DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL

MAINTENANCE MANUAL

TEST SETS, TELETYPEWRITER

AN/GGM-1, AN/GGM-2, AN/GGM-3,

AN/GGM-4, AND AN/GGM-5

This copy is a reprint which includes current pages from Changes 1 and 3 through 8

HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1961

Changes in force: C 1, C 3, C 4, C 5, C 6, C 7, and C 8

CHANGE No. 8

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *6 May 1974*

Organizational Maintenance Manual
Including Repair Parts List
TEST SETS, TELETYPEWRITER AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, AND AN/GGM-5

TM 11-6625422-12, 6 October 1961, is changed as follows:

The title is changed to read as shown above.

Page 3, paragraph 2. Delete paragraph 2 and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD, Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP PUB 378/AFR 71-4/ and MCO P4030.29.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33/AFM 75-18/MCO P4610.19A, and DSAR 4500.15.

2.1. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-C, Fort Monmouth, NJ 07703.

Page 5, paragraph 5. Delete paragraph 5 and substitute:

5. Items Comprising an Operable Equipment

FSN	*QTY*	*Nomenclature, part No., and mfr code*	*Usable on code*	*Dimensions (in.)*			*Weight (lb)*
				Height	*Depth*	*Width*	

NOTE

In the Usable on code column, number 1 refers to items comprising an operable AN/G.GM-1; number 2 refers to items comprising an operable AN/GGM-2; number 3 refers to items comprising an operable AN/GGM-3; number 4 refers to items comprising an operable AN/GGM-4; number 5 refers to items comprising an operable AN/GGM-5.

FSN	Qty	Nomenclature, Part No., and Mfr Code	Usable on code	Dimensions (in) Height	Width	Depth	Weight (lb)
6625-893-1725		Test Set, Teletypewriter AN/GGM-1		19	20	19	97
6625-893-1726		Test Set, Teletypewriter AN/GGM-2		57	29	25	189
6625-893-1727		Test Set, Teletypewriter AN/GGM-3		19	20	19	91
6625-893-1728		Test Set, Teletypewriter AN/GGM-4		12 1/4	20	19	68
6625-893-1735		Test Set, Teletypewriter AN,GGM-5		12 1/4	20	19	55

NOTE

The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42, and used to identify manufacturer, distributor, or Government agency, etc.

FSN	Qty	Nomenclature, Part No., and Mfr Code	Usable on code	Dimensions (in) Height	Width	Depth	Weight (lb)
6625-061-2040	1	Cable Assembly, Special Purpose, Electrical: CX-8411/GGM; 80058	1,2,3,4,5				
6625-061-2041	1	Cable Assembly, Special Purpose, Electrical: CX-8412/GGM; 80058	1,2,3,4,5				
5995-086-7300	1	Cable Assembly, Special Purpose, Electrical: CX-8413/GGM; 80058	1,2,3,4,5				
6150-889-0872	1	Cable Assembly, Special Purpose, Electrical: CX-8414GGM-2; 80058	2				
5995-889-0866	1	Cable Assembly, Special Purpose, Electrical: 8415/GGM-2; 80058	2	5 1/4	19	8	12
				5 1/4	19	8	12
6625-893-1733	1	Cart, Teletypewriter Test Set: D10010; 96238	2				
6625-893-1730	1	Generator, Test Pattern SG-431/GGM: 80058	1, 3				
6625-893-1731		Generator Time Base SG430(P)/GM: 80058 (Not issued with equipment, to be re-quisitioned by used)	1,3,4,5	12 1/4	19	8	28
				9 3/4	7	8	14
				12 1/4	19 1/4	19	12
6625-893-1732	1	Oscilloscope OS-119/GGM; 80058	1,3,4				
6625-893-1734	1	Power Supply PP-2971/GGM: 80058	1,3,4,5	12 ¼	19 1/4	19	11
6625-573-3875	1	Rack, Shelf Adapter: RS-1A/DAC-V; 96238	1,3,4				
6625-573-3873	1	Rack, Shelf Adapter: RS-1B/DAC-V; 96238	5	6 1/2	19 1/4	19	7
6625-573-3871	1	Rack, Shelf Adapter: RS-2A/DAC-V; 96238	1	6 1/2	19 1/4	19	10
6625-573-3872	1	Rack, Shelf Adapter: RS-2B/DAC-V; 96238	3				
6625-893-1729	1	Test Set, Teletypewriter TS1512/GGM: 80058	1,3,4,5	12 ¼	11 ½	8	15

Page 68, paragraph 51.2. Delete "App. II and" in line 1 of the Reference column.

Page 100. Delete appendix II.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

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MICOM (1)
TECOM (2)
HISA (18)
ARADCOM (2)
ARADCOM Rgn (1)
OS Maj Comd (2)
USACC (2)
USACC-ONUS (5)
Armies (1)
Ft Huachuca (5)
Ft Carson (5)
Ft Richardson (ECOM Ofc) (1)
WSMR (1)

USASESS (10)
Svc Colleges (1)
AD (1) except
- SAAD (30)
- TOAD (14)
- LBAD (10)
- ATAD (10)

USA Dep (1)
Sig Sec USA Dep (2)
Sig Dep (2)
USAERDAA (1)
USAERDAW (1)
Sig FLDMS (1)
Units org under fol TOE: I e!
- 11-97
- 11-98
- 11-117
- 11-500(AA-AC)
- 29-134
- 29-136

ARNG & USAR: None.
For explanation of abbreviations used, see AR 310-50.

Changes in force: C 1, C 3, C 4, C 5, C 6, and C7

CHANGE
No. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 July 1967*

Organizational Maintenance Manual

Including Repair Parts List

TEST SETS, TELETYPEWRITER AN/GGM-1, AN/GGM-2, AN/GGM-3,

AN/GGM-4, AND AN/GGM-5

TM 11-6625-422-12, 6 October 1961 is changed as follows:

The title of this manual is changed as shown above.

Note

The parenthetical reference to a previous change (example: page 1 of C 6) indicates that pertinent material was published in that change.

Page 3. Make the following changes:

Paragraph 1.1 (page 1 of C 3). Delete paragraph 1.1 and substitute:

1.1. Indexes of Equipment Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new additions, changes, or additional publications pertaining to the equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 7, 8, and 9), supply bulletins, and lubrication orders available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are Modification Work Orders (MWO's) pertaining to the equipment. DA Pam 310-7 lists all authorized Department of the Army modification work orders, identifying the type, model, series, and Federal stock number of the item to be modified; number, date, and classification of the MWO; categories of maintenance authorized to perform the modification; and the man hours required to apply the modification to each item.

Paragraph 2 (page 1 of C 6). Delete subparagraph c and substitute:

c. Reporting of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publication) and forwarded direct to: Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MRNMP-AD, Fort Monmouth, N.J., 07703.

Page 5, paragraph 5 (page 1 of C 3). Delete subparagraph a and substitute:

a. The components of the AN/GGM-(*) are listed in appendix II.

Page 7, paragraph 7a, line 2 (page 1 of C 5). Delete "paragraph 5a" and substitute: Appendix II.

Page 68, paragraph 51.2 (chart) (page 2 of C 4). Change "App. III" to App II.

Page 100, appendix I (page 4 of C 4). Make the following changes:

Delete all reference to "AR 40-580" and "DA Pam 310-21". Add the following:

DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.

***This change supersedes C 2, 10 January 1963.**

SB 11-573 Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.

Change the following titles:

"DA Pam 108-1" Index of Army Films, Transparencies,G T A, Charts, and Recordings.

"DA Pam 810-4" Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.

“FM 21-5” Military Training Management.

“TM 38_750” Army Equipment Record Procedures.

Appendix II (page 3 of C 6). Delete appendix II and substitute:

APPENDIX II

BASIC ISSUE ITEMS

Section I. INTRODUCTION

1. General

This appendix lists items for Test Sets, Teletypewriter AN/GGM-1, AN/GGM-2, AN/ GGM-3, AN/GGM-4, and AN/GGM-5, the component items comprising it, and the items which accompany it, or are required for installation, operation, or operator's maintenance.

2. Explanation of Columns

An explanation of the columns in sections II, III, IV, V, and VI is given below.

a. Source, Maintenance, and Recoverability Codes, Column 1.

(1) *Source code, column 1a*. The selection status and source for the listed item is noted here. The source code used is:

Code	*Explanation*
P	Applies to repair parts which are stocked in or supplied from the GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.

(2) *Maintenance code, column 1b*. The lowest category of maintenance authorized to install the listed item is noted here. The maintenance code used is as follows:

Code	*Explanation*
C	Operator/Crew

(3) *Recoverability code, column 1c*. The information in this column indicates whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

***Note*.**
When no code is indicated in the recoverability column, the part will be considered expendable.

Code	*Explanation*
R	Applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, a five-digit manufacturer's code, and a part number are included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g. ea, pr, ft, yd, etc.) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. The total quantity of the item used in the equipment is given in this column.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column. Items to be requisitioned as required are indicated by an asterisk (*).

h. Illustration, Column 8.

(1) *Figure number, column 8a*. The number of the illustration in which the item is shown in this manual is indicated in this column.

(2) *Item or symbol number, column 8b*. The callout number used to reference the item in the illustration appears in this column.

3. Federal Supply Codes

This paragraph lists the Federal supply code with the associated manufacturer's name.

Code	*Manufacturer' name*
00656	Aerovox Corp.
04773	Automatic Electric Co.
08806	General Electric Co. Miniature Lamp Dept.
73445	Amperex Electronic Corp.
80058	Joint Electronic Type Designation System
80063	Army Electronics Command
80131	Electronic Industries Association
81349	Military Specifications
82376	Astron Corp.
96238	Stelma, Inc.

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
	C	R	6625-893-1725							TEST SET, TELETYPEWRITER AN/GGM-1: 80058 (This item is nonexpendable.)	ea				1	
										TECHNICAL MANUAL TM 11-6625-422-12 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facilities. NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply central through AG channels.	ea			1		
	C		6625-061-2040							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8411/GGM; 80058 (This item is nonexpendable.)	ea		1	1		
	C		6625-061-2041							CABLE ASSEMBLY. SPECIAL PURPOSE, ELECTRICAL: CX-8412/GGM; 80058; (This item is nonexpendable.)	ea		1	1		
	C		5995-086-7300							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8413/GGM; 80058 (This item is nonexpendable.)	ea		1	1		
P	C		5910-889-4363							CAPACITOR, FIXED, ELECTROLYTIC: 82376; EYT12251	ea		1	1	7	C31
P	C		5910-865-3009							CAPACITOR, FIXED, ELECTROLYTIC: 00656; AFH3-29-95	ea		1	1	7	C29
P	C		5910-060-6708							CAPACITOR, FIXED, ELECTROLYTIC: 82376; EYT1220	ea		1	1	7	C30
P	C		5960-503-4880							ELECTRON TUBE: 81349; OA2WA	ea		1	1	38	V17
P	C		5960-262-3763							ELECTRON TUBE: 81349; OB2WA	ea		3	1	38	V16,V18,V19
P	C		5960-272-8553							ELECTRON TUBE: 80131; 1X2B	ea		1	1	38	V15
P	C		5960-681-9802							ELECTRON TUBE: 81349; 6AU6WB	ea		1		38	V9
P	C		5960-715-3894							ELECTRON TUBE: 73445; 6DJ8	ea		2	1	38	V3, V8

(1) (A) SOURCE CODE	(1) (B) MAINT CODE	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/CCM-1 (continued)						
P	C		5960-669-8921							ELECTRON TUBE: 80131; 12BH7A	ea		2	1	38	V6, V11
P	C		5960-262-0210							ELECTRON TUBE: 81349; 5814A	ea		2	1	38	V5, V10
P	C		5960-669-6838							ELECTRON TUBE: 81349; 5963	ea		4	2	38	V1,V2,V4,V7
P	C		5960-855-2875							ELECTRON TUBES, MATCED: C/o 1 each GV3A, 1 each GV6A; 96238; A6473	ea		1	1	38	V14
P	C		5920-296-0451							FUSE, CARTRIDGE: 81349; FO2A250V1-8A	ea		9	10	16	F1, F2, F4
															13	F2, F3
															29	F1, F2
															8	F2, F4
P	C		5920-280-5031							FUSE, CARTRIDGE: 81349; F02GR250A	ea		1	5	8	F3
P	C		5920-280-4465							FUSE, CARTRIDGE: 81349; F02A250V1AS	ea		3	10	16	F3
															13	F1
															8	F1
P	C		5920-284-6785							FUSE, CARTRIDGE: 81349; F02D2ROOB	ea		1	5	10	F1
P	C		5920-060-2424							FUSE, CARTRIDGE: 81349; F02A250V5AS	ea		2	3	29	F3, F4
	C	R	6625-893-1730							GENERATOR, TEST PATTERN SG-431/GGM: 80058; (installed in equipment) (This item is nonexpendable.)	ea		1	1	1	
	C	R	6625-893-1731							GENERATOR, TIME BASE SG-430(P)/GGM: 80058 (installed in equipmert)(This item is nonexpendable.)	ea		1	1	1	
P	C		6240-020-5730							LAMP, CARTRIDGE: 96283; 9520	ea		13	4	34	DS-1 thru DS-7 DS-10 thru DS-14
P	C		6240-887-4770							LAMP, CARTRIDGE: Marked Var; 96238; B9520/VAR	ea		1	1	34	DS-8 (Var)

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(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-1 (continued)						
P	C		6240-892-4420							LAMP, GLOW: 08806; NE2D	ea		5	1	27 34 26	DS1 (Signal) DS15 (Alarm) DS2, DS3, DS4 (Signal) (Early) (Late)
P	C		6240-722-6467							LAMP, INCANDESCENT: 80063; SM-B-369238	ea		2	1	27 26	DS2 (Power) DS1 (Power)
P	C		6240-683-0560							LAMP, INCANDESCENT: 08806; 345	ea		1	1	33	DS5 (Power)
	C	R	6625-893-1732							OSCILLOSCOPE OS-119/GGM: 80058 (Installed in equipment)	ea		1	1	1	
	C	R	6625-893-1734							POWER SUPPLY PP-2971/GGM: 80058 (Installed in equipment)	ea		1	1	1	
	C		6625-573-3875							RACK, SHELF ADAPTER: 96238; RS-1A/DAC-V (Installed in equipment) (This item is nonexpendable.)	ea		1	1	1	
	C		6625-573-3871							RACK, SHELF ADAPTER: 96238; RS-2A/DAC-V (Installed in equipment) (This item is nonexpendable.)	ea		1	1	1	
P	C		5945-542-7058							RELAY, ARMATURE: 8 pin; 80063; SM-D-349110-3	ea		1	1	12	K1
P	C		5945-088-1621							RELAY, ARMATURE: 11 pin; 04773; 202PTW (NOTE: Can be requisitioned if required; see pages 19, 23, 36 of TM 11-6625-422-12.)	ea		1	1	12, 23	
	C		6625-893-1729							TEST SET, TEL PEWRITER TS-1512/GGM (Installed in equipment) (This item is nonexpendable.)	ea		1	1	1	
										NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
	C	R	6625-893-1726							TEST SET, TELETYPEWRITER AN/CGM-2: 80058 (This item nonexpendable.)	ea				2	
										TECHNICAL MANUAL TM 11-6625-422-12 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facilities. NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply central through AG channels.	ea			1		
	C		6625-061-2040							CABLE ASSEMBLY, SPECIAL PURPOSE ELECTRICAL: CX-8411/GGM; 80058 (This item is nonexpendable.)	ea		1	1		
	C		6625-061-2041							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8412/GGM; 80058 (This item is nonexpendable.)	ea		1	1		
	C		5995-086-7300							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8413/GGM; 80058 (This item is nonexpendable.)	ea		1	1		
	C		5995-889-0872							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8414/GGM-2; 80058 (This item is nonexpendable.)	ea		1	1		
	C		5995-889-0866							CABLE ASSEMBLY, SPECIAL PURPOSE, EIECTRICAL: CX-8415/GGM-2; 80058 (This item is nonexpendable.)	ea		1	1		
P	C		5910-889-4363							CAPACITOR, FIXED), ELECTROLYTIC: 82376; Errl2251	ea		1	1	7	C31
P	C		5910-865-3009							CAPACITOR, FIXED, ELECTROLYTIC: 00656; AFH3-29-95	ea		1	1	7	C29
P	C		5910-060-6708							CAPACITOR, FIXED, ELECTEOLYTIC: 82376; EYT1220	ea		1	1	7	C30
P	C		6625-893-1733							CART, TELETYPEWRITER TEST SET: 96238; D10010 (This item is nonexpendable.)	ea		1	1	2	

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(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-2 (continued)						
P	C		5960-503-4880							ELECTRON TUBE: 81349; OA2WA	ea		1	1	38	V17
P	C		5960-262-3763							ELECTRON TUBE: 81349; OB2WA	ea		3	1	38	V16,V18,V19
P	C		5960-272-8553							ELECTRON TUBE: 80131; 1X2B	ea		1	1	38	V15
P	C		5960-681-9802							ELECTRON TUBE: 81349; 6AU6WB	ea		1	1	38	V9
P	C		5960-715-3894							ELECTRON TUBE: 73445; 6DJ8	ea		2	1		
P	C		5960-669-8921							ELECTRON TUBE: 80131; 12BH7A	ea		2	1	38	V6, VII
P	C		5960-262-0210							ELECTRON TUBE: 81349; 5814A	ea		2	1	38	V5, V10
P	C		5960-669-6838							ELECTRON TUBE: 81349; 5963	ea		4	2	38	VI,V2,V4,V7
P	C		5960-855-2875							ELECTRON TUBES, MATCHED: C/o 1 each GV3A, 1 each GV6A; 96238; A6473	ea		1	1	38	V14
P	C		5920-296-0451							FUSE, CARTRIDGE: 81349; F02A250V1-8A	ea		9	10	16	F1 thru F4
P	C		5920-280-5031							FUSE, CARTRIDGE: 81349; F02GR250A	ea		1	5	8	F3
P	C		5920-280-4465							FUSE, CARTRIDGE: 81349; F02A250V1AS	ea		3	10	16	F3
														13	F1	
														8	F1	
P	C		5920-284-6785							FUSE, CARTRIDGE: 81349; F02D2ROOB	ea		1	5	10	F1
P	C		5920-060-2424							FUSE, CARTRIDGE: 81349; F02A25OV5AS	ea		2	3	29	F3, F4
P	C		6240-020-5730							LAMP, CARTRIDGE: 96238; 9520	ea		13	4	34	DS-1 thru DS-7, DS-PO thru DS-14
P	C		6240-887-4770							LAMP, CARTRIDGE: Marked Var; 96238; B9520/VAR	ea		1	1	34	DS-8 (Var)

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-2 (continued)						
P	C		6240-892-4420							LAMP, GLOW: 08806; NE2D	ea		5	1	27 34 26	DS1 (Signal) DS15 (Alarm) DS2, DS3, DS4 (Signal) (Early) (Late)
P	C		6240-722-6467							LAMP, INCANDESCENT: 80063; SM-B-369238	ea		2	1	27	DS2 (Power) DS1 (Power)
P	C		6240-683-0560							LAMP, INCANDESCENT: 08806; 345	ea		1	1	3	DS-5 (Power)
P	C		5945-542-7058							RELAY, ARMATURE: 8 pin; 80063; SM-D-349110-3	ea		1	1	12	K1
P	C		5945-088-1621							RELAY, ARMATURE: 11 pin; 04773; 202PTW (NOTE: Can be requisitioned if required; see pages 19, 23, 36 of TM 11-6625-422-12.)	ea			*	12, 23	
										NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

SECTION IV. BASIC ISSUE ITEMS LIST (AN/GGM-3)

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	(3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
C	R		6625-893-1727							TEST SET, TELETYPEWRITER AN/G9G-3: 80058 (This item is nonexpendable.)	ea			1	3	
										TECHNICAL MANUAL TM 11-6625-422-12 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facilities. NOTE: For technical manuals the quantity indicated the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply central through AG channels.	ea			1		
	C		6625-061-2040							CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL: CX-8411/GGCK 80058 (This item is nonexpendable.)	ea		1	1		
	C		6625-061-2041							CABLE ASSEMBLY SPECIAL FRPOSE ELECTRICAL: CX-8412/GGM 80058 (This item is nonexpendable.)	ea		1	1		
	C		5995-086-7300							CABLE ASSEMBLY, SPECIAL PURPOSE ELECTRICAL: CX-8413/GGM 80058 (This item is nonexpendable.)	ea		1	1		
P	C		5910-889-4363							CAPACITOR, FIXED, ELECTROLYTIC: 82376; EYT12251	ea		1	1	7	C31
P	C		5910-865-3009							CAPACITOR, FIXED, ELECTROLYTIC: 00656; AFH3-29-95	ea		1	1	7	C29
P	C		5910-060-6708							CAPACITOR, FIXED, ELECTROLYTIC: 82376; EYT1220	ea		1	1	7	C30
P	C		5960-503-4880							ELECTRON TUBE: 81349; OA2WA	ea		1	1	38	V17
P	C		5960-262-3763							ELECTRON TUBE: 81349; OB2WA	ea		3	1	38	V16,V18,V19
P	C		5960-272-8553							ELECTRON TUBE: 80131; 1X2B	ea		1	1	38	V15
P	C		5960-681-9802							ELECTRON TUBE: 81349; 6AU6WB	ea		1	1	38	V9
P	C		5960-715-3894							ELECTRON TUBE: 73445; 6DJ8	ea		2	1	38	V3, V8

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-3 (continued)						
P	C		5960-669-8921							ELECTRON TUBE: 80131; 12BH7A	ea		2	1	38	V6, V11
P	C		5960-262-0210							ELECTRON TUBE: 81349; 5814A	ea		2	1	38	V5, V10
P	C		5960-669-6838							ELECTRON TUBE: 81349; 5963	ea		4	2	38	V1, V2, V4, V7
P	C		5960-855-2875							ELECTRON TUBES, MATCHED: C/o 1 each GV3A, 1 each GV6A; 96283; A6473	ea		1	1	38	V14
P	C		5920-296-0451							FUSE, CARTRIDGE: 81349; FO2A250Vi-8A	ea		8	10	16	F1, F2, F4
															29	F1, F2
															8	F2, F4
															23	F1
P	C		5920-280-5031							FUSE, CARTRIDGE: 81349; FO2GR250A	ea		1	5	8	F3
P	C		5920-280-4465							FUSE, CARTRIDGE: 81349; F02A250VIAS	ea		2	5	16	F3
															8	F1
P	C		5920-284-6785							FUSE, CARTRIDGE: 81349; FO2D2ROOB	ea		1	5	10	F1
P	C		5920-060-2424							FUSE, CARTRIDGE: 81349; F02A250V5AS	ea		2	5	29	F3, F4
	C	R	6625-893-1730							GENERATOR, TEST PATTERN SG-431/GGC: 80058 (Installed in equipment.)	ea		1	1	3	
	C	R	6625-893-1731							GENERATOR TIME BASE SG-430(P)/GGM: 80058 (NOTE: Can be requisitioned if required see page 23 of TM 11-6625-422-12.)	ea			*	3, 11	
P	C		6620-892-4420							LAMP, GLOW: 08806; NE2D	ea		3	1	27	DS-1 (Signal)
															26	DS-2, DS-3, DS-4 (Signal) (Early) (Late)
P	C		6240-722-6467							LAMP, INCANDESCENT: 80063; SM-B-369238	ea		2	1	27	DS-2 (Power)
															26	DS-1 (Power)
P	C		6240-683-0560							LAMP, INCANDESCENT: 08806; 345	ea		1	1	33	DS-5 (Power)

BASIC ISSUE ITEMS LIST

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	(3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-3 (continued)						
	C	R	6625-893-1732							OSCILLOSCOPE OS-119/G2GM: 80058 (Installed in equipment.)	ea		1	1	3	
	C	R	6625-893-1734							POWER SUPPLY PP-2971/GGM: 80058 (Installed in equipment.) (This item is nonexpendable.)	ea		1	1	3	
	C		6625-573-3875							RACK, SHELF ADAPTER: 96238; RS-1A/DAC-V (Installed in equipment.) (This item is nonexpendable.)	ea		1	1	3	
	C		6625-573-3872							RACK, SHELF ADAPTER: 96238; RS-2B/DAC-V (Installed in equipment.) (This item is nonexpendable.)	ea		1	1	3	
P	C		5945-542-7058							RELAY, ARMATURE: 8 pin; 80063; SM-D-349110-3	ea		1	1	23	K1
P	C		5945-088-1621							RELAY, ARMATURE: 11 pin; 04773; 202PTW (NOTE: Can be requisitioned if required; see pages 19, 23, 36 of TM 11-6625-422-12.)	ea			*	12, 23	
	C	R	6625-893-1729							TEST SET, TELETYPEWRITER TS-1512/GGM: 80058 (Installed in equipment.)	ea		1	1	3	
										NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
	C	R	6625-893-1728							TEST SET, TELETYPEWRITER AN/GCM-4: 80058 (This item is nonexpendable.)	ea			1	4	
										TECHNICAL MANUAL TM 11-6625-422-12 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facilities. NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a mall are., the quantity on hand may be reduced t0 practical 11,vels Excess publications must be returned to publication supply central through AG channels.	ea			1	1	
	C		6625-061-2040							CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL CX-8411/GGM: 80058; (This item is nonexpendable.)	ea		1	1		
	C		6625-061-2041							CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL CX-8412/GGM 80058 (This item is nonexpendable.)	ea		1	1		
	C		5995-086-'7300							CABLE ASSEMBLY, SPECIAL PURPOSE ELECTRICAL CX-8413/GGM: 80058 (This item is nonexpendable.)	ea		1	1		
P	C		5910-889-4363							CAPACITOR, FIXED, ELECTROLYTIC: 82376; EYT12251	ea		1	1	7	C31
P	C		5910-865-3009							CAPACITOR, FIXED, ELECTROLYTIC: 00656; AFH3-29-95	ea		1	1	7	C29
P	C		5910-050-6708							CAPACITOR, FIXED, ELECTROLYTIC: 82376; EYT1220	ea		1	1	7	C30
P	C		5960-503-4880							ELECTRON TUBE: 81349; OA2WA	ea		1	1	38	V17
P	C		5960-262-3763							ELECTRON TUBE: 81349; OB2WA	ea		3	1	38	V16,V18,V19
P	C		5960-272-8553							ELECTRON TUBE: 80131; 1X2B	ea		1	1	38	V15
P	C		5960-681-9802							ELECTRON TUBE: 81349; 6AU6WB	ea		1	1	38	V9
P	C		5960-715-3894							ELECTRON TUBE: 73445; 6DJ8	ea		2	1	38	V3, V8

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AS/GGM-4 (continued)						
P	C		5960-669-8921							ELECTRON TUBE: 80131; 12BH7A	ea		2	1	38	V6, V11
P	C		5960-262-0210							ELECTRON TUBE: 81349; 5814A	ea		2	1	38	V5, V10
P	C		5960-669-6838							ELECTRON TUBE: 81349; 5963	ea		4	2	38	V1,V2,V4,V7
P	C		5960-855-2875							ELECTRON TUBES, HATCHED: C/O 1 each GV3A, 1 each GV6A, 96238; A6473	ea		1	1	38	V14
P	C		5920-296-0451							FUSE, CARTRIDGE: 81349; F02A250V1-8A	ea		4	10	29 8	F1, F2 F2, F4
P	C		5920-280-5031							FUSE, CARTRIDGE: 81349; F02GR250A	ea		1	5	8	P3
P	C		5920-280-4465							FUSE, CARTRIDGE: 81349; F02A250V1AS	ea		1	5	8	F1
P	C		5920-284-6785							FUSE, CARTRIDGE: 81349; F02D2ROOB	ea		1	5	10	F1
P	C		5920-060-2424							FUSE, CARTRIDGE: 81349; F02A250V5AS	ea		2	5	29	F3, F4
	C	R	6625-893-1731							GENERATOR TIME BASE SG-430(P)/G(GGM: 80058 (NOTE: Can be requisitioned if required see page 23 of TM 11-6625-422-12.)	ea			*	3, 11	
P	C		6620-892-4420							LAMP, GLOW: 08806; NE2D	ea		3	1	27 26	DS-1 (Signal) DS-2, DS-3, DS-4 (Signal) (Early)
P	C		6240-722-6467							LAMP, INCANDESCENT: 80063; SM-B-369238	ea		1	1	26	DS-1 (Power)
P	C		6240-683-0560							LAMP, INCANDESCENT: 08806; 345	ea		1	1	33	DS-5 (Power)
	C	R	6625-893-1732							OSCILLOSCOPE OS-119/GGM: 80058 (Installed in equipment)	ea		1	1	4	
	C	R	6625-893-1734							POWER SUPPLY PP-2971/GGKC: 80058 (Installed in equipment.)	ea		1	1	4	

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-4 (continued)						
	C		6625-573-3875							RACK, SHELF ADAPTER: 96238; RS-1A/DAC-V (Installed in equipment.)	ea		1	1	23	
P	C		5945-542-7058							RELAY, PR]5TIJRE: 8 pin; 80063; SM-D-349L10-3	ea		1	1	23	K1
P	C		5945-088-1621							RELAY, ARMATURE: 11 pin; 04773; 202PTW .(NOTE: Can be requisitioned if required; see pages 19, 23, 36 of TM 11-6625-422-12.)	ea			*	12, 23	
	C	R	6625-893-1729							TEST SET, TELETYPEWRITER TS-1512/GGM: 80058 (Installed in equipment.)	ea		1	1	4	
										NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
	C	R	6625-893-1735							TEST SET, TELETYPEWRITER AN/GGM-5: 80058 (This item is nonexpendable.)	ea			1	5	
										TECHNICAL MAIUAL TM 11-6625-422-12 Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facilities. NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply central through AG channels.	ea			1		
	C		6625-061-2040							CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL CX-8411/GGM: 80058 (This item is nonexpendable.)	ea		1	1		
	C		6625-061-2041							CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL CX-8412/GGM: 80058 (This item is nonexpendable.)	ea		1	1		
	C		5995-086-7300							CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL CX-8413/GGC: 80058 (This item is nonexpendable.)	ea		1	1		
P	C		5920-296-0451							EUSE, CARTRIDGE: 81349; F02A250V1-8A	ea		6	10		Fl, F2, F4
P	C		5920-280-5031							FUSE, CARTRIDGE: 81349; F02GR250A	ea		2	5	8	F3
P	C		5920-280-4465							FUSE, CARTRIDGE: 81349; FO2A250VIAS	ea		2	5	8	F1
P	C		5920-060-2424							FUSE, CARTRIDGE: 81349; FOZA25OV5AS	ea		2	5	29	F3, F4
	C	R	6625-893-1731							GENERATOR TIME BASE SG-430(P)/GGM: 80058 (NOTE: Can be requisitioned if required see page 23 of TM 11-6625-422-12.)	ea			*	3, 11	
P	C		6620-892-4420							LAMP, GLOW: 08806; NE2D	ea		6	2	26	DS-2,DS-3,DS-4 (Signal) (Early) (Late)

(1) (A) SOURCE CD	(1) (B) MAINT DC	(1) (C) REC CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	BASIC ISSUE ITEMS LIST (3) DESCRIPTION	(4) UNIT OF ISSUE UN PK	(5) QTY INC IN UNIT	(6) QTY INC IN	(7) QTY. AUTH	(8) ILLUSTRATIONS (A) FIG. NO.	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NO.
										AN/GGM-5 (continued)						
P	C		6240-722-6467							LAMP, INCANDESCENT: 80063; SM-B-369238	ea		2	1		DS-1 (Power)
	C	R	6625-893-1734							POWER SUPPLY PP-2971/GGM: 80058 (Installed in equipment.)	ea		1	1	17	
	C		6625-573-3873							RACK, SHELF ADAPTER: 96238; RS-1B/DAC-V (This item is nonexpendable.)	ea		1	1		
P	C		5945-542-7058							REIAY, ARMATURE: 8 pin; 80063; SM-D-349110-3	ea		1	1	23	K1
P	C		5945-088-1621							RELAY, ARMATURE: 11 pin; 04773; 202PTW (NOTE: Can be requisitioned if required; see pages 19, 23, 36 of TM 11-6625-422-12.)	ea			*	12, 23	
	C	R	6625-893-1729							TEST SET, TELETYPEWRITER TS-1512/GGM: 80058 (Installed in equipment.)	ea		2	2	5	
										NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:
Active Army:

USASA (2)
CNGB (1)
CC-E (7)
Dir of Trans (1)
CofEngrs (1)
TSG (1)
CofSptsS (1)
USACDCEA (1)
USACDCCBRA (1)
USACDCCEA (1)
USACDCOA (1)
USACDCQMA (1)
USACDCTA (1)
USACDCADA (1)
USACDCARMA (1)
USACDCAVNA (1)
USACDCARTYA (1)
USACDCSWA (1)
USACDCCEA (Ft Huachuca) (1)
USAARENED (2)
USAMC (5)
USCONARC (5)
ARADCOM (5)
ARADCOM Rgn (2)
OS Maj Comd (4)
LOGCOMD (2)
USAMICOM (4)
USASTRATCOM (4)
USAESC (70)
MDW (1)
Armies (2)
Corps (2)
USAC (8)
Svc Colleges (2)
USASESCS (5)
USAADS (2)
USAAMS (2)
USAARMS (2)
USAIS (2)
USAES (2)
USATC (2)
WRAMC (1)

Army Pic Cen (2)
USACDCEC (10)
Gen Dep (2)
Sig Sec, Gen Dep (5)
Sig Dep (12)
Army Dep (2) except
- LBAD (14)
- SAAD (80)
- TOAD (14)
- LEAD (7)
- SHAD (3)
- NAAD (5)
- SVAD (5)
- CHAD (8)
- ATAD (10)

Instl (3) except
- Ft Hancock (4)
- Ft Gordon (10)
- Ft Huachuca (10)
- Ft Carson (25)
- Ft Knox (12)

WSMR (5)
Sig Fld Maint Shops (2)
AMS (1)
USAERDAA (2)
USAERDAW (13)
USACRREL (2)
MAAG (2)
USARMIS (2)
Units org under fol TOE (2 ea):
- 11-57
- 11-97
- 11-98
- 11-117
- 11-127
- 11-155
- 11-157
- 11-827
- 11-500 (AA-AC)
- 11-87
- 11-592
- 11-597

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

Changes in force: C 1, C 2, C 3, C 4, C 5, and C 6

CHANGE

No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *3 March 1966*

Organizational Maintenance Manual Including Repair Parts and Special Tool Lists
TEST SETS, TELETYPEWRITER AN/GGM-1, AN/GGM-2, AN/GGM3, AN/GGM-4, AND AN /GGM-5

TM 11-6625-422-12, 6 October 1961, is changed as follows:

Note

The parenthetical reference to previous changes (example: page 1 of C 3) indicates that pertinent material was published in that change.

The title is changed as shown above.

Add *"NOTE*. EQUIPMENT MODIFIED BY MWO 11-6625422-20/1 HAVE OUTPUT TIMING COAXIAL CONNECTORS MARKED BY NUMBERS CORRESPONDING TO BAUD RATE." in the following places:

Page 33, figure 21.
Page 34, figure 22.
Page 36, figure 23.
Page 37, figure 24.
Page 38, figure 25.

Page 3, paragraph 2 (page 1 of C 5). Delete subparagraph c and substitute:

c. Reporting of Equipment Manual Improvements. The direct reporting of errors, omissions, and recommendations for improving this manual by the individual user, is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publication) will be used for reporting these improvements. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MYR (NMP)-MA, Fort Monmouth, N.J., 07703.

Page 23, paragraph 15 (page 4 of C 5). After subparagraph b(3), add subparagraph c:

c. Time base. generators modified by MWO 116625-422-20/1 have clear lamps marked by decals corresponding to the numbers beside the printed circuit cards inside the time base generator.

Note

MWO 11-662422-20/1 changes the type number of the SG-430/GGM to SG--430(P)/GGM.

Page 39, figure 26 (page 4 of C 5). Make the following changes:

Change the word NOTE to NOTES.
Number the existing note: 1.
Add the following:

NOTE 2

ON DIGITAL DISTORTION ANALYZERS MODIFIED BY MWO 11-625-422-20/1, THE BAUDS SWITCH HAS 12 POSITIONS: VAR AND 1 THROUGH 11. FREQUENCIES CORRESPONDING TO THE BAUDS SWITCH MARKINGS ARE WRITTEN ON A DECAL AT THE RIGHT SIDE OF THE PANEL.

Page 41, figure 27 (page 4 of C 5). Make the following changes:

Change the word NOTE to NOTES.
Number the existing note: 1.
Add the following:

NOTE 2

ON TEST PATTERN DISTORTION GENERATORS MODIFIED BY MWO 11- 625-422-20/1, THE BAUDS SWITCH HAS 12 POSITIONS: VAR AND 1 THROUGH 11.

Page 54, paragraph 35, chart, "Control, Indicator, or Jack" column. After BAUDS switch, add (digital distortion analyzers modified by MWO 11-6625-422-20/1 have 12 positions).

Page 56, paragraph 37, chart, "Function" column. Make the following changes:

Line 2. Change "on" to: by.

Line 4, add: For time base generators modified by MWO 11-6625-422-20/1, clear lamps are used and the baud rates are written on a decal beside the lamps (fig. 34.1).

*This change supersedes TM 11-6625-422-2OP, 15 February 1963, including C 1, 26 December 1963.

Page 58, figure 34 (page 4 of C 5). After figure 34, add figure 341.

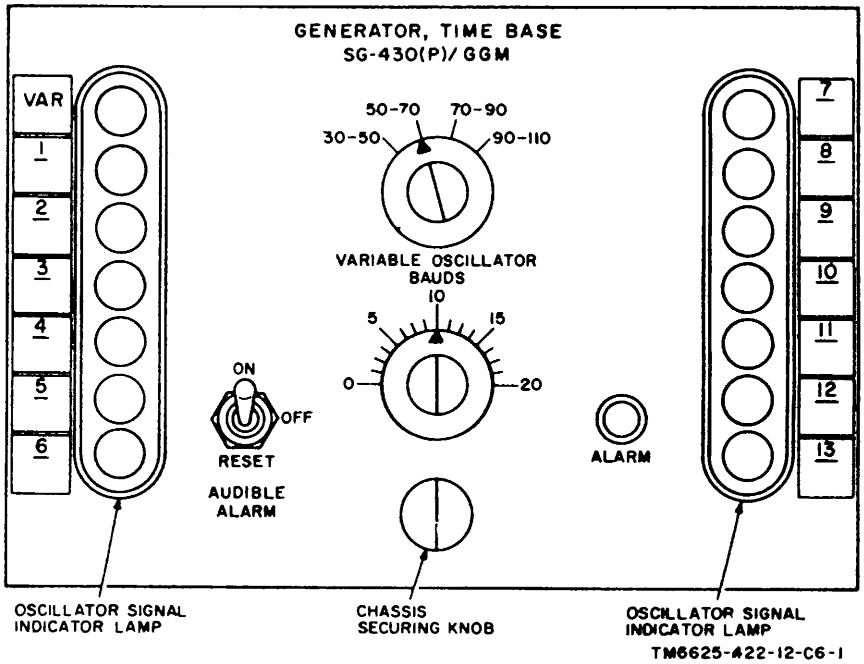

Figure 34.1. Time base generator modified by MWO 11-645-420/1, front panel.

Delete appendix II (added by C 2, 10 Jan. 63 and changed by page 5 of C 4) and substitute:

APPENDIX II
BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

a. This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

Columns are as follows:

a. *Federal Stock Number*. This column lists the 11-digit Federal stock number.

b. *Designation by Model*. Not used.

c. *Description*. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

d. *Unit of Issue*. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item' is counted for procurement, storage, requisitioning, allowances, and issue purposes.

e. *Expandability*. Nonexpendable items are indicated by NX. Expendable items are not annotated.

f. *Quantity Authorized.* Under "Items Comprising and Operable Equipment," this column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spare Items" the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

g. *Illustration*. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

SECTION II. OPERATOR'S FUNCTION PARTS LIST (AN/GGM-1)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		TEST SET, TELETYPEWRITER AN/GGM-1					
6625-893-1752		TEST SET, TELETYPEWRITER AN/GGM-1: Alignment of start/stop synchronous -telegraph transmission systems, measures peak distortion of telegraph signals; mounted in Rack, Shelf Adapter RS-1A/DAC-V; Rack, Shelf Adapter RS-2A/DAC-V; oper pwr rqmts; 115 vac, 50/60 cycle, single ph ITEMS COMPRISING AN OPERABLE EQUIPMENT		NX		1	
ORD THRU AGC		TECHNICAL MANUAL TM 11-6625-422-12 NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.		1			
6625-061-2040		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8411/GGM			1		
6625-061-2041		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8412/GGM			1-		
5995-086-7300		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8413/GGM			1		
5955-061-0031		CRYSTAL UNIT, QUARTZ: 93.237 KC; MIL type CR-37/U-93.237 KC (Installed in equipment)		NX	1		Y1
5955-689-8286		CRYSTAL UNIT, QUARTZ: 102.400 KC; MIL type CR-37/U-102.400 KC		NX	1		Y1
5955-061-0032		CRYSTAL UNIT, QUARTZ: 115.200 KC; MIL type CR-37/U-115.200 KC		NX	1		Y1
5955-813-9692		CRYSTAL UNIT, QUARTZ: 125.217 KC; MIL type CR-37/U-125.217 KC		NX	1		Y1
5955-813-9743		CRYSTAL UNIT, QUARTZ: 152.016 KC; MIL type CR-37/U-152.016 KC		NX	1		Y1
5955-813-9693		CRYSTAL UNIT QUARTZ: 153.600 KC; MIL type CR-37/U-153.600 KC (Installed in equip)		NX	2		Y1
6625-893-1730		GENERATOR, TEST PATTERN SG-431/GGM (Installed in equip)		NX	1	1	
6625-893-1731		GENERATOR, TIME BASE SG-430(P)/GGM(Installed in equip)		NX	1	1	
5895-887-1804		MODULE, BAUD RATE CONTROL PL-1098/GGM		NX	1	12	(37.5)
5895-887-4100		MODULE, BAUD RATE CONTROL PL-1099/GGM		NX	1	12	(45.5)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-1 (continued)					
5895-887-4103		MODULE, BAUD RATE CONTROL PL-1100/GGM		NX	1	12	(61.14)
5895-887-4104		MODULE, BAUD RATE CONTROL PL-11O1/GGM		NX	1	12	(74.2)
5895-887-1806		MODULE, BAUD RATE CONTROL PL-1102/GGM		NX	1	12	(112.5)
5895-887-1807		MODULE, BAUD RATE CONTROL PL-1103/GGM		NX i	1	12.	(150)
5985-887-4101		MODULE, BAUD RATE CONTROL PL-1106/GGM		NX	i	12	(50)
6625-893-1732		OSCILLOSCOPE OS-119/GGM (Installed in equip)		NX	1	1	
6625-893-1734		POWER SUPPLY PP-2971/GGM		NX	1	1	
6625-573-3875		RACK, SHELF ADAPTER: Stelma p/n RS-1A/DAC-V (Installed in equip)		NX	1	1	
6625-573-3871		RACK, SHELF ADAPTER: Stelma p/n RS-2A/DAC-V (Installed in equip)		NX	1	1	
5945-615-1457		RELAY, ARMATURE: Sigma p/n 72AOZ16OTS-TCP			1	23	K1
6625-893-1729		TEST SET, TELETYPEWRITER TS-1512/GGM(Installed in equip)		I NX	1	1	
		RUNNING SPARE ITEMS					
5910-889-4363		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 V; Astron p/n EYT12251			1	7	C31
5910-865-3009I		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 V; Aerovox p/n AFH3-29-95			1	7	C29
5910-060-6708		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 V; Astron p/n EYT1220			1	7	C30
5960-503-4880		ELECTRON TUBE: type OA2WA; MIL-E-1			1	38	V17
5960-166-7648		ELECTRON TUBE: type OB2; MIL-E-1			1	38	V16,18, 19
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	38	V15

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-1 (continued)					
5960-681-9802		ELECTRON TUBE: type 6AU6WB; MIL-E-1			1	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			1	38	V3,8
5960-669-8921		ELECTRON TUBE: type 12BH7A; MIL-E-1			1	38	V6,11
5960-262-0210		ELECTRON TUBE: type 5814A; MIL-E-1			1	38	V5,10
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			2	38	V1,2,4, 7
5960-855-2875		ELECTRON TUBE: Matched; c/o 1 each GV3A, 1 each GV6A; Stelma p/n A6473			1	38	V14
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type F02GR125A			10	16	F1,2,4
						13	F2,3
						29	F1,2
						8	F2,4
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type F02GR250A			5	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type F2G1ROOA			10	16	F3
						13	F1
						8	F1
5920-284-6785		FUSE, CARTRIDGE: Slo-Blow; 2 amp, 125 v; MIL type FO2D2ROOB			5	10	Fl
5920-295-7787		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type F02G5ROOA			5	29	F3,4
6240-683-0580		LAMP, GLOW: G. E. type no. NE2D			1	27	DS1 (signal)
						34	DS15
						26	DS2,3,4 (signal) (early) (late)
6240-722-6467		LAMP, INCANDESCENT: G. E. type no. 344			1	27	DS2 (power) 26 DS1 (power)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
							AN/GGM-1 (continued)					
6240-683-0560							LAMP, INCANDESCENT: G. E. p/n 345			1	33	DS-5 (power)
6240-020-5730							LAMP, INCANDESCENT: Stelma p/n B9526X			4	34	DS-1 thru DS-7, DS-10 thru DS-14
6240-887-4770							LAMP, INCANDESCENT: marked var; Stelma p/n B9520/VAR			1	34	DS-8
5945-615-1457							RELAY, ARMATURE: Sigma p/n 72AOZ160TS-TCP			1		K1

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		TEST SET, TELETYPEWRITER AN/GGM-2					
6625-893-1726		TEST SET, TELETYPEWRITER AN/GGM-2: Alignment of start/stop and synchronous telegraph systems measures peak distortion of telegraph signals; mounted in Equipment Housing EH-1/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph		NX		2	
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC		TECHNICAL MANUAL TM 11-6625-422-12 NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.			1		
6625-061-2040		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8411/GGM			1		
6625-061-2041		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8412/GGM			1		
5995-086-7300		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8413/GGM			1		
5995-889-0872		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8414/GGM-2			1		
5995-889-o866		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8415/GGM-2			1		
6625-893-1733		CART, TELETYPEWRITER TEST SET: Stelman p/n D10010		NX	1	2	
5955-061-0031		CRYSTAL UNIT, QUARTZ: 93.237 KC; MIL type CR-37/U-93.237 KC		NX	1		Y1
5955-689-8286		CRYSTAL UNIT, QUARTZ: 102.400 KC; MIL type CR-37/U-102.400 KC		NX	1		Y1
5955-061-0032		CRYSTAL UNIT, QUARTZ: 115.200 KC; MIL type CR-37/U-115.200 KC		NX	1		Y1
5955-813-9692		CRYSTAL UNIT, QUARTZ: 125.217 KC; MIL type CR-37/U-125.217 KC		NX	1		Y1
5955-813-9743		CRYSTAL UNIT, QUARTZ: 152.016 KC; MIL type CR-37/U-152.016 KC		NX	1		Y1
5955-813-9693		CRYSTAL UNIT, QUARTZ: 153.600 KC; MIL type CR-37/U-153.600 KC		NX	2		Y1
6625-573-3880		I EQUIPMENT HOUSING: Stelma p/n EH-1/DAC-V		NX	1	2	

