

TECHNICAL MANUAL

SERVICE AND MAINTENANCE INSTRUCTIONS

AN/GSC-24(V) MULTIPLEXER SET

**MARTIN MARIETTA AEROSPACE
ORLANDO DIVISION
COMMUNICATIONS AND ELECTRONICS**

**Contract Number
F30602-75-C-0009**

**This is a reprint which includes current
pages from Changes 1 and 2.**

**Published under authority of the Secretary of the Air Force,
under authority of the Secretary of the Army, and by direction
of Commander, Naval Electronics Systems Command.**

1 JANUARY 1976

TABLE OF CONTENTS

	Page
LIST OF ILLUSTRATIONS.....	viii
LIST OF TABLES	xi
INTRODUCTION	xii
CHAPTER 1. GENERAL INFORMATION	1-1
1-1. Description and Purpose	1-1
1-6. Leading Particulars	1-3
1-8. Capabilities and Limitations	1-3
1-10. Equipment Supplied.....	1-3
1-12. Related Technical Manuals.	1-3
1-14. Special Tools	1-3
1-16. Test Equipment.....	1-3
CHAPTER 2. INSTALLATION	2-1
Section I. INSTALLATION LOGISTICS	2-1
2-1. General	2-1
2-3. Unloading and Unpacking.....	2-1
2-5. Storage Housing Requirements.....	2-1
2-7. Receiving Data.....	2-2
2-9. Installation Housing Requirements	2-2
Section II. INSTALLATION PROCEDURES	2-3
2-11. General	2-3
2-13. Installation Procedures	2-4
CHAPTER 3. PREPARATION FOR USE	3-1
Section I. GENERAL.....	3-1
3-1. Introduction	3-1
3-5. Typical System Applications	3-1
3-11. Channel and Port Relationships	3-3
3-17. Channel Rates and Forms.....	3-5
3-19. Digital Data With Associated Timing	3-5
3-22. Digital Data Without Associated Timing	3-6
3-25. Voice Data	3-7
3-27. Channel Card Options	3-7

TABLE OF CONTENTS (CONT)

		Page
Section II.	PREPARATION OF CONFIGURATION WORKSHEETS	3-8
3-29.	General	3-8
3-32.	Multiplexer Channel Electronics.....	3-9
3-36.	Multiplexer Common Electronics	3-12
3-41.	Demultiplexer Channel Electronics.....	3-19
3-43.	Demultiplexer Common Electronics	3-22
3-45.	Supplemental Configuration Considerations	3-22
3-56.	Voice Processing Ground Rules.....	3-27
3-58.	Special Demultiplexer Output Smoothing Options.....	3-28
Section III.	EQUIPMENT PREPARATION PROCEDURES	3-29
3-64.	Preparation Considerations	3-29
3-66.	Multiplexer Channel Electronics Setup Procedures.....	3-29
3-68.	RCB Card.....	3-29
3-70.	TE/TR Card.....	3-35
3-71.	VE Card.	3-37
3-72.	Multiplexer Common Electronics Setup Procedures.	3-37
3-74.	RT Card.	3-37
3-75.	OEG Card	3-41
3-76.	Seq Card.....	3-41
3-77.	GC/DM Card	3-45
3-78.	Demultiplexer Channel Electronics Setup Procedures.....	3-45
3-80.	SB Card	3-45
3-81.	NBSB Card.	3-48
3-82.	VD Card	3-50
3-83.	TD Card.	3-50
3-84.	Demultiplexer Common Electronics Setup Procedures.....	3-52
3-86.	OEG Card	3-52
3-87.	Seq Card.....	3-52
3-88.	GC/DM Card	3-52
3-89.	FS Card.....	3-52
3-90.	ERD Card.....	3-52
3-91.	Display Card Setup Procedures.....	3-53
3-93.	Thermal Alarm Options	3-53
3-96.1.	Remote Alarm Options	3-56
3-97.	Multiplexer Set Operational Tests.....	3-56
Section IV.	PREPARATION FOR RESHIPMENT	3-58
3-99.	General	3-58
3-101.	Packing Procedures.....	3-58
CHAPTER 4.	OPERATION.....	4-1
4-1.	Introduction	4-1
4-3.	Controls and Indicators	4-1
4-5.	Operating Instructions.....	4-1
4-7.	Starting Procedures.	4-1

TABLE OF CONTENTS (CONT)

