'Industrie Canada

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46185 La Pobla de Vallbona (Valencia)

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## About This Manual

This manual describes the functional specifications of the IBM 9729 Optical Wavelength Division Multiplexer (9729) Model 001 and Model 041, its supported interfaces, and how to incorporate the 9729 into your network.

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## Who Should Read This Manual

The intended users of this manual are system operators.

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## How This Manual Is Organized

The manual contains the following chapters and appendixes:

- Chapter 1, "Introduction" on page 1 provides a functional description of the 9729, including the physical configuration and available features.
- Chapter 2, "Detailed Specification" on page 5 provides a detailed description of the 9729, including link characteristics, supported interfaces, information on the laser/receiver card (LRC), a front panel reference, and diagnostic information,
- Chapter 3, "Network Management - SNMP Agent and Subagent" on page 17 provides information on the SNMP agent and subagent used to manage the 9729, including prerequisites, installation and configuration information, operating information, and a troubleshooting guide.
- Chapter 4, "Network Management With NetView/6000" on page 43 provides information on using NetView and 9729-specific NetView applications to manage your 9729, including prerequisites, information on using the 9729-specific NetView application, and a troubleshooting guide.
- Chapter 5, "Link Initialization Procedure" on page 61 provides information on the link initialization procedure.
- Appendix A, "Safety Notices" on page 63 contains safety information pertinent to the operation of the 9729.
- Appendix B, "Power Plug Requirements" on page 67 provides wiring diagrams and a description of the power cable plugs required for operation of the 9729.
- Appendix C, "Customizing Your NetView Graphic Display" on page 69 provides information on customizing the graphic status display of your 9729-specific NetView applications.
- Appendix D, "Fiber Optic Cable Specifications" on page 73 gives specifications for various jumper and fiber cables.



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## Chapter 1. Introduction

The IBM 9729 Optical Wavelength Division Multiplexer (9729) enables multiple bit streams, each possibly using a different communication protocol, bit rate, and frame format, to be multiplexed onto a single optical fiber for transmission between geographically separate locations. The 9729 can multiplex up to 10 full-duplex bit streams over a single optical fiber. The distance between the two locations can be up to 50 km (31 miles) at a 200-Mbps bit rate per channel, and goes down as the bit rate is increased. Thus the 9729 enables economical transmission of many simultaneous bit streams bidirectionally over a single fiber.

The 9729 uses wavelength division multiplexing to transmit independent bit streams over this single fiber link. A conventional optical fiber has an accessible bandwidth of 25 000 GHz, and wavelength division multiplexing uses as much of this bandwidth as possible. Each wavelength can carry a signal at any bit rate less than an upper limit defined by the electronics, typically up to several gigabits per second.

The 9729 is available in two models. The *Model 001* can divide a single fiber-optic line into as many as 20 separate channels. The *Model 041* can divide a line into as many as eight separate channels. Throughout this manual, references to the 9729 are inclusive of both models; the model number will be used for information specific to a particular model.

The 9729 uses up to 20 optical wavelengths, spaced about 1 nm apart (about 120 GHz) in the 1.5  $\mu\text{m}$  wavelength band. Ten of these channels can be used for transmission in one direction and ten in the opposite direction on the same fiber. Because the actual signal bandwidth that the electronics can handle over one wavelength is such a small fraction of the inter-channel spacing, the signals do not interfere with each other and can therefore be multiplexed into a single fiber using a passive grating multiplexer as shown in Figure 1.

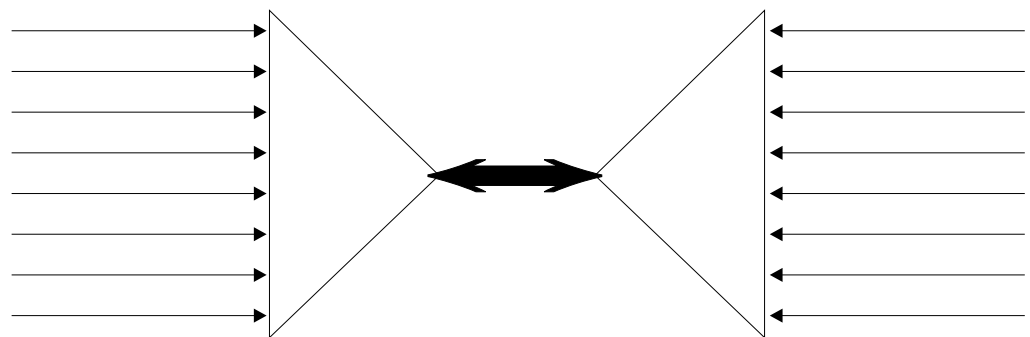


Figure 1. 9729 Multiplexing

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## Physical Configuration

Each 9729 unit is housed in an enclosure that contains the grating, a number of plug-in module cards, a diagnostic card, LRCs, a grating temperature controller card, the power system, and air cooling.

The grating in each 9729 is housed in a temperature-controlled compartment, so that the wavelengths at one end of the link will match those at the other, even when the two room temperatures are quite different. The other temperature-sensitive component is the laser diode, but each of these has its own internal temperature control.

There are two types of plug-in module cards: *input/output cards* (IOCs) whose pin connections and voltages are specific to the data stream type, and wavelength-specific *laser/receiver cards* (LRCs). Each of the 10 possible full-duplex links requires an LRC and an IOC at each end inside the 9729 units, as shown in Figure 2.

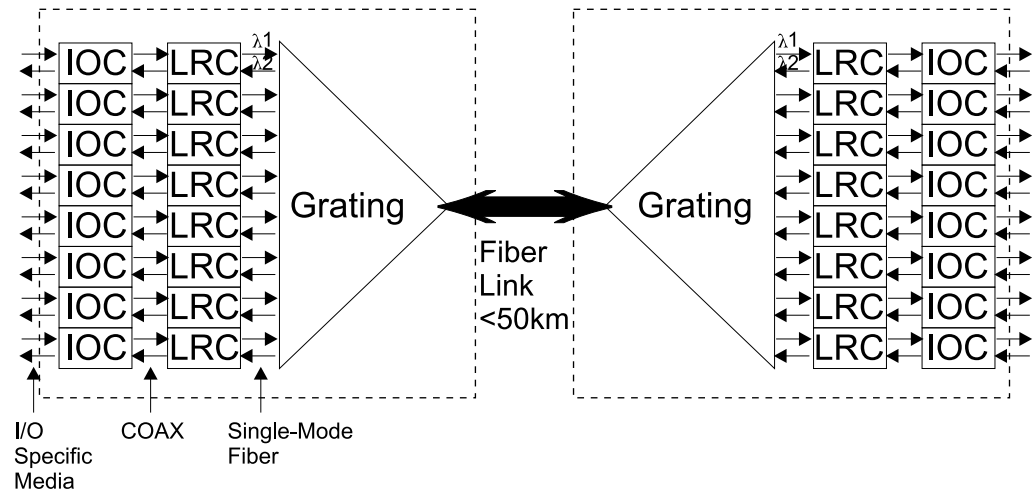


Figure 2. 9729 Configuration

One such device, as shown at the left, takes an optical signal at wavelength  $\lambda_1$  coming in on port 1 and directs it out on the common port. Similarly, signals at wavelength  $\lambda_3$  coming in on port 2,  $\lambda_5$  on port 3, and so on, are all sent out on the common port. The same passive device can also act as a demultiplexer, so a signal arriving from the other end at the common port at  $\lambda_2$  is sent out on port 1', one arriving at the common port on wavelength  $\lambda_4$  is sent out on port 2', and so on. The same process is used at the other end that sends the even-numbered wavelengths and receives the odd-numbered ones.

Operation of each data stream is independent of the other data streams in the box. For example, from the preceding discussion it is clear that the topmost LRC on the left sends at wavelength  $\lambda_1$  and receives at  $\lambda_2$ , while its partner at the other end, the LRC at the upper right, receives at  $\lambda_1$  and transmits at  $\lambda_2$ . The bit streams on these two wavelengths can be independent of each other and also independent of those on all other wavelengths. The 20 wavelengths used by the 9729 are defined by the optical grating multiplexer/demultiplexer component.

To provide a full-duplex link for an Enterprise Systems Connection (ESCON) channel, you would use an ESCON-specific plug-in IOC. This card provides a plug-compatible ESCON interface that ensures that the multimode ESCON signal is received, converted into an electronic bit stream, and sent in to the corresponding LRC to be retransmitted on a unique optical wavelength. At the other end, this unique wavelength is directed to an LRC by the grating, where it is received, converted to electronics and transferred to the corresponding IOC card. The bit stream is then transmitted out as a multimode ESCON signal again. The same

process happens in the other direction as well. The attached ESCON devices do not see the 9729; it is as if they were provided with two independent fiber cables.

The IOCs, LRCs, diagnostic card, and the grating controller card are all housed in a standard 19-inch rack-mountable card cage, 15.5 in. (394 mm) high, and 11.0 in. (279 mm) deep. The 9729 has two rows of up to  $N = 10$  pluggable modules on the front panel, the lower row containing the laser/receiver cards (LRCs) and the upper row containing the input/output cards (IOCs).

The LRCs are 6 EIA units (10.5 in. [267 mm]) high, the IOCs are 3 EIA units (5.25 in. [133 mm]) high, and both plug into the backplane from the front. Every board has a front panel including LED status indicators. The 12th slot contains the single- or dual-fiber connector in the upper row and the grating temperature controller board in the lower row. The eleventh slot in the lower row contains the diagnostic card.

The passive optics are contained in the temperature-controlled compartment mounted on the card cage above the IOC boards. The fibers between the individual channels and the grating are routed in back of the card cage to the backplane. The common fiber is routed to the backplane slot that contains either the single or dual fiber I/O card. The fiber I/O card routes the common fiber to the appropriate I/O connector.

The 9729 can be configured with a minimum of one full-duplex channel; the Model 001 supports a maximum of 10, while the Model 041 supports a maximum of four. Each channel requires one IOC and one LRC. Each channel uses a different IOC at each end tailored to the specific protocol supported by the channel. To add a channel, simply plug in an IOC and an LRC.

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## Availability Features

The 9729 incorporates several features to make it fault-tolerant:

- Individual card failures do not affect other channels and because the cards are hot-pluggable, they can be serviced independently. The result is that any card can be added or removed during operation without affecting the other channels.
- The main active optical components used are telecommunication-grade lasers with mean time between failures (MTBFs) of over 10 years.
- The Model 001 supports dual, fully-redundant power and cooling. To be effective, these must be supplied by physically separate power mains.

---

## Network Management

Network management support for the 9729 consists of two separate applications:

- **SNMP agent and SNMP subagent applications**

The SNMP agent and SNMP subagent applications execute on a RS/6000 Workstation running AIX or on a PC running Windows 95, Windows NT or OS/2 Warp Connect. These applications are directly responsible for monitoring and controlling the 9729s that are managed by them. The 9729s are attached to the RS/6000 or PC using EIA-232 serial communication ports, through which the activities of management and control are performed.

- **NetView/6000 applications.**

The NetView/6000 applications that execute on a RS/6000 running AIX are customized to the 9729 device and must be used in conjunction with the SNMP Agent and SNMP Subagent applications. These applications provide a front-end for effective management and control of the 9729 from a centralized network management station.



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## Chapter 2. Detailed Specification

This chapter contains this information about the 9729:

- Physical description
- Link characteristics
- Cable specifications
- Acoustical levels
- I/O interface support
- Front panel reference
- Settings for the diagnostic card registers

---

### Physical Description

- Up to 10 channels can be multiplexed onto a single mode optical fiber. The channels are numbered 1 to 10.
- Latency through unit: less than 100 ns.
- Class C environment:

**Shipping and storage** 10–52°C (50–125°F)

**Operating** 10–40°C (50–104°F)

- Power: Model 001 is dual redundant with 2, country-dependent, alternative input voltages; the Model 041 has a single power system with an optional feature to provide redundant power

90–125 volts, 6 amps, 47–63 Hz

180–264 volts, 4 amps, 47–63 Hz.

**Note:** The 180-volt 9729 is supplied without a power plug. It is the customer's responsibility to provide the correct plug. See Appendix B, "Power Plug Requirements" on page 67 for a description of power plugs for use with the 9729

- FCC certification: complies with the limits for a Class A computing device pursuant to subpart J of part 15 of FCC rules.
- UL and C-UL certified to comply with UL1950 ITE equipment
- CDRH laser safety certification: Complies with IEC 825-1:1993 / EN 60825-1:1994 and 21 CFR subchapter J of DHHS.
- Overall dimensions of the enclosure:

**Width** 600 mm (23.6 in.)

**Depth** 645 mm (25.4 in.)

**Height** 775 mm (30.5 in.)

- Weight:

109 kg (240 lb) for a fully configured Model 001

91 kg (200 lb) for a fully configured Model 041 with a single power system

102 kg (225 lb) for a fully configured Model 041 with a redundant power system

---

## Link Characteristics

Units must be connected with single-mode fiber with maximum attenuation of 15 dB (at 200 Mbps) at 1550 nm or 12 dB at 1550 nm at 1.062 Gbps. Connection to the 9729 is made with a ferrule connector/physical contact (FC/PC) connector.

- Operating wavelengths on the single-mode fiber: 1540 nm to 1559 nm in 1 nm increments
- Link budget
  - Worst-case laser diode power output to pigtail: - 0.5 dBm per channel
  - Worst-case loss in each grating: 6 dB
  - Losses in splices and connectors: 3 dB at each end
  - Margin: 3 dB
  - Receiver sensitivity:
    - 39 dBm for  $10^{-12}$  BER at 200 Mbps
    - 31 dBm for  $10^{-12}$  BER at 1.06 Gbps
  - Resulting maximum fiber attenuation allowed:
    - 15 dB at 1540-1559 nm operating wavelength range for 200 Mbps
    - 12 dB at 1540-1559 nm operating wavelength range for 1.06 Gbps
- Allowable range of received power, for example, for a 15-dB loss:

Operating channels (max/min)	Output of Transmitter	Received power
10 channels	+0.9 dBm	+0.9 dBm/-14.1 dBm
9 channels	+0.4 dBm	+0.4 dBm/-14.6 dBm
8 channels	-0.1 dBm	-0.1 dBm/-15.1 dBm
7 channels	-0.6 dBm	-0.6 dBm/-15.6 dBm
6 channels	-1.3 dBm	-1.3 dBm/-16.3 dBm
5 channels	-2.1 dBm	-2.1 dBm/-17.1 dBm
4 channels	-3.1 dBm	-3.1 dBm/-18.1 dBm
3 channels	-4.3 dBm	-4.3 dBm/-19.3 dBm
2 channels	-6.1 dBm	-6.1 dBm/-21.1 dBm
1 channel	-9.0 dBm	-9.0 dBm/-24.0 dBm

**Note:** These numbers are typical values and may vary. User's allowable received power must be calculated from actual transmitted power, using the following formulas:

Max = Actual transmitted power

Min =

Actual transmitted power - 12 dB (for 1.06 Gbps) or  
Actual transmitted power - 15 dB (for 200 Mbps or less)

**Note:** In order to use the second formula, you cannot have any 1.06-Gbps connections to the 9729. All connections must be through the ETR/ESCON or FDDI adapters.

