



# CRS-170A

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## L-Band 1:1 Redundancy Switch Installation and Operation Manual

Accessory Product for use only with Comtech EF Data  
CDM-625, CDM-570L, CDM-600L (CLM-9600L),  
CDM-700, CDM-710 and SDM-300L3 Modems  
(Modem Firmware and Hardware Requirements Apply)

Comtech EF Data is an  
AS9100 Rev B / ISO9001:2000  
Registered Company



**IMPORTANT NOTE:** The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.





# *CRS-170A*

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# Preface

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## Customer Support

Contact the Comtech EF Data Customer Support Department for:

- Product support or training
- Reporting comments or suggestions concerning manuals
- Information on upgrading or returning a product

A Customer Support representative may be reached at:

Comtech EF Data  
Attention: Customer Support Department  
2114 West 7th Street  
Tempe, Arizona 85281 USA  
  
480.333.2200 (Main Comtech EF Data number)  
480.333.4357 (Customer Support Desk)  
480.333.2161 FAX

To return a Comtech EF Data product (in-warranty and out-of-warranty) for repair or replacement:

- **Contact** the Comtech EF Data Customer Support Department. Be prepared to supply the Customer Support representative with the model number, serial number, and a description of the problem.
- **Request** a Return Material Authorization (RMA) number from the Comtech EF Data Customer Support representative.
- **Pack** the product in its original shipping carton/packaging to ensure that the product is not damaged during shipping.
- **Ship** the product back to Comtech EF Data. (Shipping charges should be prepaid.)

### For Online Customer Support:

An **RMA number request** can be requested electronically by contacting the Customer Support Department through the online support page at **[www.comtechedata.com/support.asp](http://www.comtechedata.com/support.asp)**:

- **Click** on “Return Material Authorization” for detailed instructions on our return procedures.
- **Click** on the “RMA Request Form” hyperlink, then fill out the form completely before sending.
- **Send e-mail** to the Customer Support Department at **[service@comtechedata.com](mailto:service@comtechedata.com)**.

For information regarding this product’s warranty policy, refer to the Warranty Policy, p. xiv.

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## About this Manual

This manual provides installation and operation information for the Comtech EF Data CRS-170A L-Band 1:1 Redundancy Switch. This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the CRS-170A.

## Reporting Comments or Suggestions Concerning this Manual

Comments and suggestions regarding the content and design of this manual will be appreciated. To submit comments, please contact the Comtech EF Data Technical Publications Department:

**TechnicalPublications@comtechefdata.com.**

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## Related Documents

- *Comtech EF Data CDM-625 Advanced Satellite Modem Installation and Operation Manual*
- *Comtech EF Data CDM-570L Satellite Modem Installation and Operation Manual*
- *Comtech EF Data CDM-600L Satellite Modem Installation and Operation Manual*
- *Comtech EF Data CLM-9600L Open Network Satellite Modem Installation and Operation Manual*
- *Comtech EF Data CDM-700 Satellite Modem Installation and Operation Manual*
- *Comtech EF Data CDM-710 Broadcast Satellite Modem Installation and Operation Manual*
- *Comtech EF Data SDM-300L3 Satellite Modem Installation and Operation Manual*

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## Conventions and References

### Cautions and Warnings



**CAUTION** indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.



**WARNING** indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



**IMPORTANT or NOTE** indicates information critical for proper equipment function.

### Metric Conversion

Metric conversion information is located on the inside back cover of this manual. This information is provided to assist the operator in cross-referencing non-metric to metric conversions.

## Recommended Standard Designations

Recommended Standard (RS) Designations are equivalent to the Electronic Industries Association (EIA). Comtech EF Data will reference a RS designator throughout the manual.

## Trademarks

All product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

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## EMC Compliance

This is a Class B product. In a domestic environment, it may cause radio interference that requires the user to take adequate protection measures.

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## EN55022 Compliance

This equipment meets the radio disturbance characteristic specifications for information technology equipment as defined in EN55022.

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## EN50082-1 Compliance

This equipment meets the electromagnetic compatibility/generic immunity standard as defined in EN50082-1.

In order that the CRS-170A continues to comply with these standards, observe the following instructions:

- Connections to the transmit and receive IF ports (BNC female connectors) should be made using a good quality coaxial cable; for example, RG58/U (50Ω) or RG59/U (75Ω).
- All 'D' type connectors attached to the unit must have back-shells that provide continuous metallic shielding. Cable with a continuous outer shield (either foil or braid, or both) must be used, and the shield must be bonded to the back-shell.
- The equipment must be operated with its cover on at all times. If it becomes necessary to remove the cover, the user should ensure that the cover is correctly re-fitted before normal operation commences.

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## Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference; in which case, users are required to correct the interference at their own expense.



***To ensure compliance, properly shielded cables for DATA I/O shall be used. More specifically, these cables shall be shielded from end to end, ensuring a continuous shield.***

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## Safety Compliance

### EN 60950

Applicable testing is routinely performed as a condition of manufacturing on all units to ensure compliance with safety requirements of EN60950.

The equipment is rated for operation at +12 volts DC and -12 volts DC. It has a maximum power consumption of 4.5 Watts, and draws a maximum of 250 mA at +12 volts DC and 120 mA at -12 volts DC. The power supply current is, in all circumstances, supplied by either a single Comtech EF Data modem, or a pair of these modems.

This equipment meets the Safety of Information Technology Equipment specification as defined in EN60950.

### Equipment Connection

The CRS-170A is designed for operation **ONLY** with the Comtech EF Data modems listed in this manual. These modems supply DC operating current (electronically fused and protected) and control signals for the correct functioning of this unit. Connection to other manufacturers' equipment could result in damage to the unit. The CRS-170A is not compatible with other Comtech EF Data modems not listed in this manual.

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## Environmental

The CRS-170A must not be operated in an environment where the unit is exposed to extremes of temperature outside the ambient range 0 to 50<sup>0</sup>C (32 to 122<sup>0</sup>F), precipitation, condensation, or humid atmospheres above 95% RH, altitudes (un-pressurized) greater than 2000 meters, excessive dust or vibration, flammable gases, corrosive or explosive atmospheres.

Operation in vehicles or other transportable installations that are equipped to provide a stable environment is permitted. If such vehicles do not provide a stable environment, safety of the equipment to EN60950 may not be guaranteed.

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## Telecommunications Terminal Equipment Directive

In accordance with the Telecommunications Terminal Equipment Directive 91/263/EEC, this equipment should not be directly connected to the Public Telecommunications Network.

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## Low Voltage Directive (LVD)

The following information is applicable for the European Low Voltage Directive (EN60950):

<HAR>

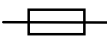
Type of power cord required for use in the European Community.





**CAUTION:** Double-pole/Neutral Fusing.

**ACHTUNG:** Zweipolige bzw. Neutraleiter-Sicherung.

International Symbols:

Symbol	Definition
~	Alternating Current
	Fuse

Symbol	Definition
	Protective Earth
	Chassis Ground

**Note:** For additional symbols, refer to “Cautions and Warnings” listed earlier in this preface.

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## Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a period of two years from the date of shipment. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

## Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.



A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

## **Exclusive Remedies**

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

**Notes:**

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# Chapter 1. INTRODUCTION

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## 1.1 Overview



**Figure 1-1. CRS-170A L-Band 1:1 Redundancy Switch**

The CRS-170A L-Band 1:1 Redundancy Switch module, shown in **Figure 1-1**, is an L-Band Tx-Rx IF signal switch designed for use with L-Band satellite modems in a 1:1 configuration.

The Tx side switches four modem output signals that are multiplexed onto the transmit coaxial cable:

- 950-1950 MHz L-band transmit RF
- 10 MHz BUC frequency reference
- 600 KHz BUC FSK control and status communication
- BUC DC power supply

The receive side of the switch uses both power dividers and relays to provide the redundant modem interface for three signals multiplexed onto the LNB coaxial cable:

- 950-1950 MHz L-band RX RF from LNB
- 10 MHz frequency reference to LNB
- DC power supply to LNB

The CRS-170A monitors the faults of both modems and determines which modem should be online. The data switch is built into each terrestrial data interface inside both modems (excluding CDM-600L [CLM-9600L] and SLM-300L3).

The CRS-170A is designed to support 1:1 redundancy for Comtech EF Data CDM-625, CDM-570L, CDM-600L (CLM-9600L), CDM-700, CDM-710, and SDM-300L3 modems. **Table 1-1** summarizes the applications including requirements for supporting data switching hardware and software.

**Table 1-1. CRS-170A Application Summary**

Modem	1:1 L-Band Switch (see Note 2)	1:1 Data Switch (see Note 1)	Other Information (see Note 3)
CDM-625	CRS-170A	Built into the CDM-625	Firmware 1.1.1 or higher
CDM-570L	CRS-170A	Built into the CDM-570L	Firmware 1.3.1 or higher
CDM-700	CRS-170A	Built into the CDM-700	Firmware 1.1.6 or higher Chassis Rev. A or higher
CDM-710	CRS-170A	Built into the CDM-710	Firmware 2.4.1 or higher Chassis Rev. A or higher
CDM-600L (CLM-9600L)	CRS-170A	CRS-150	Firmware 1.1.4 or higher. Hardware Rev. 3 or higher
SDM-300L3	CRS-170A	SMS-301	Special version of SMS-301

**Notes:**

1. For detailed information about the CRS-150 and SMS-301 switches, refer to their respective Installation and Operation Manuals.
2. Read the Overview in this section for detailed information.
3. Order modems with Type ‘N’ connectors.



***The off-line modem holds its Rx terrestrial data in tri-state as commanded by the CRS-170A Switch. Because of this, it is very important to power down the off-line modem before disconnecting the modem from the Switch.***

The CDM-600L (CLM-9600L) and SDM-300L3 modems do not have built-in switching capability for the terrestrial data side of the link. For the CDM-600L (CLM-9600L), 1:1 redundancy requires both a CRS-150 switch to act as controller and terrestrial data switch and a CRS-170A to perform the L-Band switching. The CRS-170A is required because the CRS-150 RF switching is limited to the 70/140 MHz band, and will not handle the high current BUC power supply multiplexed onto the transmit coaxial cable. Similarly, the SDM-300L3 requires an SMS-301 switch together with the CRS-170A.

In both cases, the CRS-170A is controlled by the supporting data switch, and places the “A” or “B” modem RF on-line to match the data switch state. The CDM-600L (CLM-9600L) modems supply redundant power to the CRS-170A through the CRS-150. The SMS-301 itself has redundant power supplies, and feeds power to the CRS-170A through the control cable. Online-standby modem configuration matching is provided by the CRS-150 controller communication with the CDM-600L (CLM-9600L) modem. The SMS-301 does not automatically configure the standby modem.



**The CRS-150 is an accessory product designed specifically for the Comtech EF Data CDM-600 and CDM-600L (CLM-9600L) modems, and must not be used with any other equipment.**

### 1.1.1 Modem Side Connectors

The modem side connectors, shown in **Figure 1-2** and outlined in the accompanying table, provide all necessary external connections between the CRS-170A L-Band 1:1 Redundancy Switch module and the specified Comtech EF Data modem.

Name	Ref Des	Connector Type	Function
RX A	J1	Type 'N'	RF Input to Modem A
RX B	J2	Type 'N'	RF Input to Modem B
Control A	J3	DB-9F (9-pin Type 'D' female)	Control Interface with Modem A
Control B	J4	DB-9F (9-pin Type 'D' female)	Control Interface with Modem B
TX A	J5	Type 'N'	RF Output from Modem A
TX B	J6	Type 'N'	RF Output from Modem B

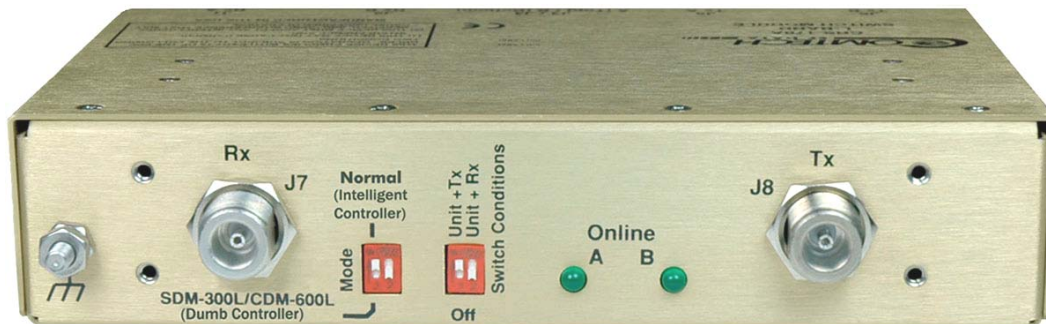


**Figure 1-2. CRS-170A – Modem Side Connectors**

## 1.1.2 Antenna Side Connectors

Two 50Ω female Type ‘N’ connectors on the antenna side of the CRS-170A L-Band 1:1 Redundancy Switch module provide the coaxial cable connections to the outdoor transmit and receive equipment (BUC and LNB). Refer to **Figure 1-3** and the accompanying table for details (this image depicts the Rev. A and later versions of the CRS-170A; see **Figure 4-1** for the original version).

Type ‘N’ Connector	Reference	Description	Direction
RX	J7	RF Input	In
		LNB 10 MHz Ref	Out
		LNB Power	Out
TX	J8	RF Output	Out
		BUC 10 MHz Ref	Out
		BUC FSK	In/Out
		Comm.	Out



**Figure 1-3. CRS-170A – Antenna Side Connectors and Ground Lug**

## 1.2 Functional Description

The CRS-170A L-Band 1:1 Redundancy Switch module performs the transmit and receive coaxial switching required for redundant modem operation with an outdoor BUC and LNB. It switches all of the BUC and LNB interface signals that are multiplexed onto the transmit and receive coaxial cables:

- Tx and Rx L-Band signals
- 10 MHz reference to BUC and LNB
- DC Power to BUC and LNB
- FSK signaling to the BUC

## 1.2.1 Operation with CDM-625, CDM-570L, CDM-700 and CDM-710

The CRS-170A is configured with two modems to form a complete 1:1 redundant modem. Software built into the modem M&C and cross connected status and communication between the modems allows the M&Cs to jointly function for 1:1 switch control. The control cables between the modems and the CRS-170A include three signal groups that are routed from one modem to the other through the CRS-170A:

- **First**, a serial communication line is routed from each modem to the other. The online unit interrogates the standby unit at regular intervals to determine its configuration. If a difference in configuration is detected, the online unit automatically reconfigures the standby unit so that the configurations are always synchronized. If the standby unit is replaced, it does not have to be manually reprogrammed to match the online unit; the process is entirely automatic.
- **Second**, the online status output signal from each modem is routed to the other in addition to the switch logic within the CRS-170A. Online control from **Modem A** overrides online control from **Modem B** inside the CRS-170A. In the event that both modems indicate true online status through some malfunction, the CRS-170A switch will select **Modem A**.
- **Third**, the fault status from each modem is routed to the other. The configuration, online status, and fault communication between the modems allows the offline modem to take over when the online unit indicates a fault.

Manual switchover is enabled from the front panel or remote control of the online modem. Automatic switching is inhibited by the User from the online unit. The User can select **Unit Faults** only, **Unit Faults or Receive Traffic Faults**, **Unit Faults or Transmit Traffic Faults**, or all three for the switchover criteria. This selection provides a great deal of flexibility in the operation of the switch. Green LEDs on the antenna side of the CRS-170A indicate which modem is online.

The control cable from each modem to the CRS-170A also includes +12V power to operate the CRS-170A. Power from both modems is diode OR'd so that the switch remains active if power is lost from one of the modems.

The CRS-170A provides L-Band redundancy, but when switching occurs, it accommodates more than just the L-Band signals. On the Tx side, it switches the Tx L-Band signal, the 10 MHz reference to the BUC, DC power to the BUC, and FSK signaling to the BUC (on CDM-570L modems). On the Rx side, it switches the 10 MHz reference to the LNB, and DC power to the LNB. The Rx L-Band signal from the LNB is split in a power divider to continuously drive both the online and offline demodulator. The offline demodulator can then maintain lock so that it is ready to quickly assume online status for receive traffic when a switchover is required.

Data switching is accomplished inside each modem, in the data interface itself. A 'Y' cable connects both the online modem and the offline modem to the terrestrial data source. Transmit data drives both modems in parallel so that the standby modulator is always ready to come online. Termination impedance for the modem line receivers is active in the online modem. On the Rx side of the interface, TRI-STATE® control of the offline modem line drivers keeps the offline

modem from interfering with the Rx data traffic. Send timing output from the offline modem is also TRI-STATE<sup>®1</sup>.

The User determines the conditions, which cause an automatic switchover. This is controlled by two switches at the front of the unit labeled Switch Conditions, and the User can select between Unit faults only, Unit faults or Receive Traffic faults, Unit faults or Transmit Traffic faults, or all three.

The Mode switch is also located on the front panel to allow selection to operate the CRS-170A in two different modes: Intelligent Controller and Dumb Controller.

- Use Intelligent Controller mode for CDM-625, CDM-570L, CDM-700, and CDM-710 modems.
- User Dumb Controller mode for CDM-600L (CLM-9600L) and SDM-300L modems.

With the ‘bridging’ architecture of the CRS-170A (whereby identical traffic signals are routed to both Online and Standby units), the Controller State Machine can avoid unnecessary switchovers. By examining the fault status of both units, it can infer if the fault is external to the system. For example, suppose the CRS-170A has been configured to switch following Unit faults or Transmit Traffic faults, and that the modems are configured for external clock operation. Now suppose that the external equipment (network, multiplex, router, etc.) fails. Both the standby and the online units will now show a Transmit Traffic fault (No Clock Detected from Terrestrial Port). The CRS-170A Controller State Machine will see that both these faults have occurred at the same time (in fact, within a 0.5 second window), and infers that the fault is external. Therefore, no unnecessary switchover is initiated.

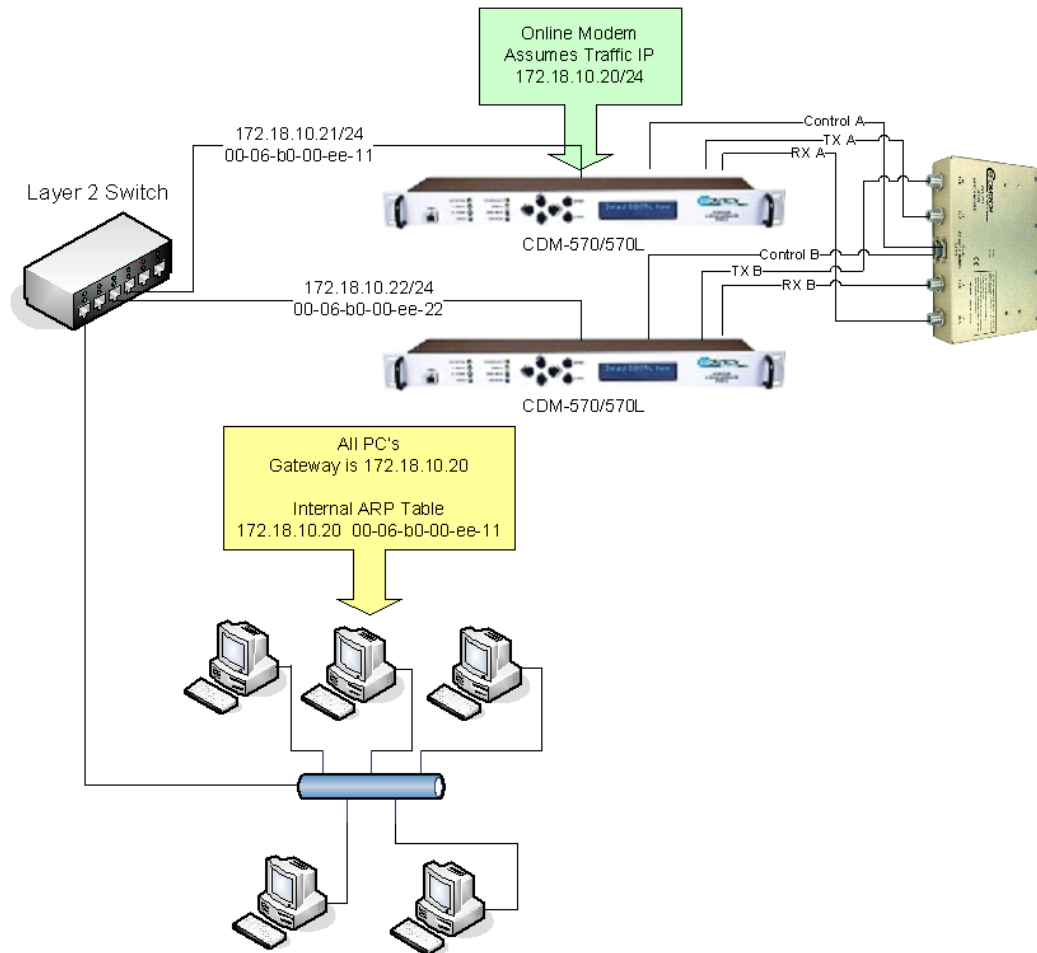
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<sup>1</sup> TRI-STATE is a registered trademark of National Semiconductor.



### 1.2.1.1 IP Data 1:1 Switching Functional Description

A standard Ethernet Layer 2 Switch (provided by User) is needed when a CDM-625/570L/700/710 modem is configured for Ethernet terrestrial traffic.



**Figure 1-4. IP 1:1 Redundancy**

For IP 1:1 redundancy operation, both modems are assigned a unique M&C IP address on the same subnet (in the diagram above, 172.18.10.21/24 and 172.18.10.22/24). A Traffic IP address on the subnet is also assigned (172.18.10.20/24). Whichever modem is online, it will also assume the Traffic IP.

When there is a switchover to the backup modem, this modem will now assume the Traffic IP. It will also broadcast a “gratuitous ARP” which will tell all local devices to now associate a new MAC address for the Traffic IP 172.18.10.20. Each device will update their ARP tables and traffic will resume virtually instantaneously.

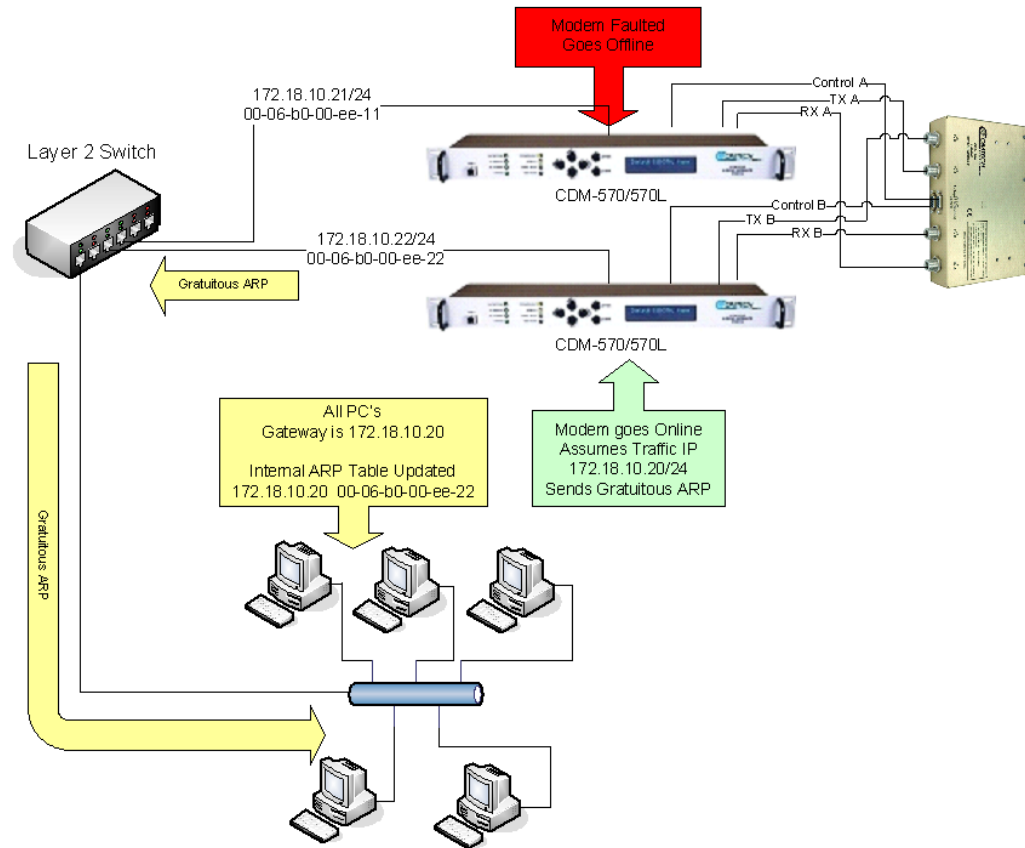


Figure 1-5. 1:1 Redundancy Switchover



**All configuration changes can only be made to the Online Modem and will require the User TO “SAVE Parameters to permanent storage” TO ENSURE THE configuration change is also applied to the Backup Modem.**

### 1.2.2 Operation with CDM-600L (CLM-9600L) and SDM-300L3

Operation with two CDM-600L (CLM-9600L) modems requires an additional CRS-150 1:1 switch for terrestrial data switching and 1:1 control, while operation with two SDM-300L3 modems requires an additional SMS-301 1:1 switch to handle terrestrial data and control. Thus, there are three functional configurations for the CRS-170A.