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-2 (continued)					
6625-893-1730		GENERATOR, TEST PATTERN SG-431/GGM (Installed in equip)		NX	1	2	
6625-893-1731		GENERATOR, TIME BASE SG-430 (P) GGM (Installed in equip)		NX	1	2	
5895-887-1804		MODULE, BAUD RATE CONTROL PL-1098/GGM		NX	1	12	(37.5)
5895-887-4100		MODULE, BAUD RATE CONTROL PL-1099/GGM		NX	1	12	(45.5)
5895-887-4103		MODULE, BAUD RATE CONTROL PL-1100/GGM		NX	1	12	(61.14)
5895-887-4104		MODULE, BAUD RATE CONTROL PL-1101/GGM		NX	1	12	1 (74.2)
5895-887-1806		MODULE, BAUD RATE CONTROL PL-1102/GGM		NX	1	12	(112.5)
5895-887-1807		MODULE, BAUD RATE CONTROL PL-1103/GGM		NX	1	12	(150)
5985-887-4101		MODULE, BAUD RATE CONTROL PL-1106/GGM		NX	1	12	(50)
6625-893-1732		OSCILLOSCOPE OS-119/GGM (Installed in equip)		NX	1	2	
6625-893-1734		POWER SUPPLY PP-2971/GGM (Installed in equip)		NX	1	2	
5945-615-1457		RELAY, ARMATURE: Sigma p/n 72AOZ16OTS-TCP (Installed in equip)			1	23	K1
7440-893-1729		TEST SET, TELETYPEWRITER TS-1512/GGM (Installed in equip)		NX	1	2	
		RUNNING SPARE ITEMS					
5910-889-4363		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 v; Astron p/n EYT12251			1	7	C31
5910-865-3009		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox p/n AFH3-29-95			1	7	C29
5910-060-6708		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron p/n EYT1220			1	7	C30
5960-503-4880		ELECTRON TUBE: type OA2WA, MIL-E-1			1	38	V17
5960-166-7648		ELECTRON TUBE: type OB2, MIL-E-1			1	38	V16,18,

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
											FIG. NO.	ITEM NO.
							AN/GGM-2 (continued)					
5960-272-8553							ELECTRON TUBE: type 1X2B; MIL-E-1			1	38	V15
5960-681-9802							ELECTRON TUBE: type 6AU6W,B; MIL-E-1			1	38	V9
5960-715-3891							ELECTRON TUBE: type 6DJ8; MIL-E-1			1	38	V3,8
5960-669-8921							ELECTRON TUBE: type 12BH7A; MIL-E-1			1	38	V6,11
5960-262-0210							ELECTRON TUBE: type 5814A; MIL-E-1			1	38	V5,10
5960-669-6838							ELECTRON TUBE: type 5963; MIL-E-1			2	38	V1,2,4,7
5960-855-2875							ELECTRON TUBE: Matched; c/o 1 each GV3A, 1 each GV6A; Stelma p/n 6473			1	38	V14
5920-356-2188							FUSE CARTRIDGE: 1/8 amp, 250 v; MIL type F02GR125A			10	16	F1,2,3
											13	F2,3
											29	F1, F2
											8	F2,4
5920-280-5031							FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type F02GR250A			5	8	F3
5920-280-4465							FUSE, CARTRIDGE: 1 amp, 250 v; MIL type F02G1R00A			10	16	F3
											13	F1
											8	F1
5920-284-6785							FUSE, CARTRIDGE: Slo-Blow; 2 amp, 250 v; MIL type F02D2R00B			5	10	F1
5920-295-7787							FUSE, CARTRIDGE: 5 amp, 250 v; MIL type F02G5R00A			5	29	F3,4
6240-683-0580							LAMP, GLOW: G. E. type no. NE2D			1	27	DS-1 (signal)
											34	DS-15
											26	DS-2,3,4 (signal) (early) (late)
6240-722-6467							LAMP, INCANDESCENT: G. E. type no. 344			1	27	CS-2 (power)
											26	DS-1 (power)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
											FIG. NO.	ITEM NO.
							AN/GGM-2 (continued)					
6240-683-0560							LAMP, INCANDESCENT: G. E. p/n 345			1	33	DS-5 (power)
6240-020-5730							LAMP, INCANDESCENT: Stelma p/n B9520X			3	34	DS-1 thru DS-7, DS-9 thru DS-14
5240-887-4770							LAMP, INCANDESCENT: marked VAR; Stelma p/n B9520/VAR			1	34	DS-8
5945-615-1457							RELAY, ARMATURE: Sigma p/n 72AOZ160TS-TCP			1		K1

SECTION IV. OPERATOR'S FUNCTIONAL PARTS LIST (AN/GGM-3)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		TEST SET, TELETYPEWRITER AN/GGM-3					
6625-893-1727		TEST SET, TELETYPEWRITER AN/GGM-3: Measures peak distortion of Telegraph Signals; provides automatic means of viewing signals; transmits "quick brown fox" test message; mounted in Rack, Shelf Adapter RS-IA/DAC-V; Rack, Shelf Adapter RS-2B/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph.		NX		3	
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
OFD THRU AGC		TECHNICAL MANUAL TM 11-6625-422-12 NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.			1		
6625-061-2040		CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL CX-8411/GGM				1	
6625-061-2041		CABLE ASSEMBLY SPECIAL SE ELECTRICAL CX-8412/GGM				1	
5995-086-7300		CABLE ASSEMBLY, SPECIAL PURPOSE ELECTRICAL CX-8413/GGM				1	
6625-893-1730		GENERATOR, TEST PATTERN SG-431/GGM (Installed in equip.)			NX	1	13
6625-893-1732		OSCILLOSCOPE OS-119/GGM (Installed in equip.)			NX	1	3
6625-893-1734		POWER SUPPLY PP-2971/GGM (Installed in equip.)			NX	1	3
6625-573-3875		RACK, SHELF ADAPTER: Stelma part #RS-1A/DAC-V			NX	1	3
6625-573-3872		RACK, SHELF ADAPTER: Stelma part #RS-2B/DAC-V			NX	1	3
5945-615-1457		RELAY, ARMATURE: Sigma part #72A0Z160TS-TCP			1	23	K1
6625-893-1729		TEST SET, TELETYPEWRITER TS-1512/GGM (Installed in equip.)			NX	1	3
		RUNNING SPARE ITEMS					
5910-889-4363		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 v; Astron part #EYT12251			1	7	C31
5910-865-3009		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox part #AFH3-29-95			1	7	C29

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-3 (continued)					
5910-060-6708		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron part #EYT1220			1	7	C30
5960-503-4880		ELECTRON TUBE: type OA2WA; MIL-E-1			1	38	V17
5960-166-7648		ELECTRON TUBE: type OB2; MIL-E-1			1	38	V16, V18, 19
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	38	V15
5960-681-9802		ELECTRON TUBE: type 6AU6WB; MIL-E-1			1	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			1	38	V3, V8
5960-669-8921		ELECTRON TUBE: type 12BH7A; MIL-E-1			1	38	V6, V11
5960-262-0210		ELECTRON TUBE: type 5814A; MIL-E-1			1	38	V5, V10
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			2	38	V1, V2, V4, V7
5960-855-2875		ELECTRON TUBES: Matched; c/o 1 each GV3A, 1 each GV6A; Stelma part #A6473			1	38	V14
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type F02GR125A			10	16	F1, F2, F4
						29	F1, F2
						8	F2, F4
						23	F1
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type F02GR250A			5	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type F02GLR00A			5	16	F3
						8	F1
5920-284-6785		FUSE, CARTRIDGE: Slow-Blo; 2 amp, 125 v; MIL type F02D2R00B F1				5	10
5920-295-7787		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type F02G5R00A				29	F3, F4
6240-892-4420		LAMP, GLOW: G. E. type #NE2D		1		27	DS-1 (SIGNAL)
						26	DS-2 DS-3 DS-4 (SIGNAL) (EARLY) (LATE)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ITEM NO.
							AN/GGM-3 (continued)					
6240-722-6467							LAMP, INCANDESCENT: G. E. type #344			1	27	DS-2 (POWER)
											26	DS-1 (POWER)
6240-683-0560							LAMP, INCANDESCENT: G. E. part #345			1	33	DS-5 (POWER)
5945-615-1457							RELAY, ARMATURE: Sigma part #72A0Z16OTS-TCP			1	23	K1

SECTION IV. OPERATOR'S FUNCTIONAL PARTS LIST (AN/GGM-3)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
							TEST SET, TELETYPEWRITER AN/GGM-4					
6625-893-1728							TEST SET, TELETYPEWRITER AN/GGM-4: measures peak distortion of telegraph signals, automatic means of viewing telegraph signals while traffic is being transmitted; mounted in Rack, Shelf Adapter RS-1A/DAC-V; oper pwr, rqmts; 115 vac, 50/60 cyc, single ph		NX		4	
							ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC							TECHNICAL MANUAL TM 11-6625-422-12			1		
							NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels					
6625-061-2040							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8411/GGM			1		
6625-061-2041							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8412/GGM			1		
5995-086-7300							CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-8413/GGM			1		
6625-893-1732							OSCILLOSCOPE OS-119/GGM (Installed in equip)		NX	1	4	
6625-893-1734							POWER SUPPLY, PP-2971/GGM		NX	1	4	
6625-573-3875							RACK, SHELF ADAPTER: Stelma p/n RS-1A/DAC-V		NX	1	4	
5945-615-1457							RELAY, ARMATURE: Sigma p/n 72AOZ160TS-TCP			1	23	K1
6625-893-1729							TEST SET, TELETYPEWRITER TS-1512/GGM (Installed in equip)		NX	1	14	
							RUNNING SPARE ITEMS					
5910-889-4363							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 v; Astron p/n EYT12251			1	7	C31
5910-865-3009							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox p/n AFH3-29-95			1	7	C29
5910-060-6708							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron p/n EYT1220			1	7	C30

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-4 (continued)					
5960-503-4880		ELECTRON TUBE: type OA2WA; MIL-E-1			1	38	V17
5960-166-7648		ELECTRON TUBE: type OB2; MIL-E-1			1	38	V16, 18,
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	38	V15
5960-681-9802		ELECTRON TUBE: type 6AU6WB; MIL-E-1			1	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			1	38	V3, V8
5960-669-8921		ELECTRON TUBE: type 12BH7A; MIL-E-1			1	38	V6, 11
5960-262-0210		ELECTRON TUBE: type 5814A, MIL-E-1			1	38	V5, V10
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			2	38	V1,2,4
5960-855-2875		ELECTRON TUBE: matched; c/o 1 each GV3A, 1 each GV6A; Stelma p/n A6473			1	38	V14
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type F02GR125A			10	29	F1 ,2,
						8	F2, 4
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type F02GR250A			5	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type F02G1R00P			5	8	F1
5920-284-6785		FUSE, CARTRIDGE: Slow-Blow; 2 amp, 125 v; MIL type F02D2R00B			5	10	F1
5920-295-7789		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type R02G5R00A			5	29	F3, 4
6240-683-0580		LAMP, GLOW: G. E. p/n NE2D			1	26	DS-2,3,4 (signal) (early) (late)
6240-722-6467		LAMP, INCANDESCENT: G. E. p/n 344			1	26	DS-1 (Power)
6240-683-0560		LAMP, INCANDESCENT: G. E. p/n 345			1	33	DS-5 (Power)

SECTION IV. OPERATOR'S FUNCTIONAL PARTS LIST (AN/GGM-3)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		TEST SET, TELETYPEWRITER AN/GGM-					
6625-893-1735		TEST SET, TELETYPEWRITER AN/GGM-5: Measures peak distortion of telegraph signals; mounted in Rack, Shelf Adapter RS-1B/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph.		NX		5	
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC		TECHNICAL MANUAL TM 11-6625-422-12			1		
		NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.					
6625-061-2040		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-8411/GGM			1		
6625-061-2041		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-8412/GGM			1		
5995-086-7300		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-8413/GGM			1		
6625-893-1734		POWER SUPPLY PP-2971/GGM			1	17	
6625-573-3873		RACK, SHELF ADAPTER: Stelma part #RS-1B/DAC-V		NX	1	5	
6625-893-1729		TEST SET, TELETYPEWRITER TS-1512/GGM (Installed in equip.)			2	5	
		RUNNING SPARE ITEMS					
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp. 250 v; MIL type F02GR125A			10	29 8	F1, F2 F2, F4
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type F02GR250A			5	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type F02G1R00A			5	8	F1
5920-295-7787		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type F02G5R00A			5	29	F3, F4
6240-683-0580		LAMP, GLOW: G. E. type #NE2D			2	26	DS-2, DS-3 DS-4 (SIGNAL) (EARLY) (LATE)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-5 (continued)					
6240-722-6467		LAMP, INCANDESCENT: G. E. type #344			1	26	DS-1 (POWER)

Delete appendix III (added by C 2, 10 Jan. 63 and changed by pages 5 and 6 of C 4) and substitute:

APPENDIX III

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component*. This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) are listed in disassembly order or alphabetical order.

(2) *Maintenance function*. This column indicates the various maintenance functions allocated to the categories.

(a) *Service*. To clean, to preserve, and to replenish lubricants.

(b) *Adjust.* To regulate periodically to prevent malfunction.

(c) *Inspect.* To verify serviceability and detect incipient electrical or mechanical failure by scrutiny.

(d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) *Replace*. To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(f) *Repair*. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(g) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) *Overhaul.* To restore an item to completely serviceable condition as prescribed by serviceability standards. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(j) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications, and subsequent reassembly of the item.

(3) *Operator, organizational, direct support, general support, and depot.* The symbol X indicates the categories; responsible for performing that particular maintenance operation, but does not; necessarily indicate that repair parts will be stocked at that level. Categories higher than those

marked by X are authorized to perform the indicated operation.

(4) *Tools required*. This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks*. Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions*. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organizational, direct support, general support, and depot*. The dagger (f) symbol indicates the categories normally allocated the facility.

(3) *Tool code*. This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by Signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including general support are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART (AN/GGM 1)

PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
TEST SET, TELETYPEWRITER AN/ GGM-1.	Service	X					11	External parts.
					X		6	Interior parts.
	Adjust				X		1,2,3,6,10,12,13	All adjustments.
	Inspect-.	X						Visual only.
	Test		.		X		1, 2, 3, 5, 6, 7, 8, 9,10, 12, 13.	All tests.
	Overhaul					X	1, 2, 3, 4, 6, 7, 8, 9,10, 12, 13, 14.	
CABLE ASSEMBLY, POWER ELECTRICAL CX-8413/GGM.	Replace				X		6	
	Repair				X		2, 6	
CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-8411/ GGM AND CX-8412/GGM.	Replace			X			11	
	Repair	.			X		2, 6	
RACK, SHELF ADAPTER RS-1A/ DAC-V; RS-2A/DAC-V.	Replace				X		6	
	Repair				X		6	
RELAY ASSEMBLY NO. B10531	Repair	.			X		2, 6	
RELAY SUBASSEMBLY PC640-2	Replace				X		6	
	Repair	.			X		2, 6	
TEST SET, TELETYPEWRITER, TS-1512/GGM.	Adjust	.			X		2, 3, 6, 10, 13	Schmitt triggers, input filters, input circuits, meter current, sweep voltage.
	Test	.			X		2, 6, 10, 13, 14	Intensity, marker test, transition test, signal input, input power, percent distortion, reset test.
	Replace		X					
	Repair		X				11	Lamps, fuses, lenses.
	Overhaul				X		2, 3, 6, 8, 9, 10, 13, 14.	
TEST SET, SUBASSEMBLIES, TELETYPEW'RITER (Repair all assemblies except PC618-2).	Replace				X			
	Repair				X		2, 6	Except PC618-2.
TEST SET, SUBASSEMBLY, TELETYPEWRITER PC618-2.	Replace				X			
OSCILLOSCOPE OS-119/GGM	Adjust	.			X		2, 10	Sweep bias adjustment, sweep amplitude adjustment, syn gate adjustment, horizontal bias adjustment, vertical bias adjustment, blanking adjustments intensity makes adjustment.
	Test	.			X		2, 3, 6, 7, 10	Ripple voltage test, free running sweep frequency test, power supply output voltage test, percent regulation test.

Section II. MAINTENANCE ALLOCATION CHART (AN/GGM 1) -- Continued

PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
OSCILLOSCOPE OS-119/GGM-Con.	Replace		X					
	Repair		X				11	Lamp, fuses, tubes, cap electrical, lens.
	Overhaul				X		2, 3, 5, 6, 7, 8, 9, 10, 13, 14.	
OSCILLOSCOPE SUBASSEMBLIES	Replace				X			
	Repair				X		2, 6	
GENERATOR, TIME BASE SG-430/ GGM.	Adjust				X		1, 6, 10	Adjust output frequency of fixed oscillator assy; adjust output frequency of variable oscillator assy.
	Test				X		1, 2, 3, 6, 10, 14	Output frequency and alarm, output voltage.
	Replace		X					
	Repair		X				11	Lamps, fuses, lenses.
	Overhaul				X		1,2,3,6,8,9,10,14	
GENERATOR, TIME BASE SUB- ASSEMBLIES.	Replace .				X			
	Repair				X		2, 6	
GENERATOR, TEST PATTERN SG- 431/GGM.	Test				X		1,2,3,6,10,12,13	
	Replace		X					
	Repair		X				11	Lamps, fuses, lenses.
	Overhaul				X		1,2,3,6,8,9, 10,12,13, 14.	
GENERATOR, TEST PATTERN SUBASSEMBLIES.	Replace				X			
EXCEPT PC-619-2	Repair				X		2, 6	Except PC-619-2.
GENERATOR, TEST PATTERN SUBASSEMBLY PC-619-2.	Replace				X			
POWER SUPPLY PP-2971/GGM	Test				X		2, 3, 6, 7, 8, 10	Input and output voltage test, regulation tests, ripple test.
	Replace	.	X					
	Repair		X				11	Fuses, cap electrical.
	Overhaul				X		2,3,6,7,8,9,10,14	
POWER SUPPLY SUBASSEMBLIES	Replace				X			
	Repair				X		2, 6	

Section III. ALLOCATION TOOLS FOR MAINTENANCE FUNCTIONS (AN/GGM- 1)							
TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY					TOOLS CODE	REMARKS
	O/C	O	DS	GS	D		
FREQUENCY METER AN/USM-26				†	†	1	
MULTIMETER TS-352/U .				†	†	2	
OSCILLOSCOPE AN/USM-81				†	†	3	
TEST SET, ELECTRON TUBE TV-2/U					†	4	
TEST SET, ELECTRON TUBE TV-7/U				†		5	
TOOL KIT TK-21/G				†	†	6	
TRANSFORMER, VARIABLE POWER CN-16/U				†	†	7	
VOLTMETER TS-443/U				†	†	8	
VOLTMETER, METER ME-30/U				†	†	9	
TELETYPEWRITER TEST SET AN/GGM-1				†	†	10	To be provided as shop support.
TOOLS AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE INSTALLER USER BECAUSE OF HIS ASSIGNED MISSION.		†				11	
TELETYPEWRITER SET TT-4/TG				†	†	12	To be provided as shop support.
POWER SUPPLY PP-351/U				†	†	13	
TRANSISTOR TEST SET TS-1100/U .				†	†	14	

Section IV. MAINTENANCE ALLOCATION CHART (AN/GGM 2)

PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
TEST SET, TELETYPE WRITER - AN/GGIM-2.	Service	X					11	External parts.
					X		6	Internal parts.
	Adjust				X		1,2,3,6,10,12,13	All adjustments.
						X	2,3,4,6,7,10,11,12	
	Inspect	X						Visual only.
	Test				X		1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13.	All tests.
	Overhaul					X	1,2,3,4,6,7,8,9, 10, 12, 13, 14.	
CABLE ASSEMBLY, POWER - ELEC RICAL CX-8413/GGM.	Replace				X		6	
	Repair				X		2, 6	
CABLE ASSEMBLIES, SPECIAL PURPOSE, ELECTRICAL CX-8411/ GGM N.,D CX-3412/GGM.	Replace		X				11	
	Repair				X		2, 6	
CART, ELETYPEWRITER TEST SET NO. D10010.	Repair				X		2,6	
RELAY ASSEMBLY NO. B10531	Repair				X		2, 6	
RELAY SUBASSEMBLY PC-64Q-2	Replace				X		6	
	Repair				X		2, 6	
TEST SET, TELETYPEWRITER TS-1512/GGM.	Adjust				X		2, 3, 6, 10, 13	Schmitt triggers, input filters, input circuits, meter current, sweep voltage.
	Test	.			X		2,6,10,13,14	Intensity marker test, transition tests, signal input, input power, percent distortion, reset test.
	Replace		X					
	Repair		X				11	Lamps, fuses, lenses.
	Overhaul				X		2,3,6,8,9,10,13,14	
TEST SET SUBASSEMBLIES, TELETYPEWRITER (Repair all assemblies except PC6182).	Replace				X			
	Repair				X		2,6	Except PC618-2.
TEST SET SUBASSEMBLY, TELETYPEWRITER PC618-2.	Replace				X			

Section IV. MAINTENANCE ALLOCATION CHART (AN/GGM 2)								
PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
OSCILLOSCOPE OS-19/GGM	Adjust				X		2,10	Sweep bias adjustment, sweep amplitude adjustment, sync gate adjustment, horizontal bias adjustment, vertical bias adjustment, blanking adjustment, intensity makeup adjustment.
	Test				X		2, 3, 6, 7,10	Ripple voltage test, free running sweep frequency test, power supply output voltage test, percent regulation test.
	Replace		X					
	Repair		X				11	Lamp, fuses, tubes, cap electrical, lens.
	Overhaul				X		2, 3, 5, 6, 7, 8, 9, 10,13, 14.	
OSCILLOSCOPE SUBASSEMBLIES	Replace				X			
	Repair				X		2, 6	
GENERATOR, TIME BASE Adjust SG-430/ GGM.					X		1, 6, 10 -	Adjust output frequency of fixed oscillator assy, adjust output frequency of variable.
	Test				X		1, 2, 3, 6, 10, 14	Output frequency and alarm, output voltage.
	Replace		X					
	Repair		X		.		11	Lamps, fuses, lenses.
	Overhaul				X		1,2,3,6,8, 9, 10, 14	
GENERATOR, TIME BASE SUB-ASSEMBLIES.	Replace -				X			
	Repair				X		2, 6	
GENERATOR, TEST PATTERN SG-431/GGM.	Test				X		1, 2, 3, 6, 10, 12, 13	
	Replace		X					
	Repair		X				11 -	Lamps, fuses, tenses.
	Overhaul-.				X		1, 2, 3, 6,8, 9, 10, 12,13, 14.	
GENERATOR, TEST PATTERN SUBASSEMBLY.	Replace				X			
EXCEPT PC619-2	Repair				X		2, 6-	Except PC-619-2.
GENERATOR, TEST PATTERN SUBASSEMBLIES PC-619-2.	Replace				X			
POWER SUPPLY PP-2971/GGM	Test				X		2, 3, 6, 7, 8, 10	Input and output voltage tests, regulation tests, ripple test.
	Replace		X					
	Repair		X				11	Fuses, cap electrical.
	Overhaul				X		2,3,6,7,8,9,10,14-	
POWER SUPPLY SUBASSEMBLIES	Replace -				X			
	Repair				X		2, 6	

Section V. ALLOCATION TOOLS FOR MAINTENANCE FUN CTIONS (AN/GGM-2)

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY					TOOLS CODE	REMARKS
	O/C	O	DS	GS	D		
FREQUENCY METER AN/USM-26				†	†	1	
MULTINIETER TS-352/U				†	†	2	
OSCILLOSCOPE AN/USM-81				†	†	3	
TEST SET, ELECTRON TUBE TV-2/U					†	4	
TEST SET, ELECTRON TUBE TV-7/U				†		5	
TEST KIT TK-21/G				†	†	6	
TRANSFORMER, VARIABLE POWER CN-16/U				†	†	7	
VOLTMETER TS-443/U				†	†	8	
VOLTMETER, METER ME-30/U				†	†	9	
TELETYPEWRITER TEST SET AN/GGM-1				†	†	10	To be provided as shop support.
TOOLS AND TEST EQUIPMENT NORMALLY		†				11	
AVAILABLE TO THE INSTALLER USER BECAUSE							
OF HIS ASSIGNED MISSION.						12	
TELETYPEWRITER SET TT-4/TG				†	†	13	To be provided as shop support.
POWER SUPPLY PP-351/U				†	†	14	
TRANSISTOR TEST SET TS-1100/U				†	†		

Section VI. MAINTENANCE ALLOCATION CHART (AN/GGM-3)

PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
TEST SET, TELETYPEWRITER AN/ GGM-3.	Service	X					11	External parts.
					X		6	Interior parts.
	Adjust				X		1, 2, 3, 6, 10, 12, 13	All adjustments.
	Inspect	X						Visual only.
	Test				X		1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13.	All tests.
	Overhaul					X	1, 2, 3, 4, 6, 7, 8, 9, 10,12, 13, 14.	
CABLE ASSEMBLY, POWER ELECTRICAL CX-8413/GGM.	Replace				X		6	
	Repair				X		2, 6	
CABLE ASSEMBLIES, SPECIAL PURPOSE.	Replace		X				11	
ELECTRICAL CX-8411/GGM AND CX-8412/GGM.	Repair				X		2, 6	
RACK, SHELF ADAPTERS RS-1A/DAC-V, RS-2B/DAC-V.	Replace				X		6	
	Repair				X		6	
RELAY ASSEMBLY B10531	Repair				X		2, 6	
RELAY SUBASSEMBLY PC-640-2.	Replace				X		6	
	Repair				X		2, 6	
TEST SET, TELETYPEWRITER TS-1512/GGM.	Adjust				X		2, 3, 6, 10, 13.	Schmitt triggers, input filter, input circuits, meter current, sweep voltage.
	Test				X		2, 6, 20, 23, 24	Intensity marker test, transition test, signal input, input power, percent distortion, reset test
	Replace		X					
	Repair		X				11	Fuses, lamps, lens.
	Overhaul				X		2,3,6,8,9, 10, 13, 14	
TEST SET, SUBASSEMBLIES TELETYPEWRITER (Repair all assemblies except PC618-2).	Replace				X			
	Repair				X		2,6	Except PC618-2.
TEST SET SUBASSEBLY, TELE-TYPEWRITER PC618-2.	Replace				X			

Section VI. MAINTENANCE ALLOCATION CHART (AN/GGM 3) Continued								
PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
OSCILLOSCOPE OS-119/GGM	Adjust				X		2, 10	Sweep bias adjustment, sweep amplitude adjustment sync gate adjustment horizontal bias adjustment vertical bias adjustment, blanking adjustment intensity marks adjustment.
	Test				X		2, 3, 6, 7, 10	Ripple voltage test, free running sweep frequency test power supply output voltage test, percent regulation test.
	Replace		X					
	Repair		X				11	Fuses, lamps, tubes, lens, cap electrical.
	Overhaul				X		2, 3, 5, 6, 7, 8, 9, 10,13, 14.	
OSCILLOSCOPE SUBASSEMBLIES	Replace				X			
	Repair				X		2, 6	
GENERATOR, TIME BASE SG-430/ GGM	Adjust				X		1, 6, 10	Adjust output frequency of fixed oscillator assy, adjust output frequency of variable.
	Test				X		1, 2, 3, 6, 10. 14	Output frequency and alarm, output voltage
	Replace		X					
	Repair		X				11	Lamps, fuses, lenses.
	Overhaul				X		1,2,3,6,8,9,10.14	
GENERATOR TIME BASE SUB-ASSEMBLIES.	Replace				X			
	Repair				X		2, 6	
GENERATOR, TEST PATTERN SG-431/GGM.	Test				X		1,2,3,6,10,12,13	
	Replace		X					
	Repair		X				11	Fuses, lamps, lens.
	Overhaul				X		1, 2, 3, 6, 8, 9, 10, 12,13, 14.	
GENERATOR, TEST PATTERN SUBASSEMBLIES - EXCEPT PC 619-2.	Replace				X			
	Repair				X		2, 6	Except PC619-2.
GENERATOR, TEST PATTERN SUBASSEMBLY PC-619-2.	Replace				X			
POWER SUPPLY PP-2971/GGM	Test				X		2, 3, 6, 7, 8, 10	Input and output voltage tests, regulation tests, ripple tests.
	Replace		X					
	Repair		X				11	Fuses, cap electrical.
	Overhaul				X		2, 3, 6, 7, 8, 9, 10,14.	
POWER SUPPLY SUBASSEMBLIES -	Replace				X			
	Repair				X		2, 6	

Section VII. ALLOCATION TOOLS FOR MAINTENANCE FUNCTIONS (AN/GGM-3)							
TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY					TOOLS CODE	REMARKS
	O/C	O	DS	GS	D		
FREQUENCY METER AN/USM-26				†	†	1	
MULTIMETER TS-352/U				†	†	2	
OSCILLOSCOPE AN/USM-81				†	†	3	
TEST SET, ELECTRON TUBE TV-2/U					†	4	
TEST SET, ELECTRON TUBE TV-7/U				†		5	
TOOL KIT TK-21/G				†	†	6	
TRANSFORMER VARIABLE POWER CN-16/U				†	†	7	
VOLTMIETER TS-443/U				†	†	8	
VOLTMETER, METER ME-30/U				†	†	9	
TELETYPEW'RITER TEST SET AN/GGM-1				†	†	10	To be provided as shop support.
TOOLS AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE INSTALLER USER BECAUSE OF HIS ASSIGNED MISSION.		†				11	
TELETYPEW'RITER SET TT-4/TG				†	†	12	To be provided as shop support.
POW-ER SUIPPLY PP-351,'U				†	†	13	
TRANSISTOR TEST SET TS-1100/U				†	†	14	

Section VIII. MAINTENANCE ALLOCATION CHART (AN/GGM 4)								
PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
TEST SET, TELETYPEWRITER AN'/ GGM-4.	Service	X					10	External parts.
					X		5	Interior parts.
	Adjust				X		1, 2, 5, 9, 11	All adjustments.
	Inspect	X						Visual only.
	Test				X		1,2,4,5,6,7,8,9,11	All tests.
	Overhaul					X	1, 2, 3, 5, 6, 7, 8, 9, 11, 12.	
CABLE ASSEMBLY, -POWER ELECTRICAL CX-8413/GGM.	Replace				X			
	Repair				X		1, 5	
CABLE ASSEMBLIES, SPECIAL PURPOSE, ELECTRICAL, CX-8411/GGM AND CX-8412/GGM.	Replace		X				10	
	Repair				X		1, 5	
RACK, SHELF ADAPTER RS-1A/ DAC-V.	Replace				X		5	
	Repair				X		5	
TEST SET, TELETYPEWRITER TS-1512/GGM.	Adjust				X		1, 2, 5, 9, 11	Schmitt triggers, input filter, input circuits, meter current, sweep voltage.
	Test				X		1, 5, 9, 11, 12	Intensity maker test, transition test, signal input, input power, percent distortion, reset test.
	Replace		X					
	Repair		X				10	Lamps, fuses, lens.
	Overhaul				X		1, 2, 5, 7, 8, 9, 11, 12.	
TEST SET SUBASSEMBLIES, TELETYPEWRITER (Repair all assemblies except PC618-2).	Replace				X			
	Repair				X		1, 5	Except PC618-2.

Section VIII. MAINTENANCE ALLOCATION CHART (AN/GGM 4)								
PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
TEST SET SUBASSEMBLY, TELE- TYPEWRITER PC618-2.	Replace				X			
OSCILLOSCOPE OSll9/GGM	Adjust				X		1, 9	Sweep bias adjustment, weep amplitude adjustment sync gate adjustment, horizontal bias adjustment, vertical bias adjustment, blanking adjustment, intensity maker adjustment.
	Test				X		1, 2, 5, 6, 9	Ripple voltage test, free running sweep frequency test, power supply output voltage test, percent regulation test.
	Replace		X					
	Repair		X				10	Lamps, fuses, tubes, lens, cap electrical.
	Overhaul				X		1, 2, 4, 5, 6, 7, 8, 9, 11, 12.	
OSCILLOSCOPE SUBASSEMBLIES	Replace				X			
	Repair				X		1, 5	
POWER SUPPLY PP-2971/GGM	Test				X		1, 2, 5, 6, 7, 9	Input and output voltage tests, regulation tests, ripple tests.
	Replace		X					
	Repair		X				10	Fuses, cap electrical.
	Overhaul				X		1, 2, 5, 6, 7, 8, 9, 12.	
POWER SUPPLY SUBASSEMBLIES.	Replace				X			
	Repair				X		1, 5	

Section IX. ALLOCATION TOOLS FOR MAINTENANCE FUNCTIONS (AN/GGM-4)							
TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY					TOOLS CODE	REMARKS
	O/C	O	DS	GS	D		
MULTIMETER TS-352/U				†	†	1	
OSCILLOSCOPE AN/USM-81				†	†	2	
TEST SET ELECTRON TUBE TV-2/U					†	3	
TEST SET ELECTRON TUBE TV-7/U				†		4	
TOOL KIT TK-21/G				†	†	5	
TRANSFORMER VARIABLE POWER CN-16/U				†	†	6	
VOLTMETER TS-443/U				†	†	7	
VOLTMETER, METER ME-30/U				†	†	8	
TELETYPEWRITER TEST SET AN/GGM-1				†	†	9	To be provided as shop support.
TOOLS AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE INSTALLER USER BECAUSE OF HIS ASSIGNED MISSION.		†				10	
POWER SUPPLY PP-351/U				†	†	11	
TRANSISTOR TEST SET TS-1100/U				†	†	12	

Section X. MAINTENANCE ALLOCATION CHART (AN/GGM 5)								
PART OR COMPONENT	MAINTENANCE FUNCTION	CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
TEST SET, TELETYPEWRITER AN/GGM-5.	Service	X						External parts.
					X			Interior parts.
	Adjust				X		1, 2, 3, 7, 9	
	Inspect	X						Visual only.
	Test				X		1, 2,3, 4,5, 6, 7, 9	
	Overhaul					X	1,2,3,4,5,6,7,9,10	
CABLE ASSEMBLY, POWER, CX-8413/GGM.	Replace				X		3	
	Repair				X		1, 3	
CABLE ASSEMBLIES, SPECIAL PURPOSE, ELECTRICAL CX-8411/GGM AND CX-8412/GGM.	Replace		X				8	
	Repair				X		1, 3	
RACK SHELF ADAPTER RS1B/DAC-V.	Replace				X		3	
	Repair				X		3	
TEST SET, TELETYPWRITER TS-1512/GGM	Adjust				X		1, 2, 3, 7, 9	Schmitt triggers, input filters, input circuits meter current, sweep voltage.
	Test				X		1, 3, 7, 9,10	Intensity maker test, transition testsignal input, input power, percent distortion, reset test.
	Replace		X					
	Repair		X				8	Fuses, lamps, lens.
	Overhaul				X		1,2,3,4,5,6,7,9,10	
TEST SET SUBASSEMBLIES, TELETYPEWRITER (Repair all assemblies except PC618-2).	Replace-				X			
	Repair				X		1, 3	Except PC-618-2.
TEST SET SUBASSEMBLY, TELETYPEWRITER PC618-2.	Replace				X			
POWER SUPPLY PP-2971/GGM	Test				X		1, 2, 3, 4, 5, 7	Input and output voltage tests, regulation tests, ripple tests.
	Replace		X					
	Repair		X				8	Fuses, cap Electrical.
	Overhaul				X		1, 2,3, ,5, 6,7,10	
POWER SUPPLY SUBASSEMBLIES	Replace -				X			
	Repair				X		1, 3	

Section XI. ALLOCATION TOOLS FOR MAINTENANCE FUNCTIONS (AN/GGM-5)							
TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY					TOOLS CODE	REMARKS
	O/C	O	DS	GS	D		
MULTIMETER TS-352/U				†	†	1	
OSCILLOSCOPE AN/USM-81				†	†	2	
TOOL KIT TK-21/G				†	†	3	
TRANSFORMER VARIABLE POWER CN-16/U				†	†	4	
VOLTMETER TS-443/U				†	†	5	
VOLTMETER, METER ME-30/U				†	†	6	
TELETYPEWRITER TEST SET AN/GGM-1				†	†	7	To be provided as shop support.
TOOLS AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE INSTALLER USER BECAUSE OF HIS ASSIGNED MISSION.		†				8	
POWER SUPPLY PP-351/U				†	†	9	
TRANSISTOR TEST SET TS-1100/U				†	†	10	

Add appendix IV after appendix III.

APPENDIX IV
ORGANIZATIONAL REPAIR PARTS LISTS
Section I. INTRODUCTION

1. General

a. This appendix lists the quantities of repair parts authorized for organizational maintenance and constitutes a basis of requisitioning when the major item of equipment is authorized to the organization. These equipments are issued on the basis of allowances prescribed in equipment authorization tables and other documents which are a basis of requisitioning.

b. Columns are as follows:

(1) *Federal stock number.* This column lists the 11-digit Federal stock number.

(2) *Designation by model*. Not used.

(3) *Description*. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(4) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(5) *Expendability*. Nonexpendable items are indicated by NX. Expendable items are not annotated.

(6) *Quantity incorporated in unit*. This column lists the quantity of each part found in a given assembly, component, or equipment.

(7) *Organizational*. The quantities indicated in this column are maximum levels of repair parts authorized to be kept on hand by units performing organizational maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(8) *Illustration*. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustration where the part, is shown.

2. Parts for Maintenance

When this equipment is used by Signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

3. Additional Repair Parts Authorization

An asterisk indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.

4. Requisitioning Information

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} = \text{number of parts authorized.}$$

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts authorized is less than 1, the quantity authorized will be 1.

(2) For all values above 1, fractional values below 0.5 will revert to the next lower number, fractional values of 0.5 or larger will advance to the next higher whole number.

c. The number of parts authorized, determined after application of a and b above, represent one prescribed load for a 15-day period. The items and computed quantities thereof must be on hand or on order at all times.

d. Major commanders will determine the number of prescribed loads organizational units will carry. Units and organizations authorized additional prescribed loads will utilize the formula explained in a above but will multiply the number of equipments supported by the number of authorized prescribed loads before completing the formula. Fractional values will be rounded to whole numbers as described above.

SECTION II. ORGANIZATIONAL FUNCTIONAL PARTS LIST (AN/GGM-1)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
							TEST SET, TELETYPEWRITER AN/GGM-1						
6625-893-1725							TEST SET, TELETYPEWRITER AN/GGM-1: type of tests; Alignment of start/stop and synchronous Telegraph Transmission Systems; measures peak distortion of telegraph signals; mounted in Rack, Shelf Adapter RS-IA/DAC-V, Rack, Shelf Adapter RS-2A/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph		NX			1	
							GROUP I TEST SET, TELETYPEWRITER TS-1512/GGM						
5920-356-2188							FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type FO2GR125A (Authorized allowances based on a total of 9.)			2	153.8	8	F2, F4
5920-280-5031							FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type FO2GR250A			1	*	8	F3
5920-280-4465							FUSE, CARTRIDGE: 1 amp, 250 v; MIL type FO2G1ROOA (Authorized allowances based on a total of 3.)			1	66.7	8	Fl
6240-892-4420							LAMP, GLOW: G.E. part #NE2D (Authorized allowances based on a total of 5.) (Items No. DS-2 (SIGNAL), DS-3 (EARLY), DS-4 (LATE))			3	*	26	See desc column
6240-722-6467							LAMP, INCANDESCENT: G.E. part #344 (Authorized allowances based on a total of 2.)			1	*	26	DS-1 (POWER)
6210-892-5737							LENS, INDICATOR LIGHT: Transitron Electronics part #RDL-7 (Authorized allowances based on a total of 6.)			4	*	26	POWER, SIGNAL, EARLY, LATE
							GROUP II OSCILLOSCOPE OS-119/GGM						
5920-283-7178							CAP, ELECTRICAL: Littelfuse part #342003SA-2 (Authorized allowances based on a total of 5.)			1	*	10	
5910-889-4363							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 v; Astron part #EYT12251			1	*	7	C31
5910-865-3009							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox part #AFH3-29-75			1	*	7	C29
5910-060-6708							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron part #EYT1220			1	*	7	C30

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-1 (continued)						
5960-503-4880		ELECTRON TUBE: type OA2WA; MIL-E-1			1	*	38	V17
5960-166-7648		ELECTRON TUBE: type OB2; MIL-E-1			3	*	38	V16, V18, V19
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	*	38	V15
5960-681-9802		ELECTRON TULE: type 6AU6WB; MIL-E-1			1	*	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			2	*	38	V3, V8
5960-669-8921		ELECTRON TUBE: type 12BH7A; M!L-E-1			2	*	38	V6, V11
5960-262-0210		ELECTRON TUBE: type 5814A; MIL-E-1			2	*	38	V5, V10
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			4	*	38	V1, V2, V4, V7
5960-855-2875		ELECTRON TUBES: matched; c/o 1 each GV3A, 1 each GV6A; Stelma part #A6473			1	*	38	V14
5920-284-6785		FUSE, CARTRIDGE: slo-blow; 2 amp, 125 v; MIL type F02D2R00B			1	*	10	F1
6240-683-0560		LAMP, INCA.TFESCENT: G.E. part #345			1	*	33	DS-5 (POWER)
6210-892-5737		LENS, INDICATOR, LIGHT (For authorized allowances see Group I.)			1		33	POWER
5960-296-4051		SHIELD, ELECTRON TUBE: Elco part #120V			1	*		
5960-264-1031		SHIELD, ELECTRON TUBE: Elco part #149V			4	*		
5960-284-9286		SHIELD, ELECTRON TUBE: Elco part #191V			8	*		
5960-548-9301		SHIELD, ELECTRON TUBE: Elco part #195V			2	*		
		GROUP III GENERATOR, TIME BASE SG-430(P)/GGM						
5995-061-0031		CRYSTAL UNIT, QUARTZ: 93.237 kc; MIL type CR-37/U-93.237KC		NX	1	*		Y1
5955-689-8286		CRYSTAL UNIT, QUARTZ: 102.400 kc; MIL type CR-37/U-102.400KC		NX	1	*		Y1

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GCM-1 (continued)						
5955-061-0032		CRYSTAL UNIT, QUARTZ: 115.200 kc; MIL type CR-37/U-115.200KC		NX	1	*		Y1
5455-813-9692		CRYSTAL UNIT, QUARTZ: 125.217 kc; MIL type CR-37/U-125.217KC		NX	1	*		Y1
5955-813-9743		CRYSTAL UNIT, QUARTZ: 152.016 kc; MIL type CR-37/U-152.016KC		NX	1	*		Y1
5955-813-9693		CRYSTAL UNIT, QUARTZ: 153.600 kc; MIL type CR-37/U-153.600KC		NX	2	*		Y1
5920-356-2188		FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		13	F2, F3
5920-280-4465		FUSE, CARTRIDGE (For authorized allowances see Group I.)			1		13	F1
6240-892-4420		LAMP, GLOW (For authorized allowances see Group I.)			1		34	DS-15
6240-020-5730		LAMP, INCADESCENT: Stelma part #B952OX			13	*	34	DS1 thru DS'7, DS-9 thru DS-14
6240-887-4770		LAMP, INCANDESCENT: Stelma part B39520/VAP			1	*	34	DS-8 (VAR)
6210-892-5737		LENS, INDICATOR, LIGHT (For authorized allowances see Group I.)			1		34	
5985-887-1804		MODULE, BAUD RATE CONTROL PL-1098/GGM		NX	1	*	12	(37.5)
5985-887-4100		MOD'JLE, BAUD RATE CONTROL PL-1099/GGM		NX	1	*	12	(45.5)
5985-887-4103		MODULE, BAUD RATE CONTROL PL-1100/GGM		NX	1	*	12	(61.14)
5985-887-4104		MODULE, BAUD RATE CONTROL PL-1101/GGM		NX	1	*	12	(74.2)
5985-887-1806		MODULE, BAUD RATE CONTROL PL-1102/GGM		NX	1	*	12	(12.5
5985-887-1807		MODULE, BAUD RATE CONTROL PL-1103/GGM		NX	1	*	12	(150)
5945-615-1457		RELAY, ARMATURE: Sigma part #72AOZ160TS-TCP			1	*	23	K1
		GROUP IV GENERATOR, TEST PATTERN SG-431/GCM						
5920-356-2188		FUSE, CARTRIDGE (For authorized allowances see Group I.)			3		16	F1, F2, F4
5920-280-4465		FUSE, CARTRIDGE (For authorized allowances see Group I.)			1		16	F3

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
							AN/GGM-1 (continued)						
6240-892-4420							LAMP, GLOW (For authorized allowances see Group I.)			1		27	DS-1 (SIGNAL)
6240-722-6467							LAMP, INCANDESCENT (For authorized allowances see Group I.)			1		27	DS2 (POWER)
6210-892-5719							LENS, INDICATOR, LIGHT: Transitron Electronic part #RD1L2			2	*	27	POWER & SIGNAL
							GROUP V POWER SUPPLY PP-2971/CGM						
5920-283-7178							CAP, ELECTRICAL (For authorized allowances see Group II.)			4		29	
5920-356-2188							FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		29	F1, F2
5920-295-7787							FUSE, CARTRIDGE: 5 amp, 250 v; MIL type FO2G5ROOA			2	50.0	29	F3, F4

SECTION III. ORGANIZATIONAL FUNCTIONAL PARTS LIST (AN/GGM-2)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		TEST SET, TELETYPEWRITER AN/GGM-2						
6625-893-1726		TEST SET, TELETYPEWRITER AN/GGM-2: Alignment of start/stop and synchronous Telegraph Systems, measures peak distortion of telegraph signals; mounted in Equipment Housing EH-1/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph		NX			2	
		GROUP I TEST SET, TELETYPEWRITER TS-1512/GGM						
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type FO2GR125A (Authorized allowances based on a total of 9.)			2	153.8	8	F2, F4
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type FO2GR250A			1	*	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type FO2GLROOA (Authorized allowances based on a total of 3.)			1	66.7	8	F1
6240-892-4420		LAMP, GLOW: G.E. part #NE2D (Authorized allowances based on a total of 5.) (Items No. DS-2 (SIGNAL), DS-3 (EARLY), DS-4 (LATE))			3	*	26	See desc column
6240-722-6467		LAMP, INCANDESCENT: G.E. part #344 (Authorized allowances based on a total of 2.)			1	*	26	DS-1 (POWER)
6210-892-5737		LENS, INDICATOR LIGHT: Transitron Electronic part #RDL-7 (Authorized allowances based on a total of 6.)			4	*	26	POWER, SIGNAL, EARLY, LATE
		GROUP II OSCILLOSCOPE OS-119/GGM						
5920-283-7178		CAP, ELECTRICAL: Littelfuse part #342003SA-2 (Authorized allowances based on a total of 5.)			1	*	10	
5910-889-4363		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 v; Astron part #EYT12251			1	*	7	C31
5910-865-3009		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox part #AFH3-29-75			1	*	7	C29
5910-060-6708		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron part #EYT1220			1	*	7	C30
5960-503-4880		ELECTRON TUBE: type OA2WA; MILE-1			1	*	38	V17