---

## Cable Specifications

The following specifications for single-mode trunk cable support the attachment of fiber-optic channel-capable devices. Use of trunk fiber having different specifications significantly alters the link characteristics. These specifications conform to International Telecommunications Union (ITU) recommendation G.652.

All external fiber cabling should be in compliance with IEC 825-1:1993, "Safety of Optical Fiber Communication Systems".

The international equivalents to EIA test procedures are specified in ITU Recommendations G651 or G652. All these FOTPs are named EIA-455-xxx, where xxx is the FOTP number. Copies of the EIA procedures can be obtained by writing to:

Director of Technical Programs  
Information & Telecommunications Technologies  
Electronic Industries Association  
2001 I Street, NW  
Washington, DC 20006

Characteristic	Value	Notes
Type of fiber	Dispersion unshifted	Dispersion shifted fiber may be used but is <b>not</b> recommended
Mode field diameter	9.0 - 10.0 $\mu\text{m} \pm 10\%$	Measured in accordance with EIA 455 FOTP 164,167 or equivalent
Core concentricity error	1.0 $\mu\text{m}$ maximum	Meas. in acc. with EIA 455 FOTP 45,48
Cladding diameter	125 $\mu\text{m} \pm 2.0 \mu\text{m}$	Meas. in acc. with EIA 455 FOTP 45,48
Cladding noncircularity	2% maximum	Meas. in acc. with EIA 455 FOTP 45,48
Zero dispersion wavelength	1295 to 1322 nm	Meas. in acc. with EIA 455 FOTP 168 or equivalent
Zero dispersion slope	0.095 ps/(nm <sup>2</sup> x km) maximum	Meas. in acc. with EIA 455 FOTP 168 or equivalent
Cutoff wavelength	1280 nm maximum	Meas. in acc. with EIA 455 FOTP 80 or equivalent
Cutoff wavelength	1260 nm maximum	Meas. in acc. with EIA 455 FOTP 170 or equivalent
Attenuation above nominal	0.06 dB/km maximum	Maximum attenuation for wavelengths from 1270 to 1340 nm must not exceed attenuation at 1310 nm by more than 0.06 dB/km. Typically, this specification can be met by fiber with 1383-nm OH absorption peaks below 2 dB/km.
Attenuation	0.2 dB/km maximum	This attenuation is a typical value, not a specification for wavelengths from 1540 to 1560 nm. Use actual dB/km attenuation value to determine the total link loss, which cannot exceed the value specified above.
Connector	FC/PC	
Maximum loss including connectors	15 dB at 1550 nm 13 dB at 1550 nm when ISC IOC is installed 12 dB at 1550 nm when ISC IOC and Dual Fiber SW are installed	

## Acoustical Noise Emission Levels

Relevant international standards:

- Measurements: ISO 7779
- Declaration: ISO 9296

Functional Unit	$L_{WAd}$		$L_{pAm}$		$\langle L_{pA} \rangle_m$	
	Operating (B)	Idling (B)	Operating (dB)	Idling (dB)	Operating (dB)	Idling (dB)
9729	7.1	7.1	N/A	N/A	55	55

### Notes:

- $L_{WAd}$  The declared (upper limit) sound power level for a random sample of machines.
- $L_{pAm}$  The mean value of the A-weighted sound pressure levels at the operator position (if any) for a random sample of machines.
- $\langle L_{pA} \rangle_m$  The mean value of the A-weighted sound pressure levels at the one-meter (bystander) positions for a random sample of machines.
- N/A** Not applicable (no operator position).
- B, dB** Abbreviations for bels and decibels, respectively.

All measurements were made in accordance with ISO 7779 and reported in conformance with ISO 9296.

## Supported I/O Interfaces

The Model 001 can be configured with up to 10 I/O interfaces; the Model 041 can be configured with as many as four interfaces. Each channel consists of an IOC and a corresponding LRC. The cards are hot pluggable; the unit can remain powered on while a card is being inserted or removed and other channels will not be affected.

## External Time Reference (ETR)/Enterprise Systems Connection (ESCON) IOC

- Multimode input and output at 1300 nm.
- IBM duplex connector P/N 5605519.
- Max. 3 km (1.9 miles) multimode fiber between the 9729 unit and attached ESCON device.
- Interface supports 200-Mbps ESCON, 16-Mbps Sysplex Timer.

**Note:** Total end-to-end link distance (between the two attached ETR/ESCON CPUs/devices) is limited by ETR/ESCON device specifications.

## OC-3 Fiber Cable

- Multimode input and output at 1300 nm.
- Max. 100 m (325 feet) multimode fiber between the 9729 ESCON or ETR/ESCON adapter and the OC-3 device.
- Physical media attachment only. The 9729 does not provide clocking, jitter removal, or OC-3 framing interpretation.
- Interface supports 155-Mbps ATM.

See “OC-3 Cable Specifications” on page 75 for more information.

## Fiber Distributed Data Interface (FDDI) IOC

- Multimode 62.5/125 fiber input and output at 1300 nm.
- ANSI FDDI MIC connector (Amphenol 963 series or equivalent)
- 100-Mbps line rate
- Maximum 2 km (1.2 miles) distance to attached FDDI device

## F-ENET Cable

- Multimode 62.5/125 micron fiber
- Multimode input and output at 1300 nm
- Physical media attachment only
- Max 10m multimode fiber between 9729 FDDI adapter and F-ENET device

For more information about this cable, see “F-ENET Cable Specifications” on page 77.

## Inter-System Coupling Channel (ISC) IOC

- Single-mode input and output at 1300 nm
- Duplex SC plug
- 1.0625 Gbps line rate
- Max. 3 km (1.9 miles) distance to attached device

**Note:** Total end-to-end line distance between the two attached ISC devices is limited by coupling facility specifications.

---

## Laser/Receiver Card (LRC)

There are 20 part numbers for the LRCs corresponding to the 20 maximum wavelengths used in the system. LRCs A1 to A10 are for use only in the 9729 unit type A. LRCs B1 to B10 are for use only in the 9729 unit type B. To add channel number  $i$ , LRC  $A_i$  must be plugged into the  $i^{\text{th}}$  slot in unit A and LRC  $B_i$  must be plugged into the  $i^{\text{th}}$  slot in unit B. The appropriate IOCs must then be plugged into slot  $i$  in units A and B.

## Front Panel Reference

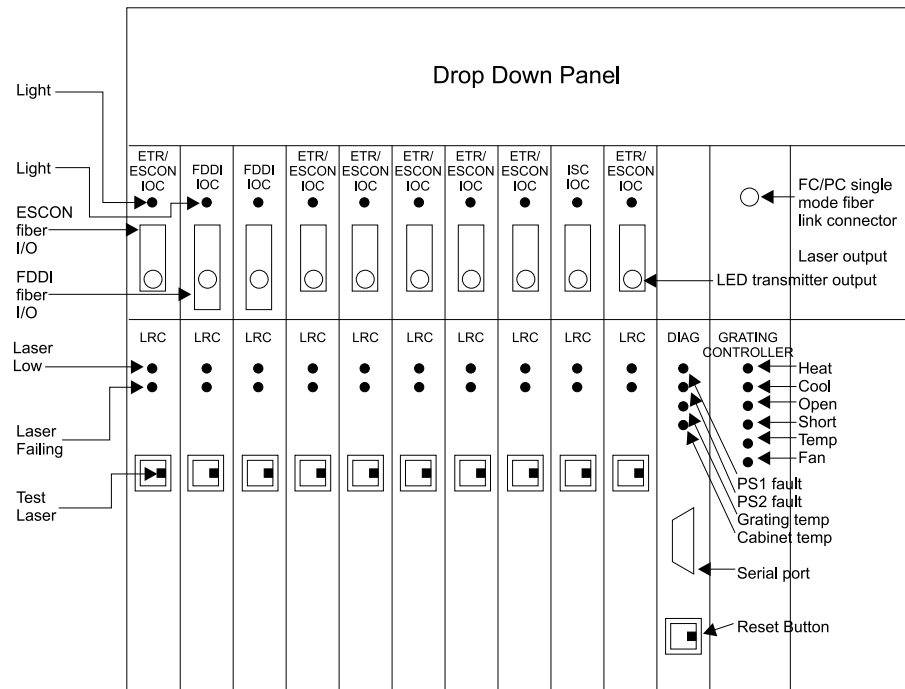


Figure 3. 9729 Front Panel Reference

Refer to Figure 3 for the location of the following indicators, switches, and port.

### Input/Output Controller (IOC) Indicators

Green *Light* LED on each ESCON or ETR/ESCON IOC lights to indicate the presence of light

Green *Light* LED on each FDDI IOC lights to indicate the presence of light

Green *Light* LED on each ISC IOC lights to indicate the presence of light.

Amber *Fault* LED on each ISC IOC lights when a laser fault is detected.

### LRC Indicators

Amber *Laser Low* LED lights if the laser has aged out of specification limits.

Amber *Laser Fault* LED lights if the laser control has failed and laser has been disabled

Green *Ready* LED lights when a signal is being received from the corresponding card in the other box.

### LRC Switch

Pressing the *Test Laser* button provides a reset to any LRC error indicated by an amber LED, and provides a backup method of establishing a connection with the other box on this channel. The diagnostic card provides the primary method of establishing the connection with the other box.

### **Diagnostic Card Indicators**

Amber *PS 1 FAULT* LED lights if power supply 1 is defective or inoperative.  
Amber *PS 2 FAULT* LED lights if power supply 2 is defective or inoperative.  
Amber *Grating Temp* LED lights if the grating temperature is out of range or if a grating controller fault occurs  
Amber *Cabinet Temp* LED lights if the enclosure temperature is above normal  
Green *Int* LED flashes on/off during normal operation of the diagnostic card.

### **Diagnostic Card Switch**

Pressing the Reset button restarts the processor on the diagnostic card.  
The *Int* LED blinks on and off when the processor on the diagnostic card is running.

### **Diagnostic Card Serial Port**

Pin 2 Transmit  
Pin 3 Receive  
Pin 7 and pin 8 connected  
Pin 5 Ground

### **Grating Controller Card (Current) Indicators**

Green *Heat* LED lights when a grating heating cycle is in progress  
Green *Cool* LED lights when a grating cooling cycle is in progress  
Amber *Open* LED lights when an open circuit is detected in the grating thermoelectric (TE) coolers.  
Amber *Short* LED lights when a short circuit is detected in the grating thermoelectric (TE) coolers.  
Amber *Temp* LED lights when the grating temperature is out of range  
Amber *Fan* LED lights when a failure is detected with the grating fan

### **Grating Controller Card (Old) Indicators**

This card, while not shown in Figure 3 on page 11, can be found on some machines.

Green *Cool* LED lights when a grating cooling cycle is in progress  
Amber *Heat* LED lights when a grating heating cycle is in progress

### **Dual Fiber Card Feature (if installed)**

This feature, not shown in Figure 3 on page 11, may be installed on your machine.

Green *Primary* LED lights when the primary fiber is in use  
Green *Secondary* LED lights when the secondary fiber is in use



---

## Diagnostics

### DCE EIA 232 Port:

Default setting: 2400 bps, even parity, 7 data bits, 1 stop bit

### Command Format and Register Definition:

Read Command: **r** *reg#*

For example, to display the contents of register r0, type **r r0** and press **Enter**.

Write Command: **w** *reg# data*

For example, to write 01 into register r0, type **w r0 01** and press **Enter**.

## Read-Only Registers:

When the indicated bit is set, it indicates:

### Register 0

Bit 0: Channel 1 No IOC light or signal  
Bit 1: Channel 1 Light received  
Bit 2: Channel 1 Laser output normal  
Bit 3: Channel 1 Laser fault  
Bit 4: Channel 2 No IOC light or signal  
Bit 5: Channel 2 Light received  
Bit 6: Channel 2 Laser output normal  
Bit 7: Channel 2 Laser fault

### Register 1

Bit 0: Channel 3 No IOC light or signal  
Bit 1: Channel 3 Light received  
Bit 2: Channel 3 Laser output normal  
Bit 3: Channel 3 Laser fault  
Bit 4: Channel 4 No IOC light or signal  
Bit 5: Channel 4 Light received  
Bit 6: Channel 4 Laser output normal  
Bit 7: Channel 4 Laser fault

### Register 2

Bit 0: Channel 5 No IOC light or signal  
Bit 1: Channel 5 Light received  
Bit 2: Channel 5 Laser output normal  
Bit 3: Channel 5 Laser fault  
Bit 4: Channel 6 No IOC light or signal  
Bit 5: Channel 6 Light received  
Bit 6: Channel 6 Laser output normal  
Bit 7: Channel 6 Laser fault

### Register 3

Bit 0: Channel 7 No IOC light or signal  
Bit 1: Channel 7 Light received  
Bit 2: Channel 7 Laser output normal  
Bit 3: Channel 7 Laser fault  
Bit 4: Channel 8 No IOC light or signal  
Bit 5: Channel 8 Light received  
Bit 6: Channel 8 Laser output normal  
Bit 7: Channel 8 Laser fault

### Register 4

Bit 0: Channel 9 No IOC light or signal  
Bit 1: Channel 9 Light received  
Bit 2: Channel 9 Laser output normal  
Bit 3: Channel 9 Laser fault  
Bit 4: Channel 10 No IOC light or signal  
Bit 5: Channel 10 Light received  
Bit 6: Channel 10 Laser output normal  
Bit 7: Channel 10 Laser fault

### Register 5

Bit 0: Power Supply 1 fault  
Bit 1: Grating temperature out of range  
Bit 2: Power supply 2 fault  
Bit 3: Cabinet temperature out of range  
Bit 4: Slot 9 cards not installed  
Bit 5: Slot 10 cards not installed  
Bit 6: Reserved  
Bit 7: Reserved

### Register 6

Bit 0: Slot 1 cards not installed  
Bit 1: Slot 2 cards not installed  
Bit 2: Slot 3 cards not installed  
Bit 3: Slot 4 cards not installed  
Bit 4: Slot 5 cards not installed  
Bit 5: Slot 6 cards not installed  
Bit 6: Slot 7 cards not installed  
Bit 7: Slot 8 cards not installed

### Register 7

Bit 0: Jumper 0 (0=Pulsing enabled, 1=Pulsing disabled)  
Bit 1: Jumper 1 - default mode Bit 0  
Bit 2: Jumper 2 - default mode Bit 1  
Bit 3: Jumper 3 (0=A system, 1=B system)  
Bit 4: Jumper 4  
Bit 5: Jumper 5  
Bit 6: Jumper 6  
Bit 7: Jumper 7 (0=Backplane, 1=Wire wrap)

### Register 8

Bit 0: 0=Primary fiber selected, 1=Secondary fiber selected  
Bit 1: 0=Link is open (incomplete), 1=Link is good (complete)  
Bit 2: 0=Bit 0 is valid, 1=Bit 0 is invalid  
Bit 3: Reserved  
Bit 4: Reserved  
Bit 5: Reserved  
Bit 6: Reserved  
Bit 7: Reserved

### Register 9

Bit 0: current mode bit 0 (see Table 1 for explanation)  
Bit 1: current mode bit 1 (see Table 1 for explanation)  
Bit 2: Reserved  
Bit 3: Reserved  
Bit 4: Reserved  
Bit 5: Reserved  
Bit 6: Reserved  
Bit 7: Reserved

*Table 1. Current Mode Definition - Dual Fiber Card*

<b>Current Mode</b>	<b>Bit 1</b>	<b>Bit 0</b>
Auto	0	0
Reserved	0	1
Reserved	1	0
Hold	1	1

## Write-Only Registers

### Register 0

Bit 0: Int LED  
Bit 1: Reserved  
Bit 2: Reserved  
Bit 3: Reserved  
Bit 4: Reserved  
Bit 5: Reserved  
Bit 6: Reserved  
Bit 7: Reserved



---

## Chapter 3. Network Management - SNMP Agent and Subagent

This section describes the installation and operation of the Simple Network Management Protocol (SNMP) agent and subagent support software for the 9729.