	Page
CHAPTER 4. (Continued)	
4-8. Lamp Test Procedures	4-4
4-9. Self-Test Procedures.	4-4
4-10. Stopping Procedures.....	4-4
4-11. Emergency Stopping Procedures.....	4-4
CHAPTER 5. THEORY OF OPERATION	5-1
5-1. Introduction.....	5-1
Section I. MESSAGE FORMAT AND BASIC EQUIPMENT CONCEPTS	5-3
5-5. General.....	5-2
5-6. Message Format	5-2
5-7. Overall Message Format	5-2
5-13. Overhead Message Format	5-4
5-19. Multiplexer Basic Concepts	5-5
5-20. Introduction.....	5-5
5-27. Equipment Application.....	5-6
5-30. Processing of Asynchronous Inputs.....	5-8
5-42. Channel Data Gating Function.....	5-11
5-48. Overhead Service Function.....	5-14
5-55. Demultiplexer Basic Concepts.	5-16
5-57. Frame Synchronization Function.....	5-16
5-64. Smoothing Function.	5-18
Section II. MULTIPLEXER, DEMULTIPLEXER, AND OVERALL DIAGNOSTIC FUNCTIONAL BLOCK DIAGRAM DISCUSSIONS.....	5-20
5-69. Overall Multiplexer Functional Block Diagram Discussion	5-20
5-70. General.....	5-20
5-71. Rate Comparison Buffer (RCB) Card.....	5-20
5-76. Transition Encoder/Timing Recovery (TE/TR) Card	5-21
5-81. Voice Encoder (VE) Card	5-22
5-85. Sequencer (Seq) Card.	5-23
5-90. Overhead Enable Generator (OEG) Card.....	5-23
5-94. Gated Clock/Data Mux (GC/DM) Card	5-24
5-102. Reference Timer (RT) Card	5-25
5-106. Overall Demultiplexer Functional Block Diagram Discussion	5-26
5-107. General.....	5-26
5-108. Frame Sync (FS) Card	5-26
5-113. Sequencer (Seq) Card.	5-27
5-116. Overhead Enable Generator (OEG) Card.....	5-28
5-119. Gated Clock/Data Mux (GC/DM) Card	5-28
5-123. Error Rate Detector (ERD) Card	5-29
5-126. Smoothing Buffer (SB) Card	5-29

TABLE OF CONTENTS (CONT)

	Page
Section II. (Continued)	
5-130. Narrow Band Smoothing Buffer (NBSB) Card.	5-30
5-132. Transition Decoder (TD) Card.....	5-30
5-135. Voice Decoder (VD) Card.....	5-31
5-138. Overall Diagnostic Functional Block Diagram	5-31
5-139. General.....	5-31
5-144. System Block Diagram Discussion	5-32
5-154. Front Panel Block Diagram Discussion.....	5-35
Section III. MULTIPLEXER CARDS FUNCTION OPERATION.....	5-38
5-164. Introduction.....	5-38
5-166. Rate Comparison Buffer (RCB) Card.....	5-38
5-167. General.....	5-38
5-168. Block Diagram Discussion.	5-39
5-190. Detailed Circuit Discussion.....	5-46
5-203. Transition Encoder/Timing Recovery (TE/TR) Card.	5-50
5-204. General.....	5-50
5-205. Block Diagram Discussion	5-51
5-230. Detailed Circuit Discussion	5-59
5-245. Voice Encoder (VE) Card.....	5-61
5-246. General.....	5-61
5-247. Block Diagram Discussion	5-61
5-258. Detailed Circuit Discussion.....	5-65
5-265. Sequencer (Seq) Card.	5-66
5-266. General.....	5-66
5-267. Block Diagram Discussion.	5-66
5-290. Detailed Circuit Discussion.....	5-75
5-306. Gated Clock/Data Mux (GC/DM) Card	5-79
5-307. General.....	5-79
5-308. Block Diagram Discussion	5-79
5-330. Detailed Circuit Discussion.....	5-87
5-351. Overhead Enable Generator (OEG) Card.....	5-93
5-352. General.....	5-93
5-356. Block Diagram Discussion	5-93
5-365. Detailed Circuit Discussion	5-96
5-373. Reference Timer (RT) Card	5-98
5-374. General.....	5-98
5-375. Block Diagram Discussion	5-98
5-379. Detailed Circuit Discussion.....	5-101
Section IV. DEMULTIPLEXER CARDS FUNCTIONAL OPERATION	5-103
5-394. Introduction.....	5-103
5-396. Smoothing Buffer (SB) Card.	5-103
5-397. General.....	5-103
5-398. Block Diagram Discussion	5-104
5-407. Detailed Circuit Discussion.....	5-108

TABLE OF CONTENTS (CONT)

		Page
Section IV.	(Continued)	
5-419.	Narrow Band Smoothing Buffer (NBSB) Card	5-112
5-420.	General.....	5-112
5-422.	Detailed Circuit Discussion.....	5-112
5-426.	Transition Decoder (TD) Card.....	5-113
5-427.	General.....	5-113
5-428.	Block Diagram Discussion	5-113
5-435.	Detailed Circuit Discussion.....	5-115
5-444.	Voice Decoder (VD) Card.....	5-118
5-445.	General.....	5-118
5-446.	Block Diagram Discussion	5-118
5-453.	Detailed Circuit Discussion.....	5-120
5-460.	Sequencer (Seq) Card	5-121
5-463.	Gated Clock/Data Mux (GC/DM) Card	5-122
5-468.	Overhead Enable Generator (OEG) Card.....	5-122
5-472.	Frame Sync (FS) Card.	5-123
5-473.	General.....	5-123
5-474.	Block Diagram Discussion.	5-123
5-511.	Detailed Circuit Discussion.....	5-136
5-535.	Error Rate Detector and Remote Alarm (ERD) Card	5-142
5-536.	General.....	5-142
5-537.	Block Diagram Discussion.	5-142
5-550.	Detailed Circuit Discussion.....	5-148
Section V.	DISPLAY CARD AND FRONT PANEL FUNCTIONAL OPERATION.....	5-152
5-561.	Introduction.....	5-152
5-563.	Display Card.....	5-152
5-564.	General.....	5-152
5-569.	Functional Block Diagram Discussion	5-152
5-578.	Self-Test Block Diagram Discussion.	5-157
5-591.	Detailed Functional Circuit Discussion	5-160
5-604.	Detailed Self-Test Circuit Discussion	5-164
5-612.	Front Panel Detailed Circuit Discussion.....	5-166
Section VI.	AC POWER DISTRIBUTION AND POWER SUPPLY ASSEMBLY FUNCTIONAL OPERATION.....	5-167
5-615.	Introduction.....	5-167
5-617.	AC Power Distribution	5-167
5-620.	Power Supply.	5-169
5-621.	General.....	5-169
5-622.	Block Diagram Discussion	5-169
5-630.	Detailed Circuit Discussion.....	5-173

