SIEMENS

USER'S HANDBOOK

HD/LINKER

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Siemens Industry, Inc., Rail Automation
9568 Archibald Ave., Suite 100,
Rancho Cucamonga, California 91730
1-800-793-7233

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DOCUMENT HISTORY

Version	Release Date	Details of Change
A	December 1997	Initial release
B	September 2000	Re-release
C	October 2003	The following changes have been incorporated per request by and in coordination with the Project Manager: Page 1-1, paragraph 1.0 ▪ Third paragraph: Changed “by means of network drive or floppy disk” to “by means of network drive, CD, or disk.” Page 1-5, paragraph 1.2 ▪ Added new sub-section 1.2 APPLICABLE DOCUMENTS to include: SIG-00-97-05, SIG-00-97-07, and COM-00-94-03. Renumbered 1.2 SYSTEM REQUIREMENTS and 1.3 ORDERING INFORMATION as 1.3 and 1.4, respectively. Page 1-5, paragraph 1.3 and Page 2-1, paragraph 2.1 ▪ Added “Windows 2000™” to System Requirements and Program Installation, respectively. Pages 3-3 thru 3-6 ▪ Added new section, 3.1.2.3 Incompatible Database Failure, to include a warning message displayed in the Self-Test Results window if the current database is not compatible with the current version of HD/LINKer; renumbered/divided old section 3.1.2 accordingly, i.e., 3.1.2.1, 3.1.2.2, 3.1.2.3, and 3.1.3. Page 4-4, Table 4-1 ▪ Marked Password Administration with unrestricted user access. Pages 5-4 to 5-5: ▪ Inserted NOTE: “If the selected database is incompatible with the current HD/LINKer version, the Upgrade Database dialog box (figure 5-4B) will appear.” Renumbered figure 5-4 as figure 5-4A and added figure 5-4B, Upgrade Database Dialog Box. Page 5-9: ▪ Added paragraph 5.1.5 Directories Tab, which enables the user to copy the various Support Files (MCFs, MEF, MDFs, and HDFs) into a new directory of their choice. Page 8-6: ▪ Added paragraph 8.3.2.2 Deleting Circuits During Communications Sessions – guidelines to apply when deleting virtual circuits during Multiple Communications or Single Communications Sessions. Page 11-2, paragraph 11.1.3

		▪ Changed figure 11-1 from a one-illustration to a 2-illustration figure, with second illustration displaying message: "* The module data has changed. Create MCF!" whenever module data is changed. Added note describing details. Page 16-2, paragraph 16.1.1.1 ▪ Added at the end of the section, (a) text: "If the search produces no result, the **Log Event Not Found** window, figure 16-2B, appears:" (b) Figure 16-2B, Log Event Not Found Window. ▪ Renumbered old Figure 16-2, Find Log Event Dialog Box, Figure 16-2A.
C.1	June 2014	Rebrand for Siemens

TABLE OF CONTENTS

Notes, Cautions, and Warnings xvi

Electrostatic Discharge (ESD) Precautions xvii

Glossary xviii

SECTION I INTRODUCTION 1-1

1.0 HD/LINKER OVERVIEW 1-1

1.1 FUNCTIONAL ELEMENTS 1-2

1.1.1 Auxiliary Functions 1-2

1.1.2 Virtual Circuit Editor (VCE) 1-4

1.1.3 MCF Manager 1-4

1.1.4 Event Log 1-5

1.2 APPLICABLE DOCUMENTS 1-5

1.3 SYSTEM REQUIREMENTS 1-5

1.4 ORDERING INFORMATION 1-6

SECTION II INSTALLATION 2-1

2.1 PROGRAM INSTALLATION 2-1

SECTION III STARTUP AND LOGIN 3-1

3.1 STARTING THE HD/LINKER PROGRAM 3-1

3.1.1 Database Not Found 3-2

3.1.2 Self-Test Failure 3-3

3.1.2.1 Shut-Down Failure 3-4

3.1.2.2 Last Termination Status Unknown Failure 3-4

3.1.2.3 Incompatible Database Failure 3-5

3.1.3 Restoring the Database 3-6

3.1.4 Login 3-7

SECTION IV USER REGISTRATION 4-1

4.1 USER REGISTRATION 4-1

4.2 MODIFY USER NAME OR PASSWORD 4-3

SECTION V SETUP 5-1

5.1 HD/LINKER SETUP 5-1

5.1.1 Installation Tab 5-1

5.1.1.1 Create a New Database 5-1

5.1.1.2 Select a Database 5-4

5.1.1.3 Save As 5-5

5.1.2 MCF Manager Tab 5-6
5.1.3 Logging Tab 5-7
5.1.4 Group Display Tab 5-8
5.1.4.1 Group Heading Display 5-8
5.1.5 Directories Tab 5-9

SECTION VI MAIN WINDOW DESCRIPTION 6-1
6.1 MAIN WINDOW ELEMENTS 6-1
6.1.1 Main Tool Bar 6-2
6.1.1.1 Circuit I/O Tool Bar 6-4
6.1.2 Circuit View 6-5
6.1.2.1 Module View 6-6
6.1.2.2 Communications View 6-6
6.1.3 Status/Progress Bar 6-6

SECTION VII CIRCUIT CONFIGURATIONS 7-1
7.1 MODULE CONFIGURATIONS 7-1
7.1.1 Designation and Identification 7-1
7.1.2 Unipolar Input/Output 7-2
7.1.3 Bipolar Input/Output 7-3
7.1.4 Unipolar Bidirectional Input/Output 7-4
7.1.5 Unipolar Bipolar Bidirectional Input/Output 7-5
7.1.6 Bipolar Bidirectional Input/Output 7-6
7.1.7 Cut Circuits 7-7
7.1.8 Internal Configurations 7-8
7.1.9 External/Internal Configurations 7-8

SECTION VIII VIRTUAL LINE CIRCUITS 8-1
8.1 VIRTUAL LINE CIRCUIT OVERVIEW 8-1
8.2 ATCS ADDRESSING 8-2
8.3 COMMUNICATIONS SESSIONS 8-3
8.3.1 Communications Components 8-3
8.3.1.1 Termination Communications Servers 8-4
8.3.1.2 Termination Communications Clients 8-4
8.3.1.3 Cut Communications Clients/Servers 8-4
8.3.2 Communications Sessions 8-4
8.3.2.1 Session Guidelines 8-5
8.3.2.2 Deleting Circuits During Communication Sessions 8-5

SECTION IX VIRTUAL CIRCUIT EDITOR 9-1
9.1 LINE SELECTION 9-1
9.1.1 Line Controller 9-1

9.1.2 Line Assignment....9-2
9.1.2.1 Add a New Line....9-2
9.1.2.2 Edit an Existing Line....9-2
9.1.2.3 Delete an Existing Line....9-3
9.2 GROUP ASSIGNMENT....9-4
9.2.1 Group Line Selection....9-4
9.2.2 Group Creation....9-4
9.2.3 Editing Group Information....9-6
9.2.4 Circuit Layout Dialog Box....9-7
9.2.4.1 Listing Groups....9-7
9.2.4.2 Selecting Groups....9-7
9.2.4.3 Arranging Groups....9-8
9.3 CIRCUIT LAYOUT....9-9
9.3.1 Group Module Selection....9-9
9.3.2.1 Virtual Circuit Creation....9-13
9.3.2.2 Creating Inputs from Existing I/O....9-17
9.3.2.3 Editing Circuit I/O Information....9-17
9.3.2.4 Separating Communications Sessions....9-17
9.3.2.5 Combining Communications Sessions....9-18
9.3.2.6 Editing Circuit Link Information....9-19
9.3.2.7 Deleting HD/LINKer Objects....9-19
SECTION X COMMUNICATIONS TIMERS....10-1
10.1 INTRODUCTION....10-1
10.1.1 I/O States Timers....10-1
10.1.1.1 Server Update Rate....10-2
10.1.1.2 Client Time-Out....10-2
10.1.2 Startup Timers....10-3
10.1.2.1 Server Session Retry Rate....10-4
10.1.2.2 Client Session Retry Rate....10-4
10.1.2.3 Client Session Attempt Timeout....10-4
10.1.3 Synchronization Timers....10-4
10.1.3.1 Client Time Stamp Refresh Rate....10-5
10.1.3.2 Client Time Stamp Network Delay....10-5
10.1.3.3 Server Time Stamp Refresh Timeout Interval....10-6
10.1.4 Cut Delay Timer....10-6
SECTION XI MCF MANAGER....11-1
11.1 MCF MANAGER ELEMENTS....11-1
11.1.1 Selecting Lines and Groups....11-1
11.1.2 Selecting Modules....11-1
11.1.3 Selecting MCFs....11-1
11.1.4 MCF Button Functions....11-1

11.2 MCF CREATION 11-4
11.3 MCF VALIDATION 11-5
11.3.1 CREATE BUTTON INITIATION 11-5
11.3.2 Validation Button Initiation 11-5
11.3.3 Print Button Initiation 11-6
11.4 MCF APPROVAL 11-7
11.5 MCF PRINT FUNCTIONS 11-10
11.6 MCF TRANSFER 11-11
11.7 SERVICE STATUS 11-13
11.7.1 Place MCF In Service 11-13
11.7.2 Take MCF Out of Service 11-14
SECTION XII VIRTUAL CIRCUIT EXAMPLES 12-1
12.1 INTRODUCTION 12-1
12.1.1 Four-Wire, Unidirectional, Unipolar Aspect Circuit 12-1
12.1.2 Two-Wire, Unidirectional, Bipolar Aspect Circuit 12-4
12.1.3 Six-Wire, Bidirectional, Unipolar Aspect Circuit 12-7
12.1.4 Two-Wire, Bidirectional, Bipolar, Aspect Circuit 12-10
12.1.5 Bidirectional, Bipolar Aspect Circuit With Cut Section 12-13
SECTION XIII FILE MANAGEMENT 13-1
13.1 FILE MANAGEMENT GUIDELINES 13-1
13.1.1 Database Designation 13-2
13.1.2 File Names 13-2
13.1.2.1 Hardware Description Files 13-3
13.1.2.2 Module Description Files 13-3
13.1.2.3 Module Executable Files 13-3
13.1.2.4 Module Configuration Files 13-4
13.1.3 Installing New Files 13-4
13.1.4 ATCS Database Backup 13-5
13.1.5 Out-of-Service Archives 13-5
13.1.6 MCF Location 13-5
13.1.7 ATCS Database Installation on Non-Local Drives 13-5
13.2 HDLINKER.INI TIMER VALUES 13-6
SECTION XIV LINE MCF TRANSFER PROCEDURES 14-1
14.1 CHECK OUT/CHECK IN 14-1
14.1.1 Line Check Out 14-2
14.1.2 Line Check-Out Validation 14-3
14.1.3 Field Computer Line Check-In Procedure 14-5

14.1.4 Office Computer Line Check-In Procedure 14-6
14.1.5 Database Transfer Status 14-9

SECTION XV TROUBLESHOOTING 15-1
15.1 SELF TEST FAILURES 15-1
15.1.1 Self Test Routines 15-1
15.1.2 Self Test Errors 15-2
15.2 VIRTUAL CIRCUIT CREATION ERRORS 15-5
15.3 MCF DISPLAY ERRORS 15-6
15.4 MCF CREATION ERRORS 15-7
15.5 MCF VALIDATION ERRORS 15-9
15.5.1 Range Consistency Test 15-11
15.5.1.1 Range Consistency Test Errors 15-11
15.5.2 Input-Output Consistency Test 15-14
15.5.2.1 Input-Output Consistency Test Errors 15-14
15.5.3 Device – Input/Output Consistency Test 15-14
15.5.3.1 Device – Input/Output Consistency Test Errors 15-14
15.5.4 Unique Device Number Test 15-15
15.5.4.1 Unique Device Number Test Errors 15-16
15.5.5 Circuit Consistency Test 15-16
15.5.5.1 Circuit Consistency Test Errors 15-16
15.5.6 MCF-Database Comparison Test 15-16
15.5.6.1 MCF-Database Comparison Test Errors 15-16
15.5.7 Device Consistency Test 15-17
15.5.7.1 Device Consistency Test Errors 15-17
15.5.8 Geographic Neighbor Test 15-17
15.5.8.1 Geographic Neighbor Test Errors 15-17

SECTION XVI HD/LINKER LOG 16-1
16.1 LOG VIEWER WINDOW 16-1
16.1.1 Find Log Events 16-2
16.1.2 Print Log Window. 16-3
16.1.3 Print Setup Dialog Box 16-4

SECTION XVII SAFETY CONSIDERATIONS 17-1
17.1 MCF APPROVAL LISTING REVIEW 17-1
17.2 ATCS ADDRESSES 17-1
17.2.1 Virtual Links 17-1

APPENDIX A A-1
APPENDIX B B-1
APPENDIX C C-1

APPENDIX D D-1
APPENDIX E E-1

LIST OF ILLUSTRATIONS

Figure 1-1. HD/LINKer System Diagram 1-2
Figure 1-2. HD/LINKer Functional Elements 1-3
Figure 2-1. HD/LINKer Setup Program Dialog Box 2-1
Figure 3-1. Start-Up Window 3-1
Figure 3-2. Self-Test Dialog Box – Database Not Found 3-2
Figure 3-3. Open Dialog Box – Safetran Directory 3-2
Figure 3-4. Open Dialog Box – Geobase Directory 3-3
Figure 3-5. Self-Test Results Window – Shut-Down Failure 3-4
Figure 3-6. Self-Test Results Window – Recoverable Failure 3-5
Figure 3-7. Self-Test Results Window – Incompatible Database 3-5
Figure 3-8. Self-Test Dialog Box – Other Database File Selection 3-6
Figure 3-9. Database Selection Dialog Box 3-6
Figure 3-10. HD/LINKer Login Dialog Box 3-7
Figure 3-11. HD/LINKer Main Window 3-8
Figure 4-1. HD/LINKer Administrator Login Dialog Box 4-1
Figure 4-2. Password Administrator Dialog Box 4-2
Figure 4-3. Add New User Dialog Box 4-2
Figure 4-4. Password Confirmation Dialog Box 4-2
Figure 4-5. Modify Existing User Dialog Box 4-3
Figure 5-1. HD/LINKer Setup Installation Tab Dialog Box 5-1
Figure 5-2. Enter New Database Name Dialog Box 5-2
Figure 5-3. Railroad Name List 5-3
Figure 5-4. Select An Existing Database Dialog Box 5-4
Figure 5-5. Upgrade Database Dialog Box 5-4
Figure 5-6. MCF Manager Tab 5-6
Figure 5-7. Logging Tab 5-7
Figure 5-8. Group Display Tab 5-8
Figure 5-9. Directories Tab 5-9
Figure 5-10. Check Files Window 5-10
Figure 6-1. Figure 6-1 Main Window 6-1
Figure 6-2. Main Tool Bar 6-2
Figure 6-3. Circuit I/O Tool Bar 6-4
Figure 6-4. Main Window With I/O Tool Bar & Circuit View 6-6
Figure 6-5. Module View 6-7
Figure 6-6. Communications View 6-7
Figure 7-1. Unipolar Configurations 7-2
Figure 7-2. Bipolar Configurations 7-3
Figure 7-3. Unipolar Input/Output Configurations 7-4
Figure 7-4. Unipolar Bipolar Configurations 7-5
Figure 7-5. Bipolar Bidirectional Configurations 7-6
Figure 7-6. Cut Circuit Configurations 7-7

Figure 7-7. Internal Connection of Internal I/O 7-8
Figure 7-8. Internal Connection of External I/O 7-8
Figure 8-1 HD/LINK System 7-1
Figure 8-2. ATCS Datagram 8-3
Figure 8-3 Communications Components 8-3
Figure 8-4. Communications Servers 8-4
Figure 8-5 Communications Sessions 8-5
Figure 9-1. Line Dialog Box 9-1
Figure 9-2. Delete Line Dialog Box 9-3
Figure 9-3. Group Dialog Box 9-4
Figure 9-4. Group Header Display 9-6
Figure 9-5. Circuit Layout Dialog Box 9-7
Figure 9-6. Main Window With Module View 9-10
Figure 9-7. Module Dialog Box Hardware Tab 9-10
Figure 9-8. Module Dialog Box Software Tab 9-11
Figure 9-9. Module Dialog Box ATCS Address Tabb 9-12
Figure 9-10. Main Window With Groups and Modules Selected 9-12
Figure 9-11. Circuit I/O Dialog Box - Unipolar Input 9-13
Figure 9-12. Circuit I/O Dialog Box - Unipolar Output 9-14
Figure 9-13. Circuit I/O Dialog Box - Internal Cut I/O 9-14
Figure 9-14. Circuit Link Dialog Box 9-15
Figure 9-15. Delete Circuit Dialog Box 9-18
Figure 9-16. Delete I/O Dialog Box 9-20
Figure 9-17. Delete Module Dialog Box 9-20
Figure 9-18. Delete Group Dialog Box 9-20
Figure 10-1. Circuit Timers Dialog Box – I/O States Tab 10-1
Figure 10-2. Circuit Timers – Startup Tab 10-3
Figure 10-3. Circuit Timers – Clocks Tab 10-5
Figure 10-4. Circuit Timers Dialog Box – Cut State Tab 10-7
Figure 11-1 MCF Dialog Box Overview 11-2
Figure 11-2. MCF Manager Dialog Box With Module Change Message 11-3
Figure 11-3. MCF Create Dialog Box 11-4
Figure 11-4. MCF Validation Tests Dialog Box 11-5
Figure 11-5. MCF Print Dialog Box – Print Selection 11-6
Figure 11-6. MCF Print Dialog Box 11-6
Figure 11-7. MCF Approval Dialog Boxes 11-7
Figure 11-8. Approval Acknowledgment Dialog Box 11-7
Figure 11-9. MCF Status Display Window 11-8
Figure 11-10 CF Contents Display window 11-9
Figure 11-11. MCF Contents Window Page 2 11-9
Figure 11-12. MCF transfer Dialog Box – General tab 11-11
Figure 11-13. MCF Transfer Dialog Boxes 11-12
Figure 11-14. Place MCF In Service Dialog Boxes 11-14
Figure 11-15. Take MCF Out of Service Dialog Boxes 11-14
Figure 11-16. Delete MCF Dialog Box 11-15

Figure 12-1 Four-Wire, Unidirectional, Unipolar Aspect Circuit Simplified Schematic Diagram 12-2
Figure 12-2 Unidirectional, Unipolar Aspect Circuit Simplified Virtual Circuit Diagram 12-3
Figure 12-3. Unidirectional, Unipolar Aspect Circuit Virtual Circuit Configuration..... 12-4
Figure 12-4 Two-Wire, Unidirectional, Bipolar Aspect Circuit Simplified Schematic Diagram .. 12-5
Figure 12-5 Unidirectional, Bipolar Aspect Circuit Virtual Circuit Diagram 12-6
Figure 12-6. Unidirectional, Bipolar Aspect Circuit Virtual Circuit Configuration..... 12-7
Figure 12-7 Six-Wire, Bidirectional, Unipolar Aspect Circuit Simplified Schematic Diagram .. 12-8
Figure 12-8 Bidirectional, Unipolar Aspect Circuit Simplified Virtual Circuit Diagram 12-9
Figure 12-9. Bidirectional, Unipolar Aspect Circuit Virtual Circuit Configuration..... 12-11
Figure 12-10 Two-Wire, Bidirectional, Bipolar Aspect Circuit Simplified Schematic Diagram ... 12-11
Figure 12-11 Bidirectional, Bipolar Aspect Circuit Simplified Virtual Circuit Diagram 12-12
Figure 12-12 Bidirectional, Bipolar Aspect Circuit Virtual Circuit Configuration..... 12-13
Figure 12-13 Bidirectional, Bipolar Aspect Circuit With Cut Section Modifications Simplified Virtual Circuit Diagram..... 12-14
Figure 12-14. Bidirectional, Bipolar Aspect Circuit With Cut Section Virtual Circuit Configuration..... 12-15
Figure 13-1. HD/LINKer File Display..... 13-1
Figure 14-1. Check In/Out Database Dialog Box Check-Out Tab..... 14-1
Figure 14-2. Enter New Database Name Dialog Box..... 14-2
Figure 14-3. Check In/Out Database Dialog Box Check In Tab..... 14-6
Figure 14-4. Select a Database Dialog Box..... 14-7
Figure 14-5. Copy MCFs Dialog Box..... 14-7
Figure 14-6. Validation Acknowledgment Dialog Box..... 14-9
Figure 14-7. Check In/Out Database Dialog Box..... 14-9
Figure 15-1. HD/LINKer Create MCF Failed Dialog Box..... 15-7
Figure 15-2. MCF Status Display Window Error Listing..... 15-10
Figure 15-3. Create Acknowledgement Dialog Box..... 15-10
Figure 15-4. Print Acknowledgment Dialog Box..... 15-11
Figure 15-5. Approval Acknowledgement Dialog Box..... 15-11
Figure 16-1. Log Viewer Window..... 16-1
Figure 16-2. Find Log Event Dialog Box..... 16-2
Figure 16-3. Log Event Not Found Dialog Box..... 16-3
Figure 16-4. Print Log Window..... 16-3
Figure 16-5. Print Setup Dialog Box..... 16-4

LIST OF TABLES

Table 4-1 HD/LINKer User Access Levels 4-4
Table 6-1 Main Tool Bar Button Functions 6-2
Table 6-2 Circuit I/O Tool Bar Functions 6-4
Table 13-1 INI File Timer Default Values 13-6
Table 15-1 Self Test Routines 15-1
Table 15-2 Self-Test Error Display 15-2
Table 15-3 Virtual Circuit Creation Error Display 15-5
Table 15-4 MCF Function Display Errors 15-7
Table 15-5 MCF Creation Error Display 15-8
Table 15-6 Range Consistency Test Error Display 15-12
Table 15-7 Device – Input/Output Consistency Test Error Display 15-15
Table 15-8 MCF-Database Comparison Test Error Display 15-16
Table 15-9 Geographic Neighbor Test Error Display 15-18

NOTES, CAUTIONS, AND WARNINGS

Throughout this manual, notes, cautions, and warnings are frequently used to direct the reader's attention to specific information. Use of the three terms is defined as follows:

NOTE

Generally used to highlight certain information relating to the topic under discussion.

CAUTION

REFERS TO PROPER PROCEDURES OR PRACTICES WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN A POTENTIALLY HAZARDOUS SITUATION AND/OR POSSIBLE DAMAGE TO EQUIPMENT. CAUTIONS TAKE PRECEDENCE OVER NOTES AND ALL OTHER INFORMATION, EXCEPT WARNINGS.

WARNING

INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY. WARNINGS ALWAYS TAKE PRECEDENCE OVER NOTES, CAUTIONS, AND ALL OTHER INFORMATION.

If there are any questions, contact Siemens Rail Automation Application Engineering.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Static electricity can damage electronic circuitry, particularly low voltage components such as the integrated circuits commonly used throughout the electronics industry. Therefore, procedures have been adopted industry-wide which make it possible to avoid the sometimes invisible damage caused by electrostatic discharge (ESD) during the handling, shipping, and storage of electronic modules and components. Siemens Industry, Inc., Rail Automation has instituted these practices at its manufacturing facility and encourages its customers to adopt them as well to lessen the likelihood of equipment damage in the field due to ESD. Some of the basic protective practices include the following:

- Ground yourself before touching card cages, assemblies, modules, or components.
- Remove power from card cages and assemblies before removing or installing modules.
- Remove circuit boards (modules) from card cages by the ejector lever only. If an ejector lever is not provided, grasp the edge of the circuit board but avoid touching circuit traces or components.
- Handle circuit boards by the edges only.
- Never physically touch circuit board or connector contact fingers or allow these fingers to come in contact with an insulator (e.g., plastic, rubber, etc.).
- When not in use, place circuit boards in approved static-shielding bags, contact fingers first. Remove circuit boards from static-shielding bags by grasping the ejector lever or the edge of the board only. Each bag should include a caution label on the outside indicating static-sensitive contents.
- Cover workbench surfaces used for repair of electronic equipment with static dissipative workbench matting.
- Use integrated circuit extractor/inserter tools designed to remove and install electrostatic-sensitive integrated circuit devices such as PROM's (OK Industries, Inc., Model EX-2 Extractor and Model MOS-40 Inserter (or equivalent) are highly recommended).
- Utilize only anti-static cushioning material in equipment shipping and storage containers.

For information concerning ESD material applications, please contact the Technical Support Staff at 1-800-793-7233. ESD Awareness Classes and additional ESD product information are also available through the Technical Support Staff.

GLOSSARY

AAR	Association of American Railroads – An organization that establishes uniformity and standardization among different railroad systems.
ATCS	Advanced Train Control System – A set of standards compiled by the AAR for controlling all aspects of train operation.
CBT	Common Base Technology – A term referring to product design using a modular based approach.
CRC	Cyclic Redundancy Check – The CRC data is calculated and appended to a file so that it can be verified that no data is lost or corrupted.
DTU	Diagnostic Terminal Utility – A PC utility for configuring an HD/LINK module and reading its status and diagnostic information.
ECD	External Configuration Device – The Erasable Programmable Read-Only Memory (EPROM) on the HD/LINK interface connector used for storing the module configuration data.
HD	Home/Distant, referring to track block signals.
HDF	Hardware Description Files – A utility file for configuring a module and reading status and diagnostic information.
HD Pole Line	Wires strung along wayside poles for carrying signal aspect and other train control signals.
In Service Check Number	A number, unique to a particular HD/LINK module, displayed through the IDTU when the HD/LINK module is placed in service.
LAN	Local Area Network – A limited network where the data transfer media is generally wires or cable.
Left Neighbor	The Group displayed on the Main Window virtual-circuit configuration display to the left of the MCF documented Group.
MCF	Module Configuration File – The site-specific configuration data which is downloaded into the HD/LINK Module.
MCI	Module Configuration Information – The collection of database records that represents the MCF data.
MDF	Module Description Files – The configuration and capability information for the MEF.

GLOSSARY

MEF	Module Executable File – The HD/LINK executable software.
Out Service Check Number	A number, unique to a particular HD/LINK module, displayed through the IDTU when the HD/LINK module is taken out of service.
Right Neighbor	The Group displayed on the Main Window virtual-circuit configuration display to the right of the MCF documented Group.
SAT	Signaling Application Task – A virtual circuit.
SIN	Site (Subnode) Identification Number – A twelve-digit ATCS address representing the module as a subnode on the network.
SSR	Spread Spectrum Radio – A transmitter/receiver that uses a method of radio transmission in which the transmitted energy is evenly spread over the complete bandwidth of the radio, resulting in small RF signature.
UCN	Unique Check Number – A configuration validation number calculated from the contents of an approved MCF and MEF and issued to be entered into an HD/LINK module for the purpose of verifying proper configuration.
VCE	Virtual Circuit Editor – The functional element of the HD/LINKer program used to graphically design the group-specific virtual line circuit configurations of the H/D LINK Vital I/O Modules.
VPI	Vital Parallel Input – A module input the function of which affects the safety of train operation.
VRO	Vital Relay Output – A module output the function of which affects the safety of train operation.

SECTION I
INTRODUCTION

1.0 HD/LINKER OVERVIEW

This document is the User's Handbook for the Safetran HD/LINKer. The HD/LINKer is a Microsoft® Windows™-based office application that creates Module Configuration Files (MCFs) for the HD/LINK Vital I/O Modules.

Each MCF created by the HD/LINKer represents the configuration of the HD/LINK Modules at a specific railroad location. Module configuration data for the various railroad groups is created by the HD/LINKer and stored in a Master Advanced Train Control System (ATCS) Database (figure 1-1).

When a MCF is needed for a Line, module specific configuration data is retrieved from the Database by the HD/LINKer and compiled into the MCF. This MCF, along with the other MCFs for the line, is transferred (checked-out) to a portable field computer by means of network drive, CD, or disk.

Within the field PC, the MCF is transferred to the Diagnostic Terminal Utility (DTU) application. At the appropriate railroad group, the MCF is transferred from the DTU into the External Configuration Device (ECD) contained within the WAGO® interface connector of the group's HD/LINK Module.

The MCF data within the ECD then determines the configuration of the connected HD/LINK Module.

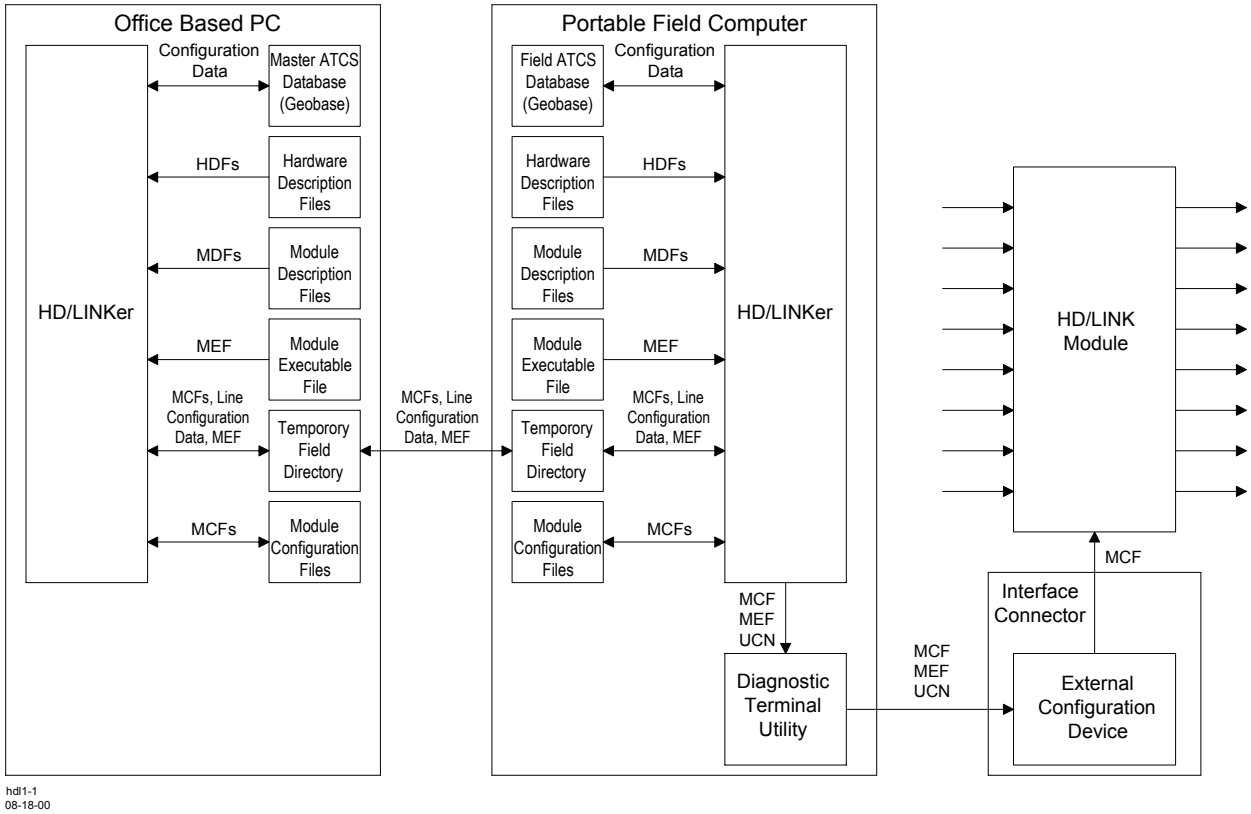

Figure 1-1.
HD/LINKer System Diagram

1.1 FUNCTIONAL ELEMENTS

The HD/LINKer application has four functional elements as shown in figure 1-2. User interaction with these elements is by means of computer monitor, mouse, and keyboard.

1.1.1 Auxiliary Functions

The Auxiliary functions check the reliability of the HD/LINKer application and control user access to the other functional elements. The Auxiliary functions are:

- **Self test.** The self-test routines check critical HD/LINKer program files plus the integrity of the ATCS Database. These routines are executed automatically at program startup and must be successfully completed before Login can be initiated.

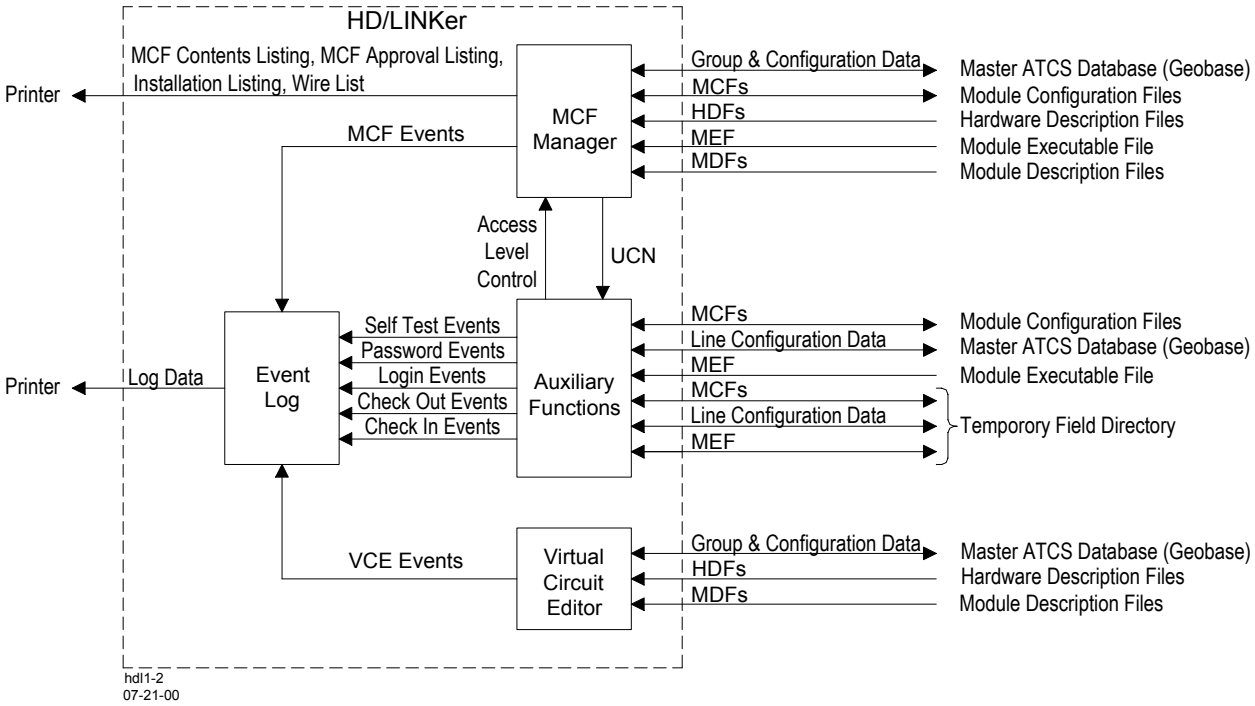

Figure 1-2.
HD/LINKer Functional Elements

- **Login.** Login is permitted following the successful completion of the self-test routines. A user name must be selected and valid password entered to successfully complete the login process.

- **Password Administrator.** User names, passwords, and access levels are entered and maintained using the Password Administrator. Access to the Password Administrator itself is password restricted. Each user name is assigned a password and an access level designation of either Unrestricted User or Restricted User. The Unrestricted User designation grants full access to all program operations except the Password Administrator. A Restricted User designation disables certain functions within the MCF Manager so that the user cannot approve, delete, or change the setup or status of an MCF.

- **Check Out/Check In**. The Check-Out/Check-In function enables the user to copy the MCFs for a particular Line and transport the files to the field using a portable laptop computer. When field activities are completed, the user checks the Line back into the Office Computer. During the check-out operation, the line configuration data and the Module Executable File (MEF) are copied and transferred with the MCFs.

During each of the Auxiliary functions, event data is sent to the Event Log for entry. When login is complete, the MCF functions are available for the designated user access level.

1.1.2 Virtual Circuit Editor (VCE)

The VCE is used to graphically design the group-specific virtual line circuit configurations of the H/D LINK Vital I/O Modules.

At the start of the design process the Group Data (line name, line number, group name, group number, and milepost designation) for a particular railroad location are entered into the VCE. The I/O data and other data describing the specific configuration for the group are then entered, creating a graphic representation of the group's I/O Modules. The group and configuration data developed in the design process is stored in the Master ATCS Database.

Throughout the virtual circuit design process relevant event data is sent to the Event Log for entry.

1.1.3 MCF Manager

The MCF Manager lets you create, validate, and approve an MCF. At the completion of these processes, you can copy the MCF to the Installer's DTU. The Manager also allows MCF listings to be printed, the service status of an MCF to be changed, or the MCF to be deleted.

Creation of an approved MCF is a user-initiated, three-step process:

- **Create.** During the Create step, pertinent Group and Configuration Data is extracted from the Master ATCS Database and an Unapproved MCF is compiled. The MCF Manager uses data from two internal files, Module Description File (MDF) and the Hardware Description File (HDF), in the compilation process. These files define the range of acceptable values for the MCF data.

- **Print/Validate.** At the completion of MCF creation, you can print and review an MCF Approval Listing. This listing contains the configuration information of the MCF, the Cyclic Redundancy Code (CRC) value, and a list of any errors and warnings generated in response to a series of validation tests. When Print is initiated, the Unapproved MCF is subjected to a series of validation tests to verify its content and consistency and to confirm its compatibility with neighbor MCFs. If the validation tests pass, a CRC value is included in the approval listing. The CRC value is derived from the MCF and is used to detect MCF corruption and to identify the MCF during approval. Changes in the MCF are reflected in the associated CRC.

NOTE

You can also validate MCFs before you print.

- **Approve.** When MCF Approval is started, you are prompted for the File CRC printed on the MCF Approval Listing. When the value has been entered, it is compared against the internal file CRC of the MCF to check for file corruption. This process also validates that the File CRC has

been correctly associated with the Approval Listing printout. If no corruption is detected, an approved MCF is created and a Unique Check Number (UCN) is calculated using the contents of the MCF and the selected Module Executable File (MEF) for the HD/LINK I/O Module. You can print the group Installation Listing and the I/O Module Wiring List. The Installation Listing contains the configuration information of the Approved MCF. The Wiring List contains the I/O Module wiring configuration.

Following its approval, the MCF may be transferred (copied) to the DTU for I/O Module installation. Once the MCF has been successfully copied to the DTU, the UCN may be manually entered into the DTU, as required. During this transfer function, the selected version of the MEF may also be copied to the DTU. This allows the MEF resident in the I/O Module to be updated as required.

During the module installation process, the HD Link I/O Module calculates an In Service Check Number. When this number is manually returned to the MCF Manager and entered, the status of the MCF is changed from Approved to In Service. When the I/O Module is taken out of service, it calculates an Out of Service Check Number. When this number is entered into the MCF Manager, the status of the MCF is changed from In Service to Out of Service.

1.1.4 Event Log

The Event Log file records all significant HD/LINKer events. Yuo can view or print the contents of the event log.

1.2 APPLICABLE DOCUMENTS

- Application Guidelines, HD/LINK ™ Vital I/O Module, 53201
  (Safetran Document #SIG-00-97-05)
- Installation Handbook, HD/LINK ™ Vital I/O Module, A53201
  (Safetran Document #SIG-00-97-07)
- Installation and Maintenance, R/LINK ATCS Radio Code Line System
  (Safetran Document #COM-00-94-03)

1.3 SYSTEM REQUIREMENTS

HD/LINKer requires the following minimum configuration:

- VGA monitor
- 200 MHz Pentium

- 64 MB RAM
- CD drive
- Disk drive
- Hard disk with sufficient space to install the required options and maintain database files.
- Printer
- Microsoft® Windows 95™, Windows 98™, Windows 2000™, or Windows NT 4.0™.

NOTE

The HD/LINKer application will not run under Windows 3.x™.

1.4 ORDERING INFORMATION

To order the HD/LINKer program and/or its support files, specify the following part numbers:

Application	Part Number
HD/LINKer program	9V337
Hardware Description File (HDF)	9V188
Module Description (MDF) & Module Executable Files (MEF)	9V140

NOTE

The HD/LINKer program, part no. 9V165, installed from a 3.5" hard disk, is no longer supported by Safetran Systems Corporation.

SECTION II
INSTALLATION

2.1 PROGRAM INSTALLATION

The HD/LINKer program and its support files [Hardware Description Files (HDF), Module Description Files (MDF), and Module Executable Files (MEF)] are distributed on a CD-ROM. The HD/LINKer program must be installed under Windows 98®, Windows 2000, Windows NT 4.0®, or Windows XP with all the latest service packs installed. You also need Microsoft's Internet Explorer 5.5 or later installed.

To install the HD/LINKer:

1. Insert the Installation CD into the CD-ROM drive.

2. From the **Start** menu, select **Run** and call the Setup program from the appropriate drive, as shown in figure 2-1.

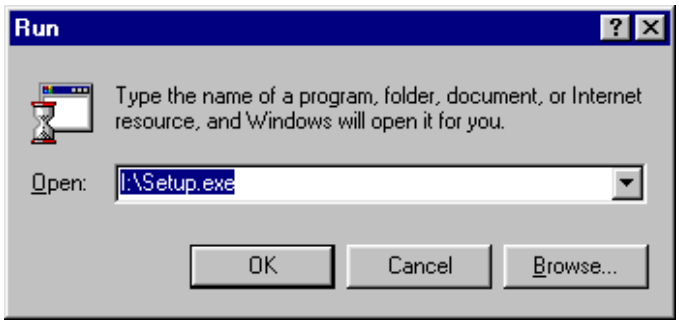

Figure 2-1.
FHD/LINKer Setup Program Dialog Box

3. Click **OK**.

4. Follow the instructions on the screen.

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SECTION III
STARTUP AND LOGIN

3.1 STARTING THE HD/LINKER PROGRAM

Start the HD/LINKer program by selecting **HD-LINKer** from the **Safetran Applications** menu.

The start-up window (figure 3-1) appears and the self-test starts.

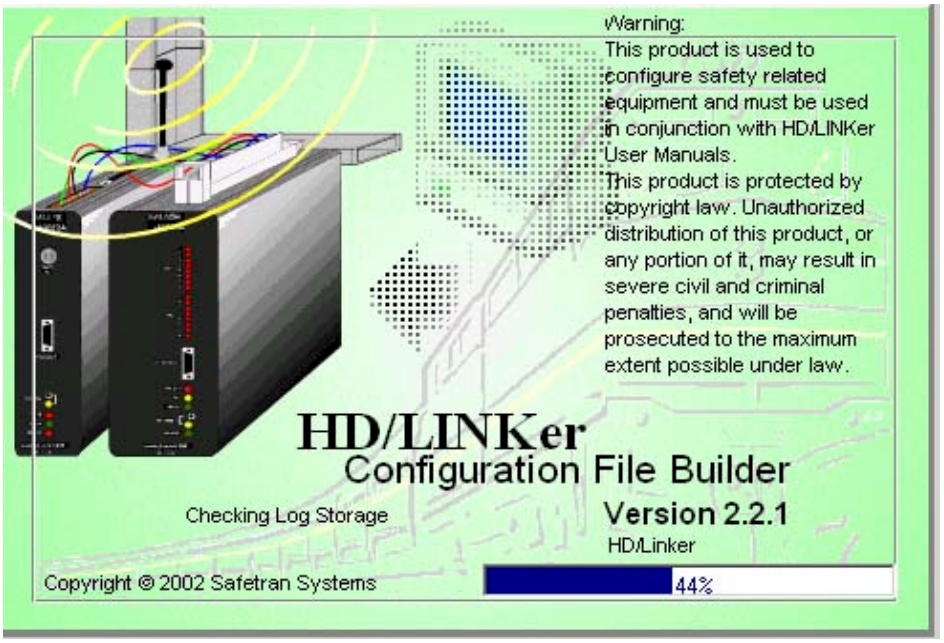

Figure 3-1. Start-Up Window

NOTE

While self-test is running, the self-test routine being executed and the percentage of completion appears in the lower-right corner of the window.

3.1.1 Database Not Found

When the database designated in the hdlinker.ini is not found, the **Self Test** dialog box, figure 3-2, appears.

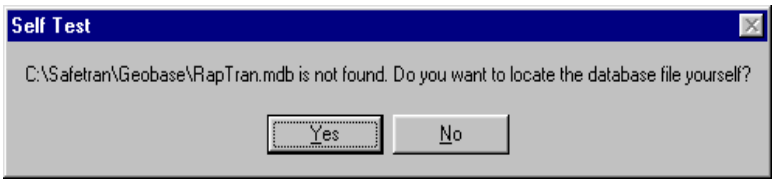

Figure 3-2.
Self-Test Dialog Box – Database Not Found

Select a database file as follows:

1. Click on the **Yes** button. The **Open** dialog box, figure 3-3, appears.

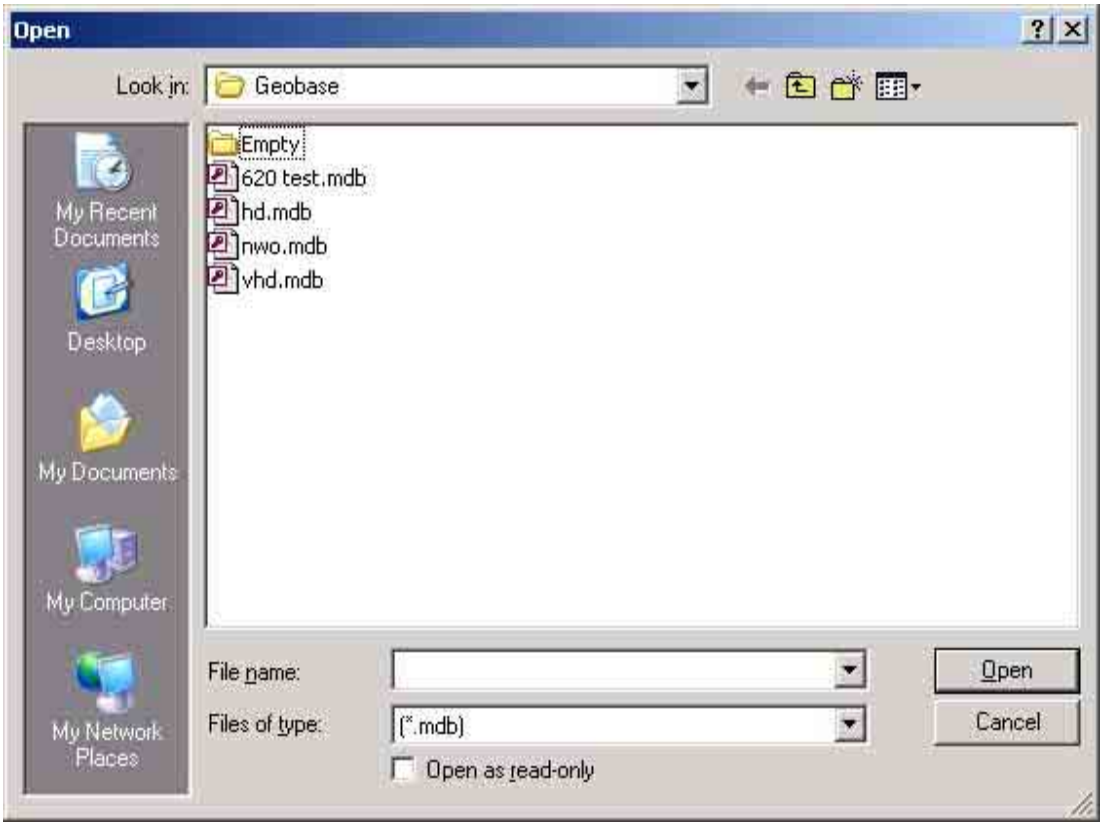

Figure 3-3.
Open Dialog Box – Safetran Directory

Clicking on the **No** button closes the dialog box and closes the HD/LINKer program.

2. Navigate to the Geobase subdirectory within the Safetran directory.

3. Select the database file to use.

   The selected database file appears in the **File name** field as shown in figure 3-4.

