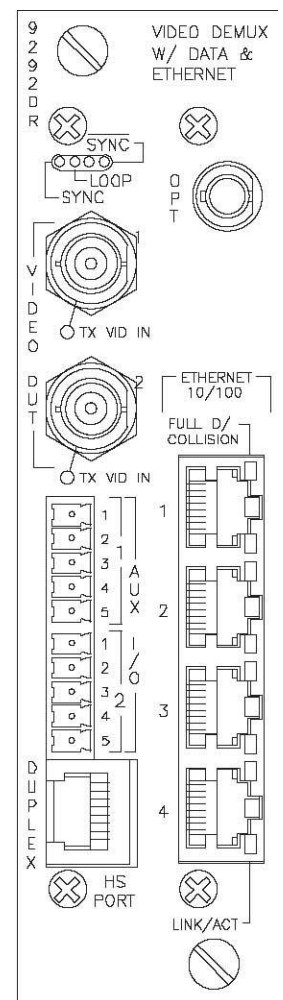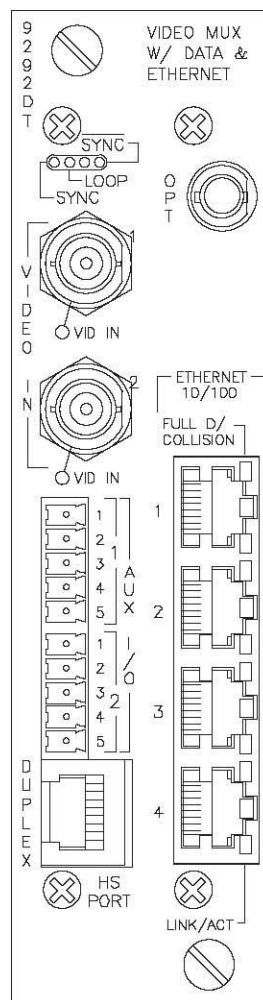**T<H GROUP** **optelecom**

Optelecom 9000 Series Installation and Operation Manual

Model 9292DT
Model 9292DR

Rack-mount Fiber Optic Two Channel Video   Transmitter/Receiver Cards with Bidirectional Data and 10/100 Ethernet.

For transporting two NTSC or PAL video signals in one direction and 10/100 Mb Ethernet, high-speed data (HS Port), and data/audio Option Module data in both directions over one or two optical fibers.

Table of Contents

Section | **Page**

Safety Instructions

The safety information contained in this section, and on other pages of this manual, must be observed whenever this unit is operated, serviced, or repaired. Failure to comply with any precaution, warning, or instruction noted in the manual is in violation of the standards of design, manufacture, and intended use of the unit. TKH Security Solutions USA assumes no liability for the customer's failure to comply with any of these safety requirements.
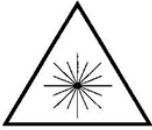
**LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS (MAGNIFIERS)
CLASS 1M LASER PRODUCT**

**CAUTION:
DISCONNECTED OPTICAL CONNECTORS MAY EMIT OPTICAL ENERGY.
DO NOT VIEW BEAM WITH OPTICAL INSTRUMENTS (MAGNIFIERS)**

This product contains Class 1M lasers or LEDs.
• Class 1M laser product according to IEC60825-1:1993+A1+A2
• **CAUTION: Use of controls or adjustments or procedures other than those specified herein may result in hazardous radiation exposure.**
• Precautions should be taken to prevent exposure to optical radiation when the unit is removed from its enclosure or when fiber is disconnected from the unit.
•Laser radiation may be present on a fiber connection to this unit even when the power has been removed from the unit.
•This unit is intended for installation in locations where only trained service personnel have access to the fiber connections.
•The locations of all optical connections are listed in the Connection Locations and Function section of this manual.
•Optical outputs and wavelengths are listed in the Specifications section of this manual.

The optical devices used in this equipment are Hazard Level 1M. As required by IEC60825-1, the installer is responsible for insuring that the label depicted below is present in the restricted locations where this equipment is installed.

Hazard Level 1M

The border shall be black and the background shall be yellow

This assembly contains parts sensitive to damage by electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing, or inserting parts or assemblies.

The chassis into which this unit is installed must be housed in a properly rated NEMA enclosure.

When this unit is operated in extremely elevated temperature conditions, it is possible for internal and external metal surfaces to become extremely hot. Care should be taken to insure this unit is installed in a restricted area where only properly trained service personnel have access to the unit.

Instrucciones de Seguridad

Debe observarse la información de seguridad contenida en esta sección, y en otras páginas de este manual siempre que se opere, dé servicio o repare esta unidad. Si no se cumple con alguna precaución, advertencia o instrucción indicada en este manual se infringen los estándares de diseño, fabricación y el uso destinado a la unidad. TKH Security Solutions USA no asume ninguna responsabilidad si el cliente no cumple con alguno de estos reequisitos de seguridad.
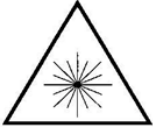
RADIACIÓN LÁSER
NO VER DIRECTAMENTE CON INSTRUMENTOS ÓPTICOS (DE AUMENTO)
PRODUCTO LÁSER CLASE 1M

PRECAUCIÓN:
LOS CONECTORES ÓPTICOS DESCONECTADOS PUEDEN AMITIR ENERGÍA ÓPTICA
NO VER EL HAZ CON INSTRUMENTOS ÓPTICOS (DE AUMENTO)

Este producto contiene rayos láser o diodos emisores de luz Clase 1M.
• Producto láser Clase 1M conforme a la norma IEC60825-1: 1993+A1+A2
• **PRECAUCIÓN: El uso de los controles, ajustes o procedimientos, aparte de los aquí especificados, pueden ocasionar exposición peligrosa a la radiación.**
• Deben tomarse precauciones para evitar la exposición a la radiación óptica cuando se saque la unidad de su alojamiento, o cuando se desconecte la fibra de la unidad
• Puede haber radiación laser en una conexión de fibra a esta unidad aun cuando se haya eliminado la corriente de la unidad.
• Este equipo está destinado a instalarse en lugares donde sólo el personal de servicio debidamente entrenado tenga acceso a las conexiones de fibra.
• La ubicación de todas las conexiones ópticas se enumeran en la sección Ubicación de los conectores y funciones de este manual.
• Las salidas ópticas y longitudes de onda aparecen en la sección Especificaciones de este manual.