---

### Prerequisites

#### Software Requirements

The software prerequisites for running the 9729 SNMP subagent are:

- One of the following operating systems:
  - AIX 4.1.2 or higher
  - Windows 95
  - Windows NT V3.51 or higher
  - OS/2 Warp, Version 3.0 or higher with TCP/IP Version 3.0 or higher
  - OS/2 Warp Connect
- The IBM SystemView Agent, Version 1.1 or higher, if you are not using OS/2 Warp for your operating system

The 9729 SNMP subagent runs under an SNMP agent. The SNMP agent must support the Distributed Protocol Interface (DPI). The DPI-compatible SNMP agent is not provided as part of the 9729 network management software. You can get the DPI-compatible agent for AIX, Windows 95, Windows NT, or OS/2 as part of the SystemView Agent product; this product and its documentation are available from the SystemView site on the World Wide Web (WWW) at:

<http://www.networking.ibm.com/sha/shahome.html>

The latest version of the 9729 SNMP subagent code and NetView application code is available from the 9729 home page at:

<http://www.networking.ibm.com/279/279prod.html>

If you cannot obtain the agent from the Web, you can obtain it from IBM by contacting your marketing representative.

Some versions of OS/2 Warp Connect include a DPI-compatible SNMP agent. If your version does not, obtain the SystemView Agent product as described above.

#### Hardware Requirements

The workstation used to execute the SNMP subagent must include the following components:

- One or more EIA-232 ports available to attach to a 9729 to be managed
- An Ethernet or token-ring network adapter card for network management communication between the subagent and your Network Management Station

- Available hard disk space as indicated:
  - For AIX, 170 KB
  - For Windows NT, 240 KB
  - For Windows 95, 240 KB
  - For OS/2, 140 KB

---

## Installation and Configuration

This section provides instructions for:

- Installing the 9729 SNMP on one of these operating systems:
  - AIX
  - Windows
  - OS/2
- Configuring the hardware

### Software Installation for AIX

Install the 9729 Management Software using this procedure:

- 1** Install the IBM SystemView Agent software according to the instructions that accompany the package.
- 2** Log on to the system as root.
- 3** Edit the file `/etc/snmpd.conf`, adding the following lines to the end of the file:
 

```
community string address 255.255.255.255 readWrite
trap string address 1.2.3 fe
```

 where:
  - string* is the community name used to access the 9729 MIB variables. *String* must be the same as the name you specify when you use the `-c` option to the `muxsnmp` command. See “SNMP Subagent Options” on page 24 for more information.
  - Address* is the IP address of your Network Management Station.
- 4** Copy the file `muxsnmp` from the AIX directory on the installation diskette to the directory `/usr/sbin` using the following command:
 

```
copy a:/AIX/muxsnmp /usr/sbin/muxsnmp
```
- 5** Edit the file `/etc/rc.tcpip`. Add the following commands after the line that starts the SNMP daemon, `start /usr/sbin/snmpd`:
 

```
Start the 9729 Optical WDM SNMP Subagent
start /usr/sbin/muxsnmp options
```

 where *options* are the optional parameters you want to use with the 9729 SNMP subagent. For more information on optional parameters, see “SNMP Subagent Options” on page 24.

## Software Installation for Windows

Install the 9729 Management Software for Windows 95 and Windows NT using the following procedure:

- 1** Install the IBM SystemView Agent software according to the instructions that accompany the package.
- 2** Start the SNMP Agent configuration program by issuing the following commands:  

```
cd \sva\dmi\bin  
snmpcfg
```

The SNMP Configuration Utility window is displayed.
- 3** In the Name field under the Communities label, enter the community name that you will use to access the 9729 MIB variables. This name must be the same as the one you specify in the -c option to the muxsnmp command. For more information on the muxsnmp command, see "SNMP Subagent Options" on page 24.
- 4** Select the **Read/Write** option from the Access list and click **Add**.
- 5** Enter the IP address of your network management station in the Trap destinations field and click **Add**.
- 6** Copy the file muxsnmp.exe from the installation disk to the \windows directory by issuing the following commands:  

```
copy a:\windows\muxsnmp.exe c:\windows
```
- 7** Edit the file \sva\dmi\bin\svastart.bat, adding the following line to the end of the file:  

```
start c:\windows\muxsnmp.exe options
```

where *options* are the optional parameters you want to use with the 9729 SNMP subagent. For more information on optional parameters, see "SNMP Subagent Options" on page 24.
- 8** Set your operating system to invoke the file \sva\dmi\bin\svastart.bat, which will execute the 9729 SNMP subagent every time your operating system is started.

## Software Installation for OS/2

To install the SNMP subagent for OS/2, follow these steps:

- 1** Copy the file muxsnmp.exe from the installation disk using this command:  

```
copy a:\OS2\muxsnmp.exe c:\TCPIP\BIN
```

- 2 Using a text editor, add the following command to the end of the tcpstart.cmd file:

```
start muxsnmp <options>
```

For information about the options, see “SNMP Subagent Options” on page 24.

- 3 Configure the SNMP agent using either “Installation for DPI-compatible Agent” or “Installation for DPI-incompatible Agent” on page 21.

### Installation for DPI-compatible Agent

If the SNMP Agent supplied with your operating system is DPI-compatible, configure the SNMP Agent using the TCP/IP configuration program:

- 1 Open an OS/2 window and enter the following command to start the TCP/IP configuration program.

```
tcpcfg
```

The TCP/IP configuration window is displayed.

- 2 From the TCP/IP configuration window, select **SNMP**.
- 3 On page 2 of the SNMP configuration, click on an entry in the SNMP Trap Destinations field and then click **Add**. The SNMP Trap Destinations window appears.
- 4 In the SNMP Trap Destinations window, click on the Trap destination host field and enter the IP address of the network management station you will use to manage the 9729s.
- 5 Click on the Community name field and enter the community name for the network management station you will use to manage the 9729s.
- 6 In the SNMP Trap Destinations window, click **Add** to submit the changes. You are returned to the TCP/IP Configuration window.
- 7 In the TCP/IP Configuration window, click on an entry in the SNMP Manager Access Authorization field and click **Add**. The SNMP Manager Access Authorization window appears.
- 8 In the SNMP Manager Access Authorization window, click on the Community name field and enter the community name that you will use to access the 9729 MIB variables. This name must be the same as the one you specify in the -c option to the muxsnmp command. For more information on the muxsnmp command, see “SNMP Subagent Options” on page 24.
- 9 Click on the **Network address** field and enter the network address that is common to the network management station and the PC running the SNMP subagent.

For example, if the network management station has the IP address 3.4.55.67, and the PC running the SNMP subagent has the IP address



3.4.56.44, the network address that is common to both is 3.4.0.0. If the network management station and the PC running the SNMP subagent are on different networks, the value of the network address is 0.0.0.0.

- 10** Click on the **Network mask** field and enter the network mask that corresponds to the Network address.

In the Network mask, nonzero parts of the Network address are masked with 255, while the zero parts of the address are masked with 0. In this example, the correct Network mask is 255.255.0.0.

- 11** Select **Read/Write** from the Access list.

- 12** In the SNMP Manager Access Authorization window, click **Add** to submit the changes. You are returned to the TCP/IP Configuration window.

- 13** In the TCP/IP Configuration window, select the **Autostart** tab. The Autostart page is displayed.

- 14** On the Autostart page, select **snmpd** from the Services to autostart list.

- 15** In the Autostart Options box, select:

**Autostart Service**  
**Foreground session**  
**Minimized**

- 16** Click on the **Parameters** field and enter:

```
-dpi tcp -transport udp
```

Note that you must re-enter this information anytime you reconfigure TCP/IP.

- 17** Exit from the TCP/IP Configuration window, saving the new configuration.

### **Installation for DPI-incompatible Agent**

If the SNMP agent supplied with your operating system is DPI-incompatible, configure the SNMP agent using the OS/2 Agent Configuration Utility:

- 1** Install the IBM SystemView Agent software according to the instructions that accompany the package.
- 2** From the desktop, double-click on the **IBM SystemView Agent for OS/2** icon to open the SystemView folder.
- 3** From the SystemView folder, double-click on the **OS/2 Agent Configuration** icon to start the Agent Configuration utility.
- 4** In the Agent Configuration utility window, select the **Communities** tab. The Communities page is displayed.
- 5** On the Communities page, select **UDP** from the Protocol list.

- 6** In the Name field, enter the SNMP community name that you will use to access the 9729 MIB variables. This name must be the same name specified in the -c option for the muxsnmp command.
- 7** In the address field, enter the network address that is common to the network management station and the PC running the SNMP subagent.  
  
For example, if the network management station has the IP address 3.4.55.67, and the PC running the SNMP subagent has the IP address 3.4.56.44, the network address that is common to both is 3.4.0.0. If the network management station and the PC running the SNMP subagent are on different networks, the value of the network address is 0.0.0.0.
- 8** In the Network Mask field, enter the correct mask for the network address above.  
  
In the network mask, nonzero parts of the network address are masked with 255, while the zero parts of the address are masked with 0. In this example, the correct network mask is 255.255.0.0.
- 9** Select **Read/Write** from the Access Type list.
- 10** Click **Add** to submit the changes.
- 11** In the main window, select the **SNMPD** tab to open the SNMPD page.
- 12** On the SNMPD page, click on **SNMPD parameters** and enter:  
**-dpi tcp -transport udp**
- 13** Click **OK** to save the changes.
- 14** Once you have completed installation of the agent, follow the instructions in “Installation for DPI-compatible Agent” on page 20 to configure the subagent.

## Hardware Configuration

To configure the 9729 management hardware:

- 1** Install the network management station and PC running the SNMP subagent according to their instructions.
- 2** Connect each 9729 to be managed to an EIA-232 port on the PC using an EIA-232 cable, *not* a null modem cable or adapter. Depending on the hardware, a 9-pin to 25-pin adapter may be required.
  - If the PC has more than one EIA-232 port with a 9729 attached, the ports must be specified using the -f option of the muxsnmp command. For more information on the muxsnmp command, see “SNMP Subagent Options” on page 24.
  - If the PC is located more than 15.24 m (50 feet) from the 9729, shielded, EIA-232 cabling may be required, depending on the distance, electrical noise level, and cabling used. Consult an expert on EIA-232 cabling to determine the correct connection.

**3** Verify that the diagnostic card in the unit is operational.

---

## Operation

This section describes:

- Subagent options
- MIB variables
- Traps

### SNMP Subagent Options

Invoke the 9729 SNMP subagent by running the `muxsnmp` program. Do not execute more than one instance of the `muxsnmp` program simultaneously. To modify any of the runtime options, terminate the current instance of the SNMP subagent and start a new instance by issuing the `muxsnmp` command with the necessary runtime options.

The format of the `muxsnmp` command is:

```
muxsnmp -d level -h hostname -c community  
          -f configuration file/comdevice -p polltime  
          -v device -l log file -s  
          -t log log file
```

Where:

- |                                     |  |
|-------------------------------------|--|
| <b>-d</b> <i>level</i>              | Specifies the level of debugging messages to be displayed during operation. Use a value of 3 if you are experiencing trouble connecting the subagent to the SNMP agent. Do not specify this option unless it is requested by IBM support personnel.  |
| <b>-h</b> <i>hostname</i>           | Specifies that the 9729 SNMP subagent is to connect to an SNMPD agent on a specific host, indicated by <i>hostname</i> . You must use this option to connect to a host running OS/2, even if the SNMPD agent and the 9729 SNMP subagent reside on the same host.   |
| <b>-c</b> <i>community</i>          | Specifies the SNMP community name to be assigned to the SNMP subagent. Community names are used for security purposes to prevent unauthorized access to the SNMP subagent. The default community is public.  |
| <b>-t</b>                           | Specifies that the SNMP subagent should not issue traps when an event occurs. Use this option to decrease network traffic by suppressing traps.  |
| <b>-f</b> <i>configuration file</i> | Use either this definition of the <code>-f</code> runtime option or the following definition, depending upon the release of code you are using. This option names the configuration file that contains the following information about links to each 9729: <ul style="list-style-type: none"><li>• Port number</li><li>• Fiber card type (S for single or D for dual)</li><li>• Logical name</li><li>• A brief description</li></ul> |

For PCs, the format of the file is:

```
COMport_number fiber_card_type logical_name - description
```

For example,

```
COM1 S mux1 - 9729 at Hawthorne
COM2 D mux2 - 9729 at Yorktown
```

For workstations, the format of the file is:

```
/dev/ttynumber fiber_card_type logical_name - description
```

For example

```
/dev/tty0 S mux1 - 9729 at Hawthorne
/dev/tty1 D mux2 - 9729 at Yorktown
```

If you do not specify this option, the default configuration is:

- For PCs: COM1 S IBM9729\_1
- For workstations: /dev/tty0 S IBM9729\_1

It is recommended that you include the full path and file name when specifying this option.

- f comdevice** Use either this definition of the -f runtime option or the previous definition, depending upon the release of code you are using. This option specifies the communication (EIA 232) device name of the device that attaches to the 9729. If not specified, COM1 is used. If specified, this value should be one of the supported OS/2 communication ports, such as COM1, COM2, and so on.
- p polltime** Sets the interval, in seconds, at which the 9729 is polled. The default value for a single 9729 is 2 seconds. It is recommended that you increase the poll value by at least 1 second for every 9729 being managed by the SNMP subagent. For example, if you are managing two devices, the poll time should be at least 3 seconds.
- When running the subagent in simulation mode, use a value of 5000.
- v device** Specifies the serial port number of the device whose MIB and internal register values are to be logged. If this option is not specified, the values are displayed on the screen. To log the MIB and internal register values of all 9729s being managed by the SNMP subagent, set this value to 0.
- l log file** Specifies the name of the file to which the MIB and internal register values are to be logged. When this option is specified, the contents of the file specified in *log file*, if it already exists, are erased. If the file does not exist, the SNMP subagent creates it.
- s** Specifies that this SNMP subagent is a simulator. This is useful for training purposes when learning to use applications specific to the 9729. Do not specify this option when the SNMP subagent is to be used for management and control of devices attached to it.

When this option is specified, the subagent queries you for:

- The 9729-specific trap that is to be generated
- The serial communication port number of the device that generates the trap
- Where appropriate, the number of the IOC and LRC that are responsible for the trap

The traps are then sent to the correct hosts as specified in the SNMP configuration.

**-tlog** *log file* Specifies the file where all traps generated by the SNMP subagent are recorded. When this option is specified, the contents of the file specified in *log file*, if it already exists, are erased. If the file does not exist, the SNMP subagent creates it.