TABLE OF CONTENTS (CONT)

	Page
CHAPTER 6. MAINTENANCE	6-1
Section I. ORGANIZATIONAL AND INTERMEDIATE LEVEL MAINTENANCE.....	6-1
6-1. Introduction.....	6-1
6-4. General.....	6-1
6-6. Maintenance Support Equipment.....	6-1
6-8. Fault Isolation, Using Built-In Diagnostic Features.....	6-1
6-9. General.....	6-1
6-10. Automatic Mode	6-1
6-11. Self-Test Mode	6-4
6-12. Lamp Test Mode	6-5
6-13. Troubleshooting.....	6-5
6-14. General.....	6-5
6-17. Extender Card Usage.....	6-5
6-18. Continuity Check	6-19
6-19. Special Purpose Switch Usage	6-20
6-20. Repair and Replacement.....	6-21
6-21. General.....	6-21
6-22. Printed Circuit Card.....	6-21
6-23. Power Supply	6-21
6-24. Front Panel Assembly	6-24
6-25. Front Panel Indicator Lamp	6-25
6-26. LED Element	6-25
6-27. Cooling Blower	6-25
6-28. Backplane Wiring	6-27
6-29. Paint Touchup	6-32
6-30. Preventive Maintenance.....	6-32
6-31. General.....	6-32
6-32. Diagnostic Circuit Self-Testing	6-32
6-33. Lamp Testing.....	6-33
6-34. RT Card Calibration.....	6-33
6-35. TE/TR Card Calibration	6-35
6-36. Cooling Air Filter Cleaning.....	6-36
6-37. Inspection	6-36
6-38. Performance Standards	6-37
6-39. General.....	6-37
6-40. Self-Testing and Lamp Testing.	6-37
6-41. Voice Processing Performance Test.....	6-37
6-42. Bit Count Integrity Test	6-40
Section II. SPECIAL MAINTENANCE	6-42
6-43. Introduction.....	6-42
6-46. General.....	6-42
6-49. Maintenance Support Equipment.....	6-42
6-51. Deleted	

TABLE OF CONTENTS (CONT)

	Page
Section II. (Continued)	
6-54. Deleted	
6-57. Deleted	
6-60. Deleted	
6-61. Deleted	
6-62. Deleted	
6-63. Deleted	
6-64. Deleted	
6-65. Connector Repair	6-42
6-68. Chassis Repair	6-49
6-69. General.....	6-49
6-70. Captive Screw Replacement.....	6-51
6-73. Deleted	
6-74. Stake Nut Replacement	6-54
6-75. Deleted	
6-76. Backplane Connector Panel Removal and Installation.	6-59
Section III. PERFORMANCE TEST CHECKS	6-64
Glossary	Glossary-1
Cross-Reference Index	CRI-1
Alphabetical Index.	Index-1