Los dispositivos ópticos usados en este equipo son de Nivel de Riesgo 1M. Según lo exige la norma IEC60825-1, el instalador es responsable de asegurar que la etiqueta descrita a continuación esté presente en las áreas restringidas donde se instale este equipo.

Nivel de Riesgo 1M

El bordo debe ser negro y el fondo debe ser amarillo

Este ensamblaje contiene piezas sensibles al daño por descargas electrostáticas (ESD, por sus siglas en inglés). Use procedimientos para prevenir las descargas electrostáticas al tocar, desmontar o insertar piezas o ensamblajes.

El chasis en el cual está instalada esta unidad debe estar dentro de un alojamiento debidamente calificado por NEMA.

Cuando se opera esta unidad en condiciones de temperatura sumamente elevada, es posible que las superficies internas y externas de metal se pongan extremadamente calientes. Debe tenerse cuidado para asegurar que esta unidad se instale en un área restringida donde sólo tenga acceso a la unidad el personal de servicio debidamente capacitado.

Sicherheitsanleitungen

Die in diesem Abschnitt und auf anderen seiten dieses Handbuchs enthaltenen Sicherheitsinformationen müssen befolgt werden, wenn diese Einheit betrieben, gewartet oder repariert wird. Falls Vorsichtsmassnahmen, Warnungen oder Anweisungen in diesem Handbuch nicht befolgt werden, verstösst dies gegen die Konstruktions, und Herstellungsstandards und erfolgt im gegensatz zum vorgesehenen Verwendungszweck dieser Einheit. TKH Security Solutions USA übernimmt keine Haftung für das Verabsäumnis des Kunden, diese Sicherheitsanforderungen einzuhalten.
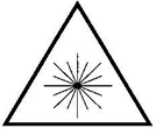
LASER-STRAHLUNG
NICHT DIREKT MIT OPTISCHEN INSTRUMENTEN (LUPEN) ANSEHEN
LASER-PRODUKT DER KLASSE 1M

VORSICHT:
ABGEKLEMMTE OPTISCHE STECKVERBINDER KÖNNEN OPTISCHE ENERGIE FREI SETZEN
NICHT MIT OPTISCHEN INSTRUMENTEN (LUPEN) IN DEN STRAHL BLICKEN.

Dieses Produkt enthält Laser oder LEDs der Klasse 1M.
• Laserprodukt der Klasse 1M gemäß IEC60825-1:1993+a1+A2
• **VORSICHT: Wenn die Bedienungselemente anders als hier beschrieben bzw. andere Einstellungen verwendet werden, kann es zu schädlicher Strahlenaussetzung kommen.**
• Es müssen Vorsichtsmaßnahmen getroffen werden, um Aussetzung an optischer Strahlung zu vermeiden, wenn die Einheit aus dem Gehäuse genommen oder die Faseroptik von der Einheit getrennt wird.
• In einer Faseroptik-Verbindung dieser Einheit kan auch dann Laserstrahlung vorhanden sein, wenn die Stromversorgung zur Einheit abgeschaltet wurde.
• Diese Einheit ist zum Einbau an Orten vorgesehen, an denen nur geschultes Personal Zugang zu den Faseroptik-Verbindungen hat.
• Die Lage aller optischen Verbindungen ist im Abschnitt über die Lage von Anschlüssen und Funktionsweise dieses Handbuchs zu finden.
• Optsiche Ausgänge und Wellenlängen sind im Abschnitt mit den technischen Daten dieses Handbuchs zu finden.

Die optischen Vorrichtungen in diesem Gerät haben Gefahrenstufe 1M. Wie vorgeschrieben durch IEC60825-1 ist der Installateur dafür verantwortlich, sicherzustellen, dass die unten abgebildeten Schilder an den Orten mit eingeschränktem Zugang, an denen dieses Gerät aufgestellt ist, vorhanden sind.

Gefahrenstufe 1M

Schwarzer Rand und gelber Hintergrund

Diese Baugruppe enthält Teile, die durch elektrostatische Entladungen (ESD) beschädigt werden können. Vorsichtsmaßnahmen zum Schutz vor elektrostatischer Entladung treffen, wenn Teile oder Baugruppen berührt, ausgebaut oder eingefügt werden.

Das Gestell, in dem diese Einheit eingebaut ist, muss in einem entsprechend klassifizierten NEMA-Schutzgehäuse untergebracht sein.

Wenn diese Einheit bei besonders hohen Temperaturen betrieben wird, können interne und externe Metallflächen extrem heiß werden. Es muss darauf geachtet werden, dass diese Einheit in einem Bereich mit eingeschränktem Zugang aufgestellt wird, damit nur geschultes Wartungspersonal Zugang zur Einheit hat.

Consignes de Sécurité

Les consignes de sécurité contenues dans cette section et dans le reste de ce manuel doivent être respectées a chaque fois que cet appareil est utilisé ou fait l'objêt d'une maintenance ou d'une réparation. Le non-respect d'une précaution, d'un avertissement ou d'une instruction figurant dans ce manuel est une violation des normes de conception, fabrication et indication d'usage de l'appareil. TKH Security Solutions USA n'est pas responsable du non-respect de ces consignes de sécurité par le client.
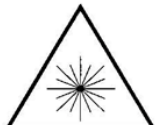
RAYONNEMENT LASER
NE PAS REGARDER DIRECTEMENT AVEC DES INSTRUMENTS OPTIQUES (LOUPES)
PRODUIT LASER DE CLASSE 1M

ATTENTION:
LES CONNECTEURS OPTIQUES DEBRANCHES PEUVENT EMETTRE UNE ENERGIE OPTIQUE.
NE PAS REGARDER LE FAISCEAU AVEC DES INSTRUMENTS OPTIQUES (LOUPES)

Ce produit contient des lasers ou diodes électroluminescentes de classe 1M.
• Produit laser de classe 1M conformément à IEC60825-1:1993+A1+A2
• **ATTENTION: L' utilisation de commandes ou réglages, ou de procedures différentes de celles indiquées ici risque de provoquer une exposition dangereuse au rayonnement.**
• Prendre des précautions pour empêcher une exposition au rayonnement optique lorsque l' appareil est retiré de son boîtier ou lorsque la câble optique fibre est débranché de l' appareil.
• Un rayonnement laser pourra être present dans un câble optique branché sur cet appareil, même une fois l'alimentation coupée.
• Cet appareil est prévu pour une installation à des endroits où seul un personnel de maintenance formé accès aux câbles optiques.
• Les points de branchement de tous les cables optiques sont indiqués à la section Points de branchement et function de ce manuel.
• Les sorties et longueurs d' onde optiques figurant à la section Caractéristiques techniques de ce manual.