SECTION III. ORGANIZATIONAL FUNCTIONAL PARTS LIST (AN/GGM-2)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-2 (continued)						
5960-166-7648		ELECTRON TUBE: type OB2; MIL-E-1			3	*	38	V16, V8, V1
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	*	38	V15
5960-681-9802		ELECTRON TUBE: type 6AU6WB; MIL-E-1			1	*	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			2	*	38	V3,V8
5960-669-8921		ELECTRON TUBE: type 12BH7A; MIL-E-1			2	*	38	V6,V11
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			4	*	38	V1,V2,V4, V7
5960-262-0210		ELECTRON TUBE: type 5814A; MIL-E-1			2	*	38	V5,V10
5960-855-2875		ELECTRON TUBES: matched; c/o 1 each GV3A, 1 each GV6A; Stelma part #A6473			1	*	38	V14
5920-284-6785		FUSE, CARTRIDGE: slow-blo; 2 amp, 125 v; MIL type F02D2ROOB			1	*	10	F1
6240-683-0560		LAMP, INCANDESCENT: G.E, part #345			1	*	33	DS-5 (POWER)
6210-892-5737		LENS, INDICATOR LIGHT (For authorized allowances see Group I.)			1		33	POWER
5960-296-4051		SHIELD, ELECTRON TUBE: Elco part #120V			1	*		
5960-264-1031		SHIELD, ELECTRON TUBE: Elco part #149V			4	*		
5960-284-9286		SHIELD, ELECTRON TUBE: Elco part #191V			8	*		
5960-548-9301		SHIELD, ELECTRON TUBE: Elco part #195V			2	*		
		GROUP III GENERATOR, TIME BASE SG-430(P)/GGM						
5955-061-0031		CRYSTAL UNIT, QUARTZ: 93.237 kc; MIL type CR-37/U-93.237KC		NX	1	*		Y1
5955-689-8286		CRYSTAL UNIT, QUARTZ: 102.400 kc; MIL type CR-37/U-102.400KC		NX	1	*		Y1
5955-061-0032		CRYSTAL UNIT, QUARTZ: 115.200 kc; MIL type CR-37/U-115.200KC		NX	1	*		Y1
5955-813-9692		CRYSTAL UNIT, QUARTZ: 125.217 kc; MIL type CR-37/U-125.217KC		NX	1	*		Y1

SECTION III. ORGANIZATIONAL FUNCTIONAL PARTS LIST (AN/GGM-2)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION	
												FIG. NO.	ITEM NO.
							AN/GGM-2 (continued)						
5955-813-9743							CRYSTAL UNIT, QUARTZ: 152.016 kc; MIL type CR-37/U-152.016KC		NX	1	*		Y1
5955-813-9693							CRYSTAL UNIT, QUARTZ: 153.600 kc; MIL type CR-37/U-153.600KC		NX	2	*		Y1
5920-356-2188							FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		13	F2, F3
5920-280-4465							FUSE, CARTRIDGE (For authorized allowances see Group I.)			1		13	F1
6240-892-4420							LAMP, GLOW (For authorized allowances see Group I.)			1		34	DS-15
6240-020-5730							LAMP, INCANDESCENT: Stelma part #B9520X			7	*	34	DS-1 thru DS-7, DS-9 thru DS-14
6240-887-4770							LAMP, INCANDESCENT: Stelma part #B9520/VAR			1	*	34	DS-8 (VAR)
6210-892-5737							LENS, INDICATOR LIGHT (For authorized allowances see Group I.)			1		34	
5895-887-1804							MODULE, BAUD RATE CONTROL PL-1098/GGM		NX	1	*	12	(37.5)
5895-887-4100							MODULE, BAUD RATE CONTROL PL-1099/GGM		NX	1	*	12	(45.5)
5895-887-4103							MODULE, BAUD RATE CONTROL PL-1100/GGM :		NX	1	*	12	(61.14)
5895-887-4104							MODULE, BAUD RATE CONTROL PL-1101/GGM		NX	1	*	12	(74.2)
5895-887-1806							MODULE, BAUD RATE CONTROL PL-1102/GGM		NX	1	*	12	(112.5)
5895-887-1807							MODULE, BAUD RATE CONTROL PL-1103/GGM		NX	1	*	12	(150)
5945-615-1457							RELAY, ARMATURE: Sigma part #72AOZ160TS-TCP			1	*	23	K1
							GROUP IV GENERATOR, TEST PATTERN SG-431/GGM						
5920-356-2188							FUSE, CARTRIDGE (For authorized allowances see Group I.)			3		16	F1, F2, F4
5920-280-4465							FUSE, CARTRIDGE (For authorized allowances see Group I.)			1		16	F3
6240-892-4420							LAMP, GLOW (For authorized allowances see Group I.)			1		27	DS-1 (SIGNAL)

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION	
												FIG. NO.	ITEM NO.
							AN/GGM-2 (continued)						
6240-722-6467							LAMP, INCANDESCENT (For authorized allowances see Group I.)			1		27	DS-2 (POWER)
6210-892-5719							LENS, INDICATOR LIGHT: Transitron Electronic part #RDL-2			2	*	27	POWER, SIGNAL
							GROUP V POWER SUPPLY PP-2971/GGM						
5920-283-7178							CAP, ELECTRICAL (For authorized allowances see Group II.)			4		29	
5920-356-2188							FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		29	F1,F2
5920-295-7787							FUSE, CARTRIDGE: 5 amp, 250 v; MIL type FO2G5ROOA			2	50.0	29	F3,F4

FEDERAL STOCK NO.	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
							TEST SET, TELETYPEWRITER AN/GGM-3						
6625-893-1727							TEST SET, TELETYPEWRITER AN/GGM-3: measures peak distortion of Telegraph Signals; provides automatic means of viewing signals; transmits "quick brown fox" test message; mounted in Rack, Shelf Adapter RS-LA/DAC-V Rack, Shelf Adapter RS-2B/DAC-V; oper pwr rqmts, 115 vac, 50/60 cyc, single ph		NX			3	
							GROUP I RACK SHELF ADAPTER RS-2B/DAC-V						
5920-356-2188							FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type FO2GR125A (Authorized allowances based on a total of 8.)			1	140.0	23	F1
							GROUP II TEST SET, TELETYPEWRITER TS-1512/GGM						
5920-356-2188							FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		8	F2, F4
5920-280-5031							FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type FO2GR250A			1	*	8	F3
5920-280-4465							FUSE, CARTRIDGE: 1 amp, 250 v; MIL type FO2G1R00A (Authorized allowances based on a total of 2.)			1	50.0	8	F1
6240-892-4420							LAMP, GLOW: G.E. part #NE2D (Authorized allowances based on a total of 4.) (Items No. DS-2 (SIGNAL), DS-3 (EARLY), DS-4 (LATE))			3	*	26	See desc column
6240-722-6467							LAMP, INCANDESCENT: G.E. type #344 (Authorized allowances based on a total of 2.)			1	*	26	DS-1 (POWER)
6210-892-5737							LENS, INDICATOR LIGHT: Transitron Electronics part #RDL-7 (Authorized allowances based on a total of 5.)			4	*	26	POWER, SIGNAL, EARLY, LATE
							GROUP III OSCILLOSCOPE OS-119/GGM						
5920-283-7178							CAP, ELECTRICAL: Littelfuse part #342003SA-2 (Authorized allowances based on a total of 5.)			1	*	10	
5910-889-4363							CAPACITOR, FIXED, ELECTROLYTIC: 40-40-80 uf, 350 v; Astron part #EYT12251			1	*	7	C31

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGA NIZAT IONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-3 (continued)						
5910-865-3009		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox part #AFH3-29-75			1	*	7	C29
5910-060-6708		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron part #EYT1220			1	*	7	C30
5960-503-4880		ELECTRON TUBE: type 0A2WA; MIL-E-1			1	*	38	V17
5960-166-7648		ELECTRON TUBE: type 0B2; MIL-E-1			3	*	38	V16, V18, V19
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	*	38	V15
5960-681-9802		ELECTRON TUBE: type 6AU6WB; MIL-E-1			1	*	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			2	*	3	V3, V8
5960-669-8921		ELECTRON TUBE: type 12BH7A; MIL-E-1			2	*	3	V6, V11
5960-262-0210		ELECTRON TUBE: type 5814A; MIL-E-1			2	*	38	V5, V10
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			4	*	38	V1, V2, V4 V7
5960-855-2875		ELECTRON TUBES: matched; c/o 1 each GV3A, 1 each GV6A; Stelma part #A6473			1	*	38	V14
5920-284-6785		FUSE, CARTRIDGE: slow-blo; 2 amp, 250 v; MIL type FO2D2R00B			1	*	10	F1
6240-683-0560		LAMP, INCANDESCENT: G.E. part #345			1	*	33	DS-6 (POWER)
6210-892-5737		LENS, INDICATOR LIGHT (For authorized allowances see Group II.)			1	*	33	POWER
5960-296-4051		SHIELD, ELECTRON TUBE: Elco part #120V			1	*		
5960-264-1031		SHIELD, ELECTRON TUBE: Elco part #149V			4	*		
5960-284-9286		SHIELD, ELECTRON TUBE: Elco part #191V			8	*		
5960-548-9301		SHIELD, ELECTRON TUBE: Elco part #195V			2	*		

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-3 (continued)						
		GROUP IV GENERATOR, TEST PATTERN SG-431/GGM						
5920-356-2188		FUSE, CARTRIDGE (For authorized allowances see Group I.)			3		16	F1, F2, F4
5920-280-4465		FUSE, CARTRIDGE (For authorized allowances see Group II.)			1		16	F3
6240-892-4420		LAMP, GLOW (For authorized allowances see Group II.)			1		27	DS-1 (SIGNAL)
6240-722-6467		LAMP, INCANDESCENT (For authorized allowances see Group II.)			1		27	DS-2 (POWER)
6210-892-5719		LENS, INDICATOR LIGHT: Transitron Electronics part #RDL-2			2	*	27	POWER, SIGNAL
		GROUP V POWER SUPPLY PP-2971/GGM						
5920-283-7178		CAP, ELECTRICAL (For authorized allowances see Group III.)			4		29	
5920-356-2188		FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		29	F1, F2
5920-295-7787		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type FO2G5R00A			2	50.0	29	F3, F4
		GROUP VI RACK, SHELF ADAPTER RS-1A/DAC-V						
5945-615-1457		RALAY, ARMATURE: Sigma part #72AOZ160TS-TCP			1	*	23	K1

SECTION V. ORGANIZATIONAL FUNCTIONAL PARTS LIST (AN/GGM-4)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		TEST SET, TELETYPEWRITER AN/GGM-4						
6625-803-1728		TEST SET, TELETYPEWRITER AN/CGM-4: measures peak distortion of Telegraph Signals; automatic means of viewing signals while traffic is being transmitted; mounted in Rack, Shelf Adapter RS-1A/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph		NX			4	
		GROUP I TEST SET, TELETYPEWRITER TS-1512/GGM						
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type FO2GR125A (Authorized allowances based on a total of 4.)			2	82.4	8	F4, F4
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type FO2GR250A			1	*	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type FO2G1R00A			1	*	8	F1
6240-892-4420		LAMP, GLOW: G.E. part #NE2D (Items No. DS-2 (SIGNAL), DS-3 (EARLY), DS-4 (LATE))			3	*	26	See desc column
6240-722-6467		LAMP, INCANDESCENT: G.E. part #344			1	*	26	DS-1 (POWER)
6210-892-5737		LENS, INDICATOR LIGHT: Transitron Electronics part #RDL-7 (Authorized allowances based on a total of 5.)			4	*	26	POWER, SIGNAL, EARLY, LATE
		GROUP II OSCILLOSCOPE OS-119/GGM						
5920-283-7178		CAP ELECTRICAL: Littelfuse part #342003SA-2 (Authorized allowances based on a total of 5.)			1	*	10	
5910-889-4363		CAPACITOR, FIXED, FIXED ELECTROLYTIC-: 40-40-80 uf, 350 v; Astron part #EYT12251			1	*	7	C31
5910-865-3009		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 35 v; Aerovox part #AFH3-29-75			1	*	7	C29
5910-060-6708		CAPACITOR, FIXED, ELECTROLYTIC: 40-40-120 uf, 350 v; Astron part #EYT1220			1	*	7	C30
5960-503-4880		ELECTRON TUBE: type 0A2WA; MIL-E-1			1	*	38	V17

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGA NIZAT IONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
		AN/GGM-4 (continued)						
5960-166-7648		ELECTRON TUBE: type 0B2; MIL-E-1			3	*	38	V16, V18, V19
5960-272-8553		ELECTRON TUBE: type 1X2B; MIL-E-1			1	*	38	V15
5960-681-9802		ELECTRON TUBE: type 6AU6WB; MIL-E-1			1	*	38	V9
5960-715-3894		ELECTRON TUBE: type 6DJ8; MIL-E-1			2	*	38	V3, V8
5960-669-8921		ELECTRON TUBE: type 12BH7A; MIL-E-1			2	*	38	V6, V11
5960-262-0210		ELECTRON TUBE: type 5814A; MIL-E-1			2	*	38	V5,V10
5960-669-6838		ELECTRON TUBE: type 5963; MIL-E-1			4	*	38	V1, V2, V4, V7
5960-855-2875		ELECTRON TUBES: matched; c/o 1 each GV3A, 1 each GV6A; Stelma. part #A6473			1	*	38	V14
5920-284-6785		FUSE, CARTRIDGE: slow-blo; 2 amp, 125 v; MIL type FO2D2R00B			1	*	10	F1
6240-683-0560		LAMP, INCANDESCENT: G.E. part #345			1	*	33	DS-5 (POWER)
6210-892-5737		LENS, INDICATOR LIGHT (For authorized allowances see Group I.)			1		33	POWER
5960-296-4051		SHIELD, ELECTRON TUBE: Elco part #120V			1	*		
5960-264-1031		SHIELD, ELECTRON TUBE: Elco part #149V			4	*		
5960-284-9286		SHIELD, ELECTRON TUBE: Elco part #191V			8	*		
5960-548-9301		SHIELD, ELECTRON TUBE: Elco part #195V			2	*		
		GROUP III POWER SUPPLY PP-2971/GGM						
5920-283-7178		CAP, ELECTRICAL (For authorized allowances see Group II.)			4		29	
5920-356-2188		FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		29	F1, F2
5920-295-7787		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type FO2G5R00A			2	50.0	29	F3, F4

SECTION VI. ORGANIZATIONAL FUNCTIONAL PARTS LIST (AN/GGM5)

FEDERAL STOCK NO.	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION FIG. NO.	ILLUSTRATION ITEM NO.
6625-893-1735		TEST SET, TELETYPEWRITER AN/GGM-5: measures peak distortion of. telegraph signals; mounted in Rack, Shelf Adapter 3S-1R/DAC-V; oper pwr rqmts; 115 vac, 50/60 cyc, single ph		NX				
		GROUP I TEST SET, TELETYPEWRITER TS-1512/GGM						
5920-356-2188		FUSE, CARTRIDGE: 1/8 amp, 250 v; MIL type FO2GR125A (Authorized allowances based on a total of 6.)			4	J111.9	8	F2, F4
5920-280-5031		FUSE, CARTRIDGE: 1/4 amp, 250 v; MIL type FO2GR250A			2	50:0	8	F3
5920-280-4465		FUSE, CARTRIDGE: 1 amp, 250 v; MIL type FO2G1R00A			2	50.0	8	F1
6240-892-4420		LAMP, GLOW: G.E. part #NE2D (Items No. DS-2 (SIGNAL), DS-2 (EARLY), DS-4 (LATE))			6	*	26	See desc column
6240-722-6467		LAMP, INCANDESCENT: G.E. part #344			2	*	26	DS-1 (POWER)
6210-892-5737		LENS, INDICATOR LIGHT: Transitron Electronics part #RDL-7			8	*	26	POWER, SIGNAL, EARLY, LATE
		GROUP II POWER SUPPLY PP-2971/GGM						
5920-283-7178		CAP, ELECTRICAL: Littelfuse part #342003SA-2			4	*	29	
5920-356-2188		FUSE, CARTRIDGE (For authorized allowances see Group I.)			2		29	F1, F2
5920-295-7787		FUSE, CARTRIDGE: 5 amp, 250 v; MIL type FO2G5ROOA			2	50.0	29	F3, F4

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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Svc Colleges (2)
Br Svc Sch (2)
USASTO (2)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
Army Pic Cen (2)
WRAMC (1)
Instl (2) except
Ft Monmouth (70)
Ft Hancock (4)
Ft Huachuca (10)
Ft Gordon (10)
Ft Carson (25)
Ft Knox (12)
WSMR (5)
GENDEP (2)
Sig Sec GENDEP (5)
Sig Dep (12)
A Dep (2) except
SAAD (30)
TOAD (14)
FTWOAD (10)
LEAD (7)
SHAD (3)
NAAD (5)
SVAD (5)
CHAD (3)
ATAD (10)
LBAD (14)
Sig Fld Maint Shops (2)
AMS (1)
USAERDAA (2)
USAERDAW (13)
Units organized under following TOE's (2 copies each):

11-57	11337
11-97	11-500 (AA-AC)
11-98	11-i87
11-117	11-502
11-155	11-597
11-157	

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

Operator and Organization Maintenance Manual
TEST SETS, TELETYPEWRITER, AN/GGM-1, AN/GGM-2,
AN/GGM-3, AN/GGM-4, AND AN/GGM-5

CHANGE No. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *9 March 1964*

TM 11-6625-422-12, 6 October 1961, is changed as follows:

Note. The parenthetical reference to previous changes (example: "page 1 of C 3") indicates that pertinent material was published in that changes.

At the places listed below (page 1 of C 3), delete the existing data opposite "Frequencies" (or "Frequency") and substitute: 9.6 kc, 11.65 kc, 15.65 kc, 19.00 kc, 28.80 kc (12.80 kc on equipment bearing order No. 15559PP-63 or 15644-PP-63), 38.4 kc, and 7.68 kc to 28.18 kc (continuously variable).

Page 4, paragraph 4*a* second item under "Input timing signals".

Page 5, paragraph 4:

Subparagraph c, first item under "Output timing signals".

Subparagraph 4d, second item under "Input timing signals".

Add the following note in the places listed below:

Note. Before using a time base generator make sure that it has the same baud rate provisions as the equipment with which it is used.

Page 23, after paragraph 14a.

Page 43, after paragraph 28a.

Page 43, paragraph 29, above subparagraph *a*.

Page 3, paragraph 2 (page 1 of C 3). Delete subparagraph c and substitute:

c. Reporting of Equipment Manual Improvements. The direct reporting, by the individual user, of errors, omissions, and recommendations for improving this equipment manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Technical Manuals Parts Lists or Supply Manual 7, 8, or 9) will be used for reporting these improvements. This form will be completed in triplicate, using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N. J., 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc.).

Page 7, paragraph 7a, line 2. Delete "paragraph 5a" and substitute "appendix III".

Paragraph 8b, line 3. After "(fig. 8)," add: or 8.1).

Line 11. After "rear panel", add: The location of input filter capacitors on digital distortion analyzers procured on order No. 15559-PP-3 or 15644-PP-63 is shown in figure 8.1.

Paragraph 10a, line 3. After "(fig. 12)", add: The location of printed circuit cards in the time base generators procured on order No. 15559-PP-63 or 15644-PP-63 is shown in figure 12.1.

Page 15, figure 8 (page 3 of C 3). In the figure caption, after "analyzer", add: (*bearing any order number except 15559-PP-6S and 15644-PP-63*).

Add figure 8.1 after figure 8.

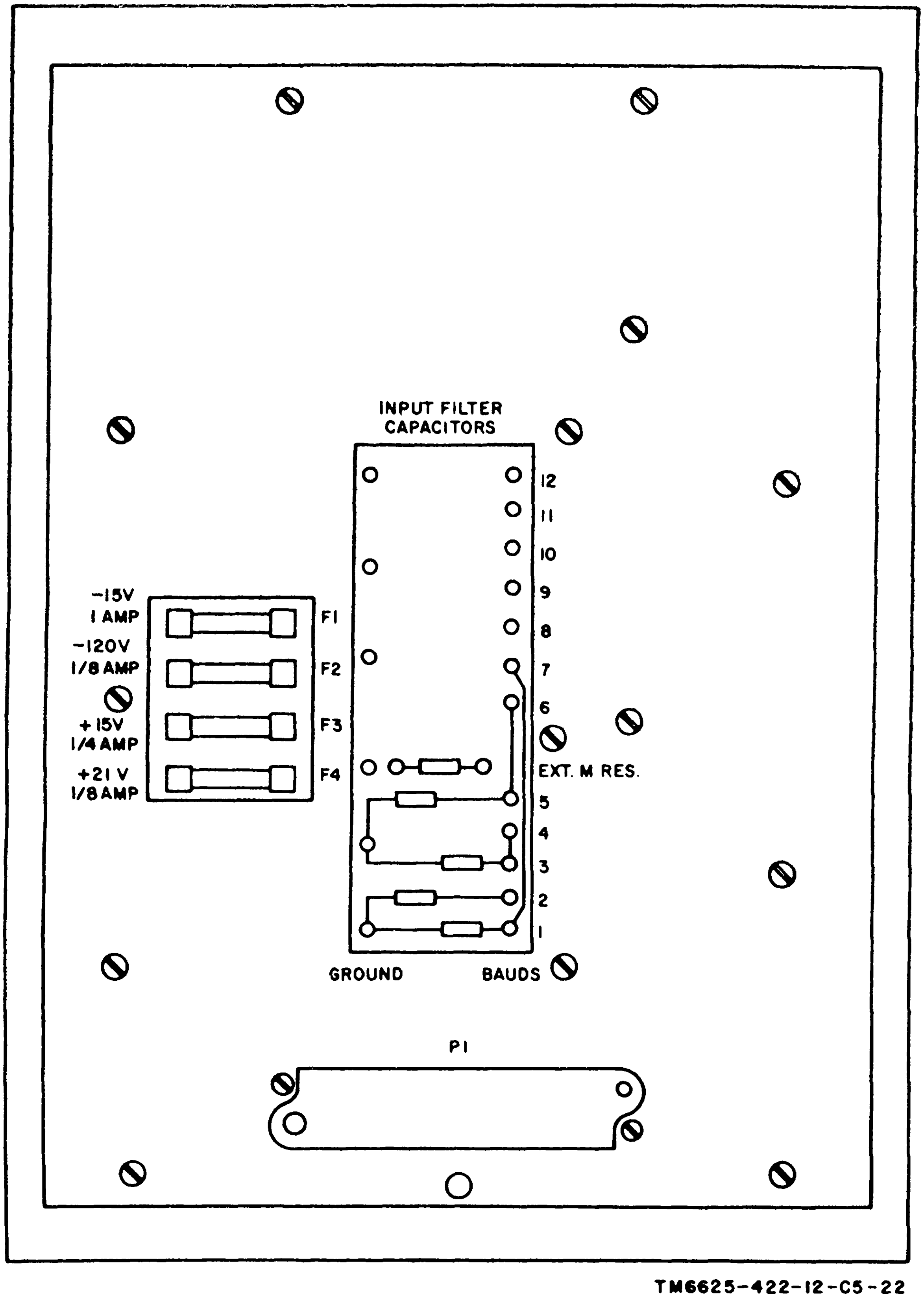


Figure 8.1. Digital distortion analyzer (bearing No. 15559-PP-63 or 15644-PP-63), rear view.

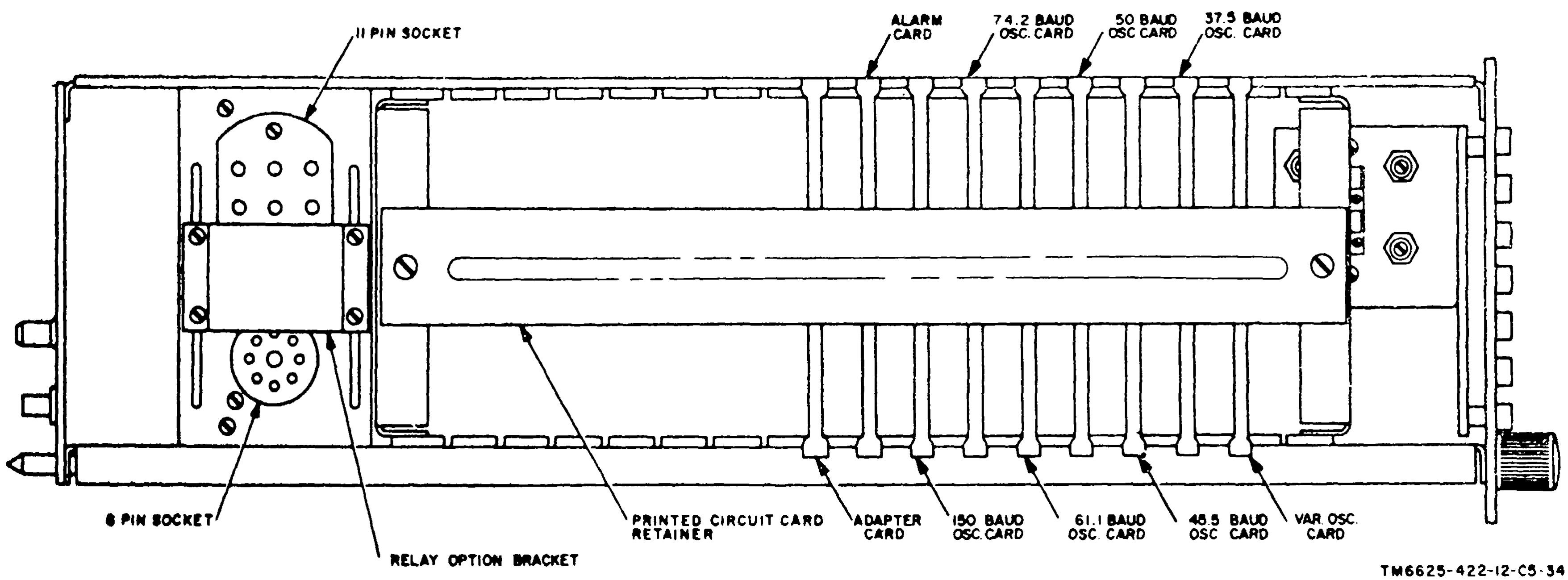


Figure 12.1. Time base generator (bearing No. 15559-PP-63 or 15644-PP-63), left side view.

Page 19, figure 12. In the figure caption, after "generator", add: (*bearing any order number except 15559-PP-63 and 15644-PP-63*).

Add figure 12.1 after figure 12.

Page 23, paragraph 15. Delete paragraph 15 and substitute:

15. Differences in Models

a. Various combinations of components used in the AN/GGM-1 and AN/GGM-2 (figs. 1 and 2) are employed in the AN/GGM3, AN/GGM-4, and AN/GGM-5 (figs. 3, 4, and 5). These components are interchangeable if they are equipped to supply the same baud rates.

Note

The AN/GGM-1 and AN/GGM-2, procured on order No. 16559-PP-65, and the AN/GGM-3 and AN/GGM-5, procured on order No. 15644-PP-63, differ from equivalent models procured on other order numbers as indicated in b below.

b. The time base generators, the digital distortion analyzers, and the test pattern distortion generators procured on order No. 15559PP-63 or 15644-PP-63 differ from equivalent components, procured on other order numbers as follows:

(1) *Time base generator* (figs. 12 and 12.1).

(*a*) A 112.5-baud printed circuit card is not provided, and the 74.2-baud printed circuit card has been inserted in its place.

(*b*) The 61.1-baud printed circuit card has been inserted in the position previously occupied by the 742baud printed circuit card.

(*c*) A 50-baud printed circuit card has been inserted in the position previously occupied by the 61.1-baud printed circuit card.

(*d*) The lamps in the left-hand column on the front panel (fig. 34) are marked so that, from top to bottom, they indicate VAR, 37, 45, 50, 61, 74, and 150.

(2) *Digital distortion analyzer* (figs. 8 and 8.1), The input filter capacitors (fig. 8) have been reconnected (fig. 8.1) and the markings on the front panel BAUDS switch (fig. 26) have been changed to VAR, 37, 45, 50, 61, 74, and 150 in order to reflect the new timing input signal arrangement ((1) above).

(3) Test pattern distortion generator (fig. 27). The markings on the test pattern distortion generator front panel BAUDS switch have been changed to VAR, 37, 45, 50, 61, 74, and 150 in order to reflect the new timing input signal arrangement ((1) above).

Page 33, figure 21. Add the following note:

NOTE:

ON ORDER No. 15559-PP-63. OUTPUT TIMING COAXIAL CONNECTORS 1 THROUGH 7 ARE DESIGNATED | VAR |, | 37.5 |, | 45 5 |, | 50 |, | 61.1 |, | 74.2 |, AND | 150 |, RESPECTIVELY.

Page 34, figure 22. Add the following note:

NOTE:

ON ORDER No. 15559-PP-63. OUTPUT TIMING COAXIAL CONNECTORS ARE DESIGNATED. FROM LEFT-TO-RIGHT.
| VAR |, | 37.5 |, | 45.5 |, | 50 1 |, | 61.1 |, | 74.2 |, AND | 150 |, RESPECTIVELY.

Page 36, figure 23. Add the following note:

NOTE:

ON ORDER No. 15559-PP-63. OUTPUT TIMING COAXIAL CONNECTORS DESIGNATED | 61.1 |, | 74.2 | AND | 112.5 |, ARE DESIGNATED | 50 |, | 61.1 |, AND |74.2 |, RESPECTIVELY.

Page 38, figure 25. Add the following note:

NOTE:

ON ORDER No. 16644-PP-63. OUTPUT TIMING COAXIAL CONNECTORS DESIGNATED | 61.1 |, | 74.2 |, AND | 112.5 |, ARE DESIGNATED | 50 |, | 61.1 |, AND | 74.2 |, RESPECTIVELY.

Page 39, figure 26. Add the following note:

NOTE:

ON ORDER Nos. 15559-PP-63 AND 156644-PP-63. | BAUDS | SWITCH IS MARKED |VAR |, | 37 |, | 46 |, 50 |, 61 |, | 74 |, AND | | 150 |.

Page 41, figure 27. Add. the following note:

NOTE:

ON ORDER Nos. 15565PP43 AND 1556-PP-63,| BAUDS |, SWITCH IS MARKED | VAR |, | 37 | | 45 |, 50 |, 61 |, | 74 |, AND | 150 |,

Page 58; figure 34. Add the following note:

NOTE:

ON ORDER Nos. 15669-PP-63 AND 16644-PP-63, LAMPS MARKED | 61 | | 74 |, AND | 112 |, ARE MARKED | 50 |, |61 |, AND |74 |, RESPECTIVELY.

Page 88, paragraph 61b. Make the following changes:

Line 2. After "figure 12", add: or 12.1.

Chart. Delete the chart and substitute:

Symptom	Probable trouble	Corrective measures
AN/GGM-(') is defective when operated from variable frequency oscillator (VAR).	Defective variable frequency oscillator assembly.	Replace variable frequency oscillator assembly.
AN/GGM-(') is defective when operated at 37.5 bauds.	Defective 37.5-baud oscillator assembly -	Replace 37.5-baud oscillator assembly.
AN/GGM-(') is defective when operated at 45.5 bauds.	Defective 45.5-baud oscillator assembly	Replace 45.5-baud oscillator assembly.
AN/GGM-1, AN/GGM-2, AN/GGM-3, or AN/GGM-5 is defective at 50 bauds (equipment procured on order No. 15559-PP-63 or 15644-PP-63 only).	Defective 50-baud oscillator assembly (equipment procured on order No. 15559-PP-63 or 15644-PP-63 only).	Replace 50-baud oscillator assembly (equipment procured on order No. 15559-PP-63 or 15644-PP-63 only).
AN/GGM-(') is defective when operated at 61.1 bauds.	Defective 61.1-baud oscillator assembly	Replace 61.1-baud oscillator assembly.
AN/GMM-(') is defective when operated at 74.2 bauds.	Defective 74.2-baud oscillator assembly	Replace 74.2-baud oscillator assembly.
AN/GMM-(') is defective when operated at 112.5 bauds. (Not applicable to equipment procured on order No. 15559-PP-63 or 15664-PP-63.)	Defective 112.5-baud oscillator assembly. (Not applicable to equipment procured on order No. 15559-PP-63 or 15644-PP-63.)	Replace 112.5-baud oscillator assembly. (Not applicable to equipment procured on order No. 15559-PP-63 or 15644-PP-63.)
AN/GMM-(') is defective when operated at 150 bauds.	Defective 150-baud oscillator assembly	Replace 150-baud oscillator assembly.
Faulty distribution of timing signals to AN/GGM-(') component equipments.	Defective interunit wiring -	Make continuity checks of interunit wiring to time base generator jack (2J2). Use figure 46, 47, or 48, as appropriate, as guide when making checks.
Time base generator oscillator alarm functions incorrectly.	Defective alarm assembly	Replace oscillator alarm assembly.

Page 91, figure 38. Under "V16", change "OA2" to: OB2. Under "V17", change "OA2" to: OA2WA.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:
Active Army:
DASA (6)
USASA (2)
CNGB (1)
CSigO (7)
CofT (1)
CofEngrs (1)
CofSptS (1)
TSG (1)
USA CD Agc.v (2)
USAMC (5)
USCONARC (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
Base Comd (2)
LOGCOMD (2)
USAECOM (7)
USAMICOM (4)
USASCC (4)
MDW (1)
Armies (2)
Corps (2)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
USASTC (2)
Instl (2) except
Ft Monmouth (63)
Ft Hancock (4)
GENDEP (OS) (2)
Sig Sec, GENDEP (5)
Sig Dep (OS) (12)
A Dep (2) except
Lexington (12)
Sacramento (28)
Tobyhanna (12)
Ft Worth (8)
Svc Colleges (2)
Br Svc Sch (2) except
USMA (2)
WRAMC (2)
USA Trans Tml Comd (1)
Army Tml (1)
USAOSA (1)
POE (1)
AMS (1)
Army Pic Cen (2)
USA Mbl Spt Cen (1)
USA Elct Mat Agcy (12)
Chicago Proc Dist (1)
Sig Fld Maint Shops (3)
USA Elct RD Actv
Ft Huachuca (2)
White Sands (13)
WSMR (5)
Yuma PG (2)
USA Corps (3)
USASA 1st Fld Sta (5)
ME Sig Agcy (5)
Letterkenny A Dep (5)
Pt Gordon (5)
Ft Huachuca (10)
Units org under fol TOE:
(2 copies each UNOINDC)
11-16
11-57
11-97
11-98
11-117
11-155
11-157
11-500 (AA-AE) (4)
11--557
11-587
11-592
11-597

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL

Operator and Organizational Maintenance Manual

TEST SETS, TELETYPEWRITER AN/GGM-I, AN/GGM-2, AN/GGM-3, AN/GGM-4, AND AN/GGM-5

TM 11-6625-422-12
CHANGES NO. 4

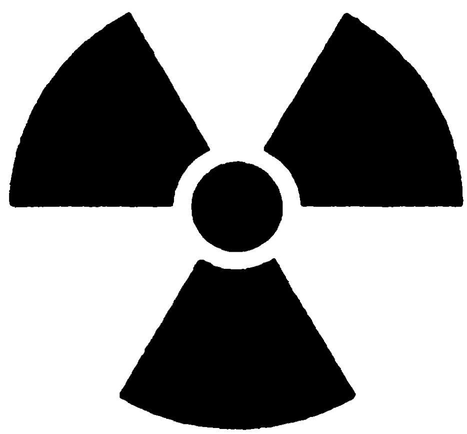
**HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C.**, *19 July 1963*

TM 11-6625-422-12, 6 October 1961, is changed as follows:

Note. The parenthetical reference to previous changes (example: "page 18 of C 2") indicates that pertinent material was published in that changes.

Inside front cover, **RADIATION HAZARDS** notice. Delete the notice and substitute:

RADIATION HAZARDS



STD-RW-2

**NI 63
Co 60**

Tubes types OA2WA and OB2WA used in the OS-119/GGM contain radioactive material. These tubes are potentially hazardous when broken; see qualified medical personnel and the Safety Director if you are exposed to or cut by broken tubes. Use extreme care in replacing these tubes (par. 63) and follow safety procedures in their handling, storage, and disposal.

Never place radioactive tubes in your pocket.

Use extreme care not to break radioactive tubes while handling them.

Never remove radioactive tubes from cartons until ready for use.

Refer to paragraph 67.1 for handling, storage, and disposal of radioactive material.

Page 5, paragraph *4b*. After last line, add: Radioactive tubes:

Item	Isotope	Quantity (microcuries)
OA2WA	Ni 63	0.01 - 0.05
	Co 60	0.0067
OB2WA	Ni 63	0.01 - 0.05
	Co 60	0.0067

Page 68. Make the following changes:

Paragraph 50. Delete subparagraph *a* and substitute:

a. General. The maintenance duties assigned to the operator of the AN/GGM-(*) are listed below, together with a reference to the paragraph covering the specific maintenance function. The duties assigned require the materials indicated in b below.

(1) Daily preventive maintenance checks and services (par. 51.2).

(2) Weekly preventive maintenance checks and services (par. 51.3).

(3) Visual inspection (par. 52).

(4) Equipment performance checklist (par. 53).

Paragraph 51. Delete paragraph 51 and substitute:

51. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 51.1 through 51.3 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (pars. 51.2 and 51.3) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the reference column lists the illustrations, paragraphs, or manuals that contain supplementary information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of the checks and services must be made in accordance with the requirements set forth in TM 38-750.

51.1. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the AN/GGM-(*) are required on a daily and weekly basis.

a. Paragraph 51.2 specifies checks and services that must be accomplished daily and under the conditions listed below.

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each week if the equipment is maintained in standby condition.

b. Paragraph 51.3 specifies *additional* checks and services that must be performed *once* each week.

51.2. Daily Preventive Maintenance Checks and Services Chart

Sequence. No.	Item	Procedure	Reference
1	End item equipment	Inspect equipment for completeness	App. III and figs. 1-5.

Sequence. No.	Item	Procedure	Reference
2	Cases and front panels	Wet a cloth with cleaning compound and clean cases and front panels; dry cases and front panels thoroughly with lint-free cloth.	Figs. 1-5.
3	Indicator lamps and meters	While making operating checks (item 5 below), check for burned-out indicator lamps, broken glass on meters, and sticking needles in meters.	Figs. 1-5.
4	Knobs and switches	While making operating checks (item 5 below), observe that mechanical action of each knob and switch is smooth and free of external and internal binding.	Figs. 1-5.
5	Operation	Check equipment operation	Par. 53.

51.3. Weekly Preventive Maintenance Checks and Services Chart

Note. Items 4 and 5 in the chart below should also be performed each time connections are changed.

Sequence. No.	Item	Procedure	Reference
1	Exterior cases and front panels.	Tighten loose screws, bolts, and mountings	Figs. 1-5.
2	External cables and cords	Inspect for cuts, cracked or gouged jackets, fray-ing, bad bruises, or kinks.	None.
3	Exposed metal surfaces	Inspect for rust and corrosion	Figs. 1-5.
4	Test pattern distortion gen-erator loop current (AN/GGM-1, AN/GGM-2, and AN/GGM-3 only).	Adjust loop current	Par. 30*b*.
5	Relay bias (AN/GGM-1, AN/GGM-2, and AN/	Adjust relay bias	Par. 30*c*.

Page 69. Delete figure 36.

Page 70. Delete figure 37.

Page 86. Make the following changes:

Paragraph 55. Delete subparagraph a and substitute:

a. The maintenance duties assigned to second echelon maintenance personnel are listed below, together with a reference to the paragraph covering the specific maintenance function. The duties assigned require the tools indicated in b below.

(1) Monthly preventive maintenance checks and services (par. 56.2).

(2) Visual inspection (par. 57).

(3) Troubleshooting (pars. 58-62).

(4) Tube testing and replacement (par. 63)

(5) Removal and replacement of printed circuit card assemblies (par. 64).

(6) Removal and. replacement of component equipments (par. 65).

(7) Lubrication of power supply fan (par. 57.1).

Paragraph 56. Delete paragraph 56 and substitute:

56. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts or subassemblies that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks of the AN/GGM-(*) at the second echelon level are made at monthly intervals unless otherwise directed by the commanding officer.

The preventive maintenance checks and services should be scheduled concurrently with the periodic service schedule of the other equipment in the station.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

Add paragraphs 56.1 and 56.2 after paragraph 56.

56.1. Monthly Maintenance

Perform all the checks and services listed in the monthly maintenance checks and services chart (par. 56.2) in the sequence listed. Record all deficiencies or shortcomings in accordance with the requirements of TM 38-750.

56.2. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	Reference
1	Printed circuit assemblies	*a.* Inspect, seating of all printed circuit assemblies. *b.* Inspect for burns, chipping, cracked or broken conductors, and dirty contacts.	*a.* Figs. 7, 11, 12, and 14. *b.* None.
2	Resistors, bushings, and insulators.	Inspect for cracks, chipping, blistering, discoloration, and moisture.	None.
3	Jacks and connectors	Inspect for snug fit and good contact	Figs. 21-26.
4	Power supply air filter -	Check air filter for dirt, and clean if necessary	Fig. 17.
5	Interior cases	Clean interior, and tighten loose switches and mountings.	None.
6	Variable capacitors in time base generator.	Check variable capacitors for dirt or moisture	None.
7	Data-scan scope	Inspect cathode-ray tube for burned screen spots	Fig. 9.
8	Power supply	Adjust output voltages.	Par. 30a.
9	Exposed metal surfaces	Clean rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion.	TM 9-213.

Page 90, paragraph 63. Below the paragraph heading, add the following warning:

Warning: The OA2WA and OB2WA type tubes used in the OS-119/GGM contain radioactive material. Handle carefully to avoid breaking.

Page 93, paragraph 67. Add paragraph 67.1 after paragraph 67.

67.1. Handling, Storage, and Disposal of Radioactive Material

Follow the procedures for safe handling, storage, and disposal of radioactive materials as directed by-

a. TB SIG 225, Identification and Handling of Radioactive Signal Items.

b. AR 40-580, Control of Hazards to Health from Radioactive Materials.

c. AR 755-380, Disposal of Unwanted Radioactive Material.

Page 100. Delete the appendix and substitute:

APPENDIX I
REFERENCES

Following is a list of applicable references available to the operator of Tests Sets, Teletypewriter AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, and AN/GGM-5. In addition to the references listed below, Instruction Data on the Use of Weston Class 50 Model, 1 Voltmeter, Voltmeter TS-443/U is available.

AR 40-580	Control of Hazards to Health from Radioactive Materials.
AR 70-10	Army Materiel Testing.

AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Codes.
AR 750-5	Organization, Policies and Responsibilities for Maintenance Operation.
AR 755-380	Disposal of Unwanted Radioactive Material.
DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides and Phono-Recordings.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8 and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
DA Pam 310-21	Military Publications: Index of Supply Manuals Signal Corps.
FM 21-5	Military Training.
FM 21-6	Techniques of Military Instruction.
FM 21-30	Military Symbols.
TB SIG 225	Identification and Handling of Radioactive Signal Items.
TM 9-213	Painting Instructions for Field Use.
TM 11-655	Fundamentals of Telegraphy (Teletypewriter).
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM 11-6625-274-12	Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 38-750	The Army Equipment Record System and Procedures.

Page 100, appendix II. Make the following changes:

(Page 3 of C 2). After "SECTION II. MAINTENANCE ALLOCATION CHART", add: (AN/GGM-1).

(Page 5 of C 2). After "SECTION III ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS", add: (AN/GGM-1).

(Page 6 of C 2). After "SECTION IV MAINTENANCE ALLOCATION CHART", add: (AN/GGM-2).

(Page 8 of C 2). After "SECTION V ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS", add: (AN/GGM-2).

(Page 9 of C 2). After "SECTION VI MAINTENANCE ALLOCATION CHART", add: (AN/GGM-3).

(Page 11 of C 2). After "SECTION VII ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS", add: (AN/GGM-3).

(Page 12 of C 2). After "SECTION VIII MAINTENANCE ALLOCATION CHART", add: (AN/GGM-4).

(Page 14 of C 2). After "SECTION IX ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS", add: (AN/GGM-4).

(Page 15 of C 2). After "SECTION X MAINTENANCE ALLOCATION CHART", add: (AN/GGM-5).

(Page 16 of C 2). After "SECTION XI ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS", add: (AN/GGM-5).

Appendix III. Make the following changes:

(Page 18 of C 2). After "SECTION II FUNCTIONAL PARTS LIST", add: (AN/GGM-1).

(Page 20 of C 2). After "SECTION III FUNCTIONAL PARTS LIST", add: (AN/GGM-2).

(Page 22 of C 2). After "SECTION IV FUNCTIONAL PARTS LIST", add: (AN/GGM-3).

(Page 24 of C 2). After "SECTION V FUNCTIONAL PARTS LIST", add: (AN/GGM-4).

(Page 26 of C 2). After "SECTION VI FUNCTIONAL PARTS LIST", add: (AN/GGM-5).

Add the following items to section II (page 18 of C 2), section III (page 20 of C 2), section IV (page 22 of C 2), and section V (page 24 of C 2) under RUNNING SPARE ITEMS, in the columns indicated below.

Section II (page 18 of C 2), column 2.

Change "6625-843-1731" to: 6625-8931731.

Change "5920-264-9493" to: 5920-2849493 in the following places:

2	4	7	8	9
5910-060-6708	CAPACITOR, FIXED ELECTROLYTIC: 40-40-120 µf, 350v; Astron part No. EYT1220.	1	7	C30
5910-889-4363	CAPACITOR, FIXED ELECTROLYTIC: 40-40-80 µf, 350v; Astron part NO. EYT12251.	1	7	C31
5910-865-3009	CAPACITOR, FIXED ELECTROLYTIC: 40-40-120 µf, 35v; Aerovox part No. AFH3-29-95.	1	7	C31

Section II (page 18 of C 2).
Section III (page 20 of C 2).
Section IV (page 23 of C 2).
Section V (page 25 of C 2).
Section VI (page 26 of C 2).

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:
Active Army:

DASA (6)
USASA (2)
CNGB (1)
CofEngrs (1)
TSG (1)
CSigO (7)
CofT (1)
CSptS (1)
USA CD Agcy (1)
USCONARC (5)
USAMC (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
USAECOM (5)
USAMICOM (4)
USASCC (4)
MDW (1)
Armies (2)
Corps (2)
USA Corps (3)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC Armor (2)
USASTC (5)
Instl (2) except
Ft Monmouth (65)
Svc Colleges (2)
Br Svc Sch (2) except
GENDEP (OS) (2)
Sig Dep (OS) (12)
Sig Sec, GENDEP (5)
Army Dep (2) except
  Ft Worth (8)
  Lexington (12)
  Sacramento (28)
  Tobyhanna (12)
USA Elct RD Actv, White Sands (13)
USA Elct RD Actv, Ft Huachuca (2)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
USAOSA (1)
AMS (1)
WRAMC (1)
AFIP (1)
Army Pic Cen (2)
USA Mbl Spt Cen (1)
USA Elct Mat Agcy (12)
Chicago Proc Dist (1)
USARCARIB Sig Agcy (1)
Sig Fld Maint Shop (3)
Units org under fol TOE
(2 cy ea UNOINDC)
  11-7
  11-16
  11-57
  11-97
  11-98
  11-117
  11-155
  11-157
  11-500 (AA-AC) (4)
  11-557
  11-587
  11-592
  11-597

NG: State AG (3); units-same as active Army except one (1) copy to each unit
USAR: None.
For explanation of abbreviations used, see AR 320-50.

Operator and Organizational Maintenance Manual
TEST SETS, TELETYPEWRITER AN/GGM-1, AN/GGM-2, AN/GGM-3
AN/GGM-4, AND AN/GGM-5

TM 11-6625-422-12 }
CHANGES No. 3 }

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *7 February 1963*

TM 11-6625-422--12, 6 October 1961, is changed as follows:

Note. The parenthetical reference to previous changes (example: "page 1 of C1") indicates that pertinent material was published in that changes.

Page 3, paragraph 1. Add paragraph 1.1 after paragraph 1.

1.1. Index of Publications

Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet No. 310-4 is a current index of technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

Paragraph 2 (C1). Delete paragraph 2 and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged and Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Comments on Manual. Forward all comments on this publication direct to: Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N. J. (DA Form 1598 (Record of Comments on Publications), DA Form 2496 (Disposition Form), or letter may be used.)

Paragraph 2.1 (C1). Delete paragraph 2.1.