LIST OF ILLUSTRATIONS

Number	Title	Page
1-1.	AN/GSC-24(V) Multiplexer Set	1-2
1-2.	Printed Circuit Card - Location view.....	1-4
1-3.	Typical Printed Circuit Board - Physical View.....	1-5
1-4.	Power Supply - Physical view.....	1-5
3-1.	Typical Duplex Configurations	3-2
3-2.	Typical Simplex Configuration	3-4
3-3.	Typical Type I Channel Input/Output Data and Timing Waveforms	3-5
3-4.	Example of Multiplexer Set Configuration.....	3-10
3-5.	Example of Sheet 1 of Configuration Worksheets	3-11
3-6.	Example of Sheet 2 of Configuration Worksheets	3-20
3-7.	Example of Sheet 3 of Configuration Worksheets	3-21
3-8.	Example of Sheet 4 of Configuration Worksheets	3-23
3-9.	Port Rate Impact Upon Input/Output Efficiency	3-25
3-10.	Input Rate Mix Impact Upon Input/Output Efficiency	3-26
3-11.	Configuration Worksheets (4 sheets)	3-30
3-12.	RCB Card - Switch Location Diagram	3-34
3-13.	TE/TR Card - Switch Location Diagram.....	3-36
3-14.	RT Card - Switch Location Diagram	3-38
3-15.	OEG Card - Switch Location Diagram	3-42
3-16.	Seq Card - Switch Location Diagram.....	3-43
3-17.	SB Card - Switch Location Diagram	3-46
3-18.	NBSB Card - Switch Location Diagram	3-49
3-19.	TD Card - Switch Location Diagram	3-51
3-20.	FS Card - Switch Location Diagram	3-53
3-21.	ERD Card - Switch Location Diagram	3-54
3-22.	Display Card - Switch Location Diagram	3-55
3-23.	Front Panel Printed Circuit Card - Jumper Location Diagram	3-57
4-1.	Front Panel Controls and Indicators	4-1
5-1.	Output Message Format	5-3
5-2.	Overhead Message Format	5-4
5-3.	Typical Multiplexer Application.....	5-7
5-4.	Channel Data Asynchronous-to-Synchronous Conversion- Functional Block Diagram	5-9
5-5.	Example of Homogeneous Sampling Sequence	5-12
5-6.	Gated Clocks - Waveform Diagram	5-13
5-7.	Multiplexer Overhead Service - Simplified Block Diagram	5-15
5-8.	Frame Synchronization Function - Simplified Block Diagram	5-17
5-9.	Smoothing Function - Simplified Block Diagram	5-19
5-10.	Diagnostic Overall System - Block Diagram (2 sheets).....	5-33
5-11.	RCB Card - Simplified Block Diagram	5-39
5-12.	RCB Card - Block Diagram.....	5-41
5-13.	RCB Card, Coarse Rate Conversion Circuits - Block Diagram	5-44
5-14.	RCB Card, Diagnostic Circuits - Block Diagram	5-45
5-15.	TE/TR Card - Simplified Block Diagram	5-51
5-16.	TE/TR Card, Transition Encoder Circuits - Block Diagram.....	5-52

LIST OF ILLUSTRATIONS (Continued)

Number	Title	Page
5-17.	TE/TR Card, Timing Recovery Circuits - Block Diagram	5-54
5-18.	TE/TR Card, Rate Conversion Buffer Circuits - Block Diagram	5-55
5-19.	TE/TR Card, Diagnostic Circuits - Block Diagram	5-58
5-20.	VE Card - Block Diagram.....	5-62
5-21.	VE Card - Waveform Diagram	5-64
5-22.	GC/DM Card, Format Generation Circuits - Block Diagram	5-80
5-23.	GC/DM Card, Gated Clock Generation Circuits - Block Diagram.....	5-81
5-24.	GC/DM Card, Data Multiplexer Circuits - Block Diagram	5-84
5-25.	GC/DM Card, Composite Error Detection Circuits - Block Diagram	5-86
5-26.	GC/DM Card, Gated Clock Generation Diagnostic Circuits - Block Diagram	5-88
5-27.	OEG Card - Block Diagram	5-94
5-28.	RT Card, Data and Timing Circuits - Block Diagram	5-99
5-29.	RT Card, Transition Encoder Timing Circuits - Block Diagram	5-100
5-30.	RT Card, Reference Timing - Waveform Diagram.	5-101
5-31.	APLL Circuit Stuffing - Waveform Diagram	5-106
5-32.	SB Card, Coarse Rate Conversion Circuits - Block Diagram	5-107
5-33.	TD Card, 3-Bit Transition Code - Waveform Diagram	5-114
5-34.	TD Card, Pulse Transition Code - Waveform Diagram	5-116
5-35.	VD Card - Block	5-119
5-36.	FS Card, Parallel Sync Acquisition Circuits - Block Diagram	5-126
5-37.	FS Card, Primary and Odd Bit Shift Registers - Block Diagram	5-129
5-38.	FS Card, Data Selector Outputs - Waveform Diagram	5-131
5-39.	FS, Card, Diagnostic Circuits - Block Diagram	5-135
5-40.	ERD Card, Minor Frame Generation Circuits - Block Diagram	5-143
5-41.	ERD Card, Error Reset, Self-Test, and Remote Alarms Relay Circuits - Block Diagram.....	5-144
5-42.	ERD Car4, Minor Frame Generation Diagnostic Circuits - Block Diagram.....	5-149
5-43.	Display Card, Primary Diagnostics - Block Diagram.....	5-153
5-44.	Display Card, Secondary Diagnostics - Block Diagram.....	5-159
5-45.	AC Power Distribution - Block Diagram,	5-168
5-46.	+12-Volt Regulator Card, Clock Generator and Over/Under Voltage Detector Circuits - Block Diagram.....	5-170
5-47.	+12-Volt Regulator Card, +12-Volt Regulator Circuit - Block Diagram	5-171
5-48.	+12-Volt Regulator Circuit - Waveform Diagram	5-172
5-49.	A Clock and B Clock Waveform Diagram	5-175
5-50.	+5-Volt Drive Pulses - Waveform Diagram	5-177

LIST OF ILLUSTRATIONS (Continued)