Les appareils optiques utilisés dans cet équipement correspondent à un niveau de danger 1M. Comme exigé par la norme IEC60825-1, il incombe à l'installateur de s'assurer que l'étiquette ci-dessous est présente aux endroits d'accès limité où cet équipement est installé.

Niveau de danger 1M

La bordure doit être noire et le fond jaune

Cet ensemble contient des pièces sensibles aux décharges électrostatiques (ESD). Prendre les précautions relatives aux ESD avant de toucher, retirer ou insérer des pièces ou des ensembles.

Le châssis dans lequel est installé cet appareil doit être place dans une enceinte NEMA conforme aux spécifications nominales.

Lorsque cet appareil fonctionne à une température ambiante extrêmement élevée, il est possible que les surfaces métalliques internes et externes deviennent extrêmement chaudes. S'assurer que cet appareil est installé dans une zone dont l'accès est limité à un personnel de maintenance correctement formé.

Fiber Information

This unit was manufactured with attention to fiber cleanliness by TKH Security Solutions USA. Beyond the optical safety information contained in this manual, the following guidelines should be observed when working with optical fibers.

The biggest problem is **dirt**!

It takes very little contamination to cause problems with optical fiber connections; cleanliness is extremely important to proper operation of optical equipment.

1. Protect optical connectors by leaving the connector covers in place on unused fiber connections and on the fiber tips themselves.

2. Personnel who remove and replace fibers should be equipped with a fiber cleaning kit. These are inexpensive and can be obtained from any fiber equipment supply house. If you choose to, you can use propanol and lint-free tissue to clean fibers.

   a. Do not use isopropanol alcohol (typically called rubbing alcohol) mixed with water. This can cause additional spots. (**Caution: *Pure isopropanol is very flammable!***)

   b. Use lintless tissues to clean fibers.

   c. Clean the fiber with a folded tissue moistened with the propanol, pulling the connector tip across the tissue, then turn the connector 90 degrees and repeat in a different spot on the tissue.

   d. Don't pull the fiber across and then push it back. This will put the dirt that was cleaned off back on again.

   e. Repeat the process on a dry, folded tissue.

3. When removing fibers, *always* clean them when replacing them no matter how long you had them off.

4. When connecting fibers, pay attention to the bend radius of the fibers. A general rule is to have a 3-inch (8 cm) bend radius. A bend radius less than 3 inches is an attenuator and can cause optical signal loss.

5. Installers of fiber equipment should be equipped with the equipment manuals and an optical power meter to measure the optical inputs and outputs in a system. An optical power meter is an inexpensive tool that can save much time and effort in getting optical communications links up and running. Properly equipped and trained installers can quickly determine the source of any problems that occur.

Functional Description

 The 9292DT and DR pair transport two very high quality uncompressed NTSC or PAL video signals, two duplex option module channels, 10/100 Mb Ethernet, and a duplex high-speed data over one fiber. 9292Ds utilize 10-bit digital linear encoding with ≥ 63dB SNR video quality transmission over the entire optical budget.

The two duplex option modules support user-configurable data, audio, intercom, or contact closure plug-in options.
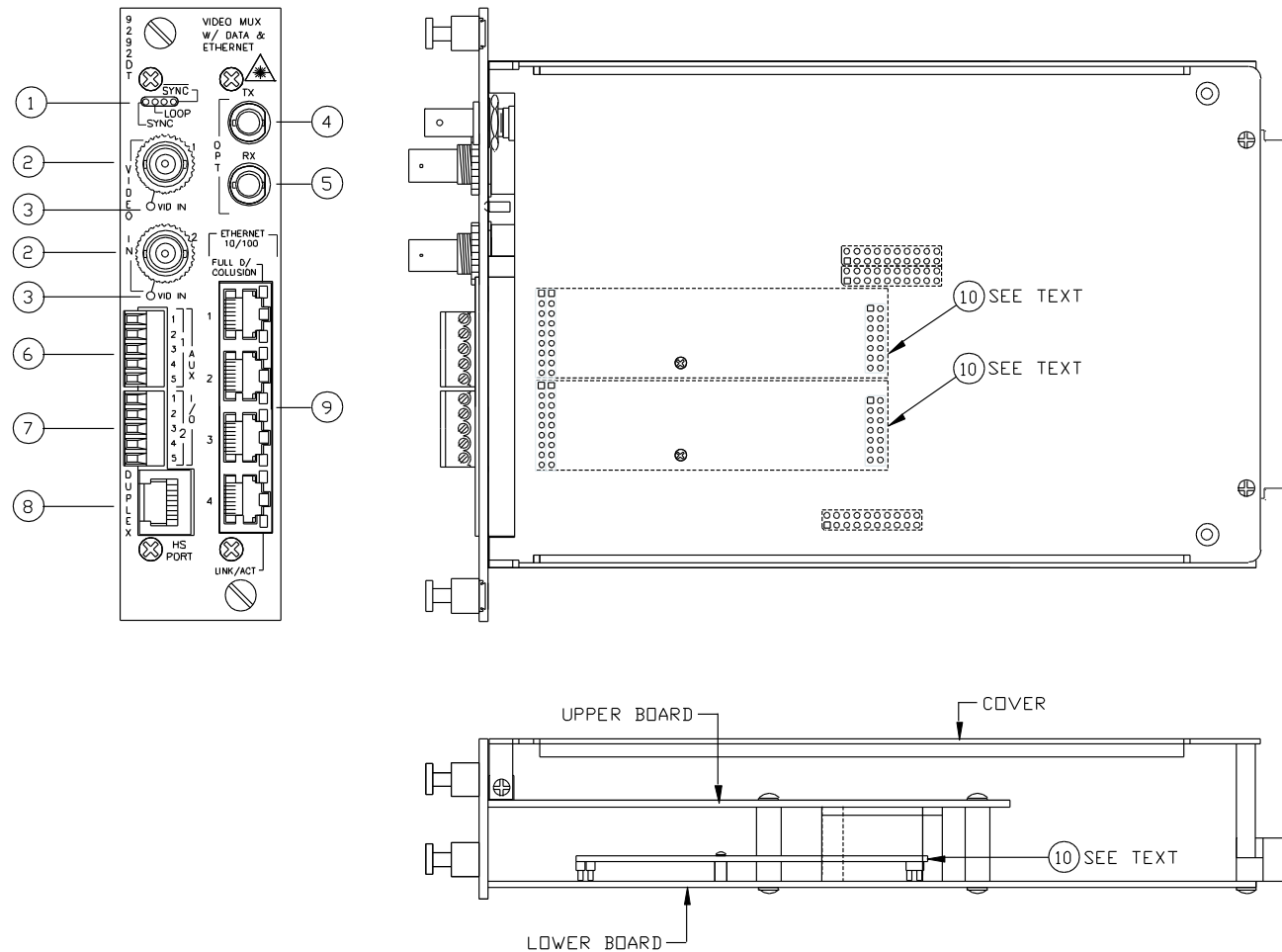
The High-Speed port provides a duplex 15 MB synchronous RS422 port. The port may be used as a 4-wire 1.5 Mbps asynchronous RS422 port; however, its primary purpose is to support optional accessory cards; for example, the 9961-C/9961A-C and 9962-C/9962A-C Option Module Host cards.