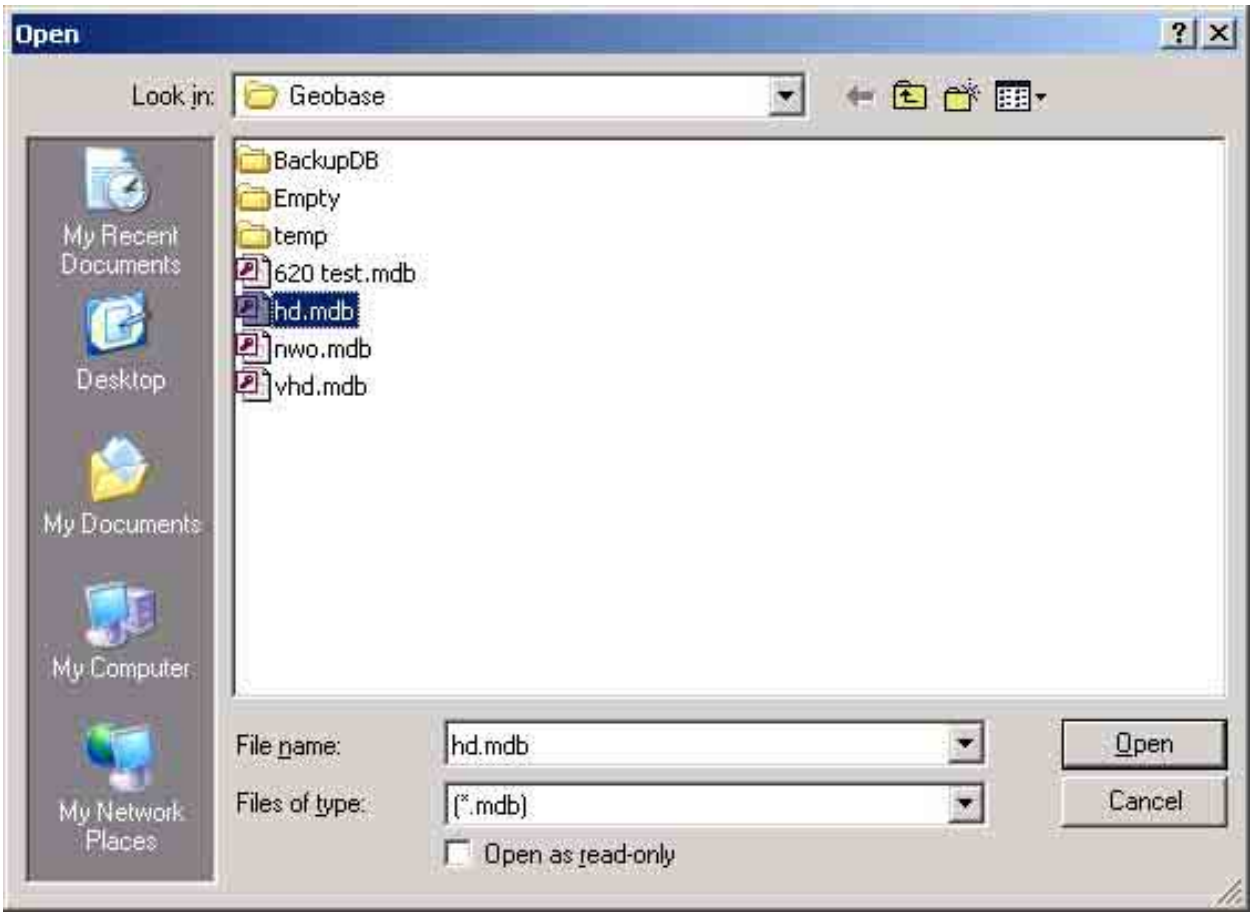

Figure 3-4.
Open Dialog Box – Geobase Directory

4. Click on the **Open** button.

   The **Open** dialog box closes.

   The **Cancel** button closes the **Open** dialog box and terminates the HD/LINKer program.

3.1.2 Self-Test Failure

When one or more self-test routines fail, a Self-Test Results window appears. This window lists the result of each self-test routine together with the description of any warnings or errors generated.

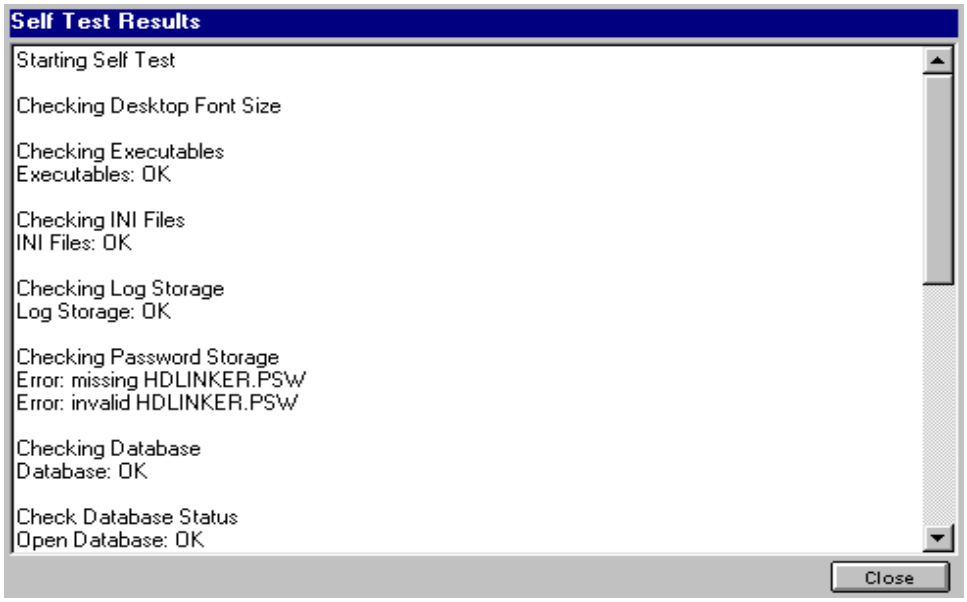

Figure 3-5.
Self-Test Results Window – Shut-Down Failure

3.1.2.1 Shut-Down Failure

If the failure is caused by missing or corrupted files, the window shown in figure 3-5 appears.

After noting the cause of the failure, close the application by clicking on the **Close** button at the bottom of the window. Refer to Section XV for troubleshooting procedures.

3.1.2.2 Last Termination Status Unknown Failure

If the failure is caused solely by a Last Termination Status Unknown error, the window shown in figure 3-6 appears. This error message indicates that the previous program session was abruptly terminated without saving the current database.

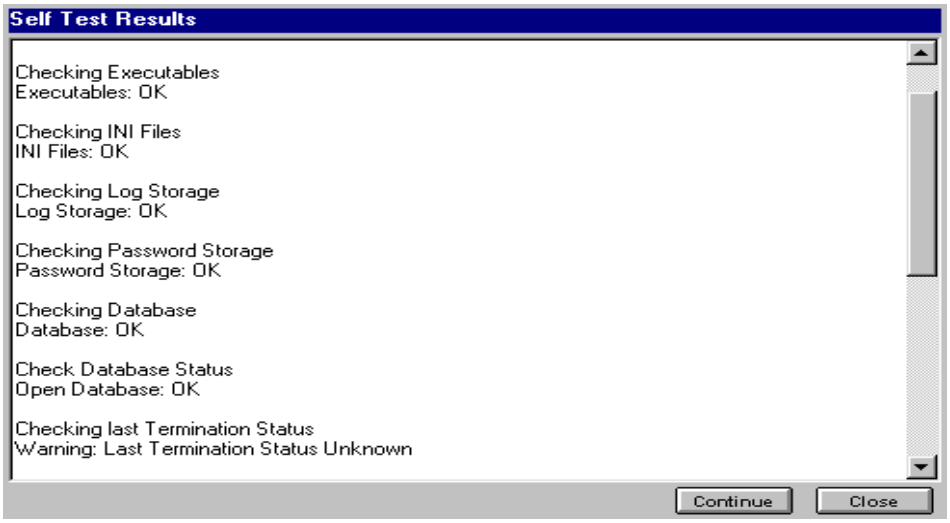

Figure 3-6.
Self-Test Results Window – Recoverable Failure

3.1.2.3 Incompatible Database Failure

If the current database is not compatible with the current version of HD/LINKer, a warning message appears in the Self-Test Results window after HD/LINKer completes the startup Self-Test.

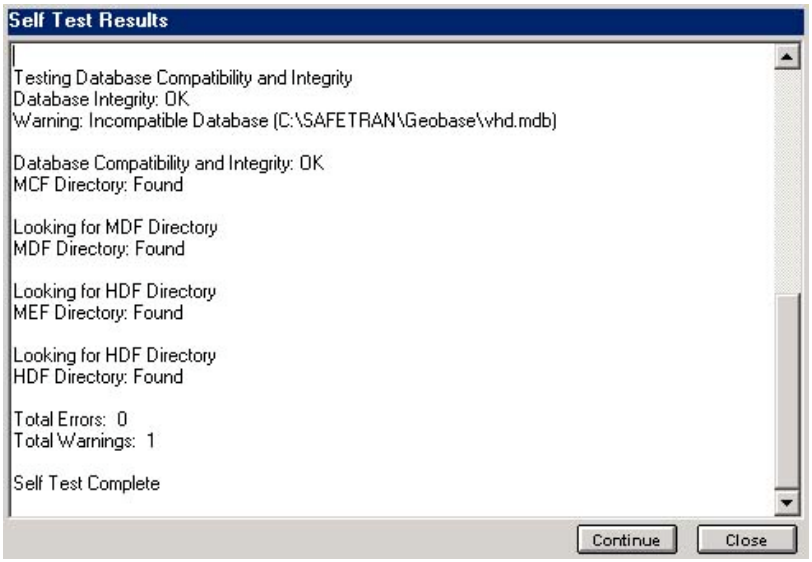

Figure 3-7.
Self-Test Results Window – Incompatible Database

If the database is incompatible with the current version of HD/LINKer and you click on the **Continue** button in the Self-Test Results window, the window shown in figure 3-8 appears.

Figure 3-8.
Self-Test Dialog Box – Other Database File Selection

Clicking on **Yes** returns you to figure 3-3, Open Dialog Box –Safetran Directory. Select another database file by performing steps 1-4 of paragraph 3.1.1, **Database Not Found**, as instructed.

Clicking on **No** returns you to figure 3-7. Click on **Close** to terminate the HD/LINKer program.

3.1.3 Restoring the Database

To restore the database and continue the application:

1. Click on the **Continue** button. The **Database Selection** dialog box (Figure 3-9) appears.

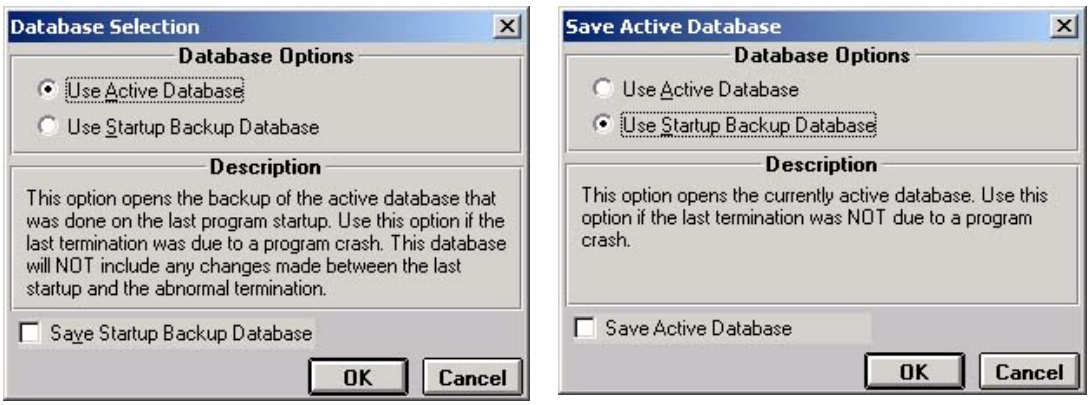

Figure 3-9.
Database Selection Dialog Box

2. Select either the **Use Active Database** (default) or the **Use Startup Backup Database** radio button in the **Database Options** section of the dialog box.

   The Description field contains information associated with each option.

   The **Save Startup Backup Database/Save Active Database** check box allows you to save the unselected database.

3. Click on **OK**.

The **Database Selection** dialog box closes, all the self-tests are run again, and a new backup of the active database file is made.

The **Cancel** button returns execution to the Self-Test Results window without affecting any databases.

3.1.4 Login

At the successful completion of the self-test routines, the **HD/LINKer Login** dialog box (figure 3-10) appears.

Figure 3-10.

HD/LINKer Login Dialog Box

The login procedure is as follows:

1. Select a name from **User Name** list.

NOTE

Only user names entered during installation or by the Password Administrator appear. See paragraph 4.1 for user registration.

2. Enter the password in the **Password** field and click **OK**. The HD/LINKer Main Window (Figure 3-11) appears. Refer to paragraph 6.1 for a description of the Main Window.

Figure 3-11.
HD/LINKer Main Window

SECTION IV
USER REGISTRATION

4.1 USER REGISTRATION

User registration is as follows:

1. Click on the Password Administrator button (see right) on the Main Tool Bar. Refer to paragraph 6.1.1 for a description of the Main Tool Bar.

   The HD/LINKer Administrator Login dialog box (figure 4-1) appears.

Figure 4-1. HD/LINKer Administrator Login Dialog Box

2. Enter the administrator password in the **Password** field and click **OK**.

NOTE

The default password for the HD/LINKer program is *SAFETRAN*. This password allows initial access to the Password Administrator functions. Change this password after installation to maintain proper application security. Refer to paragraph 4.2 for password modification instructions.

The Password Administrator dialog box (figure 4-2) appears.

Figure 4-2. Password Administrator Dialog Box

3. Click on the **Add** button to add a new user. The **Add New User** dialog box (figure 4-3) appears.

Figure 4-3. Add New User Dialog Box

Figure 4-4. Password Confirmation Dialog Box

4. Enter the user name in the **User Name** field.

5. Enter a password in the **Password** field. Select a user access level and click **OK**. The **Password Confirmation** dialog box (figure 4-4) appears.

NOTE

Unrestricted User is the default selection.

7. Re-enter the password in the **Please re-enter your Password** field and click **OK**.

4.2 MODIFY USER NAME OR PASSWORD

Modify an existing user name or password as follows:

1. Click on the **Password Administrator** button (see right) on the Main Tool Bar. Refer to paragraph 6.1.1 for a description of the Main Tool Bar.

   The **Administrator HD/LINKer Login** dialog box (see figure 4-1) appears.

2. Enter the administrator password in the **Password** field and click **OK**.

   The **Password Administrator** dialog box (see figure 4-2) appears.

3. Select the user name from the **User Name** list.

4. Click on the **MODIFY** button.

   The **Modify Existing User** dialog box (figure 4-5) appears.

5. Modify the user name in the **User Name** field as required.

6. Enter a new password in the **Password** field as required.

7. Select a new user access level as required and click **OK**.

8. Click **OK** again to close the Password Administrator dialog box.

Figure 4-5. Modify Existing User Dialog Box

NOTE

Refer to Table 4-1 for a list of the functions accessible to restricted and unrestricted users. An X indicates that a function is available at an access level.

Table 4-1
HD/LINKer User Access Levels

HD/LINKer Function	Restricted User	Unrestricted User
Login	X	X
Help	X	X
Password Administration		X
Module Configuration Data Entry	X	X
MCF Create	X	X
MCF Display	X	X
Print MCF Approval Listing	X	X
Print Installation Listing		X
Print MCF Contents	X	X
Print Wiring List	X	X
MCF Approval		X
UCN Display		X
MCF Validation	X	X
MCF Delete		X
MCF/MEF Transfer	X	X
MCF In Service Status		X
Check-In/Check-Out		X

SECTION V
SETUP

5.1 HD/LINKER SETUP

The HD/LINKer default settings can be modified using the **HD/LINKer Setup** dialog box. To open the **HD/LINKer Setup** dialog box, click on the **Setup** button (see right) on the Main Tool Bar. Refer to paragraph 6.1.1 for a description of the Main Tool Bar. The **HD/LINKer Setup** dialog box includes five tabs.

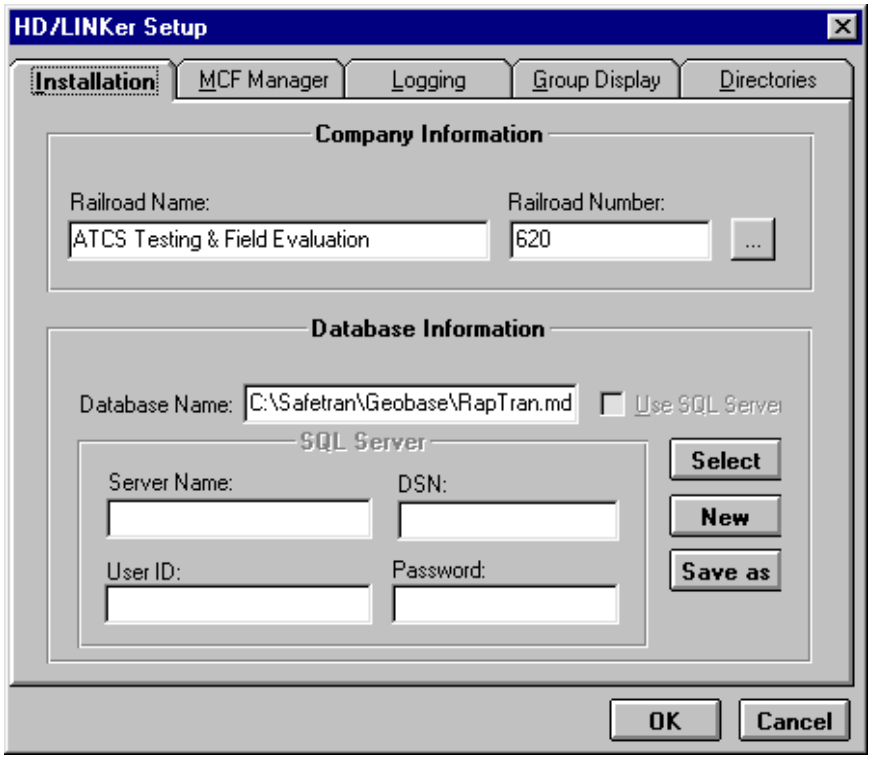

Figure 5-1. HD/LINKer Setup Installation Tab Dialog Box

5.1.1 Installation Tab

The default for the **HD/LINKer Setup** dialog box is the **Installation** tab (figure 5-1). This tab allows you to create a new database or access an existing database. The database listed on the Installation tab is the active ATCS database.

5.1.1.1 Create a New Database

Create a new database as follows:

1. Click on the **New** button.

   The **Enter New Database Name** dialog box (figure 5-2) appears.

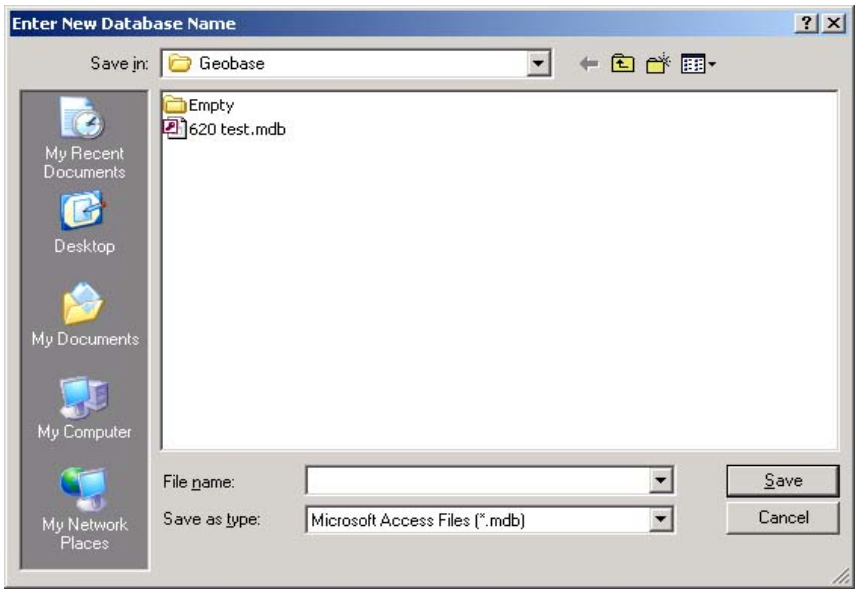

Figure 5-2. Enter New Database Name Dialog Box

2. Enter a database file name.

NOTE

The file name can be up to 255 characters. You do not need to specify an mdb extension. The extension is added automatically when the file name is saved.

3. Click on the **Save** button.

4. Click the button to the right of the **Railroad Number** text box within the **Installation** tab (figure 5-1).

The **Railroad Name** list (figure 5-3) appears.

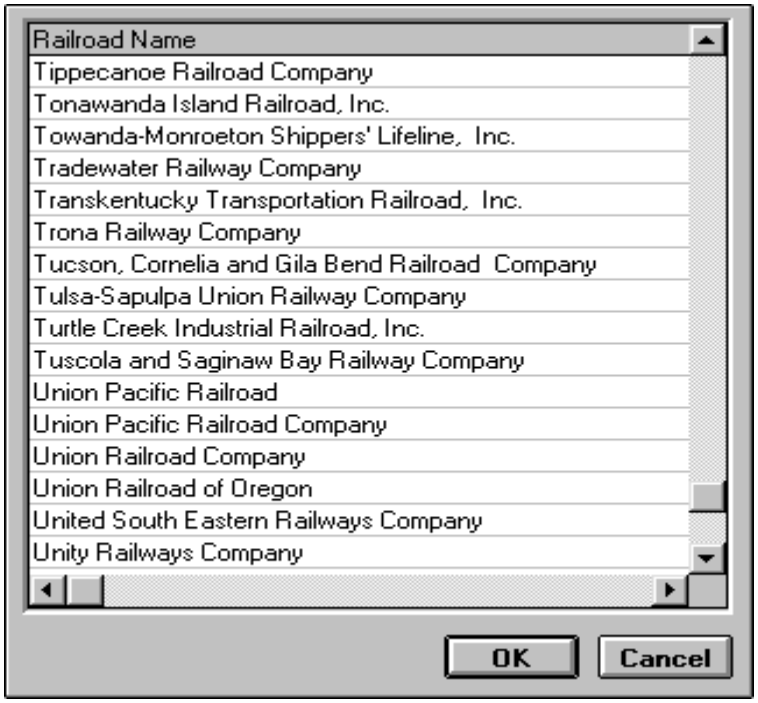

Figure 5-3. Railroad Name List

5. Select a railroad name from the list.

6. Click on **OK**.

   The **Installation** tab appears with the **Railroad Name**, **Railroad Number**, and **Database Name** fields now containing the railroad and database designations.
   Click on **OK**.

WARNING

IF MULTIPLE ATCS DATABASES ARE USED, THE RAILWAY CARRIER MUST ENSURE THAT ATCS ADDRESSES ARE NOT DUPLICATED ACROSS DATABASES.

7. Click on **OK**.

   The **HD/LINKer Setup** dialog box closes, the new database becomes the current ATCS database, and a backup of this database is made. Clicking on the **Cancel** button closes the dialog box without making the newly created database the current ATCS database, and without making a backup.

5.1.1.2 Select a Database

Select an existing database as follows:

1. Click on the **Select** button. The **Select an existing Database** dialog box (figure 5-4) appears.

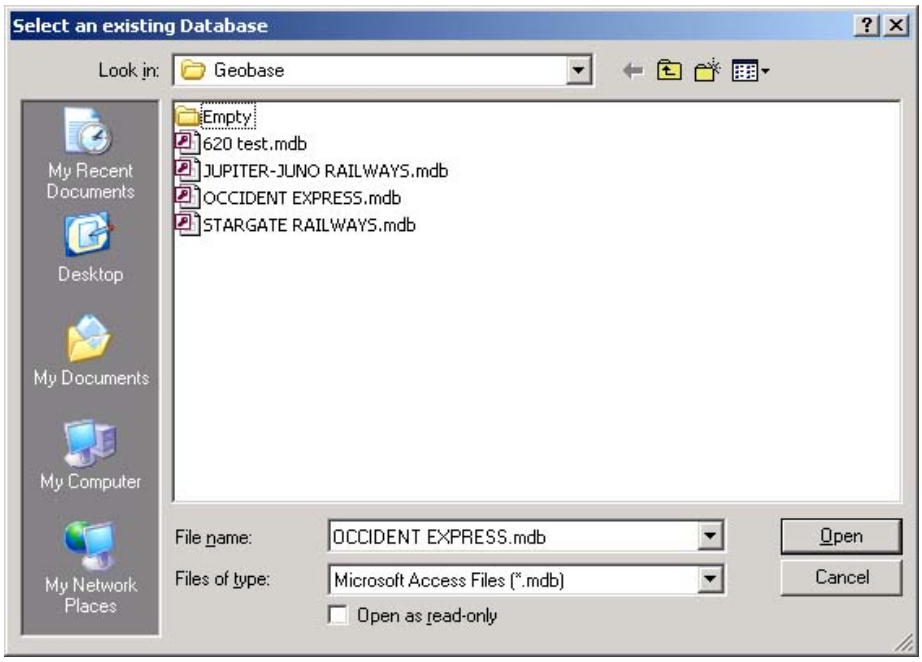

Figure 5-4. Select An Existing Database Dialog Box

2. Select the database file name from the database list. Click on the **Open** button.

NOTE

If the selected database is incompatible with the current HD/LINKer version, the **Upgrade Database** dialog box (figure 5-5) appears:

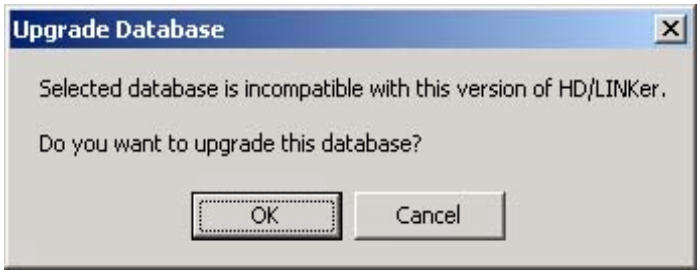

Figure 5-5. Upgrade Database Dialog Box

Click **OK** to upgrade the selected database. Otherwise click **Cancel**.

3. The **Installation** tab appears. The selected database file name now appears in the **Database Name** field and the corresponding railroad name and number are shown in the **Company Information** fields.

NOTE

The company information assigned to a database can be changed until group and configuration data are transferred to it. After this occurs, the Company Information selection button is disabled while that database is selected.

4. Click on **OK**.

   The **HD/LINKer Setup** dialog box closes. The selected database becomes the current ATCS database and a backup of this database is made. Clicking on the **Cancel** button closes the dialog box without making the selected database the current ATCS database, and without making a backup.

5.1.1.3 Save As

The **Save as** button saves the existing database with a new name. Do the following:

1. Click on the **Save as** button (figure 5-1).

   The **Enter New Database Name** dialog box (figure 5-2) appears.

2. Select the file name of the database to be saved from the **File Name** list.

3. Change the file name within the **File Name** field to the desired file name.

4. Click on the **Save** button.

   The Installation tab appears. A copy of the database is created and assigned the new file name. The new database file name now appears in the **Database Name** field and the corresponding railroad name and number are shown in the **Company Information** fields.

5. Click on **OK**.

   The **HD/LINKer** Setup dialog box closes. The new database becomes the current ATCS database and a backup of this database is made. Clicking on the **Cancel** button closes the dialog box without making the new database the current ATCS database, and without making a backup.

5.1.2 MCF Manager Tab

The **MCF Manager** tab (figure 5-6) includes check boxes to help you with the following options:

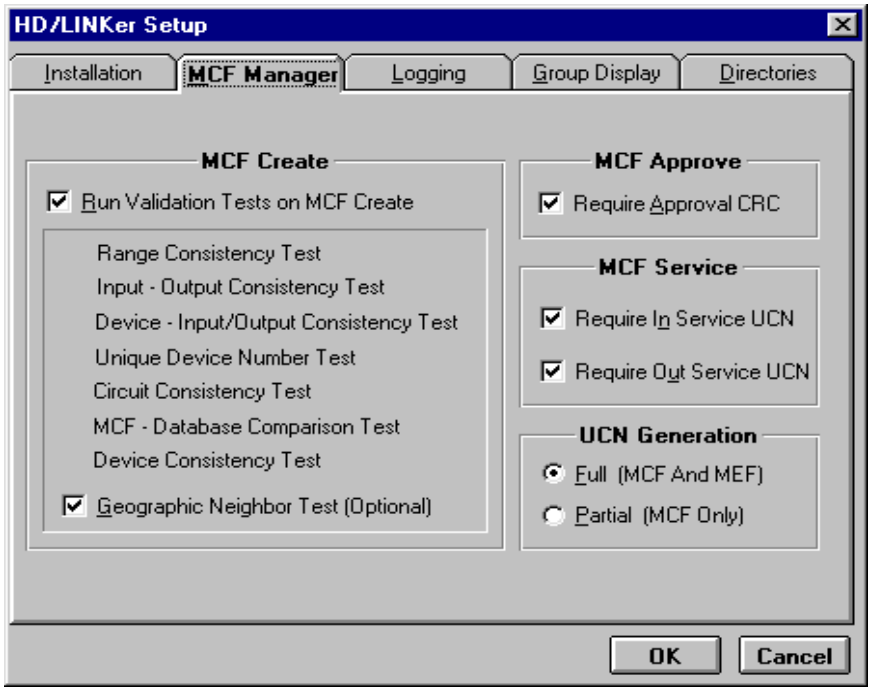

Figure 5-6. MCF Manager Tab

Run Validation on MCF Create. When checked, this option enables the validation tests to be started when the MCF is first created. This option also starts the optional Geographic Neighbor Test. Refer to paragraph 11.3 for a discussion of MCF validation and paragraphs 14.1.2 to 14.1.3 for a discussion of MCF validation errors.

- **Geographic Neighbor Test (Optional)**. When started by the Run Validation on MCF Create check box, this check box allows the validation of adjacent (neighbor) MCF for consistency and compatibility.

- **Require Approval CRC**. While selected, it requires that the Cyclic Redundancy Code (CRC), contained within the MCF Approval Listing, be returned to the MCF Manager and entered before an MCF can be approved. This check box is selected by default.

- **Require In Service UCN.** While selected, it requires that the In Service Unique Check Number (UCN) be returned to the MCF Manager and entered before the status of the MCF can be changed from Approved to In Service. This check box is selected by default.

- **Require Out Service UCN**. While selected, it requires that the Out of Service UCN be returned to the MCF Manager and entered before the status of the MCF can be changed from In Service to Out Service. This check box is selected by default.

NOTE

The In Service UCN is calculated by the HD/LINK module during installation, and the HD/LINK module during de-installation calculates the Out of Service UCN. Both must be relayed from the field to the office.

5.1.3 Logging Tab

The **Logging** tab (figure 5-6) allows you to control the maximum number of log records and the trace levels of the HD/LINKer events.

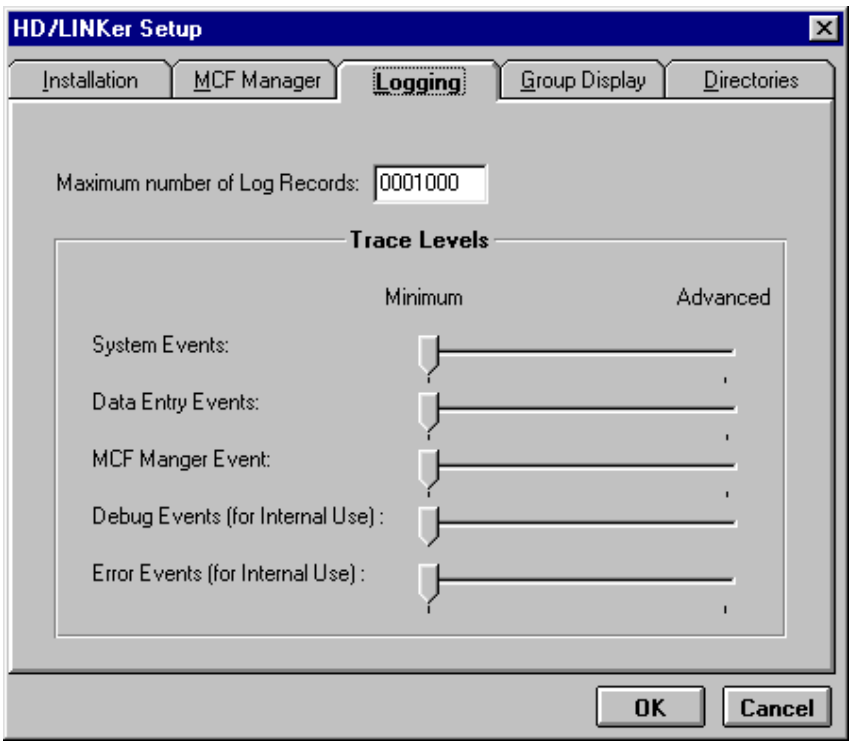

Figure 5-7. Logging Tab

- **Log Records.** You can set this field to maintain any number of log records between 1 and 8,388,607. The default is 1000.

- **Trace Levels.** Events can be recorded at two trace levels: Minimum and Advanced. The minimum trace level is the default and used for standard record keeping. The Advanced trace level is used for diagnostic purposes.

5.1.4 Group Display Tab

The **Group Display** tab (figure 5-8) allows you to determine the:

- group heading display data
- column and header element display colors
- column and header element colors to be printed

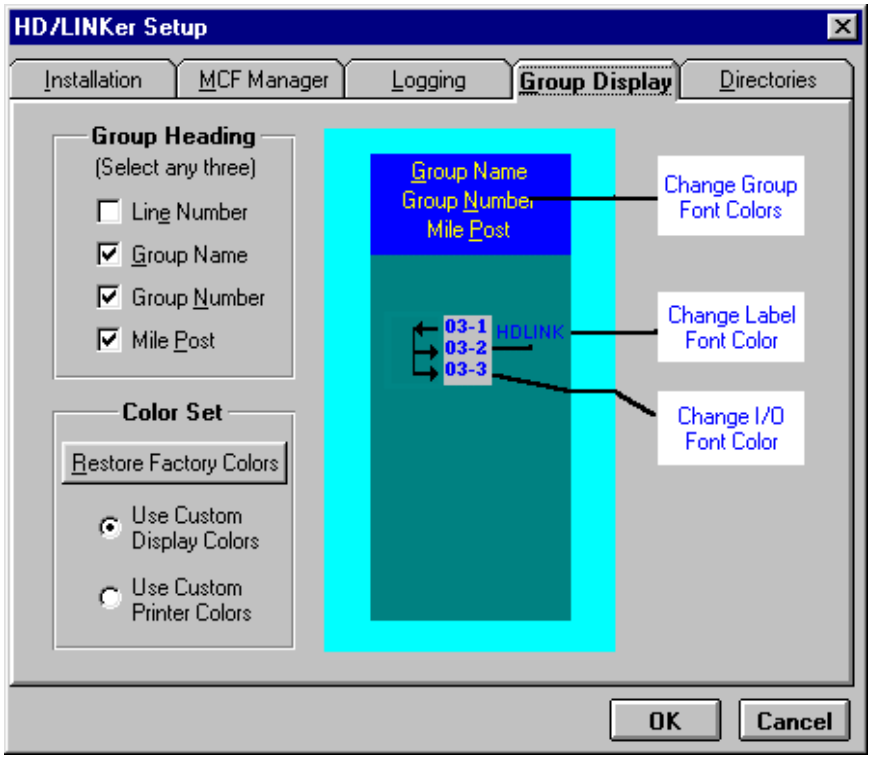

Figure 5-8. Group Display Tab

5.1.4.1 Group Heading Display

Four options are available for the Group Heading display. Only three of the four are shown at one time. The options selected appear in the tab Preview window. The four group-identification options are:

- **Line Number**. Shows the railroad line number.
- **Group Name**. Shows the railroad group name.
- **Group Number**. Shows the railroad group number.
- **Mile Post**. Shows the group milepost designation.

5.1.4.2 Color Set

The **Color Set** Functions customizes the colors of the group element on-screen display and the colors of the group element printout.

The colors of the on-screen display elements are selected for customization when the **Use Custom Display Colors** radio box is checked. The colors of the printed elements are selected for customization when the **Use Custom Printer Colors** radio box is checked.

Return customized colors to the factory default by selecting the corresponding radio button and then clicking on the **Restore Factory colors** button.

5.1.5 Directories Tab

The Directories tab (figure 5-9) lets you create the various Support Files (MCFs, MEF, MDFs, and HDFs) in another directory. For example, this lets you work from a network directory:

- **MCF**. Sets the HD/LINKer's Module Configuration Files to a new directory.
- **MEF**. Sets the HD/LINKer's Module Executable File to a new directory.
- **MDF**. Sets the HD/LINKer's Module Description Files to a new directory.
- **HDF**. Sets the HD/LINKer's Hardware Description Files to a new directory.

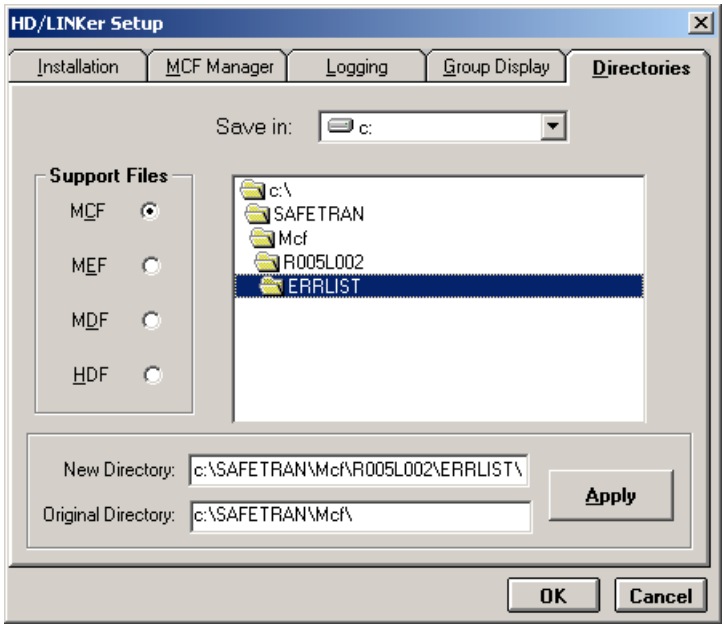

Figure 5-9. Directories Tab

NOTE

Clicking on the **OK** or **Cancel** button from the Directories tab closes the dialog box without copying the Support Files. The HD/LINKer main window appears.

After making your selection, click the **Apply** Button. The window shown in figure 5-10 appears. Click **OK** to confirm.

Figure 5-10. Check Files Window

SECTION VI
MAIN WINDOW DESCRIPTION

6.1 MAIN WINDOW ELEMENTS

The Main Window (figure 6-1) is where you design the group-specific I/O module configurations for the HD/LINK system.

The Main Window consists of three functional elements:

- Main Tool Bar
- Circuit View
- Status/Progress Bar.

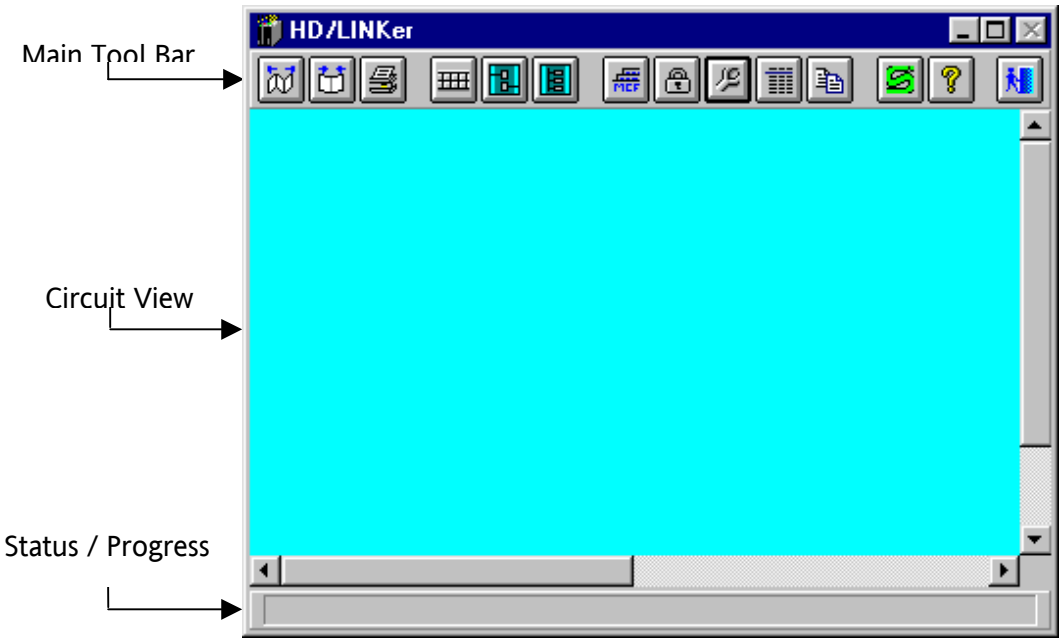

Figure 6-1.
Main Window

6.1.1 Main Tool Bar

The Main Tool Bar (figure 6-2) allows access to Virtual Circuit Editor, MCF Manager, and Auxiliary functions. Table 6-1 describes the functions of the Main Tool Bar buttons.

NOTE

When you move the cursor over a Main Tool Bar button, a tool-tip appears, showing a description of that button.

Figure 6-2. Main Tool Bar

Table 6-1. Main Tool Bar Button Functions

Button	Description
	The **Open Layout** button opens the **Circuit Layout** dialog box (figure 9-5), where one or more Groups can be selected for display in the Circuit View (figure 6-4).
	The **Clear Layout** button removes all displayed Groups from the Circuit View (figure 6-4).
	The **Print Visible Circuits** button prints the Circuit View area to the default printer and captures the image to the clipboard when there are groups displayed. It will capture the Module or Communications views as well, if one of them appears.
	The **I/O Tool Bar** button appends or removes (shows/hides) the Circuit I/O Tool Bar below the Main Tool Bar. The Circuit I/O Tool Bar enables access to the Virtual Circuit editing functions.
	The **Comm View** button appends or removes (shows/hides) the Communications View at the bottom of the Main Window (figure 6-6). This View is where the communications components of Virtual Line Circuits are shown and edited.
	The **Module View** button appends or removes the Module View at the bottom of the Main Window (figure 6-5). This View is where I/O Modules are shown, created, edited, and deleted.

Button	Description
	The **MCF Manager** button opens the **MCF Manager** dialog box (figure 11-1), where MCF management functions can be accessed.
	The **Password Admin** button opens the HD/LINKer Login dialog box (figure 4-1), where users can log in or modify user information.
	The **Setup** button opens the **HD/LINKer Setup** dialog box (figures 5-1, 5-5, 5-6, & 5-7), where HD/LINKer operational options can be selected.
	The **Log Viewer** button opens the **Log Viewer** window (figure 16-1), where the log file can be accessed.
	The **Check in/Check out** button opens the **Check in/Out Database** (Figure 14-1) dialog box, where the ATCS Master Data Base files can be accessed.
	The **About** button opens the **About HD/LINKer** window, where current user and application information appears.
	The **Help** button calls the HD/LINKer on-line help menu.
	The **Exit** button terminates HD/LINKer program execution.

6.1.1.1 Circuit I/O Tool Bar

The Circuit I/O Tool Bar (figure 6-3) appears on the Main Window below the Main Tool Bar when the Show/Hide I/O Tool Bar button is clicked on. Table 6-2 describes the functions of the Circuit I/O Tool Bar buttons.

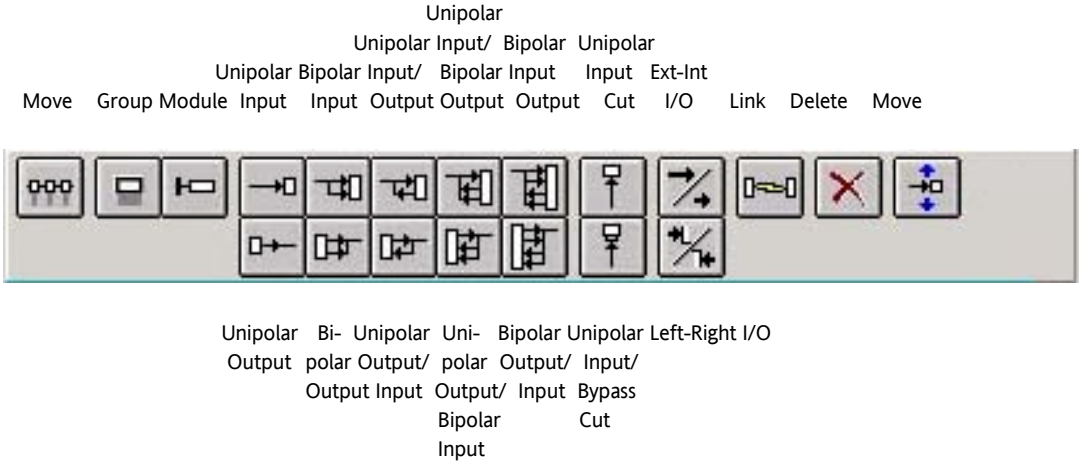

Figure 6-3. Circuit I/O Tool Bar

Table 6-2. Circuit I/O Tool Bar Functions

Button	Description
	The **Line** button opens the Line window, where Line Controller equipment can be selected and Lines can be added, modified or deleted.
	The **Group** button creates a Group on an existing Line.
	Te **Module** button createsa Module on an existing Group.
	Te **Unipolar Input** button createsa Termination Input for a Unipolar-Unidirectional virtual circuit.
	The **Unipolar Output** button creates a Termination Output for a Unipolar-Unidirectional virtual circuit.
	The **Bipolar** Input button creates a Termination Input for a Bipolar-Unidirectional virtual circuit.
	The **Bipolar Output** button creates a Termination Output for a Bipolar-Unidirectional virtual circuit.
	The **Unipolar Input-Output** button creates a Termination Input-Output for a Unipolar-Bidirectional virtual circuit.

Button	Description
	The **Unipolar Output/Input** button creates a Termination Input-Output for a Unipolar-Bidirectional virtual circuit.
	The **Unipolar-Input Bipolar-Output** button creates a Termination Input-Output for a Unipolar-Input Bipolar-Output Bidirectional virtual circuit.
	The **Unipolar-Output Bipolar-Input** buttons creates a Termination Input-Output for a Unipolar-Output Bipolar-Input Bidirectional virtual circuit.
	The **Bipolar Input-Output** button creates a Termination Input-Output for a Bipolar Bidirectional virtual circuit.
	The **Bipolar Output-Input** button creates a Termination Input-Output for a Bipolar Bidirectional virtual circuit.
	The **Unipolar Input Cut** button creates a Cut Input for any type of virtual circuit.
	The **Unipolar Input/Bypass Cut** button creates a Cut Input Bypass for any type of virtual circuit.
	The **Ext-Int I/O** button alternates the Circuit I/O buttons, on the Circuit I/O Tool Bar, between External and Internal I/O.
	The **Left-Right I/O** button alternates the Circuit I/O buttons, on the Circuit I/O Tool Bar, between left and right oriented I/O.
	The **Link** button creates a Virtual Line Circuit.
	The **Delete** button deletes Virtual Circuits, I/O, Modules, and Groups.
	The **Move** button repositions Termination and Cut I/O along a Group Column.

NOTE

When you move the cursor over a Main Tool Bar button, a tool-tip appears, showing a description of that button.

6.1.2 Circuit View

The Circuit View is the development area where Groups, I/O and Circuits are shown and manipulated as shown in figure 6-4.

6.1.2.1 Module View

The Module View (figure 6-5) is where Modules are shown, created, edited, and deleted. The Module View is shown or hidden at the bottom of the Main Window by clicking the **Show/Hide Module View** button on the Main Tool Bar.

6.1.2.2 Communications View

The Communications View (figure 6-6) is where the communications components of Virtual Line Circuits are shown and edited. The Communications View shown or hidden at the bottom of the Main Window by clicking the **Show/Hide Communications View** button on the Main Tool Bar.

6.1.3 Status/Progress Bar

The Status/Progress Bar shows the results and progress of Virtual Circuit editing functions.

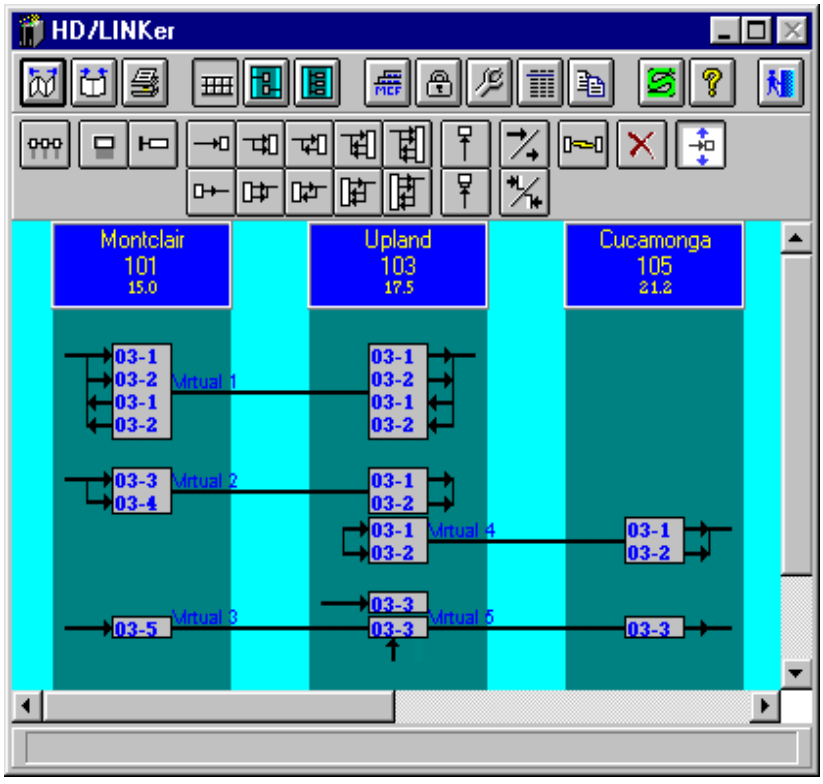

Figure 6-4. Main Window With I/O Tool Bar & Circuit View

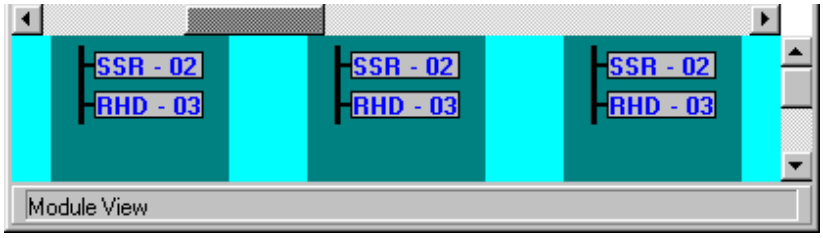

Figure 6-5. Module View

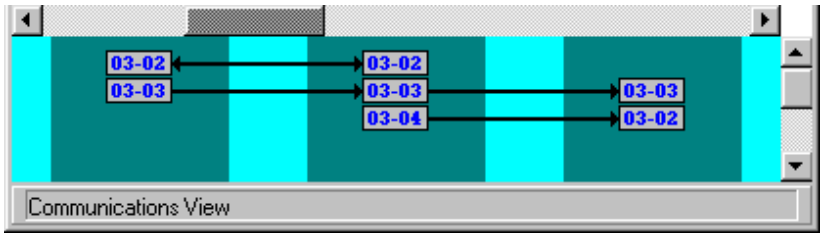

Figure 6-6. Communications View

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SECTION VII
CIRCUIT CONFIGURATIONS

7.1 MODULE CONFIGURATIONS

The HD/LINK module consists of independent Vital Parallel Input (VPI) channels, Vital Relay Output (VRO) channels, and internal I/O channels.