### 1.2.3 Operation with CDM-600L (CLM-9600L) and CRS-150

The CRS-150 connects to two modems (an online unit and a standby unit), monitors the fault status of these two units, and controls the routing of data to and from the two units. IF signals, 10MHz reference signals, DC power for the BUC and LNB, and FSK signaling to the BUC are switched in the CRS-170A under control of the CRS-150. In the case of an equipment failure, automatic switching takes place to protect the traffic circuit.

At the heart of the CRS-150 is a Controller State Machine that is responsible for fault monitoring and control of switching functions – it is implemented in a CPLD.

The CRS-150 redundancy switch derives its operating power from the two modems (online and standby units) via extra power-carrying wires in the data cable from each modem. Similarly, the CRS-170A derives its +12V power from both modems through 'Y' cable connection to the same cables. The required online and offline control signals are also included in these cables. A diode sharing arrangement with a current sharing circuit ensures that power is taken equally from the two modems in normal operation. In the event that one of the two units is removed, however, the remaining modem can supply all current requirements. The modems supply +12 volts DC (at a combined total of 400 mA max) and -12 volts DC (at a combined total of 120 mA max). Maximum power consumption occurs in a serial LVDS mode at maximum data rate (20 Mbps). Power consumption in RS-232 modes is approximately 40% of the maximum values. The modem employs electronic fuses which prevent excessive current from being drawn by the CRS-150 should an anomalous condition occur.

Transmit Clock and Data signals entering the CRS-150 via the Data Interface are buffered and fed to both modems simultaneously; this parallel feed ensures that the standby unit sees the same traffic conditions as the online unit. Rx Data and Clock signals coming from the online modem are routed through signal relays to the Data Interface. In the event that a switchover occurs, these relays switch so the standby unit then supplies the Data and Clock signals.

As only one modem in the pair (the online unit) is permitted to transmit its IF carrier signal at any one instant, the standby unit is forced to disable its Tx carrier by asserting the Tx Carrier Off signal at the Data Interface. Additionally, the CRS-170A provides further isolation and security by using an RF relay within the unit.

The Rx IF signal is fed to both modems simultaneously through the power divider in the CRS-170A. This divider introduces a loss of approximately 3.5 dB but, given the wide dynamic range of the demodulator in the CDM-600L (CLM-9600L), this is not considered to be a problem. The advantage of this scheme is that the demodulators in both online and standby units are locked, and therefore if a switchover does occur, there will be no delay while waiting for the demodulator to acquire lock.

Fault status information is fed from each of the two modems via the Data Interface connector. Based on the fault status, the Controller State Machine in the CRS-150 decides whether the 'A' or 'B' unit is to be the online unit. It asserts a control signal to the standby unit, which mutes its Tx IF carrier and simultaneously indicates to the microcontroller within the standby unit that the unit is no longer 'online'. Consequently, the 'online' LED on the front panel of the standby modem is extinguished and the standby status is also reported over the remote control bus so an external M&C system can determine the state of the redundancy system. At the same time, a green LED will illuminate on the front of the CRS-150 to indicate whether the 'A' or 'B' unit is online, and a green LED on the antenna side of the CRS-170A will indicate the same status.

DIP switches on the CRS-170A's front panel are set to establish modem-specific operation. With the CDM-600L (CLM-9600L), place the Mode switch in the SDM-300L/CDM-600L (CLM-9600L) position and push the Switch Condition switches to the OFF position. See **Section 3.7 Switch DIP Settings** for detailed information.

## 1.2.4 Operation with SDM-300L3 and SMS-301

The SMS-301 is modified from the standard version that operates with 70/140 MHz IF SDM-300A modems. The BNC IF connectors are removed since the connectors and internal switching are not suitable for L-Band operation. Signals on the Status/Faults connector (J14) are modified to provide +12VDC power output and A/B switch control outputs to the CRS-170A. The SMS-301 has its own redundant power supplies, so the CRS-170A receives redundant power.

Operation here is similar to operation with two CDM-600L (CLM-9600L) modems and a CRS-150 switch. The SMS-301 operates as the principal switch and controller, with the CRS-170A providing the required switching for L-Band signals, references, and power supplies that the SMS-301 cannot handle. The SMS-301 connects to two modems (an online unit and a standby unit), monitors the fault status of these two units, and controls the routing of data to and from the two units. IF signals, 10MHz reference signals, DC power for the BUC and LNB, and FSK signaling to the BUC are switched in the CRS-170A under control of the SMS-301. In the case of an equipment failure, automatic switching takes place to protect the traffic circuit. Consult the SMS-301 Redundancy Switch Installation and Operation Manual for detailed information on operation of the SMS-301. All operation as a 70/140 MHz modem switch applies except that the RF switching is done in the CRS-170A.

DIP switches on the CRS-170A's front panel are set to establish modem-specific operation. With the SDM-300L, place the Mode switch in the SDM-300L/CDM-600L (CLM-9600L) position and push the Switch Condition switches to the OFF position. See **Section 3.7 Switch DIP Settings** for detailed information.

## 1.3 Summary of Specifications

<b>Equipment Type</b>	L-Band 1:1 Redundancy Switch
<b>Manufacturer</b>	Comtech EF Data, Tempe, Arizona
<b>Comtech EF Data Modems Supported</b>	<ul style="list-style-type: none"> <li>• CDM-625</li> <li>• CDM-570L</li> <li>• CDM-570L with optional IP Module</li> <li>• CDM-700</li> <li>• CDM-710</li> <li>• CDM-600L (CLM-9600L) with CRS-150 1:1 Data Switch</li> <li>• SDM-300L3 with SMS-301 1:1 Data Switch</li> </ul>
<b>Operating Modes</b>	<ul style="list-style-type: none"> <li>• Fully Automatic under control of supporting 1:1 switch.</li> <li>• Manual under control of supporting 1:1 switch.</li> </ul>
<b>Architecture</b>	<ul style="list-style-type: none"> <li>• Full bridging architecture when supported by CRS-150, or SMS-301 data switching and control, with configuration synchronization.</li> <li>• Tx redundancy supports all BUC interface signals (RF, 10 MHz reference, FSK communications, and power supply)</li> <li>• Rx IF signal fed to both Online and Standby units. Rx switching supports all LNB interface signals (RF, 10 MHz reference, and power supply.)</li> </ul>
<b>Switch Conditions</b>	Tx/Rx switching follows state of supporting data switching via control input from data switch.
<b>IF Switching/ Splitting</b>	<ul style="list-style-type: none"> <li>• Tx IF: Switched by RF relay (1.5 dB max loss, 40 dB min ON/OFF isolation)</li> <li>• Rx IF: Passive power splitting (7 dB max loss)</li> </ul>
<b>BUC Power Switching</b>	Switched by power relay (60VDC max, 4A max)
<b>BUC 10 MHz Reference Switching</b>	Switched by relay (1 dB max loss, 70dB min ON/OFF isolation)
<b>BUC FSK Comm Switching</b>	Switched by relay (70dB min ON/OFF isolation)
<b>LNB Power Switching</b>	Switched by power relay (28 VDC max)
<b>LNB 10 MHz Reference Switching</b>	Switched by relay (1 dB max loss)
<b>Tx-Rx Isolation</b>	90dB min, 950-1950 MHz
<b>IF Impedance</b>	Optimized for 50Ω (> 10 dB return loss on external IF ports)
<b>IF Connectors</b>	50Ω Type N Female
<b>IF Frequency Range</b>	950-1950 MHz
<b>Weight</b>	1.1lbs (0.5kg)
<b>Dimensions [excluding connectors]</b>	1.7 H x 5.7 W x 4.1 D inches (43 H x 143 W x 104 D mm) 19-inch rack mounting kit available.

**Power requirements**

- Watts maximum
- + 12 volts DC @ 130 mA (max)
- Power supplied by modems or from the CRS-150 Data Switch (when used in tandem with the CDM-600L [CLM-9600L] modem), or from the SMS-301 Data Switch (when used in tandem with the SDM-300L modem).

**Approvals**

- 'CE' as follows:
- EMC
  - Safety

# Chapter 2. INSTALLATION

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## 2.1 Unpacking and Inspection

The CRS-170A L-Band 1:1 Redundancy Switch module and its Installation and Operation Manual are packaged and shipped in a pre-formed, reusable cardboard carton containing foam spacing for maximum shipping protection.



***Do not use any cutting tool that will extend more than 1" into the container and cause damage to the unit.***



***Be sure to keep all shipping materials for the carrier's inspection.***

Unpack and inspect the CRS-170A as follows:

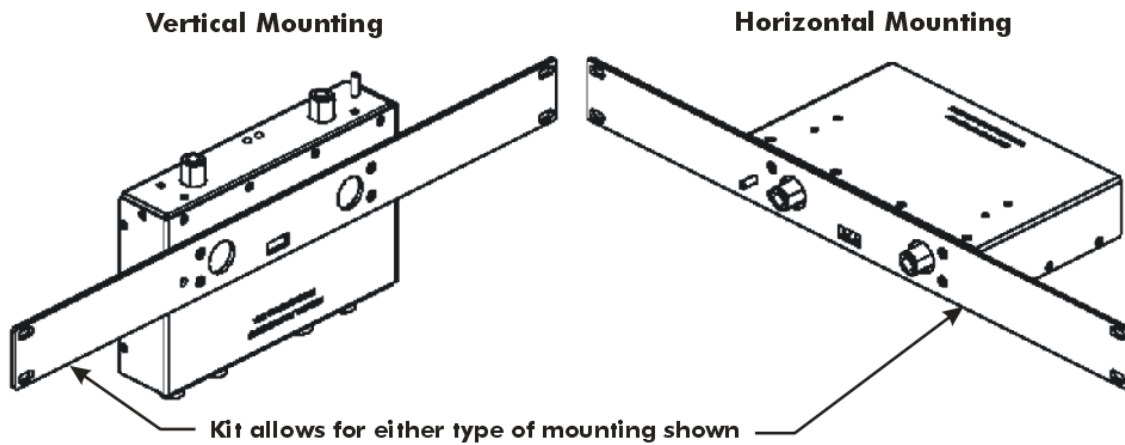
Step	Procedure
1	Inspect shipping containers for damage.
2	If shipping containers are damaged, keep them until the contents of the shipment have been carefully inspected and checked for normal operation.
3	Remove the packing list from the outside of the shipping carton.
4	Open the carton and remove the contents.
5	Check the contents against the packing list to verify completeness of the shipment.
6	If damage is evident, contact the carrier and Comtech EF Data immediately and submit a damage report.
7	If the unit needs to be returned to Comtech EF Data, use the original shipping container.

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## 2.2 Mounting

The CRS-170A is designed to be freestanding, or mounted in the rear of a rack containing the modems. Because of the module's small size and weight, one installation option is to let the module hang freely, supported by the interfacing cables.

Alternatively, the available Comtech EF Data Mounting Panel Kit KT/10254 allows the module to be mounted to the rack horizontally or vertically as shown in **Figure 2-1**. In applications with the CDM-600L (CLM-9600L) and the CRS-150, the CRS-170A is best mounted horizontally above or below the CRS-150.



**Figure 2-1. KT/10254 Mounting Panel Kit (for horizontal or vertical mounting)**



# Chapter 3. MODEM AND SWITCH CONFIGURATION

---

## 3.1 Overview



*In order to avoid damage to the modems and CRS-170A switch, it is important for the user to first configure the modems for 1:1 redundant operation as outlined in this chapter. Once the modems have been properly configured for 1:1 redundant operations, the user should then set the DIP switches on the CRS-170A to the correct modem selection (see Section 3.7 CRS-170A Switch DIP Settings). Once the modem and switches have been properly configured, the user can then connect cables between the (powered OFF) modems and switch as outlined in Chapter 4. CABLES AND CONNECTIONS.*

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## 3.2 Configuring CDM-625s for 1:1 Redundancy

Because the CDM-625 can detect if it is connected to a 1:1 redundancy system, the steps required to configure both modems is minimal. Before connecting the modems to the CRS-170A, follow the below procedures if applicable. If terrestrial data is not Ethernet and CnC will not be used, then no modem 1:1 redundancy configuration is needed.

### 3.2.1 IP Redundancy Configuration

If the terrestrial data type is Bridge-mode Ethernet, then unique IP addresses that are on the same subnet must be entered into both modems. Using the CDM-625 front panel menu, the procedure to do this is as follows:

1. From the top-level **SELECT:** menu, navigate each menu level using the ◀▶ arrows and **ENTER** key until the Address/Range screen appears:

**SELECT: Configuration → IP → Address/Range**

```
Ethernet IP Address/Range:
192.168.001.002/24          (◀▶)
```

2. The two CDM-625s will now need an Ethernet connection to each other through a Layer 2 switch or hub – preferably an L2 switch; see **Chapter 4. CABLES AND CONNECTIONS** for further information.

### 3.2.2 Carrier-in-Carrier® Redundancy Configuration

If Carrier-in-Carrier® (CnC) is utilized, the CnC control setting must be set to **Redundancy** mode. Using the CDM-625 front panel menu, the procedure to do this is as follows:

1. From the top-level **SELECT:** menu, navigate each menu level using the ◀▶ arrows and **ENTER** key until the PMSI control mode screen appears

**SELECT: Configuration → CnC → PMSI-control**

```
CnC PMSI mode: Redundancy
(Idle, Redundancy, Talk, Listen) (◆)
```

From the **CnC PMSI mode** screen, use the ▲ ▼ arrow keys to select **Redundancy**, and then press **ENTER**.

2. The two CDM-625s will now need to be connected together via use of a 1:1 PMSI cable (note that this cable bypasses the CRS-170A). See **Chapter 4. CABLES AND CONNECTIONS** for further information.

The **Pre-Mapped Symbol Interface (PMSI)** is a function associated with DoubleTalk® Carrier-in-Carrier® that permits the modulator in a selected unit to provide a direct copy of its output (the outbound interferer) to the second modem. The other modem may then choose to take the PMSI signal and use it for its own CnC reference. In this 1:1 redundancy, the PMSI is an RS-485 multi-drop bus system where one device transmits and the other device on the multi-drop bus is configured to receive.

### 3.3 Configuring CDM-570Ls for 1:1 Redundancy



**For correct operation of the CRS-170A, the CDM-570L modems must have the following installed:**

- **Firmware Version 1.3.1 (or higher)**
- **Hardware Revision 3**

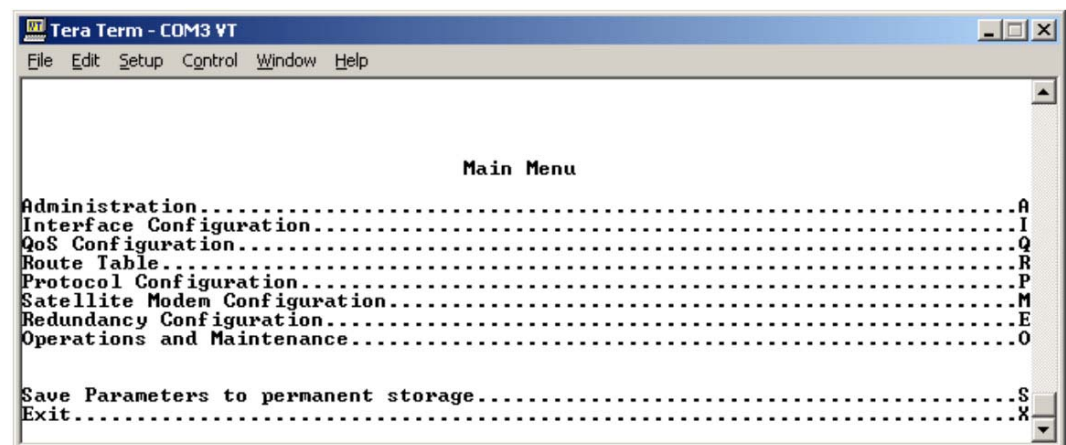
**If the modem does not meet this requirement, contact Comtech EF Data. Flash firmware upgrades are free and may be downloaded from the CEFD Web page. Hardware revision upgrades must be performed at CEFD.**

The User can fully configure, monitor, and control the operation of the CDM-570L from the modem front panel using the keypad and display, where nested menus displaying all available options are used and prompt the User to carry out a required action.

Alternately, configuration, monitoring and control of redundant systems is possible via remote means over an RS-485 multi-drop bus using the Serial console Command Line Interface, where data is transmitted in asynchronous serial form using ASCII characters (see **Figure 3-1**). For detailed information on either methodology, refer to the **CDM-570/570L Installation and Operation Manual**.



CDM-570L Front Panel



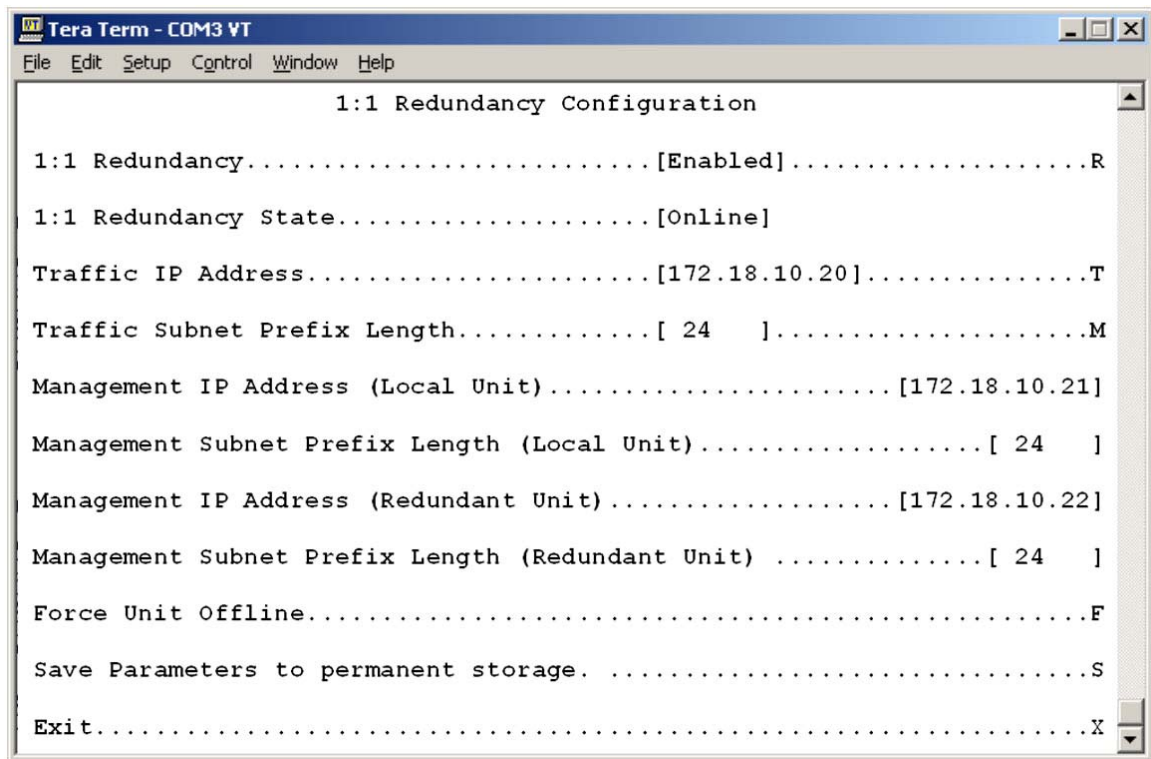
Serial console Command Line Interface (CLI)

Figure 3-1. CDM-570L Configuration Interfaces

### 3.3.1 IP Redundancy Configuration

The following steps outline setting up a CDM-570L 1:1 IP Redundant system using the CLI:

1. The two CDM-570Ls will need an Ethernet connection to each other through a Layer 2 switch or hub (preferably an L2 switch).
2. Before connecting the modems to the CRS-170A, you will need to first configure the following CDM-570L IP module settings:
  - **Redundancy Configuration → 1:1 Redundancy** set to **DISABLED**.
  - **Administration → Working Mode**: Both modems need to be set to the same Working Mode.
  - **Administration → Features**: Both modems need to have the same IP Option Feature set.
3. On both modems, enter a unique IP Address that is on the same subnet (**Interface Configuration → Ethernet Interface → IP Address**). Verify that you can ping from one 570 to the other (**Operations and Maintenance → Diagnostics → Ping**).
4. On both modems, set **Redundancy Configuration → 1:1 Redundancy** to **ENABLED**. **Save Parameters to permanent storage** and power down both modems.
5. Connect the modems to the CRS-170A. Refer to the CDM-570/570L Installation and Operation Manual, Sections **H.4 Cabling with the CDM-570L** and **H.5 Cabling with the CDM-570 IF**.
6. While monitoring the Serial console CLI on both modems, observe the following after powering on both modems at the same time (also observe the CRS-170A Online LEDs to see which modem is the Online modem).
  - **Online modem CLI will display:**  
1:1 Redundancy (Auto Detected)  
Redundancy: PARAM File Connection Established.  
Redundancy: Sending PARAM File...
  - **Offline modem CLI will display:**  
1:1 Redundancy (Auto Detected)  
Redundancy: Received PARAM File...  
Writing 5447 bytes to PARAM file on Flash
7. On the Online modem, select the **Redundancy Configuration** menu (**Figure 3-2**). Observe that the correct IP Address/Mask is displayed for the Local and Redundant Unit. You will then need to set the Traffic IP Address/Mask (this also needs to be in the same subnet as the Management IP addresses).



```
Tera Term - COM3 VT
File Edit Setup Control Window Help

1:1 Redundancy Configuration

1:1 Redundancy.....[Enabled].....R
1:1 Redundancy State.....[Online]
Traffic IP Address.....[172.18.10.20].....T
Traffic Subnet Prefix Length.....[ 24  ].....M
Management IP Address (Local Unit).....[172.18.10.21]
Management Subnet Prefix Length (Local Unit).....[ 24  ]
Management IP Address (Redundant Unit).....[172.18.10.22]
Management Subnet Prefix Length (Redundant Unit) .....[ 24  ]
Force Unit Offline.....F
Save Parameters to permanent storage. ....S
Exit.....X
```

Figure 3-2. CLI 1:1 Redundancy Configuration screen



*All configuration changes can only be made to the Online CDM-570L and will require the user to “Save Parameters to permanent storage” to ensure the configuration change is also applied to the Backup CDM-570L.*

### 3.3.2 Non-IP Redundancy Configuration

If the terrestrial data type non Ethernet, (i.e. RS422, G.703) the modem configuration procedure for non-IP redundancy is as follows:

1. On both modems, Enable 1:1 Redundancy:  
**Redundancy Configuration → 1:1 Redundancy set to ENABLE.**
2. Connect all cables – including the control cable, IF cable and data ‘Y’ cables – to the modems and the CRS-170A as directed in **Chapter 4. CABLES AND CONNECTIONS.**

## 3.4 Configuring CDM-7x0s for 1:1 Redundancy



**For correct operation of the CRS-170A, the CDM-700 and CDM-710 modems must have the following installed:**

- **For the CDM-700:**
  - ▶ **Firmware Version 1.1.6 (or higher)**
  - ▶ **Hardware Revision A (chassis with round-buttoned keypad)**
- **For the CDM-710:**
  - ▶ **Firmware Version 2.4.1 (or higher)**
  - ▶ **Hardware Revision A (chassis with round-buttoned keypad)**

**If the modem does not meet this requirement, contact Comtech EF Data. Flash firmware upgrades are free and may be downloaded from the CEFD Web page. Hardware revision upgrades must be performed at CEFD.**

**NOTE: Hardware upgrades are possible only for the Rev. A chassis and later versions of the CDM-700/710 – 1:1 redundancy operation is not available with hardware prior to Rev. A.**

The User can fully configure, monitor, and control the modem operation from the modem's front panel; via the keypad and display, nested menus displaying all available options are used and prompt the User to carry out a required action.

Refer to the **CDM-700** or **CDM-710 Installation and Operation Manual** for detailed configuration information.

### 3.4.1 IP Redundancy Configuration

If the terrestrial data type is GigE, follow the steps outlined in this procedure:

1. Before connecting the modems to the CRS-170A, you will need to first configure the following IP module settings on the CDM-7x0. From the CDM-7x0 front panel:

**CONFIG → AUX (Redundancy Mode) → ENA/DIS set to Disable.**

2. On both modems, enter a unique IP Address that is on the same subnet:

**CONFIG → REMOTE → ETHERNET → ADDRESS**

3. On both modems, enter a unique IP Address for the CDI-70 (GigE Interface) that is on the same subnet:

**For the CDM-700: CONFIG → Intfc1 → MAN → ADDRESS**

**For the CDM-710: CONFIG → Intfc2 → MAN → ADDRESS**

4. On both modems, set the redundancy to the Enable state:

**CONFIG → AUX (Redundancy Mode) → ENA/DIS set to Enable.**

Press **ENTER** to save parameters to flash memory

5. Power down both CDM-7x0s.

6. Connect all cables – including the control cable, IF cable and data cables – to the modems and the CRS-170A. Additionally, both modems will need an Ethernet connection to each other through a Layer 2 switch. For detailed information, refer to Chapter 4. **CABLES AND CONNECTIONS.**
7. Power up both CDM-7x0s. The modems will now come up in a redundant mode of operation. Verify that one modem is **ONLINE** by the front panel LEDs; also verify that the **ONLINE** LEDs for the CRS-170A indicate the same online state as the modems.