The built-in 10/100Mb Ethernet link includes a 4-port built-in unmanaged switch. Each of the four RJ45 copper Ethernet ports supports Auto MIDX. It can be connected to most any other Ethernet device using a regular Cat5 cable. Speed, duplex, and directions are automatically negotiated.

The 9292DT and DR are double-width, rack-mountable cards compatible with the Series 9000 card chassis. They operate on 6VDC power from the chassis backplane.

9292DT Indicator, Connector, and Switch Locations, Functions, and Settings

FIGURE 1

UPPER BOARD
COVER
LOWER BOARD
10 SEE TEXT

1. **LED INDICATORS**
    a. SYNC — When illuminated, this **green** LED indicates that there is sufficient incoming optical signal for the local demux circuitry to synchronize with the far end unit.
    b. LOOP — When illuminated, this **green** LED indicates the far end has synchronized with the local end unit and the local unit has synchronized with the far end unit.
    c. NOT SYNC — When illuminated, this **red** LED indicates the local end has not been able to synchronize to the incoming optical signal from the far end.

2. **VIDEO INPUT PORTS**
    These BNC female connectors accept the two video input signals.

3. **CHANNEL 1 AND CHANNEL 2 VIDEO PRESENT INDICATORS**
    Each of these indicators will illuminate **green** when a video signal is present on its respective Video Input connector.

4. **OPTICAL PORT**

    This port is an input/output on 9292D single fiber versions and an output on 9292D dual fiber versions.

5. **SECOND OPTICAL INTERFACE PORT**

    Only available on dual fiber versions, this port receives the reverse optical input in CWDM system configurations.

6. **AUX I/O 1 CONNECTOR**

    This is the connector for Option Module position 1. Refer to the separate Option Module Manual included with your shipment for details on connections to the Option Modules.

7. **AUX I/O 2 CONNECTOR**

    This is the connector for Option Module position 2. Refer to the separate Option Module Manual included with your shipment for details on connections to the Option Modules.

8. **HIGH-SPEED PORT CONNECTOR**

    This RJ45 connector interfaces directly with Model 9961A-C or Model 9962A-C Auxiliary Data/Audio Mux/Demux Cards and other options, providing transport for their high-speed composite input/output data signals. The cable provided should be a shielded straight through Ethernet-type Cat 5 or Cat 6e cable. The data cable connecting the HS Data port to accessory cards should not exceed 4 feet (1.3m) in length.
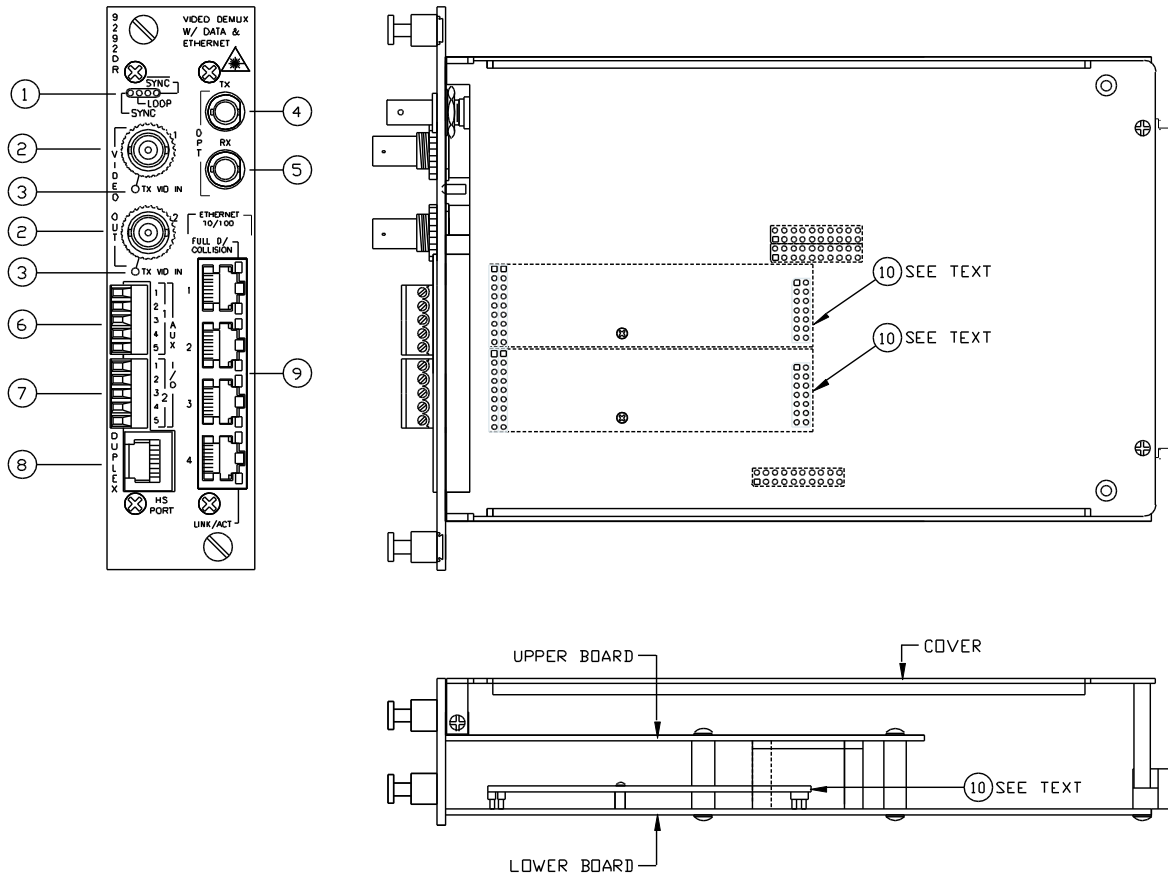
9. **10/100 ETHERNET SWITCH PORTS (PORTS 1 THROUGH 4)**
    *   Each of the eight RJ45 Ethernet switch ports is 10/100 Ethernet, Auto Negotiate, and Auto MIDX.
    *   Each port has a *yellow* Full Duplex/Collision LED. This LED is always illuminated when the port is operating in Full Duplex mode. In Half Duplex mode, this LED will not be illuminated, but will blink when there are collisions on the port.
    *   Each port also has a *green* Link/Activity LED that illuminates when the port has established a link and will blink when there is data activity on the port.