The VPI channels are enabled to sense the state of relay contacts, while the VRO channels are enabled to drive vital signaling relays. Internal input channels are enabled to sense the output of other internal channels, and internal output channels are enabled to drive other internal input channels.

The channels of an HD/LINK module can be configured to perform a variety of signaling functions as described in the following paragraphs. HD/LINK module configuration is determined by the MCF data stored in the External Configuration Device (ECD) of the interface connector.

7.1.1 Designation and Identification

In the following discussion, each HD/LINK module configuration is shown by a block diagram, showing the interconnection and interrelationship between the configured channels. Within each channel block, the type of channel and channel number are identified.

Included with each block diagram are two unique symbols that define the attributes of the configuration: external and internal.

- The external symbol designates that the configured channels are connected to external vital I/O.
- The internal symbol designates that the configured channels interact only with internal I/O events generated within one or more interconnected channels of the module.

In the graphic representation of a functional configuration, two numbers separated by a dash identify each symbol. The first number corresponds to the assigned module number within the group. The second number corresponds to the I/O channel used in the configuration.

7.1.2 Unipolar Input/Output

These configurations (figure 7-1) consist of single channels within the HD/LINK module.

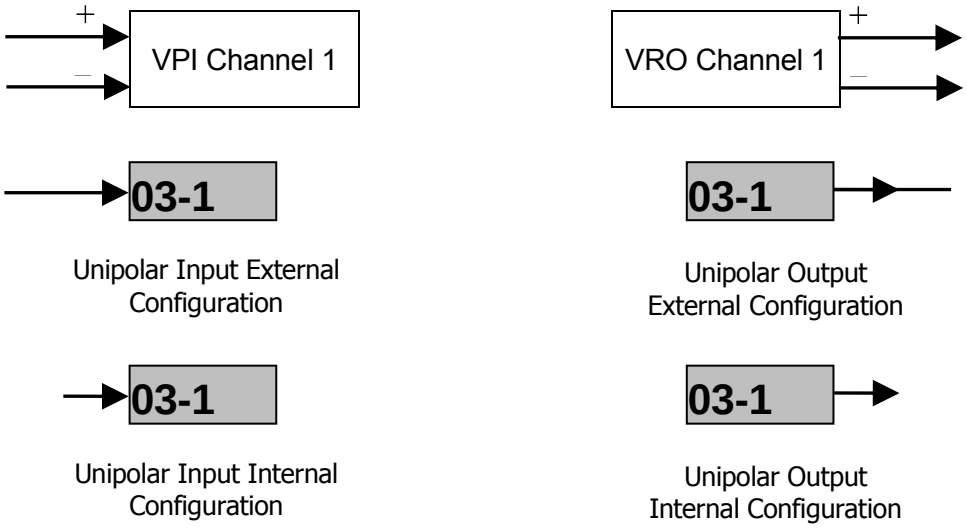


Figure 7-1. Unipolar Configurations

NOTE

The channel designations for both input and output channels are depicted in the same way. Input and output channels are identified by the direction of arrows on the symbol. Input channels are shown with arrows pointing towards the main body of the symbol, while output channels are shown with arrows pointing away from the main body of the symbol.

7.1.3 Bipolar Input/Output

These configurations consist of two channels interconnected as shown in figure 7-2.

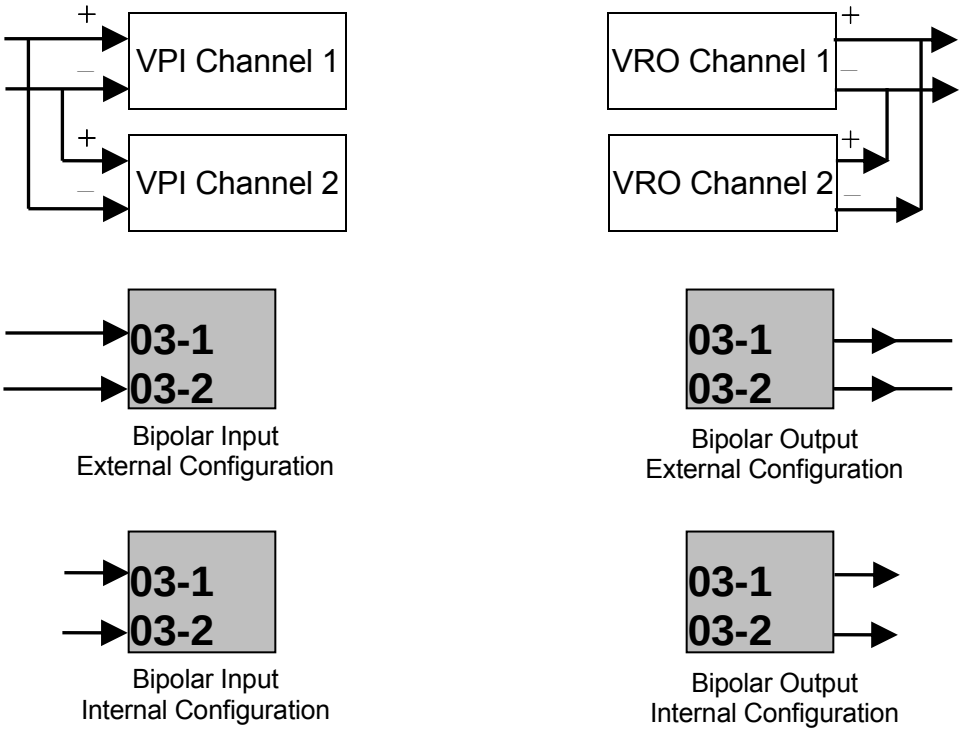


Figure 7-2. Bipolar Configurations

7.1.4 Unipolar Bidirectional Input/Output

This configuration consists of one input channel connected to one output channel as shown in figure 7-3.

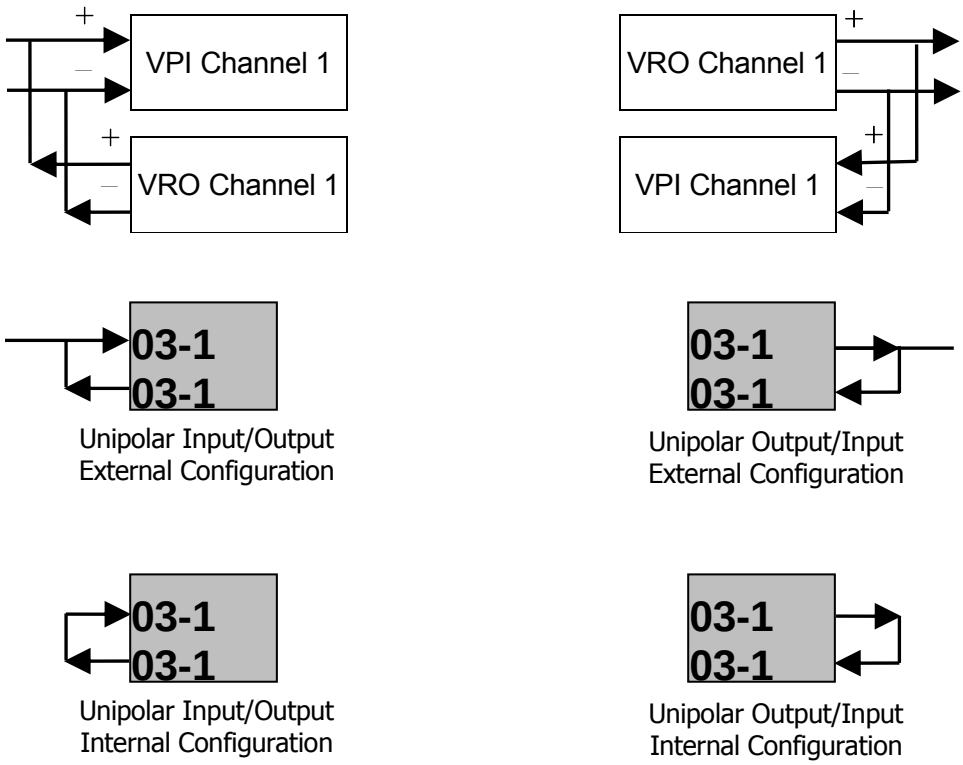


Figure 7-3. Unipolar Input/Output Configurations

7.1.5 Unipolar Bipolar Bidirectional Input/Output

This configuration consists of three I/O channels arranged as shown in figure 7-4:

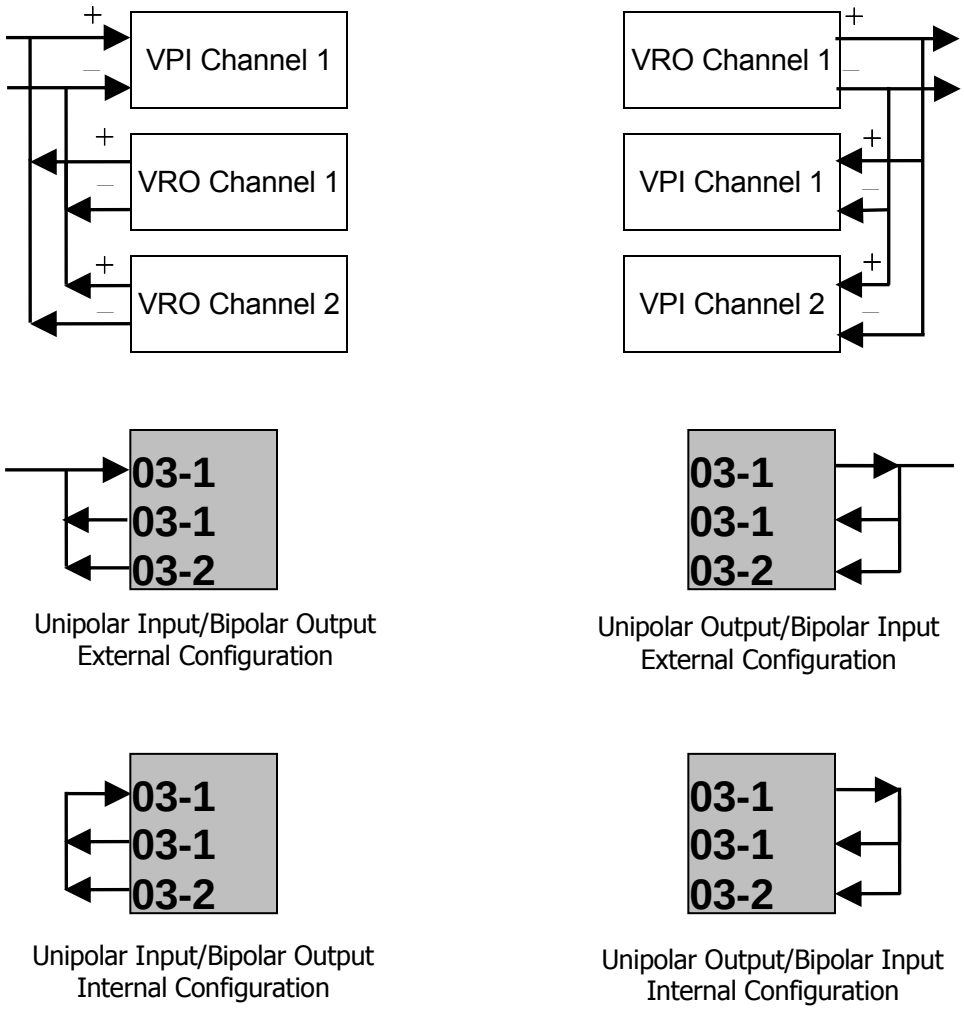


Figure 7-4. Unipolar Bipolar Configurations

- The unipolar input/bipolar output configuration contains one VPI channel and two VRO channels.
- The unipolar output/bipolar input configuration contains one VRO channel and two VPI channels.

7.1.6 Bipolar Bidirectional Input/Output

This configuration consists of two VPI channels and two VRO channels connected as shown in figure 7-5.

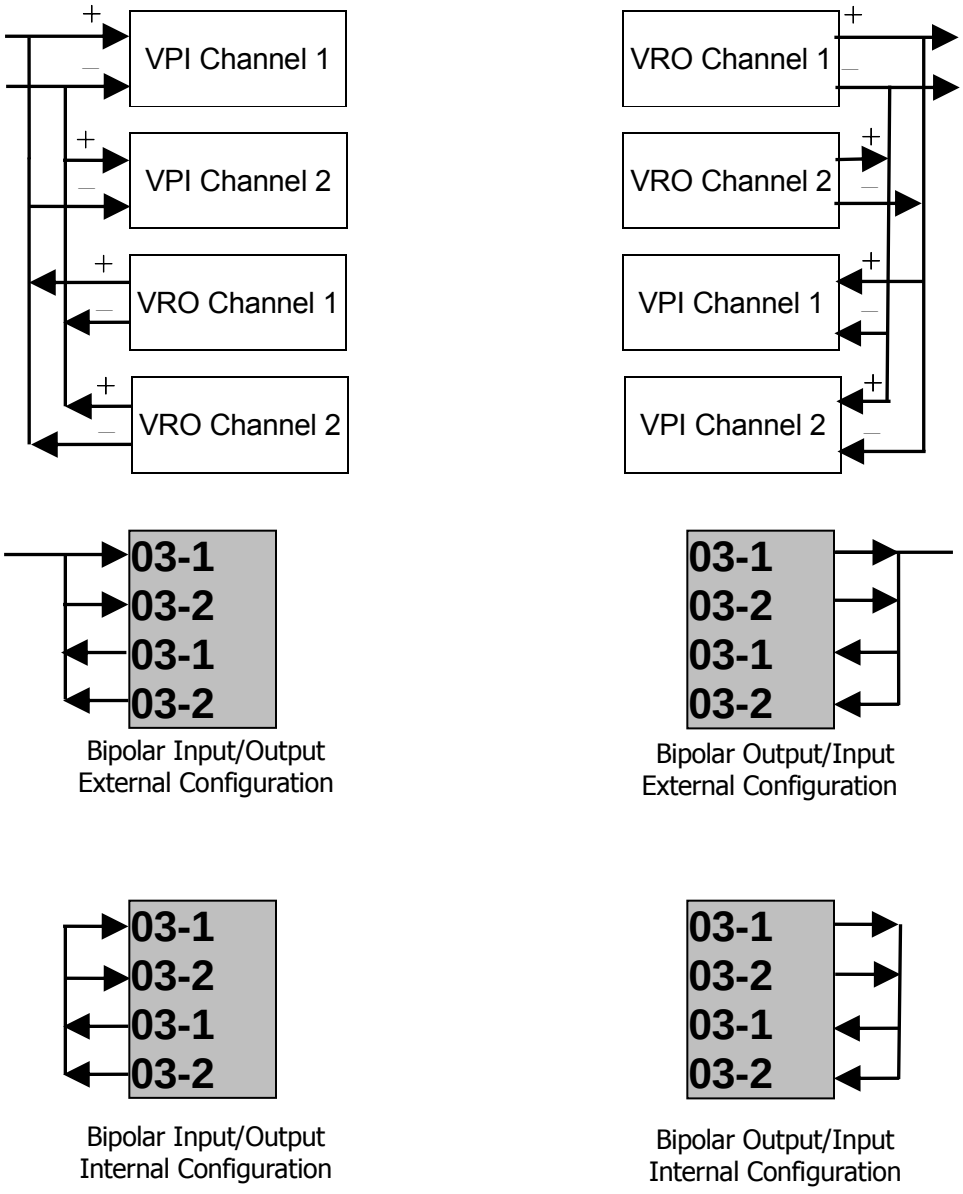


Figure 7-5. Bipolar Bidirectional Configurations

7.1.7 Cut Circuits

The HD/LINKer allows configuration of two types of cut circuits: the functional cut circuit, which interrupts connected virtual circuits when a predetermined vital event occurs, and the bypass cut circuit, which protects certain vital circuits from interruption. Both cut circuit configurations consist of a single channel as shown in figure 7-6.

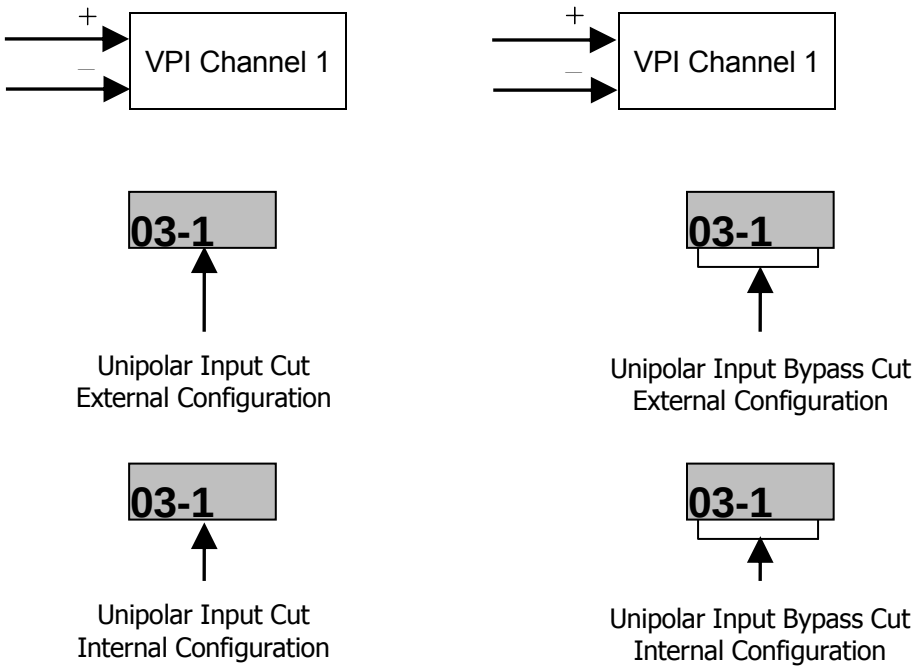


Figure 7-6. Cut Circuit Configurations

The cut circuit is controlled by the state of a single vital relay input. While the relay input is active, virtual circuit transmission is enabled. While the relay input is inactive, transmission through the circuit is interrupted. Virtual circuit transmission through the bypass cut circuit is unaffected by the state of the vital relay input.

7.1.8 Internal Configurations

Internal circuit configurations communicate by means of internal connections as shown in figure 7-7.

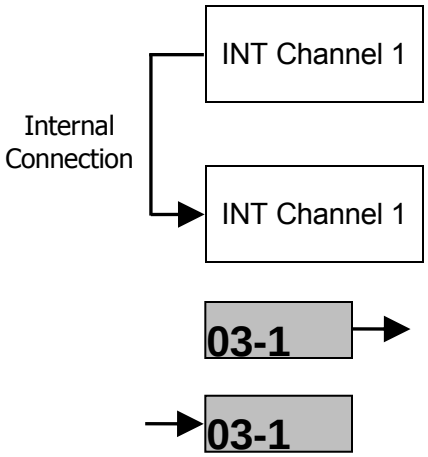


Figure 7-7. Internal Connection of Internal I/O

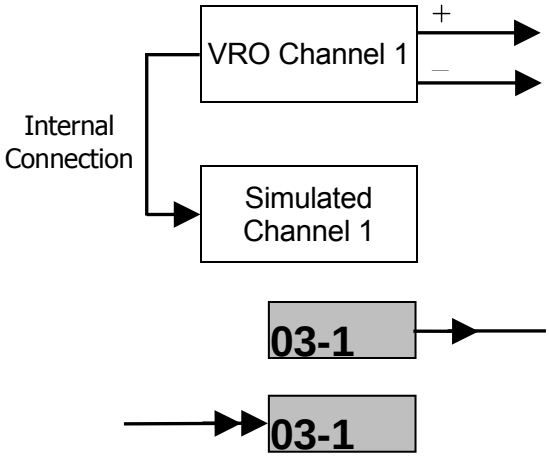


Figure 7-8. Internal Connection of External I/O

Internal connections can be established between any two complementary module configurations. For example, a bipolar output channel can be configured to internally drive a bipolar input channel, but a bipolar output channel configuration cannot be configured to drive a unipolar input channel configuration.

7.1.9 External/Internal Configurations

An external/internal configuration is shown in figure 7-8. In this configuration, the VRO is used to drive an external vital signaling relay and a simulated input channel. The simulated input channel functions as an internal input channel. External/internal connections are permitted only between complementary unidirectional configurations.

SECTION VIII
VIRTUAL LINE CIRCUITS

8.1 VIRTUAL LINE CIRCUIT OVERVIEW

Communication between groups of the HD/LINK system is by means of radio transmissions rather than conventional pole-lines (see figure 8-1). Radio transmissions (links) between groups are referred to as virtual lines.

Each HD/LINK group consists of one or more HD/LINK vital I/O modules and a Spread Spectrum Radio (SSR). Intra-group communications is by means of an Echelon® LonTalk™ Local Area Network (LAN). Vital Parallel Inputs (VPIs) to an I/O Module within a group can be transferred to other channels within the receiving module, to another I/O Module within the same group, or to an I/O Module at a remote (neighbor) group. Vital inputs received via LAN or a virtual line are translated to Vital Relay Outputs (VROs) by the receiving I/O Module.

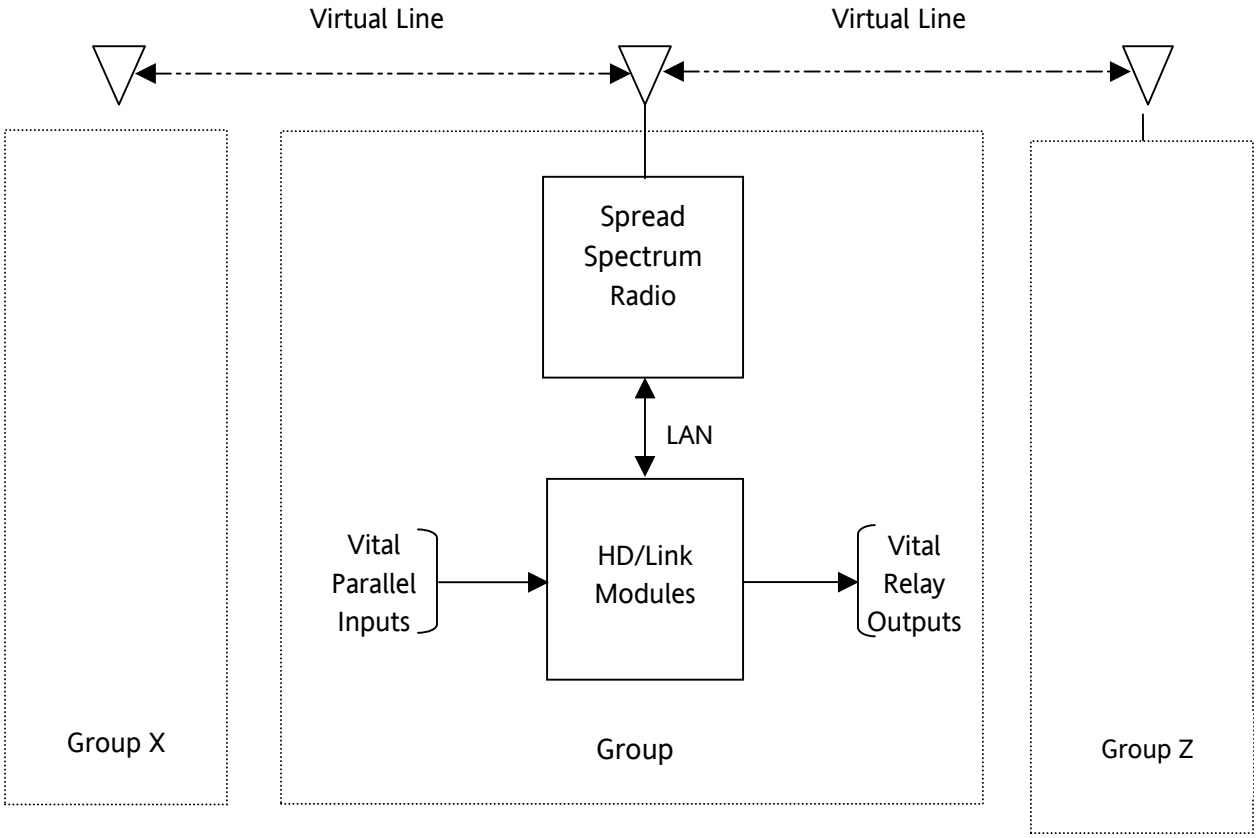


Figure 8-1. HD/LINK System

8.2 ATCS ADDRESSING

All in-service HD/LINK vital I/O modules are identified by a standardized addressing scheme, consisting of fourteen digits in the following format: 7.RRR.LLL.GGG.SS.DD where:

7 = Wayside equipment

RRR = Railroad number

LLL = Line number

GGG = Group number

SS = Subnode or Module number

DD = Device number

The **RRR** fields represent the railroad number assigned by ATCS Specification 250. See Appendix E for a list of Railway carriers.

The **LLL** fields represent the Line number within the Railroad. The LLL fields are normally assigned by each railroad according to internal conventions.

The **GGG** fields represent the Group (location) number within the Line. The GGG fields are normally assigned by each railroad according to internal conventions.

The **SS** fields represent the numbers assigned to the Group's modules. By default, two numbers are always pre-assigned at each location. Number 01 is reserved for the wayside-to-office communications device. Number 02 is reserved for the SSR. I/O module numbers are allocated in sequence beginning at 03.

The **DD** fields represent the numbers assigned to a communications component (see paragraph 8.3.1). By default, one number is always pre-assigned at each component. Number 01 is reserved for the I/O Manager of the HD/LINKer executive software. Other components are allocated in sequence beginning at 02.

8.3 COMMUNICATIONS SESSIONS

A standardized ATCS message format known as a datagram is employed during communications sessions. Each datagram consists of five major fields as shown in figure 8-2.

Destination	Source	M#	Label	Data

Figure 8-2. ATCS Datagram

The **Destination** field is the address of the recipient I/O module.

The **Source** field is the address of the sending I/O module.

The **M#** (message number) field is sequentially allocated by the source I/O module, enabling the recipient I/O module to detect duplicate, missing, or out of order messages.

The **Label** field identifies the type of information transmitted within the **Data** field.

The **Data** field comprises vital instructions for the recipient I/O module.

8.3.1 Communications Components

Communications components (figure 8-3) appear in the Communications View as a combination of Termination Communications Server icons, Termination Communications Client icons, Cut Communications Clients/Servers icons, and Communications Session lines.

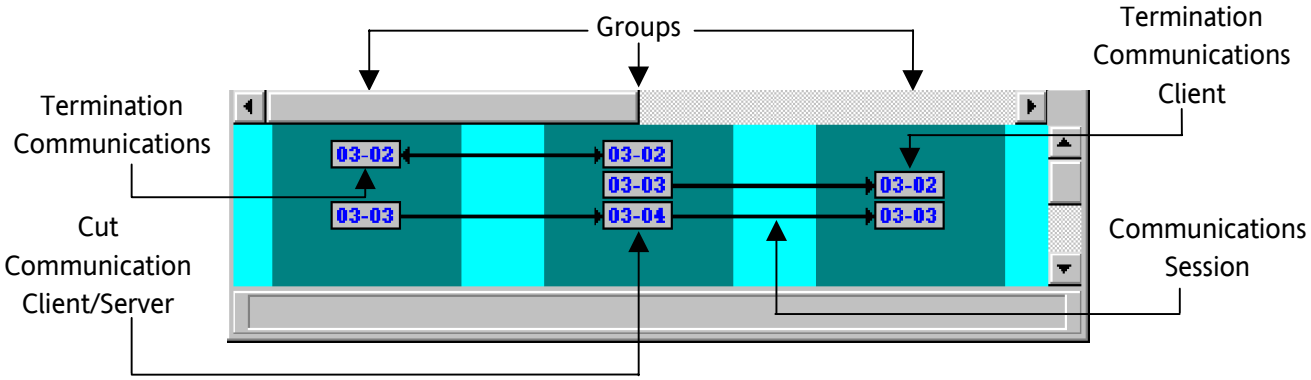


Figure 8-3. Communications Components

Communications icons are identified by two two-digit numbers separated by a dash (see figure 8-4). The first two-digit number corresponds to the assigned module designation within the group. The second two-digit number corresponds to the assigned Server/Client designation.

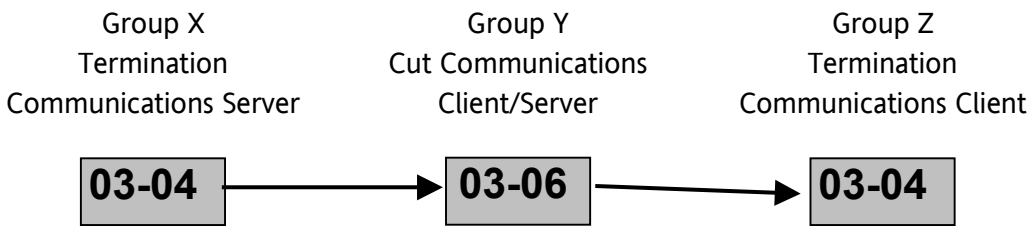


Figure 8-4. Communications Servers

8.3.1.1 Termination Communications Servers

A Termination Communications Server (refer to figure 8-4) broadcasts the status of Vital Parallel Inputs (VPIs) to a neighboring Termination or Cut Communications Client.

Communication Servers broadcast at fixed intervals as specified by user-defined timers (see paragraph 10.1.1.1).

8.3.1.2 Termination Communications Clients

A Termination Communications Client (figure 8-4) receives the status of Inputs, as broadcast by a neighboring Termination or Cut Communications Server, and sets the status of the corresponding Vital Relay Outputs (VROs).

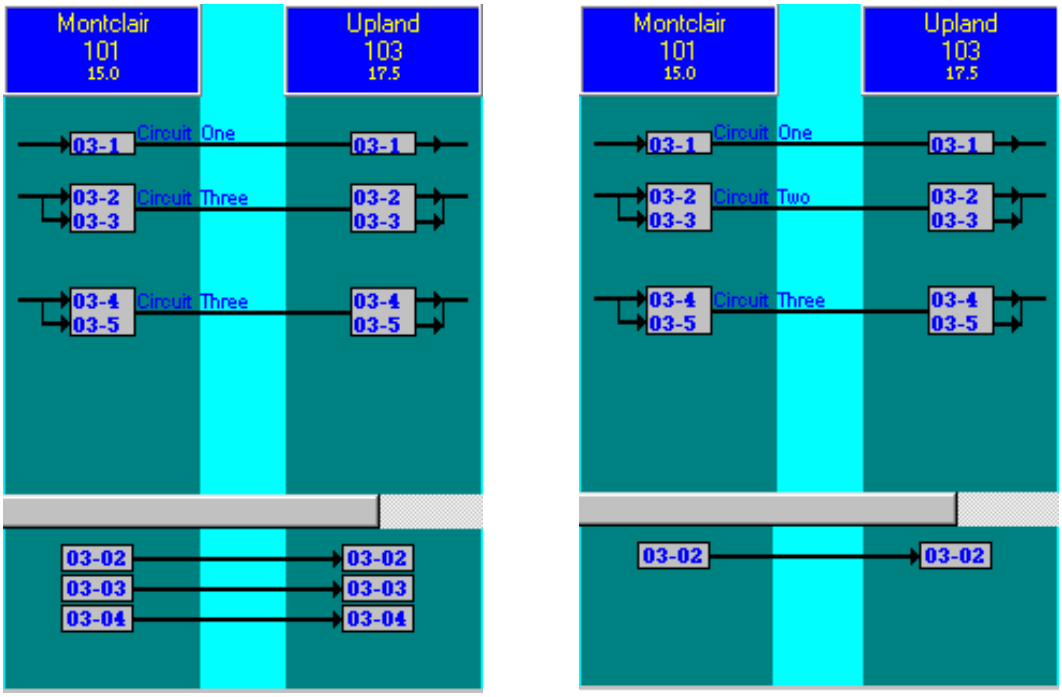
Communications Clients wait for broadcasts at fixed delays as specified by user-defined timers (see paragraph 10.1.1.2).

8.3.1.3 Cut Communications Clients/Servers

The Cut Communications circuit functions both as client and server (refer to figure 8-4). The Cut Communications Client receives the status of Inputs broadcast by a neighboring Termination or Cut Communications Server. The Cut Communications Server then re-broadcasts the status of Inputs received by its Client to a neighboring Termination or Cut Communications Client (see paragraph 12.1.5).

8.3.2 Communications Sessions

When a Virtual Circuit is created, it can be assigned to a new Communications Session or to an existing Session, as described in paragraph 9.3.2.1 (step 13). This is shown in figure 8-5, where identical virtual circuits are configured for multiple Communications Sessions and for a single Communications Session, respectively.



Multiple Communications Sessions **Single Communications Sessions**

Figure 8-5. Communications Sessions

8.3.2.1 Session Guidelines

Communications Sessions between Groups occur in series. Therefore, the total time to transfer the I/O information from one Group to another is directly dependent on the number of Communication Sessions involved. The larger the number of Sessions, the greater the time to complete the transfer. Since I/O events are time sensitive, a large number of Communications Sessions could slow information transfer to the point where performance and reliability of the sessions are adversely effected. In fact, too many Communications Sessions could ultimately slow transmission to the point where I/O information is lost entirely.

The location of Communications Clients and Servers determines the degree to which communications are affected. Sessions within a single module occur over the module's bus, while transfer between two modules within the same Group is via the LAN. The high transmission speeds allowed by these media minimize the effects of multiple sessions. However, communications between modules in separate Groups (via Spread Spectrum Radio) occur at lower rates and are thus more sensitive to the delays caused by multiple sessions. For this reason, it is recommended that the number of Communications sessions be kept to a minimum.

8.3.2.2 Deleting Circuits During Communication Sessions

When deleting an existing virtual circuit between termination devices, i.e. Inputs, Outputs, and Cuts, the HDLINKer deletes the current communications device (SAT) on the side closest to the circuit label, and creates a new SAT with the next unused SAT index. All remaining virtual circuits on the original SAT are rerouted to the new one. All HDLink modules affected by the deleted virtual circuit require the CREATION, APPROVAL and INSTALLATION of new MCF files.

When creating virtual circuits, HDLINKer creates a new SAT with the next unused SAT index. If the current SAT index is at the MAXIMUM SAT limit of 98, a warning message appears, advising that the maximum number of available SATs was reached. After you acknowledge the warning, HDLINKer releases all SAT indexes, except for any currently in use by virtual circuits, and then finds the next unused index, starting at index 03.

WARNING

REUSING A USED OR DELETED SAT INDEX CAN RESULT IN INCORRECT BIT MAPPING TO A RECEIVING HDLINK MODULE IF YOU DO NOT ENSURE PROPER DATABASE, FILE MANAGEMENT, AND AS-IN-SERVICE TESTING PROCEDURES. IT IS EXTREMELY IMPORTANT TO UPDATE ALL FIELD LOCATIONS THAT ARE AFFECTED BY REMAPPING VIRTUAL CIRCUITS. YOU REMAIN RESPONSIBLE FOR PERFORMING ALL NECESSARY SIGNAL IN-SERVICE TESTING AND OPERATIONAL CHECKS UPON INSTALLING MCF FILES.

When deleting virtual circuits that involve one or more cut devices, follow these rules:

- If the whole circuit is to be deleted, all links associated with the circuit are to be completely deleted before any other action is taken. For example, creating, modifying, re-linking or deleting other circuits.

- If the circuit is being reworked, complete the change before any other action is taken. For example, creating, modifying, re-linking or deleting other circuits.

SECTION IX
VIRTUAL CIRCUIT EDITOR

The Virtual Circuit Editor allows you to perform the following functions:

- Select line and group data for specific railroad territories.
- Select and configure the I/O modules for each group.
- Create the virtual circuits between groups.

9.1 LINE SELECTION

A Line Controller can be selected and a Line can be added, edited, or deleted by means of the **Line** dialog box (figure 9-1). To access the **Line** dialog box, click on the Line button (see right) on the Circuit I/O Tool Bar. Clicking on the **Cancel** button closes the dialog box without saving any changes.

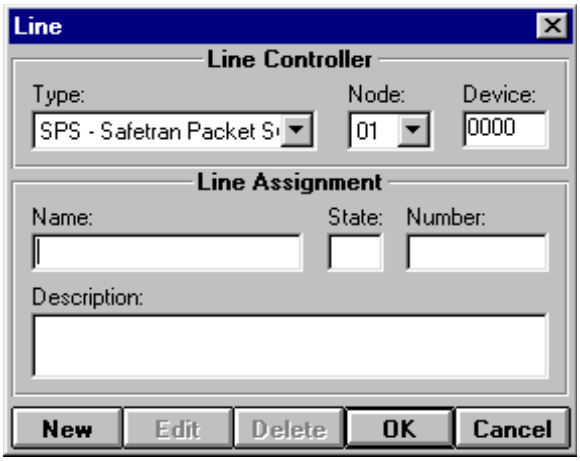


Figure 9-1. Line Dialog Box

9.1.1 Line Controller

Select a Line Controller as follows:

1. Select the required communications equipment from the **Type** list.
2. Select the corresponding node number from the **Node** list.

NOTE

Line Controller refers to FEP/Cluster Controller office equipment found in the ATCS Radio-Based Codeline systems. The **Type** list contains the equipment options available for communication with wayside equipment. Where Line Controller equipment is not available, a default listing is provided for line assignment.

9.1.2 Line Assignment

9.1.2.1 Add a New Line

1. Select a Line Controller from the **Type** list.

NOTE

The new Line is assigned to the selected Line Controller.

2. Click on the **New** button.
3. Enter the new Line name in the **Name** field.
4. Enter the state abbreviation in the **State** field (optional).
5. Enter the new Line number in the **Number** field (three digits maximum).
6. Enter a brief description of the Line in the **Description** field (optional).
7. Click on the **OK** button.

   The new Line is saved to the Master ATCS Database and the dialog box closes.

9.1.2.2 Edit an Existing Line

1. Select the Line Controller associated with the existing Line from the **Type** list.
2. Select either the Line name from the **Name** list or the Line number from the **Number** list.
3. Click on the **Edit** button.
4. Change the Line Assignment fields as required.

NOTE

Only the **Line Name**, **State**, and **Description** fields can be edited. The Line Number can be modified by first adding a new Line with the desired Number and then deleting the original Line entry.

5. Click on the **OK** button.

   The Line changes are saved to the Master ATCS Database and the dialog box closes.

9.1.2.3 Delete an Existing Line

Delete an existing line as follows:

NOTE

All existing groups must be removed from an existing Line before it can be deleted.

1. Select the Line Controller associated with the existing Line from the **Type** list.

2. Select the Line name from the **Name** list.

NOTE

The Line can also be selected by number from the **Number** list.

3. Click on the **Delete** button.

   A **Delete Line** dialog box (figure 9-2) acknowledges the deletion.

4. Click on **OK**.

   The deletion is saved to the Field ATCS Database and both dialog boxes are closed.

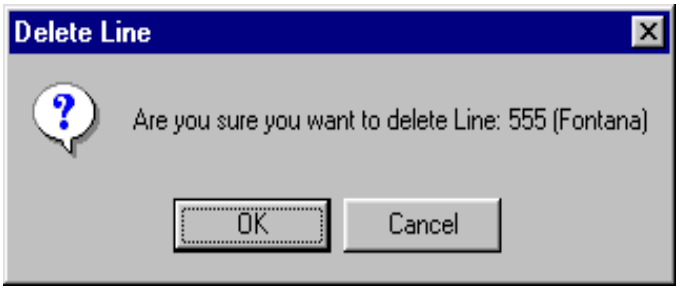


Figure 9-2. Delete Line Dialog Box

9.2 GROUP ASSIGNMENT

Group information can be entered or edited by means of the **Group** dialog box (figure 9-3). Open the **Group** dialog box as follows:

1. Click on the **Group** button (see right) on the Circuit I/O Tool Bar.

2. Move the cursor to the Circuit View.

   The cursor changes to a small white rectangle.

3. Click in the Circuit View.

   The rectangle closes and the **Group Dialog** box appears. Clicking on the **Cancel** button closes the dialog box without saving any changes.

NOTE

You can also open the Group dialog box by double clicking on an existing Group Header in the Circuit View (see figure 9-4).

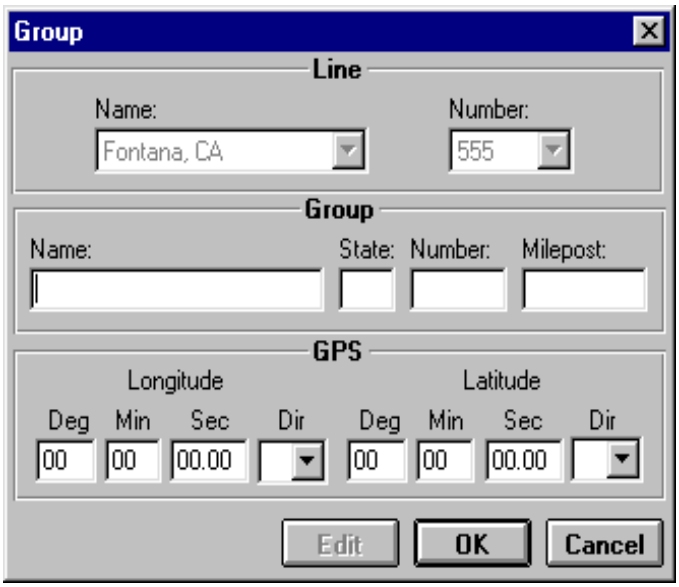


Figure 9-3. Group Dialog Box

9.2.1 Group Line Selection

Before Group information can be entered, the parent Line for that Group must be selected. This is accomplished as follows:

1. Select the desired Line from the Name list.

NOTE

You can also select a Line by choosing a Line number from the Line Number list.

2. Click on the **OK** button.

9.2.2 Group Creation

Group information for a selected Line is entered as follows:

1. Enter the Group name in the **Name** field.
2. Enter the abbreviation for the state in the **State** field (optional).
3. Enter the Group number in the **Number** field.
4. Enter the Milepost designation in the **Milepost** field (optional).
5. Enter the Group longitude in the **GCP Longitude Deg**, **Min**, and **Sec** fields (optional).
6. Select the Group longitude direction (**E** or **W**) from the **Longitude Dir** list (optional).
7. Enter the Group latitude in the **GCP Latitude Deg**, **Min**, and **Sec** fields (optional).
8. Select the Group latitude direction (**N** or **S**) from the **Latitude Dir** list (optional).
9. Click on **OK**.

The group information is saved to the Master ATCS Database, the Group dialog box is closed, and the new Header and Column for the Group are displayed in the Circuit View as shown in figure 9-4.

NOTE

When one or more Groups are shown in the Circuit View, the Line Selector lists are disabled and automatically selected to the parent Line of the Groups. The Circuit View only shows Groups assigned to the same Line.

9.2.3 Editing Group Information

Edit existing Group information as follows:

1. Double click on a Group Header in the Circuit View (figure 9-4). The Group dialog box, figure 9-3, appears.

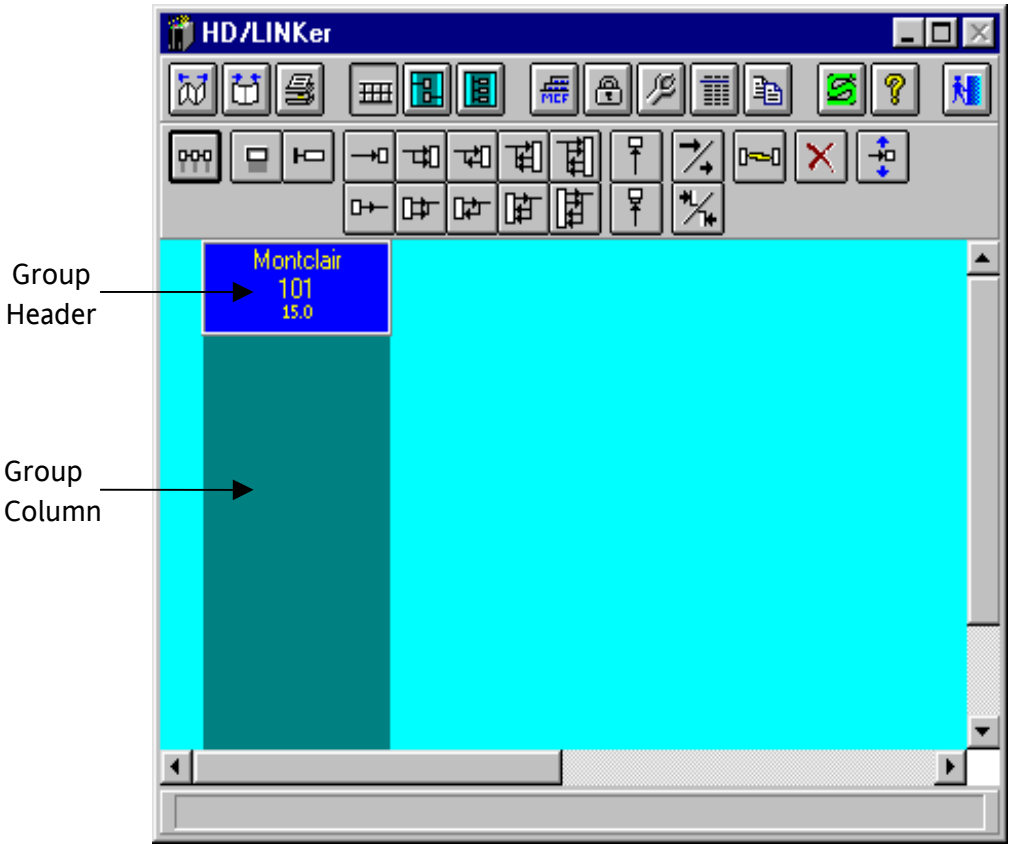


Figure 9-4. Group Header Display

2. Click on the **Edit** button.

NOTE

Only the Group Entry fields can be edited. You can edit Line name and number information in the Line dialog box, figure 9-1.

3. Edit the Group fields as required and click on **OK**.

   The changes are saved to the Master ATCS Database, the dialog box closed, and the changes appear in the Header and Column of the Group in the Circuit View.

9.2.4 Circuit Layout Dialog Box

The **Circuit Layout** dialog box, figure 9-5, allows you to list, select, and arrange the geographical location of Groups.

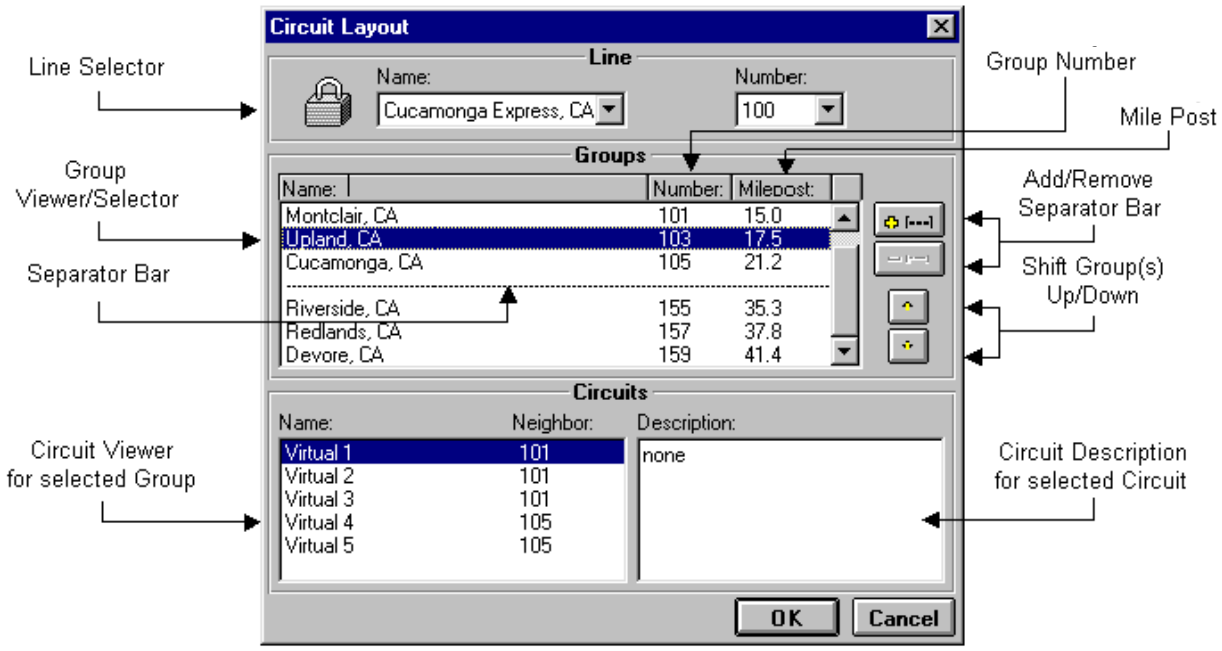


Figure 9-5. Circuit Layout Dialog Box

9.2.4.1 Listing Groups

The Group Viewer/Selector area functions as a viewer for all Groups assigned to a Line. Groups are listed by selecting a Line, by Name or Number, from the Line Selector lists. All Groups assigned to a selected Line are included in the list.