## IBM 9729 MIB Variables

The following SNMP MIB variables are supported by the 9729 SNMP subagent:

Variable Name	Object Identifier	Type
muxTotalNumbers	1.3.6.1.4.1.2.6.86.1.0	number
muxCommonTableUnitIndex	1.3.6.1.4.1.2.6.86.2.1.1.mn	number
unitName	1.3.6.1.4.1.2.6.86.2.1.2.mn	string
unitPort	1.3.6.1.4.1.2.6.86.2.1.3.mn	string
unitOperating	1.3.6.1.4.1.2.6.86.2.1.4.mn	number
cardNumbers	1.3.6.1.4.1.2.6.86.2.1.5.mn	number
powerSupply1	1.3.6.1.4.1.2.6.86.2.1.6.mn	number
powerSupply2	1.3.6.1.4.1.2.6.86.2.1.7.mn	number
gratingControl	1.3.6.1.4.1.2.6.86.2.1.8.mn	number
cabinetTemp	1.3.6.1.4.1.2.6.86.2.1.9.mn	number
lastTrapMsg	1.3.6.1.4.1.2.6.86.2.1.10.mn	string
fiberType	1.3.6.1.4.1.2.6.86.2.1.11.mn	number
cardTableUnitIndex	1.3.6.1.4.1.2.6.86.3.1.1.mn.cn	number
cardTableCardIndex	1.3.6.1.4.1.2.6.86.3.1.2.mn.cn	number
cardInstalled	1.3.6.1.4.1.2.6.86.3.1.3.mn.cn	number
inputLight	1.3.6.1.4.1.2.6.86.3.1.4.mn.cn	number
linkLight	1.3.6.1.4.1.2.6.86.3.1.5.mn.cn	number
laserOutput	1.3.6.1.4.1.2.6.86.3.1.6.mn.cn	number
laserDrive	1.3.6.1.4.1.2.6.86.3.1.7.mn.cn	number
linkTableUnitIndex	1.3.6.1.4.1.2.6.86.4.1.1.mn	number
linkValid	1.3.6.1.4.1.2.6.86.4.1.2.mn	number
linkStatus	1.3.6.1.4.1.2.6.86.4.1.3.mn	number
linkFiber	1.3.6.1.4.1.2.6.86.4.1.4.mn	string
linkLastCmd	1.3.6.1.4.1.2.6.86.4.1.5.mn	string
linkSwitchMode	1.3.6.1.4.1.2.6.86.4.1.6.mn	string

Where:

**mn** is a unit instance number. The unit instance number specifies one of the maximum of four 9729 devices that can be managed by a single workstation. Valid values are in the range 0 through 3.

**cn** is a card instance number. The card instance number specifies one of the IOCs and LRCs in a particular 9729. Valid values are in the range 0 through 9.

The MIB variables can be separated into four following groups, which are described in the following sections:

- Global variables
- General configuration and status table variables
- IOC and LRC status table variables
- Fiber link status table variables

## Global Variables

**muxTotalNumbers** Indicates the total number of devices that are managed by the SNMP subagent.

## General Configuration and Status Table Variables

### **muxCommonTableUnitIndex**

Is an index into the table that maintains status and configuration information that is common to the 9729 devices. This variable is used to reference a specific 9729.

**unitName** Is the logical name of a 9729 and a brief description. It is used to help the network administrator distinguish between various 9729s managed by a single SNMP subagent.

**unitPort** Indicates to which port a particular 9729 is attached.

**unitOperating** Indicates whether a particular 9729 is responding to polling by the SNMP subagent (1 = responding, 0 = not responding)

If a device is not responding to polling, it is either not operational or not connected to the SNMP subagent.

**cardNumbers** Indicates the number of LRCs and IOCs installed in the 9729.

**powerSupply1** Indicates the status of power supply 1 (1 = operational, 0 = not operational)

**powerSupply2** Indicates the status of power supply 2 (1 = operational, 0 = not operational).

**gratingControl** Indicates the status of the grating control system (1 = OK, 0 = error)

**cabinetTemp** Indicates whether the cabinet temperature is within range (1 = normal, 0 = out of range)

**lastTrapMsg** Contains the message text from the last trap issued by the subagent. If no traps have been issued, the string contains the value NONE.

**fiberType** Indicates the type of fiber card used in the device (1 = single fiber, 0 = dual fiber)



## Card Status Table Variables

<b>cardTableUnitIndex</b>	This variable is used to reference a particular 9729. It is used as an index into the LRC and IOC information table that is maintained by the SNMP subagent.
<b>cardTableCardIndex</b>	Indicates the channel number. Valid values are 0 through 9, corresponding to channels 1 to 10. Together with the cardTableUnitIndex variable, this variable uniquely identifies the card being managed by the SNMP subagent.
<b>cardInstalled</b>	Indicates whether an IOC or LRC is installed in a particular slot, identified by the combination of the cardTableUnitIndex and cardTableCardIndex variables.  1 indicates that an IOC or LRC is installed in the slot 0 indicates that no IOC or LRC is installed in the slot  If this variable is 0, all other variable data related to the slot is invalid.
<b>inputLight</b>	Indicates whether the IOC is receiving input from the link attached to it, determined by the presence of light at the IOC.  1 indicates that the IOC is receiving input (light present) 0 indicates that the IOC is not receiving input (light absent)
<b>linkLight</b>	Indicates whether the LRC is detecting received light from the multiplexed fiber optic link.  1 indicates light detected 0 indicates light not detected
<b>laserOutput</b>	Indicates whether the LRC's laser output is within specifications.  1 indicates that the laser output is normal 0 indicates that the laser output has degraded below the nominal value, and the LRC should be replaced at a convenient time within the next several weeks
<b>laserDrive</b>	Indicates whether the LRC's laser drive current is within specifications.  1 indicates that the laser drive current is OK 0 indicates that the laser drive current has been raised in excess of the nominal value, indicating insufficient laser output

## Fiber Link Status Table Variables

<b>linkTableUnitIndex</b>	This variable is used to reference a particular 9729 unit. It is used as an index into the 9729 link information table that is maintained by the SNMP subagent.								
<b>linkValid</b>	Indicates whether the information in the linkFiber variable is valid (1 = valid, 0 = not valid). This value is always 1 for a device with a single-fiber card.								
<b>linkStatus</b>	Indicates whether a link is up or down (1 = up, 0 = down). For devices with dual-fiber cards, this value applies only to the active fiber. No information is provided about the backup fiber.								
<b>linkFiber</b>	Indicates which fiber is currently being used to transport the optical signal, PRIMARY or SECONDARY. For devices with a single-fiber card, this value is always PRIMARY.								
<b>linkLastCmd</b>	<p>Contains the last switching command that was performed by the device. Possible values for devices using a dual-fiber card are:</p> <table><tr><td><b>auto</b></td><td>The 9729 performs automatic protection fiber switching from the bad fiber to the good one</td></tr><tr><td><b>hold</b></td><td>The 9729 is forced to use the current fiber (primary or secondary) even though it may be bad</td></tr><tr><td><b>prim</b></td><td>The 9729 was forcibly switched to the primary fiber</td></tr><tr><td><b>seco</b></td><td>The device was forcibly switched to the secondary fiber</td></tr></table> <p>For devices using a single-fiber card, the value of this variable is always none.</p>	<b>auto</b>	The 9729 performs automatic protection fiber switching from the bad fiber to the good one	<b>hold</b>	The 9729 is forced to use the current fiber (primary or secondary) even though it may be bad	<b>prim</b>	The 9729 was forcibly switched to the primary fiber	<b>seco</b>	The device was forcibly switched to the secondary fiber
<b>auto</b>	The 9729 performs automatic protection fiber switching from the bad fiber to the good one								
<b>hold</b>	The 9729 is forced to use the current fiber (primary or secondary) even though it may be bad								
<b>prim</b>	The 9729 was forcibly switched to the primary fiber								
<b>seco</b>	The device was forcibly switched to the secondary fiber								
<b>linkSwitchMode</b>	<p>Contains the current switching mode of the device. For devices using a dual-fiber card, possible values are:</p> <ul style="list-style-type: none"><li>• auto</li><li>• hold</li></ul> <p>These values are explained above.</p> <p>For devices using a single-fiber card, the value of this variable is always none.</p>								

## SNMP Traps

The 9729 SNMP subagent issues traps (asynchronous warning messages) to the network manager whenever an unusual event occurs. Each trap contains the following information:

### Generic Trap Type

This is always 6, indicating that the trap is enterprise-specific.

### Specific Trap Type

Used to indicate a specific problem with the 9729 device. For more information on specific trap types, see “Specific Trap Types.”

### lastTrapMsg

The MIB variable containing an ASCII message giving a description of the trap. This variable is suffixed with the index of the 9729 unit managed by the SNMP subagent that generated the trap, and, if applicable, the index of the IOC or LRC that is responsible for the trap.

`ibm9729.muxCommonTable.muxcommonEntry.lastTrapMsg.a.b`

where:

*a* is the index of the device managed by the subagent responsible for generating the trap

*b* is the index of the IOC or LRC specifically responsible for the trap

lastTrapMsg is not present for all traps

The object identifier information allows you to determine which device, and if applicable, which card in the device is responsible for the trap.

## Specific Trap Types

The specific traps mentioned above are defined as follows:

- Type 1** This trap will be issued if power supply 1 fails. The message sent in the trap packet is Power Supply 1 Down.
- Type 2** This trap will be issued if power supply 2 fails. The message sent in the trap packet is Power Supply 2 Down.
- Type 3** This trap will be issued if the grating control system fails. The message sent in the trap packet is Grating Control System Error.
- Type 4** This trap will be issued if the cabinet temperature is not within its permissible range. The message sent in the trap packet is Cabinet Temperature Out of Range.
- Type 5** This trap will be issued if the 9729 stops responding to polls from the SNMP subagent. The message sent in the trap packet is Unit Not Responding to Poll.
- Type 6** This trap is sent if the 9729 device has detected that its link is down or bad. The message sent in the trap packet is Link Down.
- Type 7** This trap is sent when power supply 1 comes up after a failure. The message sent in the trap packet is Power Supply 1 Up.

- Type 8** This trap is sent when power supply 2 comes up after a failure. The message sent in the trap packet is Power Supply 2 Up.
- Type 9** This trap is sent when the grating control system resumes normal operation. The message sent in the trap packet is Grating Control System OK.
- Type 10** This trap is sent when the cabinet temperature inside the 9729 device comes back to within the permissible range. The message sent in the trap packet is Cabinet Temperature Normal.
- Type 11** This trap is issued when the 9729 device resumes responding to polls from the SNMP subagent. The message sent in the trap packet is Unit Responding to Poll.
- Type 12** This trap is sent when an LRC or IOC is unplugged from its slot. The message sent in the trap packet is Card Uninstalled.
- Type 13** This trap is issued when the input light to an IOC is absent. The message sent in the trap packet is Input Light Absent.
- Type 14** This trap is issued if the LRC is not able to detect the fiber link light. The message sent in the trap packet is Link Light Not Detected.
- Type 15** This trap is issued when the LRC's laser output becomes weak, necessitating its change. The message sent in the trap packet is Laser Output Weak.
- Type 16** This trap is issued if the LRC's laser drive current is excessively high with insufficient laser output. The message sent in the trap packet is Laser Drive Failed.
- Type 17** This trap is issued if an LRC and IOC are plugged back into their slots. The message sent in the trap packet is Card Installed.
- Type 18** This trap is issued if the IOC detects input light coming from a remote host connected to it. The message sent in the trap packet is Input Light Present.
- Type 19** This trap is issued if the LRC detects the presence of link light on the fiber. The message sent in the trap packet is Link Light Detected.
- Type 20** This trap is issued if the LRC's laser output is back to normal. The message sent in the trap packet is Laser Output Normal.
- Type 21** This trap is sent if the LRC's drive current is back to normal. The message sent in the trap packet is Laser Drive OK.
- Type 22** This trap is issued if the 9729 device detects that its fiber link is up once more. The message sent in the trap packet is Link Up.
- Type 23** This trap is generated if the 9729 device switches the optical signal from its secondary fiber back onto its primary fiber. The message sent in the trap packet is Switched To Primary Fiber.
- Type 24** This trap is generated if the 9729 device switches the optical signal from its primary fiber back onto its secondary fiber. The message sent in the trap packet is Switched To Secondary Fiber.

Whenever a trap is issued, the MIB variable lastTrapMsg is set to the contents of the ASCII display string contained in the trap. For any event, its associated trap is sent only once; for example, if power supply 2 fails, then only a single trap is

generated for this event although power supply 2 may be in a failed state for a time interval that is many multiples of the subagent polling period.

---

## Troubleshooting Guide

Interactions both within the subagent and between the subagent and the network environment can affect the problem determination process in the following ways:

- Problems accessing the MIB variables
- Problems accessing register values
- Inconsistency between register values and MIB variables
- Problems in trap reporting
- Problem in simulator mode

### Problems Accessing MIB Variables

If you have a problem reading or setting MIB variables using an external manager application and you get the following type of error message:

Variable does not exist or is read-only

the problem can be due to one or more of the following reasons:

- The SNMP subagent is not operational.  
Correct this problem by starting the subagent on the management station by issuing the `muxsnmp` command.
- The SNMP agent access configuration does not permit the external application to read or set the MIB variables.

The cause could be an incorrect community string used by the application or the absence of the host on which the external application resides from the list of hosts given access to the MIB variables. To correct this problem:

- 1** Make sure that the host on which the management application resides has read permissions for the MIB variables
  - 2** Make sure that the community name used by the application is correct for the host on which the application resides, as specified in the SNMP configuration
- If this problem occurs with SNMP Set operations, it indicates that the Set operation has failed at the agent due to hardware communication failures.

However, if the messages are of the type:

Invalid destination - no route to host

the problem can be due to one or more of the following reasons:

- The name of the host on which the subagent resides cannot be resolved by any of the domain nameservers known to the host on which the external application resides. Contact your local TCP/IP administrator to correct this problem.
- The host on which the subagent resides does not have a network route to the host on which the external application resides. Ensure that the host on which the subagent resides is connected to its LAN, and check the routing table in the TCP/IP configuration to determine if this is a routing table

problem. If the problem is in the routing table, contact your local TCP/IP administrator.

## Problems Accessing Register Values

If you have a problem accessing the 9729 register values using an application such as PCPlus, the problem can be due to one or more of the following reasons:

- The 9729 device is not connected to one of the EIA-232 ports of the host running the subagent.
- The 9729 is not operational.
- The diagnostic card of the 9729 is not plugged securely into its slot.
- The diagnostic card of the 9729 has malfunctioned and requires service. Contact your IBM service representative for assistance.

## Inconsistency Between MIB Variables and Register Values

If you are experiencing inconsistency between the information represented by the MIB variables and the information in the 9729 device state registers, the problem can be due to one or more of the following reasons:

- The subagent polling period is too long, allowing the register values to change before they are reflected by the MIB variables.
- The diagnostic card of the 9729 is not plugged securely into its slot.
- The diagnostic card of the 9729 has malfunctioned and requires service. Contact your IBM service representative for assistance.