10. **LOCATION OF OPTION MODULES 1 AND 2**

9292DR Indicator, Connector, and Switch Locations, Functions, and Settings

FIGURE 2

1. **LED INDICATORS**
   a. SYNC — When illuminated, this **green** LED indicates that there is sufficient incoming optical signal for the local demux circuitry to synchronize with the far end unit.
   b. LOOP — When illuminated, this **green** LED indicates the far end has synchronized with the local end unit and the local unit has synchronized with the far end unit.
   c. NOT SYNC — When illuminated, this **red** LED indicates the local end has not been able to synchronize to the incoming optical signal from the far end.

2. **VIDEO INPUT PORTS**
   These BNC female connectors accept the two video input signals.

3. **CHANNEL 1 AND CHANNEL 2 VIDEO PRESENT INDICATORS**
   Each of these indicators will illuminate **green** when a video signal is present on its respective *transmitter end* Video Input connector.

4. **OPTICAL PORT**

   This port is an input/output on 9292D single fiber versions and an output on 9292D dual fiber versions.

5. **SECOND OPTICAL INTERFACE PORT**

   Only available on dual fiber versions, this port receives the reverse optical input in CWDM system configurations.

6. **AUX I/O 1 CONNECTOR**

   This is the connector for Option Module position 1. Refer to the separate Option Module Manual included with your shipment for details on connections to the Option Modules.

7. **AUX I/O 2 CONNECTOR**

   This is the connector for Option Module position 2. Refer to the separate Option Module Manual included with your shipment for details on connections to the Option Modules.

8. **HIGH-SPEED PORT CONNECTOR**

   This RJ45 connector interfaces directly with Model 9961A-C or Model 9962A-C Auxiliary Data/Audio Mux/Demux Cards and other options, providing transport for their high-speed composite input/output data signals. The cable provided should be a shielded straight through Ethernet-type Cat 5 or Cat 6e cable. The data cable connecting the HS Data port to accessory cards should not exceed 4 feet (1.3m) in length.

9. **10/100 ETHERNET SWITCH PORTS (PORTS 1 THROUGH 4)**
   - Each of the eight RJ45 Ethernet switch ports is 10/100 Ethernet, Auto Negotiate, and Auto MIDX.
   - Each port has a *yellow* Full Duplex/Collision LED. This LED is always illuminated when the port is operating in Full Duplex mode. In Half Duplex mode, this LED will not be illuminated, but will blink when there are collisions on the port.
   - Each port also has a *green* Link/Activity LED that illuminates when the port has established a link and will blink when there is data activity on the port.

10. **LOCATION OF OPTION MODULES 1 AND 2**

Set Up and Operation of the 9292D

Set up and operation of the 9292DT and 9292DR units consists of:
- Set the switches on the Option Modules per your particular interface requirements, as required. Refer to the instructions in the Aux Ports section for removing the cover and upper board to set the switches or change Option Module types. Refer to the Option Module manual for details on the switches and connections for each module type.
- Make the required audio, data, or contact closure cables to the Option Module connectors and plug the connectors into the Aux Ports on the front panel.
- Connect the high-speed port.
- Connect the Ethernet port.
- Connect the video input and output signals.
- Connect the fiber.

AUX I/O PORTS 1 AND 2 OPERATION

Aux I/O Ports 1 and 2 are supported by TKH Security USA Option Modules. There may be audio, data, contact closure, or intercom modules installed depending on the configuration ordered from the factory. The cover and upper board need to be removed first to change the dipswitch settings on the installed Option Modules. Refer to the following instructions and Figures 3 through 6 to remove the cover and top board.
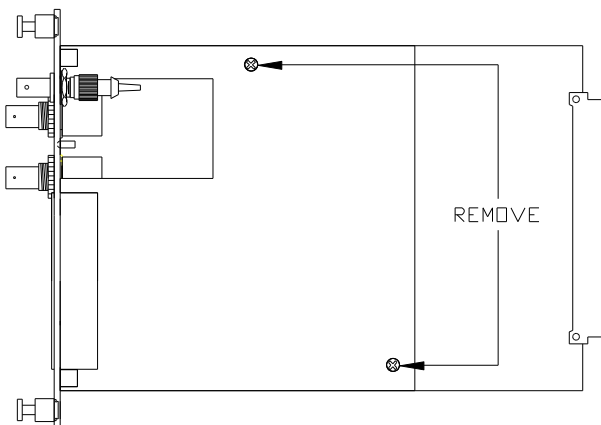
FIGURE 3 — TOP VIEW (remove the cover)
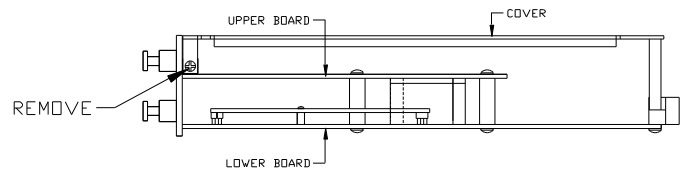