The Group Viewer/Selector lists Groups by Name, Number and Milepost, and are ordered by geographical adjacency. The topmost Group selected is displayed on the extreme left in the Circuit View. The listing order can be modified by clicking on the Sort By Group Number (default) and Sort By Milepost buttons.

A Separator Bar indicate that the last Group above and the first Group below the bar are not geographically adjacent.

A list of all Virtual Circuits associated with a Group can be displayed by selecting the Group in the Group Viewer/Selector area. The Circuit Viewer for the selected Group lists Circuits by Name and neighboring Group Number.

The **Add/Remove Separator Bar** buttons are automatically enabled or disabled, based on the selected Groups in the Group Viewer/Selector area.

The **Add Separator Bar** button (see right) inserts a Separator Bar above the position of a selected Group or Separator Bar. This button is enabled when one Group or one Separator Bar is selected, and disabled when multiple or no Groups or Separator Bars are selected.

The **Remove Separator Bar** button (see right) removes a selected Separator Bar. Clicking this button deletes the selected Separator Bar and shifts the entry below it up one position. This button is enabled when a Separator Bar is selected and disabled at all other times.

9.2.4.2 SELECTING GROUPS

Existing Groups are selected for display as follows:

1. Click on the **Open Layout** button (see right) on the Main Tool Bar.

   The Circuit Layout dialog box, figure 9-5, appears.

2. Select the Group's Line name from the **Name** list. The Line can also be selected from the **Number** list.

3. Highlight the desired Groups listed within the Group/View Selector.

4. Click on **OK**. The Group dialog box is closed and the selected Groups appear in the Circuit View.

NOTE

You can clear the Circuit View at any time by clicking on the Clear Layout button (see right) on the Main Tool Bar.

9.2.4.3 Arranging Groups

When the geographical position of Groups must be modified because of changes in the field or to reflect the actual field layout, use the Shift Group(s) Up/Down buttons. These buttons modify a Group's adjacency with respect to other Groups. They are automatically enabled or disabled based on the Groups selected in the Group Viewer/Selector area.

The Shift Group(s) Up button moves one or more selected Groups one position up in the list. The Group or Separator Bar above the selected Group or Groups is moved below the selected Group or Groups.

The Shift Group(s) Down button moves one or more selected Groups one position down in the list. The Group or Separator Bar below the selected Group or Groups is moved above the selected Group or Groups.

NOTE

If the selected Group is:	Then the Shift Group(s):
The first one listed in the Group Viewer/Selector,	Up button has no effect.
The last one listed in the Group Viewer/Selector,	Down button has no effect.
Both buttons are enabled when one or more Groups are selected, and are disabled at all other times.	

9.3 CIRCUIT LAYOUT

Circuit layout is implemented in three steps:

- Selection of Group modules.
- Selection of module configurations.
- Creation of virtual circuits between group configurations.

9.3.1 Group Module Selection

Modules are added to an existing group as follows:

1. Click on the Module View button (see right) on the Circuit I/O Tool Bar.

   The Module View appears below the Main Window.

2. Click on the **Module** button (see right) on the Circuit I/O Tool Bar.

3. Place the cursor in the **Group Column** of the Module View.

   A **Module** Icon appears in the Module View group column as shown in figure 9-6.

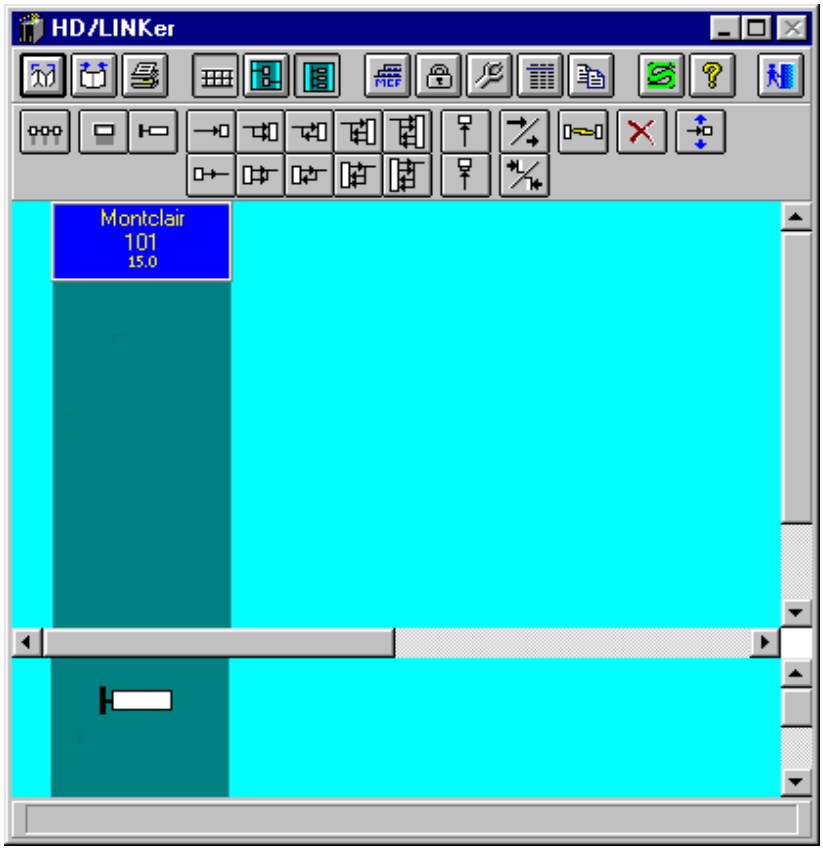


Figure 9-6. Main Window With Module View

4. Click in the Group Column.

   The **Module** dialog box appears as shown in figure 9-7. The **Hardware** Tab is the default.

5. Select a module from the **Type** list of the **Hardware** Tab.

   A list of hardware versions is available in the **Version** list.

6. Select a module version from the **Version** list.

7. Click in the Group Column.

Figure 9-7. Module Dialog Box Hardware Tab

The **Module** dialog box appears as shown in figure 9-7. The **Hardware** Tab is the default.

8. Select a module from the **Type** list of the **Hardware** Tab.

   A list of hardware versions is available in the **Version** list.

9. Select a module version from the **Version** list.

   The part number and description for the selected hardware version appear in the **Part Number** and **Description** windows, respectively.

10. Select the **Software** Tab.

    A list of software versions is available in the **Version** lists The **Software** Tab appears as shown in figure 9-8.

Figure 9-8. Module Dialog Box Software Tab

11. Select the software version number from the **Version** list. The description of the selected software version appears in the **Description** window.

12. Click on the **OK** button. The changes are saved to the Master ATCS Database. The Module dialog box closes, and shows a new Module icon in the Module View. Selecting the Cancel button closes the dialog box without saving any changes.

13. The ATCS Address Tab (figure 9-9) shows the ATCS address of the selected module. Only the Sub Node number of the address can be edited. The number shown corresponds to the next unused Sub Node number in ascending order. This number is entered automatically when the module is selected.

    - Selected modules are shown. See figure 9-10.

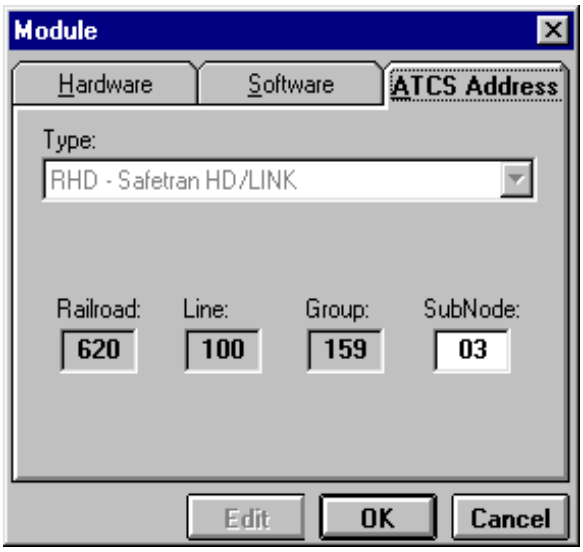


Figure 9-9. Module Dialog Box ATCS Address Tabb

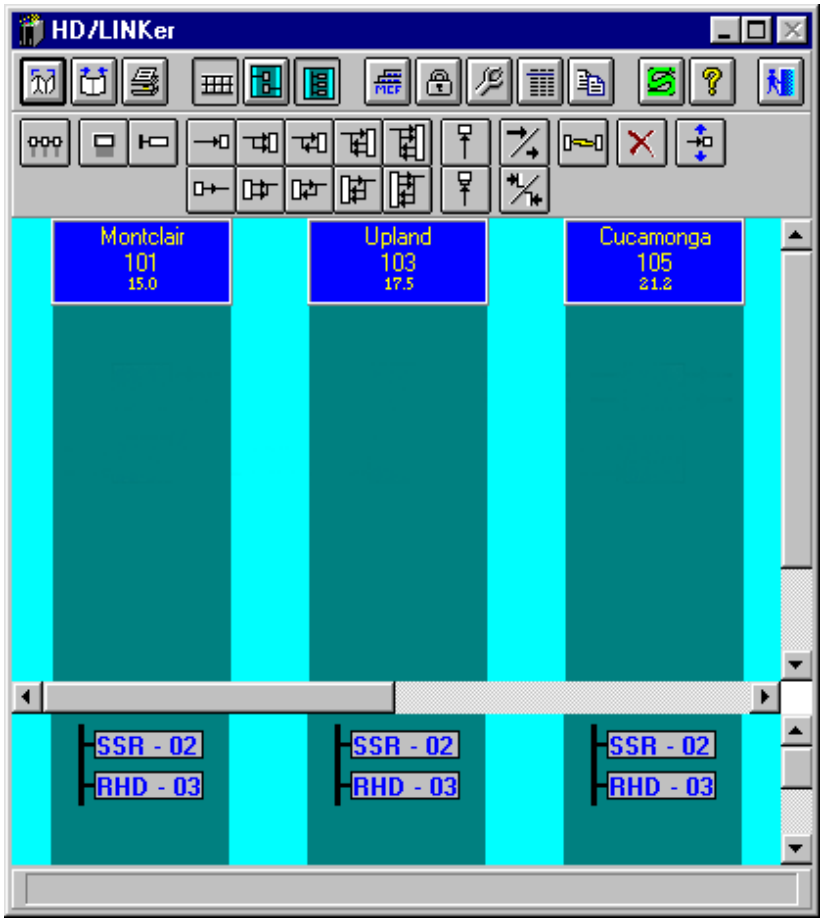


Figure 9-10. Main Window With Groups and Modules Selected

9.3.2 Circuit I/O

Circuit I/O configurations are shown by stylized icons within the bounds of a Group column. Groups are shown within the circuit view as shown in figure 9-10. Also shown are two rectangular module icons within the Module View of each Group. The first, labeled **RHD**, represents the HD/LINK I/O module to be configured. The second, labeled **SSR**, represents the Group's Spread Spectrum Radio. Inclusion of the Group's SSR within the Module View is optional.

9.3.2.1 Virtual Circuit Creation

Virtual circuit creation requires the following:

- The placement of specific I/O icons within the selected Groups.
- The entering of circuit I/O information.
- The creation of Virtual circuits between complementary I/O configurations (including Cut I/O) of adjacent Groups.

To create a Virtual Circuit, proceed as follows:

1. Click on the Termination or Cut I/O icon representing the desired I/O configuration.
2. SDFS Click on the Group column. The cursor changes to an I/O icon..

   A **Circuit I/O** dialog box appears (see figures 9-11 and 9-12). The specific I/O dialog box corresponds to the Termination or Cut icon selected.

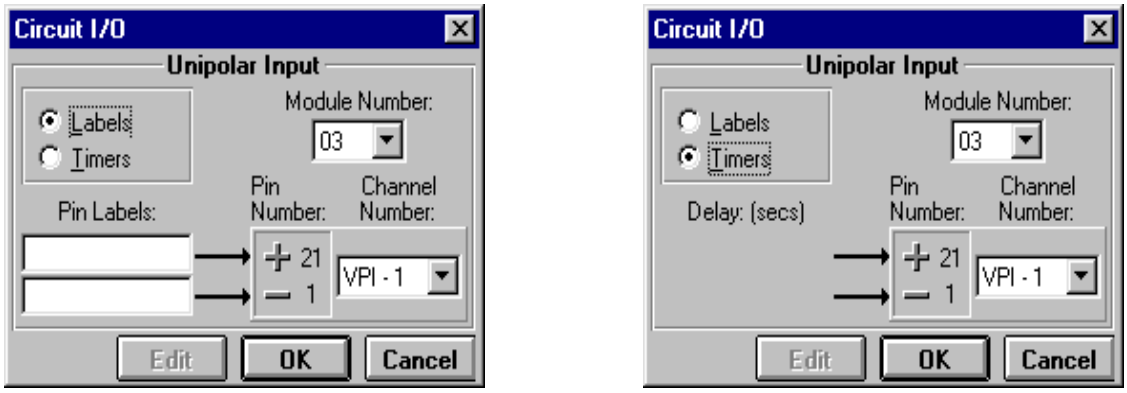


Figure 9-11. Circuit I/O Dialog Box - Unipolar Input

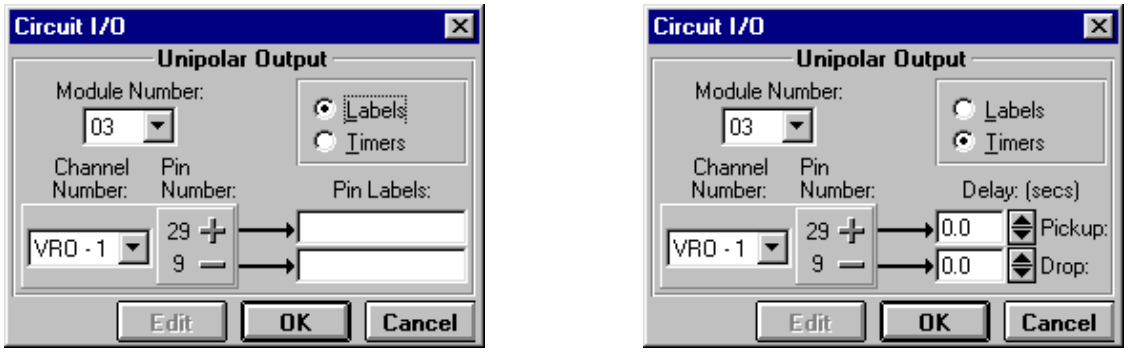


Figure 9-12. Circuit I/O Dialog Box - Unipolar Output

3. Select a number from the **Module Number** list.

   Module numbers correspond to the Sub Node number defined in the ATCS Address. The **Module Number** list selects the smallest I/O module number by default.

4. Select a number from the **Channel Number** list for each I/O channel of the configuration.

   The Channel Number list shows the lowest available channel number by default. Pin numbers for each external I/O channel are shown in the Pin Number Field. Pin Labels for external input and output channels correspond to the name assigned to the Virtual Circuit. Pin numbers and labels are not assigned to internal configurations (see figure 9-13).

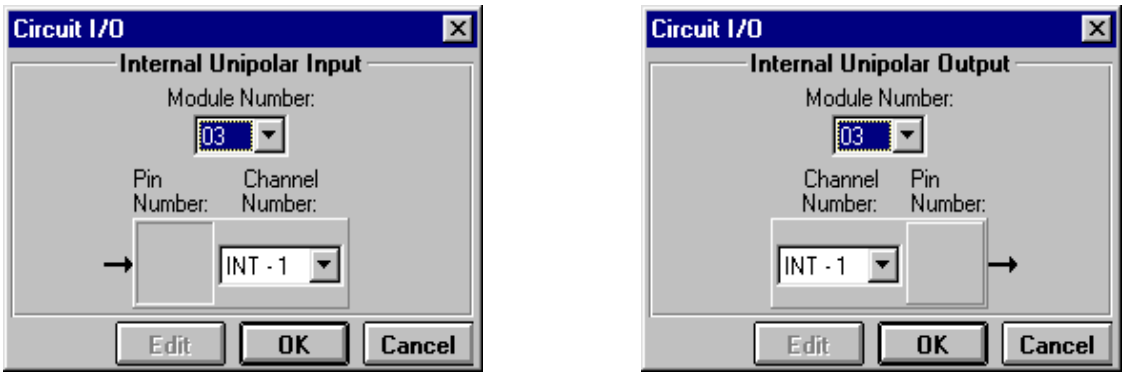


Figure 9-13. Circuit I/O Dialog Box - Internal Cut I/O

5. Select the **Timers** radial button on the **Circuit I/O** dialog box. Select the value in the **Pickup** and **Drop Delay** fields for the external output channels (VRO's).

   Both delay values default to 0 seconds. You can change delay values in 0.5-second increments. Pickup and Drop Delay fields are not provided for internal output channels.

6. Click on the **OK** button.

The I/O information is saved to the Master ATCS database, the Circuit I/O dialog box closes, and the new Termination or Cut I/O icon appears on the Group Column in the Circuit View.

7. Repeat steps 1 through 6 to create a complementary I/O configuration within an adjacent Group.

8. Click on the **Link** button on the Circuit I/O Tool Bar (see right).

9. Place the cursor on the configuration icon within the first group. The cursor changes to a stylized linking icon when on the configuration icon (see right).

10. Click on the configuration icon within the first Group.

    The stylized linking icon disappears and the body color of the configuration icon changes from gray to white.

11. Place the cursor on the corresponding configuration icon within the adjacent group.

    The cursor changes to a stylized linking icon when on the configuration icon (see right).

12. Click on the configuration icon within the adjacent group.

    The stylized linking icon disappears, the body color of the adjacent icon changes from gray to white, and the Circuit Link dialog box (figure 9-14) appears. The dialog box shows the two selected Termination and/or Cut I/O connected by a new Circuit Link.

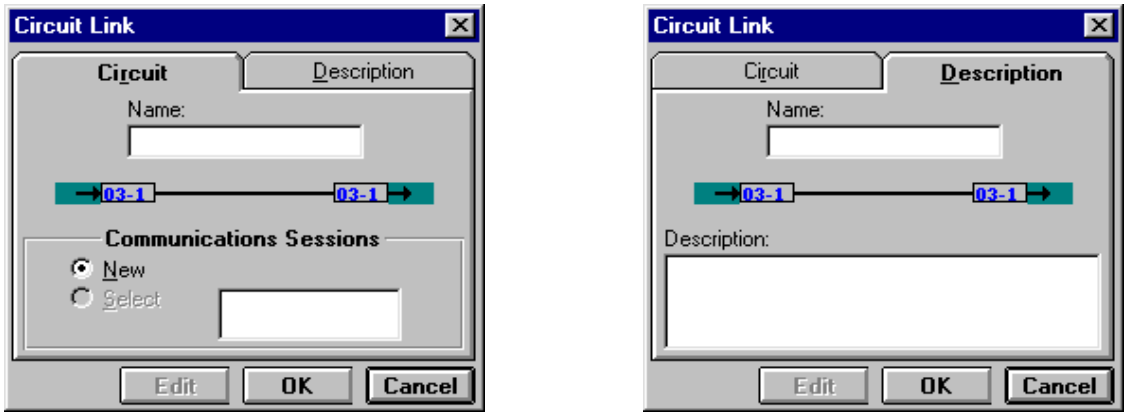


Figure 9-14. Circuit Link Dialog Box

NOTE

For Cut I/O, the dialog box indicates which side will be linked. The orientation and position of Circuit I/O are used to determine which side will be used for the Circuit Link.

13. Enter a circuit name in the Name field. You can enter the name on either the Circuit or Description tabs.

NOTE

The **Communications Sessions** radio buttons allow you to create a new virtual link or to use an existing link. The **New** radio-button option allows you to create a new communications session. The **Select** radio-button allows an existing session to be selected, allowing more than one Virtual Circuit to share the same communications session. The Communications Session list shows all existing communications sessions within a module or between modules where the I/O involved in the Virtual Circuit are allocated.

The **New** radio-button option is selected by default when no communications sessions exist. The **Select** radio-button option is selected by default when one or more sessions exist.

A symbolic representation of the new virtual circuit appears on both **Circuit Link** tabs below the **Name** field. The left Communications Client/Server component in the Communications Session list corresponds to the left/top Circuit I/O symbol. The right component corresponds to the right/bottom Circuit I/O symbol.

14. Click on the **OK** button.

The changes are saved to the Master ATCS Database. The dialog box closes and the new circuit link and its name are shown in the Circuit View. This action also shows the new Communications Components or updates the existing ones in the Communications View.

Clicking on the **Cancel** button closes the window without saving the changes.

9.3.2.2 Creating Inputs from Existing I/O

External and Internal Inputs can be created from existing I/O as follows:

1. Select a unipolar or bipolar input button on the Circuit I/O Tool Bar.

2. Click on an existing unipolar or bipolar I/O icon, then drag and drop the cursor on the Group Column in the Circuit View.

NOTE

The mouse cursor shows an Up Arrow icon when over an existing I/O. The Circuit I/O dialog box does not appear at this time.

A new icon with the same module and channel designation appears within the column below the selected icon.

9.3.2.3 Editing Circuit I/O Information

Circuit I/O information is edited as follows:

1. Double click on a Termination or Cut I/O icon in the Circuit View.

2. Click on the **Edit** button in the Circuit I/O dialog box.

3. Edit the **Pin Labels** fields, as required (External Termination and Cut I/O only).

4. Edit the **Pickup** and **Drop Delay** fields as required (External Termination Outputs only).

5. Click on the **OK** button.

The changes are saved to the Master ATCS Database and the dialog box closes. The Circuit I/O icons in the Circuit View are not affected by the edited fields. Clicking on the **Cancel** button closes the dialog box without saving any changes.

9.3.2.4 Separating Communications Sessions

A Virtual Circuit sharing a Communications Session with another Virtual Circuit can be separated into its own Session as follows:

1. Click on the **Delete** button (see right) on the Circuit I/O Toolbar.

2. Place the cursor over the Circuit Link to be separated.

The cursor changes to the stylized “X” depicted on the **Delete** button.

3. Click on the Circuit Link.

   The Delete Circuit dialog box, figure 9-15, appears.

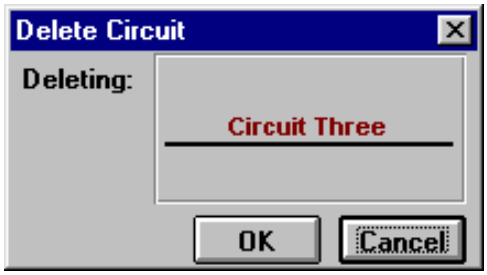


Figure 9-15. Delete Circuit Dialog Box

4. Click on the **OK** button.

   The Delete Circuit dialog box closes and the selected Circuit Link is removed.

5. Create a new Circuit Link as described in steps 8 through 12 of paragraph 9.3.2.1, selecting the **New** radio-button option in the **Circuit Link** dialog box (figure 9-14).

   The new circuit link and its name are shown in the Circuit View and the new Communications Components are shown in the Communications View.

9.3.2.5 Combining Communications Sessions

Virtual Circuits configured for separate Communications Sessions can be reconfigured to share a common Communications Session as follows:

1. Click on the **Delete** button (see right) on the Circuit I/O Toolbar.

2. Place the cursor over a Circuit Link to be reconfigured.

   The cursor changes to the stylized “X” depicted on the Delete button.

3. Click on the Circuit Link.

   The Delete Circuit dialog box, figure 9-15, appears.

4. Click on the **OK** button.

   The **Delete Circuit** dialog box closes, the selected Circuit Link is removed from the Circuit View, and the corresponding Communications Session is removed from the Communications View.

5. Create a new Circuit Link as described in steps 8 through 12 of paragraph 9.3.2.1. Select the **Select** radio-button option and the Communications Session to be shared from the **Circuit Link** dialog box (figure 9-14).

   The reconfigured circuit link and its name are displayed in the Circuit View.

6. Repeat steps 1 through 4 until all existing Virtual Circuits are reconfigured, as required.

9.3.2.6 Editing Circuit Link Information

Circuit Link information is edited as follows:

1. Double click on a Circuit Name in the Circuit View.

2. Click on the **Edit** button in the **Circuit Link** dialog box (figure 9-14).

NOTE

You can edit the Name and Description fields.

3. Click on the **OK** button.

   The changes are saved to the Master ATCS Database, the dialog box closes, and the Circuit Name is updated in the Circuit View. Clicking on the **Cancel** button closes the dialog box without saving any changes.

9.3.2.7 Deleting HD/LINKer Objects

HD/LINKer objects can be deleted in the following order:

1. All Circuit Links to an I/O icon must be deleted before the I/O icon can be deleted.

2. All I/O icons relating to a particular module must be deleted before the module icon can be deleted from the Module View.

3. All modules within a Group must be deleted before that Group can be deleted.

Objects are deleted as follows:

1. Click on the **Delete** button (see right) on the **Circuit I/O Toolbar**.

2. Place the cursor over the object to be deleted.

   The cursor changes to the stylized “X” depicted on the **Delete** button.

3. Click on the object to be deleted.

   One of the following dialog boxes appears:

   - **Delete Circuit** dialog box, figure 9-15.
   - **Delete I/O** dialog box, figure 9-16.
   - **Delete Module** dialog box, figure 9-17.
   - **Delete Group** dialog box, figure 9-18.

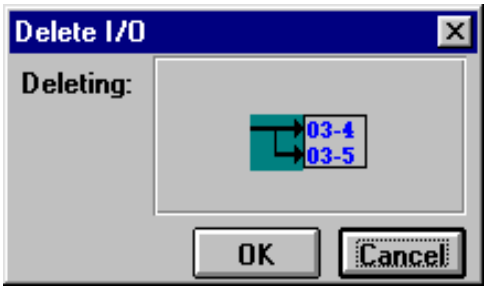


Figure 9-16. Delete I/O Dialog Box

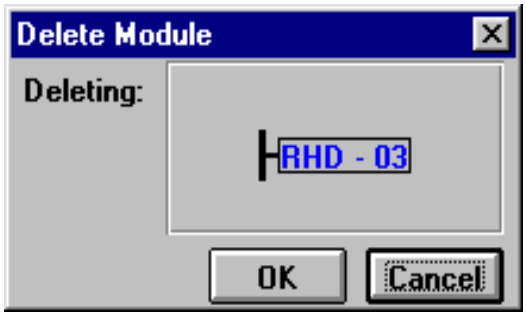


Figure 9-17. Delete Module Dialog Box

Figure 9-18. Delete Group Dialog Box

4. Click on the **OK** button.

   The dialog box closes and the selected object is removed from the View. Clicking on the **Cancel** button closes the dialog box without deleting the selected object.

SECTION X
COMMUNICATIONS TIMERS

10.1 INTRODUCTION

Communications Timers establish conditional control of information flow during a Communications Session. Communications Timer parameters are set to pre-assigned (default) values by the HD/LINKer program.

10.1.1 I/O States Timers

The I/O States Timers can be viewed and edited from the **I/O States** tab of the **Circuit Timers** dialog box, figure 10-1.

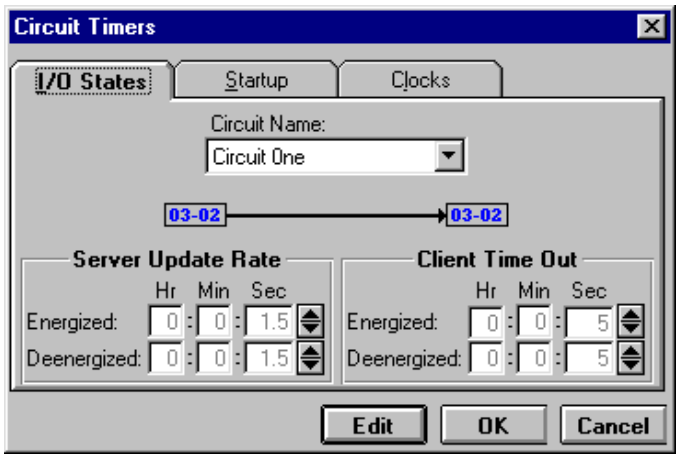


Figure 10-1. Circuit Timers Dialog Box – I/O States Tab

To open this dialog box, double click on a Termination or Cut Communications icon in the Communications View.

NOTE

The Virtual Circuits of the selected Communications Session are listed in the Circuit Name list at the top of each tab of the dialog box.

10.1.1.1 Server Update Rate

The Server Update Rate determines how often server VPI states are broadcast during a Communications Session. Separate timers are provided for the energized and deenergized states of the VPI. The default for both states is 1.5 seconds.

NOTE

The Client Time Out value must be greater than twice the value of the Server Update Rate.

The **Server Update Rate** timers are edited as follows:

1. Click on the **Edit** button.

2. Enter the desired time interval in the **Hr**, **Min**, and **Sec** section of the **Server Update Rate Energized** field.

NOTE

The **Energized** and **Deenergized** fields can be changed in 0.5 second increments by clicking on the increment/decrement button (see right) at the right side of each field.

3. Enter the desired time interval in the **Hr**, **Min**, and **Sec** section of the **Server Update Rate Deenergized** field.

4. Click on the **OK** button. The **Circuit Timers** dialog box closes and the changes are saved to the Master ATCS Database. Selecting the **Cancel** button closes the dialog box without saving any changes.

10.1.1.2 Client Time-Out

The Client Time-Out value protects against failure of the communications system server. If no messages are received from the server during the interval set by the Client Time-Out value, while the server VPI is in the energized state, the client VRO reverts to the deenergized state.

When the failure occurs while the server VPI is in the deenergized state, the client VRO remains in the deenergized state. When either failure occurs, the current Communications Session is lost and the Client transmits an *Initialize Session* message in an attempt to re-establish the Session. Separate timers are provided for the energized and deenergized states of the VPI. The default for both states is 5.0 seconds.

NOTE

The Server Update Rate must be less than half the Client Time Out value.

The **Client Time Out** timers are edited as follows:

1. Click on the **Edit** button.
2. Enter the desired time interval in the **Hr**, **Min**, and **Sec** section of the **Client Time Out Energized** field.

NOTE

The Energized and Deenergized fields can be changed in 0.5 second increments by clicking on the increment/decrement button (see right) at the right side of each field.

3. Enter the desired time interval in the **Hr**, **Min**, and **Sec** section of the **Client Time Out Deenergized** field.
4. Click on the **OK** button. The **Circuit Timers** dialog box closes, and the changes are saved to the Master ATCS Database. Selecting the **Cancel** button closes the dialog box without saving any changes.

10.1.2 Startup Timers

The Startup Timers can be viewed from the **Startup** tab of the **Circuit Timers** dialog box, figure 10-2. To open this dialog box, double click on a Termination or Cut Communications icon in the Communications View.

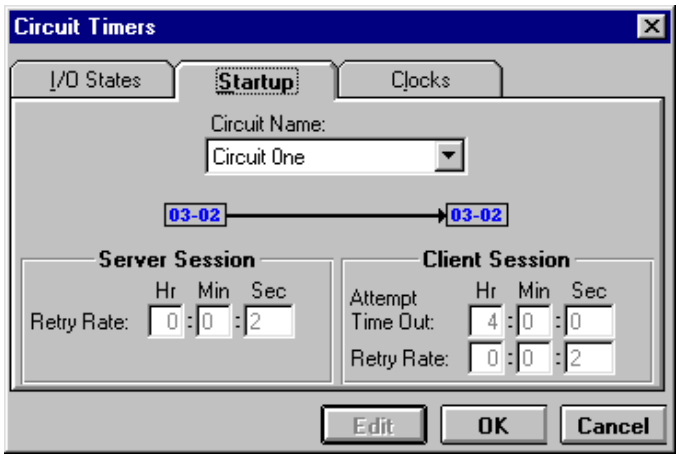


Figure 10-2. Circuit Timers – Startup Tab

NOTE

The Server and Client Session fields can be viewed but not edited from the Circuit Timers dialog box. The Startup Timer parameters can be edited only from the HD/LINKer INI file. Refer to Section XIII for a discussion of HD/LINKer file management.

10.1.2.1 Server Session Retry Rate

At startup, and after a Communications Session failure, the Server sends a *Server Alive* message to the Client. This message indicates that the Server is present and responding. The **Server Session Retry Rate** specifies the interval between *Server Alive* messages. The default parameter is 2.0 seconds.

10.1.2.2 Client Session Retry Rate

At startup and after a Communications Session failure, the Client sends an *Initialize Session* message to the Server. This message requests the start of a Communications Session. The **Client Session Retry Rate** field displays the interval between *Initialize Session* messages. The *Initialize Session* message is repeated until the Communications Session is established, or until the interval set by the **Client Session Attempt TO** (time out) parameter is exceeded. The **Client Session Retry Rate** default parameter is 2.0 seconds.

10.1.2.3 Client Session Attempt Timeout

The **Client Session Attempt Time Out** parameter sets the length of time that the *Initialize Session* messages is transmitted. The default interval is 4.0 hours.

10.1.3 Synchronization Timers

The **Server** and **Client Time Stamp** fields can be accessed from the **Clocks** tab of the **Circuit Timers** dialog box, figure 10-3. To see these fields, double-click on a Termination or Cut Communications icon in the Communications View.

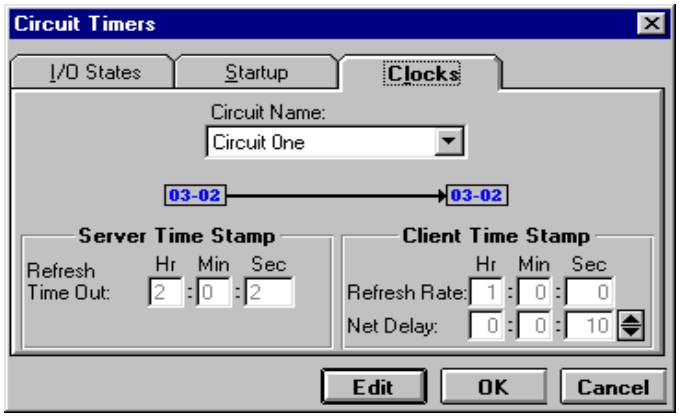


Figure 10-3. Circuit Timers – Clocks Tab

10.1.3.1 Client Time Stamp Refresh Rate

The Client Time Stamp maintains synchronization between the Client and the Server, and is transmitted with the *Initialize Session* message. The **Client Time Stamp Refresh Rate** is the interval between Client Time Stamp transmissions.

NOTE

You can view the **Client Time Stamp Refresh Rate** field but not edit it in the **Circuit Timers** dialog box. You can only edit this parameter in the HD/LINKer INI file. Refer to Section XIII for a discussion of HD/LINKer file management.

10.1.3.2 Client Time Stamp Network Delay

The network delay parameter is the maximum acceptable transmission delay between the Server and the Client. When this value is exceeded, the Client identifies the message from the Server as stale. The default value for this parameter is 10 seconds.

The **Client Time Stamp Net Delay** field is edited as follows:

1. Click on the **Edit** button.

2. Enter the desired time interval in the **Hr**, **Min**, and **Sec** section of the **Client Time Stamp Net Delay** field.

NOTE

The **Client Time Stamp Net Delay** field can be changed in 1.0 second increments by clicking on the increment/decrement button (see right) at the right side of the field.

3. Click on the **OK** button.

   The **Circuit Timers** dialog box closes and the changes are saved to the Field ATCS Database. Selecting the **Cancel** button closes the dialog box without saving any changes.

10.1.3.3 Server Time Stamp Refresh Timeout Interval

The Server time stamp must be periodically updated for the Server to remain active. The **Server Time Stamp Refresh TO** field displays the set time-out interval. If the Server does not receive a time-stamp update during this period, it terminates the current Communications Session. It then begin transmitting the *Server Alive* message to reinstate the Session. The default value for this parameter is 2 hours and 2 seconds.

NOTE

The **Server Time Stamp Refresh Timeout Interval** field can be viewed but not edited from the **Circuit Timers** dialog box. This parameter can be edited only in the HD/LINKer INI file. Refer to Section XIII for a discussion of HD/LINKer file management.

10.1.4 Cut Delay Timer

The **Cut Delay** Timer can be viewed and edited from the **Cut State** tab of the **Circuit Timers** dialog box, figure 10-4. This tab is added to the dialog box for Cut Communications icons. To access this dialog box, double click on a Cut Communications icon in the Communications View.

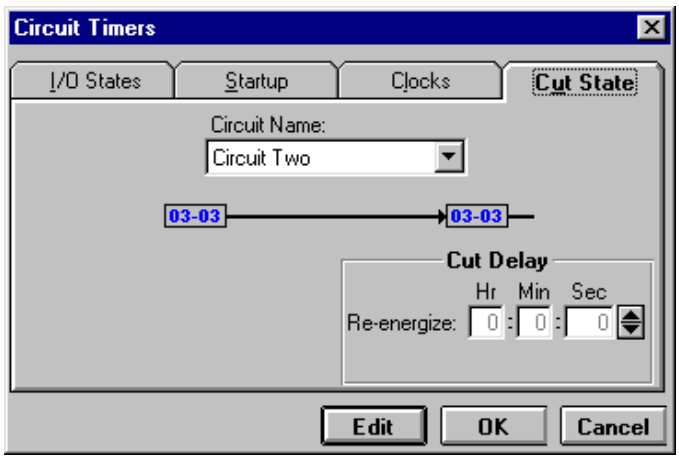


Figure 10-4. Circuit Timers Dialog Box – Cut State Tab

The Cut Delay Timer delays activation of a cut circuit for a specified period of time. Typically, this timer is used to prevent loss of shunt. The default value for this parameter is 0 seconds.

Edit the **Cut Delay Re-energize** field as follows:

1. Click on the **Edit** button.

2. Enter the desired time interval in the **Hr**, **Min**, and **Sec** section of the **Cut Delay Re-energize** field.

NOTE

The **Cut Delay Re-energize** field can be changed in 0.5 second increments by clicking on the increment/decrement button (see right) at the right side of the field.

3. Click on the **OK** button.

The **Circuit Timers** dialog box closes and the changes are saved to the Field ATCS Database. Selecting the **Cancel** button closes the dialog box without saving any changes.

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SECTION XI
MCF MANAGER

11.1 MCF MANAGER ELEMENTS

The **MCF Manager** dialog boxes, figure 11-1, allows

- the creation, validation, and approval of Module Configuration Files
- printing of the MCF listings
- transfer of MCFs to the DTU.

Open this dialog box by selecting the **MCF Manager** button on the **Main Tool Bar**.

11.1.1 Selecting Lines and Groups

Lines and groups are selected from the **Line/Group Selector** lists. Selecting a Line by Name or Number updates the Group Name, Number and MilePost lists with information on all groups assigned to that Line. A Group is then selected by Name, Number or MilePost.

11.1.2 Selecting Modules

Modules are selected from the **Module Number** list. Selecting a Line and Group updates the Module Number list with information on all modules assigned to that group. A Module is then selected by Number. For each module, the module's type, part number, and hardware and software versions are shown.

11.1.3 Selecting MCFs

MCFs are selected from the **MCF Version** list. Selecting a Module updates the MCF Version list with information on all existing MCFs for that module. An MCF is then selected by version. The status and creation date and time for each MCF are shown. If the status of the MCF is Approved, In-Service, or Out-of-Service, the Approval Date and Time are also shown. If the Status of the MCF is Approved or In-Service and the user's access level is unrestricted, the UCN appears. The UCN does not appear for Unapproved or Out-of-Service MCFs or for restricted users.

11.1.4 MCF Button Functions

The buttons at the bottom of the dialog box provide access to the MCF functions as follows:

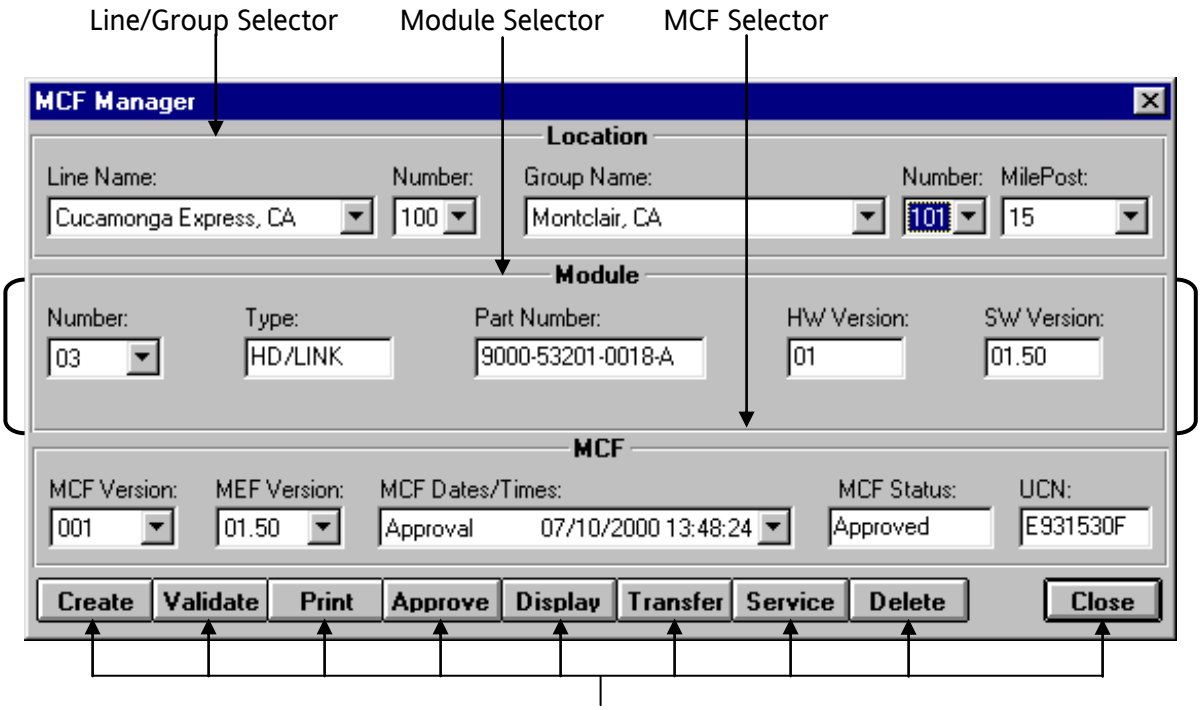

Figure 11-1. MCF Dialog Box Overview

Text boxes in the Module area are display only. You cannot select or change these text boxes.

NOTE

These buttons are enabled or disabled automatically, based on the existence and status of MCFs and the user access level.

Button name	Description	See section
Create	Opens the **MCF Create** dialog box where MCF creation information is entered and MCFs are created.	11.2
Validate	Opens the **MCF Validation Tests** dialog box where MCF validation tests are listed and run before approval.	11.3
Print	Opens the **MCF Print** dialog box where various MCF listings are selected and printed.	11.5
Approve	Opens the **MCF Approval** dialog box where an optional MCF CRC number is entered and the MCFs are approved.	11.4

Button name	Description	See section
Display	Opens the **MCF Status Display** window where the contents of an MCF or the status of the Create, Validate and Approve functions appear	11.4
Transfer	Opens the **MCF Transfer** dialog box where single or multiple MCFs and MEFs are selected for copying into another storage medium.	11.6
Service	Opens the **Place MCF In Service** dialog box or the **Take MCF Out of Service** dialog box • The **Place MCF In Service** dialog box is where an optional In Service number is entered and an MCF is placed In Service. • The **Take MCF Out of Service** dialog box is where an optional Out of Service number is entered and an MCF is taken Out of Service.	11.7
Delete	Opens the **Delete MCF** dialog box where information on the MCF to be deleted appears for confirmation, and the MCF is deleted.	11.8
Close	Closes the **MCF Manager** dialog box without affecting any MCFs.	

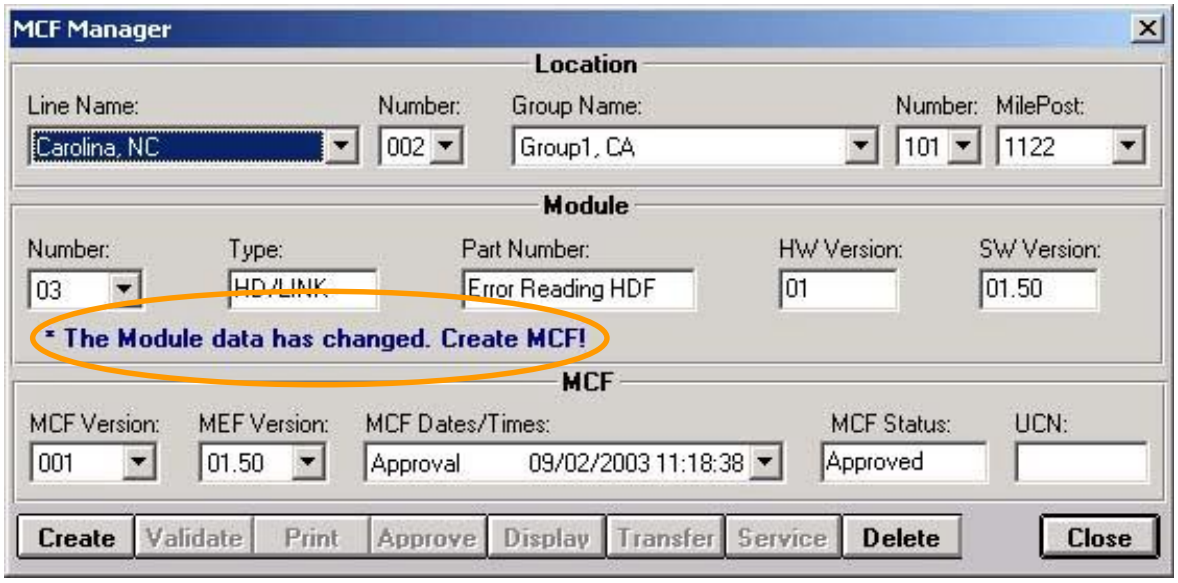

Figure 11-2. MCF Manager Dialog Box With Module Change Message

NOTE

When module data is changed, the following message— *** The module data has changed. Create MCF!** —appears in the middle of the MCF Manager Dialog Box, as shown in figure 11-2. Perform the steps to recreate an MCF for each module (see paragraph 11.2, MCF CREATION).

11.2 MCF CREATION

Module Configuration Files for each Group are created following the completion of the virtual circuit design process. An MCF must be created for each I/O module employed at each Group.

Create a Module Configuration File as follows:

1. Click on the **MCF Manager** button on the Main Tool Bar (see right).

The **MCF Manager** dialog box, figure 11-1, appears.

2. Select the Line name from the **Line Name** list.

NOTE

A Group can also be selected by number from the **Number** list or the **MilePost** list.

Information related to the I/O Modules assigned to the selected Group appears in the **Module** fields of the dialog box.

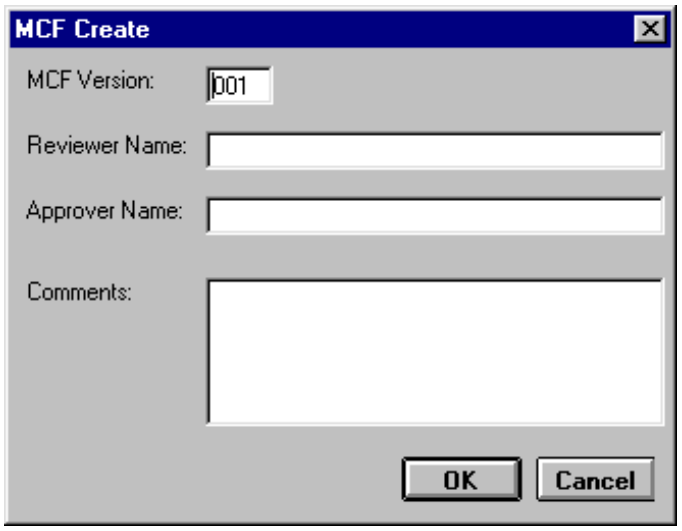

Figure 11-3. MCF Create Dialog Box

The number selected from the Module Number list determines the module information that appears.

3. Select the Group from the **Group Name** list.

4. Click on the **Create** button.

The Line can also be selected by number from the **Number** list located to the right of the **Line Name** field.

The MCF Create dialog box (figure 11-3) appears.

5. Enter the name of the reviewer in the **Reviewer Name** field.

6. Enter the name of the approver in the **Approver Name** field.

7. Enter any comments pertaining to the MCF in the **Comments** field.

8. Click on the **OK** button.

   The **MCF Create** dialog box closes and **Unapproved** appears in the **MCF Status** field. The MCF Version number and the date and time of creation also appear. Click on the **Cancel** button to close the window without creating an MCF.

9. Repeat steps 4 through 8 for each additional I/O module of the Group

11.3 MCF VALIDATION

MCF Validation consists of a series of tests to assure the consistency and accuracy of an MCF. Refer to paragraph 14.5 for a discussion of MCF Validation tests.