Number	Title	Page
6-1.	Typical Integrated Circuit Pin Arrangement - Top View.....	6-20
6-2.	Multiplexer Set Physical Arrangement.....	6-23
6-3.	Power Supply - Top View.....	6-24
6-4.	LED Element Replacement	6-26
6-5.	Typical Backplane Connector Pin Location Arrangement	6-29
6-6.	Backplane Wire Replacement Diagram.....	6-30
6-7.	Wire Wrapping Tools and Simplified Wire Installation Procedures.....	6-31
6-8.	RT Card - Test Point and Alignment Location Diagram	6-35
6-9.	Typical Performance Test Setup Diagram.....	6-38
6-10.	Test Setup Cable Diagrams.....	6-39
6-11.	Deleted	
6-12.	Deleted	
6-13.	Deleted	
6-14.	Backplane Connector Repair Diagram	6-51
6-15.	Captive Screw Removal Diagram.....	6-52
6-16.	Access Cover Captive Screw Insertion Diagram	6-53
6-17.	Deleted	
6-18.	Deleted	
6-19.	Deleted	
6-20.	Deleted	
6-21.	Stake Nut Removal Diagram	6-59
6-22.	Stake Nut Insertion Diagram.....	6-60
6-23.	Deleted	
6-24.	Deleted	
6-25.	Card File - Mounting Hardware Location Diagram	6-63
FO-1.	Overall Multiplexer System - Block Diagram	FO-1
FO-2.	Overall Demultiplexer System - Block Diagram	FO-3
FO-3.	Seq Card - Block Diagram	FO-5
FO-4.	SB Card - Block Diagram.....	FO-7
FO-5.	TD Card - Block Diagram.....	FO-9
FO-6.	Overall FS Card - Simplified Block Diagram	FO-11
FO-7.	FS Card, Primary Shift Register - Simplified Block Diagram	FO-13
FO-8.	FS Card, VLSR Circuits - Block Diagram	FO-15
FO-9.	FS Card, Serial Sync Acquisition and Sync Maintenance Circuits - Block Diagram	FO-17
FO-10.	ERD Card, Error Rate Detector Circuits - Block Diagram	FO-19
FO-11.	Overall Power Supply - Block Diagram.....	FO-21

LIST OF TABLES

Number	Title	Page
1-1.	Leading Particulars.....	1-6
1-2.	Physical Capabilities and Limitations.....	1-6
1-3.	Electrical Capabilities and Limitations.....	1-7
1-4.	Equipment Supplied	1-10
1-5.	Related Technical Publications.....	1-13
1-6.	Special Tools List.....	1-14
1-7.	Test Equipment List	1-16
2-1.	Installation Data	2-2
3-1.	Multiplexer Set Channel Card Options.....	3-8
3-2.	Configuration Worksheet Data	3-9
3-3.	Coarse Rate Conversion Strapping Data.....	3-13
3-4.	Reference Timer Rate Selection Data	3-39
3-5.	Reference Timex Setup Data	3-40
3-6.	Seq Card Ports-In-Use Switch Settings.....	3-44
4-1.	Multiplexer Set Controls and Indicators	4-2
5-1.	3-Bit Transition Codes	5-52
5-2.	Typical Channel Address Input to R.A.M.....	5-68
5-3.	Homogeneous Port Address to R.A.M.....	5-70
5-4.	Truncated Port Addresses to R.A.M. in 22 Used Ports Configuration.....	5-73
5-5.	ROM Outputs (Stuff Codes).....	5-89
5-6.	Diagnostic Display Priority	5-154
5-7.	Lamp Display Decoder Logic Outputs to Front Panel.....	5-162
6-1.	Organizational/Intermediate Level Support Equipment	6-2
6-2.	Troubleshooting Symptoms	6-6
6-3.	Signal Name and Test Point List.	6-9
6-4.	Special Purpose Switch Data.....	6-18
6-5.	Preventive Maintenance Summary	6-32
6-6.	Depot/Special Level Support Equipment.	6-43

INTRODUCTION

This manual contains the combined service and maintenance instructions necessary for servicing and maintaining the AN/GSC-24(V) multiplexer set in an operationally ready condition. The multiplexer set is a versatile asynchronous time-division multiplexer that can be configured for simplex or full-duplex operation. Up to 15 channels of voice data, high-speed and low-speed digital data with timing, and/or selected low-speed digital data without timing can be multiplexed and demultiplexed in the multiplexer set. The technical capabilities of the multiplexer set are listed in chapter 1.

This manual is divided into six chapters. Chapter 1 contains descriptive information, operating parameters, and other pertinent data by which service personnel can familiarize themselves with the multiplexer set. The installation logistics considerations and installation procedures are in chapter 2. Chapter 3 contains the procedures for making the equipment operational, as well as the procedures for preparing the equipment for reshipment. Chapter 4 contains the operating procedures and associated information required to ensure that the equipment performs its designated functions. The theory of operation is in Chapter 5. Chapter 6 prescribes the maintenance instructions that maintenance personnel require for servicing the equipment. The circuit diagrams (schematic, logic, and wiring) for the equipment are in the circuit diagrams manual.

Nonstandard symbols and abbreviations appearing in this manual are defined at their first appearance. Standard symbols and abbreviations appearing in this manual are defined in the appropriate Military Standards as referenced in the following technical content specification that was used in the preparation of this manual: MIL-M-38798A - Manuals, Technical: Operation Instructions, Maintenance Instructions, Circuit Diagrams, Alignment Procedures, and Installation Planning.

CHAPTER 1

GENERAL INFORMATION

1-1. DESCRIPTION AND PURPOSE.