**All configuration changes can only be made to the Online CDM-7x0 and will require the user to “Save Parameters to permanent storage” to ensure the configuration change is also applied to the Backup CDM-7x0.**

### 3.4.2 Non-IP Redundancy Configuration

If the terrestrial data type non Ethernet (i.e. HSSI, G.703), the modem configuration procedure is as follows:

1. On both modems, set the redundancy to the Enable state:

**CONFIG → AUX (Redundancy Mode) → ENA/DIS set to Enable.**

2. Connect all cables – including the control cable, IF cable and data ‘Y’ cables – to the modems and the CRS-170A as directed in **Chapter 4. CABLES AND CONNECTIONS.**

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### 3.5 CDM-600L (CLM-9600L) Configuration

The CDM-600L modems needs no unique special 1:1 configuration setting.



***For correct operation of the CRS-170A, the CDM-600L modems must have the following installed:***

- ***Firmware Version 1.1.4 (or higher)***
- ***Hardware Revision 3***

***If the modem does not meet this requirement, contact Comtech EF Data. Flash firmware upgrades are free and may be downloaded from the CEFD Web page. Hardware revision upgrades must be performed at CEFD.***

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### 3.6 SDM-300L3 Configuration

The SDM-300L3 modems needs no unique special 1:1 configuration setting.



***For correct operation of the CRS-170A, the SDM-300L3 modems must have the following installed:***

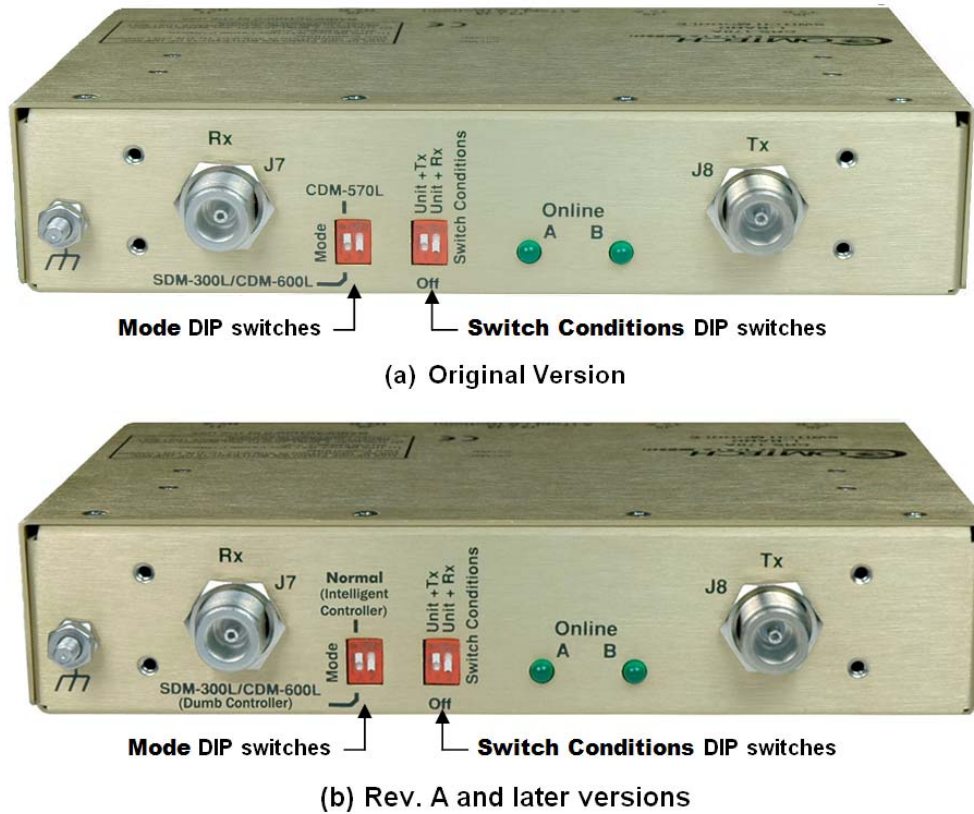
- ***Firmware Version 1.1.4 (or higher)***
- ***Hardware Revision 3***

***If the modem does not meet this requirement, contact Comtech EF Data. Flash firmware upgrades are free and may be downloaded from the CEFD Web page. Hardware revision upgrades must be performed at CEFD.***



### 3.7 CRS-170A Switch DIP Settings











**Figure 3-3** shows the DIP switches for setting the ‘**Mode**’ and ‘**Switch Conditions**’ on the Antenna Side of the CRS-170A L-Band 1:1 Redundancy Switch (toward BUC and LNB). The difference of the ‘**Mode**’ DIP switch silk screening between the original and current (Rev. A and later) versions of the CRS-170A is illustrated here.



**Figure 3-3. CRS-170A Antenna Side – DIP Switches**

**Table 3-1** illustrates the settings for the ‘**Mode**’ DIP switch set on a per-modem basis, and the ‘**Switch Conditions**’ DIP switch settings that determine switchover functionality for a given redundancy configuration.

**Table 3-1. CRS-170A DIP Switch Settings**

CRS-170A DIP Switch Settings							
'Mode' DIP Settings				'Switch Conditions' DIP Settings			
Modem	DIP	Left Switch	Right Switch	DIP	Left Switch	Right Switch	Result
CDM-625		Up	Down		Down (Off)	Down	Switchover upon a Unit fault
CDM-570L		Up	Down		Up	Down	Switchover upon a Unit or Tx Traffic fault
CDM-700 (L-Band)		Up	Down		Down	Up	Switchover upon a Unit or Rx Traffic fault
CDM-710 (L-Band)		Up	Down		Up	Up	Switchover upon a Unit or Tx Traffic or Rx Traffic fault
CDM-600L (CLM-9600L)		Down	Up				
SDM-300L3		Down	Down				

**Note:** The 'Switch Conditions' DIP switches are set depending upon the type of Tx or Rx traffic conditions resultant of switchover. Some modems have additional settings or alarm masks that affect conditions – please refer to the individual modem manual for detailed explanations.

# Chapter 4. CABLES AND CONNECTIONS

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## 4.1 Overview

When assembling a Comtech EF Data 1:1 Redundancy System, in addition to purchasing the desired modem pair (one Redundant modem, one Traffic modem), the user is also required to purchase a redundancy kit tailored to that specific modem choice. This kit includes not only the CRS-170A L-Band 1:1 Redundancy Switch module, but nearly all cables and components required for interconnection of the redundant configuration to various interfaces (e.g., control, data, IF, etc.).

The modem-specific sections that follow in this chapter specify the redundancy kit required for that particular configuration. These sections additionally provide specific interface examples that identify the individual redundancy kit item(s) required to assemble that interface.



- 1. It is physically impossible to connect all available interface solutions within a single 1:1 redundancy system at a given time. For example, when using the CDM-625 in a 1:1 system, the user is unable to establish an ASI interface together with a G.703 Unbalanced interface, or an RS-422/232 interface together with an HSSI interface. Therefore, the quantities of cables and accessories furnished with each redundancy kit have been predetermined with this operational limitation taken into consideration.***
- 2. The type of 1:1 Y-Splitter cable required for modem-to-user interconnection depends on the user's data interface. It is essential to ensure that the control and IF connections, both Rx and Tx, are made correctly.***

## 4.2 Cabling to the CDM-625

Examples for connecting a pair of CDM-625 modems together with the CRS-170A are provided in this section. To enable 1:1 operation, refer to **Chapter 3. MODEM AND SWITCH CONFIGURATION** in this manual and the **CDM-625 Advanced Satellite Modem Installation and Operation Manual**.

### 4.2.1 CRS-170A → CDM-625 1:1 Redundancy Kit KT-0000044

The following table provides a reference as to how the items provided in Redundancy Kit KT-0000044 are utilized with all possible CDM-625 data interface configurations:

Kit KT-0000044 CRS-170A → CDM-625 1:1 Redundancy – Interface Cabling Reference				
Qty/Kit (REF)	Part No.	Description	Used For	Ch. 3 Fig
1	PL/10129-1	CRS-170A Switch – Top Assembly	1:1 Redundancy	3-1
4	CA/6357-4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	Modem → Switch IF Interface	3-1
2	CA/WR9378-4	Control Cable – Universal, DB-9M → DB-9M, 4'	Modem → Switch Control	3-1
1	CA/RB10461-1	Cable – 1:1 Y-Splitter, (2X) DB-25M → DB-25F	RS-422/232 Interface HSSI Interface	3-3 3-4
1	PL/0000307	CIC-60 – Interconnect Converter, HSSI (SCSI-2 Mini-D) 50-pin Female → DB-25M	HSSI Interface	3-4
2	RF/SA32KC-IN/OUT	Splitter/Combiner – 2-way w/Bracket, .25-300 MHz, 75Ω BNC	ASI Interface	3-5
4	CA/BNC75OHM	Cable – IF, BNC, 1'	ASI Interface G.703 Unbalanced Interface	3-5 3-8
3	CA-0000071	Cable – 1:1 Y-Splitter, (2X) DB-9M → DB-9F	Quad E1 Interface G.703 Balanced Interface ESC Interface	3-6 3-7 3-10
2	CN/BNC-TEE-JPJ	T-Adapter, 50Ω BNC	G.703 Unbalanced Interface	3-8
1	CA-0000070	Cable – 1:1 Y-Splitter, (2X) HD-44M → HD-44F	Overhead Interface	3-9
1	CA-0000135	Cable – Shielded, PMSI Multi-drop, DB-9M → DM-9M	PMSI Interface	3-12

### 4.2.2 Basic Modem-to-Switch Connection

**Figure 4-1** shows how to connect a pair of CDM-625 modems together with the CRS-170A L-Band 1:1 Redundancy Switch module; the accompanying table lists the cable assemblies provided in KT-0000044 for this initial setup.

**EXAMPLE:** The Tx IF from 'Modem A' connects to the Tx IF port 'Tx A' on the CRS-170A; similarly, the Tx IF from 'Modem B' connects to the Tx IF port 'Tx B' on the CRS-170A.

**The same logic applies for the Rx IF connections. Failure to observe this requirement will result in system malfunction.**



**When connecting the Control cable between the CRS-170A and the modems, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.**

Refer to **Sect. 4.2.3** in this chapter for details of the CDM-625 data interface configurations.

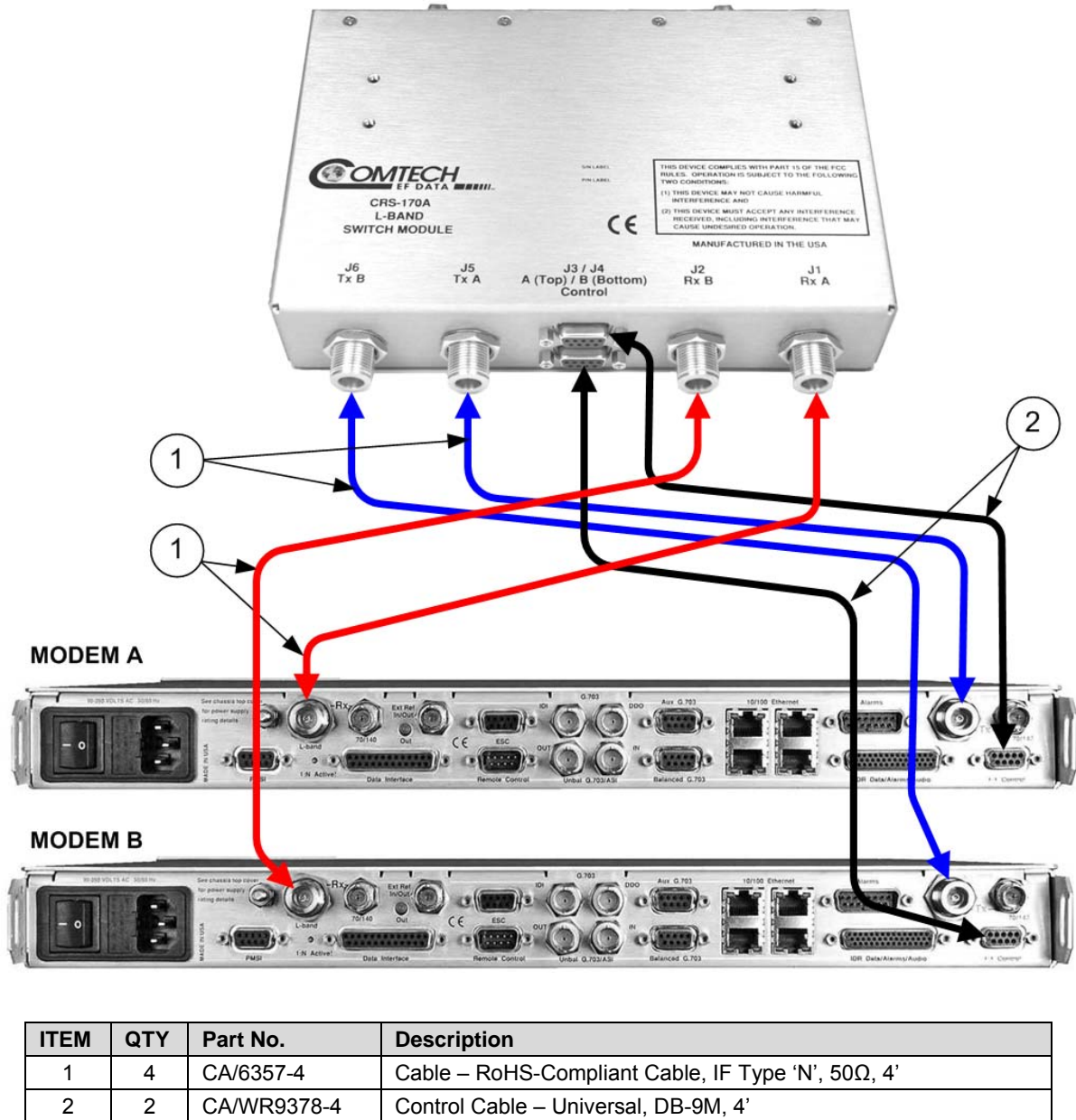
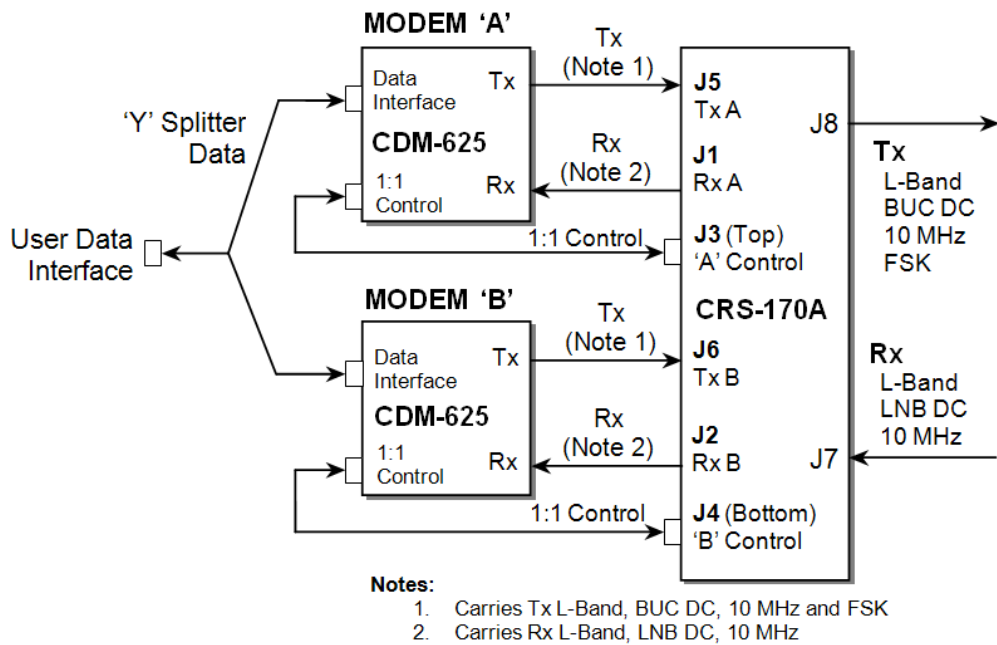


Figure 4-1. CDM-625 Basic Modem-to-Switch Connection

### 4.2.3 Data Interface Connection

In addition to the basic switch-to-modem cabling shown previously, there are a number of data interface configurations available with the CDM-625. The block diagram shown in **Figure 4-2** is typical for the examples shown in **Sects. 4.2.3.1** through **4.2.3.9**.

With the exception of the 10/100 Ethernet interface configuration shown in **Sect. 4.2.3.10** – where customer-supplied cables are utilized – one cable/component set (see examples for specified quantities) per 1:1 modem pair is required per user interface.



**Figure 4-2. CDM-625 Block Diagram: User → Modem → Switch → Traffic**

**Note:** Unless otherwise specified, the interface cables and components identified in each of the following examples are provided in the CDM-625 Redundancy Kit KT-0000044 (See Sect. 4.2.1).

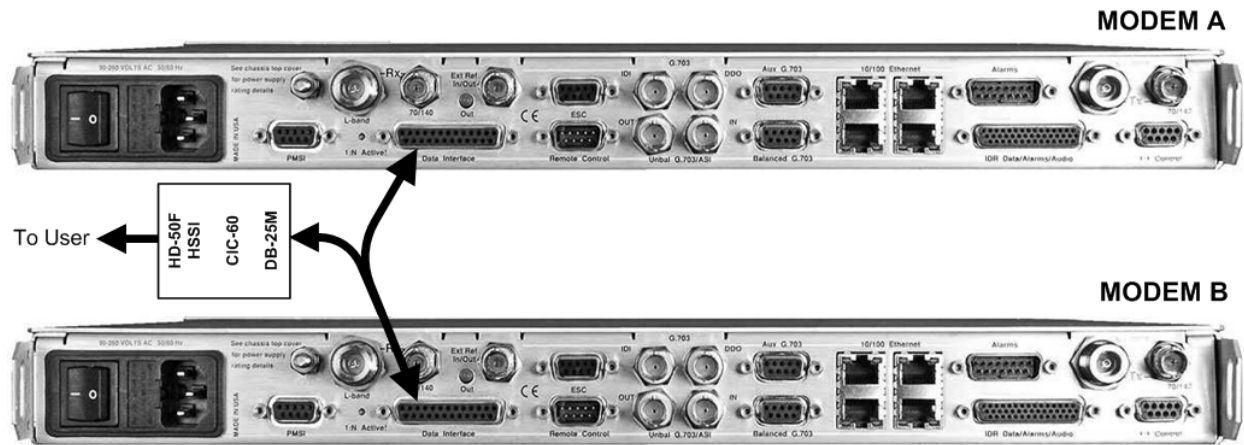
### 4.2.3.1 RS-422/232 Interface Example



QTY	Part No.	Description
1	CA/RB10461-1	Cable – 1:1 'Y' Splitter, (2X) DB-25M → DB-25F

**Figure 4-3. CDM-625 RS-422/232 1:1 Example**

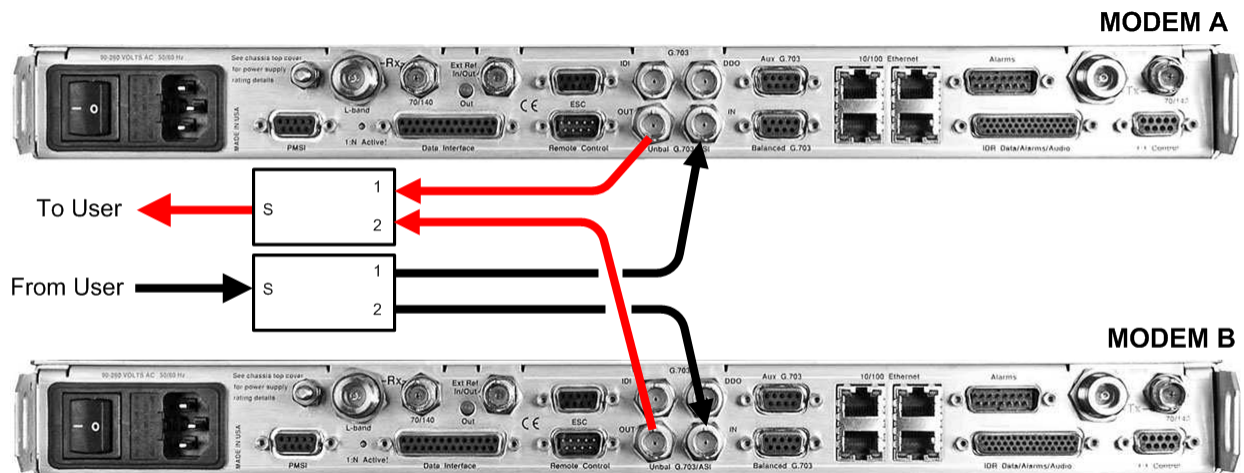
### 4.2.3.2 HSSI Interface Example



QTY	Part No.	Description
1	CA/RB10461-1	Cable – 1:1 'Y' Splitter, (2X) DB-25M → DB-25F
1	PL/0000307	CIC-60 – Interconnect Converter, DB-25M → HD-50F (SCSI-II)

Figure 4-4. CDM-625 HSSI 1:1 Example

### 4.2.3.3 ASI Interface Example



QTY	Part No.	Description
4	CA/BNC75OHM	Cable – IF BNC, 1'
2	RF/SA32KC-IN/OUT	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 4-5. CDM-625 ASI 1:1 Example

### 4.2.3.4 Quad E1 Interface Example

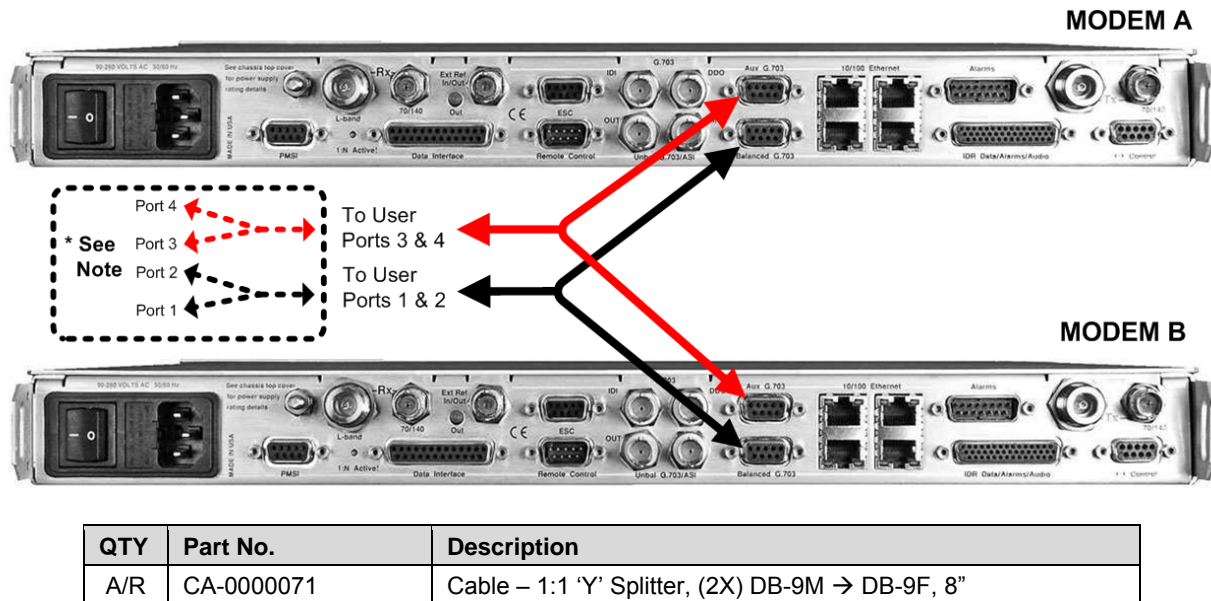


Figure 4-6. CDM-625 Quad E1 1:1 Example

**Note:** Optional adapter cables may be purchased from Comtech EF Data to adapt the Balanced G.703 or Auxiliary G.703 DB-9F connections to either a standard DB-15F connector pair (CEFD P/N CA-0000163) or an RJ-48F connector pair (CEFD P/N CA-0000164). Either cable plugs into the single ‘To User’ connector side of each CA-0000071 ‘Y’ Splitter cable used.