MCF Validation can be initiated at the completion of the Create procedure, by clicking on the **Validate** button, or while printing the **MCF Approval Listing**.

11.3.1 CREATE BUTTON INITIATION

To automatically initiate MCF Validation at the end of the Creation sequence, proceed as follows:

1. Select the **Run Validation Tests on MCF Create** check box on the **MCF Manager** tab of the **HD/LINKer Setup** dialog box (see figure 5-5).

2. Complete steps 1 through 9 as described in section 11.2.

11.3.2 Validation Button Initiation

1. Click on the **Validate** button.

   The **MCF Validation Tests** dialog box, figure 11-4, appears.

2. Select the **Geographic Neighbor Test (Optional)** if needed. See paragraph 15.5.8.

3. Click on the **OK** button. The **MCF Validation Tests** dialog box closes. Clicking on the **Cancel** button closes the dialog box without performing the validation test.

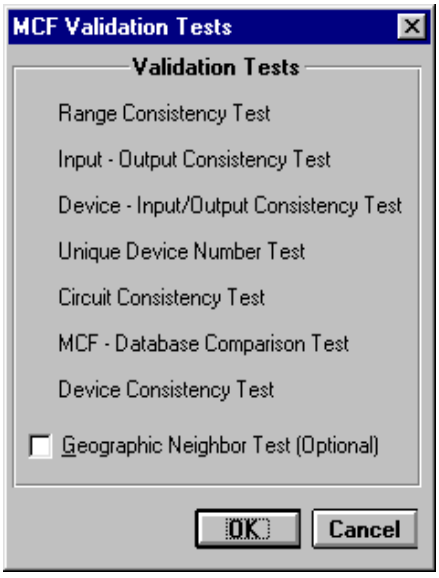

Figure 11-4. MCF Validation Tests Dialog Box

11.3.3 Print Button Initiation

The **Print** button initiation of Validation is the recommended procedure for MCF Validation. The printed MCF Approval listing contains the Cyclic Redundancy Code (CRC) required (by default) to initiate MCF Approval.

1. Click on the **Print** button.

   The **MCF Print Dialog Box – Print Selection**, figure 11-5, appears.

2. Select the **MCF Approval Listing** radio button.

3. Click on the **OK** button.

   The **MCF Print Dialog Box – Print Status**, figure 11-6, appears. After the list is transferred to the printer, the dialog box closes and the **MCF Approval Listing** prints.

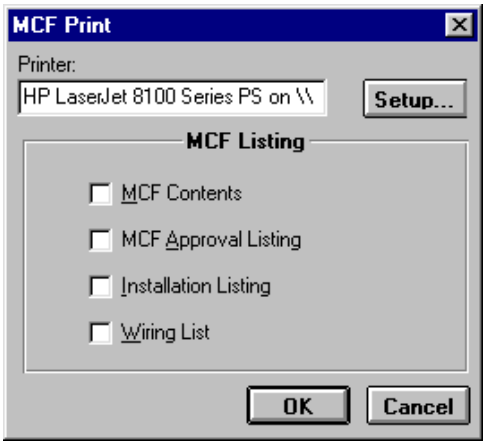

Figure 11-5. MCF Print Dialog Box – Print Selection

Figure 11-6. MCF Print Dialog Box

Clicking on the **Cancel** button (figure 11-6) closes the dialog box and stops the printing.

NOTE

When an Approval listing is selected for printing, a complete MCF validation test is run before actual printing starts. If errors or warnings are detected, the Print Acknowledgment dialog box appears. Clicking on the **OK** button closes the dialog box and starts the printout as described above.

11.4 MCF APPROVAL

Following Validation, the Module Configuration Files for each Group are approved.

MCF approval is started as follows:

1. Click on the **Approval** button.

   An **MCF Approval** dialog box, figure 11-7, appears. If the CRC must be entered, the dialog box shown on the right appears. Otherwise, the dialog box shown on the left appears.

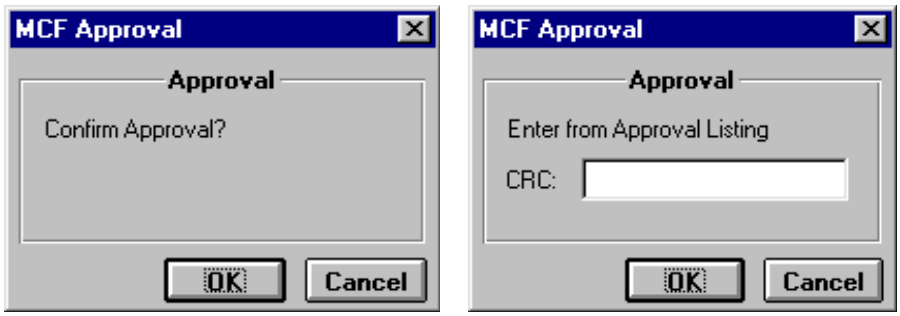

Figure 11-7. MCF Approval Dialog Boxes

2. Enter the File CRC value from the MCF Approval listing in the **CRC** field of the dialog box, as required.

3. Click on the **OK** button.

   If any warnings or errors are detected during the approval process, the **Approval Acknowledgment** dialog box, figure 11-8, appears.

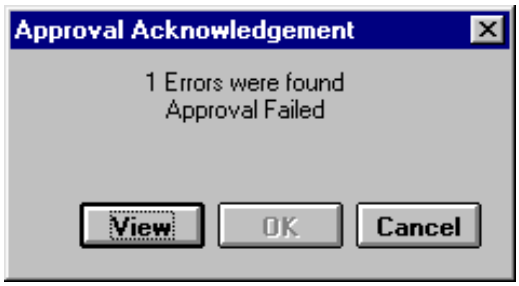

Figure 11-8. Approval Acknowledgment Dialog Box

NOTE

The warnings indicate that the geographic neighbor MCF has not been approved. This is normal if there are unapproved neighbors.

4. Click on the **View** button to view the generated warnings.

   The MCF Status Display window, figure 11-9, appears. The Validation Test results are listed, together with the generated warnings or errors.

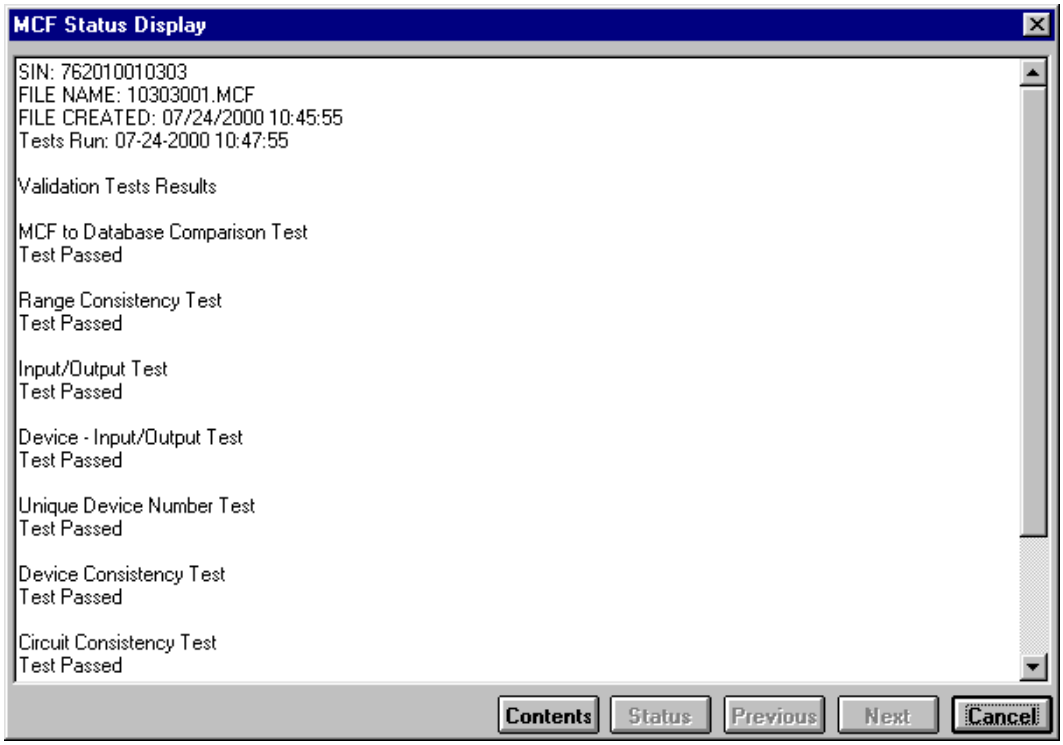

Figure 11-9. MCF Status Display Window

5. Click on the **Contents** button. The **MCF Contents Display** window, figure 11-10, appears, with the MCF Summary Data window shown on top. This window contains a summary of MCF Group data.

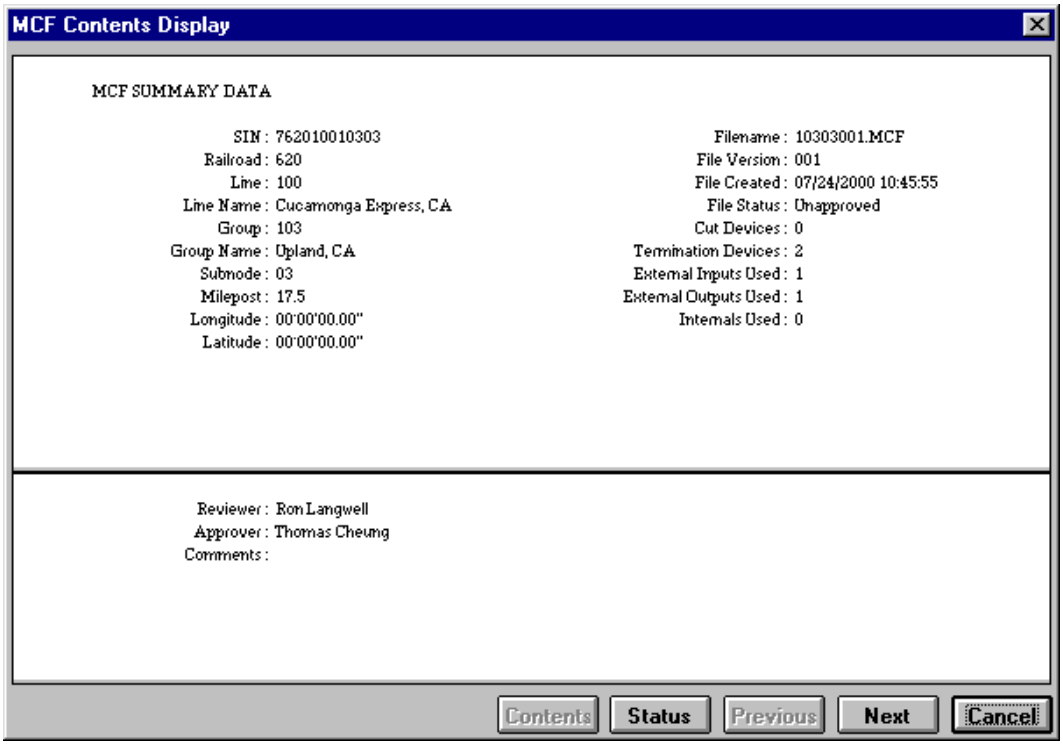

Figure 11-10. CF Contents Display window

6. Click on the **Next** button. The **Circuit Summary** window, figure 11-11, appears. This window contains a summary of the Group MCF Circuit data.

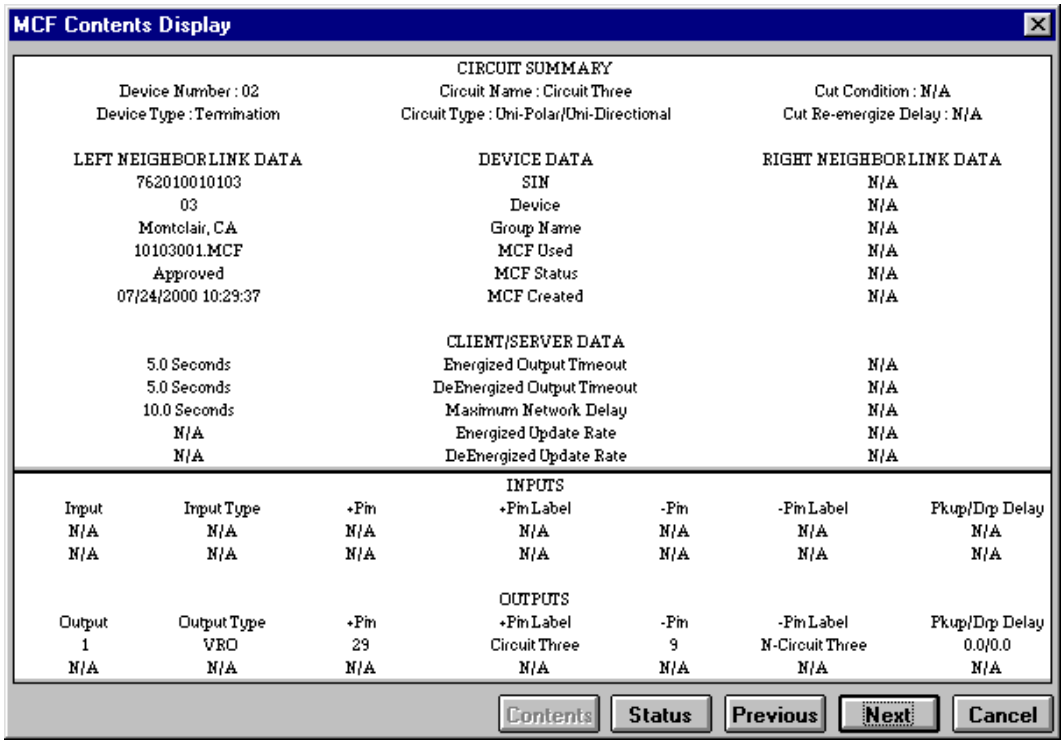

Figure 11-11. MCF Contents Window Page 2

Clicking on the **Previous** button again shows the **MCF Summary Data** window.

NOTE

Clicking on the **Display** button in the **MCF Manager** dialog box also opens the **MCF Status** and **MCF** Contents Display windows.

7. Click on the **Cancel** button.

   The **MCF Content Display** Window closes and the **Approval Acknowledgment** dialog box again appears. Clicking on the **Cancel** button of either window closes the **MCF Contents Display**.

8. Click on the **OK** button. The MCF is Approved, the **Approval Acknowledgment** dialog box closes, and the **MCF Approval** dialog box again appears. The **MCF Create** dialog box closes and **Approved** appears in the **MCF Status** field.

   Clicking on the **Cancel** button closes the **Approval Acknowledgment** dialog box and ends the Approval function.

11.5 MCF PRINT FUNCTIONS

In addition to the MCF Approval Listing, the following MCF lists can be printed from the **MCF Manager** dialog box:

- MCF Contents
- Installation Listing
- Wiring List

NOTE

Printing the Installation listing is unavailable until MCF approval.

To print an MCF listing:

1. Click on the **Print** button.

   The **MCF Print** dialog box, figure 11-5, appears.

2. Select the desired **MCF Listing** radio button.

3. Click on the **OK** button.

   The **Print Acknowledgment** dialog box appears if the **MCF Approve** button is selected and warnings or errors are detected.

4. Click on the **OK** button.

   The **MCF Print** dialog box, figure 11-6, appears. After the selected list is transferred to the printer, the dialog box closes and the selected Listing prints. Clicking on the **Cancel** button closes the dialog box without saving any changes.

11.6 MCF TRANSFER

During the MCF Transfer operation, the selected MCF is copied to a CD, diskette, or network drive for transfer to the DTU.

Start the Transfer function as follows:

1. Click on the **Transfer** button.

   The **MCF Transfer** dialog boxes, figure 11-12 and 11-13, appear.

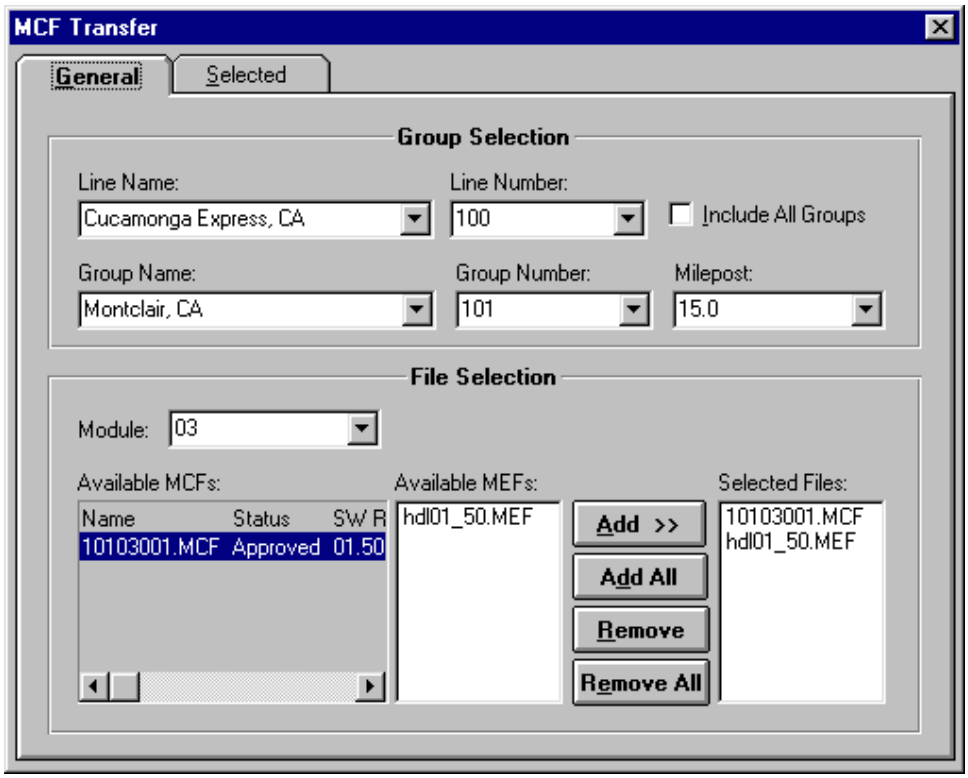

Figure 11-12. MCF transfer Dialog Box – General tab

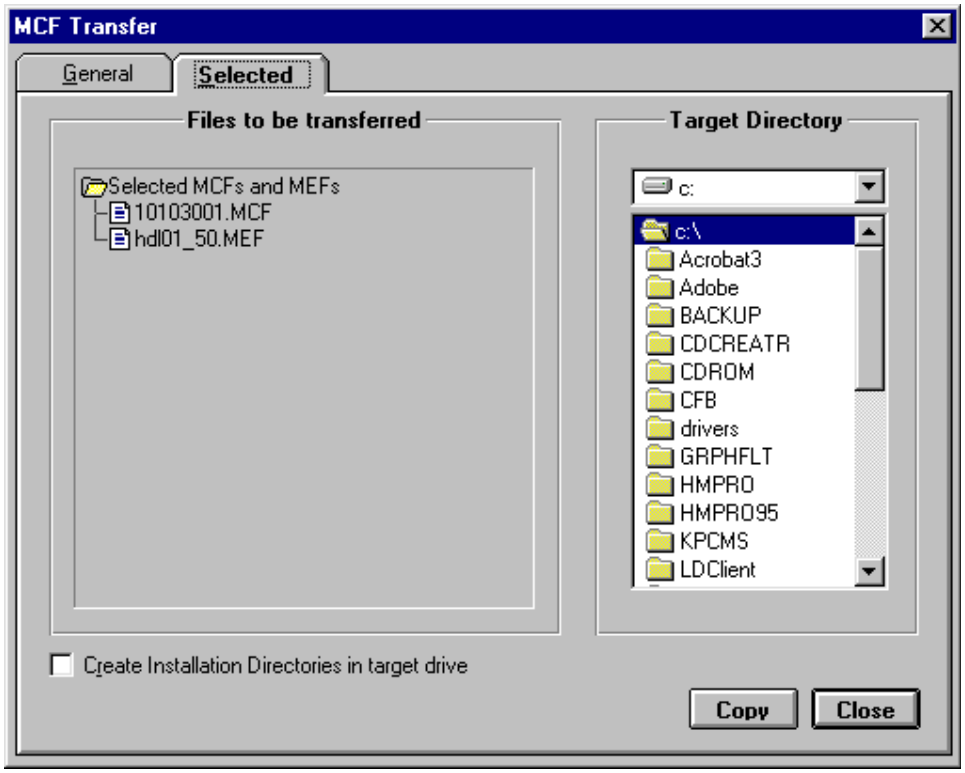

Figure 11-13. MCF Transfer Dialog Boxes

2. On the Selected tab, review the Selected MCFs and MEFs listed in the Files to be transferred list.

3. If the MCF and MEF files required for transfer are listed, select a destination drive and directory from the **Target Directory** list and the directory list below it.

4. Select the **Create Installation Directories in target drive** check box as required.

5. Click on the **Copy** button.

   The Selected files are copied to the target directory.

6. If the required MCF or MEF files are not listed in the **File to be transferred** list, click on the **General** tab.

7. Within the **Group Selection** section, select a Line name from the **Line Name** list. Lines can also be selected by number from the **Line Number** list.

8. Select a Group from the **Group Name** list. A Group can also be selected by number from the **Group Number** list or by milepost designation from the **MilePost** list. Alternately, select the **Include All Groups** check box to include all Groups of the Line.

9. Select the appropriate module designation from the **Module** list in the **File Selection** section.

10. Select the MCF to be transferred from the **Available MCFs** list.

11. Select the MEF to be transferred from the **Available MEFs** list.

12. Click on the **Add** button. The selected MCF and MEF files are listed in the **Selected Files** list.

    - The **Add All** button copies all files listed within the **Available MCFs** and **Available MEFs** lists to the **Selected Files** list.

    - The **Remove** button clears highlighted files from the **Selected Files** list.

    - The **Remove All** button clears all files from the **Selected Files** list.

13. Click on the **Selected** tab. The selected files now appear in the **Files to be transferred** list.

14. Click on the **Copy** button. The Selected files are copied to the target directory.

15. Click on the **Close** button. The **MCF Transfer** dialog box closes.

11.7 SERVICE STATUS

After an MCF has been placed in service, its status must be changed from **Approved** to **In Service**. By default, this can occur only after an In Service UCN value is returned from the field and entered in the system.

11.7.1 Place MCF In Service

An MCF is placed in service as follows:

1. Click on the **MCF Manager Service** button. One of two **Place MCF in Service** dialog boxes, figure 11-14, appears. The dialog box on the right is the default. Click on the **Cancel** button to close the dialog box without saving any changes.

Figure 11-14. Place MCF In Service Dialog Boxes

2. Enter the In Service UCN value in the **In Service UCN** field, as required.

3. Click on the **OK** button.

   The **Place MCF In Service** dialog box closes, and the **MCF Status field** of the **MCF Manager** changes from **Approved** to **In Service**.

11.7.2 Take MCF Out of Service

An In-Service MCF is taken out of service as follows:

Figure 11-15. Take MCF Out of Service Dialog Boxes

1. Click on the **MCF Manager Service** button. One of two **Take MCF Out of Service** dialog boxes, figure 11-15, appears. The dialog box shown on the right is the default.

   Clicking on the **Cancel** button closes the dialog box without saving any changes.

2. Enter the Out of Service UCN value in the **Out of Service UCN** field, as required.

3. Click on the **OK** button. The **Take MCF Out of Service** dialog box closes, and the **MCF Status field** of **the MCF Manager** changes from **In Service** to **Out of Service**.

11.8 DELETE MCF

An MCF can be deleted while its status is either Unapproved, Approved, or Out of Service. An MCF is deleted as follows:

NOTE

Deleted MCFs are not recoverable.

1. Click on the **Delete** button. The **Delete MCF** dialog box, figure 11-16, appears.

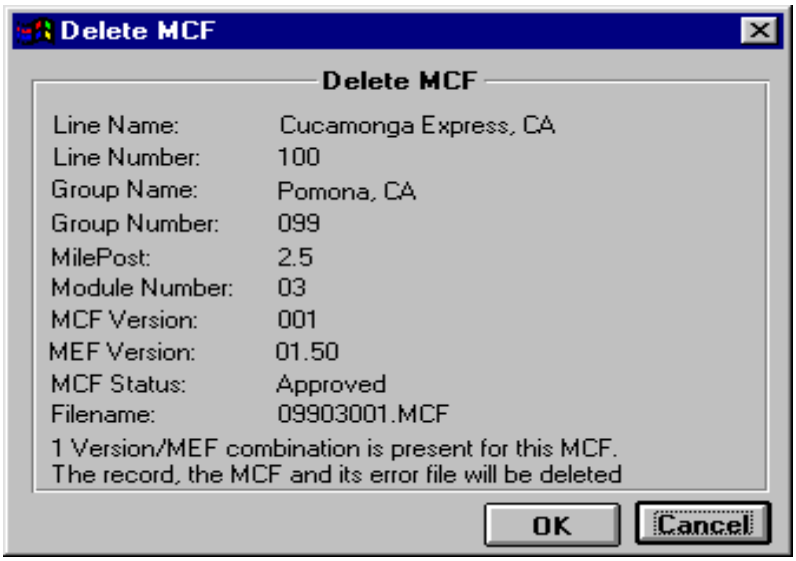

Figure 11-16. Delete MCF Dialog Box

2. Click on the **OK** button. The **Delete MCF** dialog box closes and the **MCF** fields of the MCF Manager are cleared.

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SECTION XII
VIRTUAL CIRCUIT EXAMPLES

12.1 INTRODUCTION

This section provides examples that show the relationship between pole-line and virtual circuits. These examples are based on the following aspect circuits:

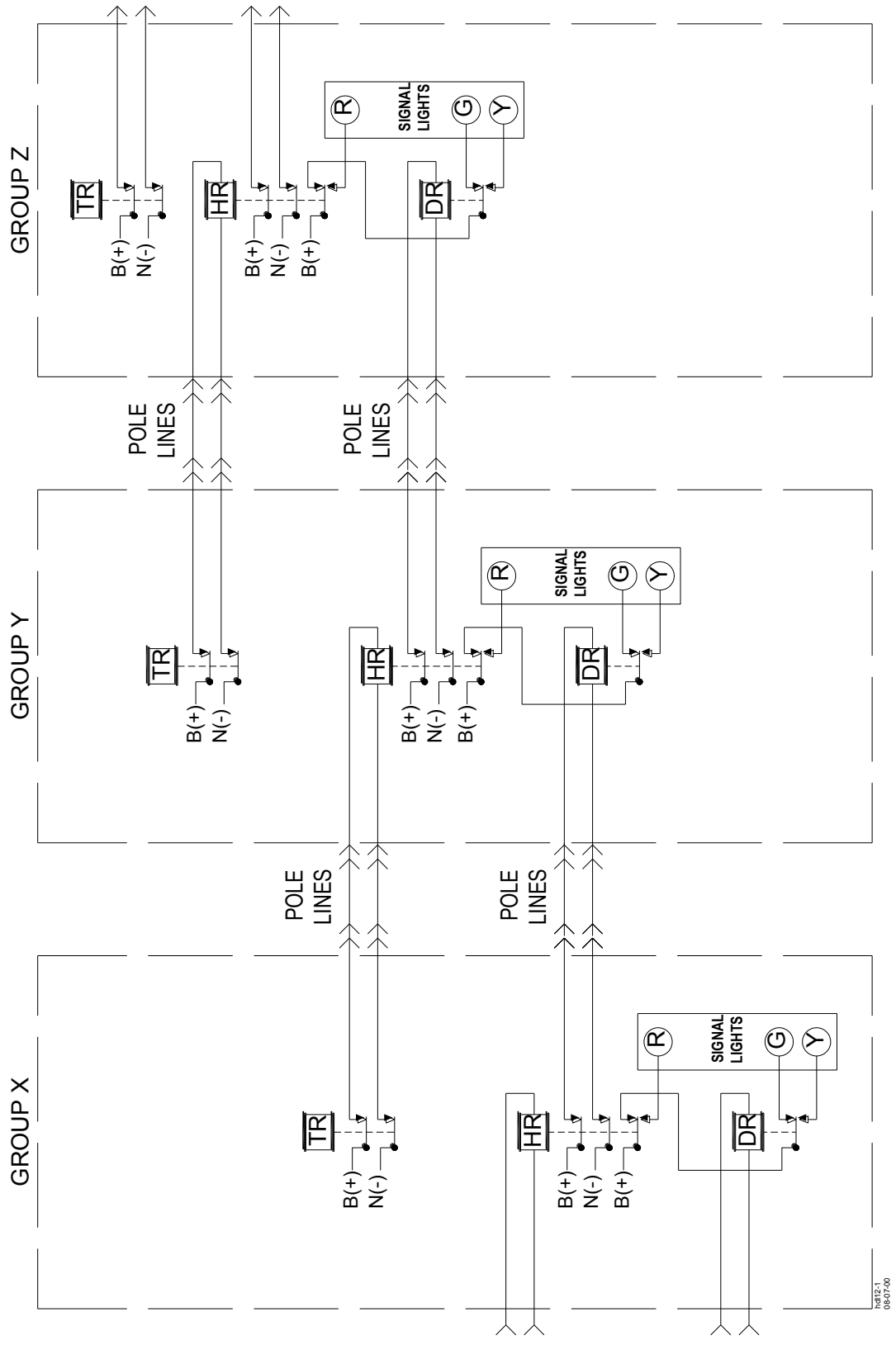
- The four-wire, unidirectional, unipolar aspect circuit, figure 12-1.
- The two-wire, unidirectional, bipolar aspect circuit, figure 12-4.
- The six-wire, bidirectional, unipolar aspect circuit, figure 12-7.
- The two-wire, bidirectional, bipolar aspect circuit, figure 12-10.

NOTE

These circuits are generalized and do not necessarily apply to any particular railroad setting.

12.1.1 Four-Wire, Unidirectional, Unipolar Aspect Circuit

The four-wire, unidirectional, unipolar aspect circuit, figure 12-1, provides one-way traffic sensing. The pole-line connections of this circuit may be converted to virtual-line circuits by the addition of HD/LINK modules as shown in figure 12-2. The corresponding Main Window virtual-circuit configuration display is shown in figure 12-3.


GROUP Z
GROUP Y
GROUP X
TR
HR
DR
B(+)
N(-)
B(+)
SIGNAL LIGHTS
R
G
Y
POLE LINES
POLE LINES
hdl12-1
08-07-00

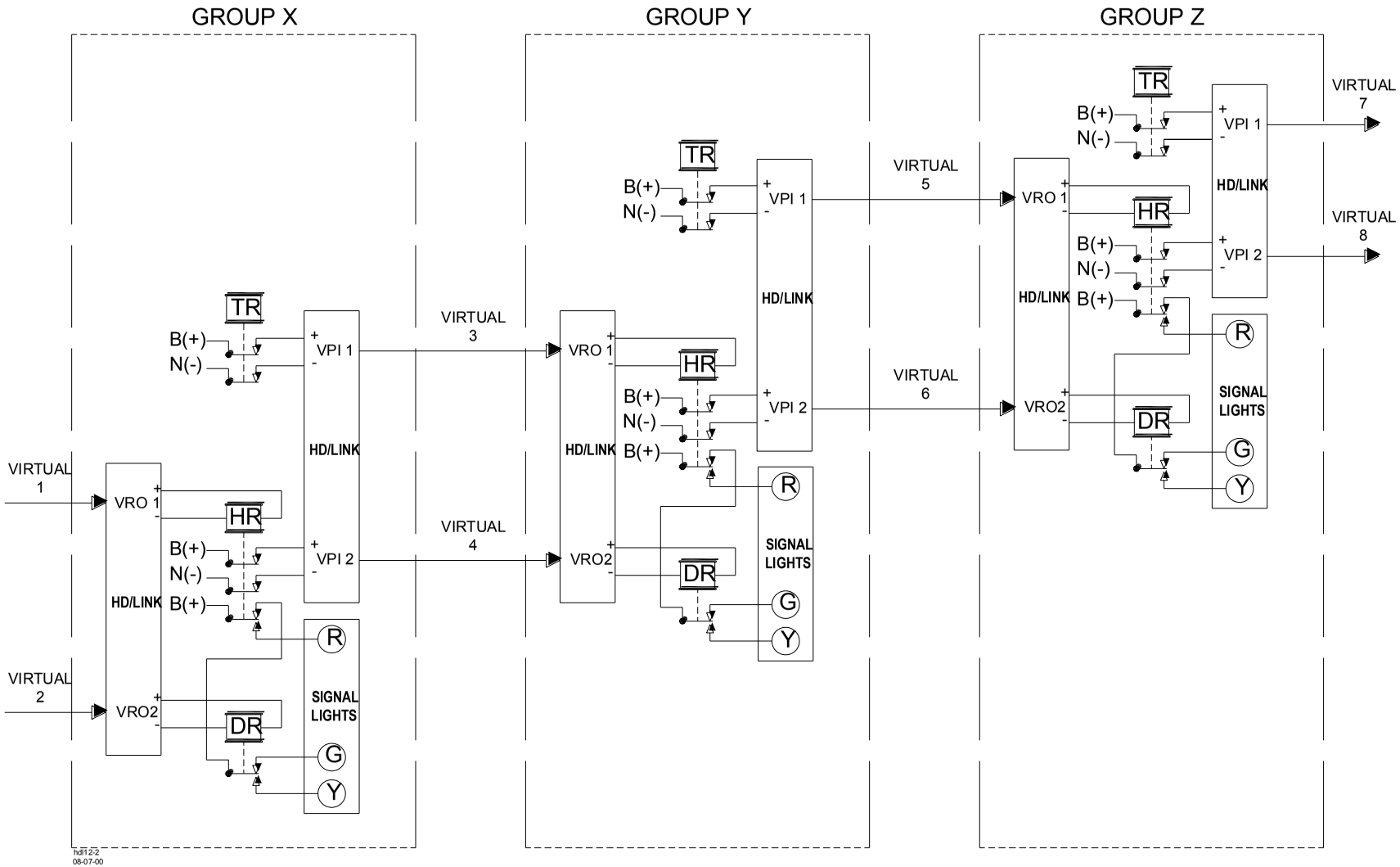


Figure 12-2
Unidirectional, Unipolar Aspect Circuit Simplified Virtual Circuit Diagram

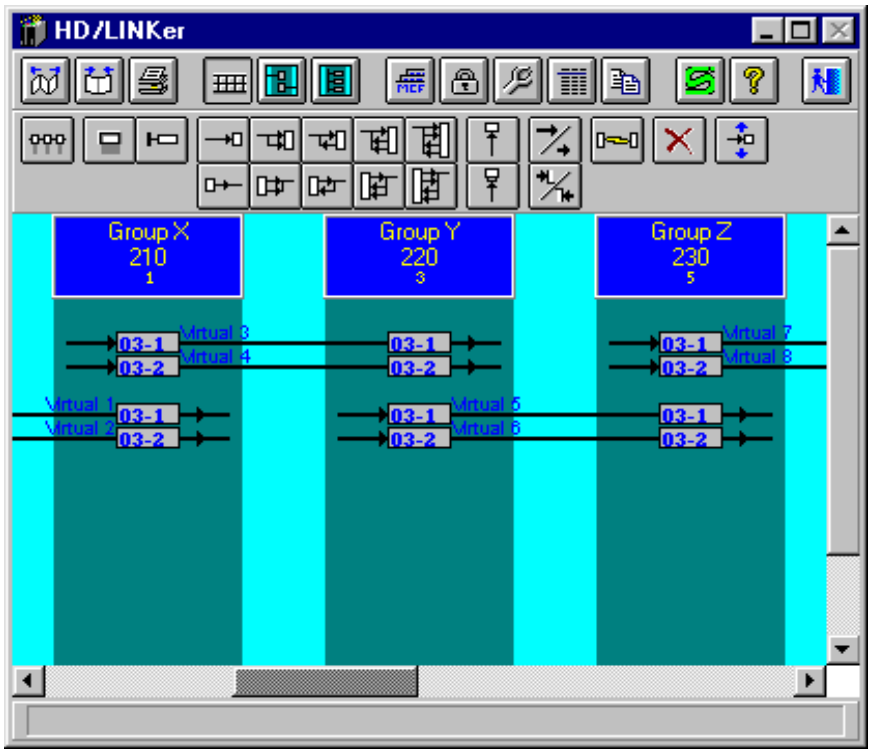


Figure 12-3. Unidirectional, Unipolar Aspect Circuit Virtual Circuit Configuration

12.1.2 Two-Wire, Unidirectional, Bipolar Aspect Circuit

The two-wire, unidirectional, bipolar aspect circuit, figure 12-4, also provides one-way traffic sensing. The pole-line connections of this circuit may be converted to virtual-line circuits by the addition of HD/LINK modules as shown in figure 12-5. The corresponding Main Window virtual-circuit configuration display is shown in figure 12-6.

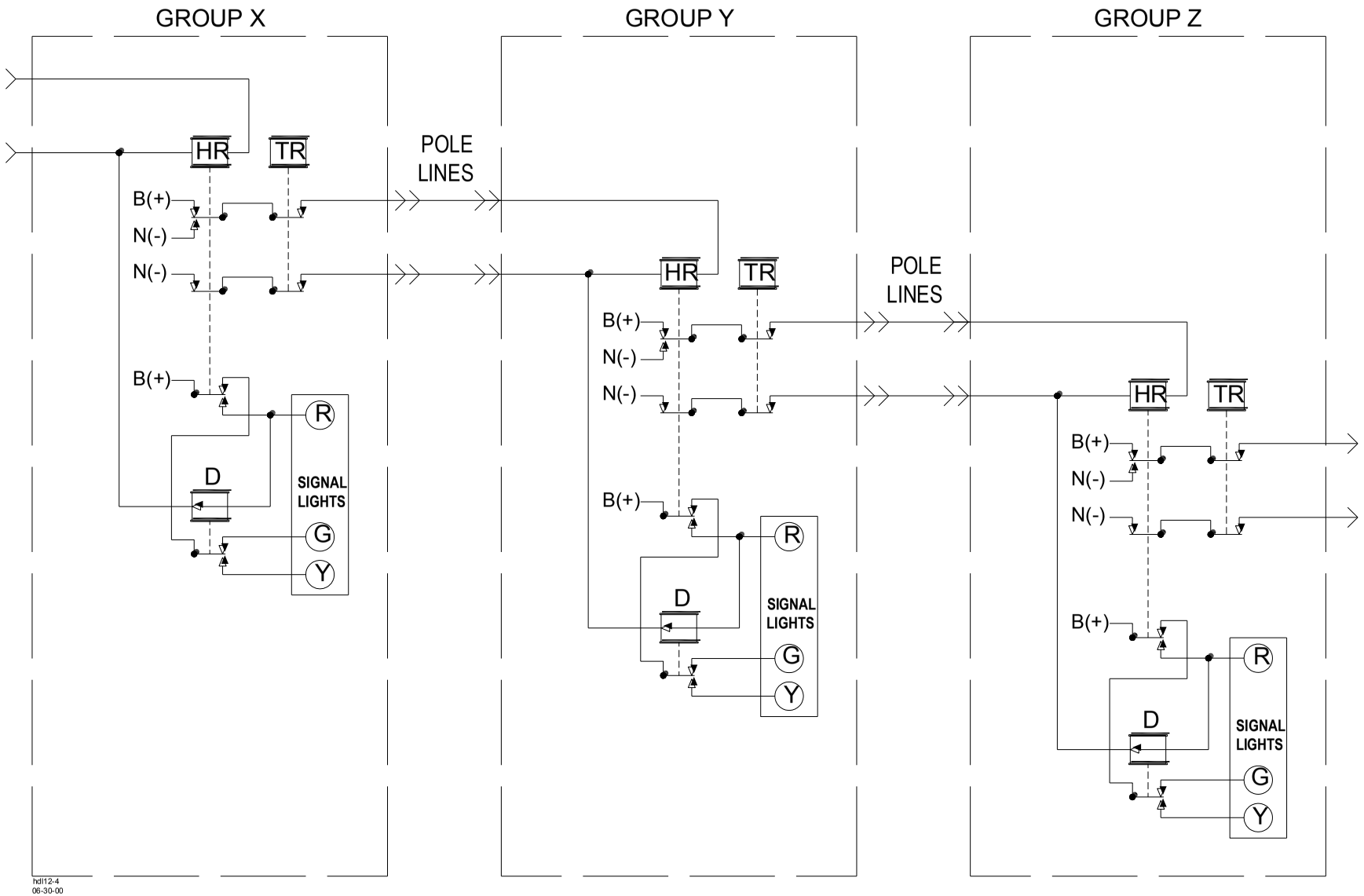


Figure 12-4
Two-Wire, Unidirectional, Bipolar Aspect Circuit Simplified Schematic Diagram

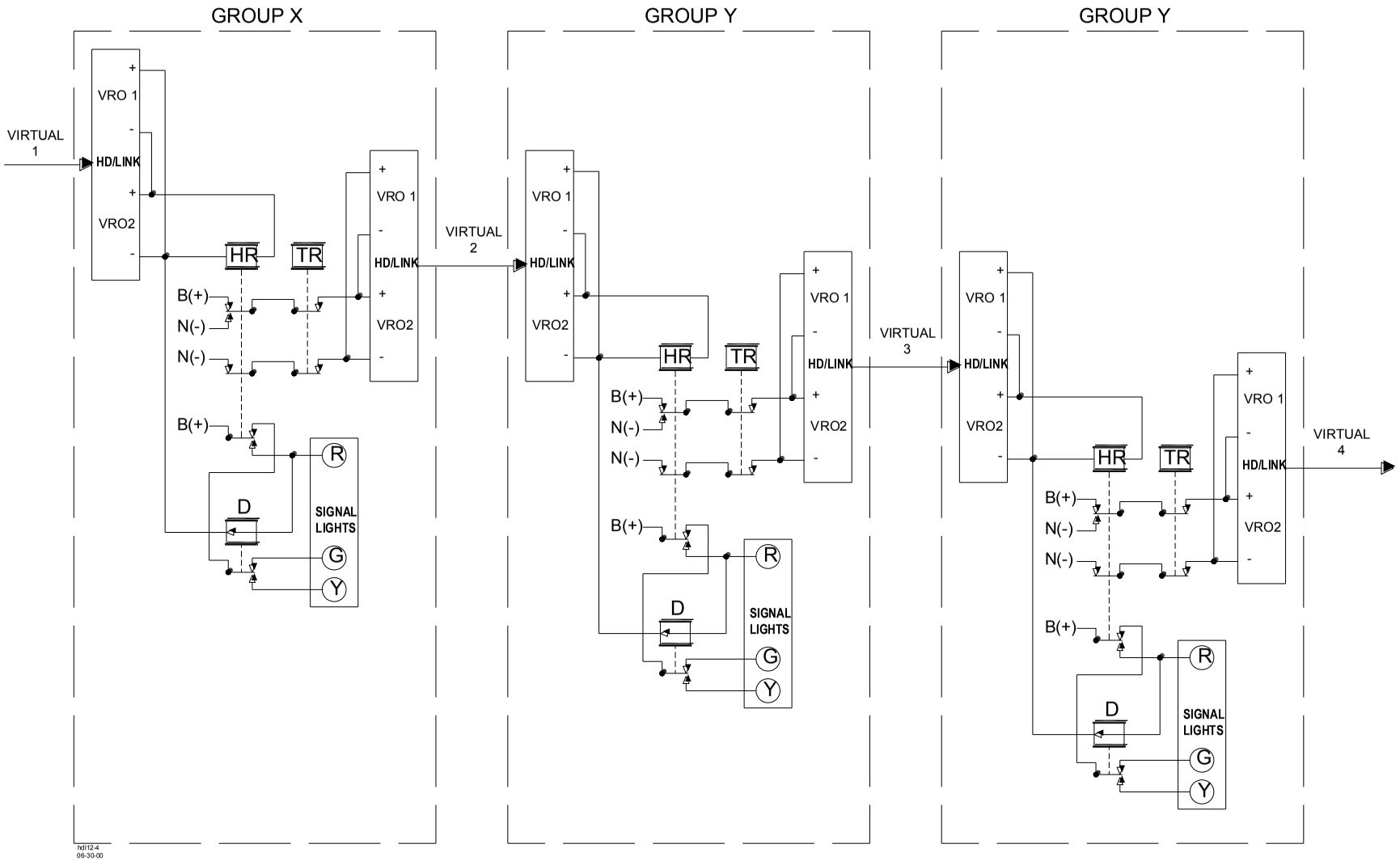


Figure 12-5
Unidirectional, Bipolar Aspect Circuit Virtual Circuit Diagram

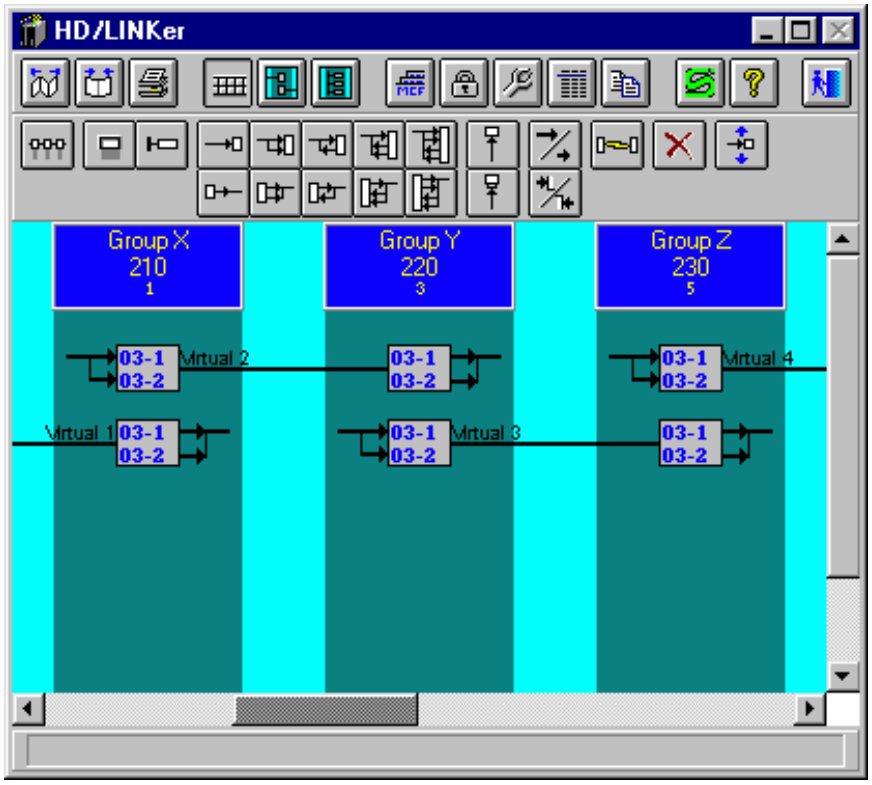


Figure 12-6. Unidirectional, Bipolar Aspect Circuit Virtual Circuit Configuration

12.1.3 Six-Wire, Bidirectional, Unipolar Aspect Circuit

The six-wire, bidirectional, unipolar aspect circuit, figure 12-7, provides two-way traffic sensing. The pole-line connections of this circuit may be converted to virtual-line circuits by the addition of HD/LINK modules as shown in figure 12-8. The corresponding Main Window virtual-circuit configuration display is shown in figure 12-9.