**Note:** This problem will be apparent only if the state of the device as reflected by the MIB variables is inconsistent with the state of the device as reported by an on-site technician.

## Problems in Trap Reporting

If the network management station is unable to receive traps from the SNMP subagent, the problem can be due to one or more of the following reasons:

- The SNMP trap destination configuration for the SNMP agent does not contain an entry for the network management station. To correct this problem, reconfigure SNMP to include an entry for the network management station. For more information, see "Installation and Configuration" on page 18.
- The SNMP subagent is being run with the -t option, which disables trap generation by the subagent. To correct this problem, stop the current instance of the subagent and restart it without the -t option. For more information, see "SNMP Subagent Options" on page 24.
- The host on which the subagent resides does not have a network route to the network management station. To correct this problem, ensure that the host running the subagent is connected to its LAN and that the routing table is correct. If the routing table is incorrect, contact your local TCP/IP administrator for assistance.

## Problems in Simulator Mode

The most common problem to occur when the SNMP subagent is being run in simulator mode is that the SNMP subagent receives the `SNMP_DPI_CLOSE` message from the SNMP agent and terminates. This problem could be due to a short polling interval selected for the subagent when in simulator mode. The subagent waits for a packet from the agent for a maximum time that is equal to the polling time, after which the subagent queries the user for the traps that are to be sent.

If a packet is sent by the agent to the subagent while the subagent is querying the user, the subagent will not respond and the agent will declare a timeout because it has received no response. Due to the timeout, the agent assumes that the subagent is down and terminates the connection to the subagent. To correct this problem, increase the polling interval.

---

## IBM9729 MIB

```
IBM9729-MIB DEFINITIONS ::= BEGIN

IMPORTS
    internet,
    directory,
    mgmt,
    experimental,
    private,
    enterprises
FROM RFC1155-SMI
    OBJECT-TYPE
        FROM RFC-1212
    DisplayString
        FROM RFC-1213;

--
-- This MIB is for IBM9729 systems that offer a fiber optic
-- multiplexing service.
--

ibm OBJECT IDENTIFIER ::= { enterprises 2 }

ibmProd OBJECT IDENTIFIER ::= { ibm 6 }

IBM9729 OBJECT IDENTIFIER ::= { ibmProd 86 }

muxTotalNumbers OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of IBM9729 devices attached to the
        Workstation/PC running the SNMP Subagent"
    ::= { IBM9729 1 }

muxCommonTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MuxCommonEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "Table containing status/configuration information
        pertaining to all IBM9729 devices managed by the
        SNMP Subagent, that is common to the device as a whole."
    ::= { IBM9729 2 }

muxCommonEntry OBJECT-TYPE
    SYNTAX MuxCommonEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "A list of status/configuration information for a
```



IBM9729 device that is common to that particular device as a whole."

INDEX { muxCommonTableUnitIndex }  
::= {muxCommonTable 1}

MuxCommonEntry ::= SEQUENCE {  
muxCommonTableUnitIndex INTEGER,  
unitName DisplayString,  
unitPort DisplayString,  
unitOperating INTEGER,  
cardNumbers INTEGER,  
powerSupply1 INTEGER,  
powerSupply2 INTEGER,  
gratingControl INTEGER,  
cabinetTemp INTEGER,  
lastTrapMsg DisplayString,  
fiberType INTEGER }

muxCommonTableUnitIndex OBJECT-TYPE  
SYNTAX INTEGER  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"Identifier of a particular IBM9729 device that is used as an index into the table muxCommonTable to access MIB information about the particular IBM9729 device."  
::= {muxCommonEntry 1}

unitName OBJECT-TYPE  
SYNTAX DisplayString  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"Logical name and description of a particular IBM9729 device"  
::= {muxCommonEntry 2}

unitPort OBJECT-TYPE  
SYNTAX DisplayString  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"The serial communication port of the Workstation/PC to which the IBM9729 device is connected."  
::= {muxCommonEntry 3}

unitOperating OBJECT-TYPE  
SYNTAX INTEGER  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"If device responds to polling by the SNMP Subagent it is 1, else it is 0."

```

::= {muxCommonEntry 4}

cardNumbers OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of Laser-Receiver & I/O Cards that have
        been installed in the device."
    ::= {muxCommonEntry 5}

powerSupply1 OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "If the device's Power Supply 1 is on it is 1 else it is 0."
    ::= {muxCommonEntry 6}

powerSupply2 OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "If the device's Power Supply 2 is on it is 1 else it is 0."
    ::= {muxCommonEntry 7}

gratingControl OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "If the grating control system is functioning normally it is 1
        else it is 0."
    ::= {muxCommonEntry 8}

cabinetTemp OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "If the cabinet temperature is within permissible limits, it
        is 1, else it is 0."
    ::= {muxCommonEntry 9}

lastTrapMsg OBJECT-TYPE
    SYNTAX DisplayString
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "This is the last trap message that was generated by the
        SNMP Subagent for this particular device."
    ::= {muxCommonEntry 10}

```

```

fiberType OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "If the IBM9729 device has the dual fiber card installed
        the value is 1 else it is 0."
    ::= {muxCommonEntry 11}

cardTable OBJECT-TYPE
    SYNTAX SEQUENCE OF CardEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "Table containing information about each Laser-Receiver & I/O
        card in each IBM9729 device managed by the SNMP Subagent."
    ::= {IBM9729 3}

cardEntry OBJECT-TYPE
    SYNTAX CardEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "List of status information for each Laser-Receiver & I/O
        card in a IBM9729 device."
    INDEX { cardTableUnitIndex,
            cardTableCardIndex }
    ::= {cardTable 1}

CardEntry ::=
    SEQUENCE {
        cardTableUnitIndex INTEGER,
        cardTableCardIndex INTEGER,
        cardInstalled INTEGER,
        inputLight INTEGER,
        linkLight INTEGER,
        laserOutput INTEGER,
        laserDrive INTEGER }

cardTableUnitIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "Identifier of a particular IBM9729 device that is used as
        an index into the table cardTable to access MIB information
        about all the LRC & I/O cards of a particular IBM9729 device."
    ::= {cardEntry 1}

cardTableCardIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory

```

DESCRIPTION

"Identifier of a particular LRC & I/O card that is used as an index into the table muxCommonTable to access MIB information about the particular LRC & I/O card."

::= {cardEntry 2}

cardInstalled OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"If a Laser-Receiver & I/O Card exists in this slot it is 1 else it is 0."

::= {cardEntry 3}

inputLight OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"If there is an input signal to the I/O card it is 1 else it is 0."

::= {cardEntry 4}

linkLight OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"If the LRC detects light on the link it is 1 else it is 0."

::= {cardEntry 5}

laserOutput OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"If the LRC's laser output power is normal it is 1 else it is 0."

::= {cardEntry 6}

laserDrive OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"If the LRC's laser drive current is normal it is 1 else it is 0."

::= {cardEntry 7}

linkTable OBJECT-TYPE

SYNTAX SEQUENCE OF LinkEntry

ACCESS not-accessible

STATUS mandatory  
DESCRIPTION  
"Table containing link status information for each IBM9729  
device."  
::= {IBM9729 4}

linkEntry OBJECT-TYPE  
SYNTAX LinkEntry  
ACCESS not-accessible  
STATUS mandatory  
DESCRIPTION  
"List of status information about the link for a IBM9729  
device."  
INDEX { linkTableUnitIndex }  
::= {linkTable 1}

LinkEntry ::=

SEQUENCE {  
linkTableUnitIndex INTEGER,  
linkValid INTEGER,  
linkStatus INTEGER,  
linkFiber DisplayString,  
linkLastCmd DisplayString,  
linkSwitchMode DisplayString }  
linkTableUnitIndex OBJECT-TYPE  
SYNTAX INTEGER  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"Identifier of a particular IBM9729 device that is used as  
an index into the table linkTable to access MIB  
information about the particular IBM9729 device's link."  
::= {linkEntry 1}

linkValid OBJECT-TYPE  
SYNTAX INTEGER  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"If the information about which fiber being used is valid,  
it is 1 else it is 0. This is used only for the device  
with the dual fiber card."  
::= {linkEntry 2}

linkStatus OBJECT-TYPE  
SYNTAX INTEGER  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
"If the link is up, it is 1 else it is 0."  
::= {linkEntry 3}

linkFiber OBJECT-TYPE  
SYNTAX DisplayString

ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
    "The fiber that is being used i.e. PRIMARY or SECONDARY. For  
    the device with the single fiber card, this variable is  
    always PRIMARY."  
::= {linkEntry 4}

linkLastCmd OBJECT-TYPE  
SYNTAX DisplayString  
ACCESS read-write  
STATUS mandatory  
DESCRIPTION  
    "The last fiber switching command. It is one of  
    auto/hold/seco/prim/none. For the device with the single fiber  
    card, this value is always none."  
::= {linkEntry 5}

linkSwitchMode OBJECT-TYPE  
SYNTAX DisplayString  
ACCESS read-only  
STATUS mandatory  
DESCRIPTION  
    "The fiber switching mode. It is one of auto/hold/none. For  
    the device with the single fiber card, the value is always  
    none."  
::= {linkEntry 6}

END

---

## Chapter 4. Network Management With NetView/6000

To facilitate easy operation of the 9729, you can take one of the following actions:

- Write your own network management applications.
- Obtain 9729 device-specific network management applications written for the NetView/6000 Network Management platform. The NetView/6000 applications provide you with an easy-to-use graphical user interface to configure 9729 devices and obtain their status information. In addition, you can maintain consistent topological information about the various devices attached to the 9729. A discovery tool is also available to automatically detect the 9729s managed by a particular agent. Furthermore, you can augment the consistency of the status information of each 9729 device being managed by means of embedded polling mechanisms.

It is strongly recommended that you make use of the customized network management applications for ease of management of the 9729 devices. These network management applications should be used in association with the 9729-specific SNMP subagent described in Chapter 3, "Network Management - SNMP Agent and Subagent" on page 17. The following sections describe the installation requirements of the NetView/6000 applications as well as their operational use. It should be noted that these applications are integrated with NetView/6000 at run time and they do not in any way conflict with the operation of other NetView/6000 applications.

---

### Requirements and Installation

Prior to the installation of the network management application, you should have the following hardware and software installed:

- IBM RS/6000 workstation running the appropriate version of AIX for NetView
- NetView for AIX, Version 3, installed on the workstation
- A minimum of 3.5 MB of free disk space in the directory /usr/OV in order to install the 9729-specific NetView/6000 applications.

A diskette containing the 9729-specific NetView/6000 applications will be provided. See "Software Requirements" on page 17 for instructions on downloading the latest version of code from the Web. To install the software, log on as root and use the following procedure:

- 1** If NetView/6000 is running, rename the current map. Open this map and continue to monitor the network.
- 2** Insert the diskette into the diskette drive of the workstation.
- 3** Copy the compressed tar<sup>1</sup> file containing the 9729-specific applications:  

```
mcopy a:/NetView/9729.tz /usr/OV/tmp
```

---

<sup>1</sup> An AIX tar command writes files to or retrieves files from an archival storage medium.

- 4** Change the current working directory to /usr/OV/tmp:  
`cd /usr/OV/tmp`
- 5** Rename the file containing the 9729-specific applications:  
`move 9729.tz 9729.tar.z`
- 6** Uncompress the file:  
`uncompress 9729.tar.z`
- 7** Expand the file:  
`tar -xvf 9729.tar`
- 8** Change the current working directory to /usr/OV/tmp/IBM9729:  
`cd /usr/OV/tmp/IBM9729`
- 9** Start the installation of the 9729-specific applications:  
`9729_install`  
The installation utility automatically install and verifies the software.
- 10** When the installation is complete, change the current working directory to /usr/OV/tmp:  
`cd /usr/OV/tmp`
- 11** At the prompt, issue the following commands:  
`\rm -rf IBM9729`  
`\rm -rf IBM9729.tar`
- 12** Remove the installation diskette from the drive.
- 13** At the prompt, issue the command:  
`/usr/OV/bin/nv6000 -map map_name`  
where *map\_name* is the name of the network topology map that is to be monitored.  
  
This command brings up the entire NetView program, together with the dedicated 9729-specific application programs that run in the background.  
**Note:** If you renamed the original map in step 1 on page 43, then *map\_name* is the name of the original map. After you have brought up NetView, delete the copy to conserve disk space.
- 14** In the NetView main menu, select **Options ...** from the menu bar. The Options menu appears.
- 15** Select **Load/Unload MIBs** from the Options menu. The Load/Unload MIBs menu appears.



- 16** Select **SNMP** from the Load/Unload MIBs menu. The Load/Unload MIBs dialog box appears.
- 17** Select **Load** from the Load/Unload MIBs dialog box. The Load MIB from File dialog box appears.
- 18** From the list of files under Files in Default MIB Directory, select **/usr/OV/snmp/mibs/IBM9729.mib**.
- 19** Click **OK** from the Load MIB from File dialog box. The 9729 MIB is loaded into NetView.
- 20** Click **Close** from the Load/Unload MIBs dialog box.

---

## Using the NetView Application

To manage the 9729s, you must first add them to the NetView topology map database; you can then form associations between peer devices in order to manage the fiber link between them. To enable you to do this, the 9729-specific NetView applications support the following activities:

- Adding a 9729
- Deleting a 9729
- Viewing the configuration parameters of a 9729
- Viewing the general operational parameters of a 9729
- Viewing the operational parameters of the LRCs and IOCs
- Adding a connection between two 9729s
- Deleting a connection between two 9729s
- Viewing a description of the connection between two 9729s
- Adding a connection between a 9729 and a remote host
- Deleting a connection between a 9729 and a remote host
- Viewing a description of a connection between a 9729 and a remote host.
- Interpreting graphical status information of a 9729, its diagnostic card, LRCs, IOCs, and its fiber link
- Resolving SNMP trap information to a specific 9729
- Auto-discovery of 9729s managed by an agent

The following sections describe these activities in detail. The term *proxy agent* refers to the host on which the SNMP agent and subagent that monitor the 9729s reside.

## Adding a 9729

There are two steps to adding a 9729:

- 1 Configuring SNMP communications
- 2 Adding the 9729 object to the NetView submap

### Configuring SNMP Communications

To add a 9729 to the NetView submap, you must first configure the SNMP communications used to monitor the device.

- 1 From the NetView menu bar, select **Options** to open the Options menu.
- 2 Select **SNMP Configuration** from the Options menu and configure the following values:

#### Node/Target

The name and IP address of the proxy agent that provides network management support to the 9729. This value must be provided by your network manager and is a read/write value.

#### Community

The community name that is used to communicate with the SNMP agent on the host running the SNMP subagent. This value must be the same that is used to configure the SNMP agents on the host running the SNMP subagent. For more information, see "Installation and Configuration" on page 18.

#### Set Community

The same value specified for Community.

#### Timeout

The maximum time that the NetView application will wait for a response from the proxy agent before performing a retransmission. The correct timeout value can be determined using the formula:

$$\text{Timeout} = (0.1 \times (9 \times \textit{single} + 11 \times \textit{dual}) + 2) \text{ seconds}$$

where *single* is the number of single fiber card devices managed by the SNMP subagent, and *dual* is the number of dual-fiber card devices managed by the SNMP subagent.