### 4.2.3.5 G.703 Balanced Interface Example

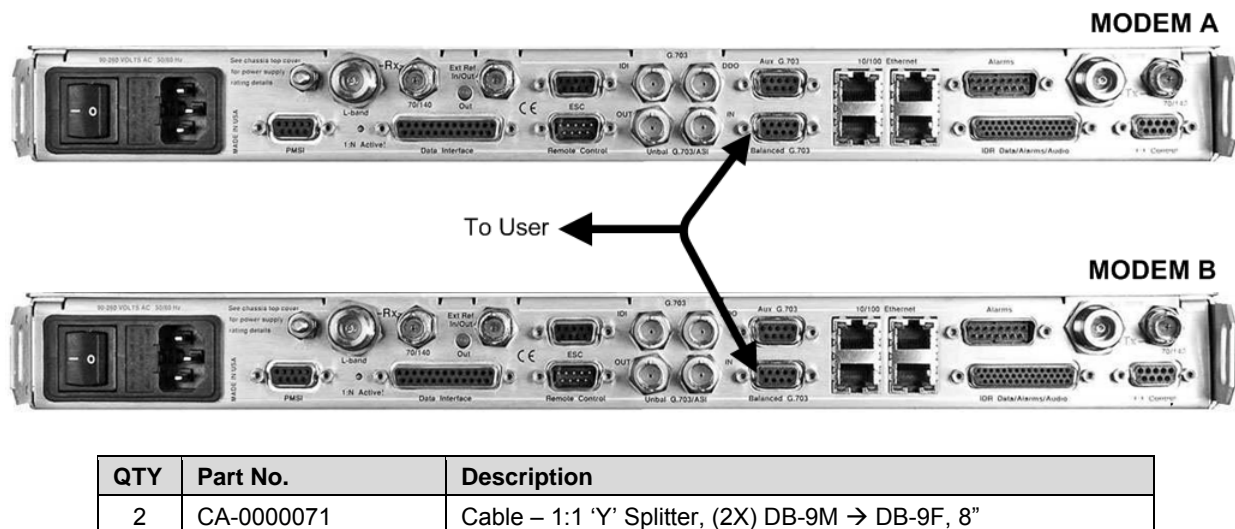


Figure 4-7. CDM-625 G.703 Balanced 1:1 Example



### 4.2.3.6 G.703 Unbalanced Interface Example

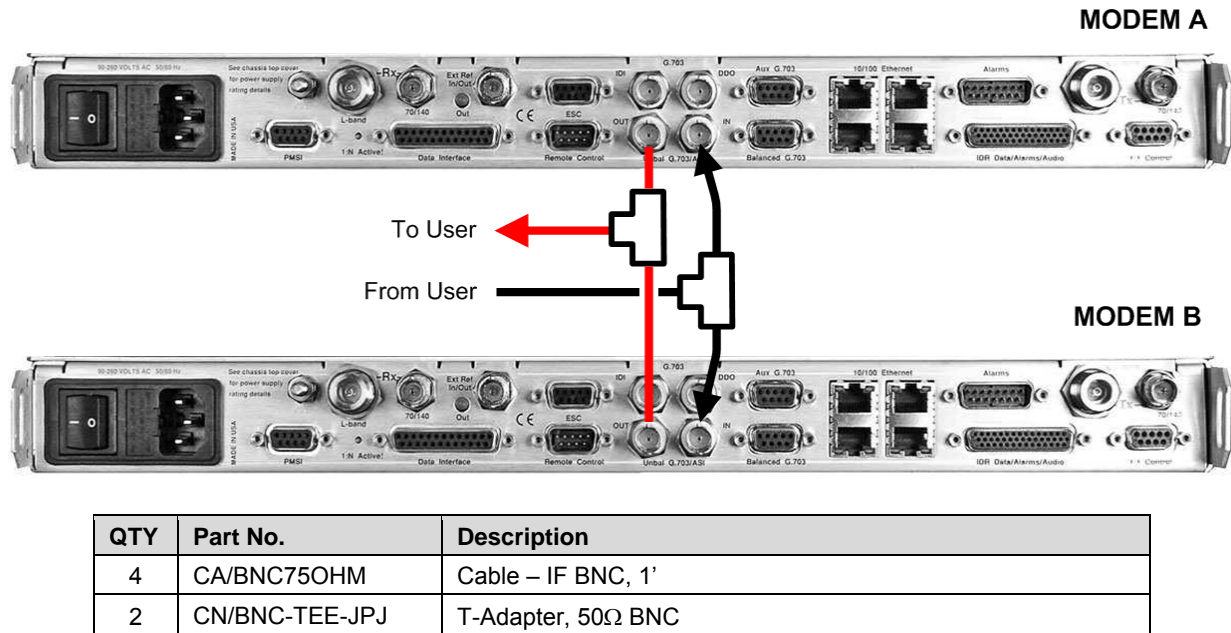


Figure 4-8. CDM-625 G.703 Unbalanced 1:1 Example

### 4.2.3.7 Overhead Interface Example

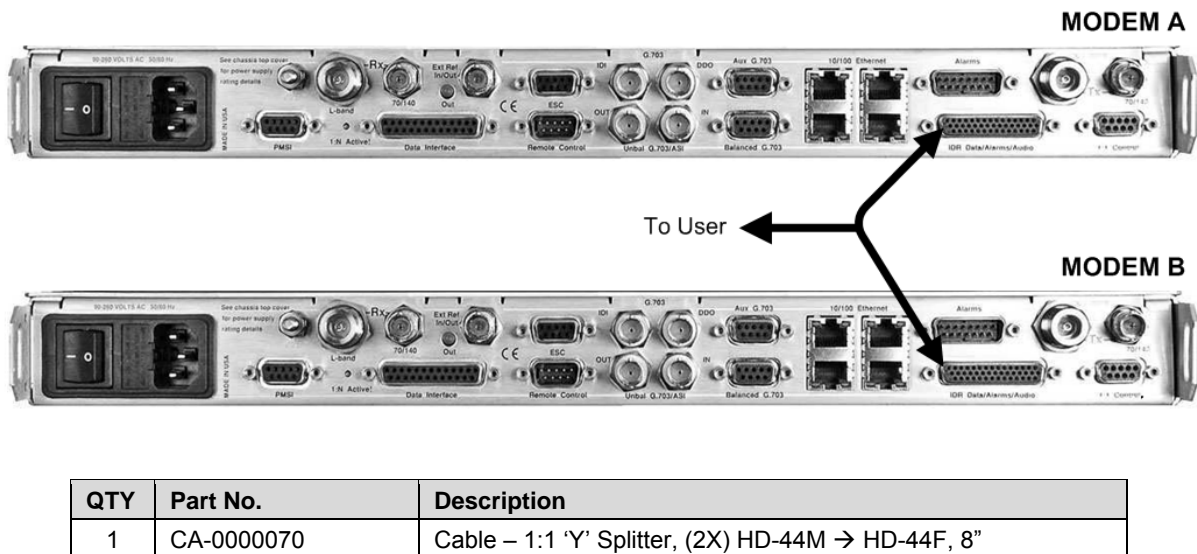
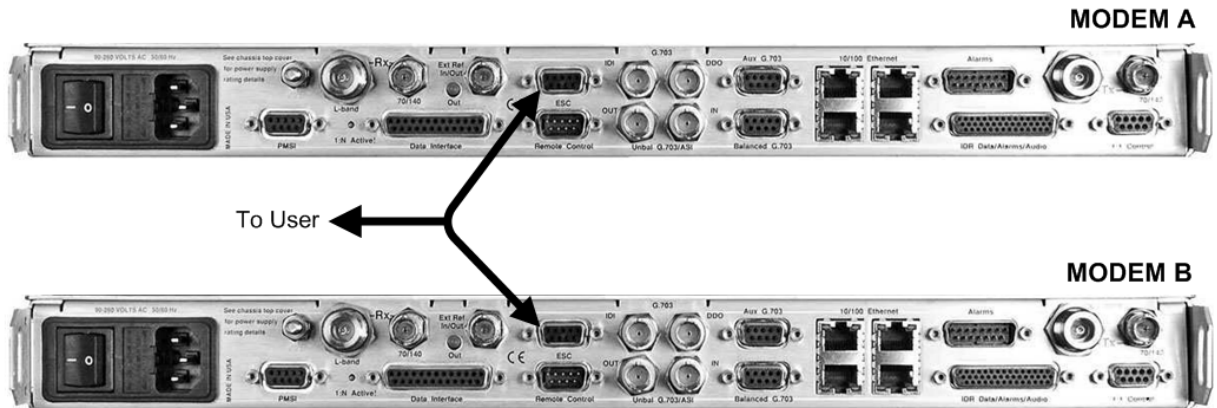


Figure 4-9. CDM-625 Overhead 1:1 Example

### 4.2.3.8 Engineering Service Channel (ESC) Interface Example

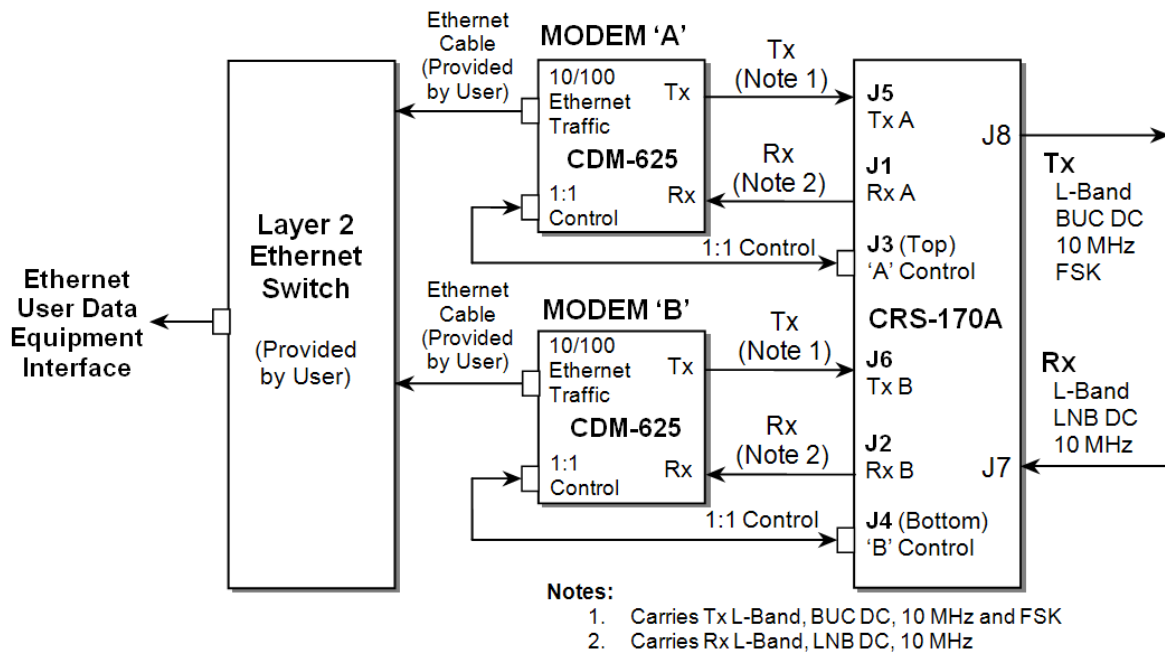


QTY	Part No.	Description
1	CA-0000071	Cable – 1:1 'Y' Splitter, (2X) DB-9M → DB-9F, 8"

Figure 4-10. CDM-625 ESC 1:1 Example

### 4.2.3.9 10/100 Ethernet Interface Example

**Figure 4-11** shows a block diagram and cabling example of a CDM-625 1:1 modem configuration using the 10/100 Ethernet interface. Direct connection is made via a *single* RJ-45 port using a customer-supplied Ethernet cable, so no cables or kit is required.



CDM-625 Block Diagram: 10/100 Ethernet Interface

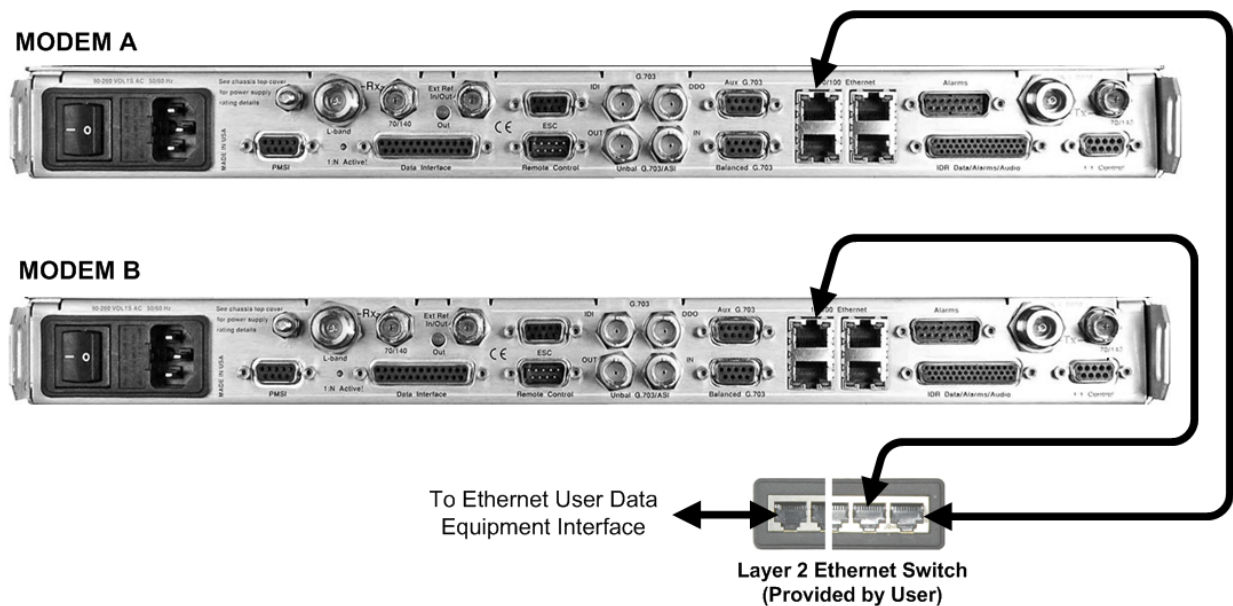


Figure 4-11. CDM-625 10/100 Ethernet 1:1 Example

### 4.2.3.10 PMSI Interface Example

The **Pre-Mapped Symbol Interface (PMSI)** is a function associated with DoubleTalk® Carrier-in-Carrier® (CnC) that permits the modulator in a selected unit to provide a direct copy of its output (the outbound interferer) to the offline modem in a 1:1 pair. The offline modem will then take the PMSI signal and use it for its own CnC reference. The PMSI is an RS-485 point-to-point bus system where one device transmits, and the other device on the bus is configured to receive.

Refer to **Figure 4-12** to connect and secure the PMSI Cable CA-0000135 (2X DB-9M, 1') between the Redundant Modem and Traffic Modem *using CnC*.



**The CA-0000135 cable bypasses the CRS-170A 1:1 Redundancy Switch.**

If CnC is utilized with a CDM-625 1:1 pair, before any switch configurations can be made, specific configuration steps must be taken with each CDM-625 to ensure proper operation of the pair within a configured CRS-170A 1:1 Redundancy System. Refer to **Chapter 3. MODEM AND SWITCH CONFIGURATION** for pertinent instructions.



QTY	Part No.	Description
1	CA-0000135	Data Cable – Shielded, PMSI, DB-9M, 1'

**Figure 4-12. CDM-625 PMSI 1:1 Example**

## 4.3 Cabling to the CDM-570L

Examples for connecting a pair of CDM-570L modems together with the CRS-170A are provided in this section. To enable 1:1 operation, refer to **Chapter 3. MODEM AND SWITCH CONFIGURATION** in this manual and the **CDM-570/570L Satellite Modem Installation and Operation Manual**.

### 4.3.1 CRS-170 → CDM-570 1:1 Redundancy Kit KT/10860-1

The following table provides a reference as to how the items provided in Redundancy Kit KT/10860-1 are utilized with all possible CDM-570L data interface configurations:

Kit KT/10860-1 CRS-170A → CDM-570L 1:1 Redundancy – Interface Cabling Reference				
Qty/Kit (REF)	Part No.	Description	Used For	Ch. 3 Fig
1	PL/10129-1	CRS-170A Switch – Top Assembly	1:1 Redundancy	3-13
4	CA/6357-4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	Modem → Switch IF Interface	3-13
2	CA/WR9378-4	Control Cable – Universal, DB-9M → DB-9M, 4'	Modem → Switch Control	3-13
1	CA/RB10461-1	Cable – 1:1 Y-Splitter, (2X) DB-25M → DB-25F	RS-422/232 Interface	3-15
1	CA/WR10522-1	Cable – 1:1 Y-Splitter, (2X) DB-15M → DB-15F	G.703 Balanced	3-16
1	KT/10553-1	G.703 Unbalanced Interface Kit containing: (Qty 4) CA/BNC75OHM Cable – IF BNC, 1' (Qty 2) CN/BNC-Tee-JPJ T-Adapter, 50Ω BNC	G.703 Unbalanced	3-17

### 4.3.2 Basic Modem-to-Switch Connection

**Figure 4-13** shows how to connect a pair of CDM-570L modems together with the CRS-170A L-Band 1:1 Redundancy Switch module; the accompanying table lists the cable assemblies provided in KT/10860-1 for this initial setup.

It is essential to ensure that the control and IF connections, both Rx and Tx, are made correctly. For the available CDM-570L modem data interface configurations, refer to **Sect. 4.3.3** in this chapter.

**EXAMPLE:** The Tx IF from 'Modem A' connects to the Tx IF port 'Tx A' on the CRS-170A; similarly, the Tx IF from 'Modem B' connects to the Tx IF port 'Tx B' on the CRS-170A.

**The same logic applies for the Rx IF connections. Failure to observe this requirement will result in system malfunction.**



IMPORTANT

**When connecting the Control cable between the CRS-170A and the modems, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.**

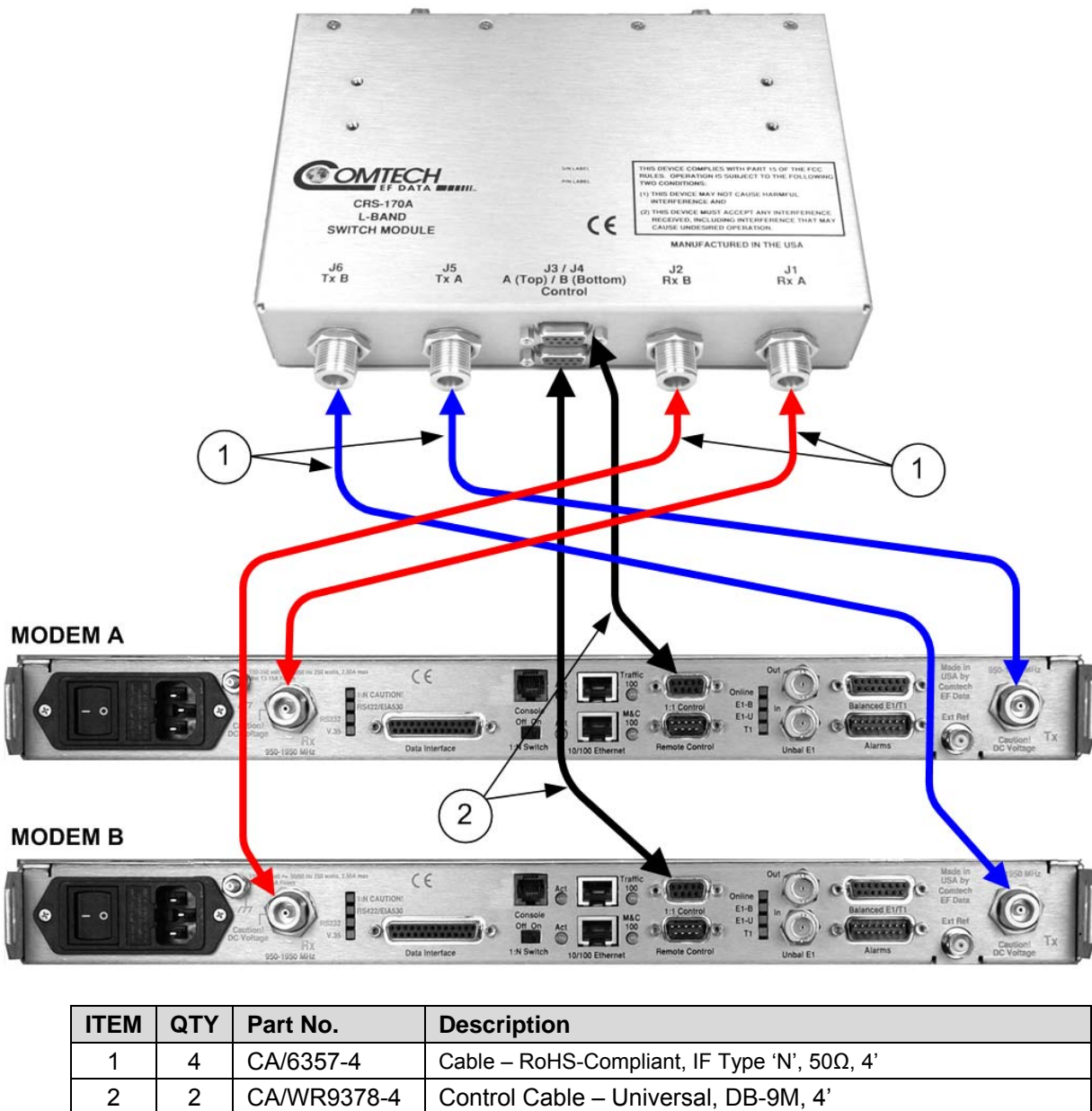
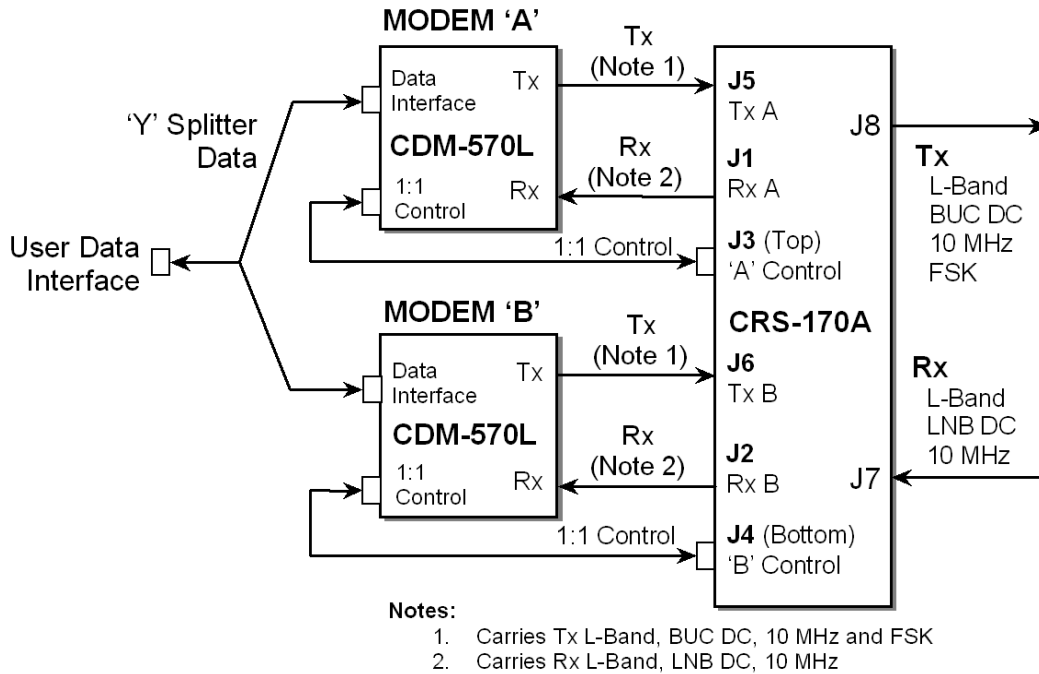


Figure 4-13. CDM-570L Basic Modem-to-Switch Connection

### 4.3.3 Data Interface Connection

In addition to the basic switch-to-modem cabling shown previously, there are a number of data interface configurations available with the CDM-570L. The block diagram shown in **Figure 4-14** is typical for the examples shown in **Sects. 4.3.3.1** through **4.3.3.3**.

With the exception of the 10/100 Ethernet interface configuration shown in **Sect. 4.3.3.4** – where customer-supplied cables are utilized – one cable/component set (see examples for specified quantities) per 1:1 modem pair is required per user interface.



**Figure 4-14. CDM-570L Block Diagram: User → Modem → Switch → Traffic**

**Note:** Unless otherwise specified, the interface cables and components identified in each of the following examples are provided in the CDM-570L Redundancy Kit KT/10860-1 (See **Sect. 4.3.1**).