1-2. The AN/GSC-24(V) multiplexer set provides asynchronous time division multiplexing and demultiplexing capabilities in digital transmission networks. The multiplexing function accepts up to 15 channels of various lower rate digital input streams and interleaves them into a single high-speed digital stream output. In turn, the demultiplexing function accepts a high-speed digital stream and separates the digital stream input into a given number (up to 15) of lower rate digital streams. The multiplexer set provides full duplex operation, performing independent and simultaneous multiplexing and demultiplexing functions.

NOTE

In this manual, the circuits are divided into one of three functional groups. The circuits that perform the multiplexing function are referred to as the multiplexer. The circuits that perform the demultiplexing function are referred to as the demultiplexer. The circuits that perform the power supply function are referred to as the power supply.

1-3. The multiplexer set also has the following unique capabilities:

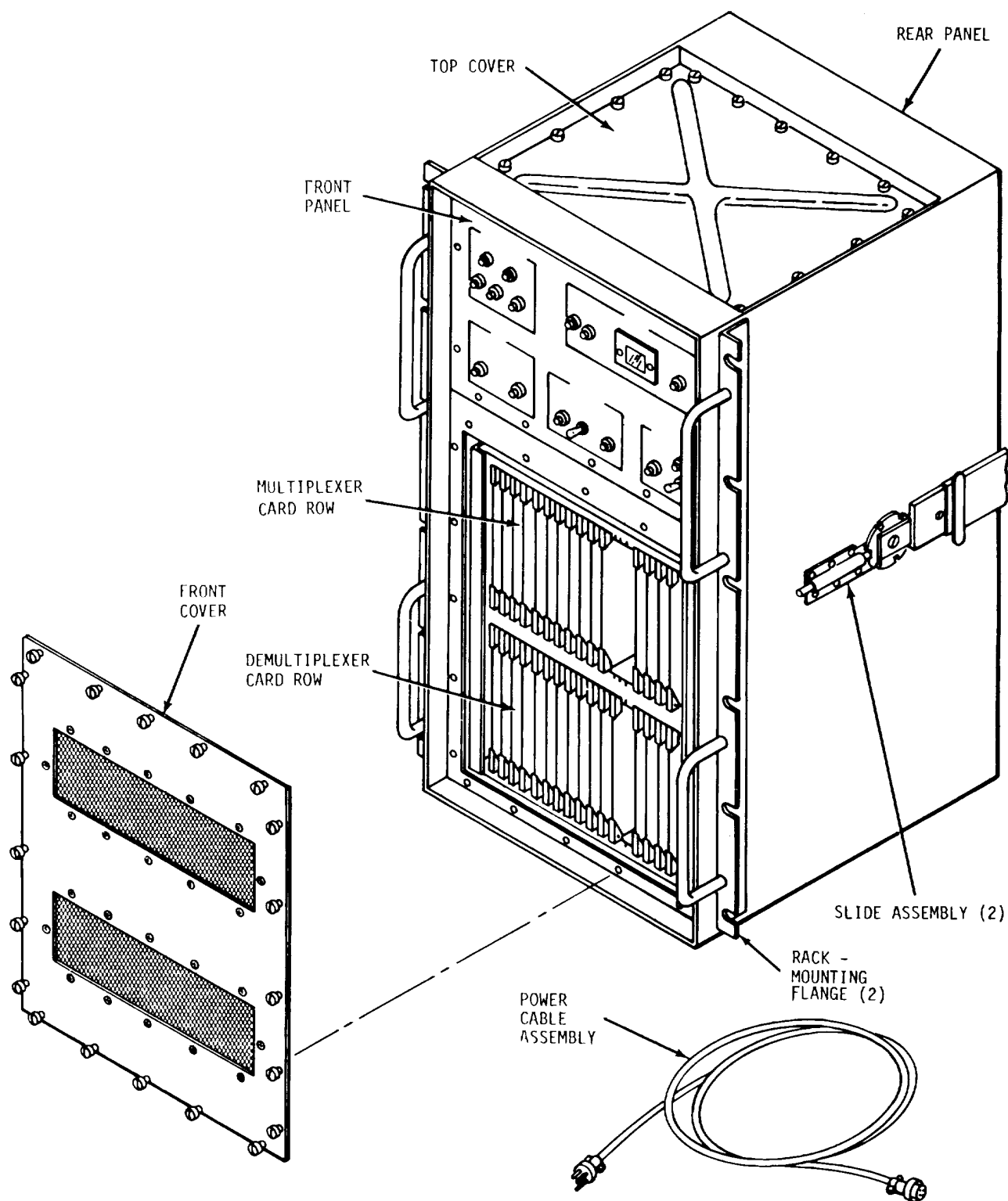
a. Voice data and digital data, supplied with and without timing, can be processed and multiplexed in the multiplexer set by the use of optional plug-in cards.

b. Automatic diagnostic circuits in the multiplexer set provide visual indications of error conditions and their probable causes. The diagnostic circuits also produce associated electrical alarm signals that can be transmitted to a remote facility for monitoring purposes.

c. The multiplexer set acquires frame synchronization and maintains bit count integrity on all channels while accepting input data whose bit rates can vary within prescribed limits. Also, the multiplexer set automatically determines when an out-of-frame (synchronization) condition exists in the data message. When in an out-of-frame condition, the equipment automatically and continuously attempts to reacquire frame synchronization. The reacquisition of frame synchronization is automatically accomplished when the cause of an out-of-frame condition is removed.

d. In the multiplexer, the overhead data required for the proper operation of the far-end demultiplexer are automatically generated and transmitted in the multiplexer high-speed digital stream output. The demultiplexer, in turn, automatically decodes and uses the overhead data to maintain bit count integrity.