Page 4, paragraph 4*a*, input timing signals. Change the characteristics opposite "Frequencies" to read: 9.6 kc, 11.65 kc, 15.64 kc, 19.00 kc, 28.81 kc, 38.4 kc, and 7.8 kc to 28.2 kc (continuously variable).

Page 5, paragraph 4. Make the following changes:

Subparagraph *c*, output timing signals. Change the characteristics opposite "Frequency" to read: 9.6 kc, 11.65 kc, 15.64 kc, 19.00 kc, 28.81 kc, 38.4 kc, and 7.8 kc to 28.2 kc (continuously variable).

Subparagraph *d*, input timing signals. Change the characteristics opposite "Frequency" to read: 9.6 kc, 11.65 kc, 15.64 kc, 19.00 kc, 28.81 kc, 38.4 kc, and 7.8 kc to 28.2 kc (continuously variable).

Subparagraph *e*, third item. Change the characteristic opposite "Number of transistors" to: 8.

Paragraph 5 (C1). Delete subparagraph *a* and substitute:

a. The components of the AN GGM-(*) are listed in appendix III.

Page 7. Make the following changes:

Paragraph 6, chart. Add the following:

Signal Corps nomenclature	Manufacturer's nomenclature	Common name
Cable Assembly, Special Purpose, Electrical CX-8411/GGM.	Cable Assembly C11716	20-conductor cable.
Cable Assembly, Special Purpose, Electrical CX-8412/GGM.	Cable Assembly C11745-1	54-conductor cable.
Cable Assembly, Power, Electrical CX-8413/GGM.	Cable Assembly A13004	. 6-foot power cord.
Cable Assembly, Special Purpose, Electrical CX-8414/GGM-2.	Cable Assembly, Beldin 17656	6 ¼ foot power cord.
Cable Assembly, Special Purpose, Electrical CX-8415/GGM-2.	Cable Assembly A13003	. 2 ½-foot power cord.

Page 7, paragraph 8b, line 10. Change "mounted on two small printed circuit cards" to: mounted on a printed circuit card.

Page 11, figure 4. In the callout for the shelf adapter, change the designation "1B" to: 1A.

Page 15, figure 8. Delete figure 8 and substitute new figure 8.

Page 20, figure 13. Change the following panel markings: Change "+15V" to: RELAY. Change "RELAY" to: + 15V.

Page 23, paragraph 13f, line 1. Change "adapters" to: adapter.

Page 28, paragraph 19. Make the following changes:

Add the following to the chart:

	Required for installation of:				
Item	**AN/GGM-1**	**AN/GGM-2**	**AN/GGM-3**	**AN/GGM-4**	**AN/GGM-5**
Radio Frequency Cable RG-62A/U			X	X	X
Plug UG-260/U			X	X	X

Paragraph 20*a*(1), line 1. Change "components" to: component.

Page 29, paragraph 21 (C1), Introduction.

In the second sentence, change "1B" to: 2B.

Page 32, paragraph 23. Delete paragraph 23 and substitute:

23. Input Ac Power Connections

Warning: Do not connect the equipment to the ac power source until all rear panel connections have been made (par. 24 through 29).

a. AN/GGM-1, AN/GGM-3, AN/GGM-4, or AN/GGM-5. Connect the terminal ends of the CX-8413/GGM (6-foot power cord) to the PWR terminals (green lead to GRD terminal; black and white leads to 117 v ac terminals) of terminal board LTBI of the AN/GGM-1 (fig. 21), AN/GGM-3) (fig. 23), AN/GGM-4 (fig. 24), or AN/GGM-5 (fig. 25).

b. AN/GGM-2.

(1) Removed from equipment cart and rack mounted. Connect the terminal end of the CX-8413/GGM to terminal board 3TB2 (black lead to terminal 13, green lead to terminal 14, white lead to terminal 15) on the AN/GGM2 (fig. 22).

(2) In equipment cart.

(a) Connect the terminal end of the CX-8415/GGM-2 (21/½-foot power cord) as indicated in (1) above.

(b) Plug the other end of the CX8415/GGM-2 into the female receptacle on the rear of the equipment cart.

(c) Connect the female plug of the CX8414/GGM-2 (61/t-foot power cord) into the male receptacle on the rear of the equipment cart.

Page 35, paragraph 25. Make the following changes.

Add the following caution beneath subparagraph a.

Caution: To avoid damage to the input circuit, adjust the loop current to the desired

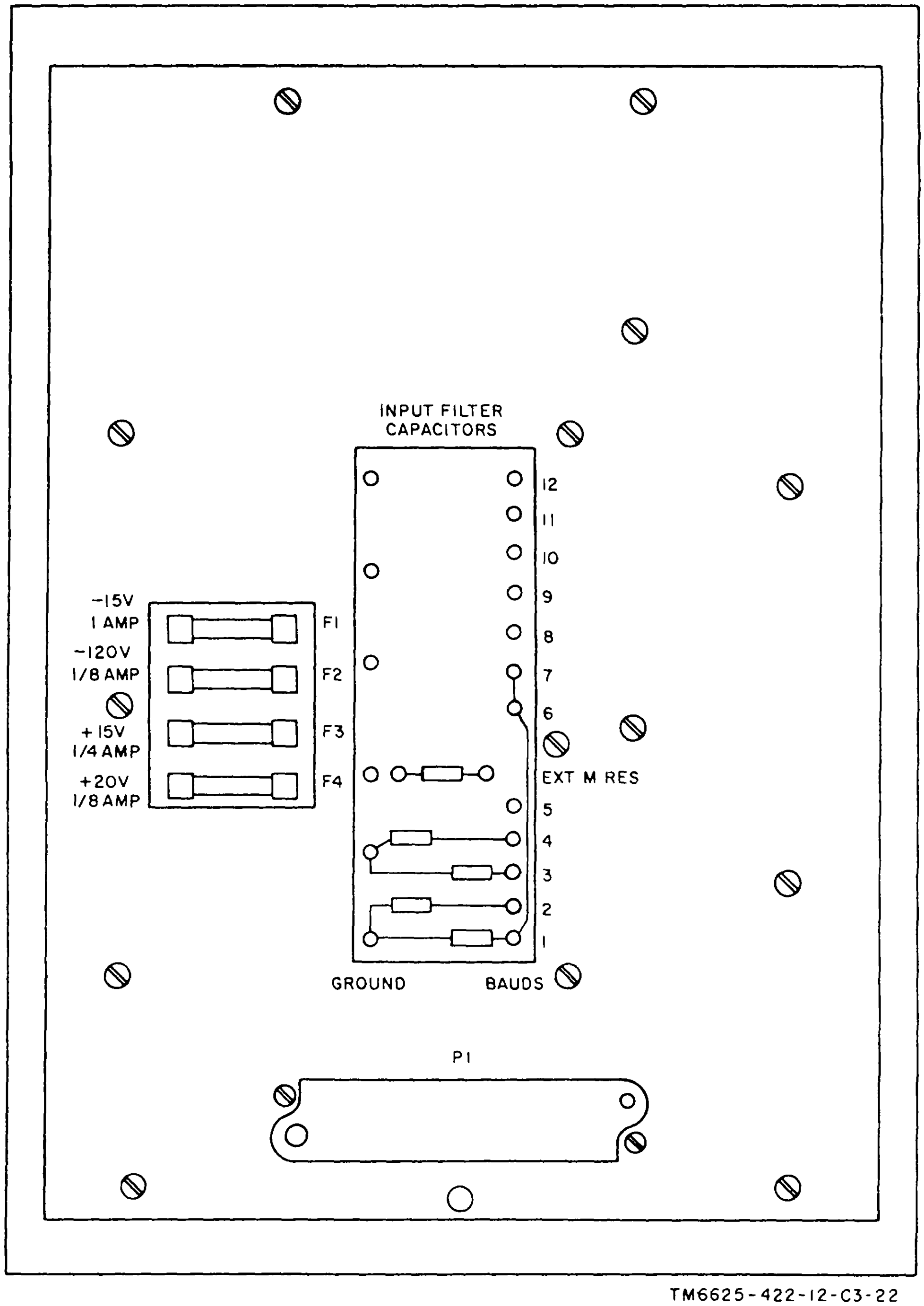


Figure 8. Digital distortion analyzer, rear view.

level before connecting the input loop to the analyzer. Check to see that the setting of the INPUT'I' SELECT switch (fig. 26) is in the proper position before the input loop power is applied.

Add subparagraph *a* (3) after subparagraph a(2).

(3) Adjust the input current to the desired level.

Note. Readjustment of the input loop current is necessary to compensate for the added loop resistance of the input circuit.

Page 39, figure 26. Make the following changes

Change the panel marking "HIGH Z INPUT" to: HIGH Z IN.

Change the panel marking "LOW Z INPUT to: LOW Z IN.

Page 44, paragraph 29. Make the following changes:

Subparagraph *b*, second line. Delete the parenthetical statement and substitute: (Use Cable, Radio Frequency RG-62A/U, FSN 6145-161-0903.) Subparagraph c. Delete the first sentence and substitute: Assemble Connector, Plug, Electrical UG-260B/'U (FSN 5935-173-5895) on each end of each length of coaxial cable.

Paragraph 30*a*. Make the following changes:

Introduction. Delete the introduction and substitute:

a. Power Supply Output Voltages. The power supply is directly accessible at the rear panel of the AN, GGM-1, AN/GGM-3, AN/GGM-4, and AN/GGM-5, and located under the hinged door on the rear panel of the AN/GGM-2. Adjust the output voltages of the power supply as follows:

Subparagraph (1). Delete and substitute:

(1) Connect the male plug of the CX8413/GGM or CX-8414/GGM-2 to the ac power source and operate the Power switch (fig. 29) to ON.

Subparagraph (4). Delete the last sentence and substitute: Tighten the locknut and check to see that the meter still indicates 15 volts. Remove the meter leads.

Subparagraph (6). Delete the last sentence and substitute: Tighten the locknut and check to see that the meter still indicates 15 volts. Remove the meter leads.

Subparagraph (7), last line. After "120 volts" add: ± 20 percent.

Subparagraph (8), line 7. After "21 volts" add: ± 5 percent.

Page 63, paragraph 43*a*. Make the following changes:

Subparagraph (4). Add after the first sentence: (Stepped operation is not available for the REVERSALS test pattern.)

Subparagraph (5). Delete the second sentence and substitute: If specific characters are to be generated, set the MARK-SPACE switches as outlined in c below. If any selected test pattern is to be distorted, set the DISTORTION switches as outlined in b below.

Page 71, paragraph 53*b*, chart. In item 4, "Normal indications" column, change "generators" to: generator.

Page 86, paragraph 55*a*. Add subparagraph (7) after subparagraph (6).

(7) Lubrication of power supply fan (para 57.1).

Subparagraph *b*. Make the following changes: In line 1, add after "the tools": materials.

Add subparagraphs (5) and (6) after subparagraph (4).

(5) Oiler (FSN 4930-277-1044).

(6) Oil, Engine, Internal Combustion Engine (FSN 9150-265-9425).

Page 87. Add paragraph 57.1 after paragraph 57.

57.1. Lubrication of Power Supply Fan

Note. Only those power supply fans identified with a gold-colored label require lubrication semiannually. To lubricate the fan motor, proceed as follows:

a. Locate the small oilhole below the OIL marking on the label.

b. Place a small amount of oil in the oiler.

c. Place the oiler needle at the center of the oilhole, and position it at an angle of approximately 45° to the surface of the label.

d. Pierce the label and the self-sealing rubber cap located under the label. Insert the needle approximately one-fourth of an inch.

e. Inject a small amount of oil (1 or 2 drops) into the fin motor, and then remove the needle.

Figures 44 and 45 (foldouts). Delete figures 44 and 45 and substitute new figures 44 and 45.

Figure 47 (foldout). Make the following changes:

Station 6, terminal 18. Change "8-31" to: 11-21.

Station 9, terminal 5. Change "10-19" to: 11-19.

Station 9, terminal 6. Change "10-17" to: 11-17

Figure 48 (foldout). Make the following changes:

Station 9, terminal 18. Change "10-2" to: 10-32.

Station 12, terminal 18. Change "24-2" to: 21-2.

Figure 49 (foldout), caption. Change "1A" to: 1B.

Figure 44. Test Sets, Teletypewriter AN/GGM-1 and AN/GGM-3, test pattern distortion generator output circuit configuration.
(To be located in back of Change 3)

Figure 45. Test Set, Teletypewriter AN/GGM-2, test pattern distortion generator output circuit configuration.
(To be located in back of Change 3)

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:
Active Army:

DASA (6)
USASA (2)
CNGB (1)
CofEngrs (1)
TSG (1)
CSigO (5)
CofT (1)
USA CD Agcy (1)
USCONARC (5)
Hq, Army Mat Comd (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
USA Elct Comd (5)
USA Msl Comd (4)
USA Strat Comm Comd (4)
MDW (1)
Armies (2)
Corps (2)
USA Corps (3)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC FA (2)
USATC Armor (2)
Instl (2) except
Ft Monmouth (63)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Army Dep (2) except
Sacramento (17)
Lexington (12)
Tobyhanna (12)
Ft Worth (8)
Sig Sec, GENDEP (OS) (5)
Sig Dep, (OS) (12)
WRAMC (1)
AFIP (1)
USA Elct RD Actv,
White Sands (13)
USA Elct RD Actv,
Ft Huachuca (2)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
AMS (1)
Army Pic Cen (2)
USA Mob Spt Cen (1)
USA Elct Mat Agcy (25)
Chicago Procurement Dist (1)
USARCARIB Sig Agcy (1)
Sig Fld Maint Shops (3)
Yuma Test Sta (2)
JBUSMC (2)
Units org under fol TOE (2
cy ea UNOINDC)
11-7
11-16
11-57
11-97
11-98
11-117
11-155
11-157
11-500 (AA-AD) (4)
11-557
11-587
11-592
11-597

NG: None.
USAR: None.

For explanation of abbreviations used see AR 320-50.

NOTES:

1. THE LOOP BATTERIES CONNECTED TO THE ELECTRONIC RELAY LOOP MUST NOT EXCEED 60 VOLTS FOR POLAR OPERATION OR 130 VOLTS FOR NEUTRAL OPERATION. IF THESE VOLTAGE LIMITS ARE NOT OBSERVED, THE KEYING TRANSISTORS WILL BE PERMANENTLY DAMAGED.

2. WHEN A PLUG IS INSERTED INTO THE [SIGNAL OUTPUT] JACK, CONTACTS 2-3 AND 4-5 OPEN THE SIGNAL PATH TO THE [MECH LOOP OUT] OR [ELECT LOOP OUT] TERMINALS (ACCORDING TO THE POSITION OF THE [JACK SIGNAL SELECTOR] SWITCH).

3. WHEN THE [JACK SIGNAL SELECTOR] SWITCH IS OPERATED TO [ELECT (MECH OFF)], THE MECH RELAY DRIVER CIRCUIT IS INHIBITED BY THE APPLICATION OF -15 VOLTS FROM SECTION B OF SWITCH S9.

4. A JUMPER MUST BE CONNECTED ACROSS THE [RELAY DRIVE] [A] AND [B] TERMINALS FOR OPERATION OF THE MECHANICAL RELAY.

5. THE FOLLOWING CHART LISTS THE CONTACT CONNECTIONS WHICH ARE MADE AS THE [JACK SIGNAL SELECTOR] SWITCH IS OPERATED TO EACH POSITION.

SWITCH SECTION	SWITCH POSITION		
	MECH	ELECT	ELECT (MECH OFF)
B FRONT	3-1	3-1	3-2
B REAR	1-2, 3-4, 5-6	1-6, 2-3, 4-5	1-6, 2-3, 4-5
A REAR	1-2, 3-4, 5-6	1-6, 2-3, 4-5	1-6, 2-3, 4-5

6. [ ] INDICATES EQUIPMENT MARKINGS.

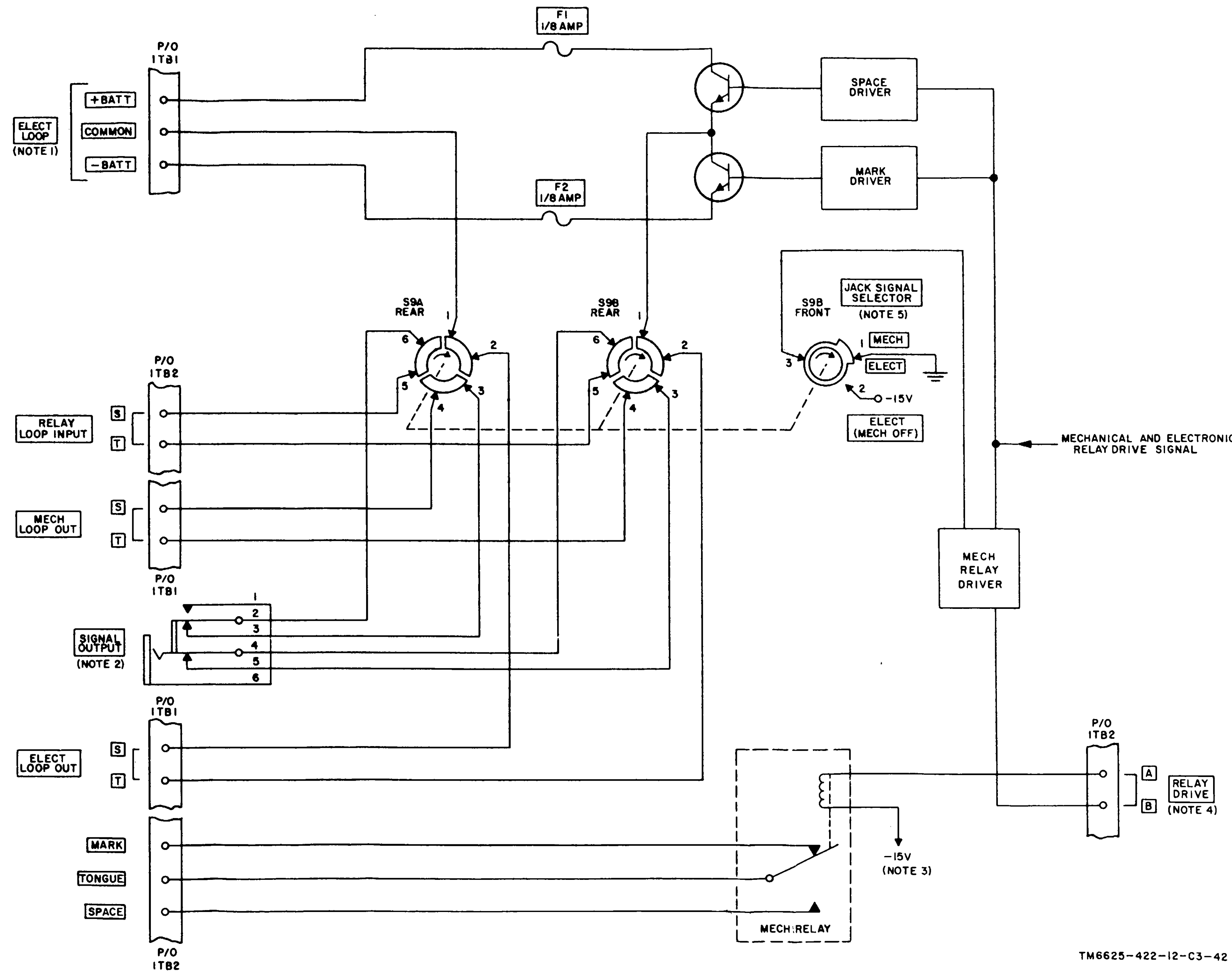


Figure 44. Test Sets, Teletypewriter AN/GGM-1 and AN/GGM-3, test pattern distortion generator output circuit configuration.

NOTES:

1. THE LOOP BATTERIES CONNECTED TO THE ELECTRONIC RELAY LOOP MUST NOT EXCEED 60 VOLTS FOR POLAR OPERATION OR 130 VOLTS FOR NEUTRAL OPERATION IF THESE VOLTAGE LIMITS ARE NOT OBSERVED, THE KEYING TRANSISTORS WILL BE PERMANENTLY DAMAGED.
2. WHEN A PLUG IS INSERTED INTO THE [SIGNAL OUTPUT] JACK, CONTACTS 2-3 AND 4-5 OPEN THE SIGNAL PATH TO THE [MECH LOOP OUT] OR [ELECT LOOP OUT] TERMINALS (ACCORDING TO THE POSITION OF THE [JACK SIGNAL SELECTOR] SWITCH).
3. WHEN THE [JACK SIGNAL SELECTOR] SWITCH IS OPERATED TO [ELECT (MECH OFF)], THE MECH RELAY DRIVER CIRCUIT IS INHIBITED BY THE APPLICATION OF-15 VOLTS FROM SECTION B OF SWITCH S9.
4. THE FOLLOWING CHART LISTS THE CONTACT CONNECTIONS WHICH ARE MADE AS THE [JACK SIGNAL SELECTOR] SWITCH IS OPERATED TO EACH POSITION.

SWITCH SECTION	SWITCH POSITION		
	MECH	ELECT	ELECT (MECH OFF)
B FRONT	3-1	3-1	3-1
B REAR	1-2,3-4,5-6	1-6,2-3,4-5	1-6,2-3,4-5
A REAR	1-2,3-4,5-6	1-6,2-3,4-5	1-6,2-3,4-5

5. [ ] INDICATES EQUIPMENT MARKINGS.
6. [RELAY LOOP INPUT] TERMINALS.
7. [MECH LOOP OUT] TERMINALS.
8. [ELECT LOOP OUT] TERMINALS.
9. A JUMPER MUST BE CONNECTED ACROSS THE [RELAY DRIVE] [A] AND [B] TERMINALS FOR OPERATION OF THE MECHANICAL RELAY.

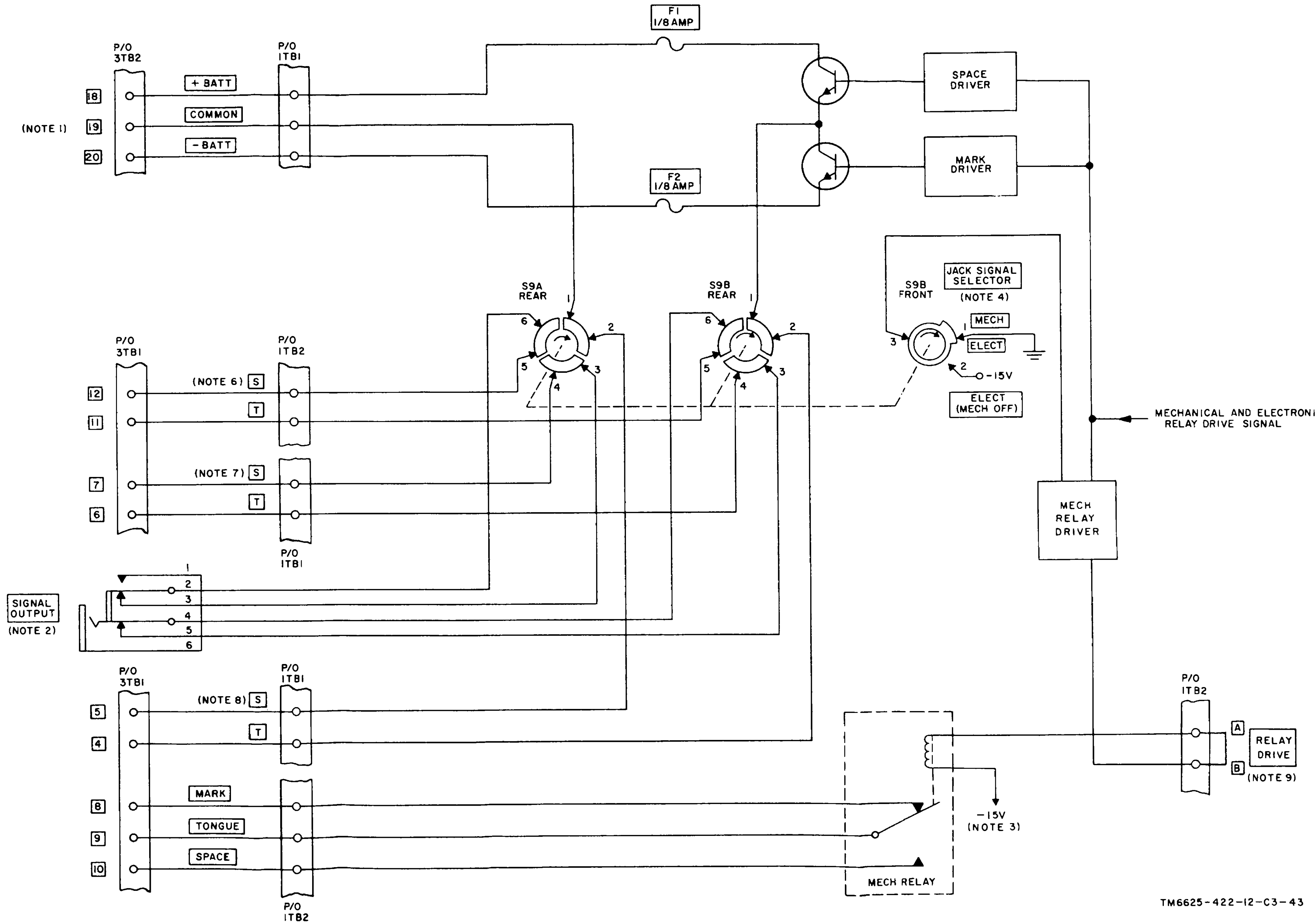


Figure 45. Test Sets, Teletypewriter AN/GGM-2, test pattern distortion generator output circuit configuration.

TECHNICAL MANUAL
Operator and Organizational Maintenance Manual
TEST SETS, TELETYPEWRITER ANIGGM-1, ANIGGM-2, ANIGGM-3, ANIGGM-4, AND ANIGGM-5

TM 11-6625-422-12
CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *14 August 1982*

TM 11-6625-422-12, 6 October 1961, is changed as follows:

Page 3. Make the following changes: Paragraph *2d*, line 5. Delete "PA2d" and substitute: **MPP4.**

Page 5, paragraph *5a*, chart. Delete the chart and substitute:

Component	AN/GGM-1	AN/GGM-2	AN/GGM-3	AN/GGM-4	AN/GGM-5.
Test Set, Teletypewriter TS-1512/GGM	1	1	1	1	2
Oscilloscope OS-119/GGM	1	1	1	1	
Generator, Time Base SG-430/GGM	1	1			
Generator, Test Pattern 8SG-431/GGM	1	1	1		
Power Supply PP-2971/GGM	1	1	1	1	1
Equipment Housing, EH-I/DAC-V*		1			
Equipment Cart, EC-1/DAC-V*		1			
Rack Shelf Adapter, RS-1A/DAC-V*	1		1		
Rack Shelf Adapter, RS-1B/DAC-V*				1	1
Rack Shelf Adapter, RS-2A/DAC-V*	1				
Rack Shelf Adapter, RS-2B/DAC-V *			1		
Relay Assembly, B10531*	1	1	1		
Cable Assembly, C11716*	1	1	1	1	1
Cable Assembly, C11745-1*	1	I	1	1	1
Cable Assembly, A13004 power cord (6 ft)	1	1	1	1	1
Cable Assembly, Beldin 17656*		1			
Cable Assembly, A13003 3* conductor (2 ft)		1			

*Manufacturer's nomenclature.

Page 6, paragraph 5. Make the following changes:

Subparagraph b, "Unit weight (lb)" column.

Delete the data in the "Unit weight (lb)" column and substitute:

Unit weight lb)
97
189
91
68
55

Subparagraph 5*c*, "Unit weight (lb)" column.

Delete the data in the "Unit weight (lb)" column and substitute:

Unit weight (lb)
15
28
12
9
14
40
71
12
11
7
10

Page 26, paragraph 16*a*, chart, "Unit weight (lb)" column. Delete data in the "Unit weight (lb)" column and substitute:

Unit weight (lb)
311
340
155
260
181
175

Page 29, paragraph 21, introduction. Delete the first sentence and substitute: The AN/GGM-1 and AN/GGM-2 are shipped with a Sigma 72 mechanical relay mounted in the rear of the SG-430/GGM. The AN/GGM-3 is shipped with a Sigma 72 mechanical relay mounted in shelf adapter 1B.

Paragraph *22a*, note. Delete note and substitute:

***Note*: If an uppercase character (number, symbol, etc.) is included in the call-letter sequence, preceded and followed by lowercase characters, the uppercase character program must be preceded by a FIGS character and followed by a LTRS character. When an uppercase character is used in this manner, only five call letters can be used.**

Page 31, paragraph *22b*, chart. Make the following changes:

CHARACTER 2, first line, under "R77." Delete "X".

CHARACTER 3, 17th line, under "R84." Add "X".

CHARACTER 4, second line, under "R87." Delete "X".

CHARACTER 7, under "R103":

Fourth line. Add "X".

Fifth line. Delete "X".

Page 52, paragraph *34d*. Delete the first sentence and substitute: To illustrate the techniques of distortion analysis which may be made with the AN/GGM-(*), transparent overlay illustrations (figs. 51 and 52, located in rear of manual) may be used in conjunction with figures 40 through 43.

Page 62, paragraph 43*a*(1), line five, Delete "(available only with SELECTED CHARACTER and REVERSAL message)." *Page 98*. Delete figure 51.

Page 99. Delete figure 52.

Figure 51. Data/telegraph signals with various bias distortion conditions.
(Transparency in envelope at back of manual)

Figure. 52. Data/telegraph signal with various speed error and distortion conditions.
(Transparency in envelope at back of manual)

BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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Tech Stf Bd (1)	USAOMC (2)	Sig Fld Maint Shops (3)
USCONARC (5)	Svc College (2)	Def Log Svc Cen (1)
USAARTYBD (1)	Br Svc Sch (2)	USA Corps (3)
USAARNIBD (2)	GENDEP (2) except Atlanta GENDEP (None)	JBUSMC (2)
USAIB (1)	Sig Sec, GENDEP (5)	Units organized under following TOE's (2 copies unless otherwise indicated):
USARADBD (2)	Sig Dep (12) except Sacramento (17)	11-7
USAAVNBD (1)	WRAMC (1)	11-16
USA Abn, Elct & SPWAR Bd (1)	USATrans Tml Comd (1)	11-57
USAATBD (1)	Army Tml (1)	11-97
ARADCOM (2)	POE (1)	11-98
ARADCOM Rgn (2)	OSA (1)	11-117
OS Mhaj Comd (3)	USAEPG (2)	11-155
OS Base Comd (2)	AFIP (1)	11-157
LOGCOMD (2)	AMS (1)	11-500 (AA-AE) (4)
MDW (1)	Army Pictorial Cen (2)	11-557
Armies (2)	EMC (1)	11-587
Corps (2)	Yuma Test Sta (2)	11-592
Instis (2)	USA Strat Comm Comd (4)	11-597
Pt Monmouth (68)		
USATC AD (2)		

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL No. 11-6625-422-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *6 October 1961*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

TEST SETS, TELETYPEWRITER AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, AND AN/GGM-5

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual describes Test Sets, Teletypewriter AN/GGM-1, AN/GGM-2, AN/ GGM-3, AN/GGM-4, and AN/GGM-5, and covers the installation, operation, and operator's and organizational maintenance of the equipment. It includes instructions for the installation of each of the sets, operation under usual and unusual conditions, cleaning, and inspection of the equipment, and replacement of parts available to first and second echelon maintenance personnel.

b. Official nomenclature followed by (*) is used to indicate all five sets of the equipment covered in this manual. Thus, Test Sets, Teletypewriter, AN/GGM-(*) represents Test Sets, Teletypewriter AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, and AN/GGM-5.

2. Forms and Records

a. Unsatisfactory Equipment Reports. Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N.J., as prescribed in AR 70038.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment), as prescribed in AR 700-58.

c. Preventive Maintenance Forms. Prepare DA Form 11-266 (figs. 36 and 37) (Maintenance Check List for Signal Equipment (Test Equipment)) in accordance with instructions on the form.

d. Comments on Manual. Forward all other comments concerning this manual direct to the Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMSPA2d, Fort Monmouth, N.J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Test Set, Teletypewriter AN/GGM-(*) is an integrated group of digital test equipments that provides facilities for comprehensive analysis of synchronous and start-stop data/telegraph signals to determine the types and magnitudes of signal distortion present in the signal.

b. The AN/GGM-(*) may be used to provide a continuous indication of system performance for quality control functions as well as a test instrument for troubleshooting and testing data/ telegraph equipment and systems.

4. Technical Characteristics

a. Test Set, Teletypewriter TS-1512/GGM.

Input signals:
- Start-stop.. 7 to 16 unit intervals/character.
- Synchronous .... All codes.

Input signal current .... 20 or 60 ma neutral, 20 or 30 ma polar, and high-impedance (bridging) polar.

Input signal baud rates .... Up to 600 (specific rates determined by timing signals available from Generator, Time Base SG-430/GGM).

Input timing signals:

Waveform	Square wave.
Frequencies	9.6 kc, 11.65 kc, 15.65 kc, 18.99 kc, 28.81 kc, 38.4 kc, and 7.6 kc to 28.1 kc (continuously variable).

Input impedances:

Neutral input:	
20 ma	300 ohms.
60 ma	100 ohms.
Polar input:	
20-30 ma	300 ohms.
High impedance	50,000 ohms.
Timing signal input	1,000 ohms.
Range of distortion measurement	0. to 60%.
Types of distortion measurement	Total peak, early peak, late peak, and average.
Modes of distortion measurement	All character segments or selected character segments.
Distortion display:	
Percent	Direct-indicating meter.
Sign	Early and late indicator lamps.
Meter reset	Manual or automatic (at 3-second interval).
Long-term measurement accuracy	±2%.
Number of transistors	175.
Operating temperature range	0° C. to 50° C.
Input power requirements:	
+15 vdc	250 milliwatts.
-15 vdc	15 watts.
-120 vdc	360 milliwatts.
+21 vdc	600 milliwatts.

b. Oscilloscope OS-119/GGM.

Input signals from TS-1512/GGM:

Vertical	Input loop signal.
Horizontal	64 bit/interval digital sweep.
Transition sync	Trigger ½ bit prior to transition selected by TS-1512/GGM TRANSITION SELECT control.
Blanking	Blanking interval corresponding to stop mark in start-stop input signal.
Character sync	Trigger corresponding to beginning of start space of stop-start input signal.
Intensity	Intensifying pulses to modulate crt during transition sense period and selected input signal transitions.
Display modes:	
Unblanked	Successive display of the input signal characters to the TS-1512/GGM.
Automatic blanking	Single character display followed by adjustable blanking interval.
Manual blanking	Single character display for each actuation of front panel pushbutton.
Triggered	Single character segment displayed on expandable sweep (with blanking options).
Free	Conventional test oscilloscope display.
Auto character blank range	500 milliseconds to 3 seconds.
Type of display	Intensity and deflection-modulated, 5-inch crt.
Vertical sensitivity	1.5 volts/cm.
Horizontal sweep speed (internal)	75 to 3 ms, 2.5 to 8 m, 7.5 to 30 ms, 25 to 80 ms, 75 to 300 ms.
Type of deflection	Electrostatic.
Sweep calibration	.±2%.
Number of tubes	19 (including crt).
Operating temperature range	0° C. to 50° C.
Input power requirements (self-contained power supply):	
Voltage	110 to 117 vac.

Frequency .... 50 to 60 cps, single phase.
Power .... 120 watts.

c. Generator, Time Base SG-430/GGM.

Output timing signals:

Frequency .... 9.6 kc, 11.65 kc, 16.65 kc, 18.99 kc, 28.8 kc, 38.4 kc, and 7.6 kc to 28.1 kc (continuously variable).
Waveform .... Square wave.
Stability .... One part in 10,000.
Power .... 30 milliwatts.

Output impedance .... 100 ohms.
Frequency-determining element .... Quartz crystals and stabilized Wein bridge oscillator.
Number of transistors.. 85.
Operating temperature range.. 0° C. to 50° C.
Input power requirements:

10 vac, 60 cps .... 4 watts (w/alarm buzzer on).
+15 vdc .... 90 milliwatts.
-15 vdc .... 7 watts.
-120 vdc .... 120 milliwatts.

d. Generator, Test Pattern SG-431/GGM.

Output test signals:

Patterns .... Test-message, reversals, and selected characters.
Selected character codes.. 5 to 8 unit intervals/character.
Baud rates .... Up to 600 (specific rates determined by timing signals available from Generator, Time Base SG-430/GGM.
Current .... Neutral or polar.
Distortion .... 0 to 49%, marking, spacing, or switched bias.
Character release modes .... Stepped, steady mark, and free running.

Input timing signals:

Waveform .... Square wave.
Frequency .... 9.6 kc, 11.65 kc, 15.65 kc, 18.99 kc, 28.8 kc, 38.4 kc, and 7.6 to 28.1 kc (continuously variable).

Accuracy of selected distortion .... ±2%.
Output keying.. Electronic or mechanical relay.
Number of transistors .... 249.
Operating temperature range .... 0 ° C. to 50° C.
Input power requirements:

+15 vdc .... 300 milliwatts.
-15 vdc .... 11 watts.
-120 vdc .... 30 milliwatts.

e. Power Supply PP-2971/GGM.

Output voltages.. +15 vdc, -15 vdc, -120 vdc, +21 vdc, and 10 vac.
Regulation .... ±1% for +15 vdc and -15 vdc, and ±5% for +21 vdc, (-120 vdc and 10 vac unregulated).
Number of transistors.. 7.
Operating temperature range.. 0° C. to 50° C.
Input power requirements:

Voltage .... 110 to 117 vac.
Frequency .... 50 to 60 cps, single phase.
Power .... 100 watts.

5. Components of Test Set, Teletypewriter AN/GGM-(*)

a. The component of each of the AN/GGM- (*)'s are listed in the following chart:

Component	AN/GGM-1	AN/GGM-2	AN/GGM-3	AN/GGM-4	AN/GGM-5
Test Set, Teletypewriter TS-1512/GGM	1	1	1	1	2
Oscilloscope OS-119/GGM	1	1	1	1	
Generator, Time Base SG-430/GGM	1	1			

Component	AN/GGM-1	AN/GGM-2	AN/GGM-3	AN/GGM-4	
Generator, Test Pattern SG-431/GGM	1	1	1		
Power Supply PP-2971/GGM	1	1	1	1	1
Equipment Housing, EH-1/DAC-V*		1			
Equipment Cart, EC-1/DAC-V*		1			
Rack Shelf Adapter, RS-1A/DAC-V*	1		1	1	
Rack Shelf Adapter, RS-1B/DAC-V*					1
Rack Shelf Adapter, RS-2A/DAC-V*	1				
Rack Shelf Adapter, RS-2B/DAC-V*			1		

* Manufacturer's nomenclature.

b. The dimensions and weight of each of the AN/GGM-(*)'s are listed in the following chart:

Model	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
AN/GGM-1	19	20	19	80
AN/GGM-2	57	29	25	140
AN/GGM-3	19	20	19	70
AN/GGM-4	12 ¼	20	19	53
AN/GGM-5	12 ¼	20	19	40

c. The dimensions and weight of each component of the AN/GGM-(*) are listed in the following chart:

Component	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
TS-1512/GGM	12 ¼	11 ½	8	11
OS-119/GGM	12 ¼	19	8	27
SG-431/GGM	5 ¼	19	8	9
SG-430/GGM	5 ¼	19	8	10
PP-2971/GGM	9 ¾	7	8	25
EH-1/DAC-VB*	21 ½	23	19 5/8	23
EC-1/DAC-VB*	36	29	25	35
RS-1A/DAC-V*	12 ¼	19 ¼	19	5
RS-1B/DAC-V*	12 ¼	19 ¼	19	5
RS-2A/DAC-V*	6 ½	19 ¼	19	4
RS-2B/DAC-V*	6 ½	19 ¼	19	4

* Manufacturer's nomenclature.

6. Nomenclature and Common Names

Signal Corps nomenclature	Manufacturer's nomenclature	Common name
Test Sets, Teletypewriter AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, and AN/GGM-5.	Signal Data Analysis Groups DAC-VA, DAC-VB, DAC-VC, DAC-VD, and DAC-VE (respectively)	
Test Set, Teletypewriter TS-1512/GGM	Digital Distortion Analyzer DD-5/DAC-V	Digital distortion analyzer
Oscilloscope OS-119/GGM	Data Scan Scope DSS-5/DAC-V	Data-scan scope
Generator, Time Base SG-430/GGM	Time Base Generator TBG-5/DAC-V	Time base generator
Generator, Test Pattern SG-431/GGM	Test Pattern Distortion Generator PG-105/DAC-V	Test pattern distortion generator
Power Supply PP-2971/GGM	Power Supply PS-5/DAC-V	Power supply

Signal Corps nomenclature	Manufacturer's nomenclature	Common name
None	Equipment Housing EH-1/DAC-V	Equipment housing
None	Equipment Cart EC-1/DAC-V	Equipment cart
None	Rack Shelf Adapter RS-1A/DAC-V	Shelf adapter 1A
None	Rack Shelf Adapter RS-1B/DAC-V	Shelf adapter 1B
None	Rack Shelf Adapter RS-2A/DAC-V	Shelf adapter 2A
None	Rack Shelf Adapter RS-2B/DAC-V	Shelf adapter 2B

7. Description of Test Set, Teletypewriter AN/ GGM-(*)
(figs. 1-5)

a. The basic components of each AN/GGM(*) are listed in paragraph 5a. The equipment cart included in the AN/GGM-2 provides portability.

b. Operating power for the digital distortion analyzer, time base generator, and test pattern distortion generator is supplied by the power supply. The data-scan scope has a self-contained power supply. The interconnecting wiring between the components of the AN/GGM*) is located on the rear of the shelf adapters d behind the equipment housing rear panel. Signal, power, loop battery, and other user connections are made to terminals located on the rear of the shelf adapters and equipment housing.

8. Description of Digital Distortion Analyzer
(figs. 6-8)

a. The digital distortion analyzer (fig. 6) is composed of a basic chassis and 18 printed circuit cards, which are inserted into the left side of the chassis (fig. 7) and secured in position by two hinged braces (printed circuit card retainers). Hinged levers (not shown) are provided on each printed circuit card for removing the card.

b. All power and timing signals are applied to the digital distortion analyzer through a connector (P1) on the rear of the unit (fig. 8). The connector mates with a plug on the inside rear panel of the shelf adapter (1A or lB) or equipment housing when the digital distortion analyzer is inserted. The fuses, input signal filter capacitors, and external indicator resistor for the digital distortion analyzer are mounted on two small printed circuit cards accessible through cutouts in the rear panel. All operating controls are on the front panel. The digital distortion analyzer is secured in position in the shelf adapter by tightening the front panel chassis securing knob.

9. Description of Data-Scan Scope
(figs. 9 and 10)

The data-scan scope (fig. 9) contains 19 tubes, including the 5-inch cathode-ray tube (crt). All connections to the unit are made through a rear panel connector (P1, fig. 10). The power fuse (F1) is located on the rear panel. All operating controls are located on the front panel. Controls normally used only during maintenance are located on the chassis side panels. The data-scan scope is secured in position in the shelf adapter (or in the equipment housing) by tightening the front panel chassis securing knob.

10. Description of Time Base Generator
(figs. 11, 12, and 13)

a. The time base generator (fig. 11) includes a basic chassis and nine printed circuit cards (fig. 12). Mounting slots for seven additional printed circuit cards (not included) are provided. The mechanical relay for the test pattern distortion generator, used in the AN/ GGM-1 and AN/GGM-2., is contained on a small subchassis at the rear of the time base generator. The status (active or nonoperative) of each oscillator card is indicated by front panel lamps.

b. Input and output signal and power connections are made through a rear panel connector (P1, fig. 13). The fuses (F1, F2, and F3) for the unit are also located on the rear panel. Operating controls and indicators are on the front panel.

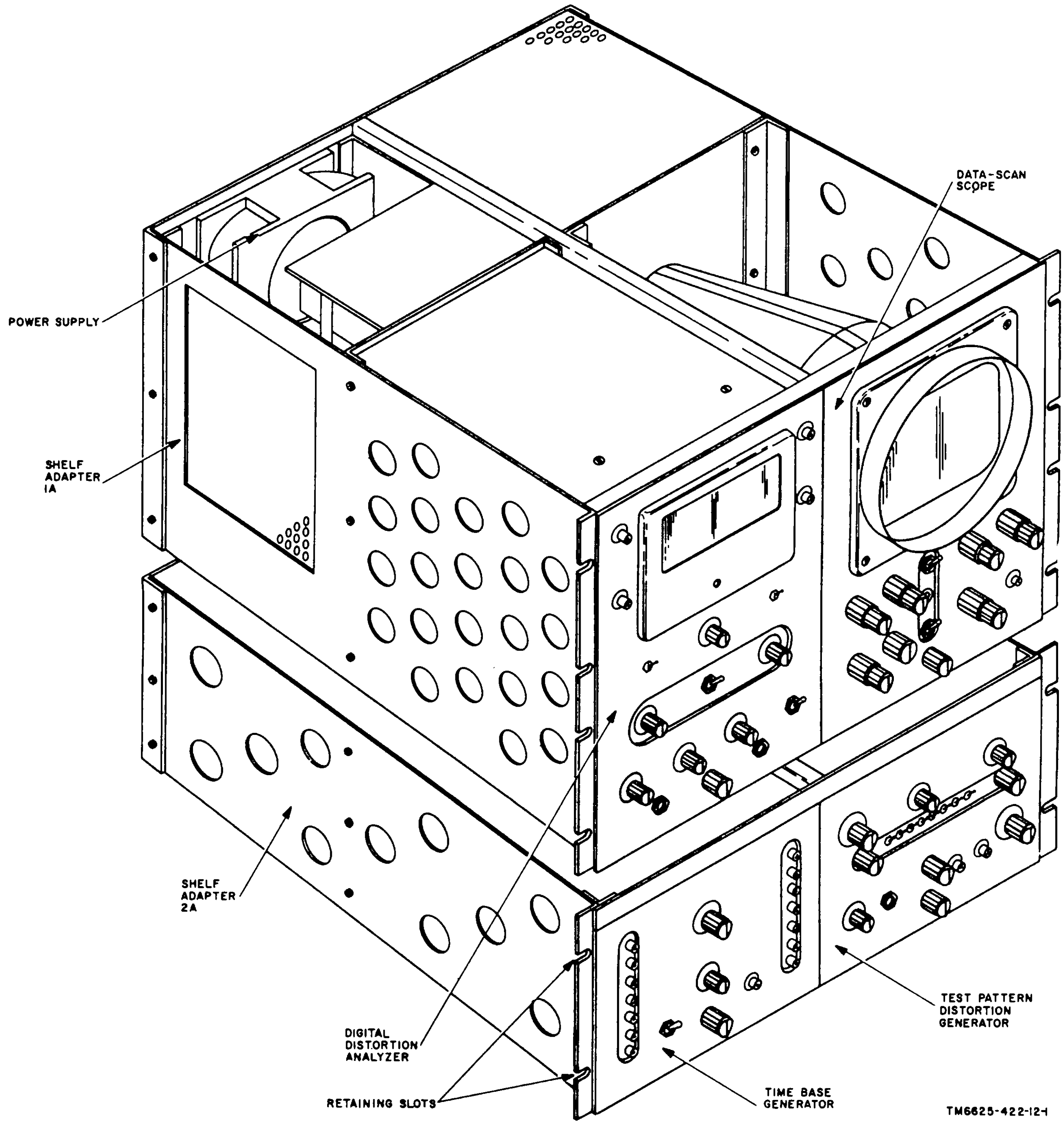

Figure 1. Test Set Teletypewriter AN/GGM-1.