FIGURE 4 — TOP VIEW (remove the cover)
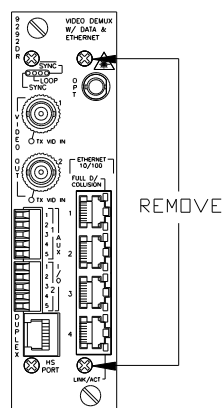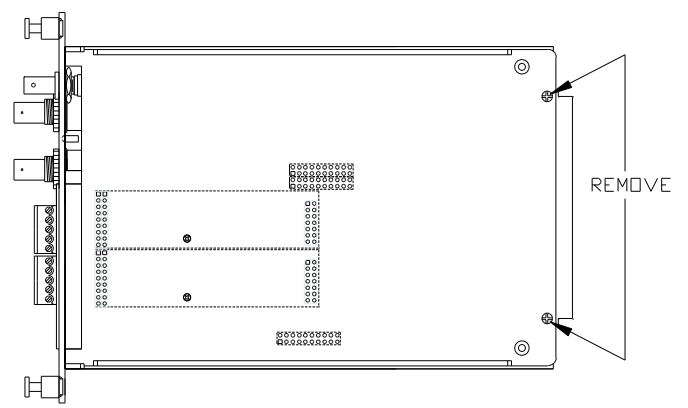

FIGURE 5 — TOP VIEW (remove the cover)

FIGURE 6 — TOP VIEW (remove the cover)

1. Insure that you are working in a static free environment.
2. Disconnect the power and *remove all electrical connectors*.
3. Remove the four single flat-head Philips screws from the top cover of the 9292D. Two screws are on the top and one on each side.
4. Remove the top cover.
5. Remove the two single flat-head Philips screws from the front panel of the 9292D and two single Philips pan-head screws from spaces for the upper board.
6. Remove the upper board. Pry up on the rear of the upper board taking care not to bend any of the six rows of pints connecting top and bottom boards. Then remove the top card from the front panel.
7. Set the Option Module switches on the lower board as required. Refer to the Option Module manual for details on setting the switches.
8. Reassemble in the reverse order. Do not over tighten the screws. Insert the top board into the front panel. Take care to insure that the pins in all six rows are correctly aligned before pushing down on the top board.

HIGH-SPEED PORT OPERATION

The High-Speed port is a 15 Mbps duplex RS422 port. The port may be used synchronously at a speed of 15 MB and asynchronously at up to 1.5 Mbps. It may be used as an RS422 port or used to expand the I/O capability of the link using 9961A-C or 9962A-C Option Module Host Cards.

The 9961A-C and 9962A-C provide any combination of four or eight duplex audio, data, contact closure, or simplex stereo audio channels. This is in addition to the two Option Module channels already built into the 9292DT and 9292DR cards. The 9961A-C and 9962A-C cards are normally supplied with a properly configured cable for connecting to a high-speed port. A shielded standard (not crossover) RJ45 CAT5 or Cat6e cable will also work correctly.

Note: If cables other than those supplied are used, they should be shielded Cat 5 or Cat 6e cables. If the cable length exceeds 1 meter and improper operation is observed, refer to the 9961A-C or 9962A-C user manuals for the proper switch settings to adjust the timing of the clock circuits to allow for longer cable lengths.

The High-Speed ports are wired as shown in Figure 7 and in Table 1.

FIGURE 7 — HIGH SPEED PORT PINOUT

High-Speed Port Connector

◀ Pin 1

◀ Pin 8
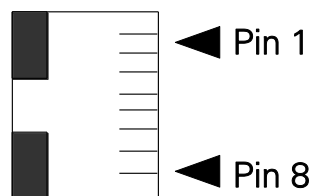
RJ45 Front View

TABLE 1 — HIGH-SPEED PORT CONNECTIONS			
RJ45 Pin #	Signal Name	RJ45 Pin #	Signal Name
1	Tx Data (+) Input	5	Rx Data (−) Output
2	Tx Data (−) Input	6	Tx Clock (−) Output
3	Tx Clock (+) Output	7	Rx Clock (+) Output
4	Rx Data (+) Output	8	Rx Clock (−) Output