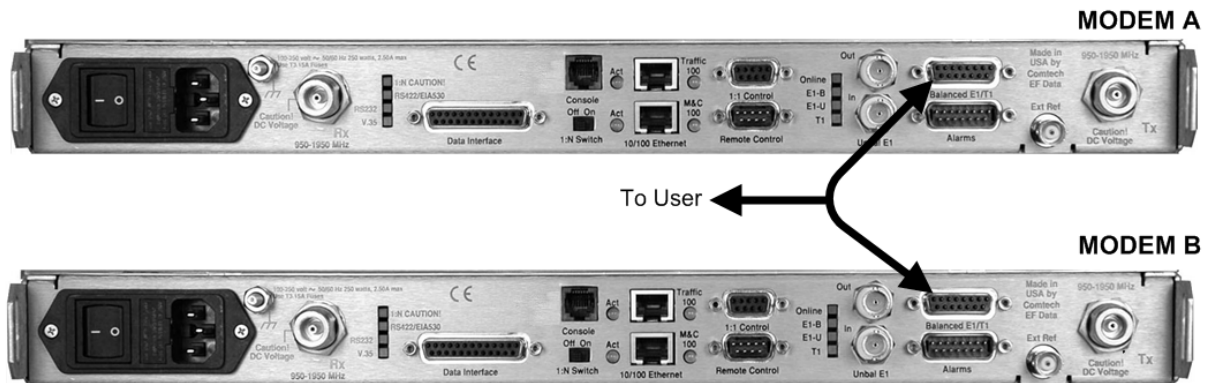
### 4.3.3.1 RS-422/232 Interface Example



QTY	Part No.	Description
1	CA/RB10461-1	Cable – 1:1 'Y' Splitter, (2X) DB-25M → DB-25F

**Figure 4-15. CDM-570L RS-422/232 1:1 Example**

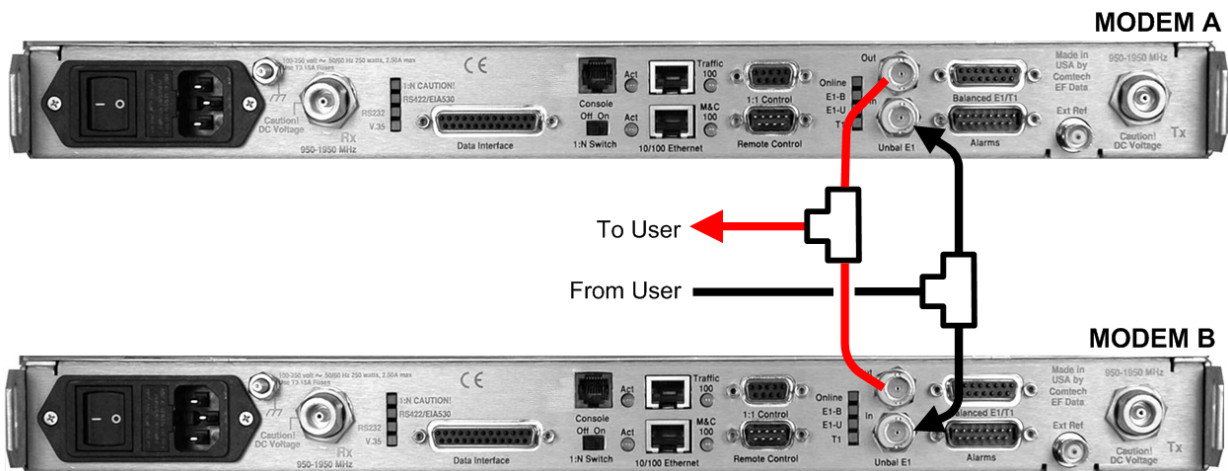
### 4.3.3.2 G.703 Balanced Interface Example



QTY	Part No.	Description
1	CA/WR10522-1	Cable – 1:1 'Y' Splitter, (2X) DB-15M → DB-15F

Figure 4-16. CDM-570L G.703 Balanced 1:1 Example

### 4.3.3.3 G.703 Unbalanced Interface Example



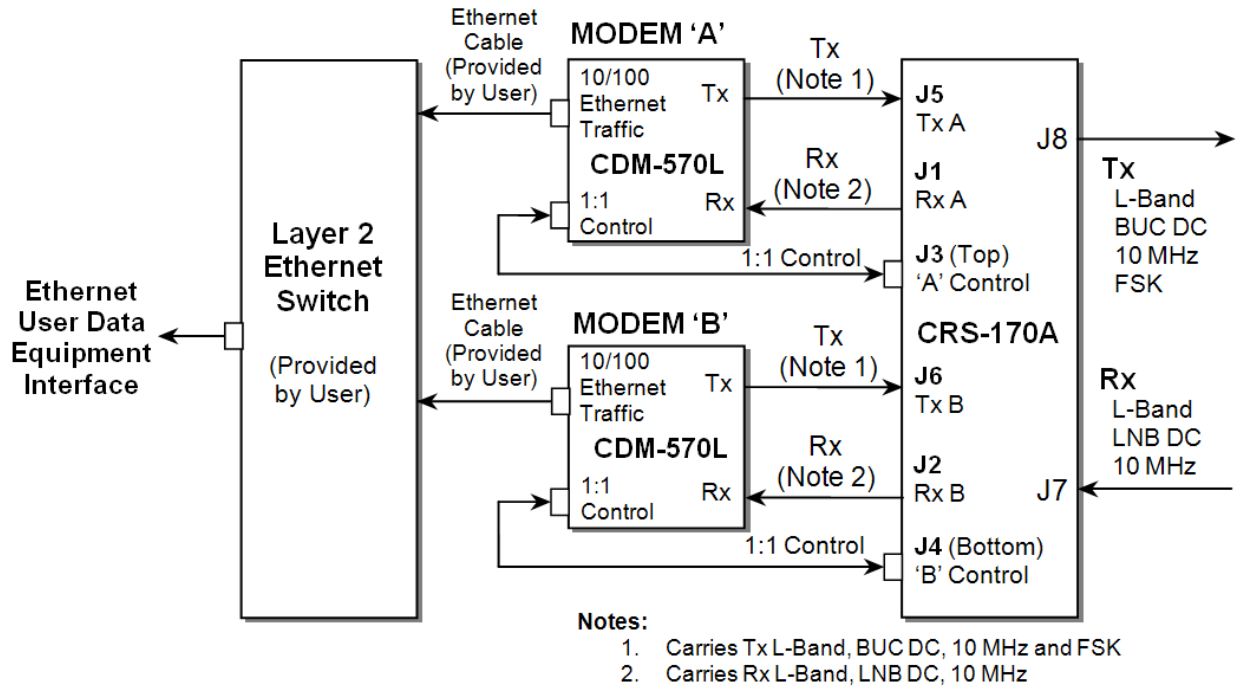
G.703 Unbalanced 1:1 Interface Kit KT/10553-1		
QTY	Part No.	Description
4	CA/BNC75OHM	Cable – IF BNC, 1'
2	CN/BNC-TEE-JPJ	T-Adapter, 50Ω BNC

Figure 4-17. CDM-570L G.703 Unbalanced 1:1 Example

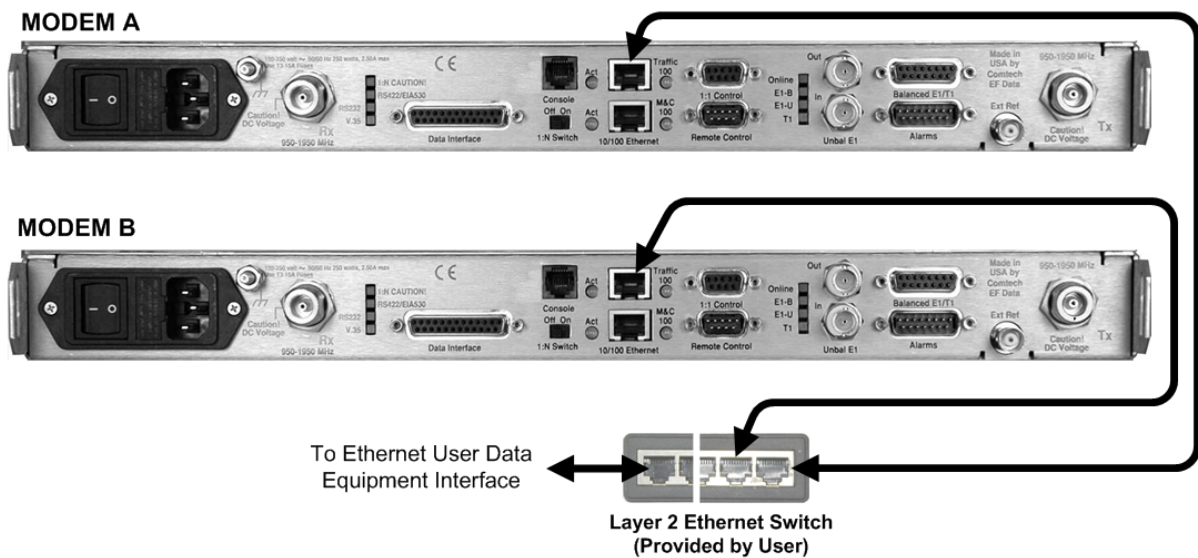


### 4.3.3.4 10/100 Ethernet Interface Example

**Figure 4-18** shows a block diagram and cabling example of a CDM-570L 1:1 modem configuration using the 10/100 Ethernet interface. Customer-supplied Ethernet cables are connected directly to the connectors, so no cables or kit is required.



**CDM-570L Block Diagram: 10/100 Ethernet Interface**



**Figure 4-18. CDM-570L 10/100 Ethernet 1:1 Example**

**Notes:**

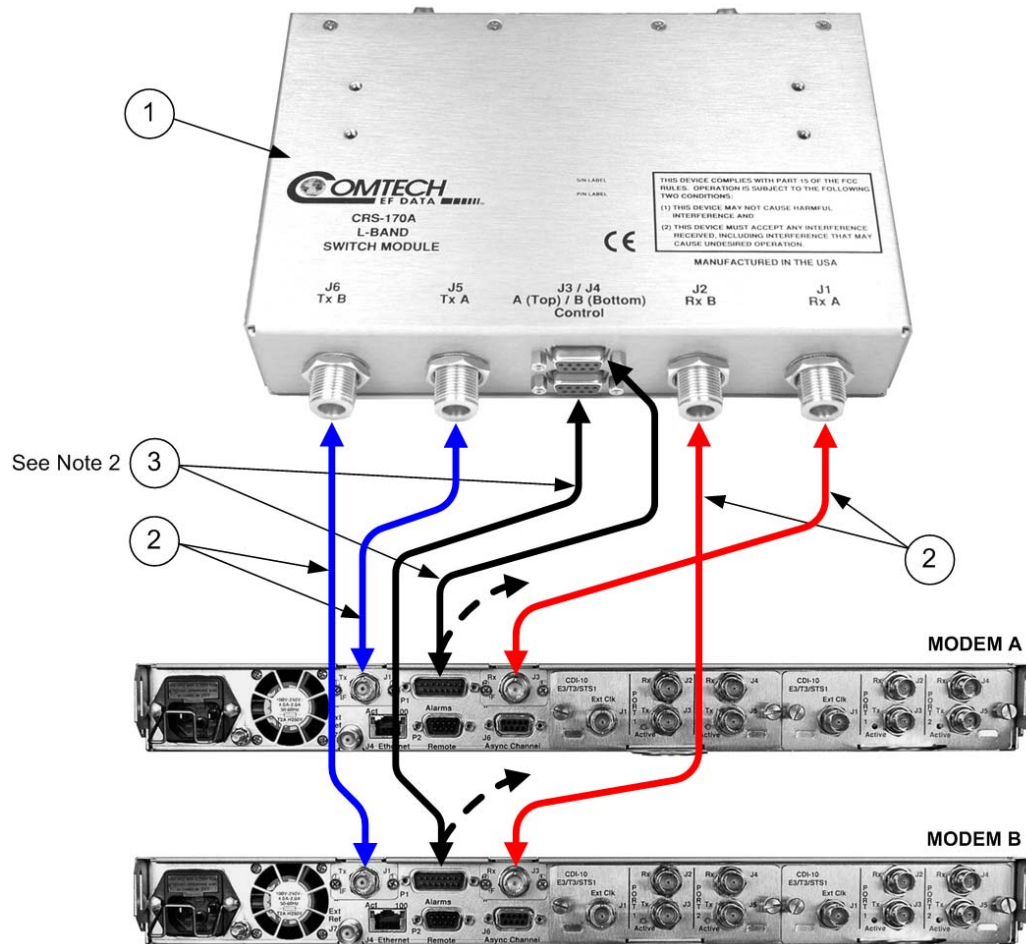
Lined area for notes consisting of 24 horizontal lines.

## 4.4 Cabling to the CDM-700

Examples for connecting a pair of CDM-700 modems together with the CRS-170A are provided in this section. To enable 1:1 operation, refer to **Chapter 3. MODEM AND SWITCH CONFIGURATION** in this manual and the **CDM-700 Satellite Modem Installation and Operation Manual**.

### 4.4.1 Basic Modem-to-Switch Connection

**Figure 4-19** shows the basic connection for the CDM-700 to the CRS-170A Switch. All IF and Control components are provided in the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (data interface components/kits must be ordered separately):



KT/12551 CRS-170A L-Band 1:1 Redundancy Kit			
Item #	QTY	Part No.	Description
1	1	PL/10129-1	CRS-170A Switch – Top Assembly
2	4	CA/6357-4	Cable – RoHS-Compliant, L-Band Type 'N', 4'
3	2	CA/WR12135-1 (Note 2)	Cable Assy – RoHS-Compliant, Control Adapter

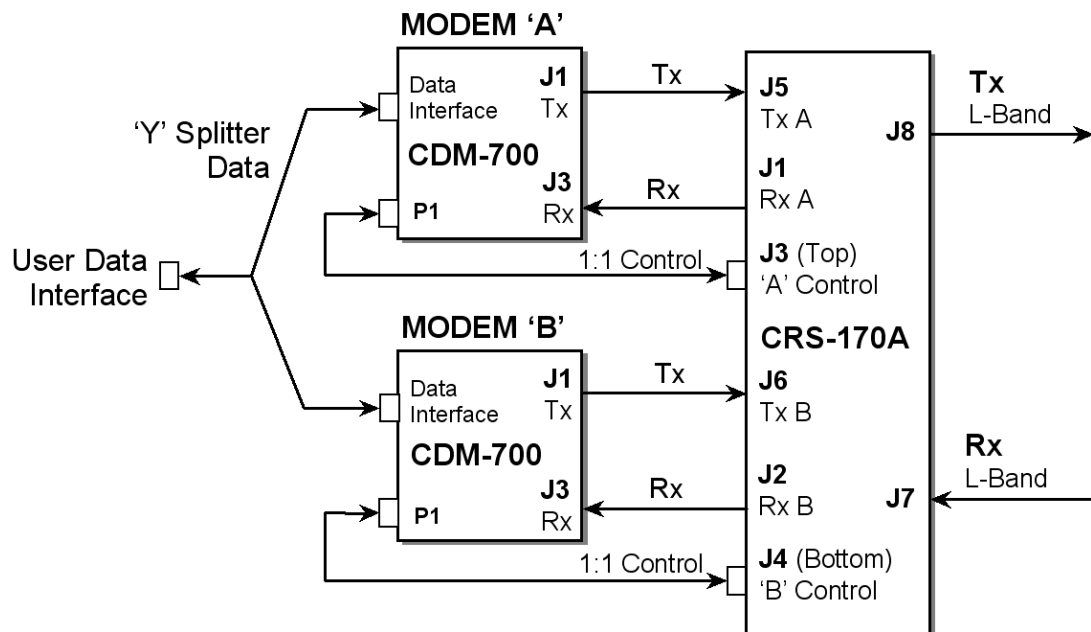
**Figure 4-19. CDM-700 Basic Modem-to-Switch Connection – KT/12551**

**Connection Notes:**

1. Separate data interface kits are needed for the data interfaces. Refer to the **CDM-700 Satellite Modem Installation and Operation Manual** for allowable data interface card combinations. **Sects. 4.4.2.1** through **4.4.2.3** identify the interface kits used for each interface type.
2. To provide user access to modem “Fault Summary Relay,” Control ‘Y’ Cable CA/WR13011-4, sold separately, is available for use in place of the CA/WR12135-1 cable. See **Appendix A. CABLE DRAWINGS** for detailed information about this optional cable assembly.

**4.4.2 Data Interface Kits and Examples**

In addition to the basic switch-to-modem cabling shown in the previous section, there are a number of data interface configurations available for use with the CDM-700.

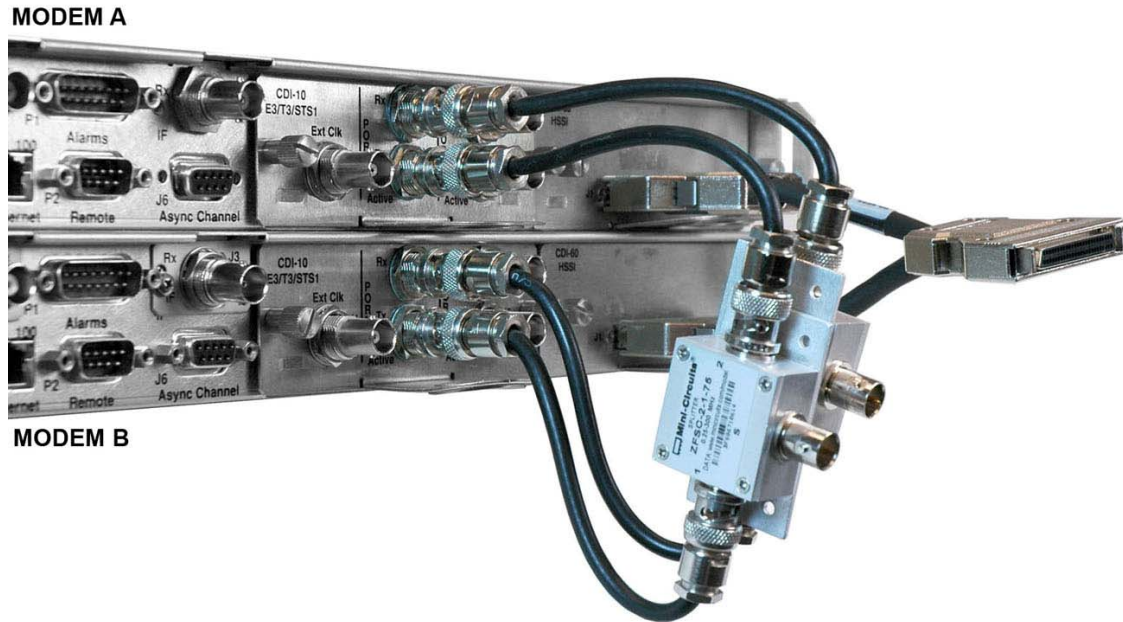


**Figure 4-20. CDM-700 Block Diagram: User → Modem → Switch → Traffic**

**Figure 4-20** shows a block diagram typical for the kits shown in **Sects. 4.4.2.1** through **4.4.2.3**. The kits featured in this section can be supplied with the CRS-170A for use with the CDM-700. With the exception of the Gigabit Ethernet interface configuration shown in **Sect. 4.4.2.4** – where customer-supplied cables are utilized – one interface kit per 1:1 modem pair is required per interface card.

#### 4.4.2.1 KT/12582 G.703 E3/T3/STS-1 75Ω (CDI-10) and KT/12586 HSSI (CDI-60) Interface Kits

**Figure 4-21** shows an example of a CDM-700 1:1 modem configuration with G.703 in Slot 1 and HSSI in Slot 2. The figure depicts installation of one KT/12582 G.703 Interface Kit (each kit can supply one or two CDI-10 interfaces), and one KT/12586 HSSI Interface Kit.



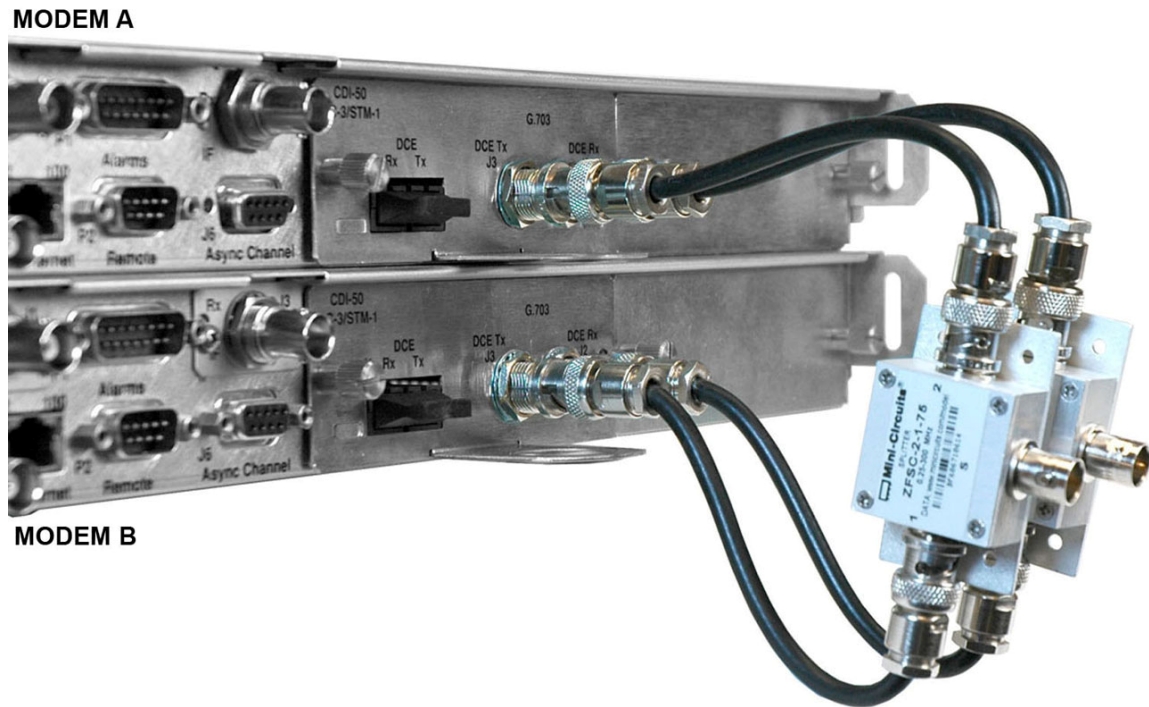
KT/12582 G.703 (CDI-10) 75Ω Interface Kit		
QTY	Part No.	Description
8	CA/BNC75OHM	Cable – IF BNC, 75Ω, 1’
4	RF/SA32KC-IN/OUT	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

KT/12586 HSSI (CDI-60) Interface Kit		
QTY	Part No.	Description
1	PP/SC3523	Cable - RoHS-Compliant, HSSI ‘Y’ Splitter, (2X) HD-50M → HD-50F, 3”

**Figure 4-21. CDM-700 G.703 E3/T3/STS-1 / HSSI 1:1 Example**

#### 4.4.2.2 KT/12583 155MB Copper (CDI-50) Interface Kit

**Figure 4-22** shows an example of a CDM-700 1:1 modem configuration with a 155MB Copper interface in Slot 1 (only) and Slot 2 empty. The figure depicts installation of one KT/12583 155MB Copper Interface Kit – each kit can supply one or two CDI-50 interfaces.



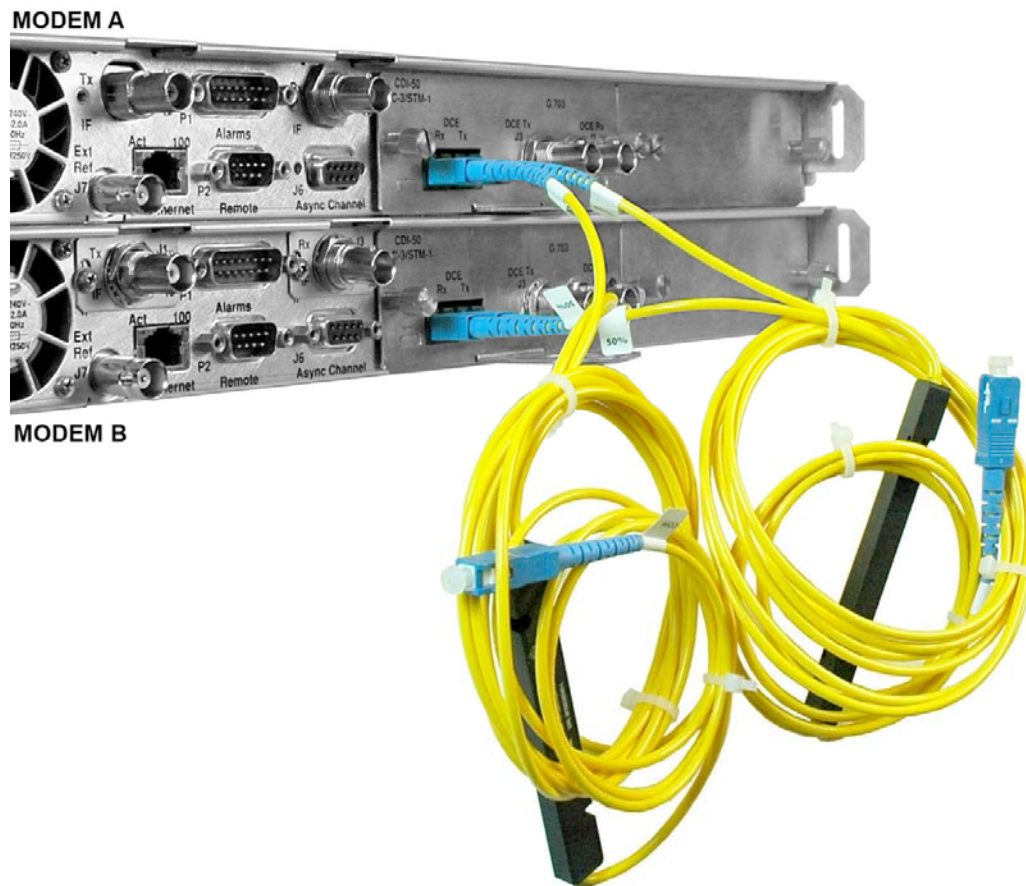
KT/12583 155MB Copper (CDI-50) Interface Kit		
QTY	Part No.	Description
4	CA/BNC75OHM	Cable – IF BNC, 75Ω, 1'
2	RF/SA32KC-IN/OUT	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

**Figure 4-22. CDM-700 155MB Copper 1:1 Example**

### 4.4.2.3 OC-3 (CDI-50) Interface Kits: KT/12585 (Single-Mode) or KT/12584 (Multi-Mode)

**Figure 4-23** depicts a CDM-700 1:1 modem configuration with installation of one KT/12585 OC-3 Single-Mode Interface Kit in Slot 1 (only) and Slot 2 empty.