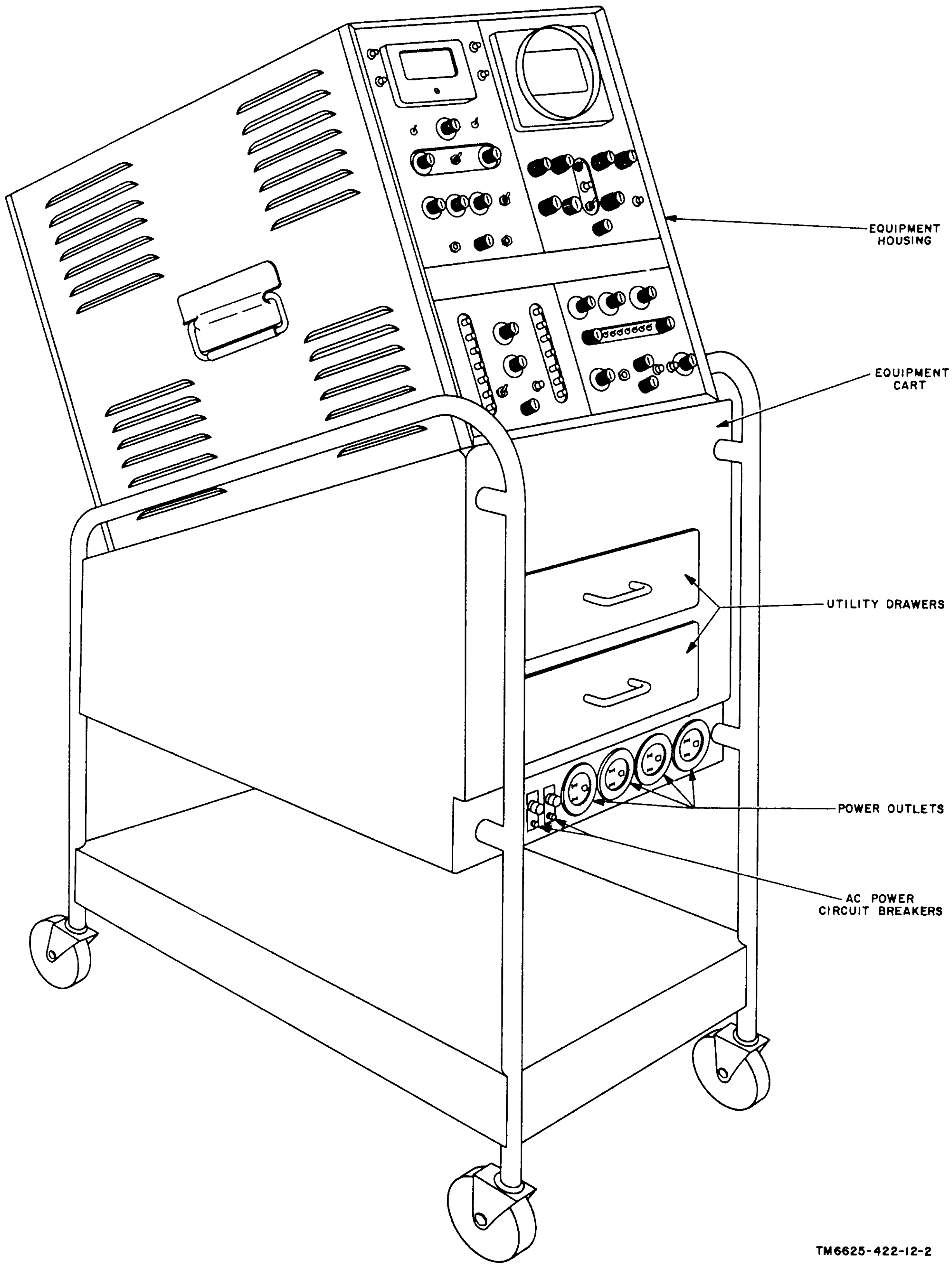

Figure 2. Test Set, Teletypewriter AN/GGM-2.

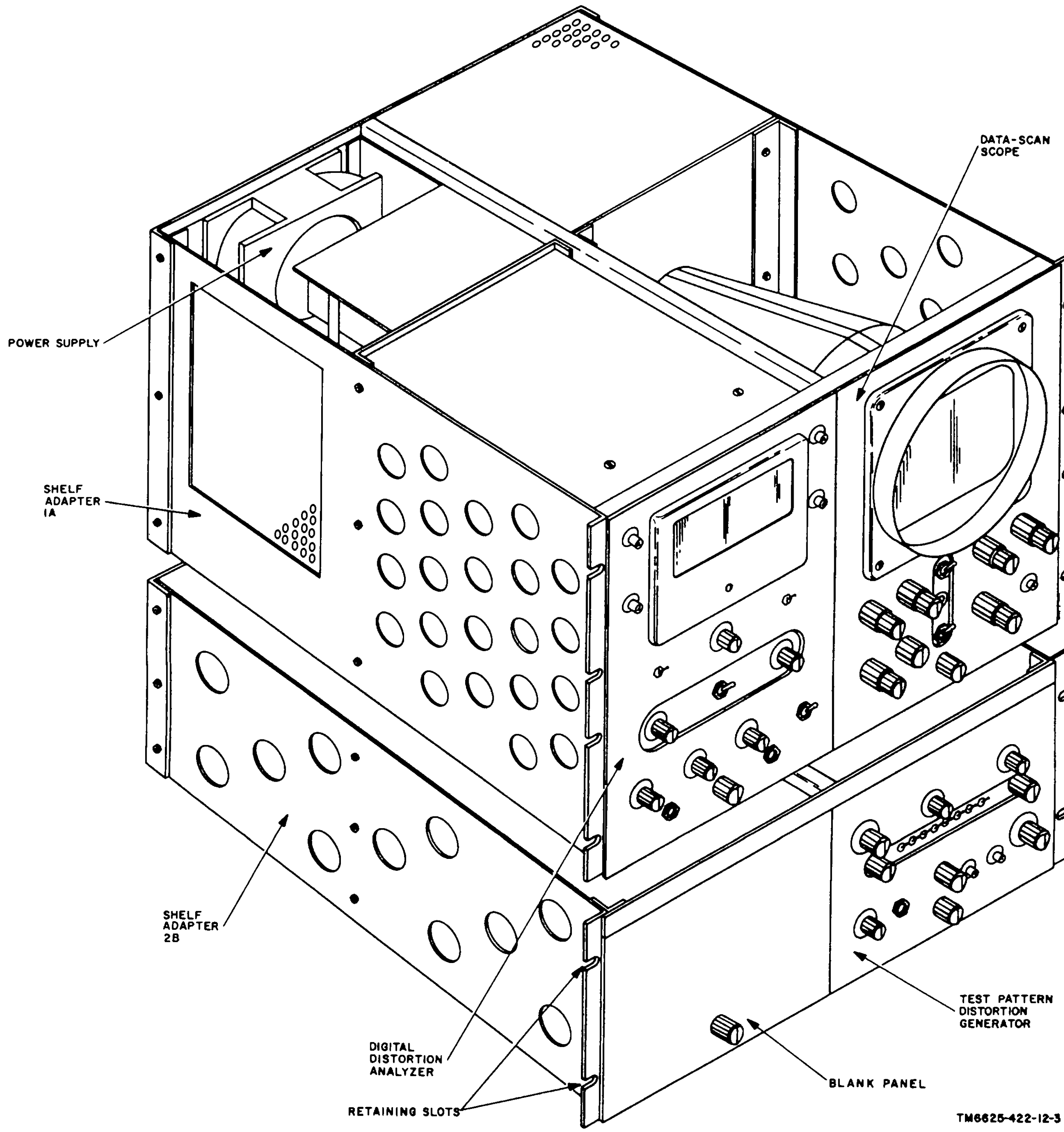

Figure 3. Test Set, Teletypewriter AN/GGM-3.

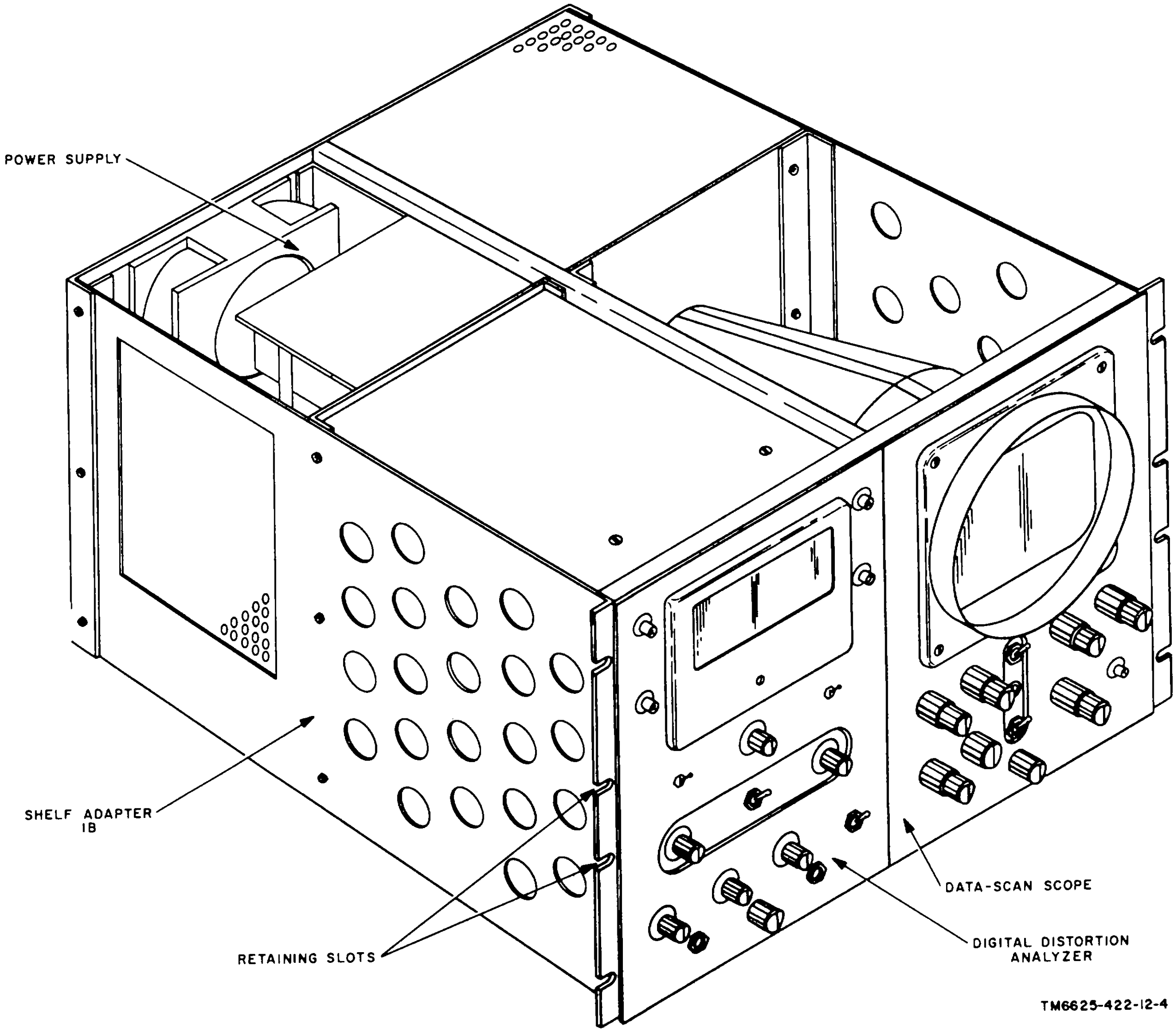

Figure 4. Test Set, Teletypewriter AN/GGM-4.

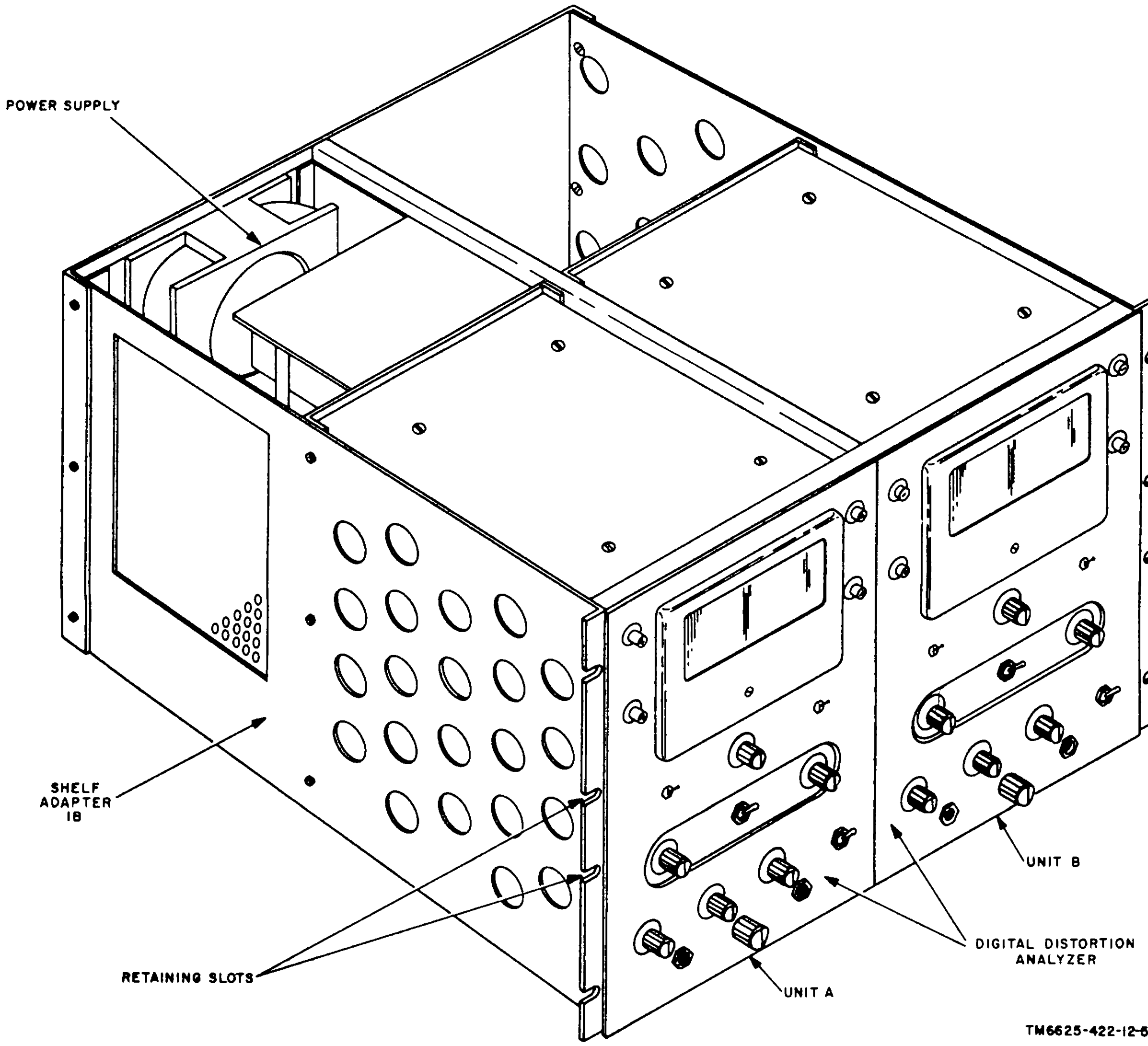

Figure 5 Test Set, Teletypewriter AN/GGM-5.

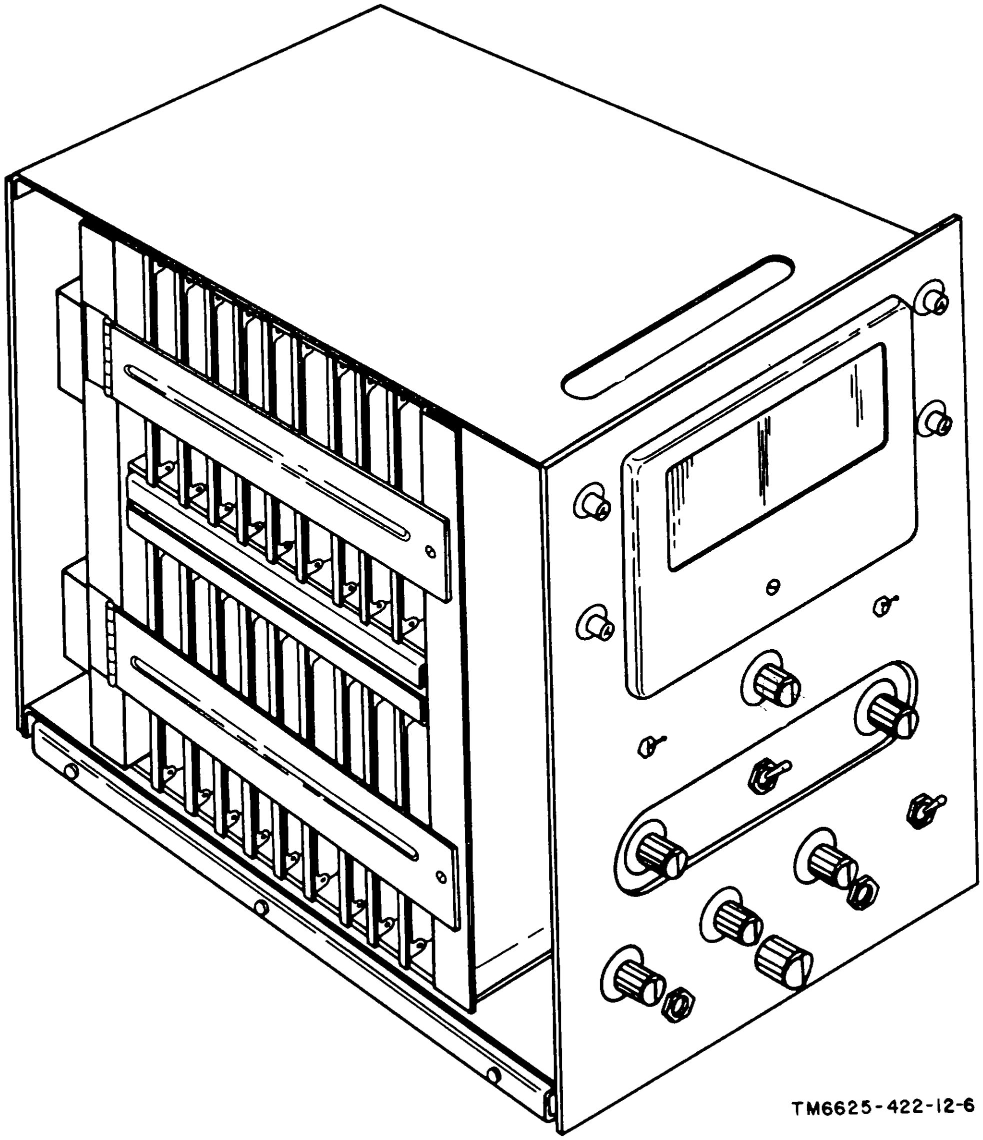

Figure 6. Digital distortion analyzer, front oblique view.

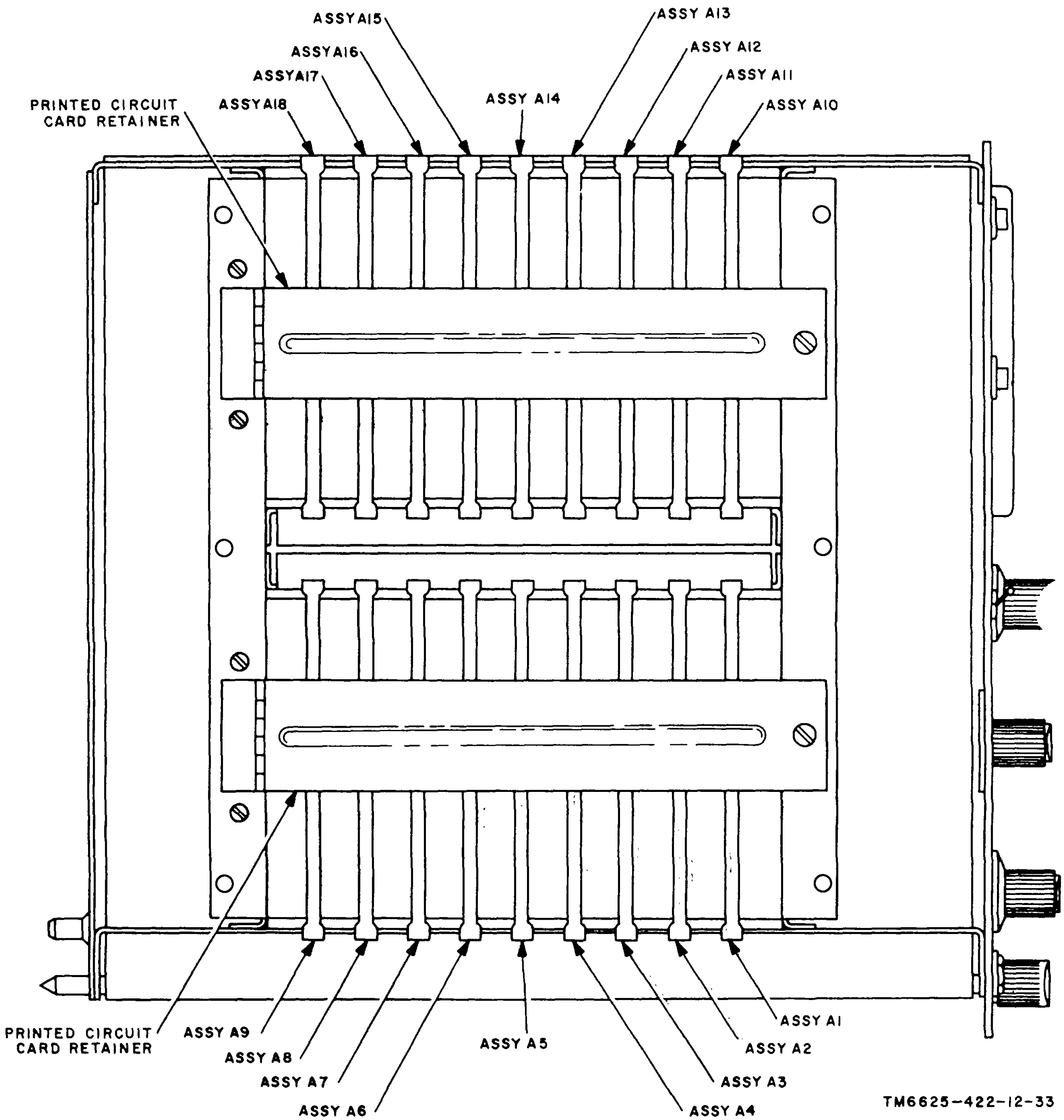

Figure 7. Digital distortion analyzer, left side view.

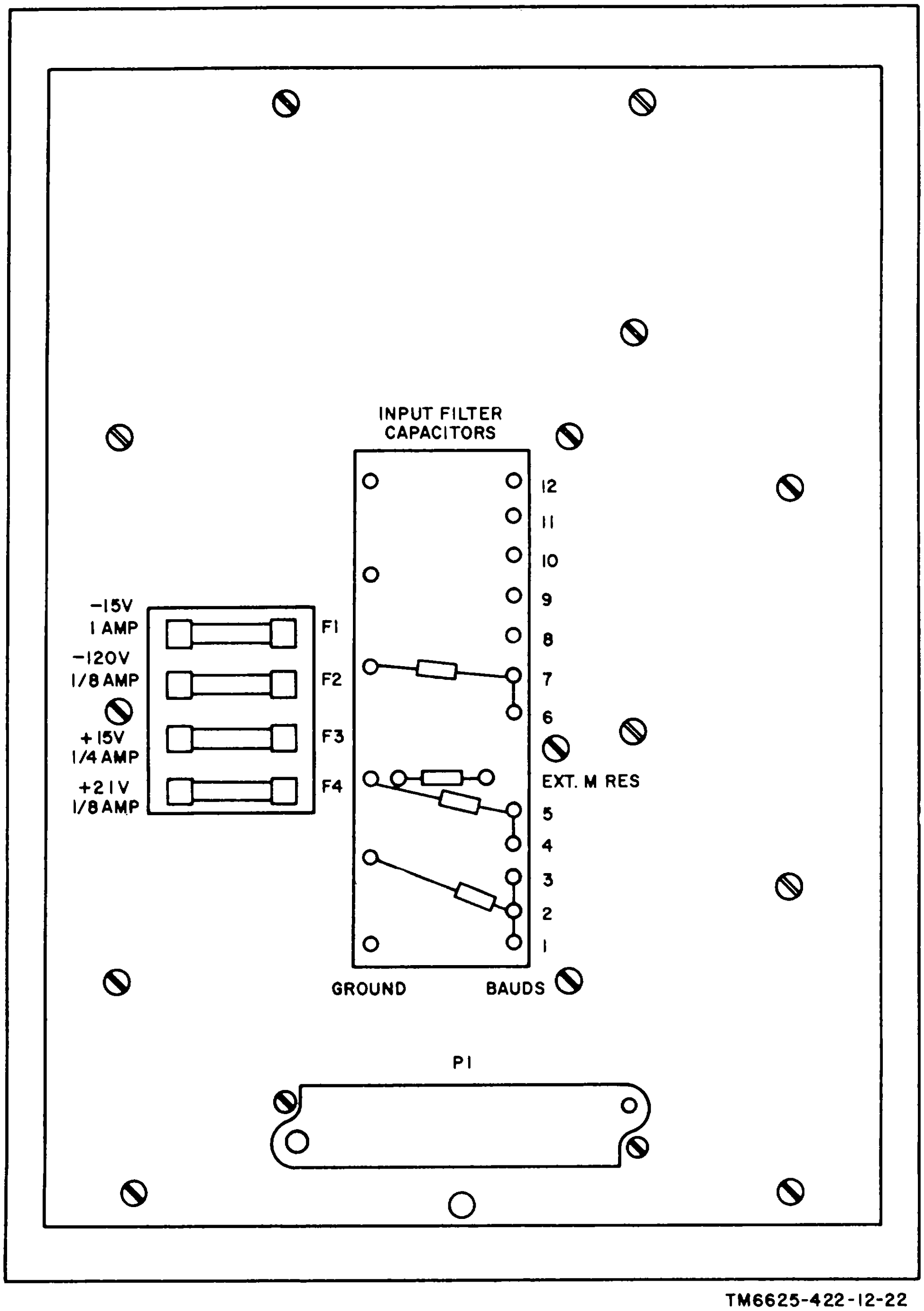

Figure 8. Digital distortion analyzer, rear view.

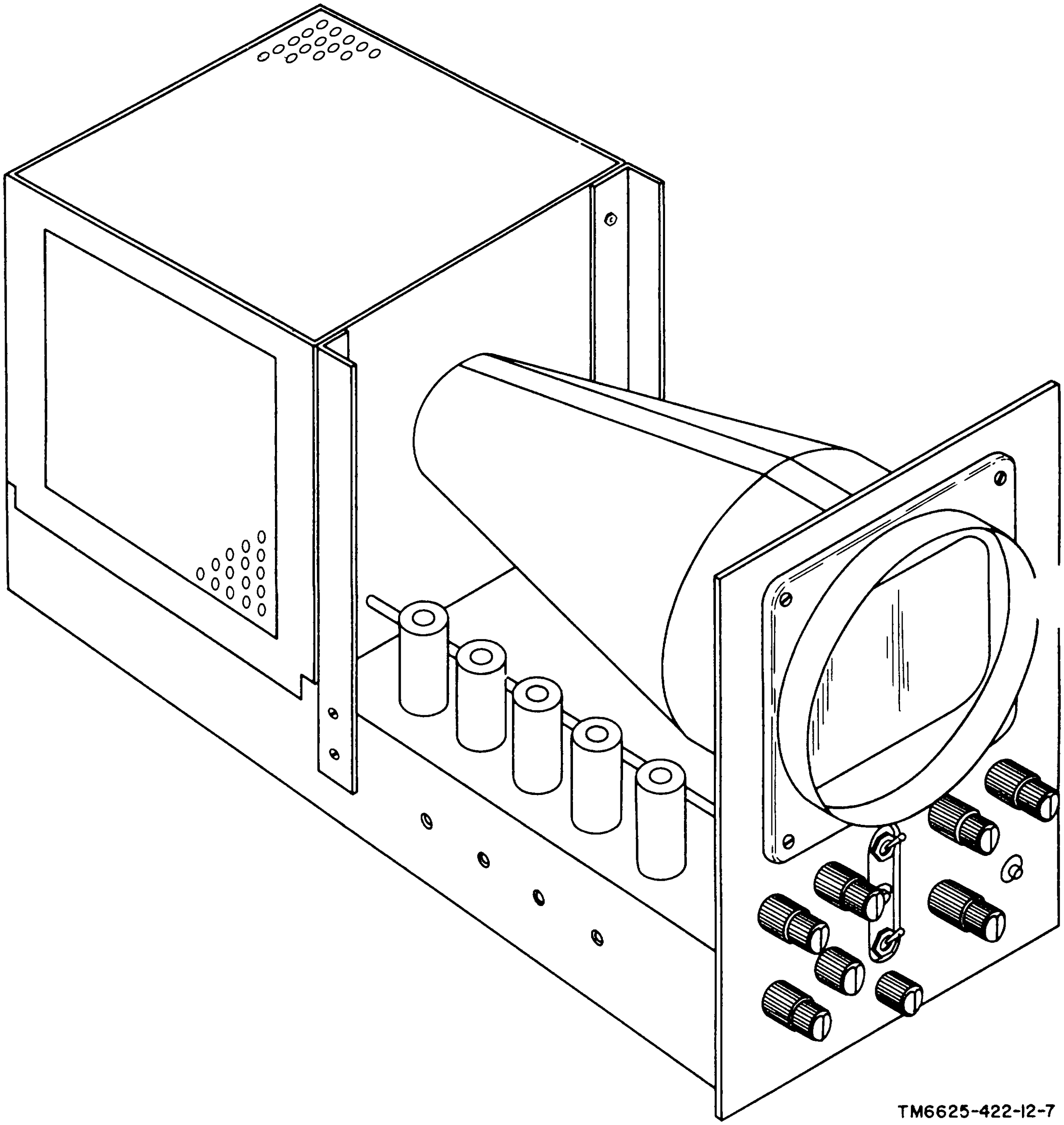

Figure 9. Data-scan scope, front oblique view.

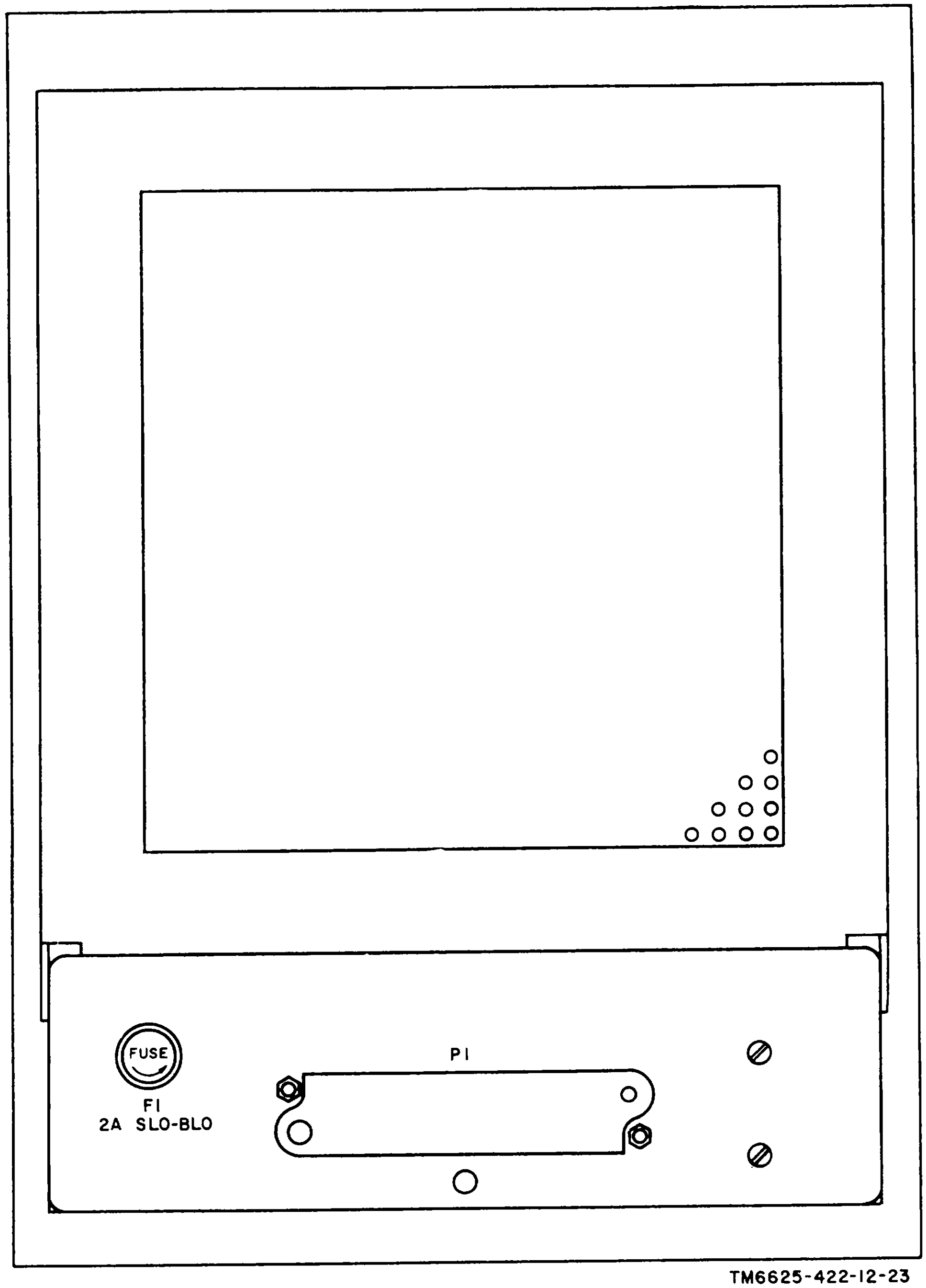

Figure 10. Data-scan scope, rear view.

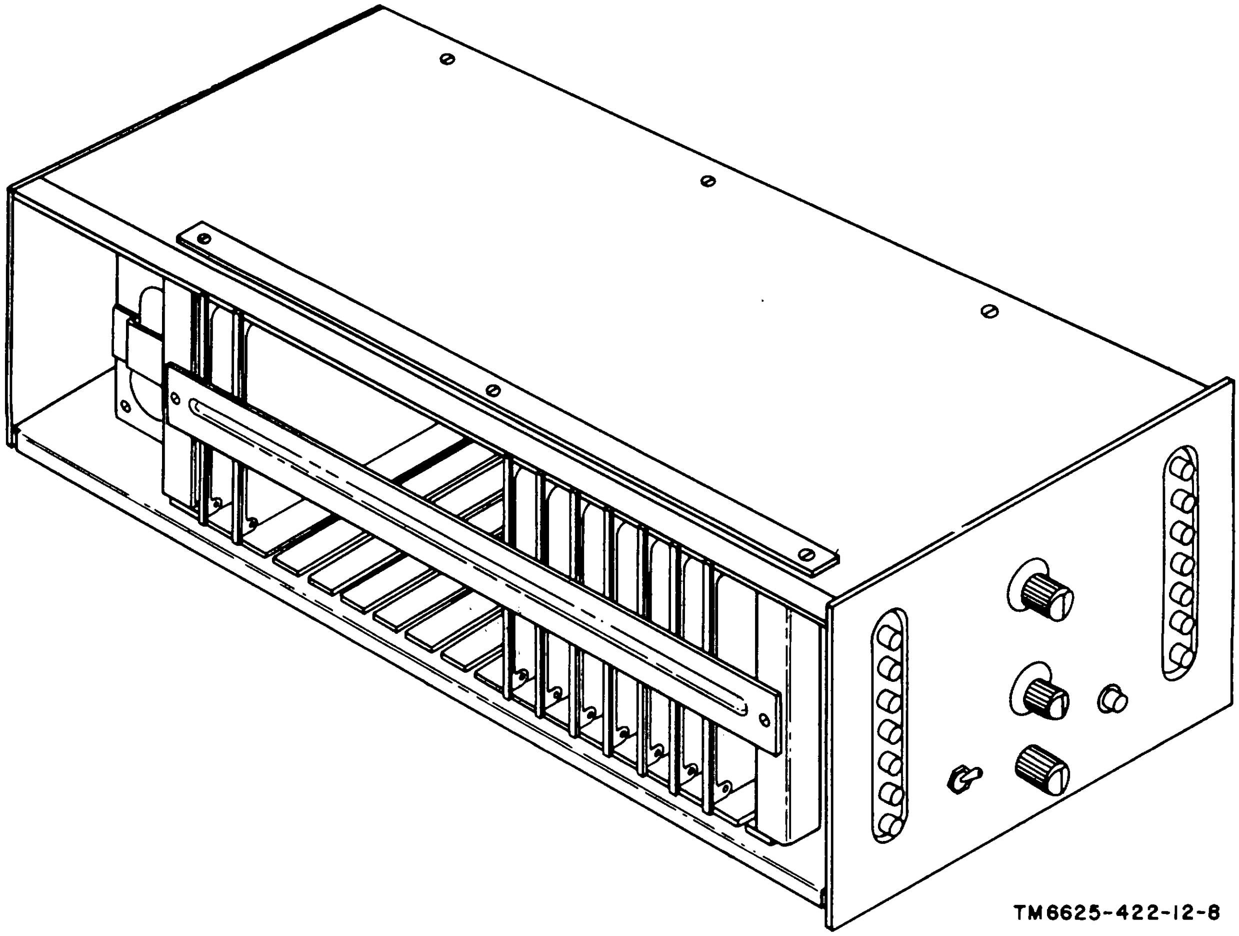

Figure 11. Time base generator, front oblique view.

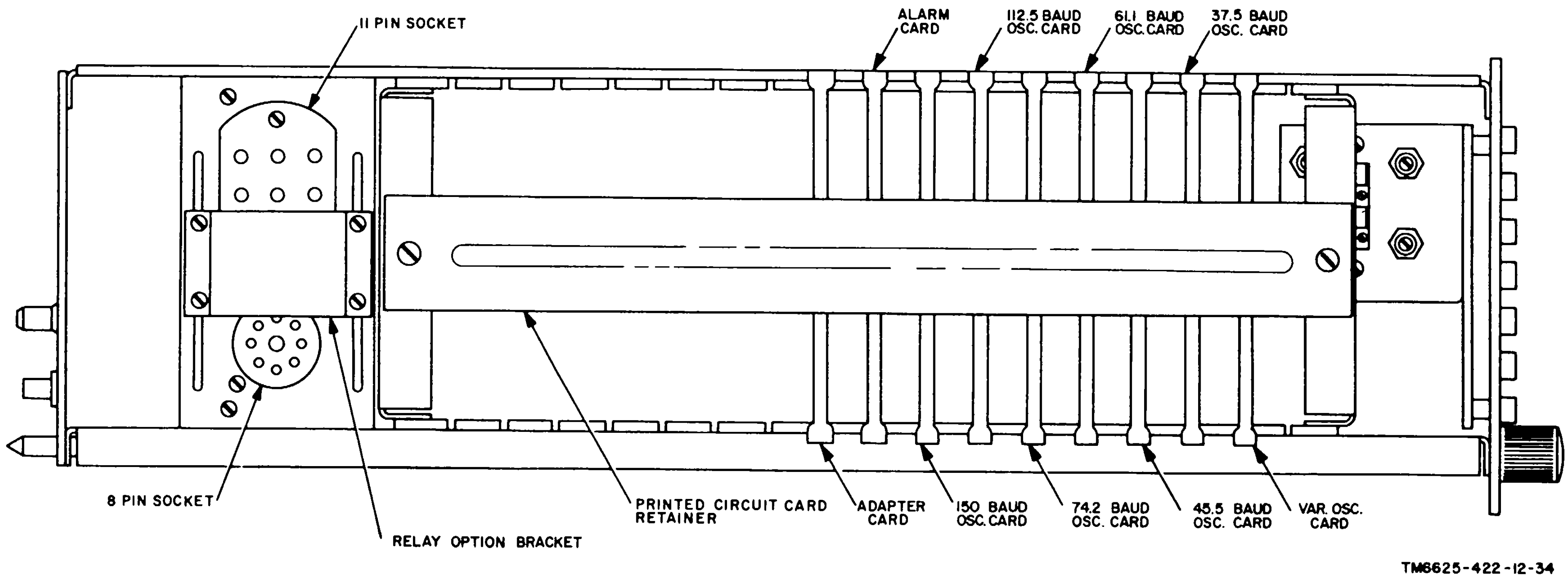

Figure 12. Time base generator, left side view.

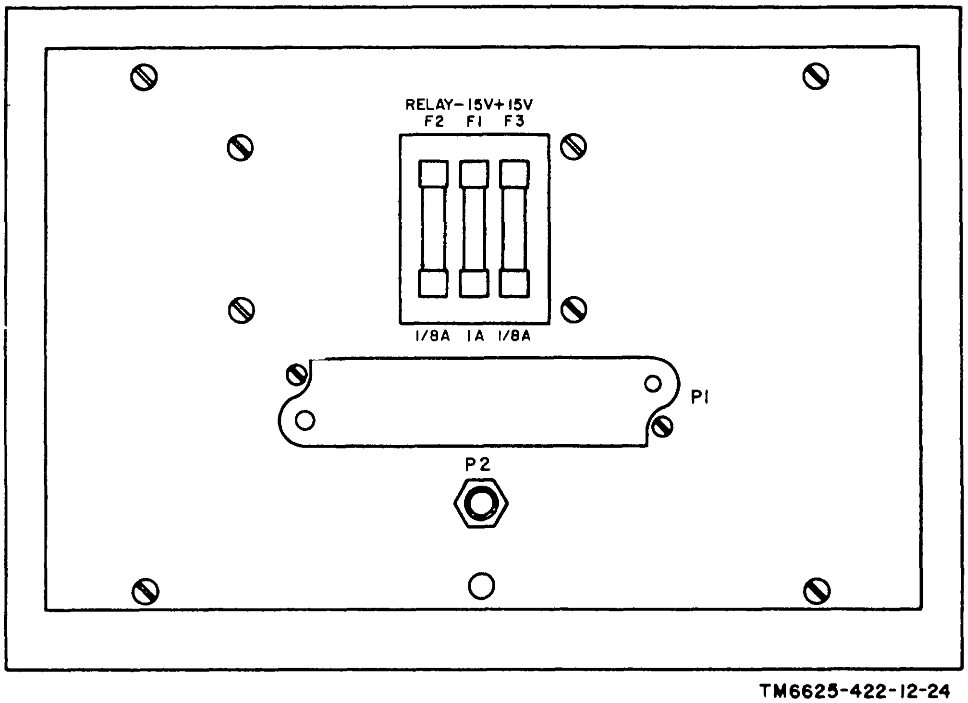

Figure 13. Time base generator, rear view.

11. Description of Test Pattern Distortion Generator
(figs. 14, 15, and 16)

a. The test pattern distortion generator (fig. 14) consists of a basic chassis and 21 printed circuit cards which are inserted into the right side of the chassis (fig. 15). The cards are secured in position by a printed circuit card retainer.

b. Power, loop battery, and timing signals are applied to the test pattern distortion generator through the rear panel connector (P1, fig. 16). The test pattern distortion generator output signal is available at a front panel jack as well as through the rear panel connectors. A switch on the rear panel allows selection of the relay (mechanical or electronic) output signal to the front panel jack. Operating controls are on the front panel.

12. Description of Power Supply
(figs. 17 and 18)

The power supply (fig. 17) is air-cooled by a blower fan mounted in the front panel. Input and output power connections are made through a rear panel connector (fig. 18). The rear panel also contains guide pins at the upper corners to aid in the alignment of the chassis for installation in the shelf adapter or equipment housing. The power switch, test points, fuses, and voltage adjust controls are on the front panel.

13. Description of Minor Components

The minor components associated with each of the AN/GGM-(*)'s are listed in paragraph 5*a* and illustrated in figures 1 through 5.

a. The equipment housing (fig. 2) is a console housing for mounting the five components of the AN/GGM-2. Power for the operation of the components is applied through a connector on the equipment housing rear panel and distributed by internal wiring in the equipment housing. All signal and timing connections to and from the components are made to jacks on the rear of the equipment housing. The housing is provided with handles and cam studs for fastening it to the equipment cart.

b. Equipment Cart EC-1/DAC-V (fig. 2)

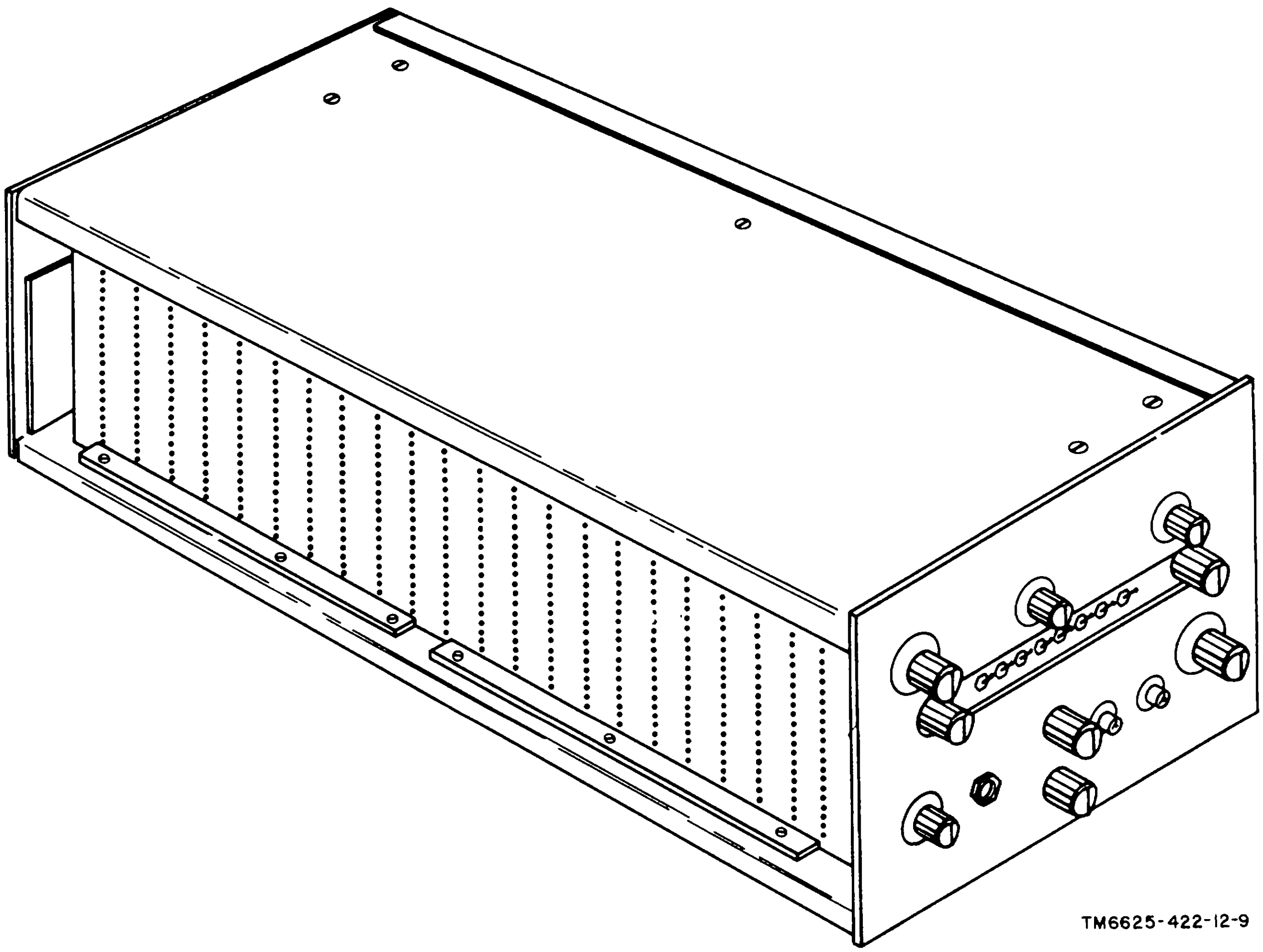

Figure 14. Test pattern distortion generator, front oblique view.