#### Retries

The maximum number of retransmissions that will be made by the NetView application for a specific SNMP session with the proxy agent. The recommended value is 1.

For each proxy agent, entries should be made having:

- The IP address of the proxy agent
- The full domain name of the proxy agent

The entries should have the same timeout and retry values.

## Adding the 9729 Object to the NetView Submap

- 1** Open the NetView submap onto which the device is to be added.
- 2** Select **Edit** from the NetView menu bar to open the Edit menu.
- 3** Select **Add** from the Edit menu to open the Add menu.
- 4** Select **Object** from the Add menu to open the Object menu.
- 5** From the Object menu, select the object class **Optic**.
- 6** Click and hold the middle mouse button on the icon subclass **9729Host**, and drag the icon to the chosen NetView submap.
- 7** Drop the bitmap icon representing the 9729 onto the submap by releasing the middle mouse button. The Add Object dialog box appears.
- 8** In the Add Object dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click **Set Object Attributes....** The Add Object - Set Attributes dialog box for the 9729 appears.
- 9** Click on the **Device Name** field and enter the logical name of the 9729 to be managed.
- 10** Click on the **Proxy Agent Name/IP Address** field and enter the logical name and IP address of the proxy agent.
- 11** Click **Verify** to contact the proxy agent and verify that it supports the named 9729. If the verification is unsuccessful, check the values of the Device Name field and Proxy Agent Name/IP Address field and correct them if necessary.
- 12** When the verification is complete, in the Add Object - Set Attributes dialog box, click **OK**. The Add Object - Set Attributes dialog box closes, and you are returned to the Add Object dialog box.
- 13** In the Add Object dialog box, click on the **Label** field and enter:  
**IBM9729::device\_name**  
where *device\_name* is the logical name of the 9729 to be managed.
- 14** Click on the **Selection Name** field and enter the same value you entered for the Label field.
- 15** Click **OK**. The 9729 is added to the NetView submap and to NetView's database of managed objects.

When you add the device to the topology submap, the application automatically creates the device submap containing symbols representing the diagnostic card, LRCs, and IOCs. To view the diagnostic card, LRCs, and IOCs, double-click the symbol representing the 9729. The status information for the entire device is

automatically obtained and displayed graphically. Do not add any symbols to the submap of the 9729.

## Deleting a 9729

Use the following procedure to delete a 9729 from the NetView topology submap:

- 1** Select the symbol of the 9729 to be deleted by clicking on it.
- 2** Select **Edit** from the NetView menu bar to open the Edit menu.
- 3** Select **Delete Object** from the Edit menu to open the Delete Object menu.
- 4** Select **From All Submaps** from the Delete Object menu. A warning dialog box appears.
- 5** In the warning dialog box, click **OK**. The 9729 is deleted from all submaps.

## Viewing the Configuration Parameters of a 9729

Use the following procedure to view the configuration parameters of a 9729:

- 1** Select the symbol of the 9729 whose configuration you want to view by clicking on it with the right mouse button. A pop-up menu appears.
- 2** Select **Edit** from the pop-up menu to open the Edit menu.
- 3** Select **Modify/Describe** from the Edit menu to open the Modify/Describe menu.
- 4** Select **Object** from the Modify/Describe menu. The Object Description dialog box appears.
- 5** In the Object Description dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click **View/Modify Attributes....** A dialog box appears listing the configuration parameters of the 9729:

### **Device Name**

The name of the 9729 as known by the proxy agent. This field is read only.

### **Device Description**

A brief description of the 9729 provided by the proxy agent. This field is read only.

### **Proxy Agent Name/IP Address**

The name and IP address of the proxy agent that provides network support for the 9729. This field is read/write.

### **Workstation/PC Serial Port**

The EIA-232 serial communication port of the host running the SNMP agent to which the 9729 is attached. This field is read/write.

**Total Cards Installed**

The total number of LRCs installed. This field is read only.

**Device Fiber Card Type**

The type of fiber card installed in the 9729. Valid values are *Dual fiber with protection switching* and *Single fiber only*

**Peer 9729 Device**

The selection name of the peer 9729. This value is updated automatically when the 9729 is connected to its peer by the system manager. The default value is *NONE*. This field is read only.

## Viewing the General Operational Parameters of a 9729

Use the following procedure to view the general operational parameters of a 9729:

- 1** Select the 9729 whose parameters you want to view by double-clicking on its symbol. The device submap appears.
- 2** Select the **Diagnostic** icon from the device submap by clicking it with the right mouse button. A pop-up menu appears.
- 3** Select **Edit** from the pop-up menu to open the Edit menu.
- 4** Select **Modify/Describe** from the Edit menu to open the Modify/Describe menu.
- 5** Select **Object** from the Modify/Describe menu. The Object Description dialog box appears.
- 6** In the Object Description dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click on **View/Modify Object Attributes**. A dialog box appears listing the operational parameters of the 9729:

**Operational Status**

Indicates whether the 9729 is responding to polls by the SNMP subagent. Valid values are *UP*, indicating that the 9729 is responding, and *DOWN*, indicating that it is not responding. If the value of this parameter is *DOWN*, the value of all other parameters should be considered inaccurate.

If this value is *DOWN*, contact IBM Customer Support.

This value is read only.

**Power Supply 1**

Indicates whether power supply 1 (PS1) is *UP* (operational) or *DOWN* (not operational). If this value is *DOWN*, contact IBM Customer Support. This field is read only.

**Power Supply 2**

Indicates whether power supply 2 (PS2) is *UP* (operational) or *DOWN* (not operational). If this value is *DOWN*, contact IBM Customer Support. This field is read only.

### **Grating Control System**

Indicates whether the grating control system is functioning normally. A value of *OK* indicates that it is functioning normally. A value of *ERROR* indicates that it is not functioning normally. If this value is *ERROR*, contact IBM Customer Support.

### **Cabinet Temperature**

Indicates whether the cabinet temperature is within acceptable limits. A value of *NORMAL* indicates that the cabinet temperature is within acceptable limits. A value of *OUT OF RANGE* indicates that the cabinet temperature is not within acceptable limits. This value is read only.

### **Last Trap Generated**

Displays the last trap generated by the SNMP subagent. This field is read only.

## **Viewing the Operational Parameters of the LRCs and IOCs**

Use the following procedure to view the operational parameters of the LRCs and IOCs installed in a 9729.

- 1** Select the symbol of the 9729 whose parameters you want to view by double-clicking on it. The device submap appears.
- 2** Select the card whose parameters you want to view from the device submap by clicking on it with the right mouse button. A pop-up menu appears.
- 3** Select **Edit** from the pop-up menu to open the Edit menu.
- 4** Select **Modify/Describe** from the Edit menu to open the Modify/Describe menu.
- 5** Select **Object** from the Modify/Describe menu. The Object Description dialog box appears.
- 6** In the Object Description dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click on **View/Modify Object Attributes**. A dialog box appears listing the operational parameters of the card:

### **Laser Receiver & I/O Card Installed**

Indicates whether the cards are installed. If the value of this field is *NO*, all other values should be considered to be incorrect. This field is read only.

### **I/O Card Input Light**

Indicates whether the IOC is receiving input from the device or communication link associated with this card. This is a read-only field.

### **Link Light**

Indicates whether the LRC detects received light from the multiplexed fiber optic link attached to the 9729. This is a read-only field.

### Laser Output

Indicates whether the LRC's laser output is at the nominal value. Possible values are *NORMAL*, indicating that the laser output is within acceptable limits, and *REACHING END OF LIFE*, indicating that the laser output is not within acceptable limits and must be replaced. If the LRC must be replaced, contact IBM Customer Support. This field is read only.

### Laser Drive

Indicates whether the LRC's laser drive is within acceptable limits. Possible values are *OK*, indicating that the laser drive is within acceptable limits, and *FAILED*, indicating that the laser drive is not within acceptable limits and must be replaced. If the LRC must be replaced, contact IBM Customer Support. This field is read only.

### Input Light Source/Destination

The selection name of the input light source/destination device to which the IOC is connected. This value is automatically updated when the card is associated with the input light source/destination device. The default value is *NONE*. This field is read only.

## Adding a Connection between 9729s

Use the following procedure to add a connection between two 9729s:

- 1** Select **Edit** from the NetView menu bar to open the Edit menu.
- 2** Select **Add** from the Edit menu to open the Add menu.
- 3** Select **Connection** to open the Connection menu.
- 4** Select the type of connection you want, and the source and destination devices. The Add Object dialog box appears.
- 5** In the Add Object dialog box, click on the **Label** field and enter the connection's label.
- 6** Click on the **Selection Name** field and enter the connection's selection name.
- 7** In the Add Object dialog box, click **OK**. The connection is displayed, along with a graphic display of the status of the fiber link.

**Note:** You cannot add a connection between two 9729s if either of the devices already has a connection to another 9729. You cannot add a connection between a device with a single fiber card and one with a dual-fiber card.

## Deleting a Connection Between 9729s

Use the following procedure to delete a connection between two 9729s:

- 1** Select the connection you want to delete by clicking on its symbol.
- 2** Select **Edit** from the NetView menu bar to open the Edit menu.
- 3** Select **Delete** from the Edit menu to open the Delete menu.
- 4** Select **Object** from the Delete menu to open the Object menu.
- 5** Select **From All Submaps**. A warning dialog box appears.
- 6** In the warning dialog box, click **OK**. The connection is deleted from all submaps.

## Viewing a Description of a Connection Between 9729s

Use the following procedure to view a description of the connection between two 9729s.

- 1** Select the connection you want to view by clicking on its symbol.
- 2** Select **Edit** from the NetView menu bar to open the Edit menu.
- 3** Select **Modify/Describe** from the Edit menu to open the Modify/Describe menu.
- 4** Select **Object** from the Modify/Describe menu to open the Object Description dialog box.
- 5** In the Object Description dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click **View/Modify Object Attributes**. A dialog box appears listing connection-specific parameters.

For a single fiber connection, the following information is displayed:

### **9729 Source**

The selection name of the source 9729. This field is read only.

### **9729 Destination**

The selection name of the destination 9729. This field is read only.

### **Link Status**

Indicates the status of the link. This field is read only.



For a dual-fiber connection, the following additional information is displayed:

#### **Fiber Used**

Indicates which fiber is being used, primary or secondary.

#### **Fiber Current Switching Mode**

Indicates the current switching mode in the format

*Source\_Switching\_Mode* : *Destination\_Switching\_Mode*. A value of HOLD indicates that the 9729 is forced to use the current fiber, even though it could be bad. A value of AUTO indicates that the 9729 performs automatic fiber switching from the bad fiber to the good.

#### **Last Switching Command**

Indicates the last switching command performed by the SNMP subagents associated with the devices on either end of the link. This field is read only.

The format is:

*source\_host\_switching\_command* :  
*destination\_host\_switching\_command*

where each switching command takes one of the following values:

PRIMARY	The 9729 was forcibly switched to the primary fiber
SECONDARY	The 9729 was forcibly switched to the secondary fiber
HOLD	The 9729 is forced to use the current fiber (primary or secondary) even though it may be bad
AUTO	The 9729 performs automatic protection fiber switching from the bad fiber to the good one

#### **Source Switching Command**

Displays the switching command that you want to issue to the source device on the connection. Values are:

Unset	Does not change the fiber switching mode
PRIMARY	Forcibly switches the link to the primary fiber, even if it is bad
SECONDARY	Forcibly switches the link to the secondary fiber, even if it is bad
HOLD	Forces the 9729 to use the current fiber (primary or secondary) even though it may be bad
AUTO	Allows the 9729 to perform automatic protection fiber switching from the bad fiber to the good

To set the new switching mode, click **Verify**. The status of the SNMP set request is displayed in the Messages field.

#### **Destination Switching Command**

Displays the switching command that you want to issue to the destination device on the connection. Possible values are:

Unset	Does not change the fiber switching mode
-------	--

PRIMARY	Forcibly switches the link to the primary fiber, even if it is bad
SECONDARY	Forcibly switches the link to the secondary fiber, even if it is bad
HOLD	Forces the 9729 to use the current fiber (primary or secondary) even though it may be bad
AUTO	Allows the 9729 to perform automatic protection fiber switching from the bad fiber to the good

To set the new switching mode, click **Verify**. The status of the SNMP set request is displayed in the Messages field.

## Adding a Connection Between a 9729 and a Remote Host

Use the following procedure to add a connection between a 9729 and a remote host:

- 1** Select **Edit** from the NetView menu bar to open the Edit menu.
- 2** Select **Add** from the Edit menu to open the Add menu.
- 3** Select **Connection** from the Add menu to open the Connection menu.
- 4** Select the 9729 by clicking on its symbol.
- 5** Select the remote host by clicking on its symbol. The Add Object dialog box appears.
- 6** In the Add Object dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click **Modify/Describe**. The Add Object - Set Attributes dialog box appears.
- 7** In the Add Object - Set Attributes dialog box, click on the **9729 Card Number** field and enter the card number to which you want to attach the remote host.
- 8** In the Add Object - Set Attributes dialog box, click **Verify**.
- 9** When the verification is successful, click **OK** in the Add Object - Set Attributes dialog box. You are returned to the Add Object dialog box.
- 10** In the Add Object dialog box, click on the **Label** field and enter the connection label.
- 11** Click on the **Selection Name** field and enter the connection's selection name. The connection between the 9729 and the remote host is displayed. In the object representation of the 9729 card, the field Input Light Source/Destination is updated with the selection name of the remote host.

Once the connection is established, the LRC and IOC associated with the connection are colored pink if all the card's parameters indicate normal transmission.

## Deleting a Connection Between a 9729 and a Remote Host

Use the following procedure to delete a connection between a 9729 and a remote host:

- 1** Select the connection to be removed by clicking on its symbol.
- 2** Select **Edit** from the NetView menu bar to open the Edit menu.
- 3** Select **Delete Object** from the Edit menu to open the Delete Object menu.
- 4** Select **From All Submaps**. A warning dialog box appears.
- 5** In the warning dialog box, click **OK**. The connection is deleted from all submaps and the associated parameters are reset to reflect the absence of the connection.

## Viewing a Description of a Connection Between a 9729 and a Remote Host

Use the following procedure to view information about a connection between a 9729 and a remote host.

- 1** Select the connection by clicking on its symbol.
- 2** Select **Edit** from the NetView menu bar to open the Edit menu.
- 3** Select **Modify/Describe** from the Edit menu to open the Modify Describe Menu.
- 4** Select **Object** from the Modify/Describe menu. The Object Description dialog box appears.
- 5** In the Object Description dialog box, select **IBM9729\_EVENT** from the Object Attributes list and click **View/Modify Object**. A dialog box appears listing the following connection parameters:

### **9729 Device**

The selection name of the 9729 that forms one end of the connection.  
This field is read only.

### **9729 Card Number**

The card number of the card to which the remote host is connected.  
This field is read only.

### **Input Light Source/Destination**

The selection name of the remote host that forms one end of the connection. This field is read only.

## Interpreting Graphic Status Information for a 9729

NetView uses color-coding to indicate the status of managed devices. The status of a device is derived from the status of its components and the type of propagation you have chosen. Consult your NetView documentation for information on status propagation.

Table 2 shows the default color-coding scheme used for the 9729 and its components.