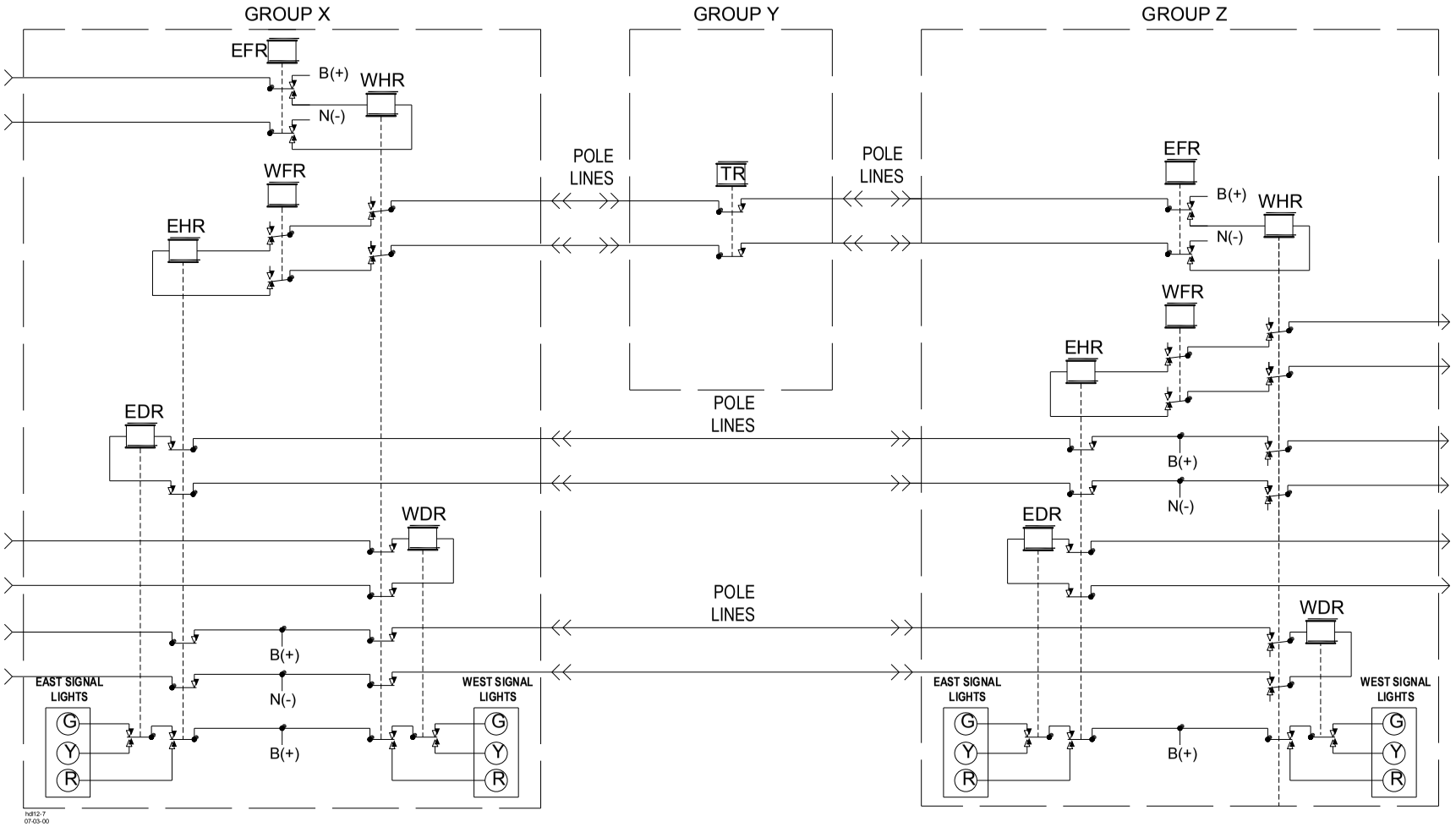
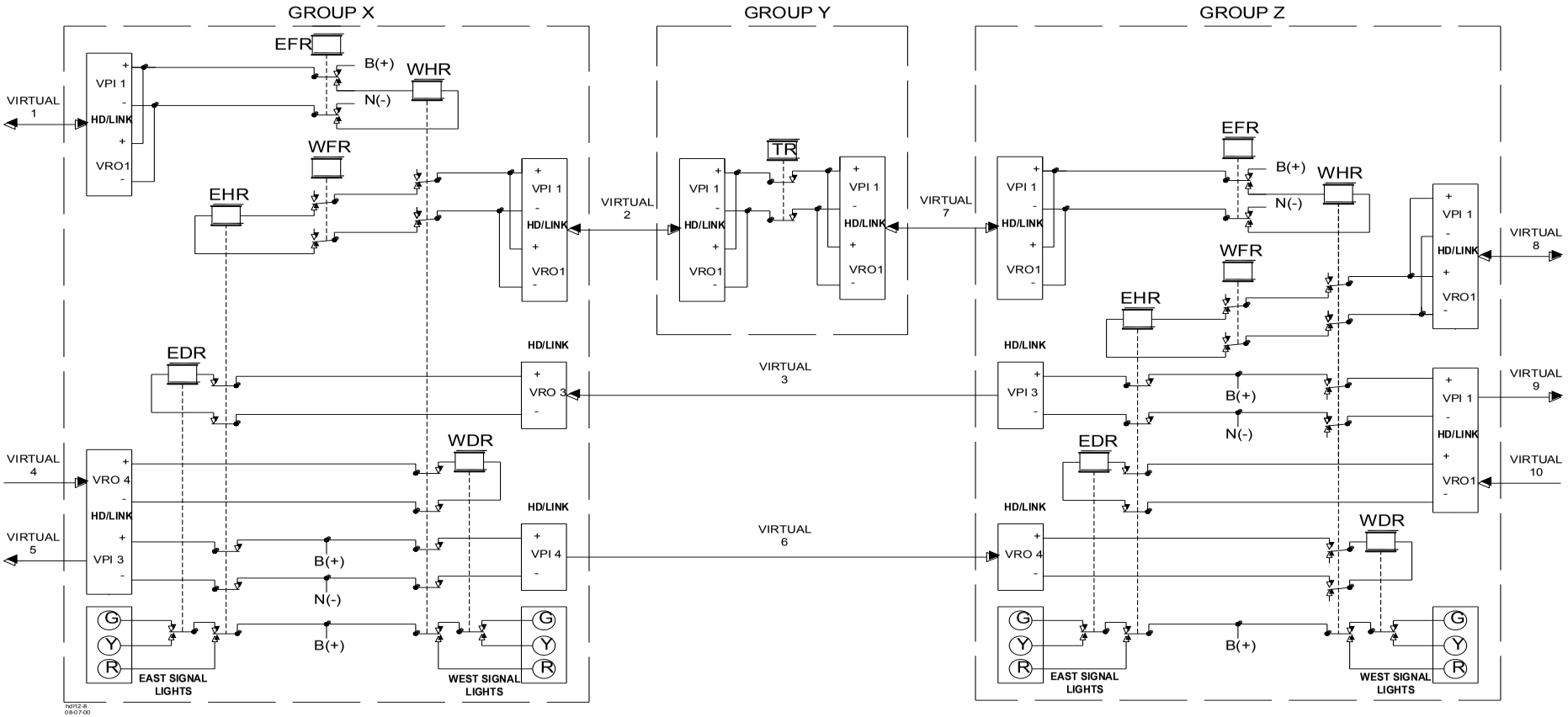


Figure 12-7
Six-Wire, Bidirectional, Unipolar Aspect Circuit Simplified Schematic Diagram


GROUP X
GROUP Y
GROUP Z
VIRTUAL 1
VIRTUAL 2
VIRTUAL 3
VIRTUAL 4
VIRTUAL 5
VIRTUAL 6
VIRTUAL 7
VIRTUAL 8
VIRTUAL 9
VIRTUAL 10
VPI 1
VPI 3
VPI 4
VRO1
VRO 3
VRO 4
HD/LINK
EFR
WHR
WFR
EHR
EDR
WDR
TR
B(+)
N(-)
G
Y
R
EAST SIGNAL LIGHTS
WEST SIGNAL LIGHTS
hdl12-8
08-07-00

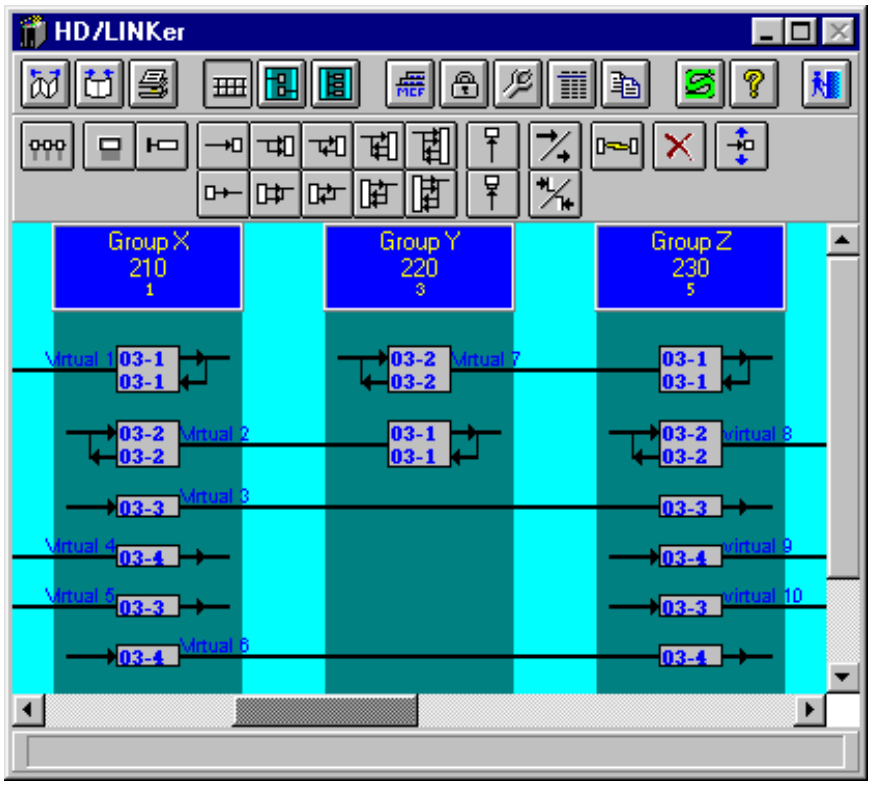


Figure 12-9. Bidirectional, Unipolar Aspect Circuit Virtual Circuit Configuration

12.1.4 Two-Wire, Bidirectional, Bipolar, Aspect Circuit

The two-wire, bidirectional, bipolar aspect circuit, figure 12-10, also provides two-way traffic sensing. The pole-line connections of this circuit may be converted to virtual-line circuits by the addition of HD/LINK modules as shown in figure 12-11. The corresponding Main Window virtual-circuit configuration display is shown in figure 12-12.

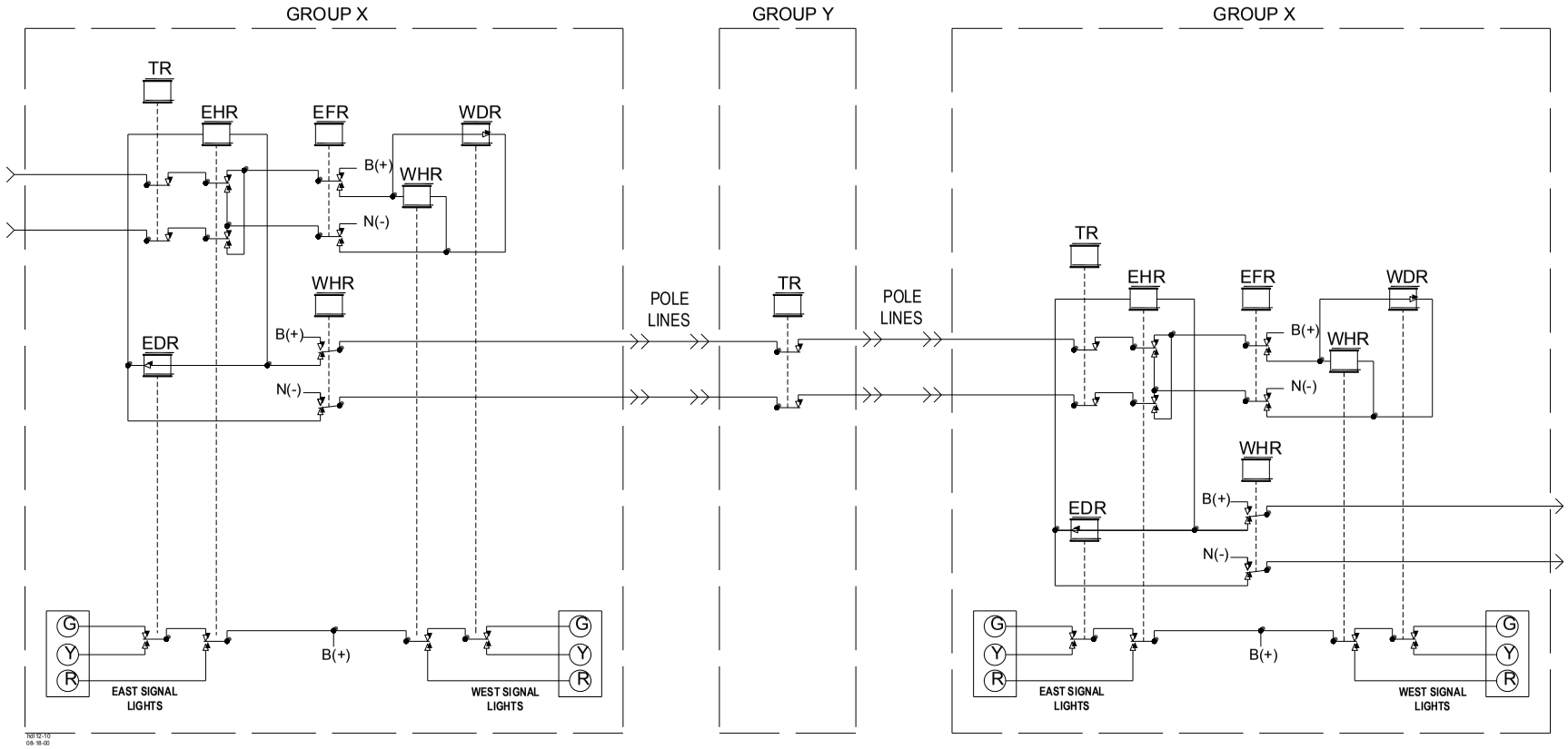


Figure 12-10
Two-Wire, Bidirectional, Bipolar Aspect Circuit Simplified Schematic Diagram

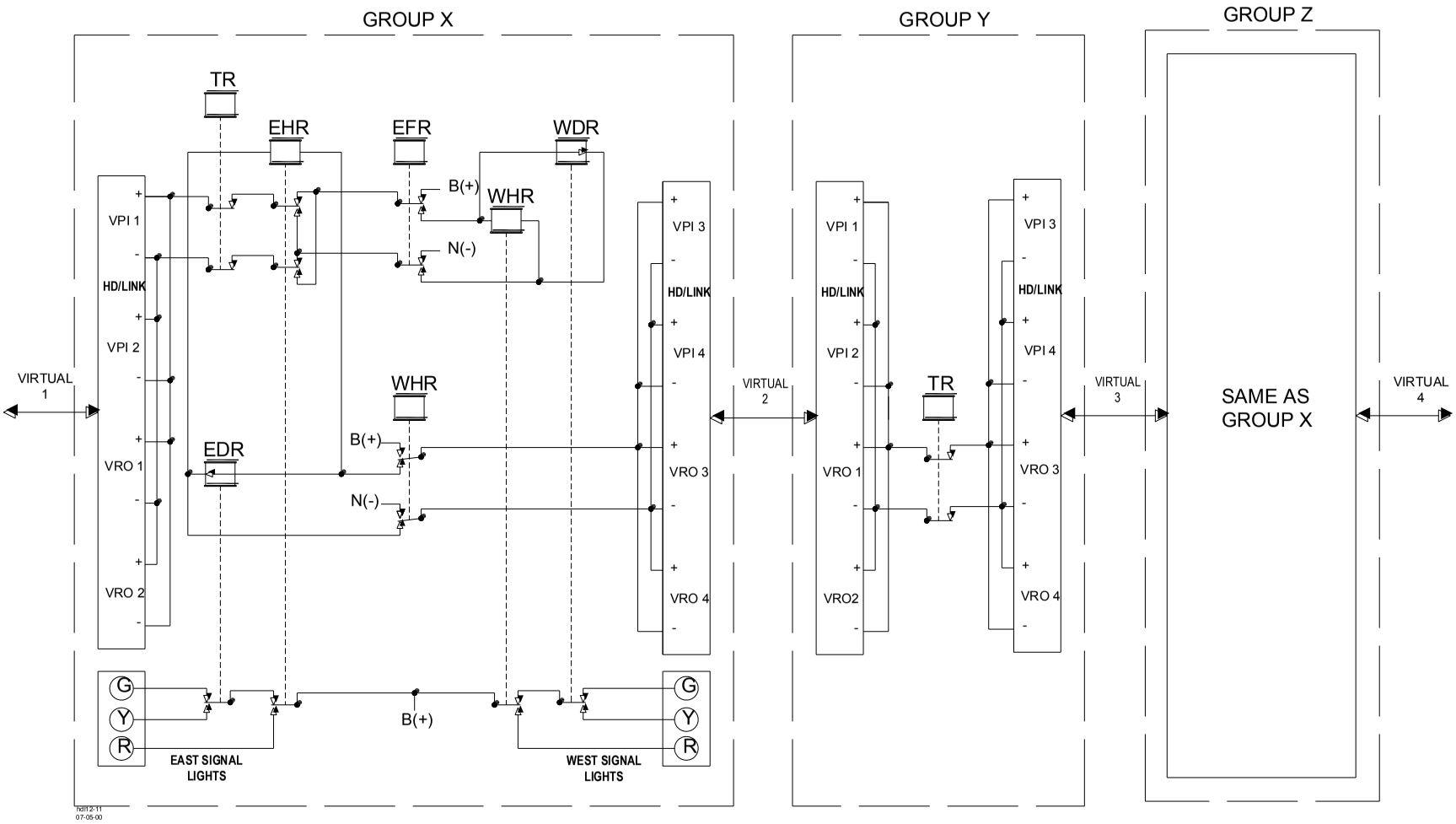


Figure 12-11
Bidirectional, Bipolar Aspect Circuit
Simplified Virtual Circuit Diagram

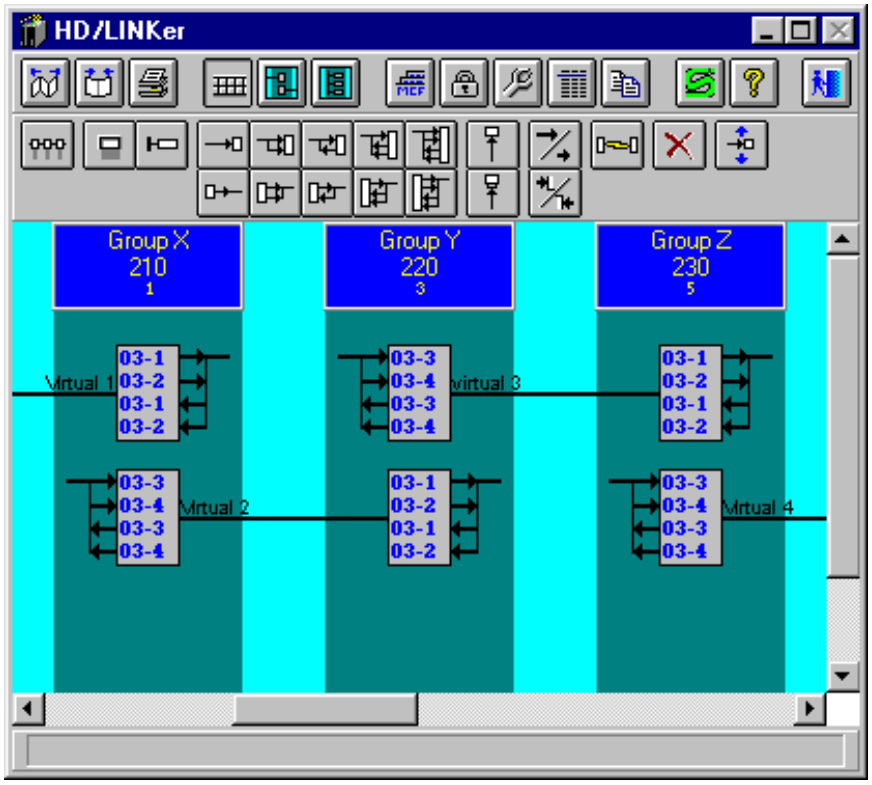


Figure 12-12. Bidirectional, Bipolar Aspect Circuit Virtual Circuit Configuration

12.1.5 Bidirectional, Bipolar Aspect Circuit With Cut Section

The virtual circuits of figure 12-11 may be simplified by the addition of a cut-circuit as shown in figure 12-13. The cut-circuit addition requires rewiring of the Group "Y" TR relay. The corresponding Main Window virtual-circuit configuration display is shown in figure 12-14.

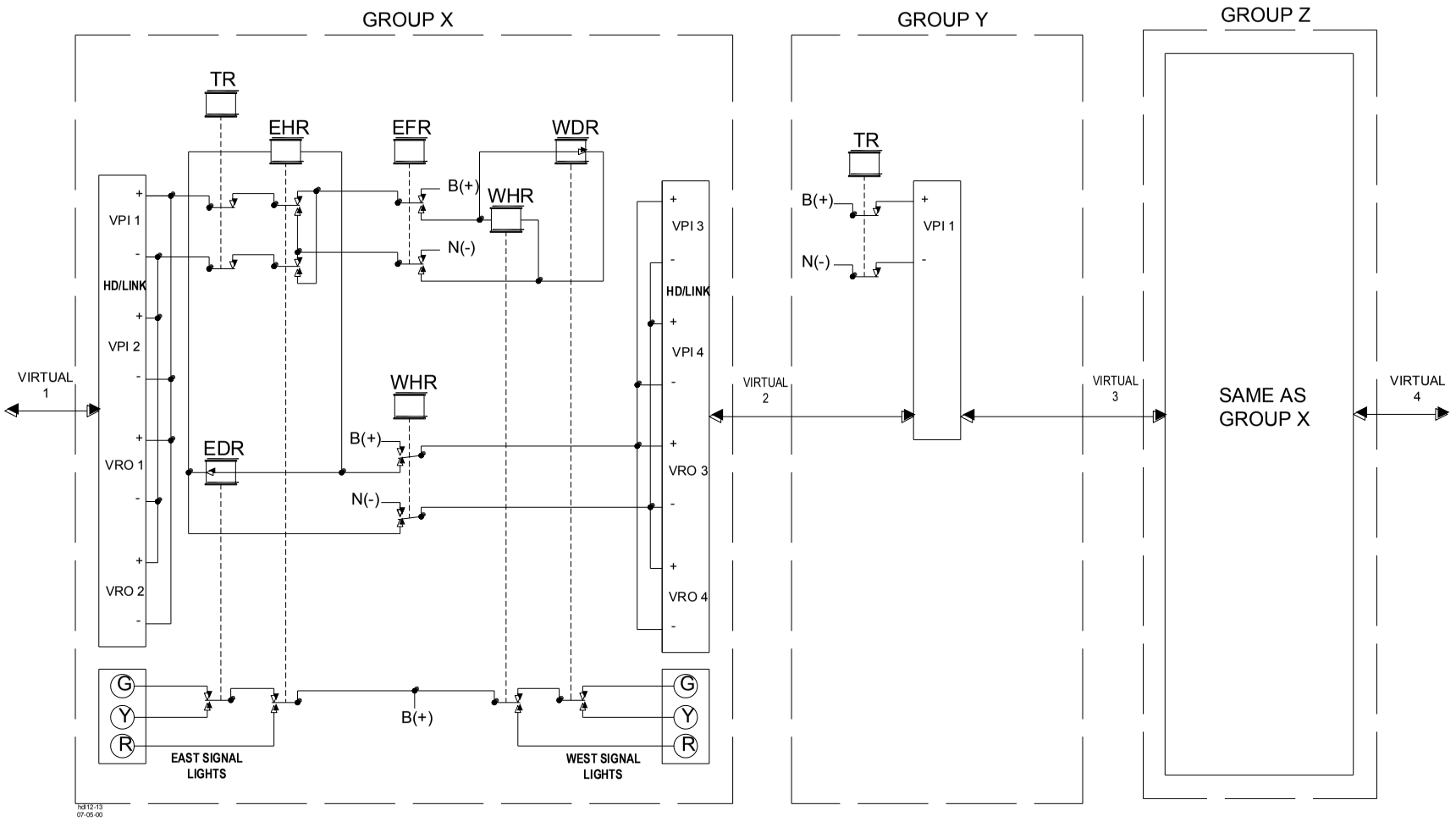


Figure 12-13
Bidirectional, Bipolar Aspect Circuit With Cut Section Modifications
Simplified Virtual Circuit Diagram

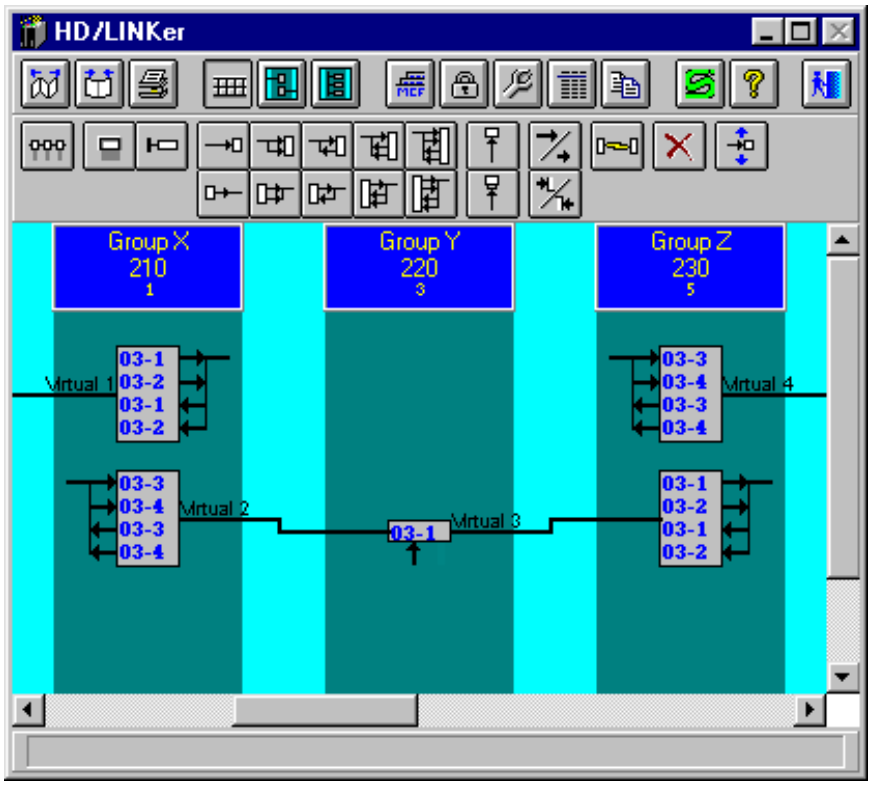


Figure 12-14. Bidirectional, Bipolar Aspect Circuit With Cut Section Virtual Circuit Configuration

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SECTION XIII
FILE MANAGEMENT

13.1 FILE MANAGEMENT GUIDELINES

Proper file management is needed for reliable HD/LINKer operation. File management requires an understanding of how files are stored and organized by the HD/LINKer program.

Figure 13-1 shows the HD/LINKer folder structure in Windows Explorer. This folder structure is always installed in C:\Safetran.

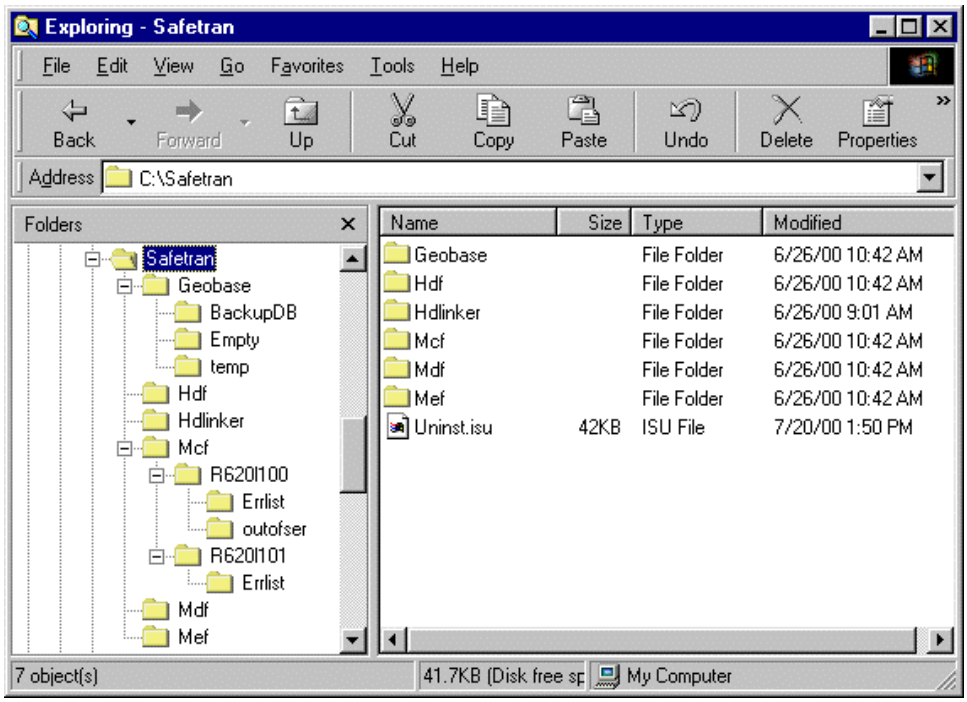

Figure 13-1. HD/LINKer File Display

The folder structure created during HD/LINKer installation consists of six subdirectories. These are:

- **Geobase** - Contains the railroad databases created by the HD/LINKer.
- **Hdf** - Contains the Common Base Technology (CBT) module Hardware Description Files (HDF). Each HDF contains hardware configuration data for a specific CBT module.
- **Hdlinker** - Contains the following program files:

- apprdev.rpt
- approv.rpt
- approver.rpt
- approvsm.rpt
- ATCS.txt
- cfb32.dll
- contdev.rpt
- contsm.rpt
- Crpe32.dll
- hdlinker.cnt
- hdlinker.exe
- hdlinker.GID
- hdlinker.hlp
- hdlinker.ini
- Hdlinker.log
- hdlinker.psw
- install.rpt
- msetup.exe
- Readme.doc
- wiring.rpt

CAUTION

DO NOT MANUALLY EDIT THE HDLINKER.INI FILE. THE HDLINKER.INI FILE MUST BE CLOSED WHILE THE HD/LINKER PROGRAM IS OPEN.

Mcf Contains the Module Configuration Files created by the HD/LINKer program.

Mdf Contains the CBT Module Description Files (MDF). Each MDF contains the configuration and capability information data for a specific Module Executable File (MEF).

Mef Contains the CBT Module MEFs. Each MEF is the executive program for a specific CBT Module.

NOTE

It is strongly recommended that you periodically run a virus scan of the HD/LINKer files.

13.1.1 Database Designation

A Master ATCS database is created during HD/LINKer installation. Additionally, you can create and name HD/LINKer databases (see paragraph 5.1.1.1). An .mdb extension is automatically assigned to each database as it is created.

13.1.2 File Names

The HD/LINKer assigns file names using the following conventions:

13.1.2.1 Hardware Description Files

HDFs are assigned an eight-character designation with the following format:
Upppppvv

Where:

U = single character unit-type designation

ppppp = five-digit sequence of the module part number

vv = two digit file version number.

An HDF for an HD/LINK module assembly with part number 9000-53201-0018 and file version 01 is assigned the following file designation: A5320101.hdf. The unit-type designation character 'A' indicates that the module is an assembly.

13.1.2.2 Module Description Files

MDFs are assigned an eight-character designation with the following format: **mmmvv_rr** where:

mmm = three-character module designation

vv = 2-digit version number

rr = digit revision number

An MDF for an HD/LINK module with file version 01 and revision 00 is assigned the following designation: hdl01_00.mdf.

13.1.2.3 Module Executable Files

MEFs are assigned an eight-character designation with the following format: **mmmvv_rr** where:

mmm = three-character module designation

vv = 2-digit version number

rr = digit revision number

An MEF for an HD/LINK module with file version 01 and revision 00 is assigned the following designation: hdl01_00.mef.

13.1.2.4 Module Configuration Files

MCFs are assigned an eight-digit designation with the following format: **gggmmvvv** where:

ggg = three-digit Group location number

mm = 2-digit module (subnode) number

vvv = 3-digit version number.

An MCF for an HD/LINK module installed at Group 157, with a module number of 03, and a version number of 001 is assigned the following designation: 15703001.mcf.

13.1.3 Installing New Files

The SETUP.EXE program, shipped with the installation CD or diskettes, is used to re-install or upgrade the following HD/LINKer software components:

- HD/LINKer executable (.EXE) and libraries (.DLL)
- Hardware Description File (.HDF)
- Module Description File (.MDF)
- Module Executable File (.MEF)
- Password File (.PSW)
- Initialization File (.INI)
- Master ATCS Database (.MDB)
- Help Files (.HLP)

The SETUP program includes options to select the appropriate components for installation.

13.1.4 ATCS Database Backup

During normal operation, the HD/LINKer program automatically maintains a backup of the current ATCS database. See paragraph 3.1.1 for a discussion of database restoration. You can also create a backup copy of any ATCS database using:

- **Save As** button as described in paragraph 5.1.1.3
- Windows Explorer

Make backups of active ATCS databases on a regular basis to protect against data loss or corruption. It is recommended that the ATCS database backup be updated each time the corresponding ATCS database is changed.

13.1.5 Out-of-Service Archives

Out-of-Service MCFs are archived within **outofser** subdirectories within the MCF directory. The file path for a typical **outofser** archive directory is shown below:

```
C:\SAFETRAN\Mcf\R620l555\outofser
```

13.1.6 MCF Location

MCFs are segregated within subdirectories of the *Mcf* subdirectory. These subdirectories are automatically assigned eight-character designations corresponding to the railroad and line numbers. The subdirectories have the following format: **Rrrrlnnn**

Where:

R = indicates railroad

Rrr = indicates a three-digit railway carrier numeric-designation

L = indicates Line

Nnn = the three-digit Line designation.

For example, an MCF subdirectory for Line 555 of Railroad 620 is assigned the following designation: R620l555.

13.1.7 ATCS Database Installation on Non-Local Drives

Master ATCS databases can be created and stored on non-local drives to allow multiple users access to these databases. Where databases are accessible to multiple users, extra care must be exercised to ensure database security.

WARNING

RESTRICT ACCESS TO A MASTER ATCS DATABASE TO ONE USER AT A TIME TO AVOID CORRUPTING THE DATABASE.

13.2 HDLINKER.INI TIMER VALUES

Communications timer default values are set by the values stored in the hdlinker.ini file. During the module configuration process, certain of these values may be modified using the Circuit Timers dialog box as described in Section X. Timer-value changes made from the dialog box affect the configured module timers but not the hdlinker.ini default values. Table 13-1 lists the hdlinker.ini timer default values. The hdlinker.ini file can be opened and modified using a text editor like Notepad or Wordpad.

Table 13-1 INI File Timer Default Values

Circuit Timer Dialog Box Timer Parameter Designation	INI File Timer Parameter Designation	INI FileDefault Value
Client Time Out Energized	CLIENT_NONRESTRICTIVE_TIMEOUT	5000 ms (5 sec.)
Client Time Out Deenergized	CLIENT_RESTRICTIVE_TIMEOUT	5000 ms (5 sec.)
Server Update Rate Energized	SERVER_NONRESTRICTIVE_UPDATE_RATE	1500 ms (1.5 sec.)
Server Update Rate Deenergized	SERVER_RESTRICTIVE_UPDATE_RATE	1500 ms (1.5 sec.)
Client Session Attempt TO	SESSION_ATTEMPT_TIMEOUT	14400000 ms (4 hrs)
Client Session Retry Rate	RETRY_CLIENT_SESSION_INTERVAL	2000 ms (2 sec.)
Server Session Retry Rate	RETRY_SERVER_SESSION_INTERVAL	2000 ms (2 sec.)
Client Time Stamp Refresh Rate	REFRESH_TIME_STAMP_INTERVAL	36000000 ms (1 hr.)
Client Time Stamp Net Delay	CLIENT_MAX_TIME_OFFSET	10 sec.
Server Time Stamp Refresh TO	REFRESH_TIME_STAMP_TIMEOUT	7202000 ms (2hrs 2 sec.)

SECTION XIV
LINE MCF TRANSFER PROCEDURES

14.1 CHECK OUT/CHECK IN

The Check Out/Check In function lets you copy the MCFs for a particular Line from the Master ATCS Database and transport the copied files to the field using a portable laptop computer.

While in the field, you can modify individual MCFs before installation. When field activities are completed, you transfer the Line files back to the Master ATCS Database, overwriting the existing MCF data for that Line.

The **Check In/Out Database** dialog box, figure 14-1, appears when the **Check-In/Check-Out** button (see right) on the Main Tool Bar is selected. The **Check Out** tab is the default.

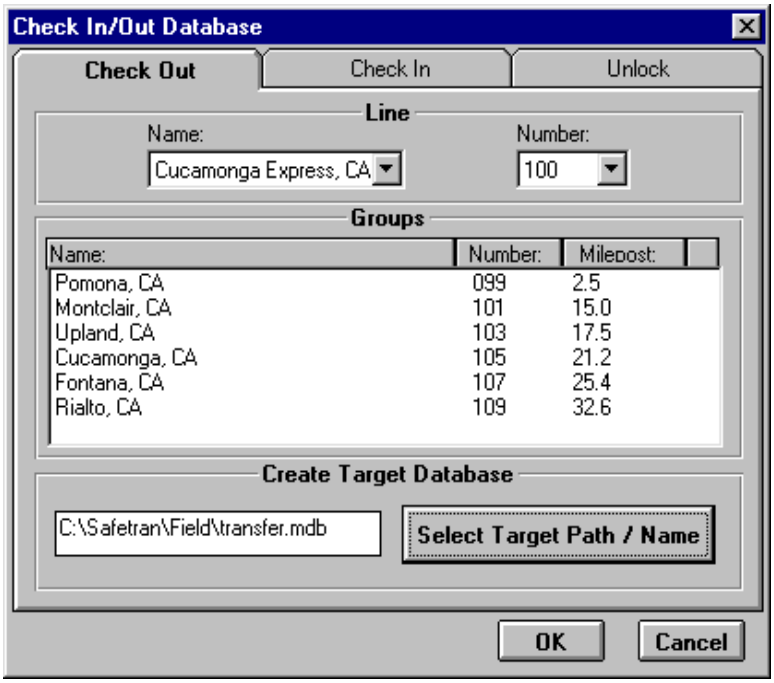

Figure 14-1. Check In/Out Database Dialog Box Check-Out Tab

NOTE

When a line is checked out, its files in the Master ATCS database are "locked"; i.e., placed in a read only mode. This locked state is maintained until the files are checked back into the office computer.

Before checking out a line, reapprove all MCFs for the Line using the MCF Manager (see paragraph 11-4).

14.1.1 Line Check Out

Line files are checked out of the Master ATCS Database as follows:

1. Click the **Check-In/Check-Out** button (see right) on the Main Tool Bar. The **Check Out** tab, figure 14-1, of the **Check In/Out Database** dialog box appears.

2. Select a line from the **Line Name** or **Line Number** list. A list of the groups of the Line appears in the **Groups** window.

3. Verify that all group and I/O data for the Line is correct.

4. Click on the **Select Target Path / Name** button. The **Enter New Database Name** dialog box, figure 14-2, appears.

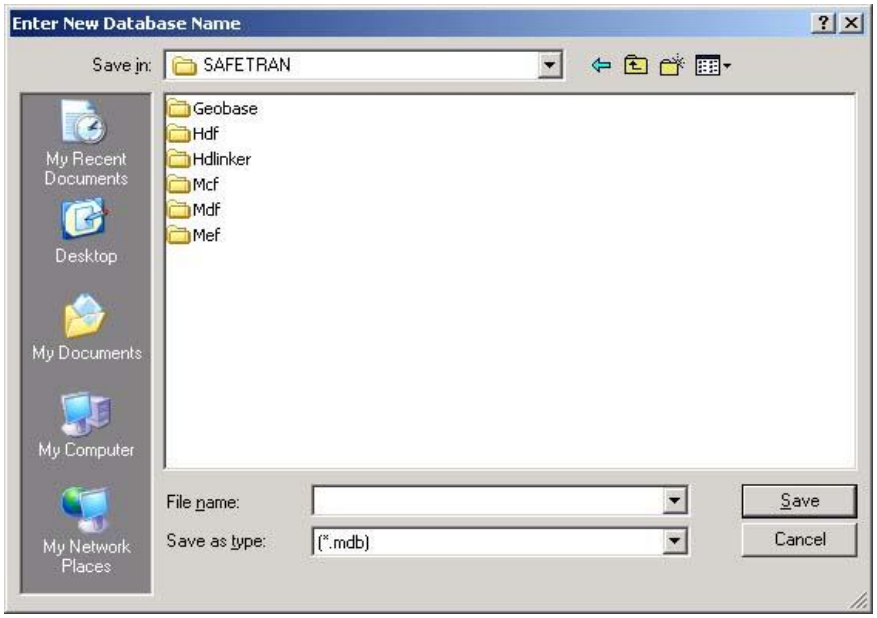

Figure 14-2. Enter New Database Name Dialog Box

5. With the **Enter New Database Name Dialog Box** still open, create a subdirectory within the Safetran directory:

   - Open Windows Explorer.
   - Select your C drive.
   - Select the Safetran folder.
   - From the **File** menu, click **New** and then click **Folder**.
   - Enter a name from the new folder in the Safetran directory.

   NOTE

   For purposes of discussion, this new subdirectory is referred to as the **Field** folder in the following procedures.

6. Go back to HD/LINKer.

7. In the **Enter New Database Name** dialog box, open the Field folder you just created.

8. Enter a name for a check-out database in the **File name** window; e.g.. **Transfer**.

9. Click on the **Save** button.

   An empty database with the specified name is created within the new folder. The **Enter New Database Name** dialog box closes, and the selected database name appears in the **Select Target Path/Name** field (see figure 14-1).

   Clicking on the **Cancel** button closes the **Enter New Database Name** dialog box without creating the new database.

10. Click on the **OK** button at the bottom of the **Check In/Out Database** dialog box.

    A progress bar appears at the bottom of the **Check In/Out Database** dialog box. The Transfer database and the associated Line MCFs are copied to the Field directory. When the copying is complete, the **Check In/Out Database** dialog box closes.

    Clicking on the **Cancel** button closes the **Check In/Out Database Name** dialog box without copying the Line MCFs to the selected database.

14.1.2 Line Check-Out Validation

Before transferring to the field sites, the Line files must be validated using the HD/LINKer program of field computer. Do the following:

1. Copy the Field folder (C:\Safetran\Field) from the office computer to the Safetran folder on the field computer.

NOTE

MCF files can be transferred between the office computer and the field computer using standard network connections or by means of floppy disks. However, a single floppy disk may no thave enough space to hold the database and the related files. When using floppy disks to transfer files, do not write the MCF files directly to the office computer floppy drive. Instead, create a target folder within the Safetran folder to be used during the check-out and check-in procedures. Following Line check-out, the contents of this directory can be copied using multiple diskettes as required.

It is strongly recommended that you practice the check-out/check-in procedures using test data before actually transferring files from or to the office computer.

2. Copy the transfer database (C:\Safetran\Field\transfer.mdb) from the Field folder to the Geobase folder (C:\Safetran\Geobase) of the field computer.

3. Copy the MCF folder (C:\Safetran\Field\Mcf) from the Field folder to the Safetran folder (C:\Safetran\Mcf) of the field computer.

4. Start the HD/LINKer program on the field computer.

5. Verify that the Safetran folders on the office and field computers contain the same versions of the following files:

   - HD/LINKer program
   - MEF
   - MDF

6. Select the transfer database (C:\Safetran\Field\transfer.mdb) as the active database.

7. Show all Groups, I/O information, and links. Verify that the data copy was successful and that no data was corrupted.

NOTE

If an error is found, delete the Field folder and files from the office computer, unlock the previously "checked-out" line, and repeat the Line Check Out procedure of paragraph 14.1.1.

8. After inspection verifies that the Line files were copied successfully, use the field computer MCF Manager to check and reapprove the Line MCFs (see paragraphs 11.3 and 11.4).

9. Verify that the UCN for each MCF remains unchanged as it is reapproved.

NOTE

A change in the UCN indicates that either the database is corrupted or that a different version of the MCF was submitted for reapproval. When a UCN changes during reapproval, delete the Field folder of the field computer, unlock the previously checked-out Line (see paragraph 14.1.5), and repeat the check-out procedure of paragraph 14.1.1.

14.1.3 Field Computer Line Check-In Procedure

Line files are transferred from the field computer to the office computer as follows:

1. Select the transfer database (C:\Safetran\Geobase\transfer.mdb) as the active database.

2. Show all Groups, I/O information, and links, and verify that all circuits are valid.

3. Use the MCF Manager (see paragraphs 11.3 and 11.4) to check and reapprove the Line MCFs.

WARNING

DO NOT CHECK IN A CORRUPTED DATABASE. IF ERRORS ARE FOUND, CORRECT THE DATA ON THE FIELD COMPUTER.

4. Copy the transfer database (C:\Safetran\Geobase\transfer.mdb) to the Field folder.

5. Copy the MCF folder (C:\Safetran\Mcf) to the Field directory (C:\Safetran\Field).

6. Copy the Field folder of the field computer to the Field folder of the office computer.

14.1.4 Office Computer Line Check-In Procedure

1. Click the **Check-In/Check-Out** button (see right) on the **Main Tool Bar**.

   The **Check Out** tab, figure 14-1, of the **Check In/Out Database** dialog box appears.

2. Select the **Check In** tab of the dialog box.

   The **Check In** tab, figure 14-3, of the **Check In/Out Database** dialog box appears.

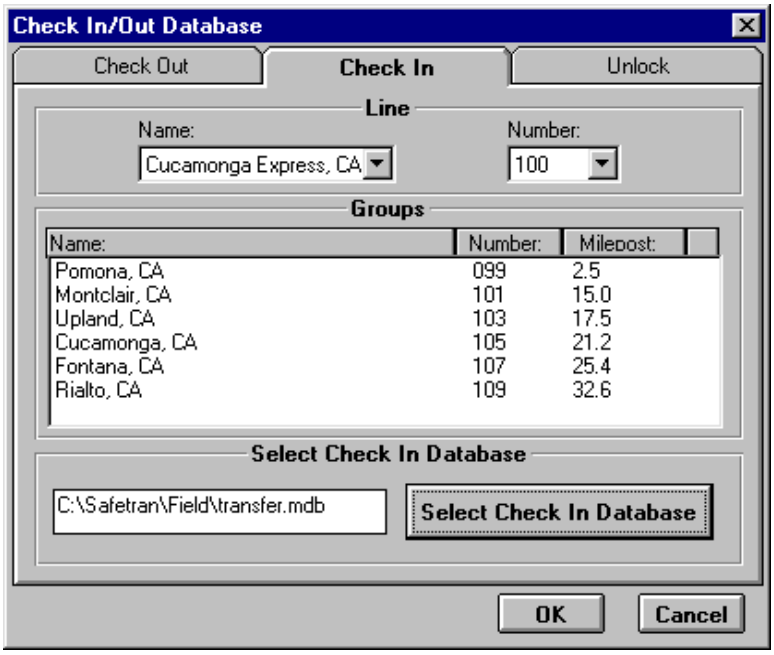

Figure 14-3. Check In/Out Database Dialog Box Check In Tab

3. Click on the **Select Check In Database** button.

   A **Select a Database** dialog box, figure 14-4, appears.

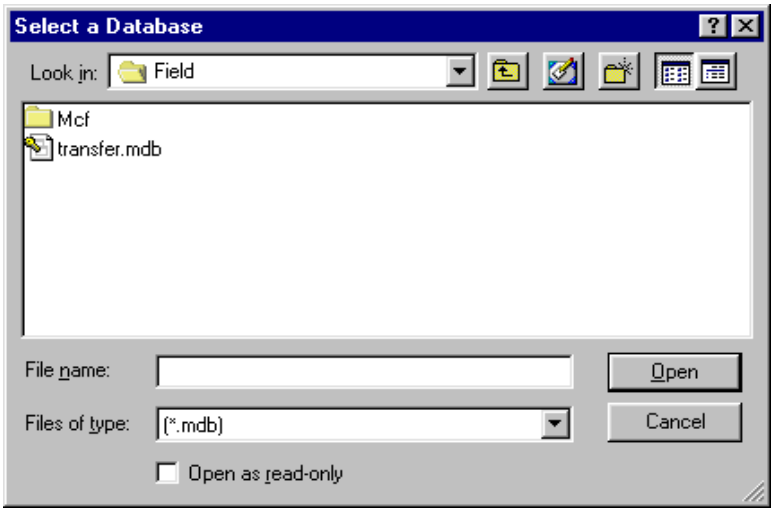

Figure 14-4. Select a Database Dialog Box

4. Select the transfer directory and click on the **Open** button.

   The **Select A Database** dialog box closes and the selected directory appears in the **Select Check In Database** window of the **Check In** tab. A list of the Groups of the check-in Line appears in the **Groups** window.

   Clicking on the **Cancel** button closes the **Select A Database** dialog box without showing the selected database or Line Groups.

5. Verify that the information shown in the **Groups** window is correct.

6. Click on the **OK** button at the bottom of the **Check In/Out Database** dialog box.

   The Transfer database overwrites the corresponding line data of the Master ATCS database and then the **COPY MCFs** dialog box, figure 14-5, appears.

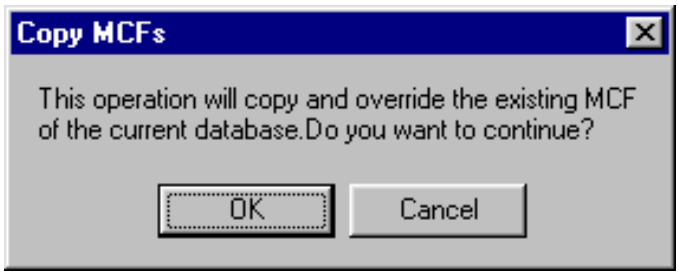

Figure 14-5. Copy MCFs Dialog Box

7. Click on the **OK** button.

NOTE

The transfer database is overwritten when the Line check-in starts, regardless of your response to the **COPY MCFs** dialog box.

8. The **Copy MCFs** dialog box closes. A progress bar appears at the bottom of the **Check In/Out Database** dialog box and the files in the Transfer folder are copied to the MCF folder (C:\Safetran\MCF). When the copying process is done, the **Check In/Out Database** dialog box closes.

NOTE

The check-in operation unlocks the Line files and merges the transfer database with the Master ATCS database. This operation also creates a backup copy of the office computer's transfer database in the Field folder of the office computer. In addition, all MCFs for a designated Line are overwritten. The replaced files cannot be recovered after check-in is completed.

Clicking on the **Cancel** button closes the **Copy MCFs** dialog box and unlocks the database; however, the MCFs of the Line are not overwritten.