Multi-Mode configurations use the KT/12584 OC-3 Multi-Mode Interface kit. Mode configuration is easily distinguished by the color of the cables included in the kit; for Single-Mode configurations, yellow cabling is used as shown in **Figure 4-23**, whereas a Multi-Mode configuration (not shown) features orange cabling.



KT/12585 OC-3 Single-Mode (CDI-50) Interface Kit		
QTY	Part No.	Description
2	PP/CPS2A12501	Cable Assy – RoHS-Compliant, Optical Coupler, SC/UPC Connectors

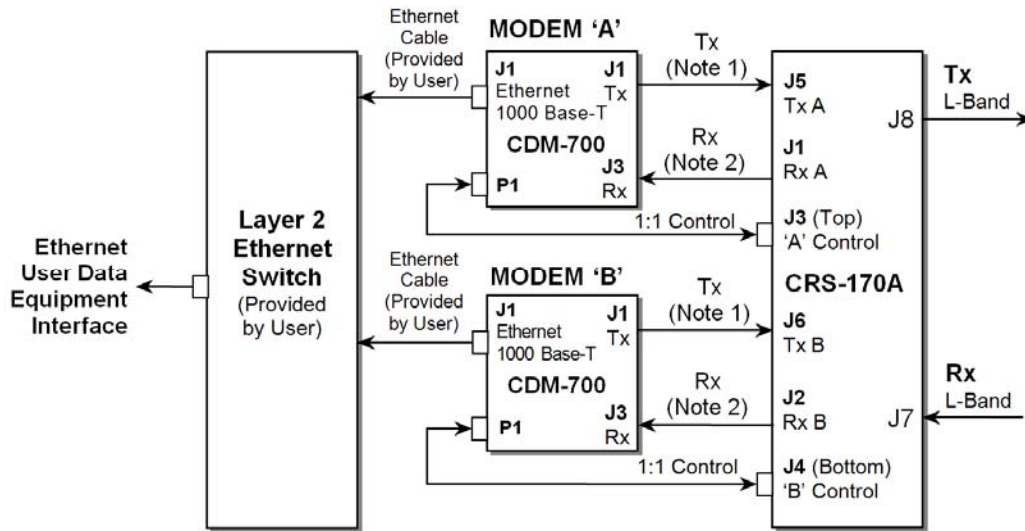
OR

KT/12584 OC-3 Multi-Mode (CDI-50) Interface Kit		
QTY	Part No.	Description
2	PP/CPM6A1250	Cable Assy – RoHS-Compliant, Optical Coupler, SC/UPC Connectors

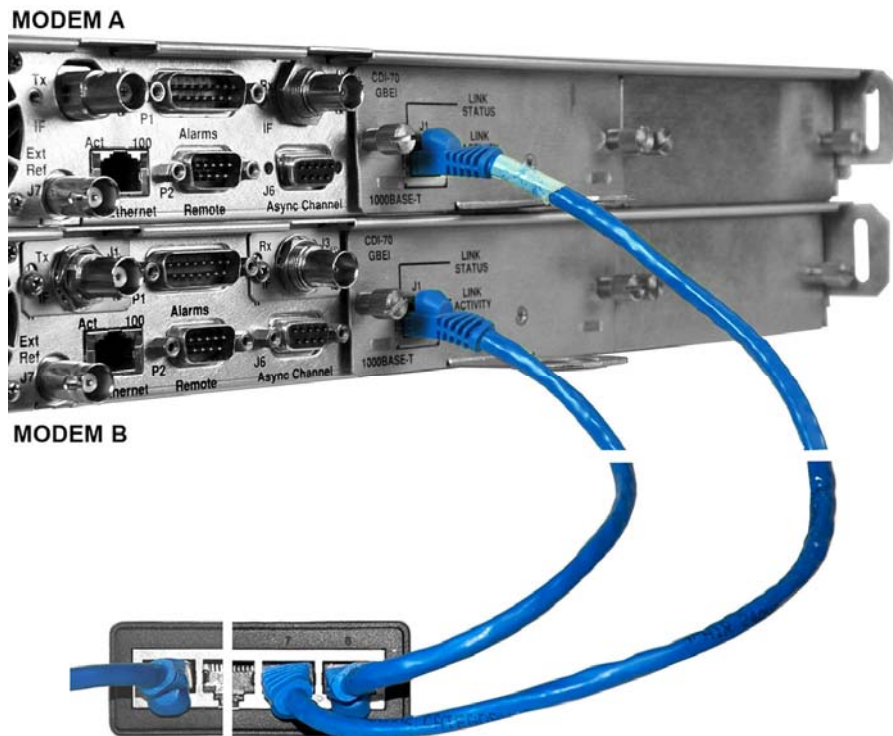
**Figure 4-23. CDM-700 OC-3 1:1 Example (Single-Mode shown)**

#### 4.4.2.4 Gigabit Ethernet Interface (CDI-70)

**Figure 4-24** shows an example of a CDM-700 1:1 modem configuration with Gigabit Ethernet (also referred to as GigE or GbE) interface in Slot 1 and Slot 2 empty. Customer-supplied Ethernet cables are connected directly to the GigE interface, so no kit is required.



**CDM-700 Block Diagram: Gigabit Ethernet (GigE) Interface**



**Figure 4-24. CDM-700 Gigabit Ethernet (GigE) 1:1 Example**

For further information, see the white paper “Bridged Ethernet Interface Redundancy,” available for download from Comtech EF Data’s Web site ([www.comtechefdata.com](http://www.comtechefdata.com)).

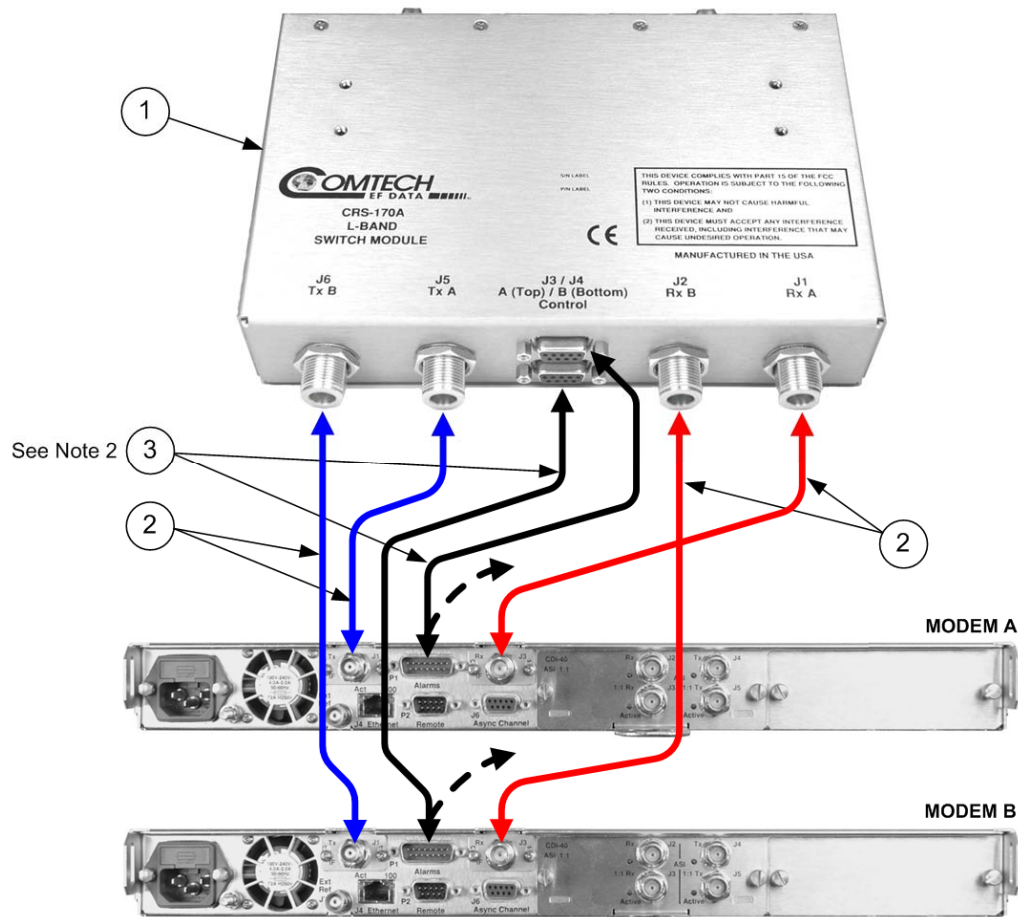


## 4.5 Cabling to the CDM-710

Examples for connecting a pair of CDM-710 modems together with the CRS-170A are provided in this section. To enable 1:1 operation, refer to **Chapter 3. MODEM AND SWITCH CONFIGURATION** in this manual and the **CDM-710 Satellite Modem Installation and Operation Manual**.

### 4.5.1 Basic Modem-to-Switch Connection

**Figure 4-25** shows the basic connection for the CDM-710 to the CRS-170A Switch. All IF & Control components are provided in the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (data interface components/kits must be ordered separately):



KT/12551 CRS-170A L-Band 1:1 Redundancy Kit			
Item #	QTY	Part No.	Description
1	1	PL/10129-1	CRS-170A Switch – Top Assembly
2	4	CA/6357-4	Cable – RoHS-Compliant, L-Band Type 'N', 4'
3	2	CA/WR12135-1 (Note 2)	Cable Assy – RoHS-Compliant, Control Adapter

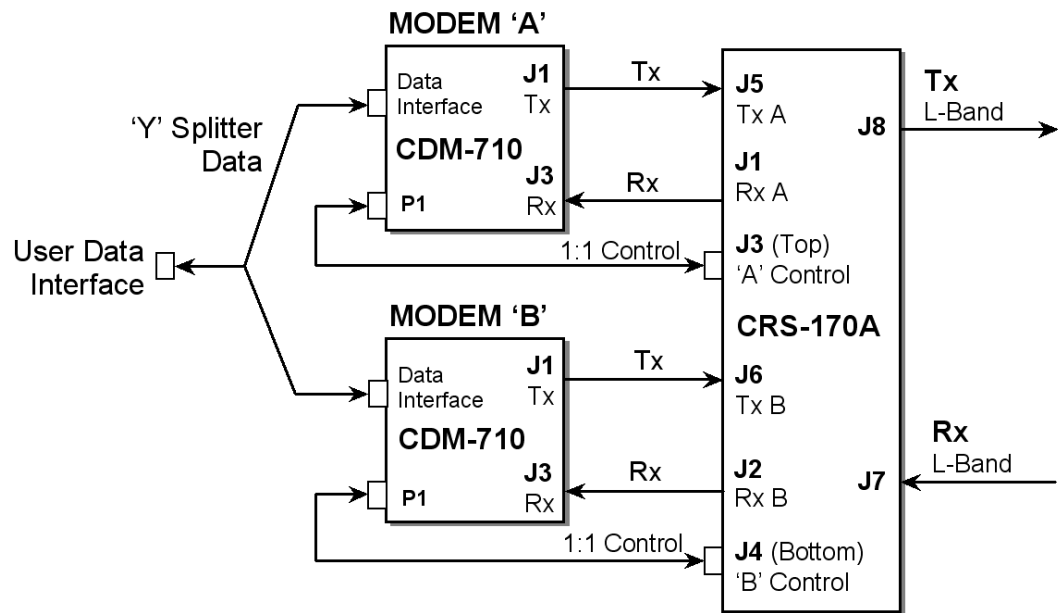
**Figure 4-25. CDM-710 Basic Modem-to-Switch Connection – KT/12551**

**Connection Notes:**

1. Refer to the **CDM-710 Broadcast Satellite Modem Installation and Operation Manual** for allowable data interface card combinations. For example, **Sect. 4.5.2.1** identifies the interface kit used for the ASI interface. Separate data interface kits are needed for the data interfaces.
2. To provide user access to modem “Fault Summary Relay,” Control ‘Y’ Cable CA/WR13011-4, sold separately, is available for use in place of the CA/WR12135-1 cable. See **Appendix A. CABLE DRAWINGS** for detailed information about this optional cable assembly.

**4.5.2 Data Interface Kits and Examples**

In addition to the basic switch-to-modem cabling shown in the previous section, there are a number of data interface configuration kits available for use with the CDM-710.



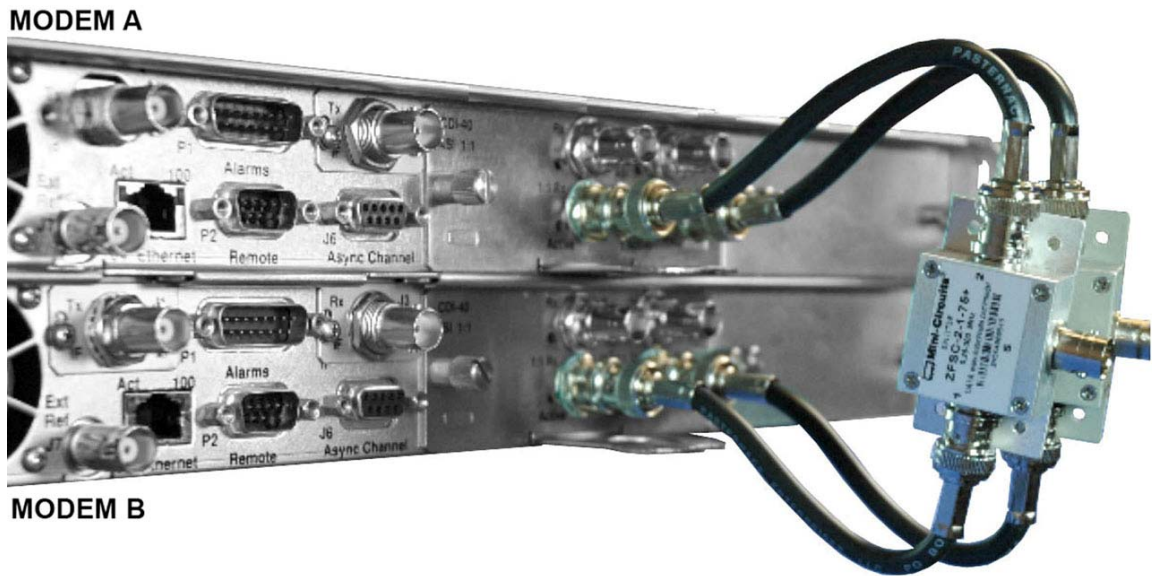
**CDM-710 Block Diagram: Gigabit Ethernet (GigE) Interface**

**Figure 4-26. CDM-710 Block Diagram: User → Modem → Switch → Traffic**

**Figure 4-26** shows a block diagram typical for the kits shown in **Sects. 4.5.2.1 and 4.5.2.2**. With the exception of the Gigabit Ethernet interface configuration shown in **Sect. 4.5.2.3** – where customer-supplied cables are utilized – one interface kit per 1:1 modem pair is required per interface card.

### 4.5.2.1 KT/12582 ASI (CDI-40) 75Ω Interface Kit

**Figure 4-27** shows an example of a CDM-710 1:1 modem configuration with ASI in Slot 1 and Slot 2 empty. The figure depicts installation of one KT/12582 ASI Interface Kit – each kit can supply one or two CDI-40 interfaces.

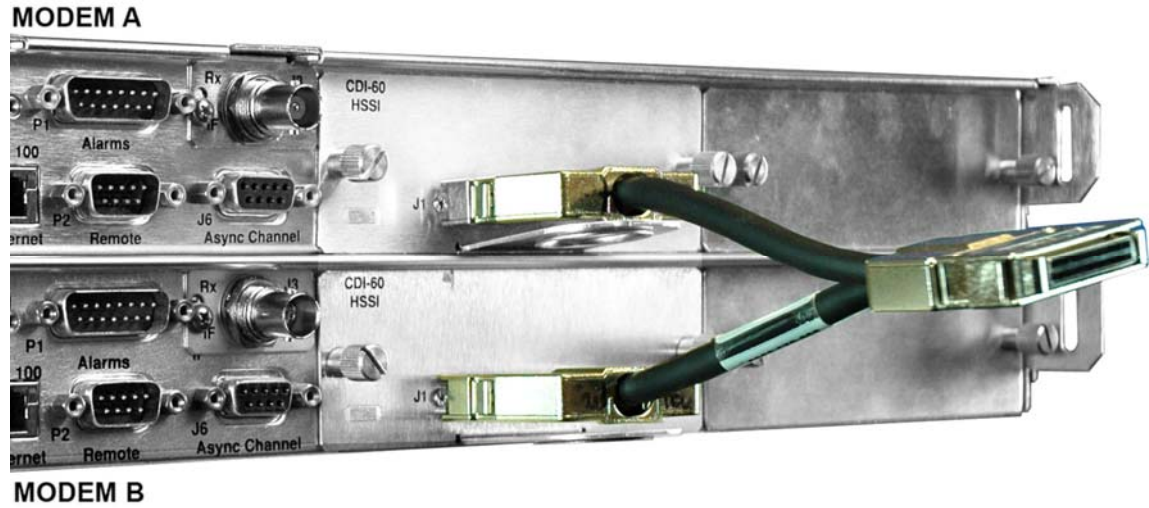


KT/12582 ASI (CDI-40) 75Ω Interface Kit		
QTY	Part No.	Description
8	CA/BNC75OHM	Cable – IF BNC, 75Ω, 1'
4	RF/SA32KC-IN/OUT	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

**Figure 4-27. CDM-710 ASI 1:1 Example**

### 4.5.2.2 KT/12586 HSSI (CDI-60) Interface Kit

**Figure 4-28** shows an example of a CDM-710 1:1 modem configuration with HSSI in Slot 1. The figure depicts installation of one KT/12578 HSSI Interface Kit.

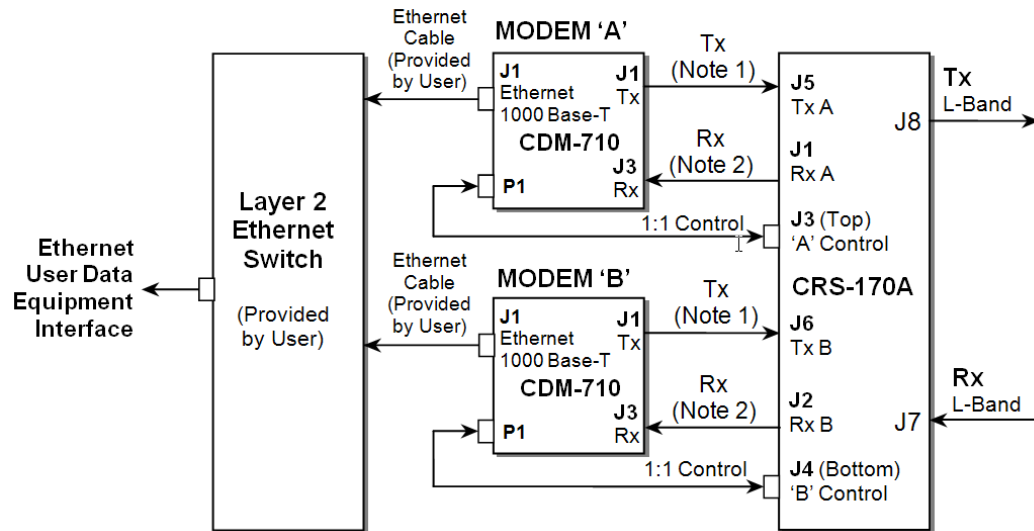


KT/12586 CDM-710 HSSI (CDI-60) Interface Kit		
QTY	Part No.	Description
1	PP/SC3523	Cable - RoHS-Compliant, HSSI 'Y' Splitter, (2X) HD-50M → HD-50F, 3"

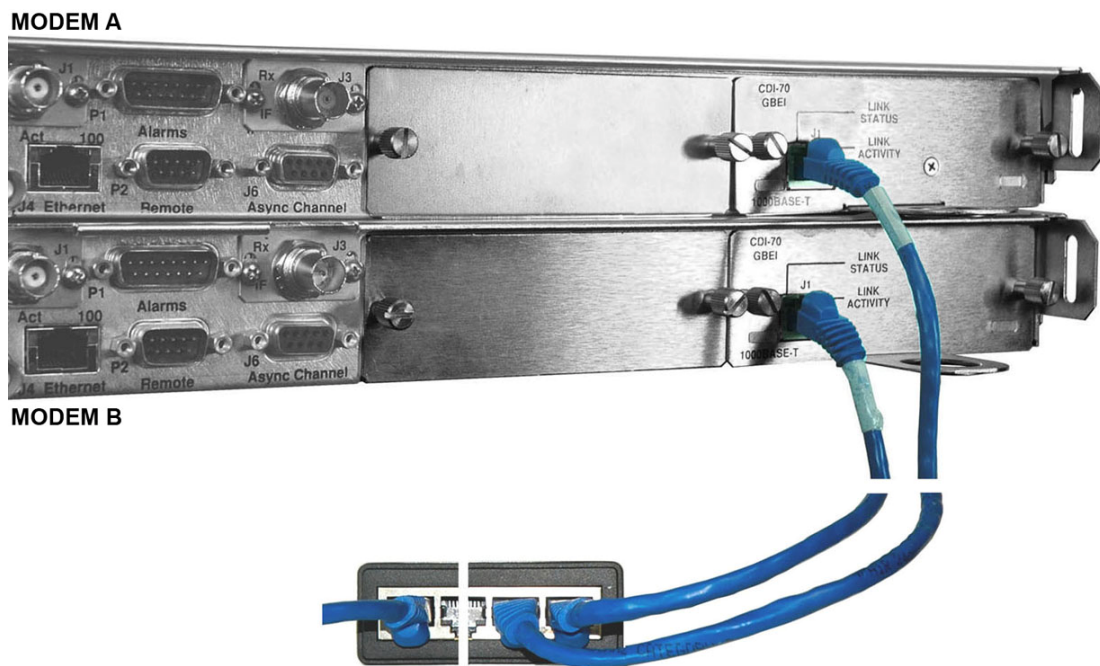
**Figure 4-28. CDM-710 HSSI 1:1 Example**

### 4.5.2.3 Gigabit Ethernet Interface (CDI-70)

**Figure 4-29** shows a block diagram and cabling example of a CDM-710 1:1 modem configuration with Gigabit Ethernet (also referred to as GigE or GbE) interface in Slot 2 and Slot 1 empty. Customer-supplied Ethernet cables are connected directly to the GigE interface, so no kit is required.



**CDM-710 Gigabit Ethernet (GigE) Interface – Block Diagram**

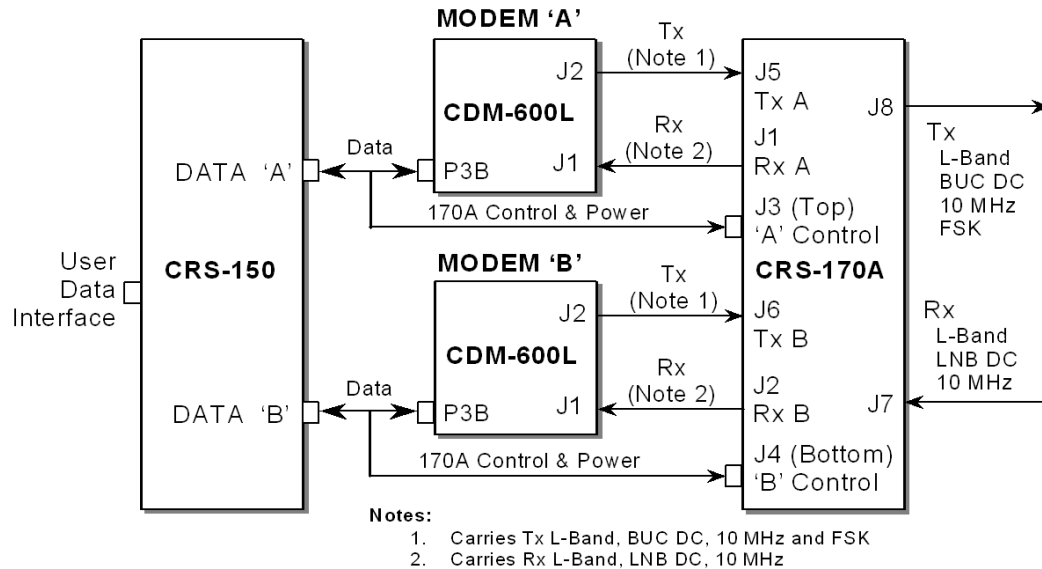


**Figure 4-29. CDM-710 Gigabit Ethernet (GigE) 1:1 Example**

For further information, see the white paper “Bridged Ethernet Interface Redundancy” available for download from Comtech EF Data’s Web site ([www.comtechefdata.com](http://www.comtechefdata.com)).