Table 2. Default Status Color Coding

Symbol	Color	Meaning
Diagnostic card	Green	All diagnostic card parameters indicate normal status.
Diagnostic card	Red	The device is not responding to polls by SNMP subagent.
Diagnostic card	Yellow	The device suffers from power supply, grating control and/or cabinet temperature faults.
Diagnostic card	Blue	Not able to retrieve management information pertaining to the diagnostic card from the SNMP Subagent. The cause could be network link failures, agent/subagent failures, or lost SNMP packets.
LRC and IOC	Green	All LRC and IOC parameters indicate normal status.
LRC and IOC	Yellow	The LRC and IOC have installation, input light, link light, laser output and/or laser drive faults.
LRC and IOC	Pink	The LRC and IOC are functioning normally and are being associated with a remote device on the NetView topology map. This color code allows you to determine which LRCs and IOCs are actually being used for data transmission.
LRC and IOC	Blue	Not able to retrieve management information pertaining to the LRCs and IOCs from the SNMP subagent. The cause could be network link failures, agent/subagent failures, or lost SNMP packets.
9729 to 9729 Fiber Link Symbol	Black	The link is up. For the device that has the dual-fiber card, this also means that the primary fiber is being used.
9729 to 9729 Fiber Link Symbol	Red	The link is down.
9729 to 9729 Fiber Link Symbol	Yellow	Not able to retrieve management information pertaining to the diagnostic card from the SNMP subagent. The cause could be network link failures, agent/subagent failures or lost SNMP packets. For the device that has the dual-fiber card, this also means that the device is using the SECONDARY fiber to transmit the data or that the source and destination devices do not agree on the fiber that is being used.

You can define your own color coding schemes for reporting device, card, and link faults. For more information see Appendix C, "Customizing Your NetView Graphic Display" on page 69.

## Resolving SNMP Trap Information to a 9729

Using a 9729-specific trap reporting application, you can determine which 9729, and which card within the 9729, is responsible for a particular trap.

When a trap is received, the submap containing the responsible nodes is displayed, and the nodes are highlighted. Once you have detected the trap, you can turn off the highlighting using the following procedure:

- 1** Select the correct device by clicking on its symbol.
- 2** Select **View** from the NetView menu bar to open the View menu.
- 3** Select **Highlights** from the View menu to open the Highlights menu.
- 4** Select **Undo Highlights**.

You can determine which component of the 9729 is responsible for the trap by double-clicking the symbol of the 9729 and viewing the status of each component on the device submap. See "Interpreting Graphic Status Information for a 9729" on page 56 for more information.

Exclude traps for a particular device using the following procedure:

- 1** Select the 9729 by clicking on its symbol.
- 2** Select **Options** from the NetView menu bar to open the Options menu.
- 3** Select **Unmanage Objects** from the Options menu.

To resume monitoring the device, use the following procedure:

- 1** Select the 9729 by clicking on its symbol.
- 2** Select **Options** from the NetView menu bar to open the Options menu.
- 3** Select **Manage Objects** from the Options menu.

You can exclude traps from a particular card within a 9729 using the following procedure:

- 1** Open the 9729 device submap by double-clicking on the 9729 symbol.
- 2** Select the card from the device submap by clicking on it.
- 3** Select **Options** from the NetView menu bar to open the Options menu.
- 4** Select **Unmanage Objects** from the Options menu.

To resume monitoring the card, use the following procedure:

- 1** Open the 9729 device submap by double-clicking on the 9729 symbol.
- 2** Select the card from the device submap by clicking on it.
- 3** Select **Options** from the NetView menu bar to open the Options menu.
- 4** Select **Manage Objects** from the Options menu.

## Auto-discovery of 9729s

You can use a 9729-specific NetView discovery application to automatically discover the 9729s managed by a particular agent and add them to submaps using the following procedure:

- 1** Select the agent by clicking on its symbol.
- 2** Select **Tools** from the NetView menu bar to open the Tools menu.
- 3** Select **IBM9729 Discover** from the Tools menu. The 9729s managed by the agent are discovered and displayed on a submap labeled Discovered IBM9729 Devices. This submap is deleted and recreated each time you initiate the discovery process.

The symbols of discovered 9729s that are already present on other submaps are displayed in purple, while others are colored according to their status.

- 4** Cut the symbol you want from the Discovered IBM9729 Devices submap using the following procedure:
  - a** Select the device by clicking on its symbol.
  - b** Select **Edit** from the NetView menu to open the Edit menu.
  - c** Select **Cut** from the Edit menu.
- 5** After cutting the symbol, add the device to the correct submap using the following procedure:
  - a** Open the submap to which the device is to be added.
  - b** Select **Edit** from the NetView menu to open the Edit menu.
  - c** Select **Paste** from the Edit menu. The device is added to the submap.

---

## Troubleshooting

The interactions between NetView and the 9729-specific NetView applications affect the problem determination process. Problems may involve:

- Communication between NetView and the agent
- Trap reporting activity

### Problems in NetView-Agent Communication

One or more of the following problems could arise in NetView-agent communication:

- In describing any 9729-related symbols, you receive the following message:  
Failed to get response from proxy agent
  - This message usually indicates that the default timeout used by the 9729-specific applications for communication with NetView is too small. Correct this problem by setting a new timeout value as described in “Viewing the Configuration Parameters of a 9729” on page 48.
  - This problem could also occur if an incorrect community string is used for communication. Compare the community string used by NetView with the one used by the SNMP agent to ensure that they are the same.
  - Another cause of this problem is that the SNMP subagent is down. Restart the SNMP subagent using the muxsnmp command.
- In describing any 9729-related symbols, you receive the following message:  
Variable does not exist or is read only  
  
This message indicates that the SNMP subagent is down. Restart the SNMP subagent using the muxsnmp command.

### Problems in Trap Reporting Activity

The most common problem involving trap reporting activities is that traps generated by the SNMP subagent do not produce a change in the graphic display. This can occur for the following reasons:

- The SNMP configuration does not contain an entry for the NetView host in the Trap Descriptions field.  
  
To correct this problem, reconfigure the SNMP agent to ensure that the NetView host is listed in the Trap Destinations field.
- NetView does not have a symbol representing the faulty 9729.  
  
To correct this problem, use the 9729 autodiscovery application to determine all 9729s managed by the SNMP subagent generating the traps. Add any new devices to the NetView topology submap.
- The 9729 responsible for the trap is not being managed by NetView.  
  
To correct this problem, manage the device as described in “Resolving SNMP Trap Information to a 9729” on page 57.





---

## Chapter 5. Link Initialization Procedure

**CAUTION:**

The use of controls or adjustments or the performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

For translations of this safety notice, see Appendix A, "Safety Notices" on page 63.

Use the following procedure any time the *Ready* LED on an LRC is not lit.

- 1** If the *Green Ready* LED on an LRC is not lit, press the **Test Laser** button on the LRC.
- 2** The *Green Ready* LED should now turn on. If the LED does not turn on, consult your IBM service representative.



---

## Appendix A. Safety Notices

This appendix contains safety information for this book.

---

### 9729 Laser Safety Compliance

The 9729 is a CLASS 1 LASER PRODUCT and is certified to comply with IEC 825-1:1993 / EN 60825-1:1994 and 21 CFR subchapter J of DHHS.

The laser's average output level is held constant by an automatic power control circuit. The average power output of the laser is 900 microwatts, under normal operating conditions, at time of manufacture. The laser is modulated with a dc balanced signal at a maximum data rate of 1.0625 gigabits per second. The automatic power control circuit operates in the absence of a signal.

If the automatic power control system fails, the system will still remain Class 1.

The laser wavelengths in the system are between 1539.5 nanometers (nm) and 1559.5 nm at the time of manufacture. The wavelengths will remain between 1539 nm and 1560 nm after manufacture.

The average power of the laser can increase or decrease by 100 microwatts after manufacture. The system contains an Open Fiber Detection Circuit to limit laser exposure in the event of an open fiber at the output of the system. The time delay before limiting occurs is 1 second maximum. Pressing the Test Laser button on the Laser Receiver card defeats the Open Fiber Detection Circuit for that card, for the purpose of measurements and troubleshooting. Installing the jumper labelled "Test" on the Laser/Receiver card also defeats the Open Fiber Detection Circuitry. It is expected that there will be a measurement uncertainty in the test equipment of +0/-50% due to connector insertion loss.

---

### 9729 ISC Card Laser Safety Compliance Requirements

The 9729 ISC card is designed and certified as a Class 1 laser product. It is to be used only with another IBM-produced ISC device or a certified equivalent in a point-to-point configuration. The equivalent must contain the Open Fiber Control system as described in the Fiber Channel standard. This is a requirement for correct operation of the ISC card.

#### **CAUTION:**

**Connection of an ISC card to a non-approved optical source, or otherwise operating the ISC card in a manner inconsistent with its design and function may result in hazardous radiation exposure, and may be considered an act of modifying or new manufacturing of a laser product under US regulations contained in 21 CFR(J) or requirements contained in IEC 825-1 or EN 60825-1.**

**The person performing such an act is required by law to recertify and reidentify the product in accordance with the provisions of 21 CFR(J) for distribution in the USA, and in countries subject to the requirements of IEC 825-1 or EN 60825-1 are responsible for compliance with those requirements.**

---

## Caution Notices

### Caution:

The use of controls or adjustments or the performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

### LET OP:

Het wijzigen van instellingen of het uitvoeren van procedures die niet in deze handleiding worden beschreven, kan leiden tot blootstelling aan gevaarlijke stralingen.

### Cuidado:

O uso de controles e ajustes ou o desempenho de procedimentos diferentes daqueles especificados neste manual pode resultar em risco de exposição à radiação.

### Pas på!

Undgå farlig stråling: Anden anvendelse af justeringsknapper eller andre fremgangsmåder end dem, der er angivet i denne vejledning, kan resultere i farlig stråling.

### Varoitus:

Muut kuin tässä julkaisussa mainitut säädöt tai toimet voivat altistaa vaaralliselle säteilylle.

### Attention:

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent manuel.

### Achtung:

Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

### VIGYÁZAT!

A kezelő vagy beállítóelemek és a megadottaktól eltérő javítási eljárások használata veszélyes sugárzási hatást válthat ki!

### Attenzione:

L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritte nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

### 注意:

本書の指定以外の制御を使用したり、調整を行ったり、手順を実行したりすると、危険な放射線にさらされる恐れがあります。

### 주의:

이 지침서에 명시되지 않은 제어기나 조절기를 사용하거나 절차를 실행하면 위험한 방사선에 노출될 수 있습니다.

### Advarsel:

Hvis du bruker styringsutstyr eller utfører justeringer eller rutiner som ikke er nevnt i denne boken, kan det føre til farlig stråling.

**Uwaga:**

Użycie elementów sterujących lub regulujących oraz wykonywanie procedur w sposób inny niż opisano w niniejszym podręczniku może spowodować niebezpieczne napromieniowanie.

**Cuidado:**

**A utilização de controlos ou regulações ou a execução de procedimentos diferentes dos especificados neste manual pode resultar no perigo de exposição a radiações.**

**ОСТОРОЖНО**

При контроле, регулировке или выполнении процедур способами, не указанными в данном руководстве, возможно поражение опасной для жизни радиацией.

**Precaución:**

**La utilización de controles o ajustes o el seguimiento de procedimientos distintos a los especificados en este manual pueden provocar una exposición a radiaciones peligrosas.**

**注意：**

如未依照本手冊中所指定的控制、調整或處理程序操作時，可能會造成嚴重的輻射傷害。



## Appendix B. Power Plug Requirements

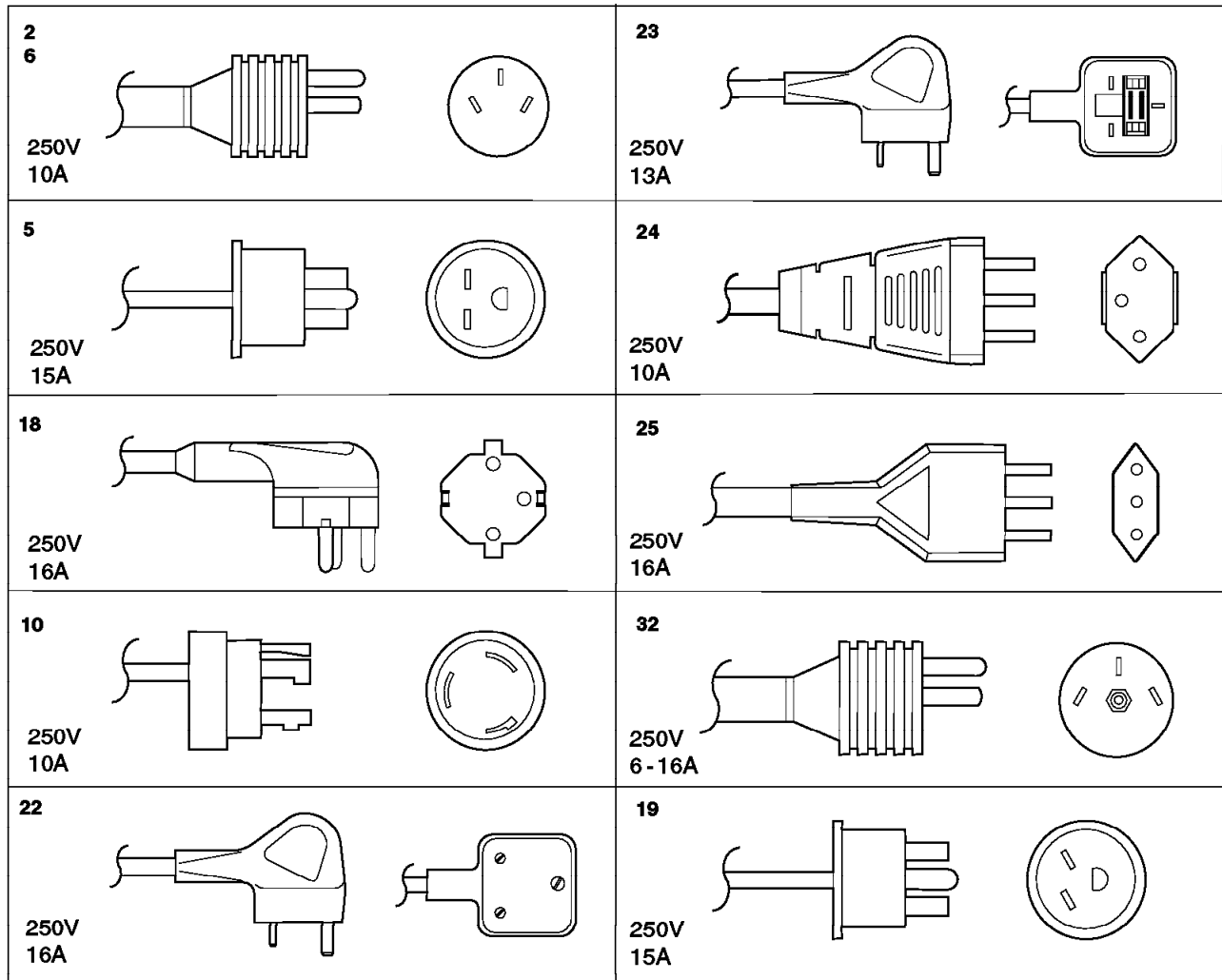


Figure 4. 9729 Power Cable Plugs

Figure 5. Power Plug Requirements by Country (200–250 volts)