1-4. As shown in figure 1-1, the multiplexer set is contained in a ruggedized aluminum chassis that is suitable for mounting in a standard relay rack. When the unit is rack mounted, slide assemblies on each side of the chassis allow it to be extended from the rack for maintenance purposes. When fully extended on the slides, the chassis can be tilted up or down and locked in position at an angle of 45° or 90°. The functional circuits, less the power supply, in the



6186-79

Figure 1-1. AN/GSC-24 (V) Multiplexer SET

multiplexer set are mounted on plug-in printed circuit cards that are accessible from the front of the equipment (figures 1-2 and 1-3). The power supply (figure 1-4) is a removable assembly that is mounted in the top of the multiplexer set. All interconnecting cables associated with the multiplexer set are connected to receptacles on the rear of the chassis.

1-5. The printed circuit cards in the MULTIPLEXER (upper) row (figure 1-2) comprise the multiplexer; the printed circuit cards in the DEMULTIPLEXER (bottom) row comprise the demultiplexer. The one exception is the display card in the upper row, which is common to both the multiplexer and the demultiplexer. Within the multiplexer and the demultiplexer, the cards are further designated as common cards or channel cards. The quantity and types of common cards are fixed, whereas the quantity and types of channels cards are determined by system application. The common cards generate the timing and control signals for the multiplexing and demultiplexing functions. The channel cards provide the input and output interface between the applied channel data and the common processing electronics. Information on the quantity and types of printed circuit cards associated with the multiplexer set is contained in paragraph 1-11.

1-6. LEADING PARTICULARS.

1-7. Leading particulars of the multiplexer set are listed in table 1-1.

1-8. CAPABILITIES AND LIMITATIONS.

1-9. Physical and electrical capabilities and limitations of the multiplexer set are listed in tables 1-2 and 1-3.

1-10. EQUIPMENT SUPPLIED.

1-11. The equipment supplied is listed in table 1-4 and shown in figure 1-1. The plug-in printed circuit cards used in the multiplexer and the plug-in printed circuit cards used in the demultiplexer are listed in separate groups. Three cards (seq, OEG, and GC/ DM) are common to the multiplexer and the demultiplexer, and are therefore listed twice. The single display card is associated with the demultiplexer and the multiplexer. The quantity of each of the three channel cards in the multiplexer is marked AR (as required) the quantity of each of the four channel cards in the demultiplexer is also marked AR. The quantity and types of channel cards installed in a multiplexer set depend on system application. The maximum number of multiplexer or demultiplexer channel cards used in a given system application is 15.

1-12. RELATED TECHNICAL MANUALS.

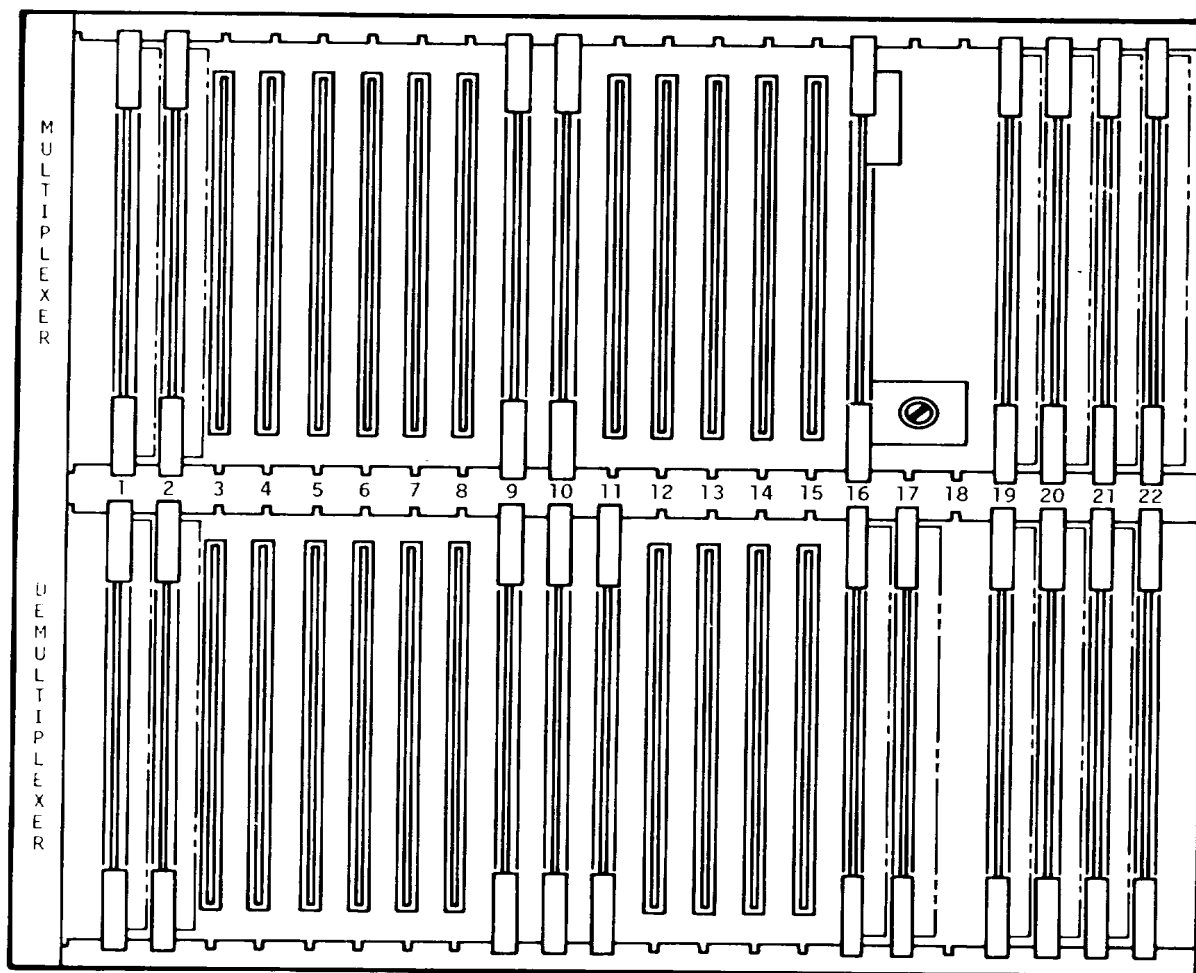
1-13. Technical manuals related to the multiplexer set are listed in table 1-5.