## 4.6 Cabling to the CDM-600L (CLM-9600L)

The block diagram shown in **Figure 4-30** depicts connection of a pair of CDM-600L (CLM-9600L) modems together with the CRS-150 and CRS-170A switches.



**Figure 4-30. CDM-600L (CLM-9600L) Block Diagram: Cable Connections**

The following table lists cable assemblies that may be supplied with the CRS-170A when used with the CDM-600L (CLM-9600L) and CRS-150. Other cables between the CRS-150 and the CDM-600L (CLM-9600L) modems are supplied with the CRS-150.

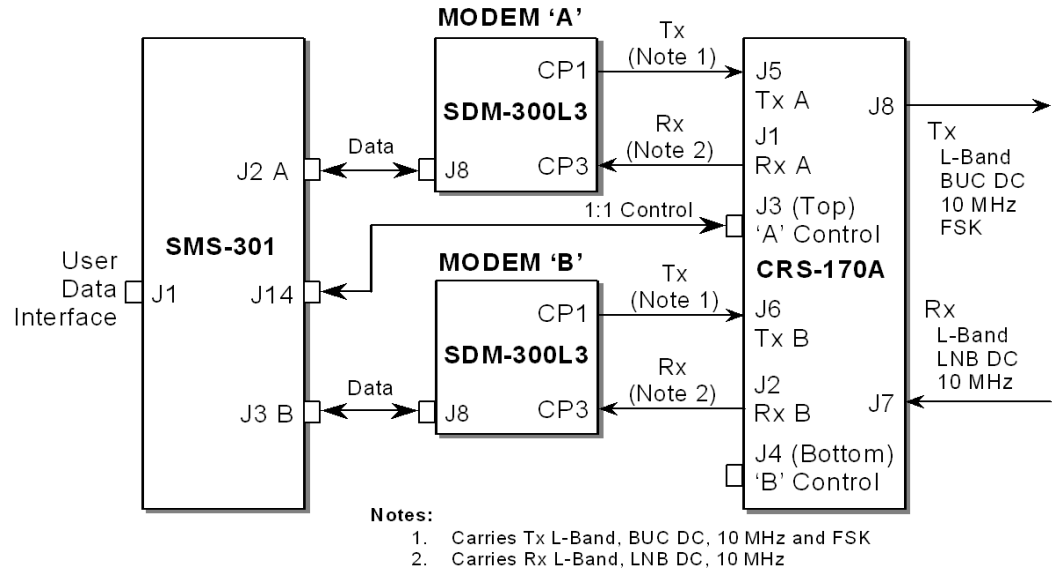
QTY	Part No.	Description
2	CA/WR10456-4	Cable – 1:1 Y-Splitter, Data/Control, DB-25M → DB-25M, 4' / DB-9M, 1'
4	CA/6357-2	Cable – RoHS-Compliant, IF Type 'N', 50Ω, 2'



**When connecting the Control cable between the CRS-170A and the modems, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental un-mating of the cable, particularly when a standby unit is being removed or replaced.**

## 4.7 Cabling to the SDM-300L3

The block diagram shown in **Figure 4-31** depicts connection of a pair of SDM-300L3 modems together with the SMS-301 and CRS-170A switches.



**Figure 4-31. SDM-300L3 Block Diagram: Cable Connection**

The following table lists cable assemblies that may be supplied with the CRS-170A when used with the SDM-300L3 and SMS-301. The other cables between the SMS-301 and the SDM-300L3 are the same cables supplied with the SMS-301 in an SDM-300A application.

QTY	Part No.	Description
1	CA/WR10163-1	Cable – Control, SMS-301 → CRS-170A, DB-15M → DB-9M, 4'
4	CA/6357-2	Cable – RoHS-Compliant, IF Type 'N', 50Ω, 2'



**When connecting the Control cable between the CRS-170A and the SMS-301, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental un-mating of the cable, particularly when a standby unit is being removed or replaced.**





# Chapter 5. CONNECTOR PINOUTS

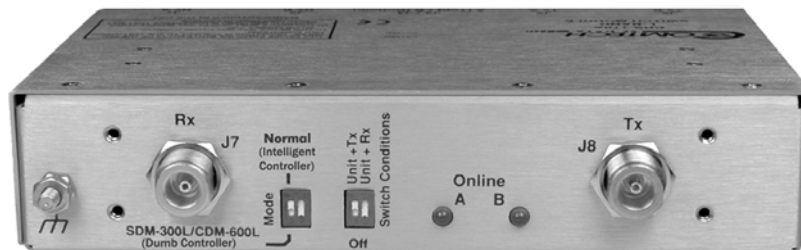
## 5.1 Overview

The CRS-170A L-Band 1:1 Redundancy Switch connectors, shown in **Figure 5-1**, provide all necessary external connections between the switch module and the specified Comtech EF Data modem.



J6 TX B    J5 TX A    J3 Control A    J2 RX B    J1 RX A  
J4 Control B

Modem Side Connectors



Antenna Side Connectors (Rev. A and later version shown)



*To maintain compliance with the European EMC Directive (EN55022, EN50082-1) properly shielded cables are required for data I/O.*

Figure 5-1. CRS-170A – Modem and Antenna Side Connectors

## 5.2 Modem Side Type 'N' Connectors



There are four 50Ω Type 'N' female connectors located on the modem side of the CRS-170A L-Band 1:1 Redundancy Switch module. Refer to Table 5-1 for details.

**Table 5-1. Modem Side Type 'N' Connectors**

Type 'N' Connector	Ref Des	Description	Direction
RX A	J1	RX-IF signal	Out
		LNB 10 MHz Ref	In
		LNB Power	In
RX B	J2	RX-IF signal	Out
		LNB 10 MHz Ref	In
		LNB Power	In
TX A	J5	TX-IF signal	In
		BUC 10 MHz Ref	In
		BUC FSK Comm.	In/Out
		BUC Power	In
TX B	J6	TX-IF signal	In
		BUC 10 MHz Ref	In
		BUC FSK Comm.	In/Out
		BUC Power	In

## 5.3 J3 Control Connector (Top) – Modem 'A', DB-9F



The Modem 'A' Control connector is a 9-pin Type 'D' female interface located on the modem side of the CRS-170A L-Band 1:1 Redundancy Switch module. Refer to Table 5-2 for pin assignments. Pins 2, 3, and 4 carry signals looped through the switch module from **Modem B** to **Modem A**, while pins 6, 7, and 8 loop the same signals from **Modem A** through to **Modem B**. The 12VDC input, which is diode OR'ed with the corresponding 12VDC input from modem B, powers the switch module.

**Table 5-2. J3 - Modem 'A' Control Connector Pin Assignments**

Pin #	Signal Function	Signal Name	Direction
1	Signal Ground	Ground	-
2	Modem B Tx Comm	AUX_SER_TX_B	Out
3	Modem B Clk Out	CLK_OUT_B	Out
4	Modem A Online	ONLINE_A	Out
5	Signal Ground	Ground	-
6	Modem A Tx Comm	AUX_SER_TX_A	In
7	Modem A Clk In	CLK_IN_A	In
8	Modem A Serial Faults	SERIAL_FAULT_A	In
9	+12 VDC	+12VDC	In

## 5.4 J4 Control Connector (Bottom) – Modem ‘B’, DB-9F

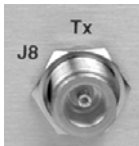


The Modem ‘B’ Control connector is a 9-pin Type ‘D’ female interface located on the modem side of the CRS-170A L-Band 1:1 Redundancy Switch module. Refer to Table 5-3 for pin assignments. Pins 2, 3, and 4 carry signals looped through the switch module from **Modem A** to **Modem B**, while pins 6, 7, and 8 loop the same signals from Modem B through to **Modem A**. The 12VDC input, which is diode OR’ed with the corresponding 12VDC input from **Modem A**, powers the switch module.

**Table 5-3. J4 - Modem ‘B’ Control Connector Pin Assignments**

Pin #	Signal Function	Signal Name	Direction
1	Signal Ground	Ground	-
2	Modem A Tx Comm	AUX_SER_TX_A	Out
3	Modem A Clk Out	CLK_OUT_A	Out
4	Modem B Online	ONLINE_B	Out
5	Signal Ground	Ground	-
6	Modem B Tx Comm	AUX_SER_TX_B	In
7	Modem B Clk In	CLK_IN_B	In
8	Modem B Serial Faults	SERIAL_FAULT_B	In
9	+12 VDC	+12VDC	In

## 5.5 Antenna Side Type ‘N’ Connectors – J7 (Rx) and J8 (Tx)



The 50Ω female Type ‘N’ connectors on the antenna side of the CRS-170A L-Band 1:1 Redundancy Switch module provide the coaxial cable connections to the outdoor receive and transmit equipment (BUC and LNB).

**Table 5-4. J7 (Rx) and J8 (Tx) Type ‘N’ Connectors**

Type ‘N’ Connector	Reference	Description	Direction
RX	J7	RF Input	In
		LNB 10 MHz Ref	Out
		LNB Power	Out
TX	J8	RF Output	Out
		BUC 10 MHz Ref	Out
		BUC FSK	In/Out
		Comm.	Out

**Notes:**

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# Appendix A. CABLE DRAWINGS

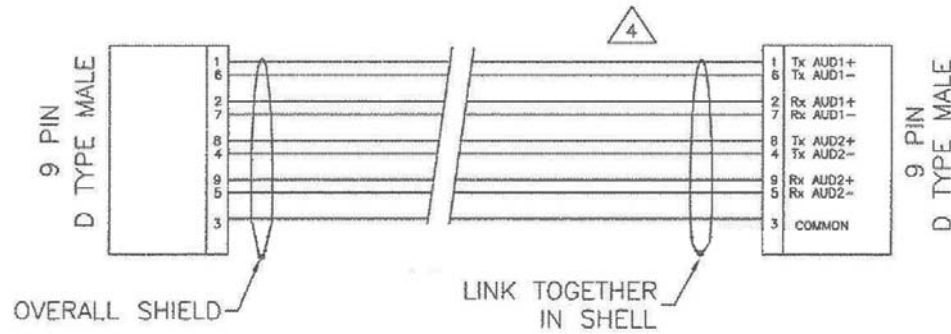
## A.1 Introduction

This appendix provides detailed information for the cables used with the CRS-170A L-Band 1:1 Redundancy Switch module. **Table A-1** shows all cables used in the system, and the accompanying figures in this section for those cables. Refer to **Chapter 4. CABLES AND CONNECTIONS** for detailed information and figures pertaining to Data Interface options.

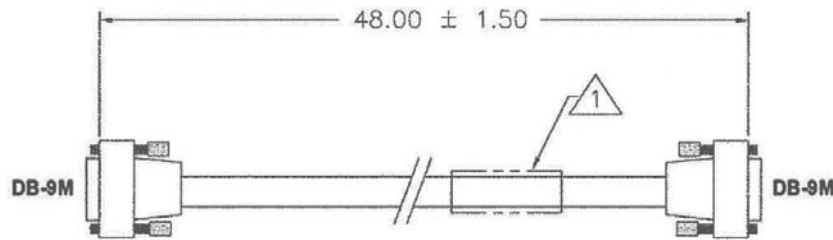
**Table A-1. CRS-170A Cables**

Fig. Num.	CEFD Part Number	Description	Length	Where Used	Modems Used
A-1	CA/WR9378-4	Control Cable, Universal, DB-9M → DB-9M	4'	Modem to CRS-170A	CDM-570/570L
A-2	CA/6357-4	L-Band Coax Cable, 50Ω (RoHS)	4'	Modem to CRS-170A [L-Band Tx (BUC DC, 10 MHz, FSK) and Rx (LNB DC, 10 MHz)]	CDM-570/570L, CDM-700, CDM-710
	CA/6357-2		2'		CDM-600L (CLM-9600L), SDM-300L3
A-3	CA/RB10461-1	Data Cable, 1:1 'Y' Splitter, (2X) DB-25M → DB-25F	4'	Modem to User	CDM-570/570L
A-4	CA/WR10522-1	G.703 Balanced 1:1 'Y' Splitter	5"	Modem to User	CDM-570/570L
A-5	CA/WR12135-1	Cable, Control Adapter (RoHS)	6'	Modem to CRS-170A	CDM-700, CDM-710
A-6	CA/WR13011-4 (optional)	Cable, Control Adapter, 'Y' Splitter DB-15F → (2X) DB-9M	4'	Modem to CRS-170A Modem to User	CDM-700, CDM-710
A-7	CA/WR10456-4	Data / Control 'Y' Cable, (2X) DB-25M → DB-9M	1'	Modem to CRS-170A and CRS-150	CDM-600L (CLM-9600L)
A-8	CA/WR10163-1	Control Cable, DB-9M → DB-15M	4'	Modem to CRS-170A and SMS-301	SDM-300L3
A-9	CA-0000071	Cable – 1:1 Y-Splitter, (2X) DB-9M → DB-9F		Modem to User	CDM-625
A-10	CA-0000163 (optional)	Cable, Adapter – Quad E1, (2X) HD-15F → DB-9M	6"	Modem to User	CDM-625
A-11	CA-0000164 (optional)	Cable, Adapter – Quad E1, (2X) RJ-48F → DB-9M	6"	Modem to User	CDM-625

### A.1.1 Modem to CRS-170A Universal Control Cable, DB-9M → DB-9M



INDICATORS		
9M	NOTES	9M
1	TO	1
2	TO	2
3	TO	3
4	TO	4
5	TO	5
6	TO	6
7	TO	7
8	TO	8
9	TO	9

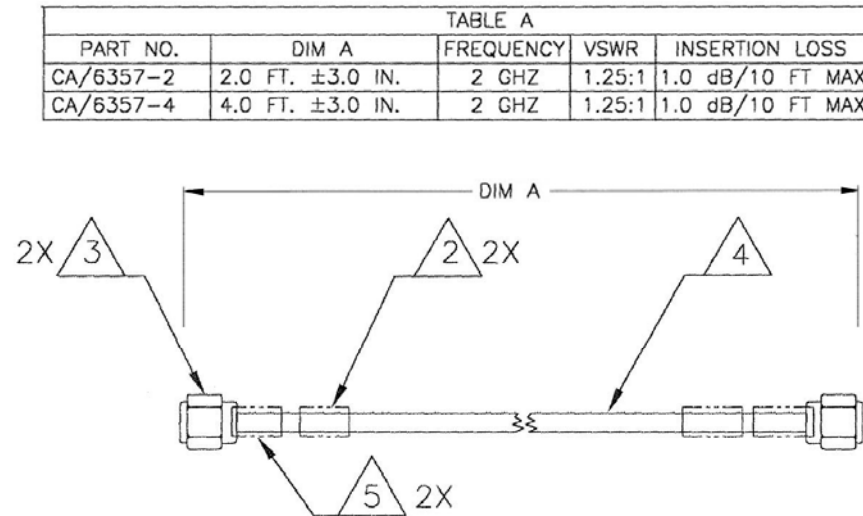


- △ 4 PAIR UP TWISTED PAIRS AS SHOWN ON DRAWING. WIRE REMAINING TWISTED PAIRS STRAIGHT THRU.
- 3. ENSURE SHIELDING FOIL AND/OR BRAID IS BONDED TO METAL BACKSHELL FOR EMI SHIELDING.
- 2. REFER TO MN/4905 FOR DETAILED INSTRUCTIONS REGARDING EMI ASSEMBLY PROCESS.
- △ 1 IDENTIFY CABLE PART NUMBER AND REV LEVEL USING LABEL OR STICKER.

NOTES: UNLESS OTHERWISE SPECIFIED:

Figure A-1. Universal Control Cable (CEFD P/N CA/WR9378-4)

### A.1.2 Modem to CRS-170A L-Band Coax Cable, 50Ω (RoHS)



6. ALL MATERIALS MUST BE RoHS COMPLIANT IN ACCORDANCE WITH DIRECTIVE 2002/95/EC.
5. ADD 2 IN. ±.25 PIECE OF ADHESIVE HEATSHRINK, RAYCHEM PART NUMBER M23053/4-203-0TAT OR APPROVED EQUIVALENT. HEATSHRINK TO BE UP TO CONNECTORS MOUNTING NUT WITHOUT INTERFERENCE.
4. CABLE: LMR-400-DB (DOUBLE SHIELDED) TIMES MICROWAVE SYSTEMS, CAGE CODE 68999. P/N 54091 OR APPROVED EQUIVALENT.
3. CONNECTOR: N TYPE MALE, TIMES MICROWAVE SYSTEMS, CAGE CODE 68999. P/N 3190-400 OR APPROVED EQUIVALENT.
2. APPLY PART NUMBER AND REVISION TO LABEL, IN .12 HIGH CHARACTERS, USING PERMANENT INK, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.
1. SEE REVISION TABLE FOR CURRENT PART NO. REVISION.

NOTES: UNLESS OTHERWISE SPECIFIED.

Figure A-2. Tx/Rx 50Ω Coax Cable (CEFD P/N CA/6357-x [See Table])

### A.1.3 Modem to User Data Cable, 1:1 'Y' Splitter, (2X) DB-25M → DB-25F

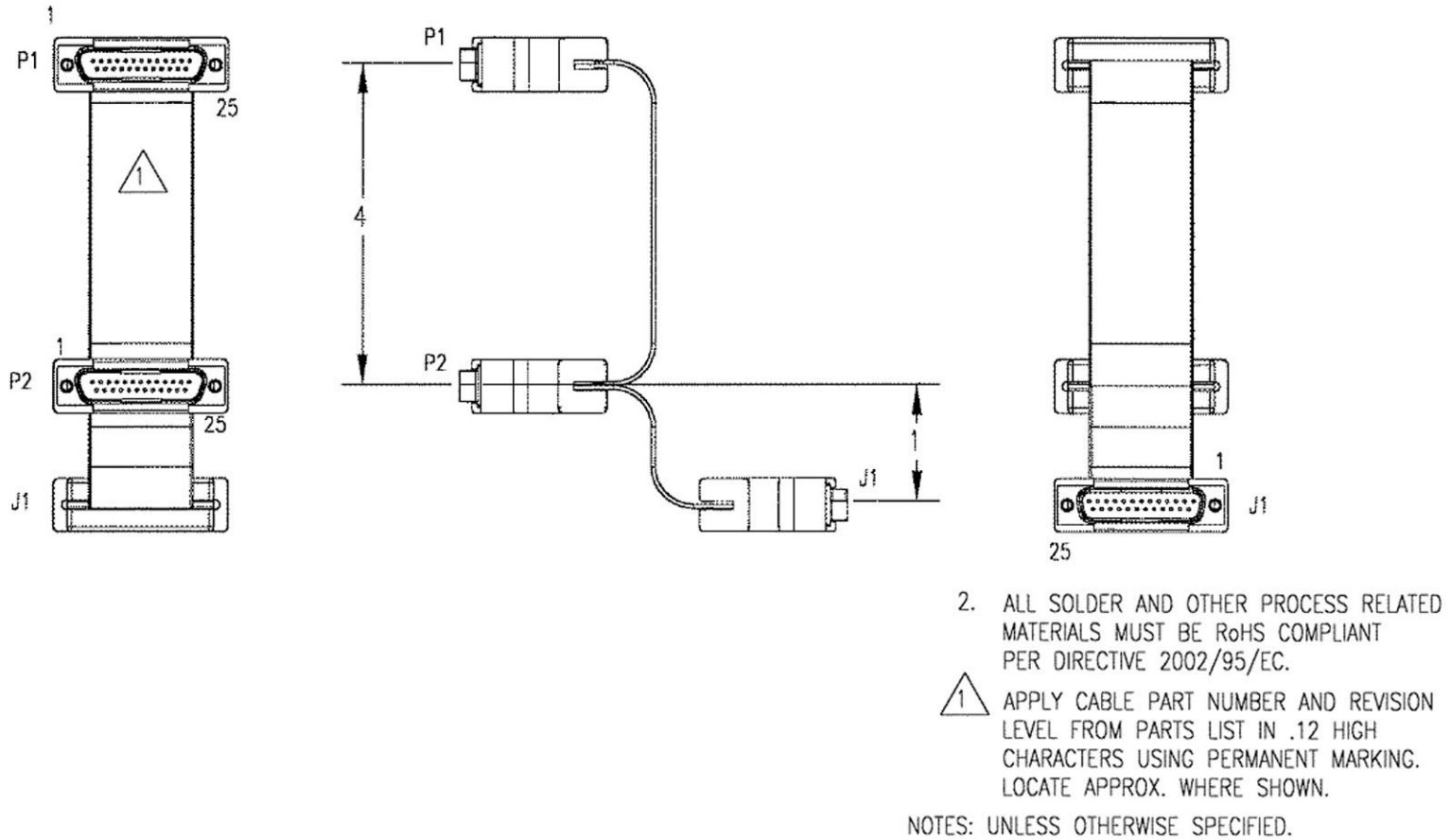
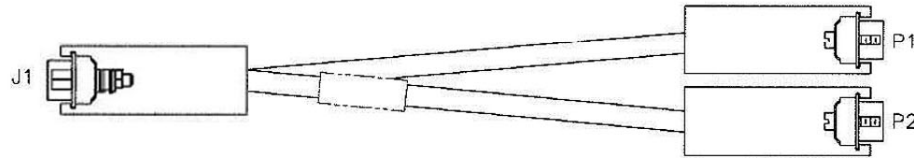
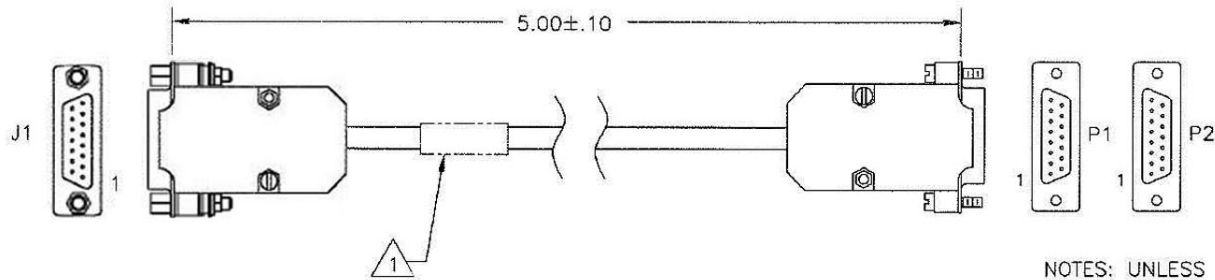


Figure A-3. 1:1 'Y' Splitter Data Cable (CEFD P/N CA/RB10461-1)



### A.1.4 Modem to User G.703 Balanced 1:1 'Y' Splitter, (2X) DB-15M → DB-15M



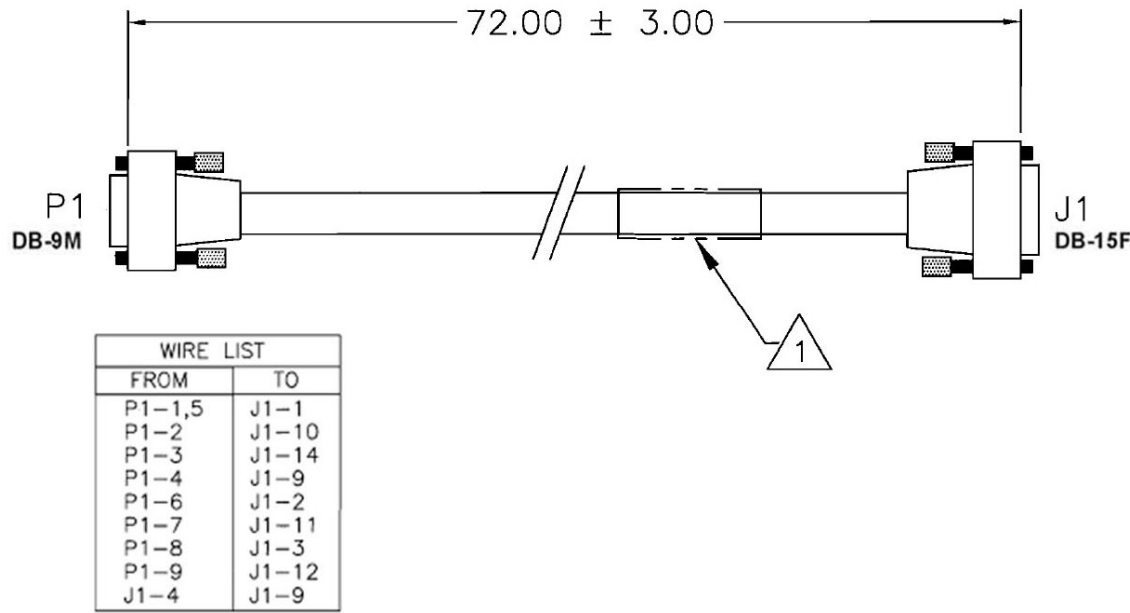
WIRE LIST				
FROM	TO	TO	SIGNAL	PAIR
J1-3	P1-3	P2-3	OUT+	X
J1-11	P1-11	P2-11	OUT-	
J1-1	P1-1	P2-1	IN+	X
J1-9	P1-9	P2-9	IN-	

NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL, ITEM 5, IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.
2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURER'S INSTALLATION PROCEDURE.
3. ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, ITEM 3, OVER EACH SOLDER JOINT. SEE DETAIL A.
4. FOLD BACK FOIL, BRAID AND DRAIN FROM CABLE, ITEM 6, OVER GROMMET AND SEAL WITH COPPER TAPE, ITEM 4, AS SHOWN IN DETAIL B.