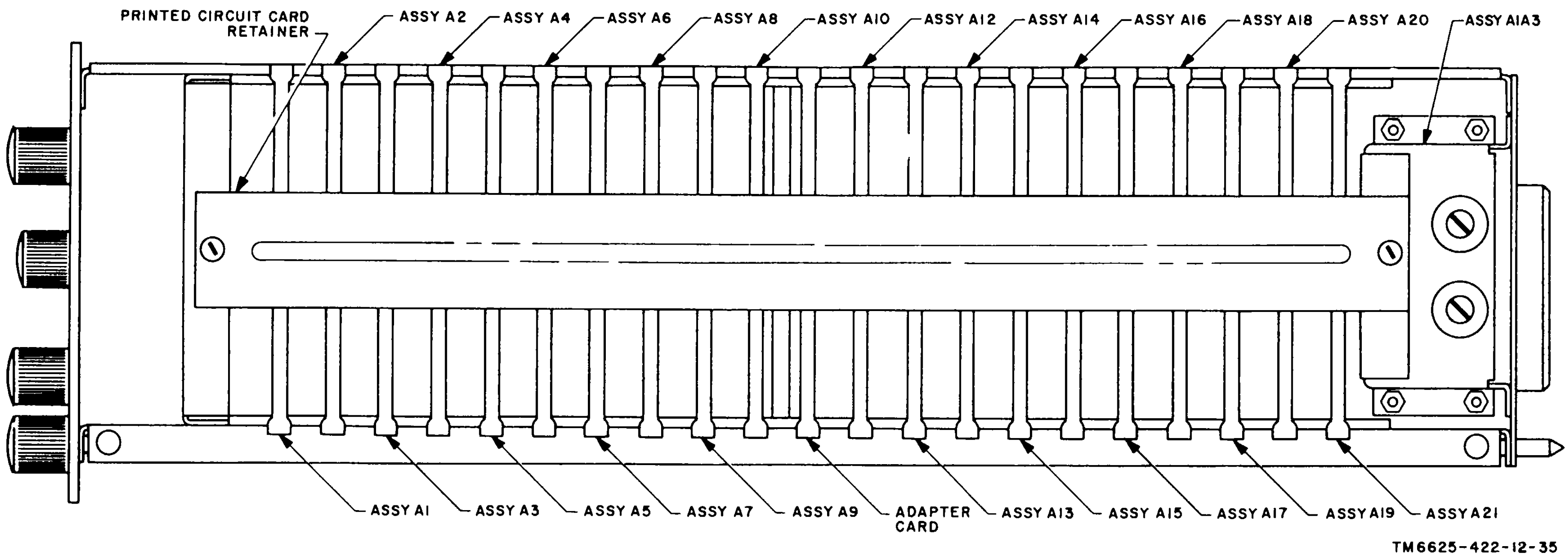

Figure 15. Test pattern distortion generator, right side view.

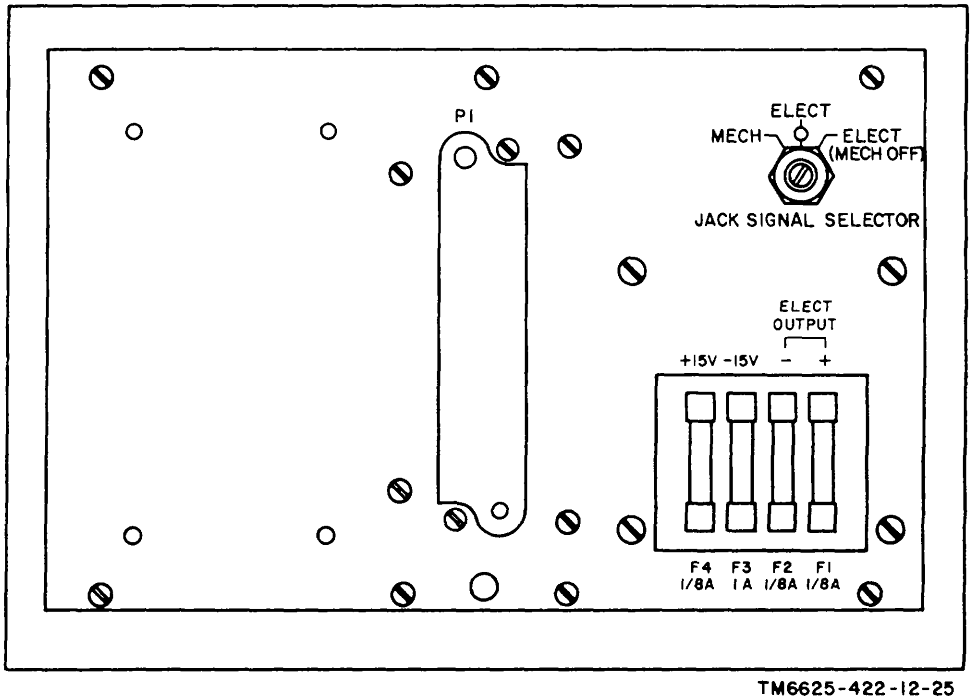

Figure 16. Test pattern distortion generator, rear view.

provides portability of the AN/GGM-2. The equipment cart has alternating-current (ac) power outlets on the front panel to provide power for the operation of electrical tools and test equipment. Ac power circuit breakers on the front panel of the equipment cart control application of the input ac power to the five major components of the AN/GGM-2 and the power outlets.

c. Shelf adapter 1A (figs. 1, 3, and 4) provides interconnecting and rack mounting facilities for the power supply, digital distortion analyzer, and the data-scan scope of the AN/ GGM-1, AN/GGM-3, and AN/GGM-4.

d. Shelf adapter 1B (fig. 5) provides interconnecting and rack mounting facilities for the power supply and the two digital distortion analyzers of the AN/GGM-5.

e. Shelf adapter 2A (fig. 1) provides interconnecting and rack mounting facilities for the time base generator and the test pattern distortion generator of the AN/GGM-1.

f. Shelf adapters 2B (fig. 3) provides interconnecting and rack mounting facilities for the test pattern distortion generator of AN/GGM-3.

14. Additional Equipment Required

a. The time base generator is not supplied as part of the AN/GGM-3, AN/GGM-4, and AN/GGM-5, but is required for operation. The time base generator may be located up to 1,000 feet from the AN/GMM-(*). One time base generator can supply signals to a maximum of 25 digital distortion analyzer or test pattern distortion generators.

b. Although a Sigma 72 mechanical telegraph relay is supplied with the AN/GGM(*), facilities are included for the operation of an Automatic Electric 202 relay, which is not supplied.

c. If time studies of transmission characteristics are to be made with the AN/GGM-(*), an appropriate pen recorder is required.

15. Difference in Models

AN/GGM-1, AN/GGM-2, AN/GGM-3, AN/GGM-4, and AN/GGM-5 are similar in function and basic components. The differences are the number and type of components included (par. 5*a*).

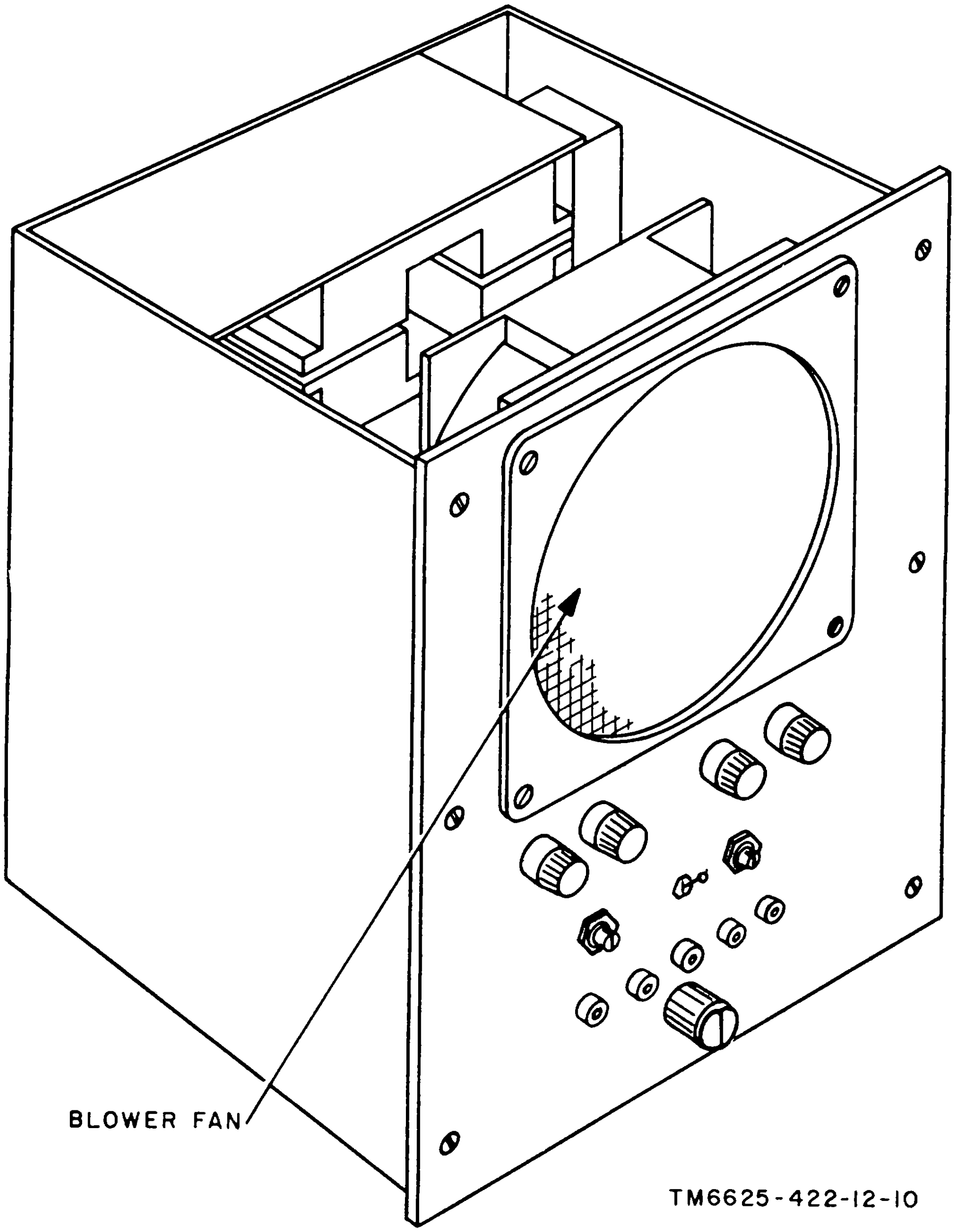

Figure 17. Power supply, front oblique view.

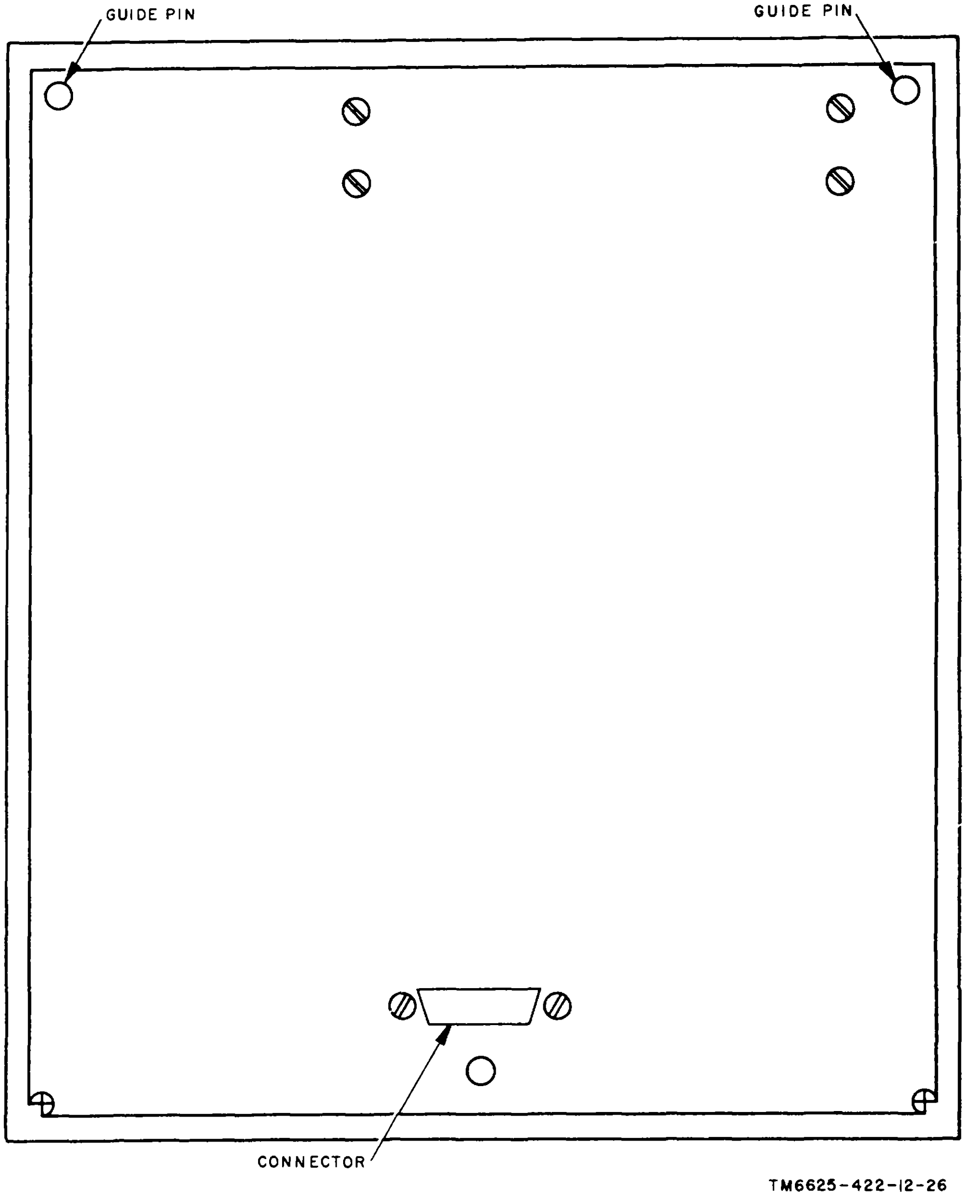

Figure 18. Power supply, rear view.

CHAPTER 2

INSTALLATION

Note.

The AN/GGM-(*) should be installed by second echelon personnel.

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

16. Unpacking

(fig. 19)

a. Packaging Data. When packed for shipment, the AN/GGM-(*) is placed in a corrugated carton and packed in a wooden packing case. The dimensions and contents of the wooden packing case for each AN/GGM-(*) are listed in the following chart.

Equipment set	Height (in.)	Depth (in.)	Width (in.)	(Volume) (cu ft)	Unit weight (lb)
AN/GGM-1	25	27	23	8 1/4	120
AN/GGM-2 (box 1 of 2)	28	29	25	9	140
AN/GGM-2 (box 2 of 2)	38	31	28	18	35
AN/GGM-3	25	27	23	8 1/4	110
AN/GGM-4	13	27	23	4 1/2	70
AN/GGM-5	13	27	23	4 1/2	53

b. Removing Contents.

(1) Cut and fold back the metal bands.

(2) Remove the nails from the wooden cover with a nail-puller, and remove the wooden cover. Do not attempt to pry the wooden cover from the wooden packing case; prying may damage the equipment.

(3) Remove the envelope containing the technical manuals.

(4) Open the moisture-proof paper and remove the corrugated carton.

(5) Open the corrugated carton and remove the corrugated cardboard cover, the carton containing the spare parts, and the corner supports.

(6) Remove the component.

17. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 2.

b. Check the equipment against the packing list. When no packing list accompanies the equipment, use the table of components (par. 5) and the packaging data (par. 16*a*) as a general check.

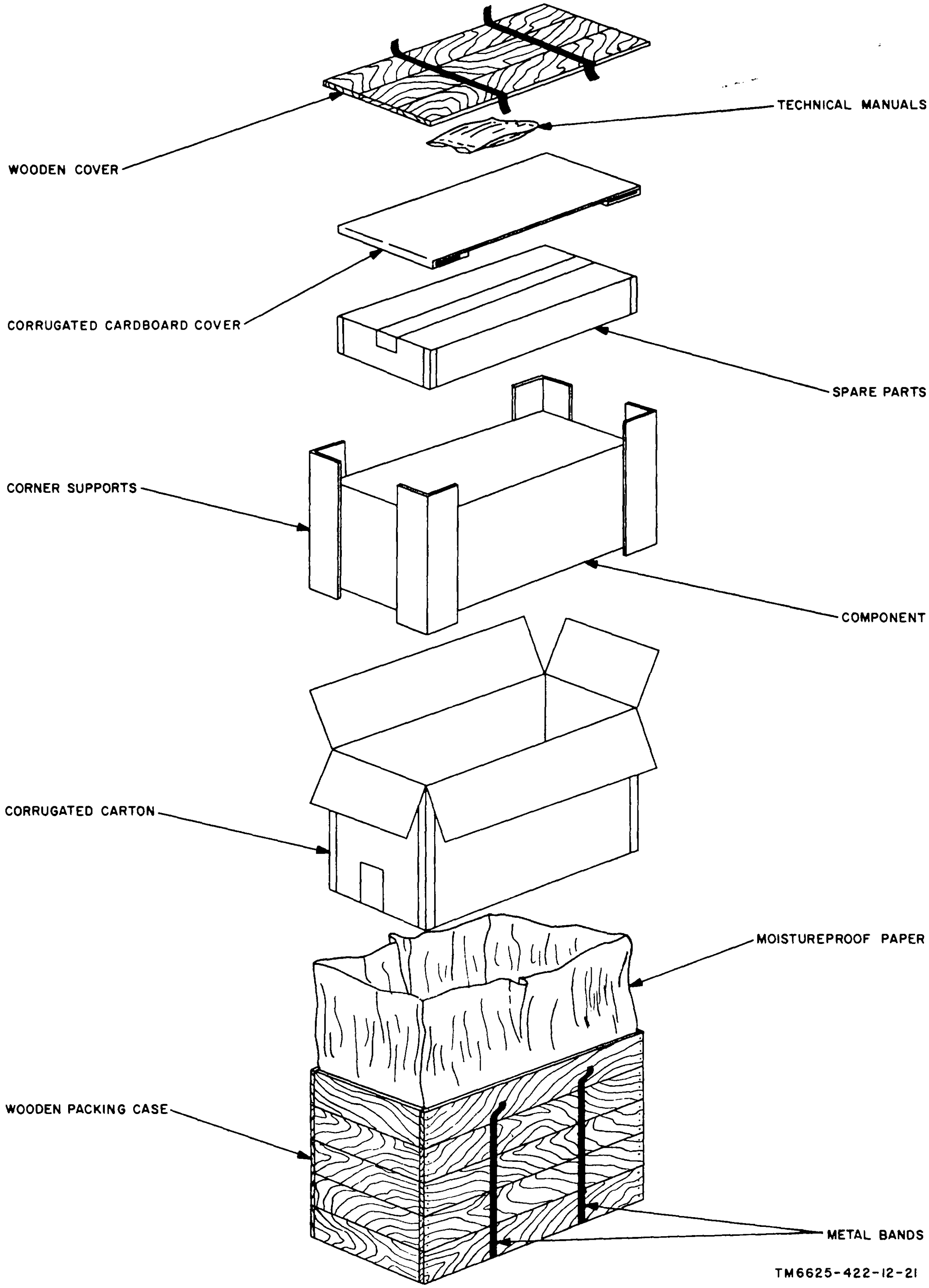

Figure 19. Typical packaging diagram.

Section II. INSTALLATION OF TEST SET, TELETYPEWRITER AN/GGM-(*)

18. General

Paragraphs containing information applicable to the installation of each AN/GGM-(*) are listed in the chart below.

Equipment	Paragraphs
AN/GGM-1..........................	19, 20*a*, 21, 22, 23*a*, 24, 25, 26, 27, 28, 29, 30
AN/GGM-2..........................	19, 20*b*, 21, 22, 23*b*, 25, 26, 27, 28, 29, 30
AN/GGM-3..........................	19, 20*a*, 21, 22, 23*a*, 25, 26, 27, 28, 29, 30
AN/GGM-4..........................	19, 20*a*, 23*a*, 24, 25, 29, 30
AN/GGM-5..........................	19, 20*a*, 23*a*, 24, 26, 29, 30

19. Tools, Test Equipment, and Materials Required

Item	Required for installation of:				
	AN/GGM-1	AN/GGM-2	AN/GGM-3	AN/GGM-4	AN/GGM-5
Multimeter TS-352/U	X	X	X	---	X
Voltmeter TS-443/U	X	X	X	X	X
Wiring Test Set TS-563A/FT	X				
Polar telegraph loop power supply (60 volts)	X	X	X		
Loop current rheostat (0-2,500 ohms, 5 watts)	X	X	X		
Tool Equipment TE-123.................................	X	X	X	X	X
Nonlocking pushbutton switch (FSN 5039-238-6866)[a].	X	---	X	X	X

[a] Required only for remote reset applications of the digital distortion analyzer meter (par. 24).

20. Installation of Equipment
(figs. 1-5)

The AN/GGM-1, AN/GGM-3, AN/GGM-4, or AN/GGM-5 is installed in a standard 19-inch relay rack or cabinet (*a* below); the AN/GGM-2 (*b* below) is installed on an equipment cart (part of AN/GGM-2). The AN/GGM-1 and AN/GGM-3 require approximately 20 inches of vertical rack space; the AN/GGM-4 and AN/GGM-5, approximately 13 inches.

a. Installation in Rack or Cabinet (fig. 1, 3, 4, or 5, as appropriate).

(1) Remove each components from its shelf adapter by loosening the chassis securing knob at the bottom center of each front panel and withdrawing the component.

Caution:

Do not install the AN/ GGM-(*) directly above an equipment that generates excessive heat. Excessive heat will cause faulty operation of the AN/GGM-(*) and may damage the transistors.

(2) Position each shelf adapter in the relay rack or cabinet and secure it with a panel bolt in each retaining slot. For the AN/GGM-1 and AN/GGM-3, position shelf adapter 1A directly above shelf adapter 2A or 2B, as appropriate.

Note.

Shelf adapters 2A (fig. 21) and 2B (fig. 23) are shipped with the interunit harness jacks removed from the rear panels. After a shelf adapter 2A or 2B is installed in the rack or cabinet, remove the jack retaining screws from the jack, position the jack in the rear panel opening provided, and replace and tighten the retaining screws to secure the jack in position.

(3) Replace the components in the shelf adapters. Secure each component by tightening the front panel chassis securing knob.

Note.

Program the call letters in the test pattern distortion generator (par. 22) for the AN/GGM-1, AN/GGM-2, and AN/GGM-3 before replacing it in the shelf adapter.

b. Installation of Equipment Housing on Equipment Cart (fig. 2).

(1) Loosen the chassis securing knobs on the digital distortion analyzer, time base generator, test pattern distortion generator, and data-scan scope and remove them from the equipment housing. Open the rear door on the equipment housing, loosen the chassis securing knob on the power supply, and remove the power supply from the equipment housing.

(2) Lift the equipment housing by using the handles on the sides and place it on the equipment cart (fig. 2). Position the housing so that the cam studs on the bottom insert into the keyholes on the equipment cart.

(3) Press the equipment housing to the rear to engage the cam studs in the keyhole slots on the equipment cart.

(4) Replace the component in the equipment housing and tighten the chassis securing knobs.

21. Installation of Telegraph Relay

The AN/GGM-1, AN/GMM-2, and AN/GGC-3 are shipped with a Sigma 72 mechanical telegraph relay installed. If an Automatic Electric 202 relay is to be used, install it in the relay option bracket as follows:

Note.

The relay option bracket for the AN/GGM-3 is accessible at the rear of shelf adapter 2B (fig. 23). Perform only *b*, *c*, and *e* below for the AN/GGM-3.

a. Loosen the chassis retaining knob at the bottom center of the time base generator front panel. Withdraw the time base generator from the shelf adapter.

b. Loosen the bracket retaining screws on the relay option bracket (figs. 12 and 23). Move the bracket to expose the 11-pin socket. Tighten the bracket retaining screws.

c. Insert the relay into the socket and press firmly to insure proper seating.

d. Replace the time base generator in the equipment housing or shelf adapter and tighten the chassis securing knob.

e. Adjust the relay bias (par. 30*c*).

22. Call Letters Programming Procedure

Note.

The resistors removed from the test pattern distortion generator to program call letters (*a* and *b* below) should be tagged and stored for use when call letters are changed, when the equipment is packed for shipment or storage, or when the equipment is forwarded for higher echelon repair.

Caution:

A low wattage soldering iron (25 watts) must be used when replacing the resistors on the printed circuit assembly components.

Personnel skill in maintenance of printed circuit assemblies must replace these resistors.

a. General. The test message of the test pattern distortion generator contains provisions for the addition of seven call letters (including letters and figures shift characters) at the end of the message. The call letters are programmed into the test pattern distortion generator by removing selected resistors from printed circuit assembly A17 (fig. 15). The program chart (*b* below) lists the resistors that should be removed to cause any specific characters to be generated. To use the program chart, first locate the first character of the desired call letters in the CHARACTER column of the chart and note which resistor columns under CHARACTER 1 are checked (X). Use figure 20 as a guide and locate these resistors on printed circuit assembly A17; carefully clip the resistor leads and remove the resistors from the printed circuit card. Program the remaining six characters the same way, only use the applicable CHARACTER columns. For example, if character A is to be the first call letter, remove resistors R70 and R71 (fig. 20). If character Y is to be the second call letter, remove resistors R75, R77, and R79.

Note.

If a lowercase character (number, symbol, etc.) is included in the call-letter sequence, preceded and followed by upper case characters, the lowercase character program must be preceded by a FIGS character and followed by a LTRS character. When a lowercase character is used, in this manner, only five call letters can be used.

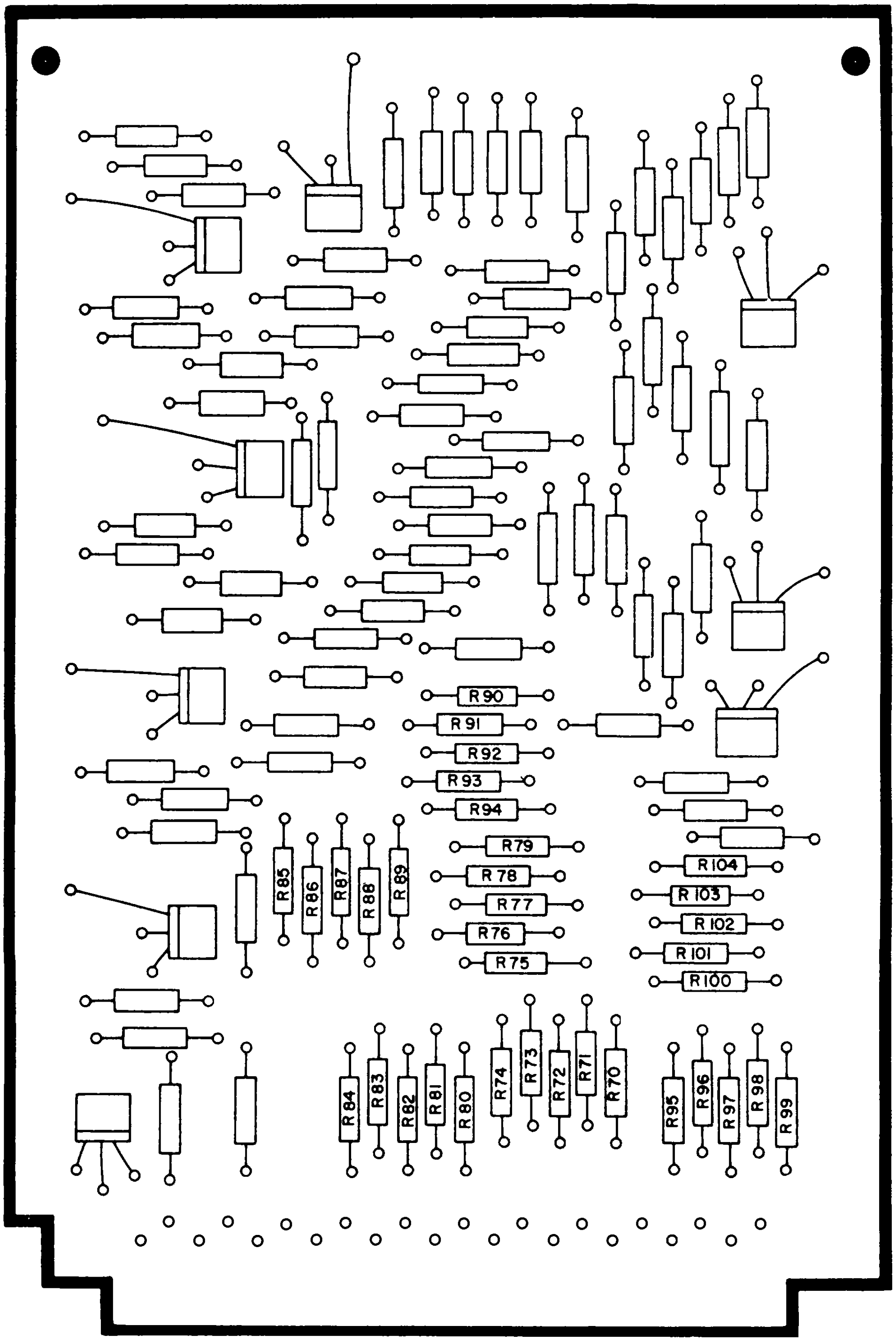

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Figure 20. Printed circuit assembly A17, call-letter program resistors.

b. Program Chart

PROGRAM CHARACTER		CALL CHARACTER MARK RESISTORS																																		
		CHARACTER 1					CHARACTER 2					CHARACTER 3					CHARACTER 4					CHARACTER 5					CHARACTER 6					CHARACTER 7				
LTRS	FIGS	R70	R71	R72	R73	R74	R75	R76	R77	R78	R79	R80	R81	R82	R83	R84	R85	R86	R87	R88	R89	R90	R91	R92	R93	R94	R95	R96	R97	R98	R99	R100	R101	R102	R103	R104
A	-	X	X				X	X	X			X	X				X	X				X	X				X	X				X	X			
B	?	X			X	X	X			X	X	X			X	X	X		X	X	X	X			X	X	X			X	X	X			X	X
C	:		X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X	
D	$	X			X		X			X		X			X		X			X		X			X		X			X		X				
E	3	X					X					X					X					X					X					X			X	
F	.′	X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X	
G	&		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X
H	STOP			X		X			X		X			X		X			X		X			X		X			X		X			X		X
I	8		X	X				X	X				X	X				X	X				X	X				X	X				X	X		
J	,	X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X	
K	(	X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X	
L	)		X			X		X			X		X			X		X			X		X			X		X			X		X			X
M	.			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X
N	,			X	X				X	X				X	X				X	X				X	X				X	X				X	X	
O	9				X	X				X	X				X	X				X	X				X	X				X	X				X	X
P	0		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X
Q	1	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X
R	4		X		X			X		X			X		X			X		X			X		X			X		X			X		X	
S	BELL	X		X			X		X			X		X			X		X			X		X			X		X			X		X		
T	5					X					X					X					X					X					X					X
U	7	X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X		
V	;		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X
W	2	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X	X	X			X
X	/	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X
Y	6	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X	X		X		X
Z	″	X				X	X				X	X				X	X				X	X				X	X				X	X				X
SPACE				X					X					X					X					X					X					X		
CAR RETURN					X					X					X					X					X					X					X	
LINE FEED			X					X					X					X					X					X					X			
LTRS		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FIGS		X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X		X	X

23. Input AC Power Connections

Warning:

Do not connect the equipment to the ac power source until all rear panel connections have been made.

a. The AN/GGM-1 (fig. 21), AN/GGM-3 (fig. 23), AN/GGM-4 (fig. 24), and AN/GGM-5 (fig. 25) are shipped with the power cord connected to the PWR terminals of terminal board 1TB1.

b. The AN/GGM-2 (fig. 22) must be connected as follows:

(1) Connect the 2-foot power jumper cord (supplied with the AN/GGM-2) to terminals: 13, 14, and 15 of terminal board 3TB2 on the rear of the equipment housing. Connect the green lead of the power cord to terminal 14. Connect the black and white leads to terminals 13 and 15, respectively.

(2) Connect the jumper cord plug into the female power jack on the rear of the equipment cart.

(3) Connect the female plug of the 6-foot power cord (supplied with the AN/GGM-2) into the male power plug located on the rear of the equipment cart.

24. Connection of Remote Controls and Indicators

a. General. The connection of remote controls and indicators is optional but does not apply to the AN/GGM-2. Perform the procedures in *b*, *c*, and *d* below, as required, for the AN/GGM-1. Perform the procedures in *c* and *d* below, as required, for the AN/GGM-3, AN/GGM-4, and AN/GGM-5.

Note.

Refer to figures 21, 23, 24, or 25, as appropriate. On figure 25, the terminals marked UNIT A and UNIT B apply to the left-hand and right-hand digital distortion analyzer, respectively, as viewed from the front.

b. Remote Time Base Generator Oscillator Alarm Indicator. If remote indication of the time base generator oscillator failure is required, connect the binding posts of Wiring Test Set TS-563A/FT (placed at the remote location) to the TBG REMOTE ALARM terminals of terminal board 1TB1.

c. Remote Meter Reset. If remote reset of thk digital distortion analyzer meter is required during peak measurements, connect a nonlocking pushbutton switch (FSN 5930-238-6866), placed at the remote location, to the METER RESET terminals on terminal board 1TB1.

d. Remote Indicator. If a pen recorder is to be used with the AN/GGM-1, (fig. 21) connect the unit as follows:

(1) If the pen drive input to the recorder is to be a *voltage* proportional to the distortion indicated by the digital distortion analyzer, connect the recorder pen drive input terminals to the EXT IND terminals on terminal board 1TB1.

Note. For this operation, the input resistance of the recorder must be at least 10,000 ohms. Otherwise, the calibration of the digital distortion analyzer will be disturbed.

(2) If the pen drive input to the recorder is to be a *current* proportional to the distortion indicated by the digital distortion analyzer, first remove the EXT M RES. resistor from the rear pane of the digital distortion analyzer (fig. 8) and measure the value of the resistor with the TS352/U. Connect a variable resistor in series with the input to the pen recorder and adjust it until the total resistance (variable resistor and the recorder input resistance) equals the value of the EXT M. RES. resistor removed from the digital distortion analyzer rear panel. Connect the recorder input (in series with the variable resistor) to the EXT IND terminals of terminal board TB1 on the AN/GGM-1 rear panel.

Note.

If the resistance of the variable resistor and recorder is not adjusted to equal the EXT M. RES. resistor, the calibration of the digital distortion analyzer will be disturbed.

25. Digital Distortion Analyzer Input Signal Loop Connections

Warning:

Dangerous voltages exist on telegraph loops. Direct the station supply battery power to the loop circuits to open the loop before

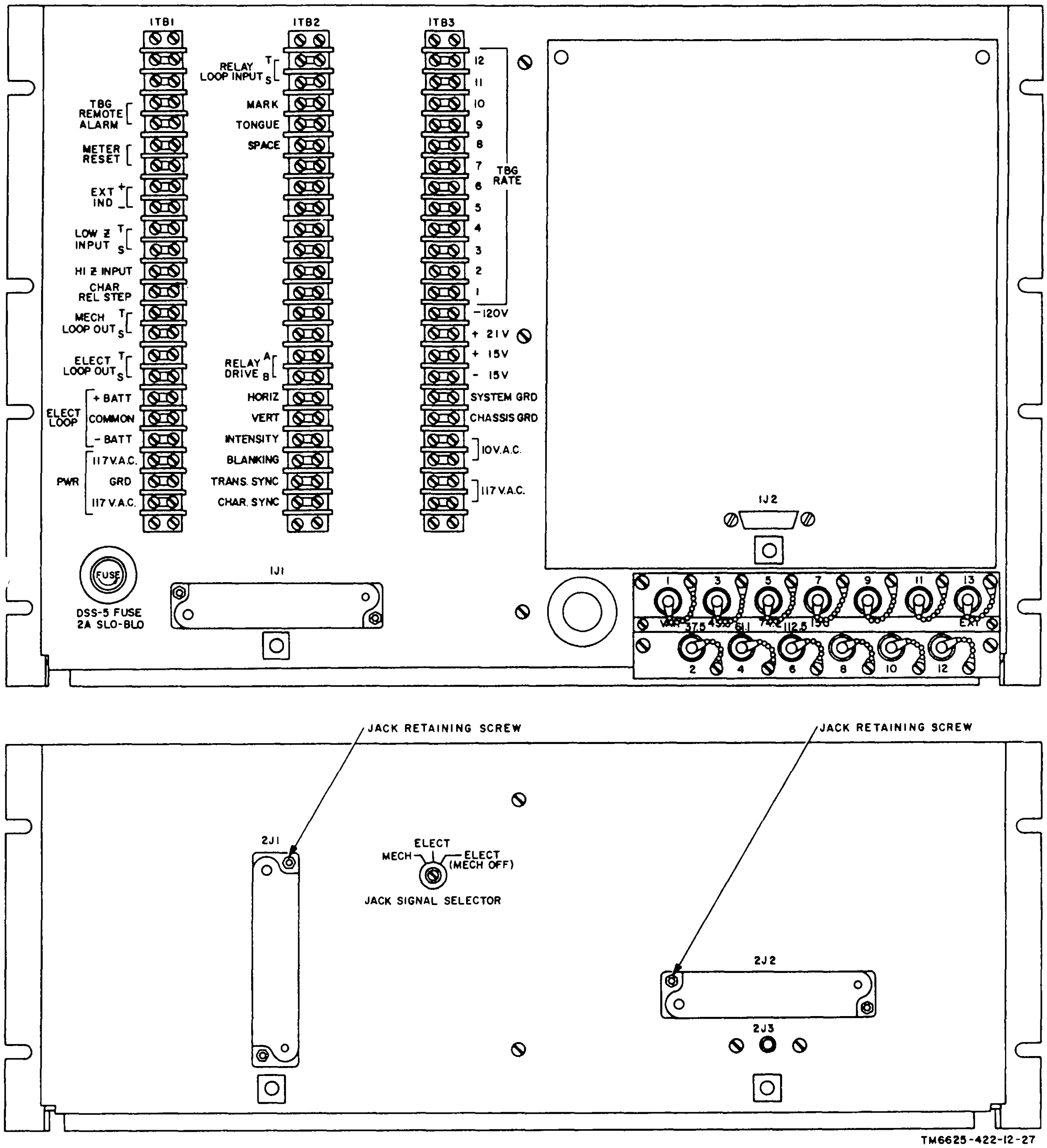

Figure 21. Test Set, Teletypewriter AN/GGM-1, rear view with power supply and interunit harness removed.

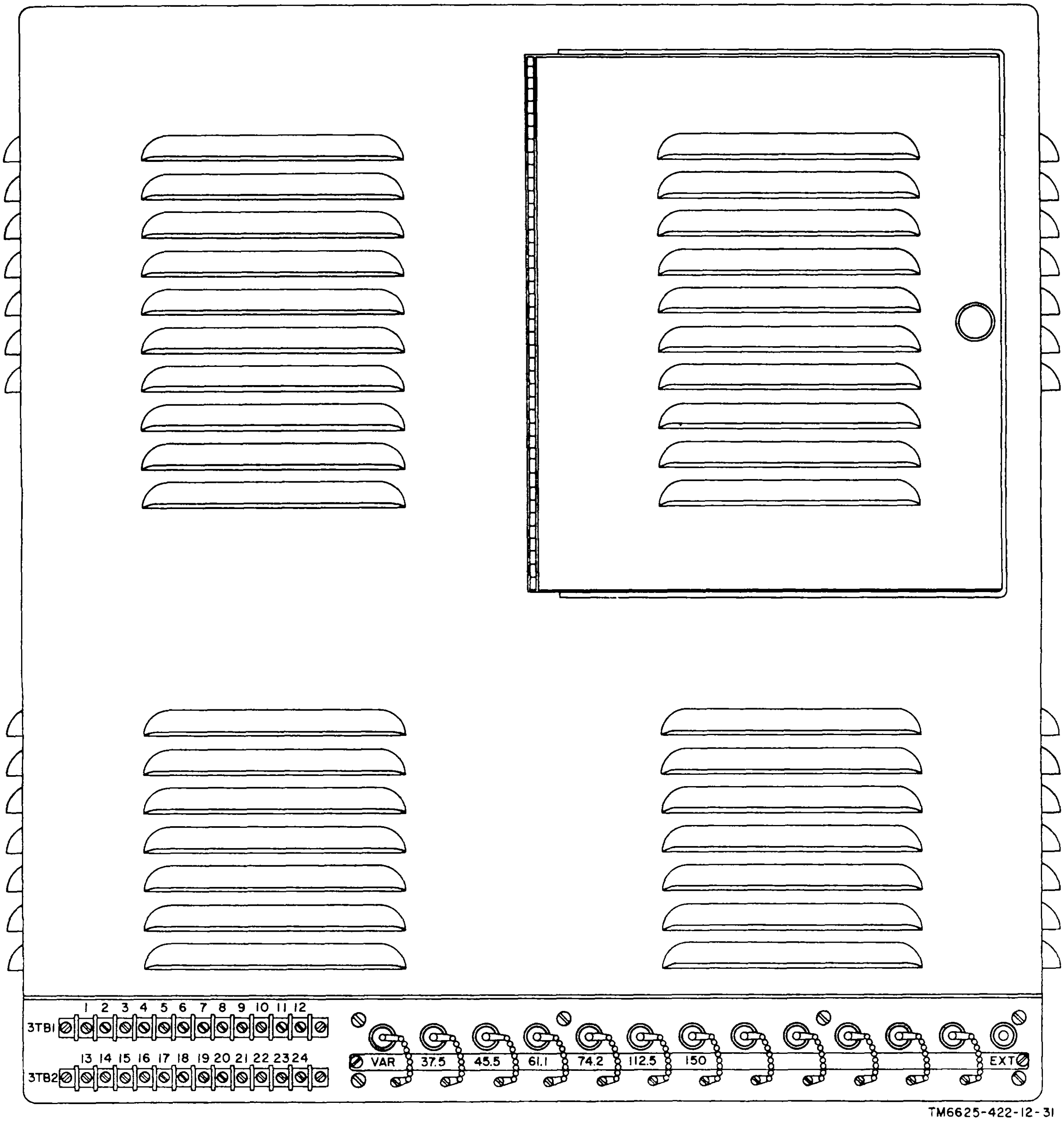

Figure 22. Test Set, Teletypewriter AN/GGM-2, rear view of equipment housing.

making the connections described in *a* and *b* below.

Input signals to the digital distortion analyzer may be applied through either the digital distortion analyzer front panel input jacks or the shelf adapter (equipment housing) rear panel terminals. The rear panel terminals may be used for connecting leads to a switchboard or patch bay, thus facilitating connection of the digital distortion analyzer to numerous signal loops from a common switching point. The front panel input jacks may then be used for temporary patching to loops or equipment for testing and troubleshooting.

Notes.

1. When a loop signal is patched into the digital distortion analyzer front panel input jacks, the traffic on the loops connected to the corresponding rear panel input terminals is not interrupted, but cannot be analyzed.

2. Refer to figure 21, 22, 23, 24, or 25, as appropriate. On figure 25, the terminals marked UNIT A and UNIT B apply to the left-hand and right-hand digital distortion analyzer, respectively, as viewed from the front. Parenthetical references to terminals and terminal boards in *a* and *b* below apply only to the AN/GGM-2.

a. Low-Impedance (Current) Input Signals. If the data/telegraph input signal to the digital distortion analyzer is 20 or 60 milliampere (ma) neutral or 20 or 30 ma polar, connect the input loop as follows:

(1) If rear panel connection is required, connect the loop wires to the LOW Z INPUT terminals on terminal board 1TB1 (to terminals 1 and 2 of terminal board 3TB1 for the AN/GGM-2).

(2) If front panel connection is required, connect the loop wires to a two-conductor phone plug and insert the plug into the LOW Z INPUT jack on the digital distortion analyzer front panel (fig. 26). The polarity of the leads connected to the tip and sleeve of phone plug should correspond to that of the leads connected to the LOW Z INPUT S (sleeve) and T (tip) terminals on the rear panel, if such connections are made.

b. High-Impedance (Voltage) Input Signals. If the data/telegraph input signal to the digital distortion analyzer is high-impedance (shunting) polar, connect the input loop as follows:

(1) If rear panel connection is required, connect the signal line to the HI Z INPUT terminal on terminal board 1TB1 (terminal 3 of terminal board 3TB1 for the AN/GGM-2). Connect the ground bus of the polar signal equipment to the PWR GRD terminal board 1TB1 (terminal 14 of terminal board 3TB1 for the AN/GGM-2).

(2) If front panel connection is required, connect the signal wire to the tip of a two-conductor phone plug. Connect the polar equipment ground to the rear panel PWR GRD terminal of terminal board 1TB1 (terminal 14 of terminal board 3TB1 for the AN/ GGM-2). Insert the plug into the HIGH Z INPUT jack on the digital distortion analyzer front panel (fig. 26).

26. Connection of Character Release Signal

Connection of the character release signal is applicable only to the AN/GGM-1, AN/GGM-2, and AN/GGM-3.

a. General. If the test pattern distortion generator is to be used with synchronous equipment that requires character inputs in response to a step signal, make the appropriate connections in b or c below for the character step control signal line. The step signal must be negative and have an amplitude of from 30 to 60 volts.

b. Connection Procedure for AN/GGM-1 and AN/GGM-3.

(1) Connect the character step control signal line to the CHAR REL STEP terminal on terminal board 1TB1 (fig. 21 or 23, as appropriate).

(2) Connect the step signal ground to the PWR GRD terminal of terminal board 1TB1.

c. Connection Procedure for AN/GGM-2.

(1) Connect the character step control signal line to terminal 17 of terminal board 3TB2 (fig. 22).