NOTE

It is recommended that all MCFs of a Line be overwritten during the check-in procedure.

Line MCFs stored in the Field folder are overwritten during subsequent check-in/check-out operations for that Line. MCFs for other lines are not overwritten. To avoid the accumulation of MCFs for different lines within the Field folder, it is recommended that the Field folder on the office and field computers be deleted after each successful line check-in operation.

9. Show all Groups, I/O information, and links. Verify that the data copy was successful and that no data was corrupted.

10. After inspection verifies that the Line files were copied successfully, use the MCF Manager (see paragraphs 11.3 and 11.4) to check and reapprove the Line MCFs.

11. Verify that the UCN for each MCF remains unchanged as the MCF is reapproved.

NOTE

Submitting an older MCF version for reapproval results in the following warning message:

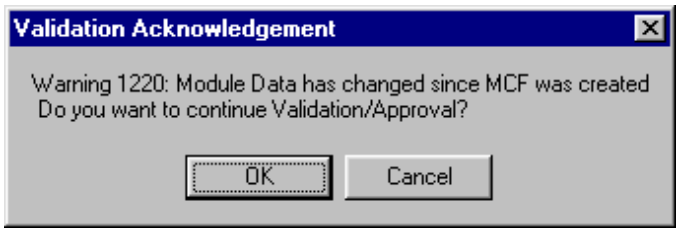

Figure 14-6. Validation Acknowledgment Dialog Box

14.1.5 Database Transfer Status

The database transfer status is shown on the **Unlock** tab of the **Check In/Out Database** dialog box, figure 14-7. This tab can be used to unlock a line that has been checked out.

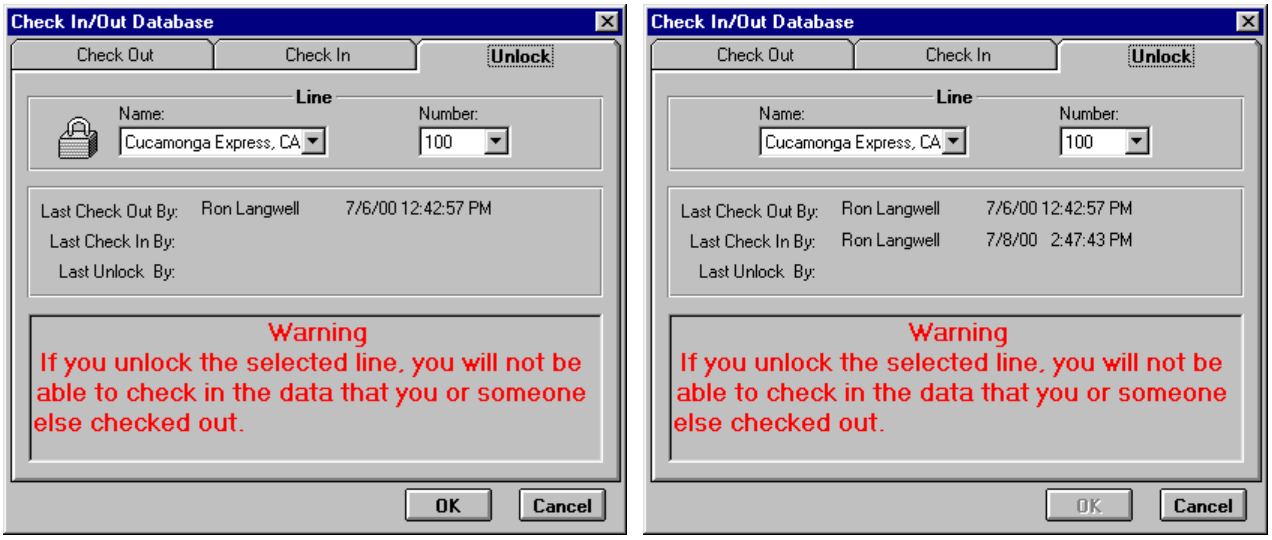

Figure 14-7. Check In/Out Database Dialog Box

NOTE

While a Line is checked out, a lock symbol appears to the left of the **Name** list. MCF files that are checked out can not be modified without first being unlocked.

A database that is checked out can be unlocked as follows:

1. Click the **Check-In/Check-Out** button (see right) on the **Main Tool Bar**.

   The **Check Out** tab, figure 14-1, of the **Check In/Out Database** dialog box appears.

2. Select the **Unlock** tab of the dialog box.

   The **Unlock** tab, figure 14-6, of the **Check In/Out Database** dialog box appears.

3. Select the Line to be unlocked from the **Line Name** list. You can also select the Line from the **Line Number** list.

   The check out, check in, and unlock history of the selected Line are shown below the **Line Name** and **Number** selection fields.

   NOTE

   Files that are checked out cannot be checked into the Master ATCS Database after the corresponding Line has been unlocked.

4. Click on the **OK** button.

   The Line is unlocked and the **Check In/Out Database** dialog box closes. If the **Cancel** button is selected, the dialog box closes without unlocking the Line.

SECTION XV
TROUBLESHOOTING

This section provides information to enable the user to analyze and resolve conditions that hinder HD/LINKer operation and the successful development and distribution of MCFs.

15.1 SELF TEST FAILURES

Self-test routines are started during HD/LINKer program startup. When a self-test failure is detected, the Self-Test Results Window (see figures 3-5 and 3-6) displays, listing the cause of the failure.

15.1.1 Self Test Routines

Table 15-1 shows the HD/LINKer software components and the tests performed on them:

Table 15-1 Self-Test Routines

File	Existence	Integrity	Version	Status
CFB32.DLL	X	X	X	
HDLINKER.EXE		X		X
HDLINKER.INI	X			
HDLINKER.LOG	X			
HDLINKER.PSW	X	X		
*.MDB	X	X		
* The database file name defaults to the current file from the last installation or selection.				

- The Existence test checks for the presence of files in the installation drive and directory.
- The Integrity test performs a file CRC calculation and compares the calculated value with known installation values.
- The Version test compares the file version with known installation values.
- The Status test checks for the state of the last HD/LINKer termination.

When all tests pass, a backup copy of the current database file is made and the **Login** dialog box (see figure 3-8) appears.

15.1.2 Self Test Errors

To resolve a self-test error, do the following:

1. Note the cause of the failure listed in the Self-Test Result Window (see figures 3-5 and 3-6).
2. Terminate the application by clicking on the **Close** button at the bottom of the **Self-Test Result** Window.
3. Run the HD/LINKer installation program.
4. Re-install any missing or corrupted file listed in the **Self-Test Result** Window.
5. Restart the HD/LINKer application and verify that the cause of the failure is corrected.

Table 15-2 shows the various error messages listed in the Self-Test Result Window. Listing is by error code number. A description of the error message and the recommended action to correct the error are also provided.

Table 15-2
Self-Test Error Display

Error Code	Error Message	Description	Action
48	Error loading DLL	The cfb32.dll file missing.	Use the HD/LINKer Installation disks to reinstall the cfb32.dll file. Select the Program Files option only.
–	Invalid CFB32.DLL	The cfb32.dll file is not found in the HDLINKER directory.	Use the HD/LINKer Installation disks to reinstall the cfb32.dll file. Select the Program Files option only. If the error persists, contact Safetran Technical Support* for a new copy of this file.
–	Incompatible DLL	The cfb32.dll file in the HDLINKER directory has an incompatible Version Number.	

Error Code	Error Message	Description	Action
–	Last Termination Status Unknown	Abnormal program termination (Program Crash).	Restore database file as described in Paragraph 3.1.1.
–	Desktop Using Large Fonts	The system display driver Font Size settings are set to Large Font.	Change to small font using the Windows Control Panel.
–	Missing HDLINKER.PSW	File not found.	Use the HD/LINKer Installation disks to reinstall the hdlinker.psw file. Select the Password File option only. Use the Create New Users option to recreate the user information.
–	Invalid HDLINKER.PSW	The hdlinker.psw file in the HDLINKER directory is corrupted.	Close current application session and start a new session. Use the Restore database option described in Paragraph 3.3.1. as required.
–	Error Accessing Log File	The hdlinker.log file is not found in the HDLINKER directory.	
–	Unable to Create Backup of the Database.	The active database file was not found in the GEOBASE directory. The database could not be opened for automatic backup and verification.	If a manual backup of the active database file exists, restore it by copying it to the GEOBASE folder. If the active database file does not exist, use the HD/LINKer Installation disks to create a new database file. Use the New option to create a new database. Restart the HD/LINKer application to recreate the lost data. If the error continues, contact Safetran Technical Support* for assistance.
–	Missing Database	The active database file in the GEOBASE directory is corrupted.	Contact Safetran Technical Support* for a configuration or database file update.
–	Unable to Open Database, Cannot Continue		

Error Code	Error Message	Description	Action
–	Invalid database		
–	Incompatible database	The active database file in the GEOBASE directory has an incompatible Version Number.	

* Safetran Technical Support is available for telephone consultation as required (see Sales and Service Locations, page ii).

15.2 VIRTUAL CIRCUIT CREATION ERRORS

Errors occurring during the virtual circuit creation process are listed in dialog boxes and in the Status/Progress bar beneath the Main Window.

Table 15-3 presents the various error messages that can occur during virtual circuit creation. Listing is by error code number. A description of the error message and the recommended action to correct the error is also provided.

Table 15-3
Virtual Circuit Creation Error Display

Error Code	Error Message	Description	Action
56	Mismatched Expected/Actual CRC - HDF File Corrupted	The a53201vv.hdf file in the HDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall the a53201vv.hdf file. Select the Hardware Description Files option only.
70	MDF Internal/external name mismatch	The hdlvv_rr.mdf file in the MDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall the hdlvv_rr.mdf file. Select the Module Description Files option only.
71	MDF Internal/external version mismatch	The hdlvv_rr.mdf file in the MDF directory is corrupted.	
73	Mismatched Expected/Actual CRC - MDF File Corrupted	The hdlvv_rr.mdf file in the MDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall the hdlvv_rr.mdf file. Select the Module Description Files option only.
74	HDF Internal/external name mismatch	The a53201vv.hdf file in the HDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only.
75	HDF Internal/external version mismatch	The a53201vv.hdf file in the MDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only.

Error Code	Error Message	Description	Action
211	Hardware Description File Not Found	The a53201vv.hdf file was not found in the HDF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Description Files option only.
211	Module Description File Not Found	The hdlvv_rr.mdf file was not found in the MDF directory.	
–	Missing, Corrupted or Incompatible HDF for Selected Module	See error codes 56 and 211 above.	See error codes 56 and 211 above.
–	Missing, Corrupted or Incompatible MDF for Selected Module	See error codes 73 and 211 above.	See error codes 73 and 211 above.

NOTE

A Module Description File Not Found, error code 211, can also be generated by the Virtual Circuit Editor functions when entering or editing Virtual Circuit Link information, and when viewing and editing Communications Timer information.

15.3 MCF DISPLAY ERRORS

Table 15-4 lists the error messages that can be generated by the Module Configuration functions when displaying the MCF Manager:

Table 15-4
MCF Function Display Errors

Error Code	Error Message	Description	Action
–	Error Reading HDF	The a53201vv.hdf file in the HDF directory is missing or corrupted. This message appears in the Part Number text box in the Module Selector area of the MCF Manager dialog box.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of the *.hdf file.
–	System Error: <dir path>*.MCF Was Not Found	The gggssvvv.mcf file was not found in MCF directory. This message appears in the Created Date/Time in the MCF Selector area.	Use the MCF Create function to recreate the MCF.
87	Mismatched Expected/Actual CRC - MCF File Corrupted	The gggssvvv.mcf file in the MCF directory is corrupted. This message appears in the Created Date/Time in the MCF Selector area.	

15.4 MCF CREATION ERRORS

Errors occurring during the MCF creation process are listed in dialog boxes, shown in figure 15-1. Listing is by error code number. An Error message describes the cause of the error.

Figure 15-1. HD/LINKer Create MCF Failed Dialog Box

Clicking on **OK** closes the dialog box and opens the **MCF Manager** dialog box (see figure 11-1).

Table 15-5 lists the various error messages that can occur during MCF creation. Listing is by error code number. A description of the Error message and the recommended action to correct the error is also provided.

Table 15-5
MCF Creation Error Display

Error Code	Error Message	Description	Action
–	Create MCF Failed. <dir path>*.HDF Was Not Found	The a53201vv.hdf file was not found in the HDF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
56	Create MCF Failed. Mismatched Expected/Actual CRC - HDF File Corrupted	The a53201vv.hdf file in the HDF directory is corrupted.	
–	Create MCF Failed. <dir path>*.MDF Was Not Found	The hdlvv_rr.mdf file was not found in the MDF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file
73	Create MCF Failed. Mismatched Expected/Actual CRC - MDF File Corrupted	The hdlvv_rr.mdf file in the MDF directory is corrupted.	
–	Create MCF Failed. <dir path>*.MEF Was Not Found	The hdlvv_rr.mef file was not found in the MEF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Executable Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
89	VPI # Missing from Sat Inputs and SAT Outputs	The module has Circuit I/O that uses a VPI channel that is not linked to another Circuit I/O.	Use the Link I/O function to create a Circuit Link.

Error Code	Error Message	Description	Action
90	VRO <#> is Missing from SAT Inputs and SAT Outputs	The module has Circuit I/O that uses a VRO channel that is not linked to another Circuit I/O.	
91	Internal Channel <#> is Missing from SAT Inputs and SAT Outputs	The module has Circuit I/O that uses an internal channel that is not linked to another Circuit I/O.	
92	No Termination or Cut Device Found at Least One is Required	The module has no Circuit I/O or none of the Circuit I/O has Circuit Links.	
205	No linked group found for this group <###>	A circuit link exists between two groups that are not geographically adjacent.	Use the Group function to add a group that is geographically adjacent to both, or use the Remove Separator Bar button in the Circuit Layout window to make the two groups adjacent.

15.5 MCF VALIDATION ERRORS

During the validation of an MCF, the following tests are performed:

- Range Consistency Test
- Circuit Consistency Test
- Input/Output Consistency Test
- MCF - Database Comparison Test
- Device - Input/Output Consistency Test
- Device Consistency Test
- Unique Device Number Test
- Geographic Neighbor Test

MCF validation is started under the following conditions (see paragraph 11.2):

- At the completion of MCF creation.
- When the MCF Manager **Validate** button is selected.
- When printing the MCF Approval Listing.

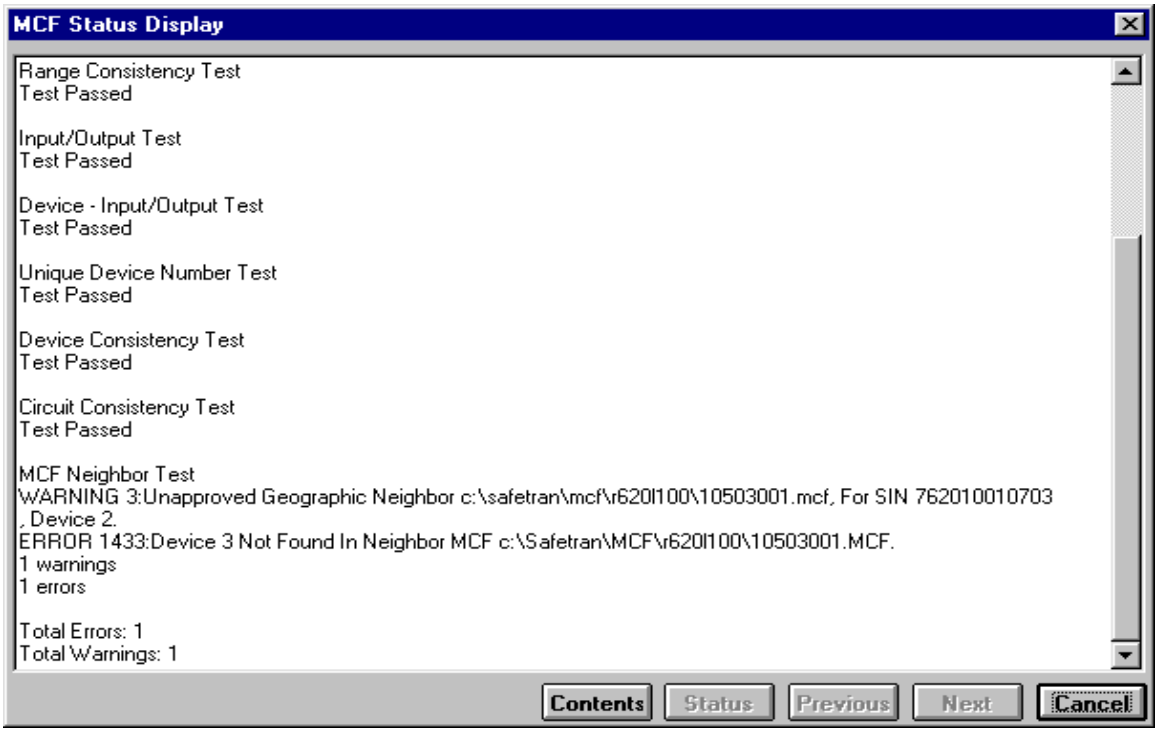

Figure 15-2. MCF Status Display Window Error Listing

- When the MCF Manager **Approval** button is selected.

The **Create Acknowledgement** dialog box, figure 15-2, indicates errors and warnings detected during MCF creation.

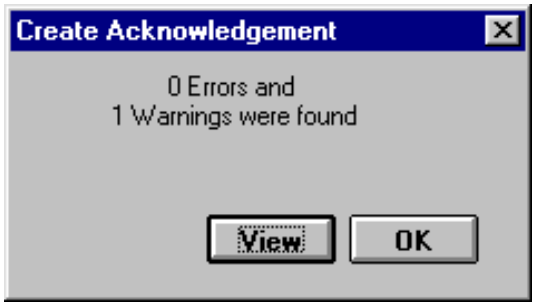

Figure 15-3. Create Acknowledgement Dialog Box

Clicking on the **View** button opens the **MCF Status Display** window, figure 15-3. Clicking on **OK** closes the dialog box and opens the **MCF Manager** dialog box (see figure 11-1).

Within the **MCF Status Display** window, validation errors (detected when the **Validate** button is selected from the MCF Manager dialog box, figure 11-1) are categorized and designated, as shown in figure 15-3. See paragraph 11.4 for a discussion of this window.

The **Print Acknowledgement** dialog box, figure 15-4, appears if errors are detected when you print the MCF Approval Listing:

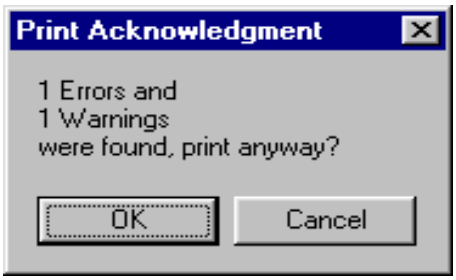

Figure 15-4. Print Acknowledgment Dialog Box

The **Approval Acknowledgement** dialog box, figure 15-5, appears if errors are detected when you print the MCF Listing:

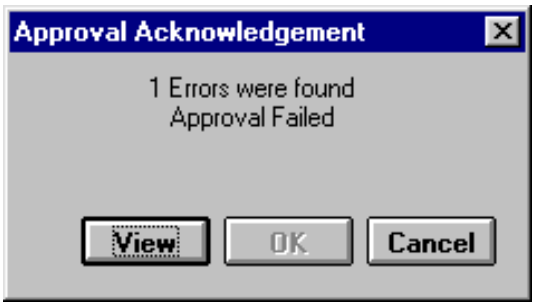

Figure 15-5. Approval Acknowledgement Dialog Box

Clicking on the **OK** button in figure 15-4 closes the dialog box and starts the printout as described above. Clicking **Cancel** closes the dialog box and stops the printing.

Clicking on the **View** button in figure 15-5 opens the **MCF Status Display** window, figure 15-3. Continue with the MCF approval process, as shown in steps 4-8 of paragraph 11.4, MCF APPROVAL.

15.5.1 Range Consistency Test

The Range Consistency Test verifies that all MCF data elements are within range and consistent with the MCF format.

15.5.1.1 Range Consistency Test Errors

Range Consistency Test Errors are allocated Error Code Numbers 1312 through 1419. Table 15-6 lists the most frequent error messages that occur during the Range Consistency test. Listing is by error code number. A description of the Error message and the recommended action to correct the error is also provided.

Table 15-6
Range Consistency Test Error Display

Error Code	Error Message	Description	Action
–	System Error. <dir path>*.HDF Was Not Found	The a53201vv.hdf file was not found in the HDF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
–	System Error. <dir path>*.MDF Was Not Found	The hdlvv_rr.mdf file was not found in the MDF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
–	System Error. <dir path>*.MEF Was Not Found	The hdlvv_rr.mef file was not found in the MEF directory.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Executable Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
56	Mismatched Expected/Actual CRC - HDF File Corrupted	The a53201vv.hdf file in the HDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.

Error Code	Error Message	Description	Action
73	Mismatched Expected/Actual CRC - MDF File Corrupted	The hdlvv_rr.mdf file in the MDF directory is corrupted.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
1324	Left Neighbor Subnode 0, Cut Device <##>. Legal Range is 3 to 98.	The Left Circuit Link for a Cut I/O is missing.	Use the Link I/O function to create a Circuit Link for the left-hand side of the Cut I/O.
1326	LEFT Neighbor Device 0, Cut Device <##>. Legal Range is 2 to 90		
1327	Right Neighbor Device 0, Cut Device <##>. Legal Range Is 2 to 90	The Right Circuit Link for a Cut I/O is missing.	Use the Link I/O function to create a Circuit Link for the right hand side of the Cut I/O.
1409	The HDF Read Function Failed <dir path>*.HDF	The a53201vv.hdf file in the HDF directory is missing or corrupted.	Use the HD/LINKer Installation disks to reinstall this file. Select the Hardware Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
1411	The MDF Read Function Failed <dir path>*.MDF.	The hdlvv_rr.mdf file in the MDF directory is missing or corrupted.	Use the HD/LINKer Installation disks to reinstall this file. Select the Module Description Files option only. If the error continues, contact Safetran Technical Support for a new copy of this file.
1417	MCI CSAT Orientation 255, for Device <##> is Illegal	The Left or Right Circuit Link for a Cut I/O is missing.	Use the Link I/O function to create a Circuit Link for the left or right hand side of the Cut I/O.

NOTE

For error codes not listed in table 15-6, contact Safetran Technical Support for assistance.

15.5.2 Input-Output Consistency Test

The Input-Output Consistency Test verifies that the selected Inputs and Outputs are consistent with those supported by the modules.

15.5.2.1 Input-Output Consistency Test Errors

Input-Output Consistency Test Errors are allocated Error Code Numbers 1000 through 1050. These errors are caused by corrupted data in the MCF file or the Master ATCS database.

15.5.3 Device – Input/Output Consistency Test

The Device – Input/Output Consistency Test verifies that the selected Inputs and Outputs are consistent with those supported by the communications components.

15.5.3.1 Device – Input/Output Consistency Test Errors

Device – Input/Output Consistency Test Errors are allocated Error Code Numbers 1051 through 1129. These errors are caused by corrupted data in the MCF file or the Master ATCS database.

Table 15-7 lists the most frequent error messages that occur during the Device – Input/Output Consistency test. Listing is by error code number. A description of the Error message and the recommended action to correct the error is also provided.

Table 15-7
Device – Input/Output Consistency Test Error Display

Error Code	Error Message	Description	Action
1068	Missing Internal Output for Termination Device 2 Internal Input 1	The internal input used by a Termination I/O does not have the required internal output of the same number.	Use the MCF Create function to recreate the MCF or use the Circuit and Link I/O functions to recreate the virtual circuits. If the errors continue, contact Safetran Technical Support.
1069	Missing Internal Input for Termination Device 2 Internal Input 1	The internal output used by a Termination I/O does not have the required internal input of the same number.	
1083	Internal 4 Missing for SAT Inputs and SAT Outputs	Internal output(s) or input(s) used by a Termination or Cut I/O does not have the required internal input(s) or output(s) of the same number.	
1073	Missing Internal Output for Cut Device <##>, Internal Output <##>	The internal input used by a Cut I/O does not have the required internal output of the same number.	Use the Circuit I/O function to create an internal input from an existing internal output. If the errors continues, contact Safetran Technical Support.

NOTE

For error codes not listed in table 15-7, contact Safetran Technical Support for assistance.

15.5.4 Unique Device Number Test

The Unique Device Number Test verifies that an MCF does not have duplicate communications components' numbers within a module.

15.5.4.1 Unique Device Number Test Errors

Unique Device Number Test Errors are allocated Error Code Numbers 1150 through 1169. These errors are caused by corrupted data in the MCF file or the Master ATCS database. Use the MCF Create function to recreate the MCF or use the Circuit and Link I/O functions to recreate the virtual circuits. If the errors persist, contact Safetran Technical Support.

15.5.5 Circuit Consistency Test

The Circuit Consistency Test verifies that all Virtual Circuit data is consistent with all other MCF data.

15.5.5.1 Circuit Consistency Test Errors

Circuit Consistency Test Errors are allocated Error Code Numbers 1170 through 1219. These errors are caused by corrupted data in the MCF file or the Master ATCS database. Use the MCF Create function to recreate the MCF or use the Circuit and Link I/O functions to recreate the virtual circuits. If the errors persist, contact Safetran Technical Support.

15.5.6 MCF-Database Comparison Test

This test determines if any differences exist between an MCF and the corresponding data of the Master ATCS Database.

15.5.6.1 MCF-Database Comparison Test Errors

MCF-Database Comparison Test Errors are allocated Error Code Numbers 1220 through 1311. Table 15-8 lists the most frequent error messages that occur during the MCF – Database Comparison test. Listing is by error code number. A description of the Error message and the recommended action to correct the error is also provided.

Table 15-8
MCF-Database Comparison Test Error Display

Error Code	Error Message	Description	Action
–	Mismatch Between the Selected MCF and the One Generated from the Database	The data in the Master ATCS Database does not match the data in the MCF that was last created.	Use the MCF Create function to recreate the MCF. If the errors continue, contact Safetran Technical Support.
1220	Database Has Changed Since MCF was Created		

NOTE

For error codes not listed in table 15-8, contact Safetran Technical Support for assistance.

The remaining MCF-Database Comparison Test Error messages are caused by corrupted data in the MCF file or the Master ATCS database. Use the MCF Create function to recreate the MCF or use the Circuit and Link I/O functions to recreate the virtual circuits. If the errors persist, contact Safetran Technical Support.

15.5.7 Device Consistency Test

The Device Consistency Test verifies that the created communications components are consistent with those supported by the module.

15.5.7.1 Device Consistency Test Errors

Device Consistency Test Errors are allocated Error Code Numbers 1130 through 1149. These errors are caused by corrupted data in the MCF file or the Master ATCS database. Use the MCF Create function to recreate the MCF or use the Circuit and Link I/O functions to recreate the virtual circuits. If the errors persist, contact Safetran Technical Support.

15.5.8 Geographic Neighbor Test

The Geographic Neighbor Test verifies that all neighbor Virtual Circuit data is consistent and compatible.

15.5.8.1 Geographic Neighbor Test Errors

Geographic Neighbor Test Errors are allocated Error Code Numbers 1420 through 1452. Table 15-9 lists the most frequent error messages that occur during the Geographic Neighbor test. Listing is by error code number. A description of the Error message and the recommended action to correct the error is also provided.

Table 15-9
Geographic Neighbor Test Error Display

Error Code	Error Message	Description	Action
1431	Neighbor MCF Does Not Exist For Termination Device <##>. Neighbor SIN is <ATCS address>.	The MCF for a virtual-circuit linked, neighbor-group module does not exist.	Create an MCF for the linked module. If the errors continues, contact Safetran Technical Support.
1432	Neighbor MCF Does Not Exist for Cut Device <##>. Neighbor SIN is < ATCS address>	The MCF for a virtual-circuit linked, neighbor-group module does not exist.	

NOTE

For error codes not listed in table 15-9, contact Safetran Technical Support for assistance.

SECTION XVI
HD/LINKER LOG

16.1 LOG VIEWER WINDOW

The HD/LINKer log provides a historical record of program events. The **Log Viewer** window, figure 16-1, allows you to view, search, clear and print the log file. To access the **Log Viewer** window, click on the **Log Viewer** button (see right) on the Main Tool Bar.

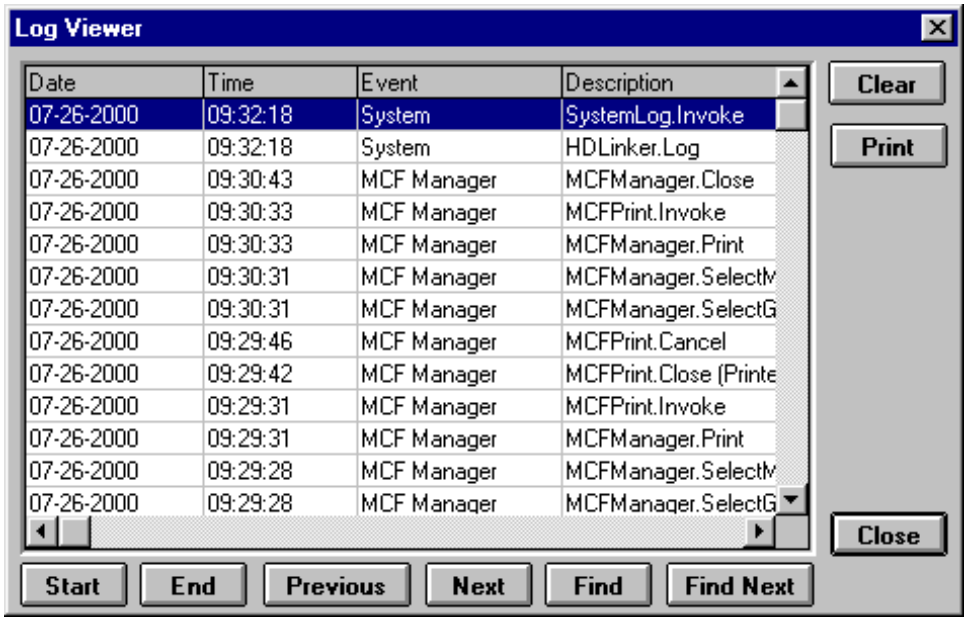

Figure 16-1. Log Viewer Window

The contents of the log file are shown in pages, each containing 60 events. The first page contains the latest events. The last page contains oldest events. The date, time, type and description are listed for each event.

The **Log Viewer** window function buttons are as follows:

- The **Start** button shows the first page containing the latest events.
- The **End** button shows the last page containing the oldest events.
- The **Previous** button shows a page with events that occur later than the events of the current page.
- The **Next** button shows a page with events that occur earlier than those of the current page.

- The **Find** button opens the **Find Log Event** dialog box, figure 16-2A, where the user specifies the search criteria. The search is performed within the current page.
- The **Find Next** button lets you search for the next occurrence of the search criteria defined in the **Find Log Event** dialog box.
- The **Clear** button deletes the data from the log file and clears the **Log Viewer**
- The **Print** button opens the **Print Log** window, figure 16-3.
- The **Close** button closes the **Log Viewer** window and returns you to the **Main** window.

16.1.1 Find Log Events

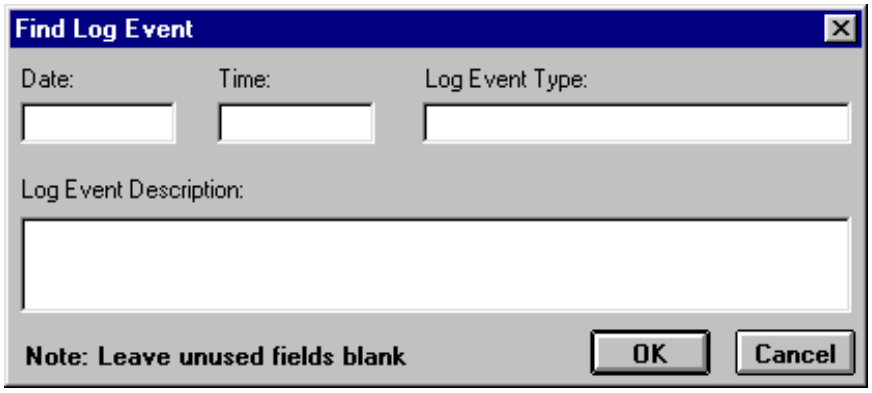

Figure 16-2. Find Log Event Dialog Box

The **Find Log Event** dialog box contains four event selection fields:

Date Field	Allows a search by date of event. When used alone, the earliest occurrence of the event date is found
Time Field	Allows a search by time of event. When used alone, the earliest occurrence of the event time is found.
Log Event Type Field	Allows a search by event type. When used alone, the earliest occurrence of the event type is found.
Log Event Description	Allows a search by event description. When used alone, the earliest occurrence of the event description is found.

The **Find Log Event** dialog box fields can find a specific event on the current page. Search is started by clicking on the **OK** button**.** Clicking on the **Cancel** button closes the dialog box without starting the search.

If the search produces no results, the **Log Event Not Found** window, figure 16-3, appears:

Figure 16-3. Log Event Not Found Dialog Box

16.1.2 Print Log Window

The **Print Log** window, figure 16-4, shows the **HD/LINKer** Log Summary.

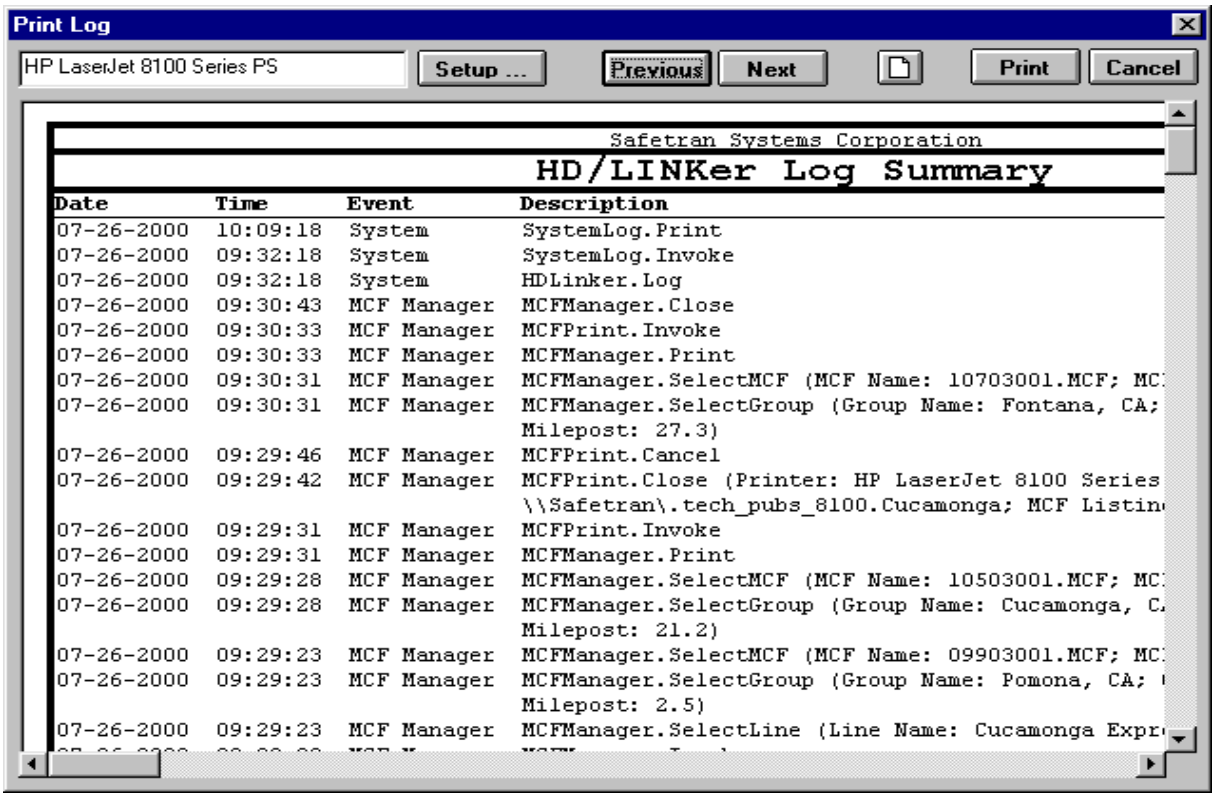

Figure 16-4. Print Log Window

The contents of the **Log Summary** are shown in pages, each containing a maximum of 70 events. The first page contains the most recent events. The last page contains the oldest events. The date, time, type and description are shown for each event.

The **Print Log** window buttons are as follows:

- The **Setup** button opens the **Print Setup** dialog box, figure 16-4.

- The **Previous** button shows a page with events that occur later than those of the current page.
- The **Next** button shows a page with events that occur earlier than those of the current page.
- The **Display Full-Page** button (see right) selects a full-page display of the current Log **Summary** page. When a full page is shown, selecting this button returns the display to a partial page view.
- The **Print** button prints the entire **HD/LINKer Log Summary** using the default settings of the **Print Setup** dialog box.
- The **Cancel** button closes the **Print Log** window and returns you to the **Log Viewer** window.

16.1.3 Print Setup Dialog Box

The **Print Setup** dialog box, figure 16-5, allows the printer default settings to be modified.

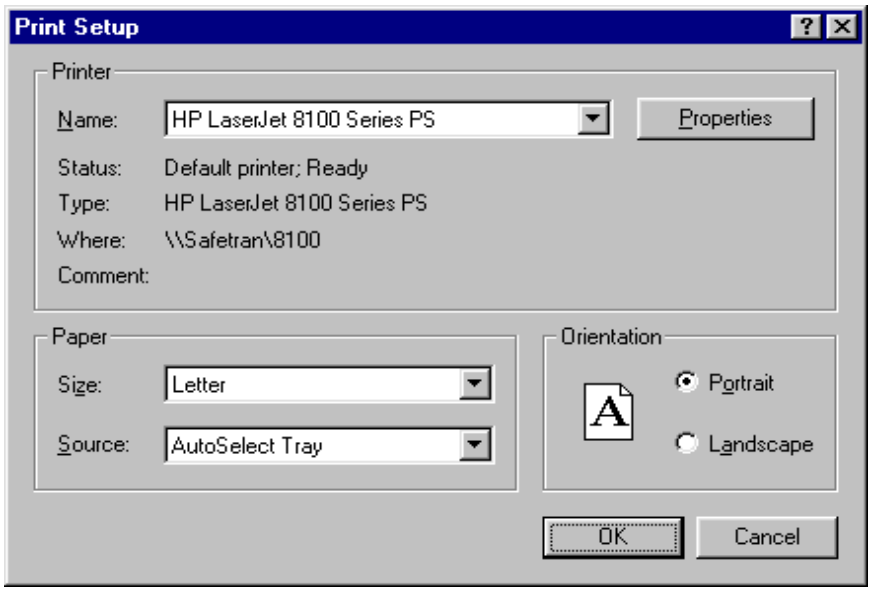

Figure 16-5. Print Setup Dialog Box

The **Print Setup** dialog box options are as follows:

- The **Printer Name** list allows alternate printer selection.
- The **Properties** button allows you to change the properties of the selected printer (including paper size and paper orientation).
- The **Paper Size** list allows printer paper size selection.
- The **Paper Source** list allows you to select the printer paper source.

- The **Orientation Portrait** radio button selects portrait-orientation printing.
- The **Orientation Landscape** radio button selects landscape-orientation printing.

Clicking on the **OK** button saves the selected printer settings and closes the **Print Setup** dialog box. Clicking on the **Cancel** button closes the dialog box without saving any of the changes.

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SECTION XVII
SAFETY CONSIDERATIONS

This section contains guidelines for creating and distributing MCFs.

17.1 MCF APPROVAL LISTING REVIEW

The MCF approval listing is designed to provide you with a hard copy of the module's configuration information. This listing contains validation test results, as well as MCF, module, and Virtual Circuit summary data. It also includes the CRC for the MCF and a section for the Approver and Reviewer to sign and date the listing. A typical MCF Approval Listing is presented in Appendix B.

NOTE

It is strongly recommended that you review the contents of **MCF Approval Listing** and/or the **MCF Status Display** and the **MCF Contents Display** before the MCF is placed in service.

17.2 ATCS ADDRESSES

In-service I/O module communications components are identified by the standardized ATCS addressing scheme described in paragraph 8.2. ATCS addresses allow virtual communications links to be established and maintained between the various groups of the railroad line.

17.2.1 Virtual Links

Pole-line circuits are dedicated links between groups of the railroad (see figure 12-1), providing hard-wired connections between vital railroad circuits. In contrast, virtual links are SSR communications channels (see figure 12-2) that rely on unique ATCS addresses to identify and route signals to their destination.

Due to the vital nature of ATCS addresses, it is essential that care be exercised in their assignment. Follow the guidelines in the implementation and maintenance of ATCS addresses:

- Track ATCS addresses to assure that the ATCS addresses in the field matches those of the master ATCS database at all times. (Refer to paragraph 11.7 for a discussion of MCF service status.)

WARNING

WHEN CREATING MULTIPLE DATABASES FOR A

SINGLE RAILROAD, THE HD/LINKER APPLICATION DOES NOT PREVENT DUPLICATING WAYSIDE EQUIPMENT ATCS ADDRESSES BETWEEN THE DATABASES. IT IS YOUR RESPONSIBILITY TO MANAGE ALLOCATING THESE ADDRESSES.

YOU ARE RESPONSIBLE FOR THE DEVELOPMENT, APPROVAL, AND INSERVICE TESTING OF MCF DATA. FINAL INSERVICE TESTING IS REQUIRED TO IDENTIFY FUNCTIONAL PROBLEMS.

- DO NOT DUPLICATE LINE NUMBERS ACROSS MULTIPLE DATABASES.

WARNING

LINE NUMBER DUPLICATION CAN RESULT IN IDENTICAL ATCS ADDRESS FOR DIFERENT LINE COMPONENTS. IT IS YOUR RESPONSIBILITY TO MANAGE THE ALLOCATION LINE NUMBERS.

NOTE

Safetran Technical Support is available for telephone consultation as required. See Sales And Service Locations, page ii.

APPENDIX A
MCF CONTENTS LISTING

This appendix contains the Module Configuration File Contents Listing for the Upland 103 Group shown in figure A-1.

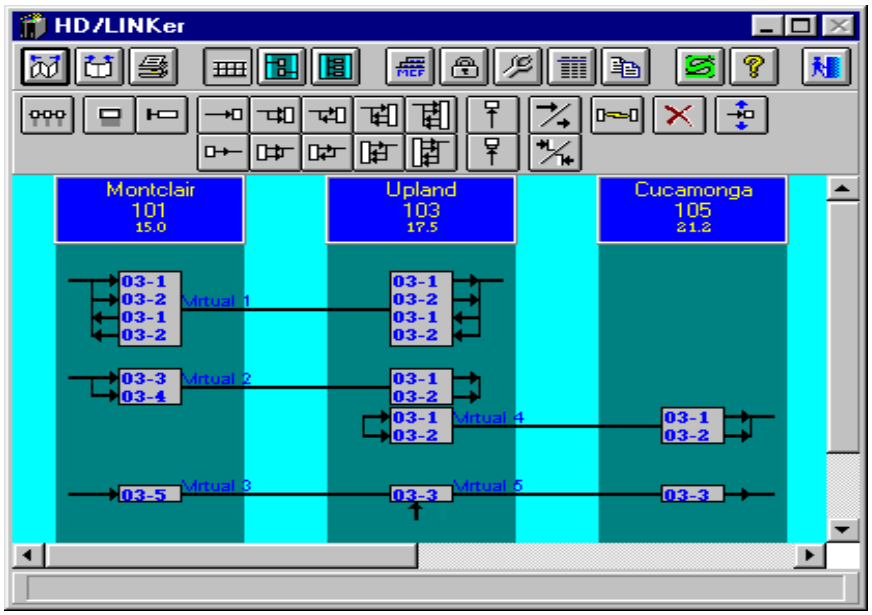

Figure A-1
Main Window Circuit View

The MCF Manager Display for this Group is shown in figure A-2.

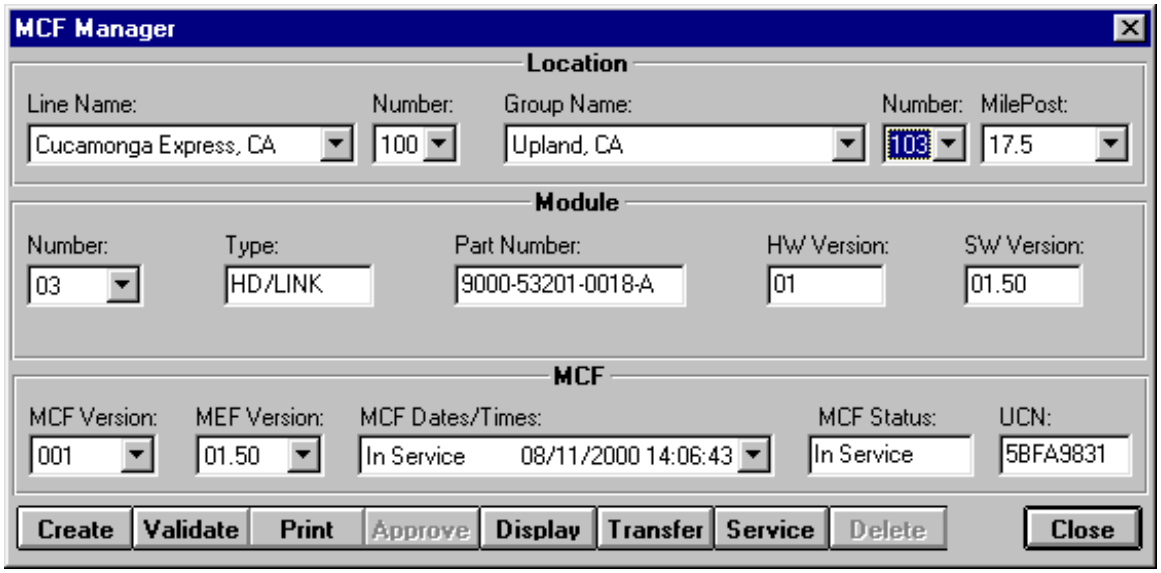

Figure A-2
MCF Manager Display

The Contents Listing for this Group consists of five sheets (see pages A-3 through A-7).
At the top of each sheet is listed the Line and Group names followed by two columns of data. The first column contains all pertinent designation data relative to the Group itself. The second column lists all pertinent data relative to the Group's Module Configuration File (MCF).

The first sheet (page A-3) contains MCF Module Summary data. Sheets 2 through 5 (pages A-4 through A-7) list the Device Data Summary for each virtual circuit created using the selected I/O module within the group.

Each Device Data Summary page of the MCF Contents Listing and MCF Approval Listing contain information about one end of a circuit. To see the complete circuit, print the MCF Contents Listing or Approval Listing for each Neighboring Group. Find the Device Data Summary page from the neighbor MCF Listing with the same circuit name as the page of the MCF from the original group. Placing the pages side by side will complete the circuit (see figure A-3). The Right Neighbor Link Information and Left Neighbor Link Information columns will have data and should be next to each other. For a cut circuit, three Device Data Summary pages will be required to complete a circuit (see figure A-4).