FIGURE 8 — CONNECTING THE HIGH-SPEED DUPLEX PORT AS AN RS422 DUPLEX PORT
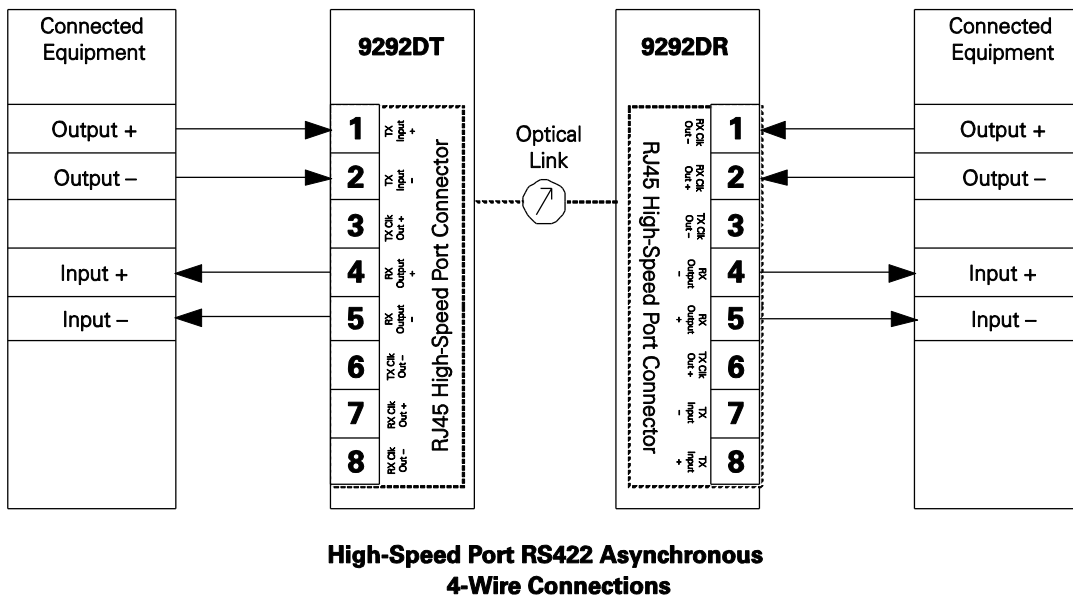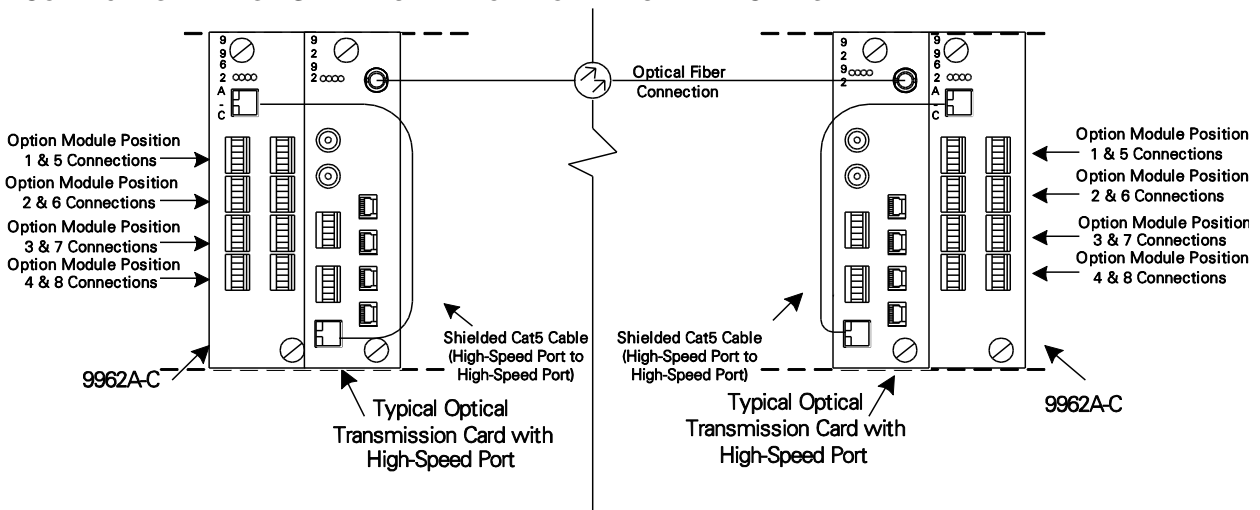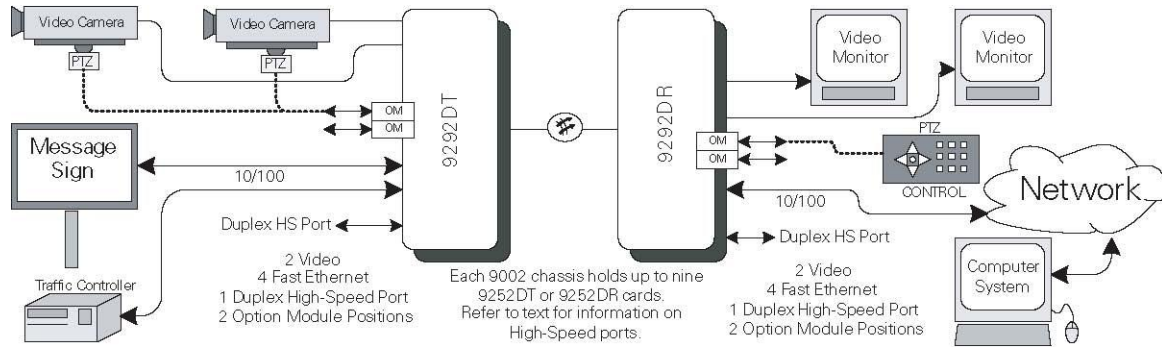

High-Speed Port RS422 Asynchronous
4-Wire Connections

FIGURE 9 — CONNECTING THE HIGH-SPEED DUPLEX PORT TO THE AUXILIARY CARDS

16

Typical Application of the 9292D

FIGURE 10

Each 9002 chassis holds up to nine 9252DT or 9252DR cards. Refer to text for information on High-Speed ports.

Troubleshooting 9292D Links

The indicator LEDs on the transmitter and receiver provide information as to the optical and electrical status of the units. Troubleshooting normally starts at the transmit end.

On the 9292DT transmitter, at least one the indicators should be illuminated. If no indicators are illuminated, check the power supply connections.

When video is connected to Channel 1 or Channel 2 input BNCs, the Video Present indicator for that channel should be illuminated **green**. If the Video Present indicator is not **green**, then check the video source and connections.

On the 9292DR receiver, at least one indicator should be illuminated. If no indicators are illuminated, check the power supply and connections.

When the Loop indicator is illuminated **green**, operation is normal.

If the SYNC is not illuminated **green**, the Not Sync will be illuminated **red**; this is usually an indication of insufficient optical signal at the optical input. Check the fiber for poor connections or optical losses greater than the unit specifications.

If the SYNC indicator is **green**, but the Loop indicator is not illuminated, the local unit is in sync and the remote unit is not. This usually means that there is an optical loss problem in one direction from the local unit to the remote. Again, check the fiber for bends or check the optical link for excessive losses.

Since this unit uses two wavelengths the losses for each one can be different. Each wavelength reacts differently to bends and splices as well.

At the receiver end, if the Loop indicator is illuminated **green** and a TX Video Present indicator is not illuminated, the video source at the transmitter end should be checked.

Each Ethernet port has a **yellow** Full Duplex/Collision LED that illuminates when the port is operating in Full Duplex mode. In Half Duplex mode, this LED will not be illuminated, but will blink when there are collisions on the port. The collision can happen when the port is set at half-duplex and connected to the hub. To solve the collision issue, recommend to use the switch and set the port in full duplex mode.