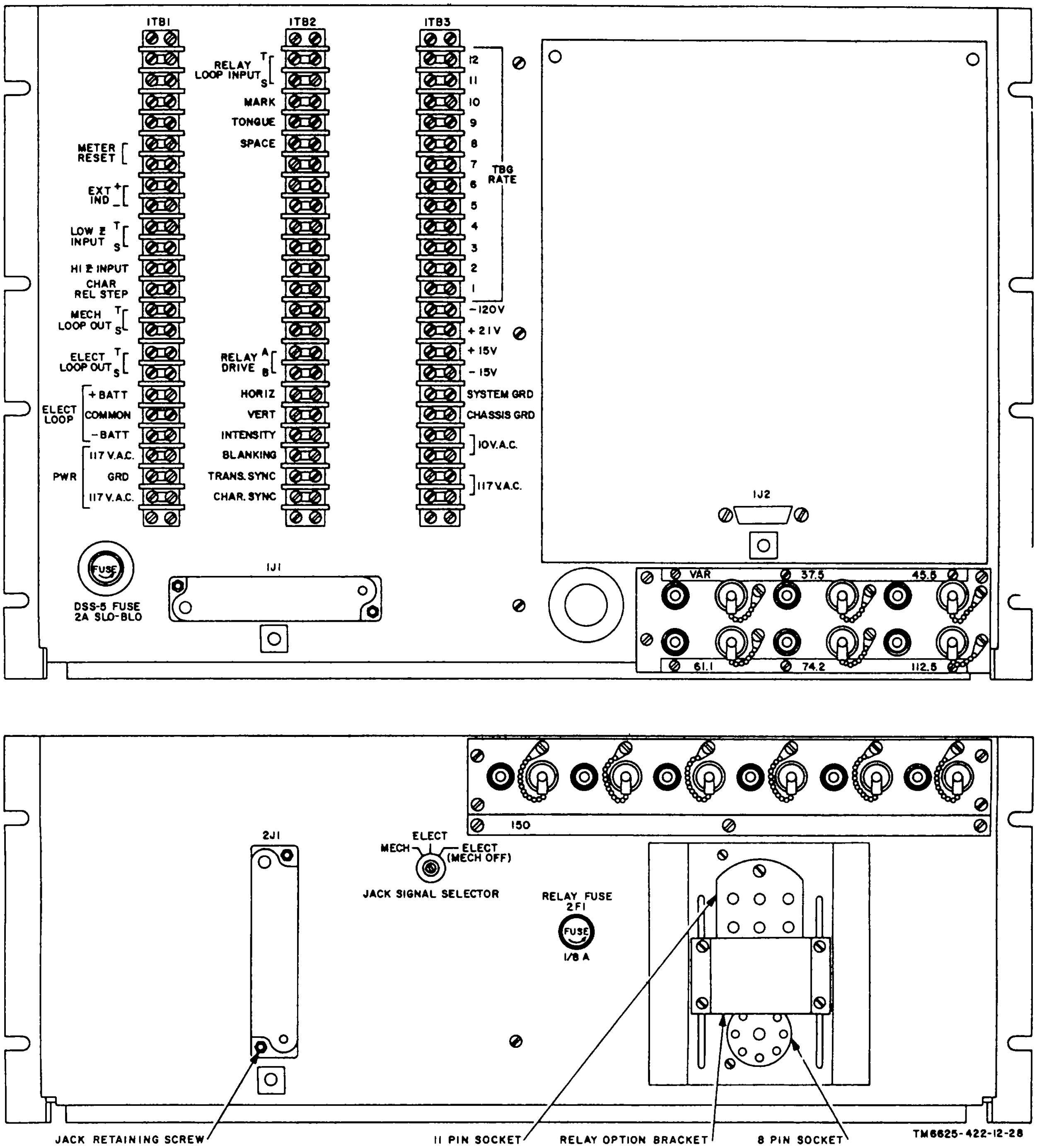

Figure 23. Test Set, Teletypewriter AN/GGM-3, rear view with power supply and interunit harness removed.

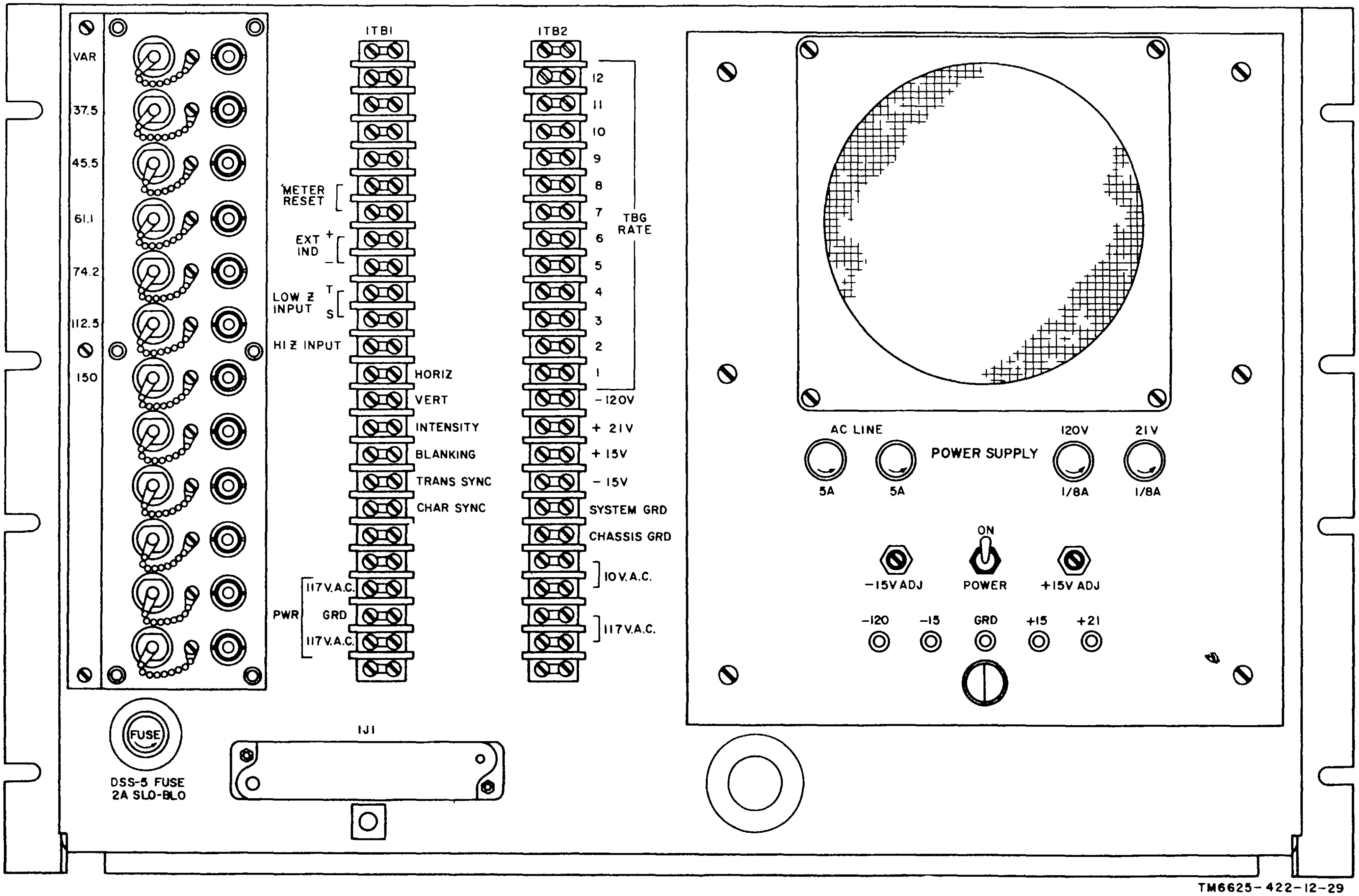

Figure 24. Test Set, Teletypewriter AN/GGM-4, rear view with interunit harness removed.

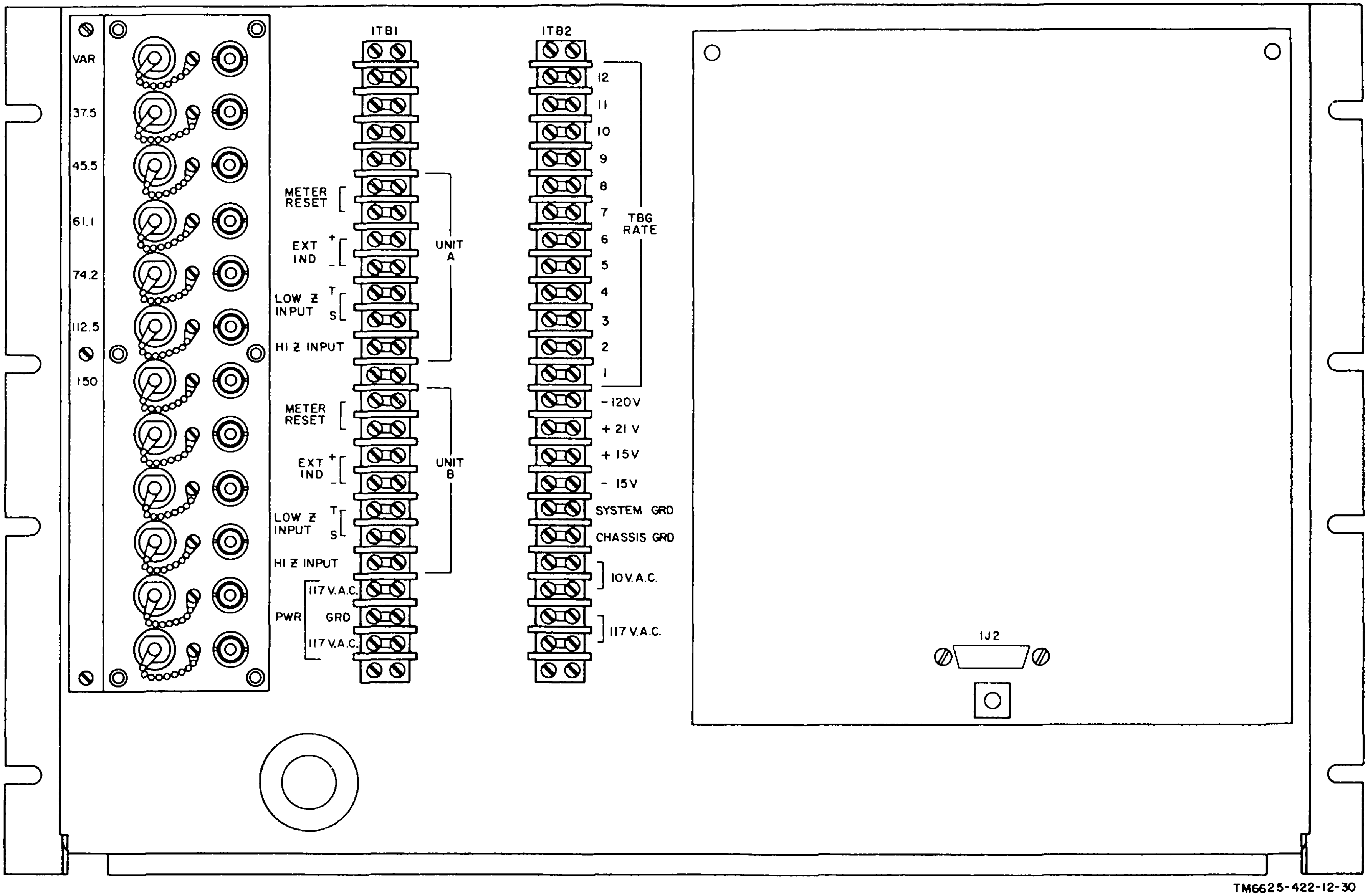

Figure 25. Test Set, Teletypewriter AN/GGM-5, rear view with power supply and interunit harness removed.

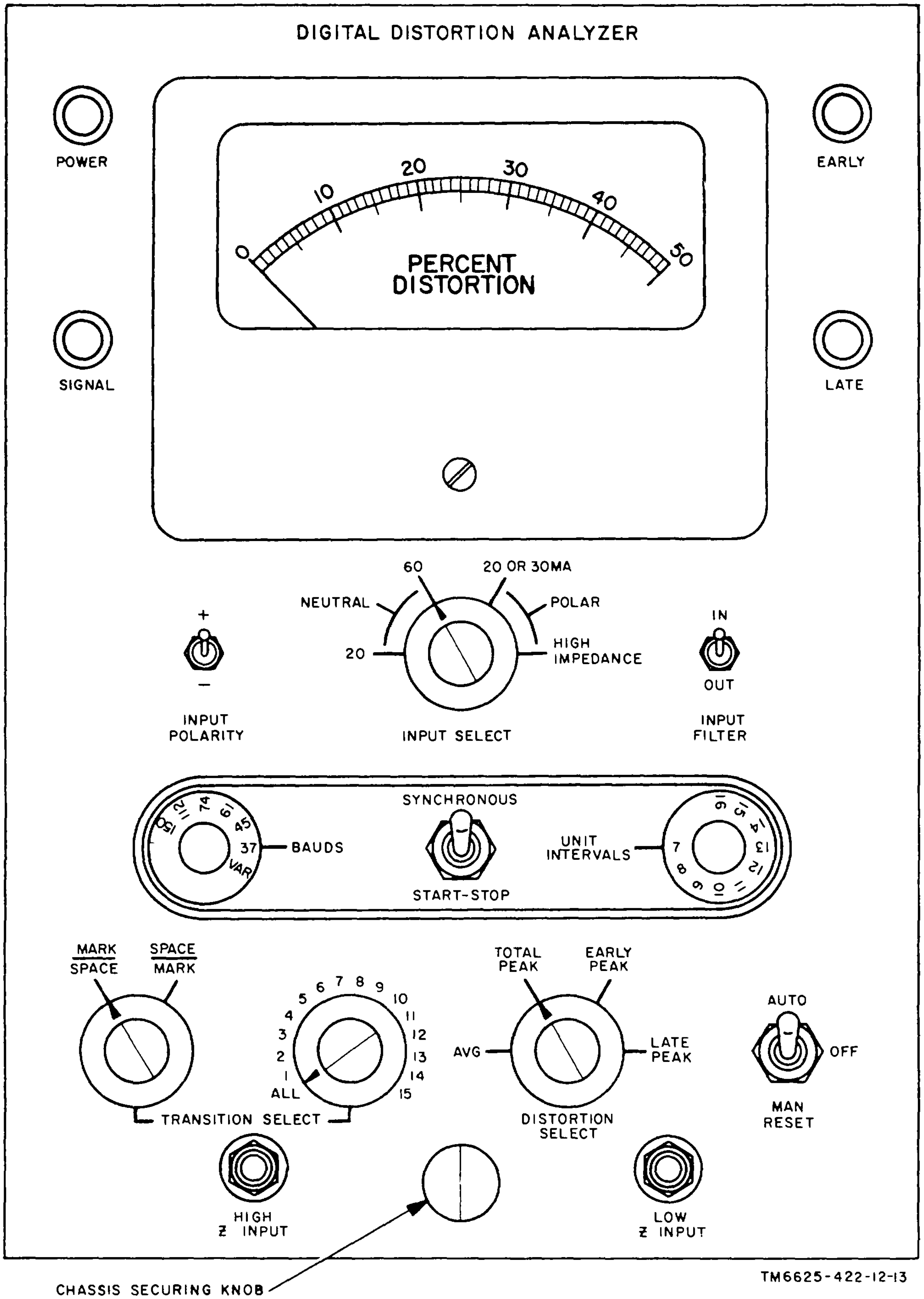

Figure 26. Digital distortion analyzer, front panel.

(2) Connect the step signal ground to terminal 14 of terminal board 3TB2.

27. Connection of Test Pattern Distortion Generator Output Signal Loops from AN/GGM-1, AN/GGM-2, AN/GGM-3

The test pattern distortion generator output signal is available at both the test pattern distortion generator front panel SIGNAL OUTPUT jack (fig. 27) and the shelf adapter equipment housing rear panel terminals. The rear panel terminals may be used to connect the signal to a switchboard or patch bay, to facilitate routing the signal into numerous loops from a common switching locations. The front panel SIGNAL OUTPUT jack may then be used for temporary connections for troubleshooting and testing. After the loops are connected and the batteries installed (60-volt batteries are required when operating with polar output signal or with neutral output signal *into loop* not having loop battery), the loop current must be adjusted. Make the necessary connections to obtain the appropriate type of output configuration as follows:

Notes.

1. When a phone plug is inserted into the front panel SIGNAL OUTPUT jack on the test pattern distortion generator (fig. 27), the corresponding rear panel loop (mechanical or electronic loop, as selected by the rear panel JACK SIGNAL SELECTOR switch) is disabled.

2. Parenthetical references in *a* through *f* below are to terminal and terminal board numbers of the AN/GGM-2 (fig. 22) which differ from those of the AN/GGM-1 (fig. 21) and AN/GGM-3 (fig. 23).

Caution:

Be extremely careful that you are connecting to the proper terminals. Be careful also that the loop batteries connected to the electronic relay loop do not exceed 60 volts for polar operation or 130 volts for neutral operation. Damage to the equipment will result if these precautions are not observed.

a. Connection of Mechanical Relay Loop for Polar Operation. Connect the test pattern distortion generator output for a polar signal from the mechanical telegraph relay as follows:

(1) Connect a wire from the positive (+) battery terminal to the SPACE terminal of terminal board 1TB2 (terminal 10 of terminal board 3TB1 in the AN/GGM-2

(2) Connect a wire from the negative (-) battery terminal to the MARK terminal of terminal board 1TB2 (terminal 8 of terminal board 3TB1 in the AN/GGM-2).

(3) Connect a wire from the battery common terminal (connected to station ground) through a loop current rheostat to the RELAY LOOP INPUT S terminal of terminal board 1TB2 (terminal 12 of terminal board 3TB1 in the AN/GGM-2).

(4) Connect a jumper wire between the RELAY LOOP INPUT T terminal and the TONGUE terminal of terminal board 1TB2 (terminals 11 and 9 of terminal board 3TB1 in the AN/GGM3).

Note.

In the AN/GGM-1 and AN/GGM-3, check to see that a jumper wire is connected between the RELAY DRIVE A and B terminals of terminal board 1TB2. If the jumper wire has been removed, it must be replaced.

(5) Connect the output loop wires to the MECH LOOP OUT T and S terminals of terminal board 1TB1 (terminals 6 and 7 of terminal board 3TB1 in the AN/GGM-2). The polarity of the T (6) and S (7) terminals corresponds to the polarity of the tip, T (6) and sleeve, S (7) connections of the test pattern distortion generator front panel SIGNAL OUTPUT jack.

(6) If the output signal is to be connected from the front panel jack, connect the loop wired to a two-conductor phone plug and insert the plug into the test pattern distortion generator SIGNAL OUTPUT jack. Operate the rear panel JACK SIGNAL SELECTOR switch to MECH.

(7) Adjust the loop current (par. 30*b*).

b. Connection of Mechanical Relay Loop for Dry-Contact Neutral Operation. Connect the test pattern distortion generator output for dry-contact (relay closures) neutral keying from the mechanical relay into a loop having battery supplied by another station as follows:

(1) Connect a jumper wire between the MARK and RELAY LOOP INPUT T

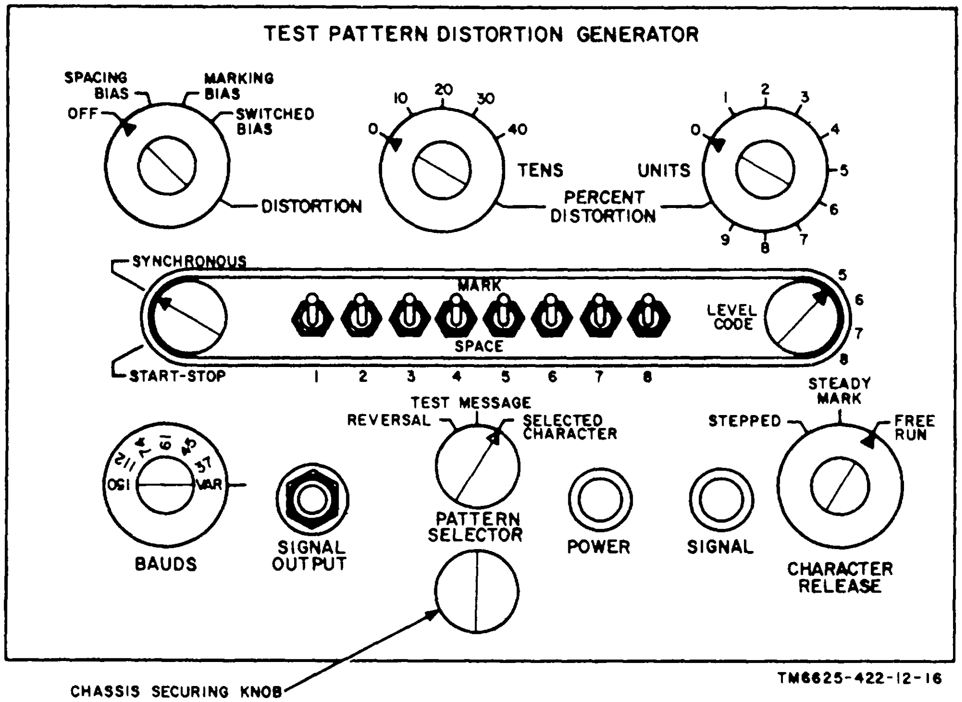

Figure 27. Test pattern distortion generator, front panel.

terminals of terminal board 1TB2 (terminals 8 and 11 of terminal board 3TB1 in the AN/GGM-2).

(2) Connect a jumper wire between the TONGUE and RELAY LOOP INPUT S terminals of terminal board 1TB2 (terminals 9 and 12 of terminal board 3TB1 in the AN/GGM-2).

Note.

In the AN/GGM-1 and AN/GGM-3, check to see that a jumper wire is connected between the RELAY DRIVE A and B terminals of terminal board 1TB2. If the jumper wire has been removed, it must be replaced.

(3) Connect the loop wires to the MECH LOOP OUT terminals of terminal board 1TB1 (terminals 6 and 7 of terminal board 3TB1 in the AN/GGM-2). If the output signal is to be connected from the front panel jack, connect the loop wires to a two-conductor phone plug and insert the plug into the test pattern distortion generator SIGNAL OUTPUT jack. Operate the rear panel JACK SIGNAL SELECTOR to MECH.

(4) Operate the test pattern distortion generator CHARACTER RELEASE switch (fig. 27) to STEADY MARK and notify the station supplying battery to adjust the loop current to the required value.

c. Connection of Mechanical Relay Loop for Neutral Operation With Locally Supplied Loop Battery. Connect the test pattern distortion generator output for a neutral signal from the mechanical relay with loop battery applied locally to the AN/GGM-1, AN/GGM-2, or AN/ GGM-3 as follows:

(1) Connect a wire from the positive (+) battery terminal to the MARK terminal

of terminal board 1TB2 (terminal 8 of terminal board 3TB1 in the AN/ GGM-2).

(2) Connect a wire from the negative (-) battery terminal through a loop current rheostat to the RELAY LOOP INPUT S terminal of terminal board 1TB2 (terminal 12 of terminal board 3TB1 in the AN/GGM-2).

(3) Connect a jumper wire between the RELAY LOOP INPUT T and TONGUE terminals of terminal board 1TB2 (terminals 11 and 9 of terminal board 3TB1 in the AN/GGM-1).

Note.

In the AN/GGM-1 and AN/GGM3, check to see that a jumper wire is connected between the RELAY DRIVE A and B terminals of terminal board 1TB2. If the jumper wire has been removed, it must be replaced.

(4) Do not make any connection to the battery common terminal.

(5) Connect the output loop wires to the MECH LOOP OUT terminals of terminal board 1TB1 (terminals 6 and 7 of terminal board 3TB1 in the AN/GGM-2). The polarity of the T (6) and S (7) terminals which are positive and negative, respectively, corresponds to the polarity of the tip, T (6) and sleeve S (7) connections of the test pattern distortion generator front panel SIGNAL OUTPUT jack. If the output signal is to be connected from the front panel jack, connect the loop wires to a two-conductor phone plug and insert the plug into the test pattern distortion generator SIGNAL OUTPUT jack. Operate the rear panel JACK SIGNAL SELECTOR switch to MECH.

(6) Adjust the loop current (par. 30*b*).

d. Connection of Electronic Relay Loop for Polar Operation. Connect the test pattern distortion generator output for a polar signal from the electronic telegraph relay as follows:

(1) Connect the wire from the positive (+) battery (60 volts maximum) terminal to the ELECT LOOP + BATT terminal of terminal board 1TB1 (terminal 18 of terminal board 3TB2 in the AN/GGM-2).

(2) Connect the wire from the negative (-) battery (60 volts maximum) terminal to the ELECT LOOP-BATT terminal of terminal board 1TB1 (terminal 20 of terminal board 3TB2 in the AN/GGM-2).

(3) Connect the wire from the battery common terminal (connected to station ground) through a loop current rheostat to the ELECT LOOP COMMON terminal of terminal board 1TB1 (terminal 19 of terminal board 3TB2 in the AN/GGM-2).

(4) Connect the output loop wires to the ELECT LOOP OUT terminals of terminal board 1TB1 (terminals 4 and 5 of terminal board 3TB1 in the AN/GGM-2). The polarity of the T and S terminals which are negative and positive, respectively, in mark condition, corresponds to the tip, T (4) and sleeve S (5) connection of the test pattern distortion generator front panel SIGNAL OUTPUT jack. If the output signal is to be connected from the front panel jack, connect the loop wires to a two-conductor phone plug and insert the plug into the test pattern distortion generator SIGNAL OUTPUT jack. Operate the rear panel JACK SIGNAL SELECTOR switch to ELECT or to ELECT (MECH OFF), as desired.

(5) Adjust the loop current (par. 30*b*).

e. Connection of Electronic Relay Loop for Dry-Contact Neutral Operation. Connect the test pattern distortion generator output for dry-contact (electronic relay closures) neutral keying from the electronic relay into a loop with a battery (120 volts maximum) supplied by another station as follows:

(1) Connect a jumper wire between the ELECT LOOP-BATT and ELECT LOOP COMMON terminals on terminal board 1TB1 (terminals 19 and 20 on terminal board 3TB2 in the AN/ GGM-2).

(2) Connect the *negative* loop wire to the ELECT LOOP OUT S terminal of terminal board 1TB1 (terminal 5 of terminal board 3TB1 in the AN/GGM-2). Connect the positive loop wire to the ELECT LOOP OUT T terminal of terminal board 1TB1 (terminal 4 of terminal board 3TB1 in the AN/GGM-2).

(3) If the output signal is to be connected from the front panel SIGNAL OUTPUT jack, connect the loop wires to a two-conductor phone plug; connect the *negative* loop wire to the plug *sleeve* and the *positive* loop wire to the plug tip. Operate the rear panel JACK SIGNAL SELECTOR switch to ELECT or to ELECT (MECH OFF), as desired.

(4) Operate the test pattern distortion generator CHARACTER RELEASE switch (fig. 27) to STEADY MARK and notify the station supplying battery to adjust the loop current to the required value.

f. Connection of Electronic Relay Loop for Neutral Operation with Locally Supplied Loop Battery. Connect the test pattern distortion generator output for a neutral signal from the electronic relay with loop battery (120 volts maximum) supplied locally to the AN/GGM-1, AN/GGM-2, or AN/GGM-3 as follows:

(1) Connect a wire from the positive (+) battery terminal to the ELECT LOOP COMMON terminal of terminal board 1TB1 (terminal 19 of terminal board 3TB2 in the AN/GGM-2).

(2) Connect a wire from the negative (-) battery terminal through a loop current rheostat to the ELECT LOOP-BATT terminal of terminal board 1TB1 (terminal 20 of terminal board 3TB2 in the AN/GGM-2).

(3) Do not make any connection to the battery common terminal.

(4) Connect the output loop wires to the ELECT LOOP OUT terminals of terminal board 1TB1. The polarity of the T and S terminals corresponds to the polarity of the tip (T) and sleeve (S) connections of the test pattern distortion generator front panel SIGNAL OUTPUT jack. If the output signal is to be connected from the front panel jack, connect the loop wires to a two-conductor phone plug and insert the plug into the test pattern distortion generator SIGNAL OUTPUT jack. Operate the rear panel JACK SIGNAL SELECTOR switch to ELECT or to ELECT (MECH OFF), as desired.

(5) Adjust the loop current (par. 30*b*).

28. Connection of Timing Signals from AN/GGM-1 and AN/GGM-2

(figs. 21 and 23)

a. If timing signals from time base generator in the AN/GGM-1 or AN/GGM-2 are to be applied to other sets of the AN/GGM-(*), remove the terminating caps from the coaxial cable receptacles on the rear panel. Connect cables from the AN/GGM-(*) receiving the timing signals to the appropriate coaxial connector on the AN/GGM-1 or AN/GGM-2.

b. If timing signals from time base generator are not to be applied to other AN/GGM-(*)'s, make sure that the terminating caps are in place on the coaxial cable receptacles on the rear of the AN/GGM-1 and AN/GGM-2.

29. Connection of External Timing Signal to AN/GGM-3, AN/GGM-4, and AN/ GGM-5

The AN/GGM-3, AN/GGM-4, and AN/GGM-5 do not contain a time base generator and thus require an input timing signal from a remote AN/GGM-1 or AN/GGM-2. The input timing signal may be applied from the AN/ GGM-1 or AN/GGM-2 either directly or indirectly (through another AN/GGM-3, AN/ GGM-4, or AN/GGM-5). Refer to figure 23, 24, or 25, as appropriate, and perform the procedures in a through h below, as required.

a. Measure the distance to the AN/GGM-(*) applying or relaying the timing signal; *the total distance between all AN/GGM-(*)'s must not exceed 1,000 feet*.

b. Measure and cut seven pieces of coaxial cable (Radio Frequency Cable RG-62A/U); the length of each piece is determined by the distance measured in a above.

c. Assemble a Plug UG-206/U on each end of each coaxial cable. Figure 28 illustrates the procedure for assembling the plug on the cable.

d. Remove the terminating caps from the coaxial cable receptables on the rear of each AN/GGM-(*).

e. Connect the coaxial cables between corresponding baud rate coaxial cable receptacles on the AN/GGM-(*) applying the timing signal and the AN/GGM-(*) receiving the timing signal.

f. If the timing signal is to be applied from your AN/GGM-3, AN/GGM-4, or AN/GGM-5 to a like equipment, connect coaxial cables (*a*, *b*, and *c* above) between corresponding baud rate coaxial cable receptacles.

g. Make sure that terminating caps are replaced on all unused baud rate coaxial cable receptacles on the AN/GGM-(*)'s.

h. Do not make connections to the EXT jack.

30. Initial Adjustment of Equipment

Note.

The procedure in *a* below applies to the AN/GGM-1 through AN/GGM-5; *b* and *c* below apply only to the AN/GGM-1, AN/GGM-2, and AN/GGM-3.

a. Power Supply Output Voltages (fig. 29). The power supply output voltages must be adjusted prior to normal operation of the AN/GGM-(*) as follows:

(1) For the AN/GGM-2, hinged door on the rear of the equipment housing. For the other AN/GGM-(*)'s, the power supply is directly accessible at the rear of the equipment rack or cabinet.

(2) Loosen the locknuts on the +15 V ADJ and the -15 V ADJ controls and set both controls to the extreme counterclockwise position.

(3) Connect one meter lead between the + terminal on the TS-443/U and the +15 jack on the power supply. Connect the other meter lead between the 15 terminal on the TS-443/U and the power supply GRD jack.

(4) Adjust the +16 V ADJ control on the power supply until the meter indicates 15 volts. Disconnect the meter leads and tighten the locknut.

(5) Connect one meter lead between the 15 terminal in the TS-443/U and the power supply -15 jack. Connect the other meter lead between the + terminal on the TS-443/U and the power supply GRD jack.

(6) Adjust the -15 V ADJ control until the meter indicates 15 volts. Tighten the locknut and remove the meter leads.

(7) Connect one meter lead between the 150 terminal on the TS-443/U and the power supply -120 jack. Connect the other meter lead from the + terminal on the TS-443/U to the power supply GRD jack. The meter should indicate 120 volts. Disconnect the meter leads.

(8) Connect one lead of the meter between the 150 terminal on the TS-443/U and power supply GRD jack. Connect the other meter lead between the + terminal on the TS-443/U and the power supply +21 jack. The meter should indicate 21 volts. Disconnect the meter leads.

b. Loop Current Adjustments. When the test pattern distortion generator output signal loop connections are changed, check and adjust the loop current as follows:

(1) Arrange the TS-352/U to measure current and insert the meter in series with the loop. If the loop is polar, connect the meter in the battery common leg. If the loop is neutral, insert the meter into either leg of the loop.

(2) Place the test pattern distortion generator CHARACTER RELEASE switch (fig. 27) to STEADY MARK and adjust the applicable loop current rheostat until the meter indicates the correct value (20, 30, or 60 ma).

(3) Disconnect the meter and reconnect the loop wires.

c. Mechanical Relay Bias Adjustment. Whenever the AN/GGM-1, AN/GGM-2 or AN/

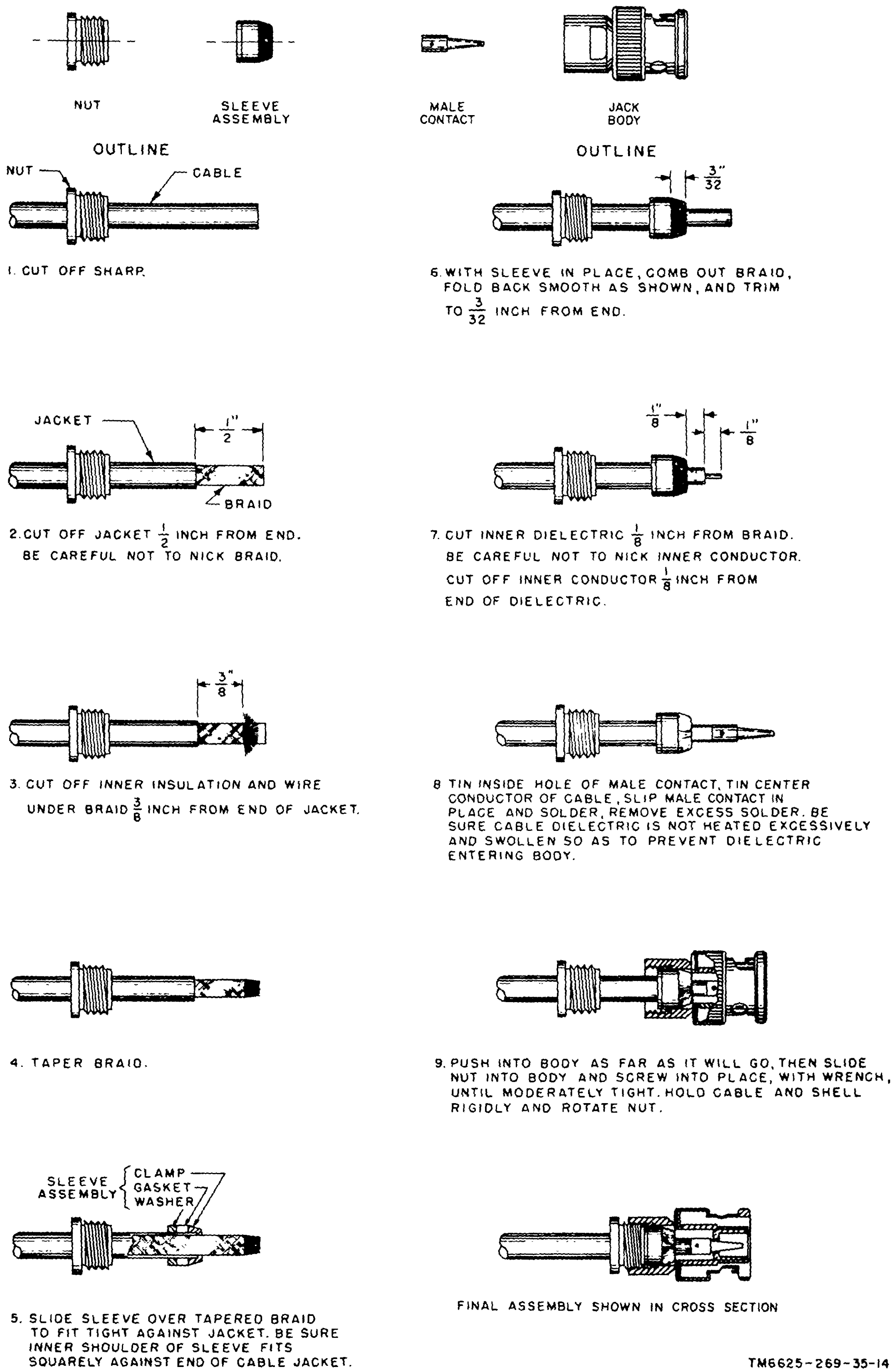

Figure 28. Assembly procedures for time base generator coaxial cables.

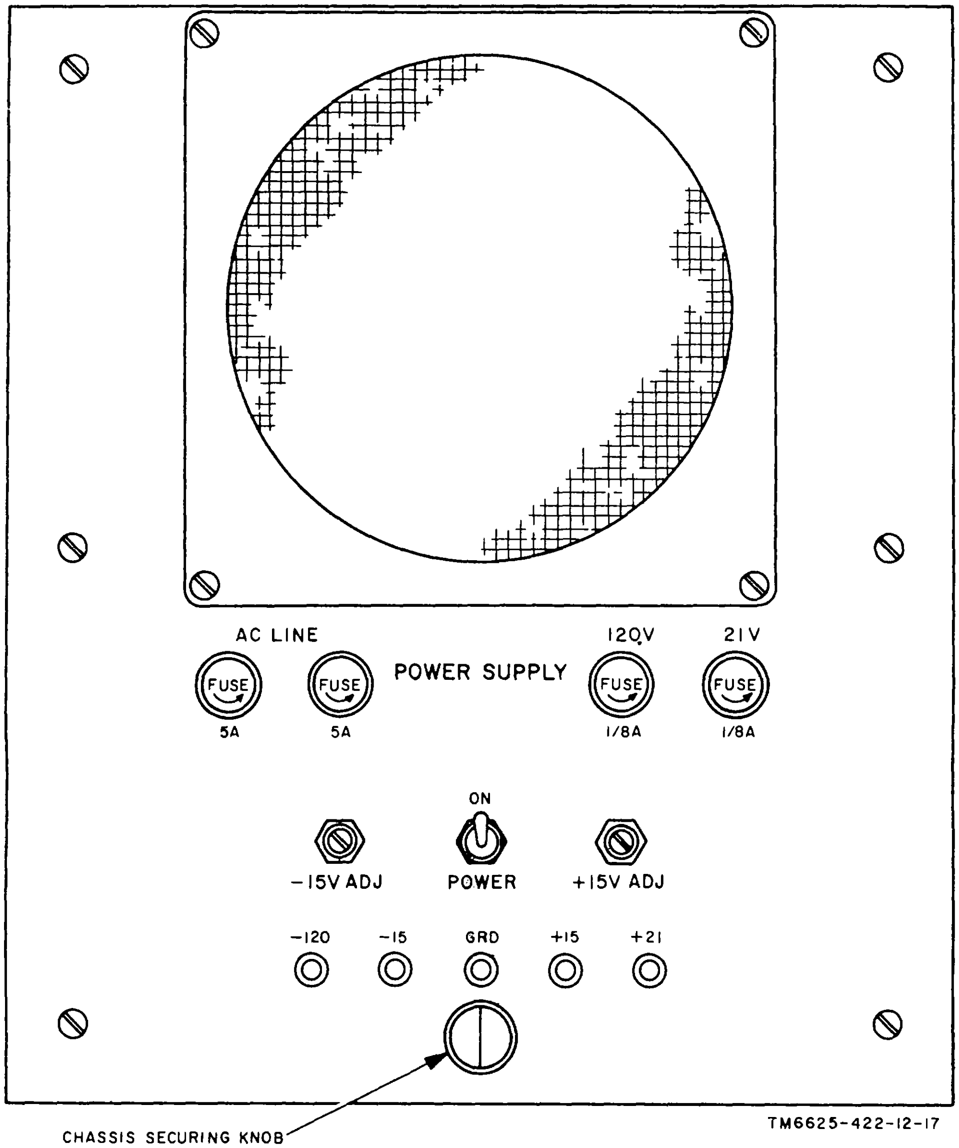

Figure 29. Power supply, front panel.

GGM-3 initially installed or anytime the mechanical relay is changed or the operation of mechanical relay is changed (polar or neutral or vice-versa), adjust the bias for the mechanical relay as follows:

(1) If the mechanical relay is to be adjusted for polar operation, connect the test pattern distortion generator output and batteries to produce a polar signal output from the mechanical relay to the front panel SIGNAL OUT PUT jack (par. 27a). If the relay is to be adjusted for neutral operation, connect the test pattern distortion generator output and batteries to produce a neutral signal output from the relay to the front panel SIGNAL OUTPUT jack (par. 27*c*).

(2) Arrange the test pattern distortion generator to produce zero distortion reversals output signal (par. 43).

(3) Connect a two-conductor patch cord

between the test pattern distortion generator SIGNAL OUTPUT jack (fig. 27) and the digital distortion analyzer LOW Z INPUT jack (fig. 26).

(4) Operate the digital distortion analyzer INPUT SELECT switch to the position corresponding to the input signal selected in (1) above and (5) below.

(5) Adjust the loop current to 30 ma if output signal is polar or 60 ma if the output signal is neutral; follow the procedure in *b* above.

(6) Arrange the digital distortion analyzer to measure bias distortion of all transitions (par. 41).

Note.

Perform either (7) below (for the AN/GGM-1 and AN/GGM-2) or (8) below (for the AN/GGM-3), as required.

(7) Remove the time base generator of the AN/GGM-1 or AN/GGM-2 from the shelf adapter and connect the 32-conductor extension cable (supplied with equipment) between the time base generator plug and the shelf adapter jack to allow the time base generator to be operated out of the shelf adapter. Locate the RELAY BIAS ADJ control on the rear of the relay assembly (fig. 30) on the time base generator (fig. 12).

(8) Remove the blank panel from the front of the AN/GGM-3 and locate the RELAY BIAS ADJ control on the rear of the relay assembly (fig. 30) at the rear of the shelf adapter.

(9) Loosen the locknut on the RELAY BIAS ADJ control. Carefully observe the digital distortion analyzer indications and adjust the control until the digital distortion analyzer indicates zero distortion and the EARLY and LATE lamps on the digital distortion analyzer light alternately. Tighten the locknut.

(10) Remove the extension cable and replace the time base generator in the shelf adapter ((7) above) or replace the blank panel ((8) above), as required.

(11) Rearrange the test pattern distortion generator output and battery connections for the desired output configuration.

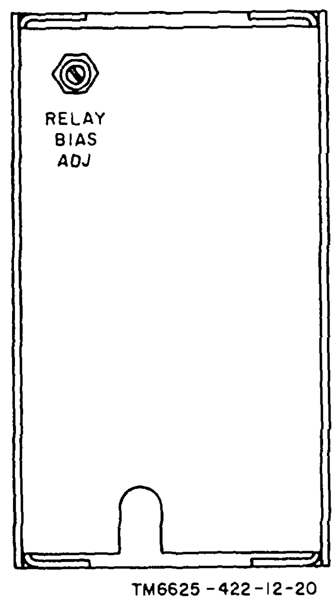

Figure 30. Test pattern distortion generator mechanical relay subassembly, rear view.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. FUNDAMENTALS OF START-STOP AND SYNCHRONOUS TELEGRAPHY AND DISTORTION MEASUREMENT TECHNIQUES OF AN/GGM-(*)

31. General

a. To obtain maximum utilization and flexibility of the AN/GGM-(*), the operator of the equipment must have a general understanding of the basic principles of synchronous telegraphy, some of the relative advantages and disadvantages of synchronous telegraphy as compared to conventional start-stop signaling, and the basis by which telegraph distortion measurements are made with the digital distortion analyzer of the AN/GGM-(*).

b. Although it is assumed that the reader is familiar with the conventional start-stop telegraph systems, a review of the fundamentals of start-stop telegraphy with special attention being given to certain specific features may well illustrate the more important features of a synchronous system. For a more detailed review of the fundamentals of start-stop telegraphy, refer to TM 11-655.

c. The purpose of this section is not to illustrate an *actual* synchronous system, but rather, to explain some of the basic requirements of such a system. Throughout this section, actual processing of synchronous data is discussed only in general terms, and the greater detail is devoted to synchronous telegraph principles and system requirements.

32. Start-Stop Telegraphy

a. The code used in start-stop telegraphy consists of a start signal, normally a space, to notify the receiving equipment of the start of the character; a series of information bits that convey a part of the message data to the receiving station; and a stop signal, normally a mark, to notify the receiving equipment of the end of the character. Although start-stop codes exist which contain a different number of information bits and different types of stop signals, one of the more common is illustrated in figure 31, line A, containing a start signal (start-space), five information bits, and a stop signal (stop-mark) in the form of a mark having a time duration of 1.42 times the time duration of the information bits. This particular code is called 7.42 unit code, derived from the total of the start-space (1 bit), the information bits (5 bits), and the stop-mark (1.42 bits). The 7.42 unit code will be used throughout this section as the example of a start-stop code.

b. When the receiving station equipment receives a start space, it begins to measure time to determine the beginning and end of each bit within the character being received. If an error exists between the timing of the receiving and transmitting equipment, the timing error will accumulate only over a period of one character since each character is a separate semi-unrelated event. For example, if a 1-percent error exists in the bit timing of the two stations (sending and receiving) the start-space will end with a 1-percent error between the equipments; the first information bit will end with a 2-percent error; the second, 3-percent; the third, 4 percent; the fourth, 5-percent; the last information bit (prior to the beginning of the stopmark) ends with an accumulated timing error of 6 percent. However, since the station equipments begin the next character timing in synchronism, the timing error in start-stop telegraphy can accumulate only to a magnitude equal to the basic timing error multiplied by the number of bits in *one* character. Thus, the timing requirements for most start-stop systems are comparatively noncritical and the need for highly stabilized timing devices does not ordinarily exist.

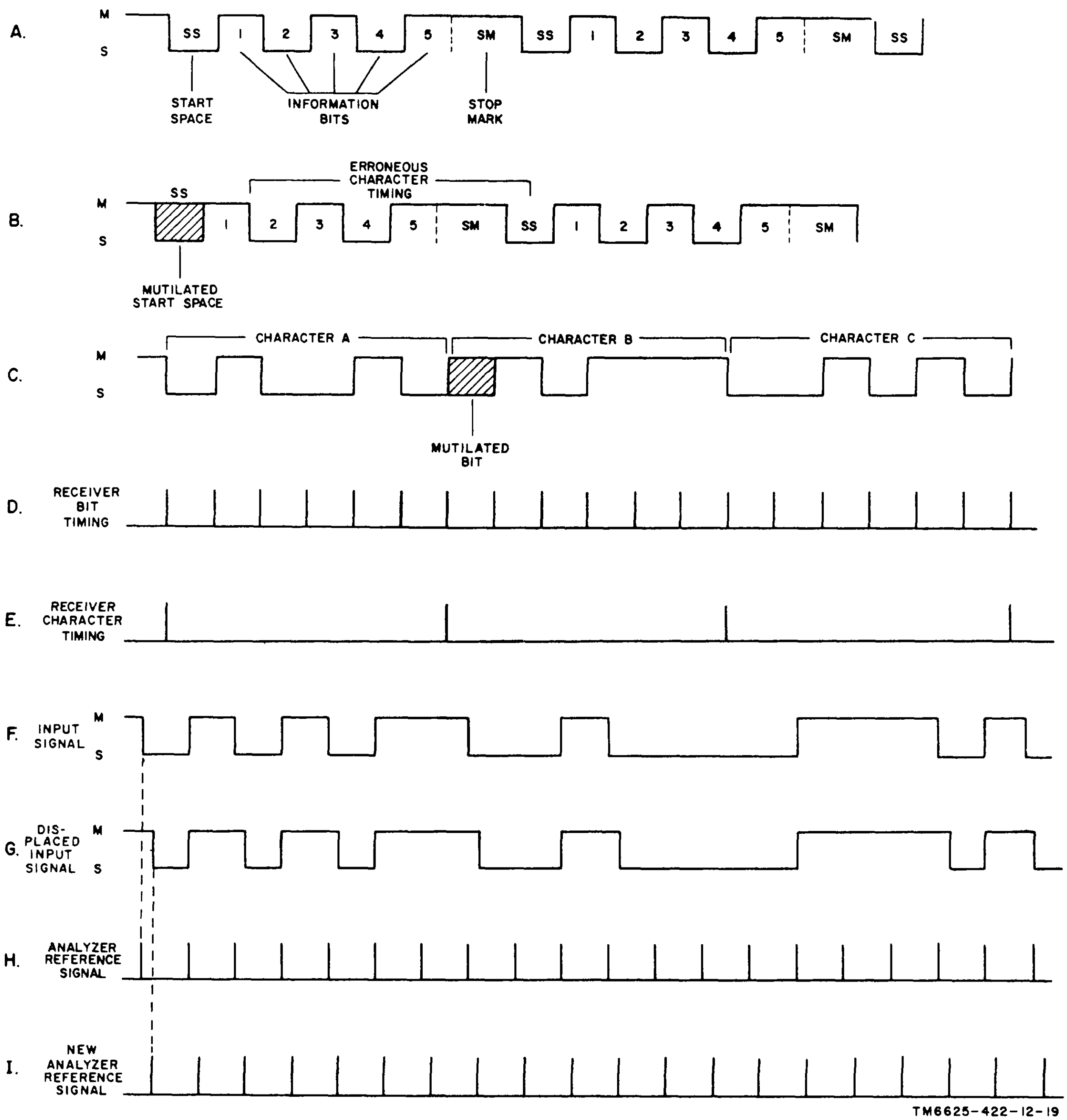

Figure 31. Data/telegraph signal and timing waveforms.

c. The use of the start-space and stop-mark in start-stop telegraphy reduces the need for very accurate timing devices, but it also decreases the efficiency of the system. For example, assume that a start-stop system is capable of transmitting data at 75 bits per second. Since only approximately two-thirds of each character is actual message information (the remaining one-third being the start and stop signals), the actual *information data rate* is only 50 bits per second. If the same installation were transmitting signals containing only *information data*, approximately 25 bits per second more *information data* could be transmitted, increasing the efficiency of the system by 50 percent.

d. One of the most important disadvantages of start-stop telegraphy is shown in figure 31, line B, which illustrates a typical 7.42 startstop code character in which the start-space has been mutilated. Upon receipt of this signal, the receiving equipment would probably interpret the start-space and first information bit as a continuation of the stop-mark and the second information bit as the start-space. The character would thus be incorrectly decoded and, of even greater importance, the timing of the receiving equipment would be such that the *character* timing would end during the start-space of the following character. The receiving equipment would then interpret the first information bit of the second character as the stopmark of the first character and thus, the second character would also be incorrectly decoded. The erroneous print-out would continue until the receiving equipment happened to lock on to the correct stop-mark. Thus, a single distorted character may result in a multitude of erroneously decoded characters in the startstop signaling system.