Country	Plug	Country	Plug	Country	Plug
Afghanistan	18	Bahamas	5	Bulgaria	18
Angola	18	Bahrain	23	Channel Islands	23
Antigua	23	Bangladesh	22	Chile	25
ARAMCO	18	Barbados	5	Colombia	2
Argentina	2	Belgium	18	Costa Rica	5
Armenia	18	Belorussia	18	Croatia	18
Aruba	5	Bermuda	23	Curacao	5
Australia	6	Bolivia	5	Cyprus	23
Austria	18	Brazil	5	Czech Republic	18
Azerbaijan	18	Brunei	23	Denmark	19

<b>Country</b>	<b>Plug</b>	<b>Country</b>	<b>Plug</b>	<b>Country</b>	<b>Plug</b>
Dominican Republic	5	Myanmar	22	Yugoslavia	18
Dubai	23	Nepal	23	Zaire	18
Ecuador	5	Netherlands	18	Zambia	23
Egypt	18	Netherlands Antilles	5	Zimbabwe	18
El Salvador	5	New Zealand	6		
Estonia	18	Nicaragua	5		
Ethiopia	25	Nigeria	23		
Finland	18	Norway	18		
Fiji	23	Oman	23		
Germany	18	Pakistan	22		
Georgia	18	Panama	5		
France	18	Paraguay	2		
France Overseas	18	Peoples' Rep of China	23		
Ghana	23	Peru	5		
Greece	18	Philippines	5		
Guatemala	5	Poland	18		
Guyana	23	Portugal	18		
Haiti	5	Qatar	23		
Honduras	5	Romania	18		
Hong Kong	23	Russia	18		
Hungary	18	Saudi Arabia	18		
Iceland	18	Sierra Leone	23		
India	23	Singapore	23		
Indonesia	18	Slovakia (Republic of)	18		
Iran	18	Slovenia	18		
Iraq	23	Somalia	23		
Ireland	23	South Africa	22		
Israel	32	Spain	18		
Italy	25	Sri Lanka	22		
Jamaica	5	Sudan	18		
Japan	5	Swaziland	18		
Jordan	23	Sweden	18		
Kazakhstan	18	Switzerland	24		
Kenya	23	Syria	18		
Kirgizstan	18	Tadzhikstan	18		
Korea (Republic of)	18	Taiwan	5		
Kuwait	23	Tanzania	23		
Latvia	18	Thailand	5		
Lebanon	18	Trinidad and Tobago	5		
Libya	25	Turkey	18		
Liechtenstein	24	Turkmenistan	18		
Lithuania	18	Uganda	23		
Luxembourg	18	Ukraine	18		
Macau	18	United Arab Emirates	23		
Malawi	23	United Kingdom	23		
Malaysia	23	Uruguay	2		
Malta	23	Uzbekistan	18		
Mexico	10	Venezuela	5		
Moldavia	18	Western Samoa	6		
Mozambique	18	Yemen	23		



---

## Appendix C. Customizing Your NetView Graphic Display

You can define your own color coding schemes for reporting device, card, and link faults using the fault color coding configuration file IBM9729\_CONF in the directory /usr/OV/conf. The format of this file is described below.

### Line 1: diagnostic card Faults

Line 1 has the following format:

OP:*a,b,c,d,e*

where:

- a* Operational status
- b* Power supply 1
- c* Power supply 2
- d* Grating control system
- e* Cabinet temperature

and each variable can take one of the following values:

- R* Red: critical fault
- Y* Yellow: non-critical fault

For example, this line 1:

OP:*R,R,Y,R,Y*

would indicate that a failure of the 9729 to respond to polls (operational status of DOWN), a primary power supply failure, and a grating control system failure are all considered critical faults.

### Line 2: LRC and IOC Faults

Line 2 has the following format:

CD:*a,b,c,d,e*

where:

- a* LRC installed
- b* IOC input light
- c* Link light
- d* Laser output
- e* Laser drive

and each variable can take one of the following values:

- R* Red: critical fault
- Y* Yellow: non-critical fault

For example, this line 2:

CD:*R,Y,Y,R,Y*

would indicate that a card installation failure and a card laser output failure are considered critical faults.

If you do not have all ten LRCs and IOCs installed, it is recommended that you “unmanage” the cards that are not installed by following this procedure for each card that is not installed:

**1** Select the symbol of the card

**2** Choose the NetView menu option **Options...Unmanage Objects**.

If the card is installed later, you can choose to manage it by selecting the NetView menu option **Options...Manage Objects**.

### Line 3: Fiber Link Faults

Line 3 has the following format:

FL:*a,b,c*

where:

*a* Link status

*b* Primary fiber used

*c* Secondary fiber used

and each variable can take one of the following values:

*R* Red: critical fault

*Y* Yellow: non-critical fault

*G* Green or normal

In this line, you have the option to choose the color that you want to indicate the fiber in use. For example, this line 3:

FL:*R,G,Y*

would indicate that a link failure is a critical fault. With the link up, *Black* indicates that the primary fiber is being used and *Yellow* means that the secondary fiber is being used.

### Line 5: Polling Period Specification

Periodic polling increases the reliability of the status information. Relying on traps from the SNMP subagent alone is not advisable, as the trap packets can get lost while in transit due to, for example, network congestion or link failure along the packet's route. The polls that are generated by the 9729-specific, NetView application poll all the device MIB values; consequently, you do not have to define your own polls.

Line 5 has the following format:

PP:*a*

where:

*a* Polls should be sent to the 9729s every  $a * 10$  seconds.

For example, this line 5:

PP:2

would indicate that a poll is sent every  $2 * 10$  seconds = 20 seconds.

Use a poll period of 0 to indicate that no polling should be performed. This value is the default.

The recommended polling period is 1 minute (poll period = 6) when a single 9729 is managed by the NetView application. Increase the polling period by 60 seconds for each additional 9729 that is managed by the NetView application. For example, if four 9729s are being managed, the polling period should be 4 minutes, or

PP:24

If you want to change the color coding scheme online:

- 1** Edit the file `/usr/OV/conf/IBM9729`, making changes according to the formats above
- 2** Select the NetView menu option **Tools...IBM9729 Reload Reload Configuration File**

If you want to change, for example, only the poll time interval:

- 1** Edit the last line of the file `/usr/OV/conf/IBM9729`
- 2** Select the NetView menu option **Tools...IBM9729 Change Polling interval**



---

## Appendix D. Fiber Optic Cable Specifications

This section contains specifications for the following equipment:

- ESCON Multimode Jumper Cable
- Coupling Facility Channel Single-Mode Jumper Cable
- OC-3 Fiber Cable
- FDDI Jumper Cable
- F-ENET Cable

**Note:** The symbol  $\mu\text{m}$  denotes micron, which is one millionth of a meter.

---

### ESCON Multimode Jumper Cable Specifications

#### Optical specifications

Type of fiber	Graded index with glass core and cladding
Operating wavelength	1300 nm
Core diameter	62.5 $\pm$ 3.0 $\mu\text{m}$
Cladding diameter	125 $\pm$ 3.0 $\mu\text{m}$
Ferrule outer diameter	2.4984 $\pm$ 0.0004 mm
Numerical aperture	0.275 $\pm$ 0.015
Minimum modal bandwidth	500 MHz•km
Attenuation	1.75 dB/km maximum

#### Physical Specifications

Connector color	Black
Jacket color	Orange
Jacket outside diameter	4.8 mm (0.188 in.)
Weight	20 grams per meter (0.013 lb/ft)
Installation tensile strength	1000 newtons (225 lb) maximum
Minimum bend radius (during installation)	4.0 mm (0.157 in.); 5 seconds maximum at 400 newtons (90 lb)
Minimum installed bend radius	No load: 12 mm (about 0.5 in.) Long-term residual: 25 mm (about 1.0 in.) at 89 newtons (20 lb) maximum
Flammability	Underwriters Laboratory-rated OFNR (Optical Fiber Nonconductive Riser) UL-1666 (plenum UL-910 is also acceptable)
Crush resistance	500 newtons per cm (286 lb/in.) maximum
Maximum unsupported vertical rise	100 m (328 ft)
Connector	IBM Duplex connector, IBM P/N 5605519, or equivalent

## Environmental Specifications

Operating environment	Inside buildings only
Operating temperature	10° to 60°C (40°F to 140°F)
Operating relative humidity	5% to 95%
Storage and shipping temperature	-40°C to 60°C (-40°F to 140°F)
Lightning protection	None required
Grounding	None required

---

## Coupling Facility Channel Single-Mode Jumper Cable Specifications

### Optical Specifications (at 1300 nm Wavelength)

Operating wavelength	1270 to 1355 nm
Mode field diameter	8.7 to 10.0 $\mu\text{m}$
Zero dispersion wavelength	1310 $\pm$ 10 nm
Dispersion (1270–1340 nm)	3.5 ps/(nm•km) maximum
Cutoff wavelength	1260 nm maximum
Attenuation (1270–1340 nm)	0.8 dB/km maximum

### Physical Specifications

Connector color	Grey
Jacket material	Yellow polyvinyl chloride (PVC) Jacket outside diameter - zip cord Weight: 20 grams/m (0.013 lb/ft)
Installation tensile strength	1000 newtons (225 lb) maximum
Minimum bend radius (during installation)	50.0 mm (1.969 in.); 5 seconds maximum at 100 newtons (11.5 lb)
Minimum installed bend radius	No load 30 mm (1.18 in.) Long-term residual 50 mm (1.969 in.) at 80 newtons (18 lb) maximum
Flammability	Underwriters Laboratory-rated OFNR (optical fiber nonconductive riser) UL-1666
Crush Resistance	889 newtons per cm (200 lb/in.) maximum
Maximum unsupported vertical rise	100 m (328 ft)

## Environmental Specifications

<b>Operating environment</b>	Inside buildings only
<b>Operating temperature</b>	0° to 60°C (32°F to 140°F)
<b>Operating relative humidity</b>	8% to 95%
<b>Storage and shipping temperature</b>	-40°C to +60°C (-40°F to 140°F)
<b>Lightning protection</b>	None required
<b>Grounding</b>	None required

---

## OC-3 Cable Specifications

OC-3 connections are supported via the ESCON or ETR/ESCON adapter. Figure 6 shows the connections for an ESCON multimode jumper cable. This customer-provided cable will allow attachment of a 9729 to OC-3 multimode media.

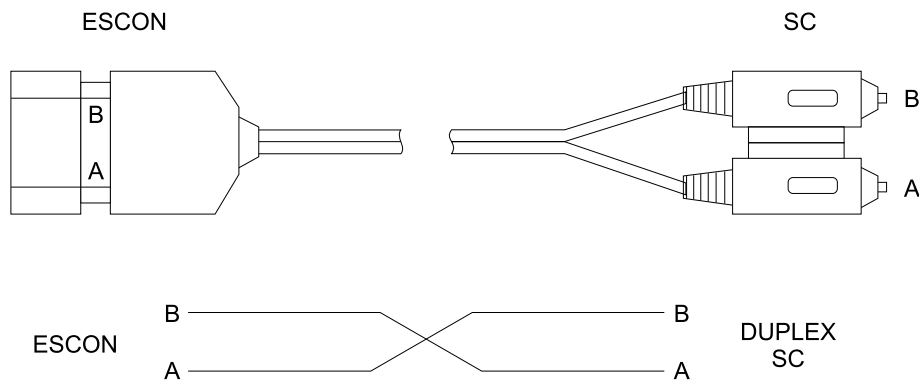


Figure 6. Specifications for OC-3 Fiber Cable

Note the orientation of the connector keys and connect ESCON fiber B to SC fiber connector A, and ESCON fiber A to SC fiber connector B.

## Optical Specifications

<b>Core diameter</b>	62.5 ±3.0µm
<b>Cladding diameter</b>	125 ±3.0µm
<b>Type of fiber</b>	Multimode graded index with glass core and cladding

## Physical Specifications

<b>Maximum length</b>	100 m (328 ft.)
<b>SC Connector type</b>	Amphenol 954 series duplex SC (Amphenol P/N 954-101-5210) or equivalent
<b>ESCON Connector</b>	Duplex, IBM P/N 5605519 or equivalent

---

## FDDI Jumper Cable Specifications

### Optical Specifications

Wavelength	1300 nm
Core diameter	$62.5 \pm 3.0\mu\text{m}$
Cladding diameter	$125 \pm 3.0\mu\text{m}$
Numerical aperture	$0.275 \pm 0.015$
Minimum modal bandwidth	500 MHz•km
Optical loss	1.75 dB/km maximum

### Physical Specifications

Connector color	Pearl
Connector type	FDDI MIC connector (Amphenol 963 Series or equivalent)
Jacket material	Orange polyvinyl chloride (PVC), plenum rated
Jacket outside diameter	4.8 mm (0.189 in.)
Weight	20 g/m (0.013 lb/ft)
Installation tensile strength	1000 newtons (225 pounds) maximum
Minimum bend radius during installation	4.0 mm (0.157 in.); 5 seconds maximum at 400 newtons (90 lb)
Minimum installed bend radius	No load 12 mm (0.5 in.) Long-term residual 25 mm (1.0 in.) at 89 newtons (20 lb) maximum
Flammability	Underwriters Laboratory-rated OFNR (optical fiber non-conductive riser) UL-1666 or OFNP (optical fiber non-conductive plenum) UL-910
Crush resistance	500 newtons per cm (286 lb/ft) maximum
Maximum unsupported vertical rise	100 m (328 ft)

### Environmental Specifications

Operating environment	Inside buildings only
Operating temperature	0°C to 60°C (32°F to 140°F)
Operating relative humidity	8% to 95%
Storage and shipping temperature	-40°C to 60°C (-40°F to 140°F)
Lightning protection	None required
Grounding	None required



---

## F-ENET Cable Specifications

F-ENET connections are supported via the FDDI adapter. Figure 7 shows the connections for this cable.

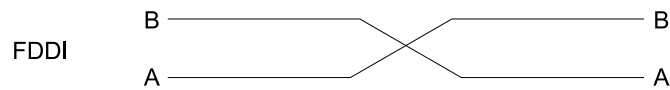


Figure 7. Specifications for F-ENET Cable

## Optical Specifications

<b>Wavelength</b>	1300 nm
<b>Core diameter</b>	62.5±3.0µm
<b>Cladding diameter</b>	125±3.0µm
<b>Numerical aperture</b>	0.275±0.015
<b>Minimum modal bandwidth</b>	500 MHz•km
<b>FDDI connector</b>	MIC (Amphenol 963 series or equivalent )
<b>F-ENET connector</b>	FDDI MIC (ISO/IEC 9314-3) ST (BFOC/2.5) Duplex SC
<b>Maximum length</b>	10 m (33 ft)
<b>Type of fiber</b>	Multimode graded index with glass core and cladding
<b>Zero dispersion wavelength</b>	1295 nm to 1365 nm
<b>Dispersion slope</b>	<0.093 ps/nm <sup>2</sup> •km



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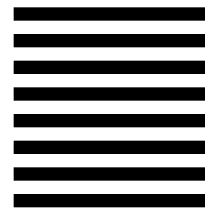
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