Figure A-4. G.703 Balanced 1:1 'Y' Splitter (CEFD P/N CA/WR10522-1)

### A.1.5 Modem to CRS-170A Cable, Control Adapter (RoHS), DB-9M to DB-15F



5. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT IN ACCORDANCE WITH DIRECTIVE 2002/95/EC.
4. FOLD BACK FOIL AND BRAID FROM CABLE, ITEM 1, OVER GROMMET AND SEAL WITH COPPER TAPE, ITEM 6, AS SHOWN IN DETAIL A.
3. ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, ITEM 5, OVER EACH SOLDER JOINT. SEE DETAIL B.
2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURERS INSTALLATION PROCEDURE.
1. APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED:

Figure A-5. Control Adapter Cable (CEFD P/N CA/WR12135-1)

### A.1.6 Modem to CRS-170A / Modem to User Control Adapter ‘Y’ Splitter, (2X) DB-9M → DB-15F (Optional)

The optional CA/WR13011-4 Control Adapter ‘Y’ Splitter (sold separately) is used in replacement of the CA/WA12135-1 cable to permit User access to the Summary Fault Relay of the CDM-7x0 modems.

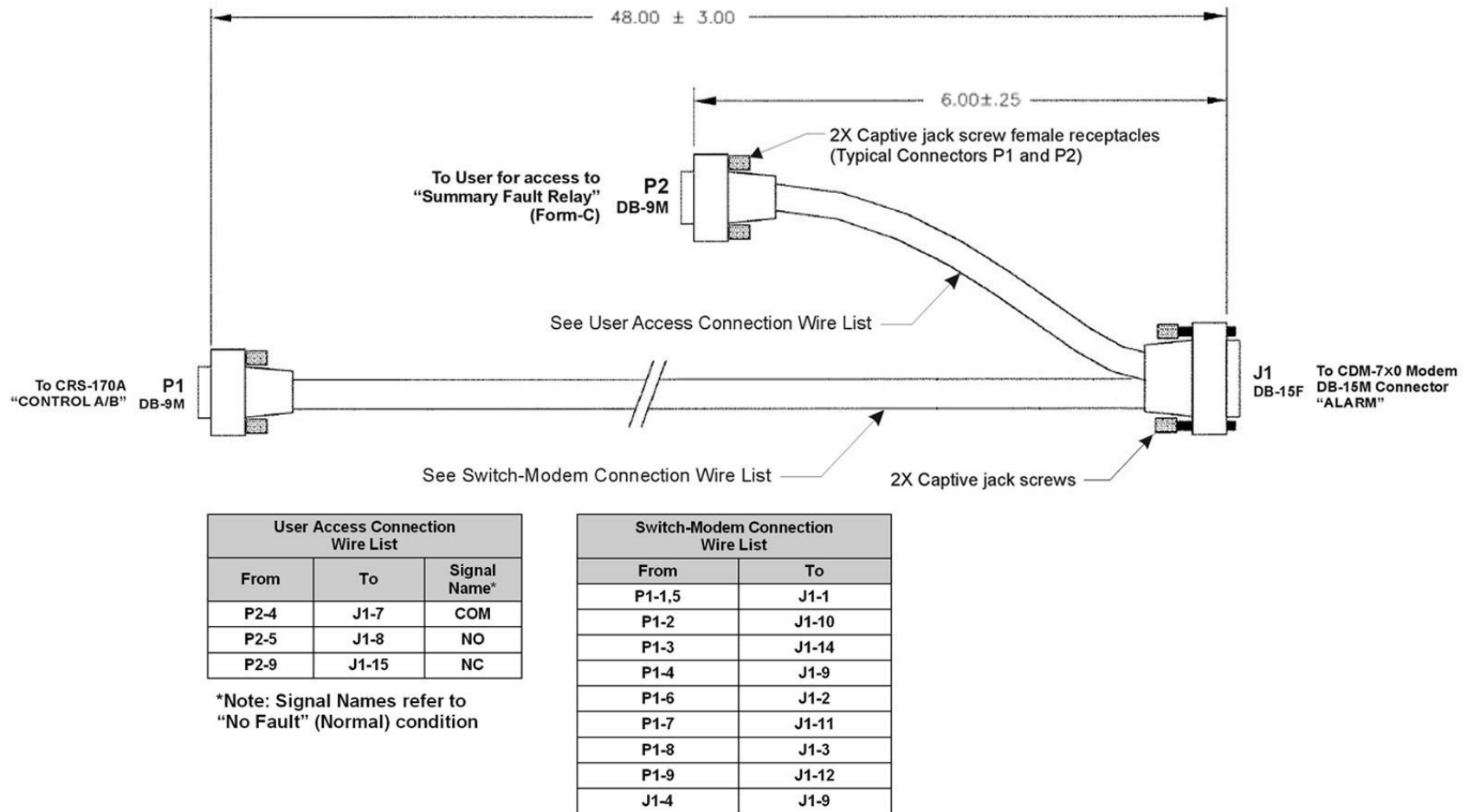
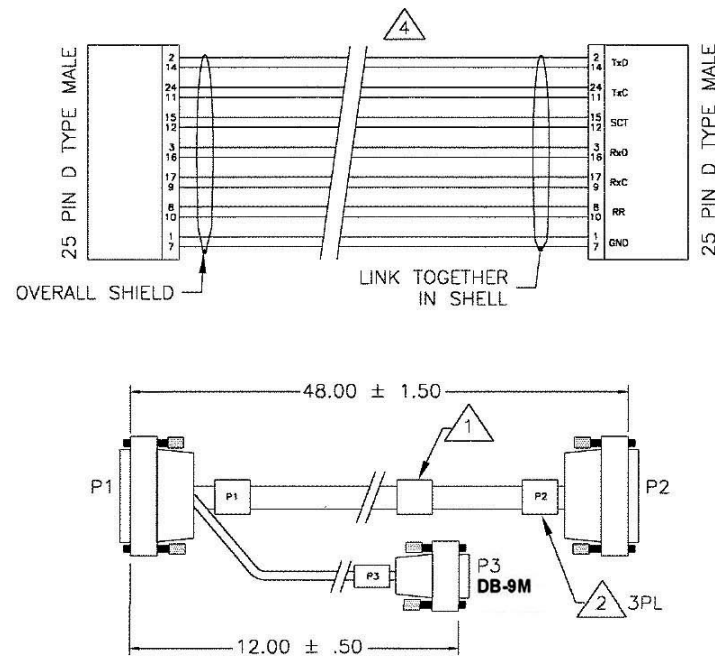


Figure A-6. Optional Control Adapter ‘Y’ Splitter (CEFD P/N CA/WR13011-4)

**A.1.7 Modem to CRS-170A and CRS-150 Data / Control 'Y' Cable, DB-25M → DB-25M, DB-9M**

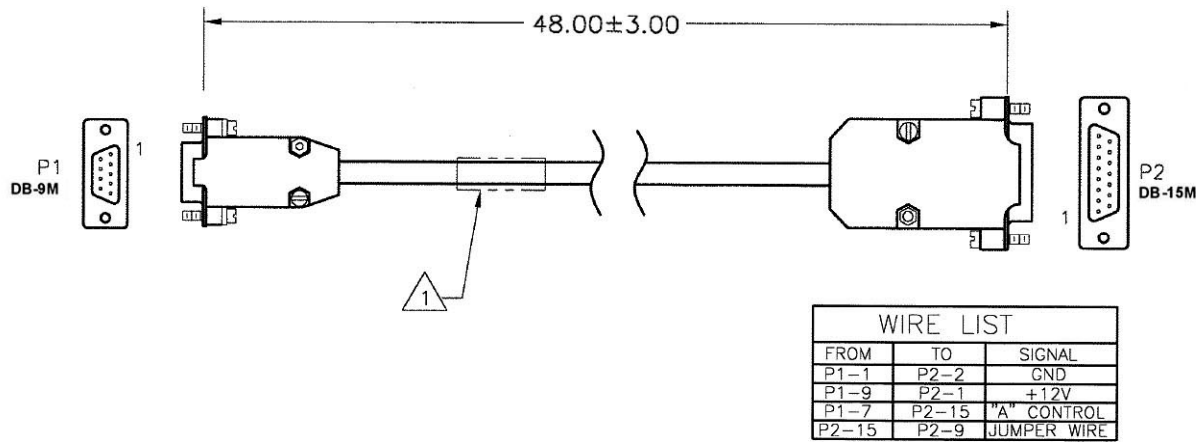
INDICATORS			
25M	NOTES	25M	9M
1	TO	1	1
2	TO	2	
3	TO	3	
4	TO	4	
5	TO	5	
6	TO	6	
7	TO	7	5
8	TO	8	
9	TO	9	
10	TO	10	
11	TO	11	
12	TO	12	
13	TO	13	
14	TO	14	
15	TO	15	
16	TO	16	
17	TO	17	
18	TO	18	9
19	TO	19	
20	TO	20	
21	TO	21	
22	TO	22	
23	TO	23	7
24	TO	24	
25	TO	25	



6. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT PER DIRECTIVE 2002/95/EC.
  5. USE METAL BACKSHELLS FOR D TYPE CONNECTORS.
  4. PAIR UP TWISTED PAIRS AS SHOWN ON DRAWING. WIRE REMAINING TWISTED PAIRS STRAIGHT THRU.
  3. ENSURE SHIELDING FOIL AND/OR BRAID IS BONDED TO METAL BACKSHELL FOR EMC SHIELDING.
  2. MARK TERMINATION ENDS IN .12 HIGH CHARACTERS USING PERMANENT MARKING, COLOR BLACK. LOCATE APPROXIMATELY WHERE SHOWN.
  1. APPLY CABLE PART NUMBER AND THE BOM REV. LETTER TO LABEL IN .12 HIGH CHARACTERS USING PERMANENT MARKING, COLOR BLACK. LOCATE APPROXIMATELY WHERE SHOWN.
- NOTES: UNLESS OTHERWISE SPECIFIED:

**Figure A-7. Data / Control 'Y' Cable (CEFD P/N CA/WR10456-4)**

**A.1.8 Modem to CRS-170A and SMS-301 Control Cable, DB-9M → DB-15M**



- 4 FOLD BACK FOIL, BRAID AND DRAIN FROM CABLE, ITEM 6, OVER GROMMET AND SEAL WITH COPPER TAPE, ITEM 4, AS SHOWN IN DETAIL B.
  - 3 ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, ITEM 3, OVER EACH SOLDER JOINT. SEE DETAIL A.
  2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURER'S INSTALLATION PROCEDURE.
- △ 1 APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL, ITEM 5, IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED

**Figure A-8. Control Cable (CEFD P/N CA/WR10163-1)**

### A.1.9 Modem to User, CDM-625 Data Cable, (2X) DB-9M → DB-9F

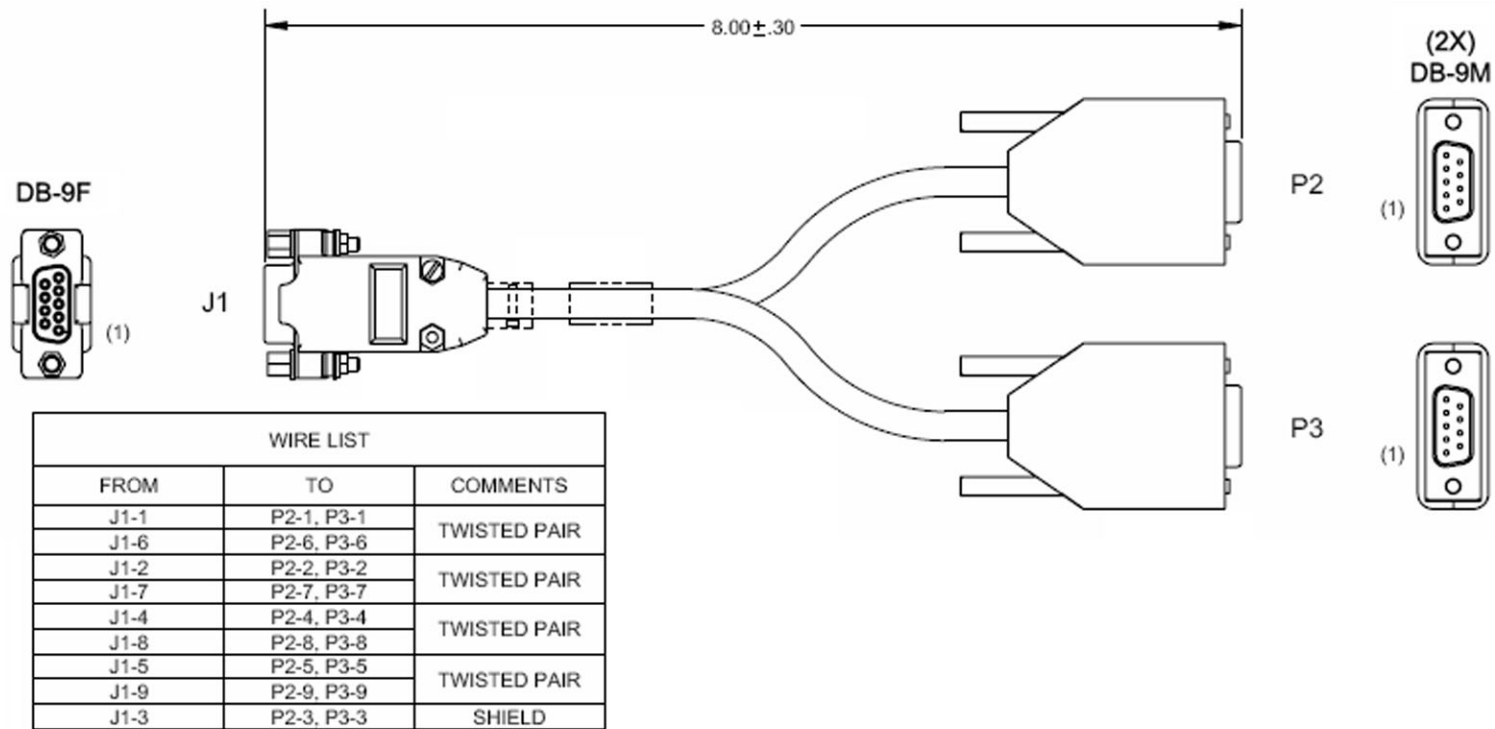


Figure A-9. 1:1 'Y' Splitter Data Cable (CEFD P/N CA-0000071)

### A.1.10 Modem to User, CDM-625 Quad E1 Adapter Cable, (2X) DB-15F → DB-9M

This optional adapter cable may be purchased from Comtech EF Data to adapt the Balanced G.703 or Auxiliary G.703 DB-9F modem connections to a DB-15F connector pair. The DB-9M end of this cable plugs into the 'To User' connector side (DB-9F) of the CA-0000071 'Y' Splitter cable shown in **Figure A-9**.

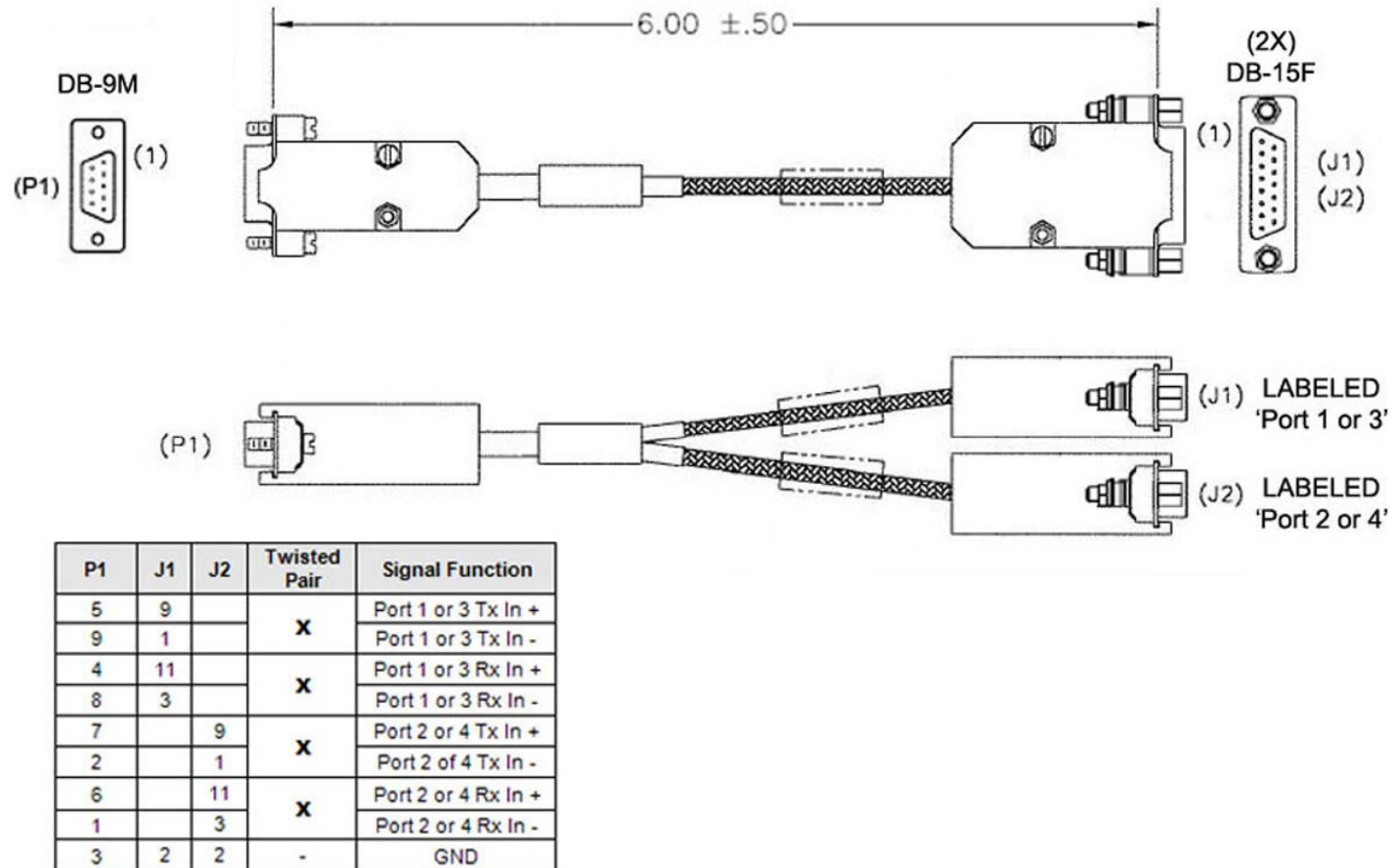
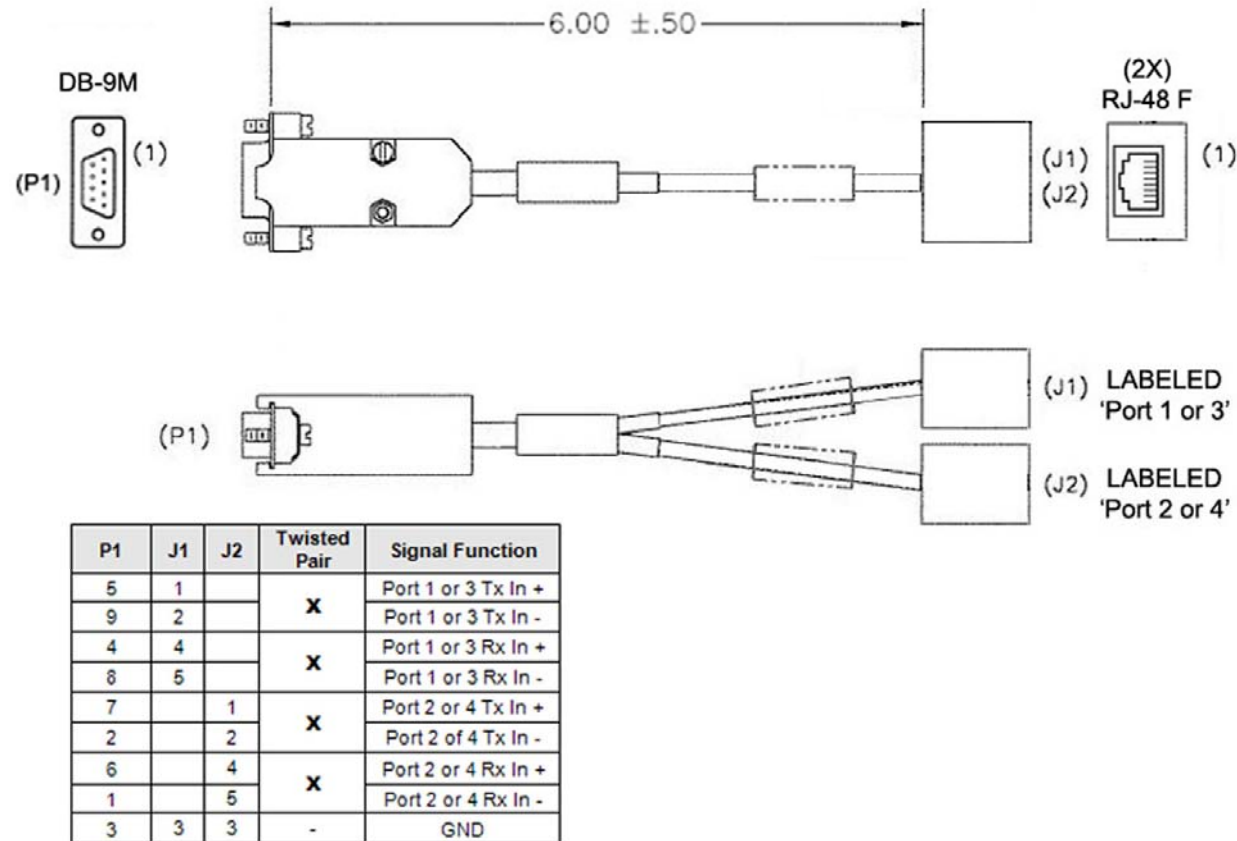


Figure A-10. 1:1 Quad E1 'Y' Splitter Data Cable (CEFD P/N CA-0000163)

### A.1.11 Modem to User, CDM-625 Quad E1 Adapter Cable, (2X) RJ-48F to DB-9M

This optional adapter cable may be purchased from Comtech EF Data to adapt the Balanced G.703 or Auxiliary G.703 DB-9F modem connections to a RJ-48F connector pair. The DB-9M end of this cable plugs into the 'To User' connector side (DB-9F) of the CA-0000071 'Y' Splitter cable shown in **Figure A-9**.



**Figure A-11. Quad E1 'Y' Splitter Adapter Cable (CEFD P/N CA-0000164)**



## METRIC CONVERSIONS

### Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	$6.214 \times 10^{-6}$	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	$1.578 \times 10^{-5}$	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	$1.893 \times 10^{-4}$	0.3048	—	—
1 yard	91.44	36.0	3.0	—	$5.679 \times 10^{-4}$	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	$6.214 \times 10^{-4}$	—	—	—
1 mile	$1.609 \times 10^5$	$6.336 \times 10^4$	$5.280 \times 10^3$	$1.760 \times 10^3$	—	$1.609 \times 10^3$	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

### Temperature Conversions

Unit	° Fahrenheit	° Centigrade
32° Fahrenheit	—	0 (water freezes)
212° Fahrenheit	—	100 (water boils)
-459.6° Fahrenheit	—	273.1 (absolute 0)

Formulas
$C = (F - 32) * 0.555$
$F = (C * 1.8) + 32$

### Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoirdupois	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoird.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoird.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	$1.0 \times 10^3$	35.27	32.15	2.205	2.679	—



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