Each Ethernet port also has a **green** Link/Activity LED that illuminates when the port has established a link and will blink when there is data activity on the port. If the link has been established, but the Link/Activity LED is not illuminated green, check the cable connection.

Operation of the 9292D with the Network Management System

Operation of the 9292DT with the Network Management System consists of the following parameters:
1. Slot number
2. Card Name (Model Number)
3. Serial Number
4. Time
5. Wavelength
6. Revision Number
7. Chronometer Value (Cumulative Hours of Operation)
8. Reset Cycles (Cumulative Number of Power Cycles)
9. Firmware Revision
10. Received Optical Power
11. Emitter Current
12. Temperature
13. Optical Output Power
14. Local Demux Sync
15. Remote Demux Sync
16. Video Input Present (each channel)
17. Link Status/Alarm for each of the four Ethernet ports

Operation of the 9292DR with the Network Management System consists of the following parameters:
1. Slot number
2. Card Name (Model Number)
3. Serial Number
4. Time
5. Wavelength
6. Revision Number
7. Chronometer Value (Cumulative Hours of Operation)
8. Reset Cycles (Cumulative Number of Power Cycles)
9. Firmware Revision
10. Received Optical Power
11. LED/Laser Drive Current
12. Temperature
13. Optical Power Input
14. Local Demux Sync
15. Remote Demux Sync
16. Transmit Video Input Present (each channel)
17. Link Status/Alarm for each of the four Ethernet ports

NMS users should set the Alarm Status and Alarm Limits for each parameter as required for the specific application when the NMS software is operated for the first time.

When the 9292D card is installed into an existing system already utilizing NMS system software, an upgrade of the software may be necessary to add the 9292D card to the software database in the NMS software. Consult the factory for guidance on how to download the latest version of the software from the TKH Security USA FTP download site.

Specifications for the Model 9292D

OPTICAL

Model Pair	MMH 1315	SM	SMH	LD3X-L[1]
Fiber Size	52.5/125	09/125	09/125	09/125
Transmitter Optical Output Power (dBm)	−7	−7	−3	−3
Transmitter Optical Output Wavelength (nm)	1310	1310	1550	CWDM
Transmitter Optical Input Sensitivity (dBm)	−23	−30	−30	−30
Maximum Transmitter Optical Input (dBm)	−5	−5	0	0
Receiver Optical Output Power (dBm)	−7	−7	−3	−3
Receiver Optical Output Wavelength (nm)	1550	1550	1310	CWDM
Receiver Optical Input Sensitivity (dBm)	−23	−27	−27	−27
Maximum Receiver Optical Input (dBm)	−5	−5	−5	0
Txmtr Opt Budget (Txmtr Out Pwr-Rcvr Input Sens) (dB)	16	20	24	24
Rcvr Opt Budget (Rcvr Out Pwr-Txmtr Input Sens) (dB)	16	23	27	27
Estimated Distance (km) 50 μm[2, 3]	8	N/A	N/A	N/A
Estimated Distance (km) 62.5 μm[2, 3]	7	N/A	N/A	N/A
Estimated Distance (km) 09 μm[2, 3]	N/A	25	68	60-84

[1] *Replace the X in LD3X CWDM models with the required wavelength letter code from the CWDM chart below.*
[2] *Range estimates based on losses of 3.0 dB/km @ 850 nm or 1.0 dB/km @ 1310 nm for 62.5/125 multimode fiber, 0.35 dB/km @ 1310 nm or 0.25 dB/km @ 1550 nm for singlemode fiber, and includes a 3 dB safety factor.*
[3] *Range may be limited by modal and chromatic dispersion, fiber quality, and bandwidth. Range estimates for multimode are based on 500Mhz/Km fiber.*

CWDM Letter Code	Wavelength	CWDM Letter Code	Wavelength
A	1470	N	1290
B	1490	P	1310
C	1510	Q	1330
D	1530	R	1350
E	1550	S	1370
F	1570	T	1390
G	1590	U	1410
H	1610	V	1430
M	1270	W	1450

VIDEO (per channel)

Video Format	NTSC or PAL
Voltage	1V p-p, 75W
Bandwidth	6.5 MHz, -3dB
Differential Gain	≤0.7% typical
Differential Phase	≤0.7° typical
Video SNR	≥63 dB over usable fiber range (weighted per RS250 standard)
Encoding	10-bit linear PCM

DATA TRANSMISSION BY PORT

Data Port

Connector	RJ45
	One duplex RS232
	One switch-selectable duplex 2- or 4-wire
	RS422 or RS485
Data Rate	DC to 115.2 kbps

RS485 Port

Connector	RJ12
	One duplex RS485 2-wire
Data Rate	DC to 115.2 kbps

Duplex High Speed Port	Designed for operation with the 9961-C or 9962-C Option Module Host Cards, the 9971-C or 9973-C Ethernet Extender cards, or other external option cards
Connector	RJ45
	Duplex 2-wire RS422
	15Mbps synchronous, 1.5 Mb asynchronous

POWER REQUIREMENTS

TX	1.4A @ 6VDC (may vary with Option Modules installed)
RX	1.4A @ 6VDC (may vary with Option Modules installed)

PHYSICAL

Dimensions (in inches)	6.1 H x 1.6 W x 8.6 D
Weight (in pounds)	0.8

ENVIRONMENTAL

Operating Temperature	-40° C to +74° C
Storage Temperature	-55° C to +85° C
Relative Humidity	0 to 95% noncondensing

QUALITY/CERTIFICATIONS

Compliance	CE, FCC Part 15, Class A
MTTF	Consult factory

TKH Security Solutions
www.tkhsecurity.com

Siqura B.V.
Zuidelijk Halfrond 4 • 2801 DD Gouda
The Netherlands
Telephone: +31 182 592 333
Fax: +31 182 592 123
E-mail: sales.nl@tkhsecurity.com

TKH Security Solutions USA
12920 Cloverleaf Center Drive • Germantown
Maryland 20874 USA
Telephone: +1 301 444 2200
Toll Free: +1 800 293 4237
Fax: +1 301 444 2299
E-mail: sales.us@tkhsecurity.com