1-14. SPECIAL TOOLS.

1-15. The special tools required for maintenance of the multiplexer set are listed in table 1-6.

1-16. TEST EQUIPMENT.

1-17. The test equipment required for maintenance of the multiplexer set is listed in table 1-7.



MULTIPLEXER LOCATIONS:

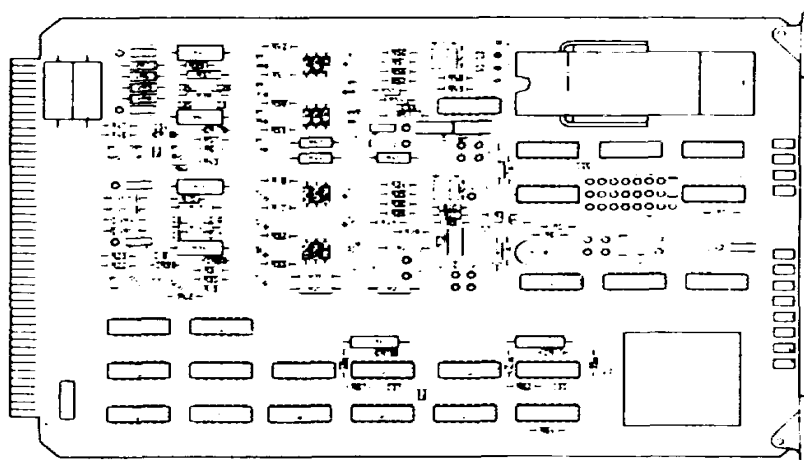
1 THRU 15	CHANNEL CARDS	} COMMON CARDS
16	RT CARD	
17, 18	NOT USED	
19	OEG CARD	
20	GC/DM CARD	
21	SEQ CARD	
22	DISPLAY CARD	

DEMUTIPLEXER LOCATIONS:

1 THRU 15	CHANNEL CARDS	} COMMON CARDS
16	FS CARD	
17	ERD CARD	
18	NOT USED	
19	OEG CARD	
20	GC/DM CARD	
21	SEQ CARD	
22	EXTENDER CARD	

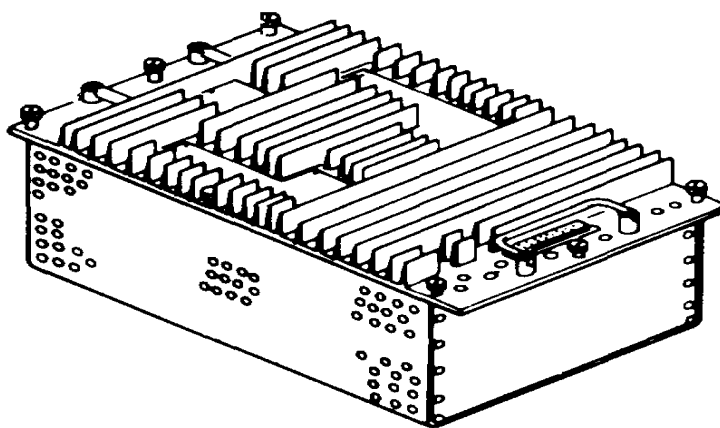
6186-124

Figure 1-2. Printed Circuit Card - Location View



6186-75

Figure 1-3. Typical Printed Circuit Board - Physical View



6186-74

Figure 1-4. Power Supply - Physical View