Group: 101	
Device Data Summary	
Circuit Name: Virtual 1	
Left Neighbor	Right Neighbor
	xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx

Group: 103	
Device Data Summary	
Circuit Name: Virtual 1	
Left Neighbor	Right Neighbor
xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx	

Figure A-3
Geographic Neighbor Device Data Summary Comparison

Group: 101	
Device Data Summary	
Circuit Name: Virtual 3	
Left Neighbor	Right Neighbor
	xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx

Group: 103	
Device Data Summary	
Circuit Name: Virtual 3/Virtual 5	
Left Neighbor	Right Neighbor
xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx

Group: 105	
Device Data Summary	
Circuit Name: Virtual 5	
Left Neighbor	Right Neighbor
xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxxxx xxxxxxxxx	

Figure A-4
Geographic Neighbor Device Data Summary
Cut Circuit Comparison

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MODULE CONFIGURATION FILE CONTENTS LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Montclair, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	LONGITUDE	: 00° 00' 00.00"
SUBNODE	: 03	LATITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5		

Module Summary

Module Type	:	R-HD
Module Subtype	:	None
Part Number	:	9000-53201-0018-A
MEF Name	:	hd101_50.MEF

Number of Termination Devices	:	2
Number of Cut Devices	:	1
External Inputs Used	:	3
External Outputs Used	:	2
Internals Used	:	2
Name of Approver	:	Thomas Mouse
Name of Reviewer	:	Ron Mouse
Comments	:	

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MODULE CONFIGURATION FILE CONTENTS LISTING

LINE NAME:Cucamonga Express, CA **GROUP NAME:Montclair, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	LONGITUDE	: 00° 00' 00.00"
SUBNODE	: 03	LATITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5		

Device Data Summary

Device Number	02
Device Type	Termination
Circuit Name	Virtual 1
Circuit Description	
Circuit Type	Bi-Polar/Bi-Directional
Cut Condition	N/A
Cut Re-energize Delay	N/A

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
762010010103	SIN	N/A
02	Device	N/A
Montclair, CA	Group Name	N/A
10103001.MCF	MCF Use	N/A
In Service	MCF Status	N/A
08/11/2000 14:03:45	MCF Create	N/A
	Client and Server Data	
5.0 Seconds	Energized Output Timeout	N/A
5.0 Seconds	De-Energized Output Timeout	N/A
10.0 Seconds	Maximum Network Delay	N/A
1.5 Seconds	Energized Update Rate	N/A
1.5 Seconds	De-Energized Update Rate	N/A

INPUTS

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
1	VPI	21	Virtual 1	01	N-Virtual 1	N/A
2	VPI	02	N-Virtual 1	22	Virtual 1	N/A

OUTPUTS

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
1	VRO	29	Virtual 1	09	N-Virtual 1	0.0/0.0
2	VRO	10	N-Virtual 1	30	Virtual 1	0.0/0.0

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MODULE CONFIGURATION FILE CONTENTS LISTING

LINE NAME:Cucamonga Express, CA **GROUP NAME:Montclair, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	LONGITUDE	: 00° 00' 00.00"
SUBNODE	: 03	LATITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5		

Device Data Summary

Device Number	02
Device Type	Termination
Circuit Name	Virtual 2
Circuit Description	

Circuit Type	Bi-Polar/Bi-Directional
Cut Condition	N/A
Cut Re-energize Delay	N/A

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
762010010103	SIN	N/A
02	Device	N/A
Montclair, CA	Group Name	N/A
10103001.MCF	MCF Used	N/A
In Service	MCF Status	N/A
08/11/2000 14:03:45	MCF Created	N/A

Client and Server Data

5.0 Seconds	Energized Output Timeout	N/A
5.0 Seconds	De-Energized Output Timeout	N/A
10.0 Seconds	Maximum Network Delay	N/A
1.5 Seconds	Energized Update Rate	N/A
1.5 Seconds	De-Energized Update Rate	N/A

INPUTS

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

OUTPUTS

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
1	INT	N/A	N/A	N/A	N/A	N/A
2	INT	N/A	N/A	N/A	N/A	N/A

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MODULE CONFIGURATION FILE CONTENTS LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME:Montclair, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	LONGITUDE	: 00° 00' 00.00"
SUBNODE	: 03	LATITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5		

Device Data Summary

Device Number	03
Device Type	Cut
Circuit Name	Virtual 3 / Virtual 5
Circuit Description	
Circuit Type	Uni-Polar/Uni-Directional
Cut Condition	Cut
Cut Re-energize Delay	0.0 Seconds

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
762010010103	SIN	762010010503
03	Device	03
Montclair, CA	Group Name	Cucamonga, CA
10103001.MCF	MCF Used	10503001.MCF
In Service	MCF Status	In Service
08/11/2000 14:03:45	MCF Created	08/11/2000 14:04:45
	Client and Server Data	
5.0 Seconds	Energized Output Timeout	N/A
5.0 Seconds	De-Energized Output Timeout	N/A
10.0 Seconds	Maximum Network Delay	N/A
N/A	Energized Update Rate	1.5 Seconds
N/A	De-Energized Update Rate	1.5 Seconds

Inputs

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
03	VPI	23	Virtual 3	03	N-Virtual 3	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Outputs

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

MODULE CONFIGURATION FILE CONTENTS LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME:Montclair, CA**

SIN :	762010010303	FILE NAME :	10303001.MCF
RAILROAD :	620	FILE VERSION :	001
LINE :	100	FILE CREATED :	08/11/2000 14:04:28
LINE NAME :	Cucamonga Express, CA	FILE PRINTED :	08/14/2000 13:41:05
GROUP :	103	FILE STATUS :	In Service
GROUP NAME :	Upland, CA	LONGITUDE :	00° 00' 00.00"
SUBNODE :	03	LATITUDE :	00° 00' 00.00"
MILEPOST :	17.5		

Device Data Summary

Device Number	04
Device Type	Termination
Circuit Name	Virtual 4
Circuit Description	

Circuit Type	Bi-Polar/Uni-Directional
Cut Condition	N/A
Cut Re-energize Delay	N/A

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
N/A	SIN	762010010503
N/A	Device	02
N/A	Group Name	Cucamonga, CA
N/A	MCF Used	10503001.MCF
N/A	MCF Status	In Service
N/A	MCF Created	08/11/2000 14:04:45

Client and Server Data

N/A	Energized Output Timeout	N/A
N/A	De-Energized Output Timeout	N/A
N/A	Maximum Network Delay	N/A
N/A	Energized Update Rate	1.5 Seconds
N/A	De-Energized Update Rate	1.5 Seconds

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
1	INT	N/A	N/A	N/A	N/A	N/A
2	INT	N/A	N/A	N/A	N/A	N/A

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

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APPENDIX B
MCF APPROVAL LISTING

This appendix contains the Module Configuration File Approval Listing for the Upland 103 Group shown in figure A-1. The MCF Manager Display for this Group is shown in figure A-2. The Approval Listing for this Group consists of 7 sheets (see pages B-2 through B-8).

At the top of each sheet is listed the Line and Group names followed by two columns of data. The first column lists all pertinent designation data relative to the Group itself. The second column lists all pertinent data relative to the Group's Module Configuration File (MCF). This column also contains the File Cyclic Redundancy Code (CRC) value generated when the validation tests pass. After reviewing the Module Configuration File Approval Listing and acquiring the proper signatures, enter the File CRC as described in paragraph 11.4.

This listing contains the MCF configuration information plus any errors and warnings generated by the validation tests. The first two sheets (B-2 and B-3) contain MCF Validation Status data. Sheet 3 (B-4) contains Module Summary data. Sheets 4 through 7 (B-5 through B-8) list the Device Data Summary for each virtual circuit created using the selected I/O module within the group.

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MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	FILE CRC	: E93A6D73
SUBNODE	: 03	LONGITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5	LATITUDE	: 00° 00' 00.00"

Warning : Check that all pages are present.
Total pages = 7

Validation Status :

SIN: 762010010303
FILE NAME: 10303001.MCF
FILE CREATED: 08/11/2000 14:04:28
Tests Run: 08-14-2000 13:41:03

Validation Tests Results

MCF to Database Comparison Test
Test Passed

Range Consistency Test
Test Passed

Input/Output Test
Test Passed

Device - Input/Output Test
Test Passed

Unique Device Number Test
Test Passed

Device Consistency Test
Test Passed

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

Comments :

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MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN	762010010303	FILE NAME	10303001.MCF
RAILROAD	620	FILE VERSION	001
LINE	100	FILE CREATED	08/11/2000 14:04:28
LINE NAME	Cucamonga Express, CA	FILE PRINTED	08/14/2000 13:41:05
GROUP	103	FILE STATUS	In Service
GROUP NAME	Upland, CA	FILE CRC	E93A6D73
SUBNODE	03	LONGITUDE	00° 00' 00.00"
MILEPOST	17.5	LATITUDE	00° 00' 00.00"

Validation Status Continued...

Circuit Consistency Test
Test Passed

MCF Neighbor Test
Test Passed

Total Errors: 0
Total Warnings: 0

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

Safetran Systems Corporation

MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN	762010010303	FILE NAME	10303001.MCF
RAILROAD	620	FILE VERSION	001
LINE	100	FILE CREATED	08/11/2000 14:04:28
LINE NAME	Cucamonga Express, CA	FILE PRINTED	08/14/2000 13:41:05
GROUP	103	FILE STATUS	In Service
GROUP NAME	Upland, CA	FILE CRC	E93A6D73
SUBNODE	03	LONGITUDE	00° 00' 00.00"
MILEPOST	17.5	LATITUDE	00° 00' 00.00"

Module Summary

Module Type	R-HD
Module Subtype	None
Part Number	9000-53201-0018-A
MEF Name	hd101_50.MEF
Number of Termination Devices	2
Number of Cut Devices	1
External Inputs Used	3
External Outputs Used	2
Internals Used	2
Software Compatibility Index	1
MDF Name	hd101_50.MDF
MDF CRC	62EEA803
HDF Name	A5320101.HDF
HDF CRC	5218133A
MEF CRC	4C7D8F1B
Module Data Checksum	0012

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

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MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	FILE CRC	: E93A6D73
SUBNODE	: 03	LONGITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5	LATITUDE	: 00° 00' 00.00"

Device Data Summary

Device Number	02
Device Type	Termination
Circuit Name	Virtual 1
Circuit Description	
Circuit Type	Bi-Polar/Bi-Directional
Cut Condition	N/A
Cut Re-energize Delay	N/A

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
762055510103	SIN	N/A
02	Device	N/A
Montclair, CA	Group Name	N/A
10103001.MCF	MCF Used	N/A
In Service	MCF Status	N/A
08/11/2000 14:03:45	MCF Created	N/A
	Client and Server Data	
5.0 Seconds	Energized Output Timeout	N/A
5.0 Seconds	De-Energized Output Timeout	N/A
10.0 Seconds	Maximum Network Delay	N/A
1.5 Seconds	Energized Update Rate	N/A
1.5 Seconds	De-Energized Update Rate	N/A

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Labe	Pkup/Drp Delay
1	VPI	21	Virtual 1	01	N-Virtual 1	N/A
2	VPI	02	N-Virtual 1	22	Virtual 1	N/A

OUTPUTS

Input	Output Type	+Pin	+Pin Label	-Pin	-Pin Labe	Pkup/Drp Delay
1	VRO	29	Virtual 1	09	N-Virtual 1	0.0/0.0
2	VRO	10	N-Virtual 1	30	Virtual 1	0.0/0.0

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

Safetran Systems Corporation

MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN :	762010010303	FILE NAME :	10303001.MCF
RAILROAD :	620	FILE VERSION :	001
LINE :	100	FILE CREATED :	08/11/2000 14:04:28
LINE NAME :	Cucamonga Express, CA	FILE PRINTED :	08/14/2000 13:41:05
GROUP :	103	FILE STATUS :	In Service
GROUP NAME :	Upland, CA	FILE CRC :	E93A6D73
SUBNODE :	03	LONGITUDE :	00° 00' 00.00"
MILEPOST :	17.5	LATITUDE :	00° 00' 00.00"

Device Data Summary

Device Number	02
Device Type	Termination
Circuit Name	Virtual 2
Circuit Description	

Circuit Type	Bi-Polar/Uni-Directional
Cut Condition	N/A
Cut Re-energize Delay	N/A

Left Neighbor Link Information		Right Neighbor Link Information
762055510103	SIN	N/A
02	Device	N/A
Montclair, CA	Group Name	N/A
10103001.MCF	MCF Used	N/A
In Service	MCF Status	N/A
08/11/2000 14:03:45	MCF Created	N/A
	Client and Server Data	
5.0 Seconds	Energized Output Timeout	N/A
5.0 Seconds	De-Energized Output Timeout	N/A
10.0 Seconds	Maximum Network Delay	N/A
1.5 Seconds	Energized Update Rate	N/A
1.5 Seconds	De-Energized Update Rate	N/A

INPUTS

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

OUTPUTS

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
1	INT	N/A	N/A	N/A	N/A	N/A
2	INT	N/A	N/A	N/A	N/A	N/A

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	FILE CRC	: E93A6D73
SUBNODE	: 03	LONGITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5	LATITUDE	: 00° 00' 00.00"

Device Data Summary

Device Number	03
Device Type	Cut
Circuit Name	Virtual 3 / Virtual 5
Circuit Description	
Circuit Type	Uni-Polar/Uni-Directional
Cut Condition	Cut
Cut Re-energize Delay	0.0 Seconds

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
762010010103	SIN	762010010503
03	Device	03
Montclair, CA	Group Name	Cucamonga, CA
10303001.MCF	MCF Used	10303001.MCF
In Service	MCF Status	In Service
08/11/2000 14:03:45	MCF Created	08/11/2000 14:04:45
	Client and Server Data	
5.0 Seconds	Energized Output Timeout	N/A
5.0 Seconds	De-Energized Output Timeout	N/A
10.0 Seconds	Maximum Network Delay	N/A
N/A	Energized Update Rate	1.5 Seconds
N/A	De-Energized Update Rate	1.5 Seconds

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
03	VPI	23	Virtual 3	03	N-Virtual 3	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

Safetran Systems Corporation

MODULE CONFIGURATION FILE APPROVAL LISTING

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE PRINTED	: 08/14/2000 13:41:05
GROUP	: 103	FILE STATUS	: In Service
GROUP NAME	: Upland, CA	FILE CRC	: E93A6D73
SUBNODE	: 03	LONGITUDE	: 00° 00' 00.00"
MILEPOST	: 17.5	LATITUDE	: 00° 00' 00.00"

Device Data Summary

Device Number	04
Device Type	Cut
Circuit Name	Virtual 4
Circuit Description	
Circuit Type	Uni-Polar/Uni-Directional
Cut Condition	N/A
Cut Re-energize Delay	N/A

Left Neighbor Link Information	Device Data	Right Neighbor Link Information
N/A	SIN	762010010503
N/A	Device	02
N/A	Group Name	Cucamonga, CA
N/A	MCF Used	10503001.MCF
N/A	MCF Status	In Service
N/A	MCF Created	08/11/2000 14:04:45
	Client and Server Data	
N/A	Energized Output Timeout	N/A
N/A	De-Energized Output Timeout	N/A
N/A	Maximum Network Delay	N/A
N/A	Energized Update Rate	1.5 Seconds
N/A	De-Energized Update Rate	1.5 Seconds

INPUTS

Input	Input Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
1	INT	N/A	N/A	N/A	N/A	N/A
2	INT	N/A	N/A	N/A	N/A	N/A

OUTPUTS

Output	Output Type	+Pin	+Pin Label	-Pin	-Pin Label	Pkup/Drp Delay
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

File CRC : E93A6D73

Reviewed By : Ron Mouse

Signature : _____ Date : _____

Approved By : Thomas Mouse

Signature : _____ Date : _____

Page 7 of 7

APPENDIX C
MCF INSTALLATION LISTING

This appendix contains the Module Configuration File Installation Listing for the Upland 103 Group shown in figure A-1. The MCF Manager Display for this Group is shown in figure A-2. The Approval Listing for this Group consists of a single sheet.

At the top of this sheet are listed the Line and Group names, followed by two columns of data. The first column lists all pertinent designation data relative to the Group itself. The second column lists all pertinent data relative to the Group's Module Configuration File (MCF). This column also lists the File Cyclic Redundancy Code (CRC) value generated when the validation tests pass.

This listing can be printed only after the MCF for the Group is approved. It contains the Unique Check Number (UCN) required (by default) to install the MCF into the associated HD/LINK module of the Group. After reviewing the Module Configuration File Installation Listing and acquiring the proper signatures, you transfer the UCN to the HD/LINK module using the Installers Diagnostic Terminal Utility (IDTU).

MODULE CONFIGURATION FILE INSTALLATION LISTING

LINE NAME: Fontana, CA **GROUP NAME: Upland, CA**

SIN	: 762010010303	FILE NAME	: 10303001.MCF
RAILROAD	: 620	FILE VERSION	: 001
LINE	: 100	FILE CREATED	: 08/11/2000 14:04:28
LINE NAME	: Cucamonga Express, CA	FILE APPROVED	: False
GROUP	: 103	FILE PRINTED	: 08/14/2000 13:41:05
GROUP NAME	: Upland, CA	FILE STATUS	: In Service
SUBNODE	: 03	FILE CRC	: E93A6D73
MILEPOST	: 17.5	LONGITUDE	: 00° 00' 00.00"
		LATITUDE	: 00° 00' 00.00"

Unique Check Number(UCN) : 5BFA9831

UCN Generation Option : Full (MCF And MEF)

Commissioning Signature : _____

Commissioning Date : _____

Installer's Name : _____

In Service Check Number : _____

Authorizing Signature : _____

In Service Date : _____

Out of Service Check Number : _____

Authorizing Signature : _____

Out of Service Date : _____

APPENDIX D
HD/LINK WIRING LIST

This appendix contains the HD/LINK Wiring List for the Upland 103 Group shown in figure A-1. The MCF Manager Display for this Group is shown in figure A-2. The HD/LINK Wiring List for this Group consists of a single sheet.

At the top of this sheet is listed the Line and Group names followed by two columns of data. The first column lists all pertinent designation data relative to the Group itself. The second column lists all pertinent data relative to the Group's Module Configuration File (MCF). This column also lists the File Cyclic Redundancy Code (CRC) value generated when the validation tests pass.

The main body of the List contains information on how to wire the associated HD/LINK module.

Safetran Systems Corporation

HD/LINK WIRING LIST

LINE NAME: Cucamonga Express, CA **GROUP NAME: Upland, CA**

SIN : 762010010303
RAILROAD : 620
LINE : 100
LINE NAME : Cucamonga Express, CA
GROUP : 103
GROUP NAME : Upland, CA
SUBNODE : 03
MILEPOST : 17.5

FILE NAME : 10303001.MCF
FILE VERSION : 001
FILE CREATED : 08/11/2000 14:04:28
FILE APPROVED : False
FILE PRINTED : 08/14/2000 13:41:05
FILE STATUS : In Service
FILE CRC : E93A6D73
LONGITUDE : 00° 00' 00.00"
LATITUDE : 00° 00' 00.00"

Label	Channel	Pin	Pin	Channel	Label
N-Virtual 1	VPI 1-	01	21	VPI 1+	Virtual 1
N-Virtual 1	VPI 2+	02	22	VPI 2-	Virtual 1
N-Virtual 3	VPI 3-	03	23	VPI 3+	Virtual 3
		04	24		
		05	25		
		06	26		
		07	27		
		08	28		
N-Virtual 1	VRO 1-	09	29	VRO 1+	Virtual 1
N-Virtual 1	VRO 2+	10	30	VRO 2-	Virtual 1
		11	31		
		12	32		
		13	33		
		14	34		
		15	35		
		16	36		
	+5V	**17	37 **	I2C_Clock	
	0V	**18	38 **	I2C_Data	
	ECH TWP 1	19	39	ECH TWP 2	
	BATT+	20	40	BATT-	

**Factory Pre-wired

Pin Label	Pins To Jumper
Virtual 1	21, 22, 29, 30
N-Virtual 1	01, 02, 09, 10

THE OPERATION OF THE ORGANIZATION REPRESENTED HEREON CANNOT BE CHECKED FINALLY UNTIL ALL CIRCUITS AND DEVICES ARE CONNECTED TO FORM A COMPLETE SYSTEM OR AN EFFECTIVE PORTION THEREOF. SUCH A SYSTEM, OR PORTION THEREOF, MUST BE GIVEN A COMPLETE CIRCUIT AND OPERATIONAL TEST BEFORE BEING PLACED IN REGULAR SERVICE.

APPENDIX E
RAILWAY CARRIER NAMES

This appendix provides a list of Railway Carrier Names, their alpha designation, and their numerical designation. In the event of any discrepancy between this list and the current AAR list, the current AAR list shall govern.

Carrier Name	Alpha & Numeric Codes	
ATCS Reserved for Future Use	ATCS	050
ATCS Shared Network	ATCS	340
ATCS Testing & Field Evaluation	ATCS	620
Aberdeen and Rockfish Railroad Company	AR	9
Aberdeen, Carolina & Western Railway Company	ABPR	178
Ahnapee & Western Railway Company	AHW	33
Akron & Barberton Belt Railway Company	ABB	2
Alabama & Florida Railroad	AFLR	917
Alabama Great Southern Railroad Company	SOU	29
Alameda Belt Line	ABL	14
Alaska Hydro-Train	AHT	39
Alaska Railroad Corporation	ARR	5
Alexander Railroad Company	ARC	49
Algers, Winslow and Western Railway Company	AWW	4
Algoma Central Railway	AC	8
Aliquppa and Southern Railroad Company	ALQS	18
Allegheny Railroad	ALY	532
Alley Railroad Company		664
Almanor Railroad Company	AL	46
Alton & Southern Railway Company	ALS	32
Amador Central Railroad Company	AMC	19
Amtrak		891
Andalusia & Concecuh Railroad Company, Inc.	ACRC	173
Angelina & Neches River Railroad Company	ANR	35
Ann Arbor Railroad	AA	6
Anthracite Railway, Inc.	ATRW	176
Apache Railway Company	APA	11
Apalachicola Northern Railroad Company	AN	12
Appanoose County Community Railroad Company	APNC	226
Arcade and Attica Railroad Corporation	ARA	13
Arkansas & Louisana Missouri Railway Company	ALM	16
Arkansas & Memphis Railway Bridge & Terminal Company		

Carrier Name	Alpha & Numeric Codes	
Arkansas and Missouri Railroad Company	AM	906
Arkansas Western Railway Company	ARW	36
Aroostook Valley Railroad Company	AVL	38
ARTC		047
Ashley, Drew & Northern Railway Company	ADN	21
Ashtabula Carson Jefferson Railroad Company, Inc.	ACJR	235
Atchison, Topeka and Santa Fe Railway Company	ATSF	22
Atlanta & Saint Andrews Bay Railway Company	ASAB	42
Atlantic and East Carolina Railway Company	SOU	
Atlantic and Western Railway Company	ATW	25
Augusta Railroad Company	AUG	44
Austin Railroad-d/b/a Austin & Northwestern Railroad Company	AUNW	924
Austin, Todd and Ladd Railroad Company	ATLT	514
Baltimore and Annapolis Railroad Company	BLA	53
Bangor and Aroostook Railroad Company	BAR	56
Bath and Hammondsport Railroad Company	BH	79
Batten Kill Railroad Company, Inc.	BKRR	86
Bauxite & Northern Railway Company	BXN	84
Bay Colony Railroad Corporation	BCLR	82
Bayside Railway Company		021
BC Hydro Rail	BCE	72
BC Rail, Limited	BCOL	997
Beaufort and Moreland Railroad Company	BMH	68
Beech Mountain Railroad Company	BEEM	60
BHP		042
Belfast and Moosehead Lake Railroad Company	BML	87
Belt Railway Company of Chicago	BRC	83
Belton Railroad Company	BRR	207
Berlin Mills Railway, Inc.	BMS	73
Bessemer and Lake Erie Railroad Company	BLE	61
Birmingham Southern Railroad Company	BS	65
Black River & Western Railroad	BRW	66
Bloomer Shippers Connecting Railroad Company	BLOL	223
Blue Mountain and Reading Railroad	BMRG	256
Border Pacific Railroad Company	BOP	225
Boston & Maine Corporation	BM	69
Brandon Corporation	BRAN	81
Brandywine Valley Railroad Company	BVRY	67
Brownsville and Rio Grande International Railroad	BRG	170
Buffalo Southern Railroad, Inc.	BSOR	85
Burlington Junction Railway	BJRY	383

Carrier Name	Alpha & Numeric Codes	
Burlington Northern Railroad Company	BN	76
Burlington Northern (Manitoba) Limited	BNML	457
C & J Railroad Investment Company, Inc.	CJRR	565
Cadillac & Lake City Railway Company	CLK	93
Cadiz Railroad Company	CAD	92
Cairo Terminal Railroad Company	CTML	162
California Western Railroad	CWR	100
Camas Prairie Railroad	CSP	952
Cambria and Indiana Railroad Company	CI	101
Camp Lejeune Railroad Company	SOU	
Canada and Gulf Terminal Railway Company	CGR	116
Canadian National Railways	CN	103
Caney Fork and Western Railroad, Inc.	CFWR	187
Canton Railroad Company	CTN	97
Cape Breton Development Corporation		711
Cape Fear Railways, Incorporated	CF	99
Carolina and Northwestern Railway Company	SOU	106
Carolina Rail Services, Inc.	CRIJ	988
Carrollton Railroad	CARR	113
Carthage, Knightstown & Shirley Railroad	CKSI	396
Cartier Railway Company		
Cedar Rapids and Iowa City Railway Company	CIC	111
Cedar Valley Railroad Company	CVAR	313
Central California Traction Company	CCT	112
Central Indiana & Western Railroad Company	CEIW	949
Central Michigan Railway Company	CMGN	472
Central Montana Rail, Inc.	CM	374
Central New York Railroad Corporation	CNYK	151
Central of Georgia Railroad Company	SOU	118
Central Vermont Railway, Inc.	CV	120
Central Western Railway Corporation	CWRL	527
Charles City Rail Lines	CCRY	967
Chattahoochee Industrial Railroad	CIRR	222
Chattahoochee Valley Railway Company	CHV	124
Chelatchie Prairie Railroad, Inc.	CCPR	155
Chesapeake and Ohio Railway Company	CO	125
Chesapeake Western Railway	CHW	179
Chestnut Ridge Railway Company	CHR	117
Chicago & Illinois Midland Railway Company	CIM	130
Chicago and North Western	CNW	131
Chicago and Western Indiana Railroad Company	CWI	132

Carrier Name	Alpha & Numeric Codes	
Chicago Heights Terminal Transfer Company	CHTT	139
Chicago Rail Link	CRL	420
Chicago Short Line Railway Company	CSL	147
Chicago South Shore and South Bend Railroad	CSS	168
Chicago, Central & Pacific Railroad Company	CC	569
Chicago, Missouri and Western Railway	CMNW	947
Chicago, West Pullman & Southern Railroad Company	CWP	172
Chihuahua Pacific Railway Company	CHP	284
Cimarron River Valley Railway Company	CRVC	378
Cincinnati, New Orleans and Texas Pacific Railway Company	SOU	153
City of Columbia d/b/a Columbia Terminal	CT	90
City of Prineville Railway	COP	166
Claremont and Concord Railway Company, Inc.	CLCO	188
Clarendon and Pittsford Railroad Company	CLP	169
Cliffaide Railroad Company	CLIF	181
Colonel's Island Railroad Co.	CISD	164
Colorado & Wyoming Railway Company	CW	158
Colorado Springs & Eastern Railroad		
Company	CSE	319
Columbia and Cowiltz Railway Company	CLC	163
Columbia and Silver Creek Railroad Company	CLSL	165
Columbus and Greenville Railway Company	CAGY	177
Conemaugh & Black Lick Railroad Company	CBL	215
Connecticut Central Railroad	CCCL	416
Conrail	CR	190
Consolidated Rail Corporation	CR	190
Cooperstown and Charlotte Valley Railroad Corporation	CACV	114
Cooper Basin Railway, Inc.	CBRY	909
Corinth and Counce Railroad Company	CCR	201
Corman Railroad Company	RJCR	970
Cotton Belt Route	SSW	694
CP Rail	CP	105
Crab Orchard & Egyptian Railroad	COER	89
Curtin Milburn	CMER	180
Cuyahoga Valley Railway Company	CUVA	186
D&I Railroad Co.	DAIR	211
Dakota Rail, Inc.	DAKR	221
Dakota Southern Railway Co.	DSRC	526
Dakota, Minnesota & Eastern Railroad Corporation	DME	912
Dansville and Mount Morris Railroad Company	DMM	220
Dardanelle & Russellville Railroad Company	DR	191

Carrier Name	Alpha & Numeric Codes	
Davenport, Rock Island and North Western Railway Company	DRI	192
DeQueen and Eastern Railroad Company	DQE	200
Delaware & Hudson Railway Company	DH	195
Delaware Coast Line Railroad	DCLR	214
Delaware Otsego Corporation		
Delray Connecting Railroad Company	DC	196
Delta Valley & Southern Railway Company	DVS	193
Denver and Rio Grande Western Railroad Company	DRGW	197
Denver Terminal Railroad Company	DTMR	288
Des Moines Union Railway Company	DMU	202
Detroit and Mackinac Railway Company	DM	204
Devco Railway	DVR	711
Dominion Atlantic	DA	209
Doniphan, Kensett & Searcy Railway	DKS	210
Duluth & Northeastern Railroad Company	DNE	212
Duluth, Missabe and Iron Range Railway Company	DMIR	213
Duluth, Winnipeg & Pacific Railway	DWP	216
Dunn-erwin Railway Corporation	DER	219
East Camden & Highland Railroad Company	EACH	242
East Cooper and Berkeley Railroad Company	ECBR	229
East Erie Commercial Railroad	EEC	40
East Jersey Railroad and Terminal Company	EJR	245
East St. Louis Junction Railroad	ESLJ	233
East Tennessee Railway Corporation	ETRY	257
Eastern Shore Railroad, Inc.	ESHR	251
Edgmoor & Manetta Railway	EM	232
El Dorado and Wesson Railway Company	EDW	247
Elgin, Joliet and Eastern Railway Company	EJE	238
Escanaba & Lake Superior Railroad Company	ELS	241
Esquimalt and Nanaimo Railway Company	EN	246
Essex Terminal Railway Company	ETL	228
Eureka Southern Railroad Company, Inc.	EUKA	368
Everett Railroad Company	EV	231
Falls Creek Railroad Company	FCRK	267
Farmrail Corporation	FMRC	280
Ferdinand & Huntingburg Railroad	FRDN	273
Ferrocarril de Chihuahua al Pacifico, S.A. de C.V.	CHP	284
Ferrocarriles Nacionales de Mexico	NDM	266
Ferrocarriles Nacionales de Mexico - Region Pacifico	FCP	738
Ferrocarriles Nacionales de Mexico - the Baja California Division	SBC	283
Ferrocarriles Unidos del Sureste, S.A. de C.V.	SE	281

Carrier Name	Alpha & Numeric Codes	
Florida Central Railroad	FCEN	986
Florida East Coast Railway Company	FEC	263
Florida Midland Railroad Co., Inc.	FMID	507
Fonda, Johnstown and Gloversville Railroad Company	FJG	264
Fordyce & Princeton Railroad Company	FP	265
Fore River Railway Co., Inc.	CRY	908
Fort Smith and Van Buren Railway Co.	FSVB	279
Fort Worth & Western Railroad	FWWR	277
Galveston Railway, Inc.	GVSR	567
Galveston Wharves	GWF	303
Galveston, Houston and Henderson Railroad Company	GHH	293
Garden City Western Railway Company	GCW	287
Gateway Western		362
Genesee and Wyoming Railroad Company	GNWR	320
Georgetown Railroad Company	GRR	302
Georgia Eastern Railroad Company	GERY	993
Georgia Northern Railway Company	SOU	298
Georgia Southern and Florida Railway Company	SOU	300
Gettysburg Railroad Company	GETY	294
Gloater Southern Railroad Company	GLSR	916
Golden Triangle Railroad	GTRA	295
GO Transit	GOT	954
Grafton and Upton Railroad Company	GU	323
Grainbelt Corporation	GNBC	443
Grand River Railway Corporation	GRNR	322
Grand Trunk Western Railroad Company	GTW	308
Graysonia, Nashville & Ashdown Railroad Company	GNA	307
Great River Railroad	GTR	271
Great Slave Lake Railway		
Great Southwest Railroad, Inc.	GSW	305
Great Western Railway Company	GWR	311
Greater Winnipeg Water District		
Green Bay and Western Railroad Company	GBW	312
Green Hills Rural Development, Inc d/b/a/ Chillicothe-Brunswick Rail Mail	GHRD	980
Green Mountain Railroad Corporation	GMRC	314
Greenville and Northern Railway Company	GRN	306
Guilford Transportation Industries, Inc. - Rail Division		
Gulf & Mississippi Railroad Corporation	GMSR	392
Hammersley Iron		041
Hampton & Branchville Railroad Company, Inc.	HB	330
Harbor Belt Line Railroad	HBL	

Carrier Name	Alpha & Numeric Codes	
Hartford and Slocomb Railroad Company	HS	336
Hartwell Railway Company	HRT	334
Helena Southwestern Railroad Company	HSW	331
High Point, Thomasville & Denton Railroad Company	HPTD	366
Hillsboro and North Eastern Railway Company	HLNE	338
Hillsdale County Railway Company, Inc.	HCRC	326
Hillside		018
Hollis & Eastern Railroad Company	HE	328
Houston Belt & Terminal Railway Company	HBT	342
Huntsville and Madison County Railroad Authority	HMCR	391
Huron and Eastern Railway Company, Inc.	HESR	890
Hutchinson and Northern Railway Company	HN	332
Id-michigan Railroad Co.		785
Illinois Central Railroad Company	IC	360
Indian Creek Railroad Co.	ICRK	380
Indiana & Ohio Rail Corp.	INOH	344
Indiana Harbor Belt Railroad Company	IHB	357
Indiana Hi-Rail Corp.	IHRC	352
Indiana Railroad Company	INRD	780
Indianapolis Union Railway	IU	363
Indonesia		093
Intermodal Transportation Services		
International Bridge & Terminal Company	IBT	358
Interstate Railroad Company	SOU	381
Iowa Interstate Railroad, Ltd.	IAIS	316
Iowa Northern Railway	IANR	341
Iowa Southern Railroad Company	ISR	272
Iowa Traction Railroad Company (Electric)	IATR	994
Iowa Transfer Railway Company		
Jefferson Warrior Railroad Company	JEFW	254
K.W.T. Railway, Inc.	KWT	996
Kankakee, Beaverville, and Southern Railroad Company	KBSR	399
Kansas and Missouri Railway and Terminal Company	KM	414
Kansas City Public Service Freight Operation	KCPS	
Kansas City Southern Lines	KCLS	400
Kansas City Southern Railway Company	KCS	400
Kansas City Terminal Railway Company	KCT	401
Kentucky and Tennessee Railway Company	KT	405
Keokuk Junction Railway	KJRY	365
Kiamichi Railroad Company, Inc.	KRR	424
Knox & Kane Railroad Company	KKRR	376

Carrier Name	Alpha & Numeric Codes	
Kyle Railroad Company	KYLE	377
Lackawanna Valley Railroad	LVAL	381
Lackawaxen Stourbridge Railroad Corporation	LASB	409
Lake Erie and Northern Railway Company	LEN	421
Lake Erie, Franklin & Clarion Railroad Company	LEF	423
Lake Superior & Ishpeming Railroad Company	LSI	425
Lake Terminal Railroad Company	LT	404
Lamoille Valley Railroad Company	LVRC	452
Lancaster and Chester Railway Company	LC	426
Landisville Railroad, Inc.	AMHR	71
Laurinburg and Southern Railroad Company	LRS	427
Levin-richmond Terminal Corporation	PRT	606
Lewis & Clark Railway Company	LINC	355
Little Rock & Western Railway Corporation	LRWN	485
Little Rock Port Railroad	LRPA	435
Live Oak, Perry and South Georgia Railway Company	SOU	
Livonia, Avon & Lakeville Railroad Corp.	LAL	398
Logansport & Eel River Railroad Museum, Inc.	LER	304
Long Island Railroad Company	LI	436
Longview, Portland & Northern Railway Company	LPN	450
Los Angeles Junction Railway Company	LAJ	428
Louisana & Arkansas Railway Company	LA	441
Louisana and Delta Railroad	LDRR	972
Louisana and North West Railroad Company	LNW	442
Louisana Southern Railway Company	SOU	
Louisville and Wadley Railway Company	LW	451
Louisville, New Albany & Corydon Railroad	LNAC	446
Lowville and Beaver River Railroad Company	LBR	447
Ludington and Northern Railway	LUN	430
McCloud River Railroad Company	MCR	466
McKeesport Connecting Railroad Company	MKC	583
Madison Railroad	CMPA	144
Magma Arizona Railroad Company	MAA	463
Mahoning Valley Railway Company	MVRY	504
Maine Central Railroad Company	MEC	456
Manufacturers Railway Company	MRS	460
Manufacturers Junction Railway Company	MJ	459
Marinette, Tomahawk & Western Railroad Company	MTW	520
Maryland and Delaware Railroad Company	MDDE	454
Maryland and Pennsylvania Railroad Company	MPA	463
Maryland Midland Railway, Inc.	MMID	495

Carrier Name	Alpha & Numeric Codes	
Massachusetts Central Railroad Corporation	MCER	461
Massena Terminal Railroad Company	MSTR	471
Meridian & Bigbee Railroad Company	MBRR	462
Metra		892
Mexican Pacific Railroad Company, Inc.	MDP	285
Mg Rail, Inc.	MGRI	388
Michigan-Wisconsin Transportation Company	MWTT	512
Michigan Interstate Railway Company	AA	6
Mid Atlantic Railroad Co., Inc.	MRR	877
Middletown & Hummelstown Railroad Company	MIDH	479
Middletown and New Jersey Railway Company, Inc.	MNJ	475
Midland Terminal Company	MDLR	385
Midlouisana Rail Corporation	MDR	919
Midsouth Corporation	MSRC	905
Milwaukee Road	MILW	140
Minneapolis, Northfield and Southern Railway	MNS	460
Minnesota Commercial Railway Company	MNNR	973
Minnesota Valley Transportation Co., Inc. Southwest	MNVA	489
Minnesota, Dakota & Western Railway Company	MDW	610
Mississippi & Skuna Valley Railroad Company	MSV	503
Mississippi Delta Railroad	MSDR	786
Mississippi Export Railroad Company	MSE	506
Mississippian Railway, Co-operative, Inc.	MISS	502
Missouri-Kansas-Texas Railroad Co.	MKT	490
Missouri Pacific Railroad Company	MP	494
Mobile & Gulf Railroad Company	MG	483
Modesto and Empire Traction Company	MET	524
Monongahela Connecting Railroad Company	MCRR	498
Monongahela Railway Company	MGA	497
Montana Rail Link	MRL	671
Morristown & Erie Railway, Inc.	ME	511
Moscow, Camden & San Augustine Railroad	MSCA	548
Mount Vernon Terminal Ry, Inc.	MVT	
Muncie and Western Railroad Company	MWR	464
N.D.C. Railroad Company	NDCR	902
Napa Valley Railroad Company	NVRR	402
Napierville Junction Railway Company	NJ	562
Nash County Railroad Company	NCYR	776
Nashville & Ashland City Railroad	NACR	521
Nashville and Eastern Railroad Corporation	NERR	934
Natchez Trace Railroad	NTR	564

Carrier Name	Alpha & Numeric Codes	
National Railways of Mexico	NDM	286
National Railways of Spain	RENFE	119
New England Southern Railroad Co., Inc.	NEGS	536
New Hampshire Northcoast Corporation	NHN	787
New Hope & Ivyland Railroad Co.	NHIR	585
New Orleans Public Bell Railroad	NOPB	536
New York & Lake Erie Railroad	NYLE	545
New York Cross Harbor Railroad Terminal Corp.	NYCH	573
New York, Susquehanna and Western Railway	NYSW	546
Nicolet Badger Northern Railroad	NBNR	476
Nittany & Bald Eagle Railroad Company	NBER	249
NJT		574
Norfolk and Portsmouth Belt Line Railroad Company	NPB	549
Norfolk and Western Railway Company	NW	550
Norfolk Southern Corporation	NS	
North Carolina & Virginia Railroad Co., Inc.	NCVA	531
North Shore Railroad Company	NSHR	248
North Stratford Railroad Corporation	NSRC	570
Northwestern Oklahoma Railroad Company	NOKL	591
Northwestern Pacific Railroad Company	NWP	559
Oakland Terminal Railway	OTR	586
Octoraro Railway, Inc.	OCTR	587
Ogden Union Railway and Depot Co.	OURD	956
Ohi-Rail Corporation	OHIC	579
Ohio Southern Railroad Co.	OSRR	948
Oil Creek & Titusville Lines, Inc.	OCTL	945
Oklahoma Central Railroad Company	OCR	270
Oklahoma, Kansas and Texas Railroad Company	OKKT	593
Old Augusta Railroad Company	OAR	578
Omaha, Lincoln and Beatrice Railway Company	OLB	598
Ontario Central Railroad Corp.	ONCT	589
Ontario Midland Railroad Corp.	OMID	588
Ontario Northland Railway	ONT	754
Oregon & Northwestern Railroad Co.	ONW	596
Oregon, California & Eastern Railway Company	OCE	603
Oregon, Pacific & Eastern Railway Company	OPE	597
Otter Tail Valley Railroad Co., Inc.	OTVR	983
Ottumwa Terminal Railroad Company	OTT	276
Paducah & Illinois Railroad Company	PI	614
Paducah & Louisville Railway, Inc.	PAL	907
Panther Valley Railroad Corporation	PVAL	575

Carrier Name	Alpha & Numeric Codes	
Patapsco & Back Rivers Railroad	PBR	609
Pearl River Valley Railroad Company	PRV	636
Pecos Valley Southern Railway Company	PVS	644
Pee Dee River Railway Corp.	PDRR	171
Peninsula Terminal Company	PT	643
Peoria and Pekin Union Railway Company	PPU	645
Philadelphia Belt Line Railroad Company	PBL	608
Philadelphia, Bethlehem and New England Railroad	PBNE	659
Pickens Railroad Company	PICK	624
Pinsly Railroads		
Pioneer and Fayette Railroad Company	PF	630
Pioneer Valley Railroad Company, Inc.	PVRR	611
Pittsburg & Shawmut Railroad	PS	627
Pittsburgh and Lake Erie Railroad Company	PLE	626
Pittsburgh and Ohio Valley Railway Company	POV	616
Pittsburgh, Alleghany & McKees Rocks Railroad Company	PAM	607
Pittsburgh, Chartiers & Youghiogheny Railway Company	PCY	629
Plymouth Short Line, Ltd.	PSLL	566
Pocono Northeast Railway, Inc.	PNER	618
Point Comfort & Northern Railway Company	PCN	651
Port Bienville Railroad	PBVR	677
Port of San Francisco Belt Railroad	SFBR	
Port of Tillamook Bay Railroad	POTB	637
Port Royal Railroad	PRYL	393
Port Terminal Railroad Association	PTRA	
Portland Terminal Company	PTM	619
Portland Traction Company	PRTD	632
Poseyville and Owensville Railroad Co., Inc.	POR	339
Prescott and Northwestern Railroad Company	PNW	634
Providence and Worcester Railroad Company	PW	631
Quebec Central Railway Company	QC	658
Quebec North Shore and Labrador Railroad Company	QNSL	
Queensland Rail		036
Quincy Railroad Company	QRR	656
Railway Association Of Canada	RAC	033
Rarus Railway Company	RARW	516
Red River Valley & Western Railroad Co.	RRVW	321
Richmond, Fredericksburg & Potomac Railroad Company	RFP	663
River Terminal Railway Company	RT	665
Robe		044
Roberval and Saguenay Railway Company	RS	669

Carrier Name	Alpha & Numeric Codes	
Rochester & Southern Railroad, Inc.	RSR	941
Rockdale, Sandow & Southern Railroad Company	RSS	675
Rocky Mountain Railcar and Railroad, Inc.	RMRR	915
Roscoe, Snyder and Pacific Railway Company	RSP	673
Sabine River and Northern Railroad Company	SRN	678
Saint Lawrence Railroad	SLAW	705
Saint Louis Southwestern Railway Company	SSW	694
Saint Maries River Railroad Company	STMA	698
Salt Lake, Garfield and Western Railway Company	SLGW	690
San Diego & Imperial Valley Railroad Company	SDIY	315
San Francisco Belt Railroad	SFBR	
San Luis Central Railroad Company	SLC	696
San Manuel Arizona Railroad Company	SMA	794
Sand Springs Railway Company	SS	707
Sandersville Railroad Company	SAN	691
Santa Fe	ATSF	22
Santa Maria Valley Railroad Company	SMV	741
Savannah State Docks Railroad Company	SSDK	679
Seaspan International Limited	SIL	
Sequatchie Valley Railroad Co.	SQVR	910
Shore Fast Line Railroad Company	SFLR	255
Sierra Railroad Company	SERA	716
Singapore		076
Sisseton Southern Railway Co.	SSOR	440
Somerset Railroad Corporation	SOM	772
Soo Line Railroad Company	SOO	
South Branch Valley Railroad	SBVR	732
South Brooklyn Railway Company	SBK	718
South Buffalo Railway Company	SB	719
South Carolina Central Railroad Co., Inc.	SCRF	582
South Central Tennessee Railroad Company, Inc.	SCTR	672
Southeast Kansas Railroad Company	SEKR	944
Southern Indiana Railway, Inc.	SIND	720
Southern New Jersey Light Rail Transit		026
Southern Pacific Transportation Company	SP	721
Southern Railway Company	SOU	724
Southern San Luis Valley Railroad Company	SSLV	706
Spencerville and Elgin Railroad Company	SPEG	723
Springfield Terminal Railway Company	ST	746
St. Marys Railroad Company	SM	682
STA		048

Carrier Name	Alpha & Numeric Codes	
State University Railroad Company	SOU	
Staten Island Railway Corporation	SIRY	389
Steelton & Highspire Railroad Company	SH	799
Stewartstown Railroad	STRT	729
Stockton Terminal and Eastern Railroad	STE	739
Strasburg Railroad Company	SRC	686
Strouds Creek and Muddlety Railroad	SCM	687
Sunset Railway Company	SUN	734
Susquehanna Connecting Railway		
Tacoma Municipal Belt Line Railway	TMBL	759
Tasrail		119
Tennessee Railway Company	SOU	767
Tennessee, Alabama and Georgia Railway Company	SOU	755
Tennken Railroad Company, Inc.	TKEN	745
Terminal Railroad Association of St. Louis	TRRA	757
Terminal Railway Alabama State Docks	TASD	758
Texas & Northern Railway Company	TN	795
Texas Central Railroad Company	TEXC	750
Texas City Terminal Railway Company	TCT	761
Texas Mexican Railway Company	TM	762
Texas North Western Railway Company	TXNW	747
Texas South-Eastern Railroad Company	TSE	765
Texas Transportation Company	TXTC	768
Texas, Oklahoma & Eastern Railroad Company	TOE	764
Thailand		102
Tippecanoe Railroad Company	TIPP	753
Tonawanda Island Railroad, Inc.	TIRL	743
Towanda-Monroeton Shippers' Lifeline, Inc.	TMSS	752
Tradewater Railway Company	TWRY	746
Transkentucky Transportation Railroad, Inc.	TTIS	773
Tranz Rail		057
Trona Railway Company	TRC	779
Tucson, Cornelia and Gila Bend Railroad Company	TCG	783
Tulsa-Sapulpa Union Railway Company	TSU	709
Turtle Creek Industrial Railroad, Inc.	TCKR	744
Tuscola and Saginaw Bay Railway Company	TSBY	770
Union Pacific Railroad		
Union Pacific Railroad Company	UP	802
Union Railroad Company	URR	803
Union Railroad of Oregon	UO	800
United South Eastern Railways Company	SE	281

Carrier Name	Alpha & Numeric Codes	
Unity Railways Company	UNI	806
Upper Marion and Plymouth Railroad Company	UMP	808
Utah Railway Company	UTAH	811
Valdosta Southern Railroad	VSO	816
Vandalla Railroad Company	VRRC	781
Ventura County Railway Company	VCY	821
Vermont Railway, Inc.	VTR	817
VIA Rail	VIA	818
Victrack		017
Visalla Electric Railroad Company	VE	824
Walking Horse & Eastern Railroad Co.	WHOE	390
Warren & Saline River Railroad Company	WSR	832
Washington Central Railroad Company, Inc.	WCRC	943
Washington County Railroad Corporation	WACR	812
Washington Terminal Company	WATC	849
Waterloo Railway Company	WLO	835
WCVTU Railway Company	WCTR	844
Weatherford Mineral Wells & Northwestern Railway Company	WMWN	837
West Jersey Short Line, Inc.	WJSL	387
West Shore Railroad Corporation	WTSE	882
West Tennessee Railroad Corp.	WTNN	258
West Virginia Northern Railroad, Ltd.	WVN	866
Western Rail Road Company	WRRC	838
Westrail		038
White Pass and Yukon Corporation Limited	WPY	845
Williamette Valley Railroad Company	WGRR	863
Wilmington Terminal Railroad, Inc.	WTRY	981
Winchester and Western Railroad Company	WW	850
Winifrede Railroad Company	WNFR	852
Winston-Salem Southbound Railway Company	WSS	854
Wisconsin & Calumet Railroad	WICT	382
Wisconsin & Southern Railroad Co.	WSOR	879
Wisconsin Central Ltd.	WC	260
Yancey Railroad Company	YAN	876
Youngstown & Austintown Railroad Company	YARR	372
Youngstown & Southern Railway Company	YS	875
Yreka Western Railroad Company	YW	873
Zug Island Road	DC	196

Carrier	Alpha & Numeric Codes	
Texas Central Railroad Company	TEXC	750
Texas City Terminal Railway Company	TCT	761
Texas Mexican Railway Company	TM	762
Texas North Western Railway Company	TXNW	747
Texas South-Eastern Railroad Company	TSE	765
Texas Transportation Company	TXTC	768
Texas, Oklahoma & Eastern Railroad Company	TOE	764
Tippecanoe Railroad Company	TIPP	753
Tonawanda Island Railroad, Inc.	TIRL	743
Towanda-Monroeton Shippers' Lifeline, Inc.	TMSS	752
Tradewater Railway Company	TWRY	746
Transkentucky Transportation Railroad, Inc.	TTIS	773
Trona Railway Company	TRC	779
Tucson, Cornelia and Gila Bend Railroad Company	TCG	783
Tulsa-Sapulpa Union Railway Company	TSU	709
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Tuscola and Saginaw Bay Railway Company	TSBY	770
Union Pacific Railroad		
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Union Railroad Company	URR	803
Union Railroad of Oregon	UO	800
United South Eastern Railways Company	SE	281
Unity Railways Company	UNI	806
Upper Marion and Plymouth Railroad Company	UMP	808
Utah Railway Company	UTAH	811
Valdosta Southern Railroad	VSO	816
Vandalla Railroad Company	VRRC	781
Ventura County Railway Company	VCY	821
Vermont Railway, Inc.	VTR	817
VIA Rail	VIA	818
Visalla Electric Railroad Company	VE	824
Walking Horse & Eastern Railroad Co.	WHOE	390
Warren & Saline River Railroad Company	WSR	832
Washington Central Railroad Company, Inc.	WCRC	943
Washington County Railroad Corporation	WACR	812

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