33. Synchronous Telegraphy

a. Unlike start-stop telegraphy, synchronous telegraphy does not employ start and stop signals; instead, the data in a synchronous transmission system is sent in a continuous serial stream. Therefore, the sending and receiving stations must utilize highly stabilized timing devices to prevent the accumulation of timing errors. If, for example, a bit timing error of 1 percent existed between the bit timing of the transmitting and receiving equipment and the equipment were assumed to start with a zero timing difference, the timing error would not be erased at the end of each character (as was the error in the start-stop system) but instead, would continue to accumulate until, after only 30 to 40 bits, the receiving equipment would begin to print out erroneously. Thus, the need for a very accurate timing signal at both the transmitting and receiving stations is apparent. This requirement, however, is comparatively simple to fulfill as present state-of-the-art techniques provide timing devices accurate to within 1 part in 10 million.

b. Assuming that the receiving equipment aware of the exact starting time of a character the matter of determining the start of each bit therein and each character thereafter is simply a matter of measuring time from the assumed correct start. Since it has been stated that the timing device that controls the transmitter is very accurate, the receiving equipment must therefore *look* for the start of each bit within a period of comparatively small duration.

c. The primary consideration of the timing of a synchronous system is not to have the transmitter and receiver operating at a *particular* frequency, but rather in phase synchronism; therefore, the small corrections necessary to maintain the synchronism may be made by making a continuous comparison of the incoming signal rate with that of the local receiver timing device and using a correction network to shift the local timing device to maintain synchronism. The phase-frequency comparison is made by circuitry which compares the time position of the incoming signal transitions (transitions from mark condition to space condition or vice versa) to that of the local timing device. The incoming signal transitions will always have one of three time relationships with the local signal: *early* or before the corresponding local signal transition; in phase with the local signal; *late* or after the corresponding local signal transition. If the comparison reveals the incoming signal phase to be early with respect to the local signal, the frequency of the local timer is increased. If the incoming transitions are late with respect to the local signal, the frequency of the local timer is decreased. Note that it has been assumed thus far in this discussion that any displacement of the incoming signal transition is due to a timing error: This assumption, however, is not necessarily true, because the incoming signal transitions may also be *apparently* displaced by other effects which were assumed to be nonexistent in the discussions thus far.

d. The determination of the correct time position of an incoming signal transition can be made by the receiving equipment only if it is aware of the correct time position of the transition to which the time measurement is referenced. For example, if the timing is initiated by an uncertain transition (disturbed by noise or other random effects), the timing is therefore uncertain and the determination of the correct position of the following transition is not more than an uncertain estimate. To resolve the uncertainty caused by random disturbances, the receiving equipment must integrate the output of *comparison circuits*. The integration of the signal resolves the uncertainty by averaging the effect of the noise (noise being used to describe all random disturbances). If noise is integrated over a comparatively long time period, its net effect is approximately zero and the output of the comparison circuits represents the average or *most correct* relationship of the transmitter and receiver timing signal.

e. When there is no information to be transmitted in start-stop telegraphy, the transmitter produces a steady mark signal. When a message begins, the first bit of the message is identified to the receiver by the first mark-to-space transition. In synchronous telegraphy, however, the receiver often requires input signal transitions to maintain the correct timing relationship. If steady mark or space were used when no information was being sent, the receiver and transmitter timing signals would gradually drift apart; therefore, a special *idle* character is normally required to maintain the timing during no-information periods.

f. Line C, figure 31, illustrates the immunity of the synchronous telegraph system to multiple errors from a single bit error. If the first bit of character B should be disturbed to the degree that the receiver interprets the mark as a space, the character would be incorrectly decoded but the error in character B would not cause an error in the following character C because the receiver bit and character timing (line D and line E) are not solely dependent on the occurrence of any transition in character B to enable it to forecast the start of character C. Thus, in contrast to start-stop telegraphy, a single distorted character does not normally cause other characters to be incorrectly decoded by the receiving equipment.

34. Techniques of Distortion Measurement by AN/GGM-(*)

a. Telegraph distortion may be defined as the time displacement of the input signal transitions from their correct time position. In startstop telegraph distortion measurements, the stop-mark to start-space transition is normally used as a reference on which the measurements are based. When measuring the distortion of synchronous telegraph signals, the AN/GGM(*) digital distortion analyzer averages the time position of all mark-to-space transitions and this average time position is used as the reference for the measurements. In addition to specifying the reference, distortion measurements specify the magnitude of the transition displacement (normally expressed as the percent of the transition displacement to the normal bit time duration), the affected transitions (mark-space or space-mark transitions of the first bit, second bit, etc.) and the sign of the displacement (early or late in respect to the zero-distortion time position).

b. Since the mark-to-space transitions are used as a timing reference, a constant displacement of the mark-to-space transitions is interpreted by the digital distortion analyzer to be a timing phase error and is erased by the digital distortion analyzer integrating to the new time position. Thus, bias distortion, which is usually constant in sign and magnitude for any given bias condition, is always indicated by the digital distortion analyzer to be a displacement of the space-to-mark transition. For example, if the signal shown in line F, figure 31, should be instantaneously displaced to the condition shown in line G, the digital distortion analyzer would, at first, sense a *late mark-to-space* condition of approximately 20 percent in relation to the reference (line H). However, after the new timing phase is adopted through the digital distortion analyzer's integration process, the *space-to-mark* transitions would appear to be 20 percent *early* in relation to the new timing reference (line I) and the digital distortion analyzer would indicate such.

c. The digital distortion analyzer measures distortion of the complete input signal character or any segment of the input character by electronically dividing the time period of the input character into equal one-bit *character segments*, each of which extends from one-half bit before to one-half bit after the zero-distortion time position of the input signal transitions. Each character segment is further divided electronically into 128 equal parts, 64 before the zero-distortion transition time position (each representing approximately 4/5 of 1 percent distortion) and 64 after. If the incoming signal transition occurs before the zero-distortion time position, it falls into the *early* analysis period; if the transition occurs after the zero-distortion time position, it falls into the *late* analysis period. The relationship of an input signal character and the analysis periods for various types of measurements is illustrated in figure 32. Note that the signal shown is undistorted and, with this condition, the transitions are positioned to occur exactly in the middle of each character segment (line A, fig. 32), and any displacement of the transitions will cause them to occur in the early or late regions marked E and L respectively. If the digital distortion analyzer DISTORTION SELECT switch is operated to TOTAL PEAK or AVG and the right-hand TRANSITION SELECT switch is operated to ALL; and the left-hand TRANSITION SELECT switch is operated to either MARK/SPACE or SPACE/MARK, the complete input signal character is analyzed as illustrated in line A. This particular switch configuration facilitates the measurement of the total peak (maximum) or average displacement of the input signal transitions. With the afore-mentioned switches set to AVG, ALL, and SPACE/MARK respectively, the bias distortion of the input signal may be measured. When measuring bias distortion, if the space-to-mark transitions fall in the early areas, the digital distortion analyzer EARLY indicator lamp lights and marking bias is indicated. If the space-to-mark transitions occur in the late zones, the LATE indicator lamp on the digital distortion analyzer lights and spacing bias is indicated. With the right-hand TRANSITION SELECT switch operated to ALL and the DISTORTION SELECT switch operated to EARLY PEAK, only the half-bit analysis periods *preceding* the zero-distortion points are active (line B). With the DISTORTION SELECT switch operated to LATE PEAK, only the half-bit analysis periods *following* the zero-distortion points are active (line C). When the right-hand TRANSITION SELECT switch operated to the numbered positions, any specific character segment may be analyzed by use of the distortion select options described above. Lines D, E, and F, figure 32, respectively, illustrate the measurement of average, total peak, early peak, and late peak distortion of the first character segment (selected by operation of the right-hand TRANSITION SELECT switch to 1, the left-hand TRANSITION SELECT switch to SPACE/MARK, and the DISTORTION SELECT switch to TOTAL PEAK, AVG, EARLY PEAK, and LATE PEAK, respectively).

d. Figures 40 through 43 and 51 and 52 provide a graphic illustration of the techniques of distortion analysis which may be made with the AN/GGM-(*). Figures 40 through 43 illustrate the analysis periods of the digital distortion analyzer for various switch configurations. The selection points (points at which the receiving telegraph equipment senses the input signal to determine if it is a mark or space) are marked on each drawing. Figures 51 and 52 illustrate typical waveforms with various distortion conditions. When a specific wave form (figs. 51 and 52) is placed over one of thk analysis periods (figs. 40-43) and the stopmark to start-space transition of the waveform is aligned with the S-register mark to the left of the analysis period, it is then evident how the digital distortion analyzer will react to the particular input signal. By experimenting with the waveforms and the various analysis options, the equipment operator may readily learn which analysis option is better suited for any particular distortion condition. For example, when the waveform shown in line B, figure 51, is placed over the analysis option in line C, figure 40, it is evident that the digital distortion analyzer will indicate zero-distortion although the waveform contains 25 percent marking bias. Thus, it is important that the operator of the AN/GGM-(*) understand the technique of measurement used by the digital distortion analyzer. Using the scale of the waveforms in figures 51 and 52, the user may draw additional waveforms on thin tracing paper and, by using the waveforms with the analysis figures, thus obtain additional training. When using the waveforms and analysis figures, the following rules must always be observed to insure correct results:

(1) Always align the stop-mark to start-space transition on the waveform with the S-register line to the left of the analysis period in use.

(2) If a transition falls within the area marked E, it is early; if it falls within the area marked L, it is distorted late.

(3) When the AVG, EARLY PEAK, or LATE PEAK analysis options are used, only the mark-to-space or the space-to-mark transitions are analyzed at any specific time, according

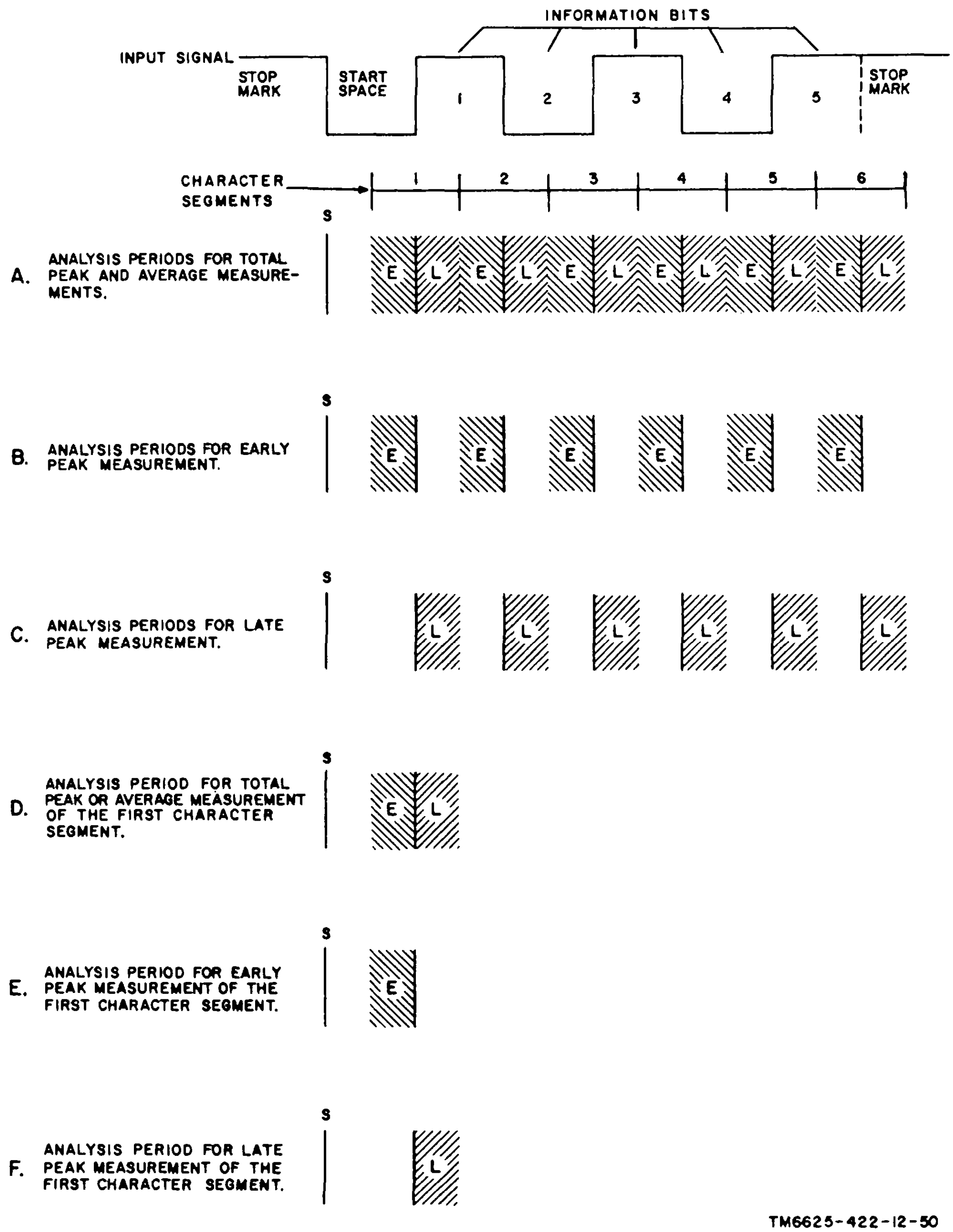

Figure 32. Relationship of input signal and digital distortion analyzer analysis periods.

to the position of the left-hand TRANSITION SELECT switch.

(4) When the TOTAL PEAK, EARLY PEAK, or LATE PEAK analysis options are used, the digital distortion analyzer meter indicates the maximum distortion that is detected.

(5) When a transition does not fall within any analysis period of a given switch configuration, it indicates that the digital distortion analyzer would not sense that specific transition.

Section II. OPERATOR'S CONTROLS, INDICATORS, AND JACKS

35. Digital Distortion Analyzer

(fig. 26)

Control, indicator or jack	Function	
POWER indicator lamp	Lights when dc power is applied from the power supply.	
SIGNAL indicator lamp	Lights when input signal is in marking condition.	
EARLY indicator lamp	Lights to indicate that the time position of the signal transition being measured is *early* in relation to that of the reference timing signal.	
LATE indicator lamp	Lights to indicate that the time position of the signal transition being measured is *late* in relation to that of the reference timing signal.	
PERCENT DISTORTION meter.	Indicates, in percent, the magnitude of the input signal distortion	
INPUT POLARITY switch (2-posi-..... tion toggle sw).	Reverses the polarity of the input signal connection.	
INPUT SELECT switch (4-position rotary sw).	Arranges the digital distortion analyzer to accept various input signals.	
	Sw pos	*Action*
	NEUTRAL, 20	Arranges for 20-ma neutral input signals.
	NEUTRAL, 60	Arranges input circuits for 60-ma neutral input signals.
	POLAR, 20 OR 30MA	Arranges input circuits for 20-ma or 30-ma polar input signals.
	POLAR, HIGH IMPEDANCE	Arranges input circuits for high impedance (voltage) polar input signal.
	Sw pos	*Action*
INPUT FILTER switch (2-position toggle sw).	IN	Arranges to filter input signal.
	OUT	Removes filter from input circuitry.
BAUDS switch (7-position rotary sw).	Arranges to accept input signals of various modulation rates. Specific switch marking determined by timing signals available from the time base generator.	
	Sw pos	*Action*
SYNCHRONOUS, START-STOP Switch (2-position toggle sw).	SYNCHRONOUS	Arranges for synchronous input signals.
	START-STOP	Arranges for start-stop input signals.
UNIT position rotary sw).	INTERVALS switch (10- Arranges for input signals having from 7 to 16 bits per character (start- stop only).	
TRANSMISSION SELECT switches (left-hand switch, 2-position rotary) (right-hand switch, 16-position rotary).	Allows individual transition to be analyzed. Left-hand switch allows selection of either the mark-to-space (MARK/SPACE) or the space-to-mark(SPACE/MARK) transitions. The right-hand switch allows selection of any one or all of the character segments	
DISTORTION SELECT switch (4-position rotary sw).	Selects type of distortion analysis to be made by the digital distortion analyzer.	
	Sw pos	*Action*
	AVG	Arranges to indicate the average distortion of the selected transitions.
	TOTAL PEAK	Arranges to indicate the peak (early or late) distortion of the selected transitions.
	EARLY PEAK	Arranges to indicate the peak early distortion of the selected transitions.
	LATE PEAK	Arranges to indicate the peak late distortion of the selected transitions.

Control, indicator or jack	Function
RESET switch (3-position toggle sw, nonlocking at MAN position).	Resets the PERCENT DISTORTION meter from peak distortion measurements.
	Sw pos — *Action*
	AUTO — Arranges to automatically reset the PERCENT DISTORTION meter at 3-second intervals.
	OFF — Disables reset function.
	MAN RESET (spring-loaded position) — Resets the PERCENT DISTORTION meter from peak indication.
HIGH Z INPUT jack	Input jack for high-impedance (voltage) polar signals.
LOW Z INPUT jack	Input jack for low-impedance (20, 30, or 60 ma) polar or neutral input signals.

36. Data-Scan Scope
(fig. 33)

Control or indicator	Function
Cathode ray tube (crt)	Visually displays input signal.
VERTICAL controls:	
CENT control	Adjusts the vertical position of the crt display.
GAIN control	Adjusts the vertical height of the crt display.
INTENSITY control	Adjusts the brightness of the crt display.
SCALE ILLUM control	Adjusts the illumination of the crt graticule.
FOCUS control	Adjusts the focus of the crt display.
ASTIGMATISM control	Adjusts the off-center focus of the oscilloscope display.
HORIZONTAL controls:.................	
CENT control	Adjusts the horizontal position of the oscilloscope display.
GAIN control	Adjusts the horizontal width of the oscilloscope display.
INTERNAL SWEEP MILLISECONDS controls:	
COARSE switch (5-position rotary sw).	Selects the horizontal sweep frequency rate (coarse) of the data-scan scope.
	Sw pos — *Action*
	.75-3 — Arranges for horizontal sweep rates from 0.75 ms/sweep to 3 ms/sweep.
	2.5-8 — Arranges for horizontal sweep rates from 2.5 ms/sweep to 8 ms/sweep.
	7.5-30 — Arranges for horizontal sweep rates from 7.5 ms/sweep to 30 ms/sweep.
	25-80 — Arranges for horizontal sweep rates from 25 ms/sweep to 80 ms/sweep.
	75-300 — Arranges for horizontal sweep rates from 75 ms/sweep to 300 ms/sweep.
FINE control	Adjusts the horizontal sweep frequency rate (fine) of the data-scan scope.
	Sw pos — *Action*
SWEEP OPTIONS switch (3-position rotary sw).	AUTO — Arranges to display complete input character (start-stop input signal only).
	TRIGGERED — Arranges to start sweep 1/2 bit before the transition selected by the digital distortion analyzer TRANSITION SELECT switches. Sweep speed determined by setting of INTERNAL SWEEP MILLISECONDS controls.
	FREE — Arranges to generate internal free-running (nonsynchronized) sweep.

Control or indicator	Function	
CHARACTER BLANKING controls:		
SELECT switch (3-position rotary sw).	Selects mode of blanking operation.	
	Sw pos	*Action*
	OFF	Disables blanking circuits.
	AUTO	Arranges to display one character, then blank succession characters for 0.5 to 2 seconds (as adjusted by the CHARACTER BLANKING ADJUST control).
	MANUAL	Arranges to unblank display during one character each time the SINGLE SWEEP RELEASE switch is actuated.
ADJUST control	Adjusts the blanking interval during AUTO blanking operation.	
SINGLE SWEEP RELEASE switch (nonlocking pushbutton sw).	Arranges to display a single character each time switch is depressed (when CHARACTER BLANKING SELECT switch is at MANUAL).	
POWER switch (2-position toggle sw).	Applies ac power to scan-data scope.	
POWER indicator lamp	Lights when power is applied.	
	Sw pos	*Action*
INTENSITY MARKERS switch (2-position toggle sw).	ON	Allows crt display to be intensified during transition sense period and selected character segments.
	OFF	Inhibits the intensity modulation signals.

37. Time Base Generator
(fig. 34)

Control or indicator	Function	
Oscillator signal indicator lamps	Lamps light when oscillators are operating. If oscillator fails, applicable lamp goes off. Number on lamps indicates baud rate of corresponding printed circuit oscillator card. Lamps along right side of front panel are not used.	
VARIABLE OSCILLATOR BAUDS switch (5-position rotary sw).	Arranges variable frequency oscillator to produce baud timing signals from 30 to 110 bauds in 20-baud ranges.	
VARIABLE OSCILLATOR BAUDS control.	Adjusts frequency of variable frequency oscillator within the 20-baud range selected by VARIABLE OSCILLATOR BAUDS switch.	
	Sw pos	*Action*
AUDIBLE ALARM switch (3-position toggle).	ON	Enables audible alarm circuit.
	OFF	Disables audible alarm circuit.
	RESET	Resets audible alarm circuit.
ALARM indicator lamp	Lights to indicate oscillator failure alarm condition.	

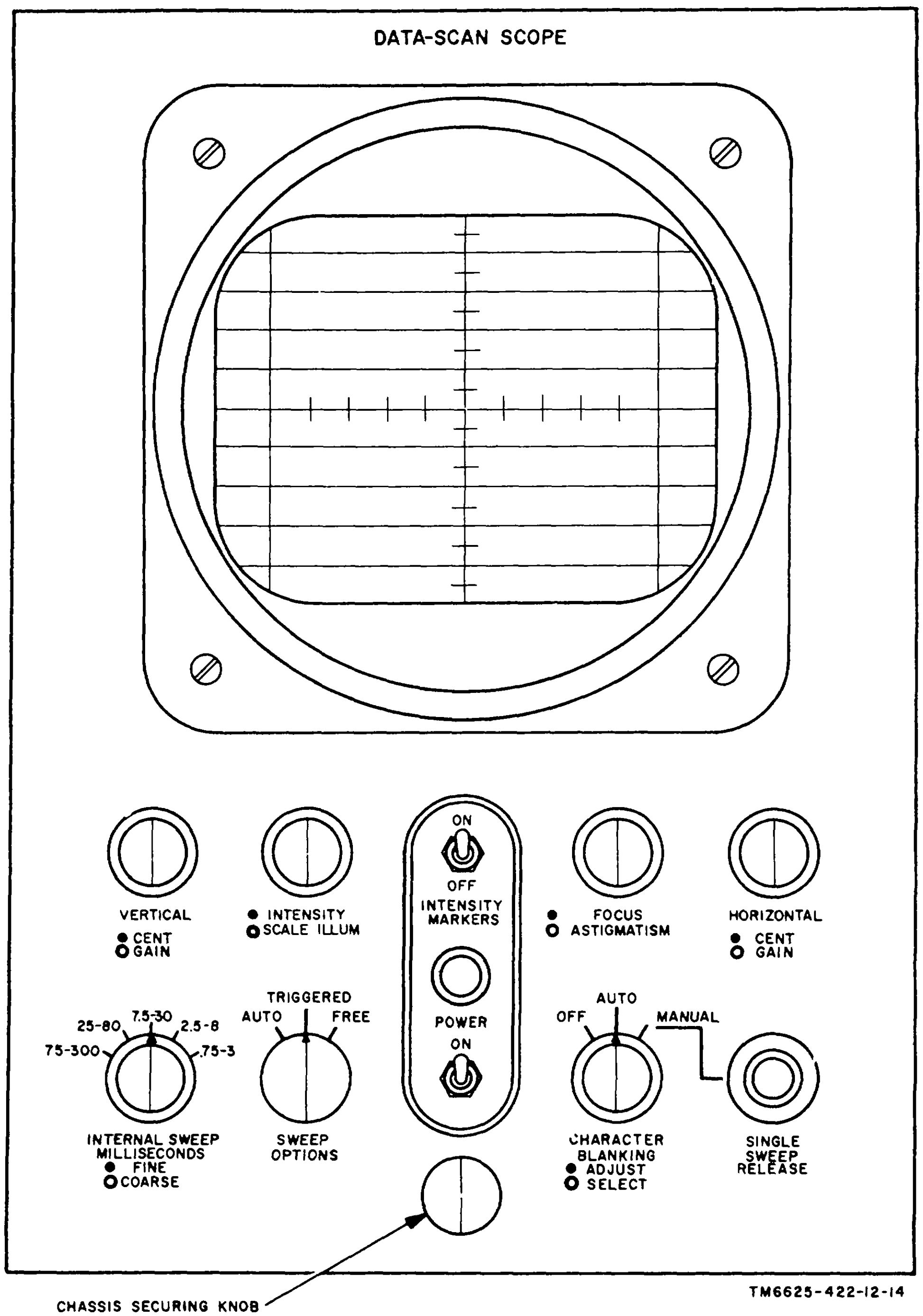

Figure 33. Data-scan scope, front panel

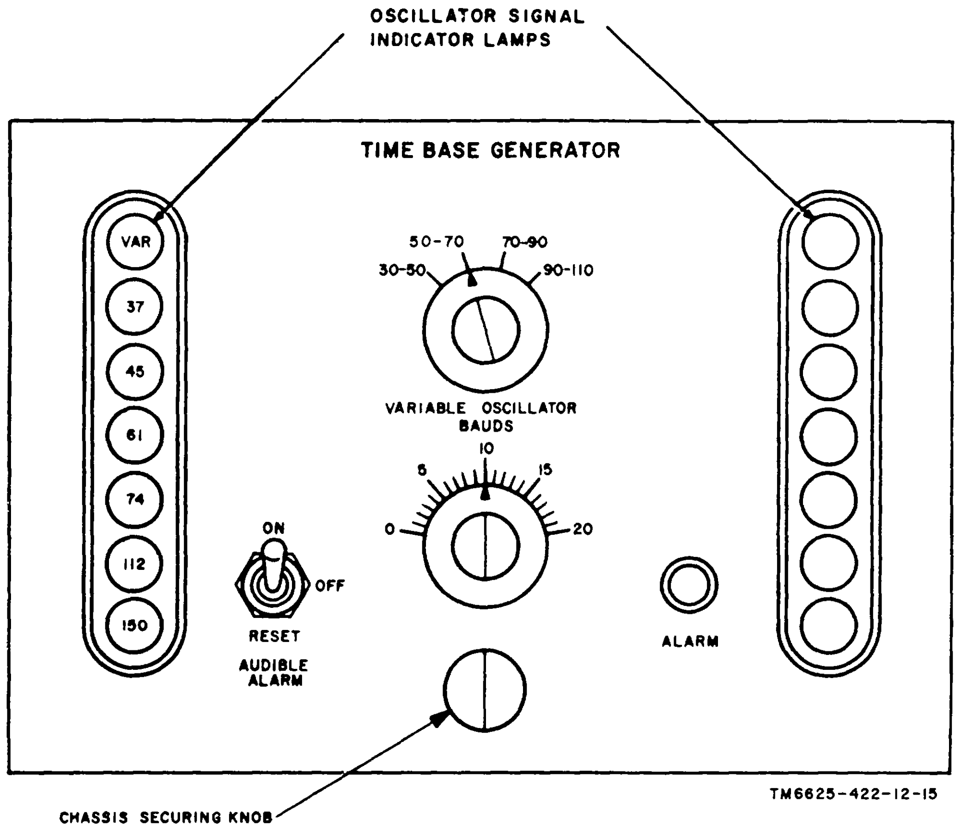

Figure 34. Time base generator, front panel.

38. Test Pattern Distortion Generator

a. Front Panel Controls (fig. 27).

Control, indicator, or jack	Function	
DISTORTION switch (4-position rotary sw).	Selects type of test pattern distortion generator output signal	
	Sw pos	*Action*
	OFF	Arranges to produce undistorted output signal.
	SPACING BIAS	Arranges to produce output signal in which the space-to-mark transitions are late.
	MARKING BIAS	Arranges to produce output signal in which the space-to-mark transitions are early.
	SWITCHED BIAS	Arranges to produce output signal in which the space-to-mark transitions are alternately early and late on a character basis.
PERCENT DISTORTION switches (TENS: 5-position rotary sw). (UNITS: 10-position rotary sw).	Selects magnitude of distortion in output signal. UNITS switch selects distortion in 1-percent steps and TENS switch selects distortion in 10-percent steps.-	
	Sw pos	*Action*
SYNCHRONOUS, START-STOP switch (2-position rotary).	SYNCHRONOUS	Arranges to produce synchronous output signals.
	START-STOP	Arranges to produce start-stop output signals.
MARK-SPACE switches (eight 2-position toggle switches).	Arranges each bit of selected character for transmission as mark or space signal.	

Control, indicator, or jack	Function	
LEVEL CODE switch (4-position rotary switch).	Arranges to produce selected character having from 5 to 8 information bits per character.	
BAUDS switch	Arranges to operate at various modulation rates (specific position markings determined by timing signals available from time base generator).	
SIGNAL OUTPUT jack	Jack for connection of output.	
PATTERN SELECTOR switch (3-position rotary sw).	Arranges to produce various test signals.	
	Sw pos	*Action*
	REVERSAL	Arranges to produce alternate mark and space signals.
	TEST MESSAGE	Arranges to produce "Quick brown fox" test message.
	SELECTED CHARACTER	Arranges to produce test character as formed by the position of the MARK-SPACE switches.
POWER indicator lamp	Lights when dc power is applied from power supply.	
SIGNAL indicator lamp	Indicates presence of output signal. (On for mark, off for space).	
CHARACTER RELEASE switch (3-position rotary sw).	Selects method of character timing of output signal.	
	Sw pos	*Action*
	STEPPED	Arranges to produce single output character in response to step signal from external source.
	STEADY MARK	Arranges to produce constant mark signal.
	FREE RUN	Arranges to produce serial string of successive characters.

b. Rear Panel (fig. 16).

Control	Function	
	Sw pod	*Action*
JACK SIGNAL SELECTOR switch (3-position rotary sw).	MECH	Arranges to supply mechanical relay output to SIGNAL OUTPUT jack.
	ELECT	Arranges to supply electronic relay output to SIGNAL OUTPUT jack.
	ELECT (MECH OFF)	Arranges to supply electronic relay output to SIGNAL OUTPUT jack and to inhibit mechanical relay.

39. Power Supply (fig. 29)

Control	Function
POWER switch (2-position toggle sw).	Controls application of input ac power to the power supply.
- 15 v ADJ control	Controls output voltage measured between - 15 and GRD jacks.
+ 15 v ADJ control	Controls output voltage measured between + 15 and GRD jacks.

40. General

a. Generally, the component equipments of the AN/GGM-(*) are operated independently and the same general procedures apply, regardless of the particular AN/GGM-(*) in use. One exception is that the data-scan scope must be operated in conjunction with the digital distortion analyzer. Thus, the operational procedures for the digital distortion analyzer, power supply, time base generator, and test pattern distortion generator are presented separately in this section and an additional procedure is provided for concurrent operation of the data-scan scope and digital distortion analyzer.

b. The paragraphs containing the applicable equipment operating procedures for each AN/ GGM-(*) are listed in the following chart:

Analysis group model	Reference paragraphs
AN/GGM-1	41, 42, 43, 44, 45
AN/GGM-2	41, 42, 43, 44, 45
AN/GGM-3	41, 43, 44, 45
AN/GGM-4	41, 44, 45
AN/GGM-5	41, 45

41. Digital Distortion Analyzer

Note.

If abnormal indications are obtained during operation of the digital distortion analyzer, refer to the applicable equipment performance checklist (par. 53) for corrective measures.

a. Preliminary Operating Procedures.

(1) If the input signal is synchronous, set the SYNCHRONOUS, START-STOP switch to SYNCHRONOUS. If the input signal is start-stop, operate the switch to START-STOP.

(2) Operate the INPUT SELECT switch to the position that indicates the type (polar or neutral) and current (20, 30, or 60 ma or high impedance) of the input signal.

(3) Operate the BAUDS switch to the position that indicates the baud rate of the input signal.

(4) If the input signal is start-stop, operate the UNIT INTERVALS switch to the position that indicates the number of bits per character of the input signal. If the signal is synchronous, the UNIT INTERVALS switch may be operated to any position.

(5) Connect the input signal to the digital distortion analyzer as described in the applicable input signal loop connection paragraph (par. 25).

(6) If the input signal is in a mark condition or is being keyed, the digital distortion analyzer SIGNAL indicator lamp should light. If the lamp does not light, reverse the position of the INPUT POLARITY switch.

(7) To eliminate transients and noise from the input signal before analysis, operate the INPUT FILTER switch to IN. To analyze the signal with the transients and noise present, operate the switch to OUT.

(8) If automatic reset of the meter at 3-second intervals is desired, operate the RESET switch to AUTO.

(9) If the input signal is synchronous, the time delay necessary to allow the servo timing loop to null on the input signal may be shortened by momentarily operating the SYNCHRONOUS, START-STOP switch to START-STOP and then returning the switch to the SYNCHRONOUS position.

Note.

The operating procedures in b through f below are for analyzing all character segments of the input signal characters If the input signal is start-stop, any selected segment within the characters may be individually analyzed by operation of the right-hand TRANSITION SELECT switch from the ALL position to the position that indicates the *number* of the desired character sequence. The number is derived by counting one-bit *character segments*, starting at the middle of the start space (A, fig. 32). For example, to analyze the end transition of the first information bit, place the right-hand TRANSITION SELECT switch at 2; the analyzer then senses only those transitions occurring from the middle of the first *information bit* to the middle of second information bit. If the input signal is synchronous, the TRANSITION SELECT switch may also be used to select individual transitions for analysis; however, since the digital distortion analyzer does not establish character framing in synchronous operation, the relationship of the selected transition to the composite character normally cannot be determined.

b. Average Bias Distortion Measurements. To measure the average bias distortion of the input signal, proceed as follows:

(1) Operate the DISTORTION SELECT switch to AVG.

(2) Operate the right-hand TRANSITION SELECT switch to ALL.

(3) Set the left-hand TRANSITION SELECT switch to SPACE/MARK.

(4) The average displacement of the space-to-mark transitions of the input signal is indicated on the PERCENT DISTORTION meter. If the EARLY indicator lamp is on, marking bias distortion is indicated. If the LATE indicator lamp is on, spacing bias distortion is indicated.

c. Start-Stop Speed Error Measurements. The speed error (the difference between the transmitter distributor speed and the reference speed established by the AN/GGM-(*)) of the input signal may be determined by the following procedure:

(1) Measure the total peak distortion (d below) of each transition of the input signal (by rotating the right-hand TRANSITION SELECT switch from position 1 through each character segment of the input signal being measured).

(2) If, as the right-hand TRANSITION SELECT switch is operated from 1, through each character segment of the input signal, an increasing distortion is noted, a speed error is probably present. The average increase in distortion in each position of the right-hand TRANSITION SELECT switch is the approximate speed *difference* expressed in percent of one bit. For example, if the first transition was distorted 3 percent, the second 7 percent, the third 10 percent, the fourth 12 percent, and the fifth 15 percent; the approximate speed error would be 3 percent.

(3) To determine whether the speed error is fast or slow, measure the average distortion of both the space-mark and mark-space transitions. If the EARLY indicator lamp lights during the measurements, the speed of the transmitter is *fast*. If the LATE indicator lamp lights during the measurements, the transmitter speed is *slow*.

Note.

Since the stability of the time base generator is inferior to that of the clock used in synchronous telegraphy, the AN/GGM(*) cannot be used to measure the speed error of synchronous signals.

d. Total Peak Distortion Measurements. To measure the total peak distortion of the input signal, proceed as follows:

(1) Operate the DISTORTION SELECT switch to TOTAL PEAK.

(2) Operate the right-hand TRANSITION SELECT switch to ALL.

(3) The PERCENT DISTORTION meter indicates the peak (maximum) distortion of the input signal.

(4) Operate the RESET switch to MAN to reset the meter.

e. Early Peak Distortion Measurements. To measure the early peak distortion (the maximum early transition displacement) of the input signal, proceed as follows:

(1) Operate the DISTORTION SELECT switch to EARLY PEAK.

(2) Operate the right-hand TRANSITION SELECT switch to ALL.

(3) Operate the left-hand TRANSITION SELECT switch to SPACE/MARK (4) The peak (maximum) early displacement of the space-to-mark transitions is indicated on the PERCENT DISTORTION meter.

(5) Operate the RESET switch to MAN to reset the meter.

(6) Operate the left-hand TRANSITION SELECT switch to MARK/SPACE.

(7) The peak (maximum) early displacement of the reference mark-to-space transitions is indicated on the PERCENT DISTORTION meter.

(8) Operate the RESET switch to MAN to reset the meter.

f. Late Peak Distortion Measurements. To measure the late peak distortion (the maximum late transition displacement) of the input signal, proceed as follows:

(1) Operate the DISTORTION SELECT switch to LATE PEAK.

(2) Operate the right-hand TRANSITION SELECT switch to ALL.

(3) Operate the left-hand TRANSITION SELECT switch to SPACE/MARK.

(4) The peak (maximum) late displacement of the space-to-mark transitions is indicated on the PERCENT DISTORTION meter.

(5) Operate the RESET switch to MAN to reset the meter.

(6) Operate the left-hand TRANSITION SELECT switch to MARK/SPACE.

(7) The peak (maximum) late displacement of the reference mark-to-space transitions is indicated on the PERCENT DISTORTION meter.

(8) Operate the RESET switch to MAN to reset the meter.

g. Stopping Procedure. To stop the digital distortion analyzer, loosen the equipment securing knob at the bottom center of the front panel and withdraw the analyzer about 2 inches from the shelf adapter or equipment housing.

42. Time Base Generator

Note.
If abnormal indications are obtained during operation of the time base generator, refer to the applicable equipment performance checklist (par. 53), for corrective measures.

a. Variable Frequency Oscillator Adjustment. To adjust the variable frequency oscillator to any specific frequency in the range of 30 to 110 bauds, set the VARIABLE OSCILLATOR BAUDS controls such that their indicated digits total the desired modulation rate. For example, if a modulation rate of 60 bauds is desired, set the controls as shown in figure 34.

b. Operation Upon Oscillator Failure Alarm. When an oscillator failure is indicated by the audible alarm and the extinguishing of one or more oscillator signal indicator lamps, proceed as follows:

(1) If replacement of the defective printed circuit card at the time of alarm is convenient, notify second echelon maintenance personnel to replace it with an operational card of the correct frequency.

(2) If the printed circuit card cannot be immediately replaced, notify the operators of *all* equipments receiving timing signals from the time base generator, that the particular baud rate card is defective. The audible alarm may be muted by operating the AUDIBLE ALARM switch to OFF. The ALARM indicator lamp will remain on. If the defective oscillator should become inoperative, the alarm lamp will remain on although the corresponding oscillator signal indicator lamp will light. Operate the AUDIBLE ALARM switch to RESET to reset the audible alarm circuit.

c. Stopping Procedure. To stop the time base generator, loosen the chassis securing knob at the bottom center of the front panel and withdraw the time base generator about 2 inches from the shelf adapter or equipment housing.

43. Test Pattern Distortion Generator

Note.
If abnormal indications are obtained during operation of the test pattern distortion generator, refer to the applicable equipment performance checklist (par. 53) for corrective measures.

a. Preliminary Operating Procedures.

(1) If the output signal is to be start-stop, operate the SYNCHRONOUS, START-STOP switch to START-STOP. If the output signal is to be synchronous (available only with SELECTED CHARACTER and REVERSAL message), place the switch in the SYNCHRONOUS position.

(2) Operate the BAUDS switch to the position indicating the desired output signal modulation rate.

(3) If the output signal is to be a selected character, operate the LEVEL CODE switch to the position indicating the desired number of information bits per character.

(4) Operate the CHARACTER RELEASE switch to STEPPED if an external step signal is to control the character rate of the output signal. If a steady marking signal is desired for adjusting loop current, etc., operate the CHARACTER RELEASE switch to STEADY MARK. If the characters are to be successive without control from an external step signal, place the CHARACTER RELEASE switch at FREE RUN.

(5) Operate the PATTERN SELECTOR switch to the position that indicates the type of test pattern desired. If the signal is to be distorted, set the MARK-SPACE switches as outlined in c below.

b. Distortion Adjustments. To provide distortion in the test pattern distortion generator output signal, follow the procedures outlined below.

(1) Operate the DISTORTION switch to the type of distortion desired (par. 38)

(2) To adjust the magnitude of the output signal distortion, set the PERCENT DISTORTION switches such that the total of the numbers indicated by the TENS control and the UNITS control equals the desired distortion. For example, if 15-percent distortion is desired, set the TENS switch to 10 and the UNITS switch to 5.

c. Formation of Selected Characters. To form a specific character for transmission, first operate the LEVEL CODE switch to the position that indicates the number of information bits per character; then operate the MARK-SPACE switches to the positions to correspond to the desired character. For example, the letter B in the 067 IBM 10.42 level data code is composed of 8 information bits as follows: space, space, mark, space, mark, mark, space, mark. To transmit this character, the LEVEL CODE switch would be operated to 8 and MARK-SPACE switches 1 and 2 would be operated to SPACE; 3 to MARK; 4 to SPACE; 5 and 6 to MARK; 7 to SPACE; and 8 would be operated to MARK. When a character having a code level less than 8 is transmitted, the unused MARK-SPACE switches may be left in any position. For example, to transmit the letter B in 7.42 Baudot code, the LEVEL CODE switch is operated to 5 and MARK-SPACE switches 1, 4, and 5 are operated to MARK and switches 2 and 3 are operated to SPACE. MARK-SPACE switches 6, 7, and 8 may be operated to either MARK or SPACE.

d. Stopping Procedures. To stop the test pattern distortion generator, loosen the equipment securing knob at the bottom center of the front panel and withdraw the test pattern distortion generator about 2 inches from the shelf adapter or equipment housing.

44. Data-Scan Scope

Note.
If abnormal indications are obtained during operation of the data-scan scope, refer to the applicable equipment performance checklist (par. 53) for corrective measures.

a. General. The data-scan scope can only be operated in conjunction with the digital distortion analyzer because the sweep, blanking, intensifying, and triggering signals for the operation of the data-scan scope are applied from the digital distortion analyzer and are controlled by the setting of the digital distortion analyzer controls. Because of the interaction of the digital distortion analyzer, the operating procedures in b through g include instructions for operation of both the digital distortion analyzer and the data-scan scope; however, only those indications displayed by the data-scan scope will be included in this section. For information regarding the digital distortion analyzer indications, refer to paragraph 41.

b. Starting Procedures.

(1) Adjust the INTENSITY control to its extreme counterclockwise position.

(2) Adjust the VERTICAL CENT, VERTICAL GAIN, HORIZONTAL GAIN, and HORIZONTAL CENT controls to their midrange positions.

(3) Operate the POWER switch to ON.
The POWER indicator lamp should light.

(4) Allow the data-scan scope to warm up for 10 minutes.

c. Preliminary Operating Adjustments.

(1) Connect the input signal to the digital distortion analyzer (par. 25).

(2) Operate the data-scan scope SWEEP OPTIONS switch to TRIGGERED.

(3) Operate the data-scan scope CHARACTER BLANKING SELECT switch to OFF.

(4) Operate the INTENSITY MARKERS switch to ON.

(5) Rotate the data-scan scope INTENSITY control clockwise until the input signal pattern is displayed on the data-scan scope screen at the desired brightness. The intensity should be low enough to allow the intensity pips to be observed.

Caution:

If the intensity of the data-scan scope display is excessive, the face of the crt may be permanently damaged by burning. Never adjust the INTENSITY control to the point that a halo forms about the data-scan scope display.

(6) Adjust the HORIZONTAL CENT control until the pattern is centered horizontally on the data-scan scope screen.

(7) Adjust the VERTICAL CENT control until the pattern is centered vertically on the data-scan scope screen.

(8) Adjust the HORIZONTAL GAIN control until the pattern displayed on the data-scan scope screen extends from the vertical graticule line at the left side of the screen to the vertical graticule line at the right side of the screen.

(9) Adjust the VERTICAL GAIN control until the pattern displayed on the data-scan scope screen extends vertically from the second horizontal graticule mark above the center horizontal graticule mark to the second horizontal graticule mark below the center horizontal graticule mark. A properly positioned and adjusted pattern is illustrated in A, figure 35.

(10) Adjust the FOCUS control until the portion of the pattern positioned near the center of the screen appears sharp and clear.

(11) Adjust the ASTIGMATISM control until the overall pattern and especially those portions of the pattern at the extreme edges of the screen are properly focused.

(12) Adjust the SCALE ILLUM control until the desired brightness of the graticule scale is obtained.

d. Operational Procedures for Automatic Character Display. In the automatic character display mode, the data-scan scope presents a display containing a signal input character. The AUTO sweep option is available only with start-stop input signals. To arrange the data-scan scope for automatic character display, perform the steps in c above, then proceed as indicated below.

(1) Operate the SWEEP OPTIONS switch to AUTO.

(2) To view successive characters of the input signal, operate the CHARACTER BLANKING SELECT switch to OFF.

(3) If it is desired that all characters for a specific time interval following the display of a single character be blanked, operate the CHARACTER BLANKING SELECT switch to AUTO and adjust the CHARACTER BLANKING ADJUST control for the desired blanking interval.

(4) To cause a single character to be displayed upon a manual signal, operate the CHARACTER BLANKING SELECT switch to MANUAL and depress the SINGLE SWEEP RELEASE switch each time a character is to be displayed.

(5) As individual character segments are analyzed by the digital distortion analyzer, the selected segment of the character will be intensified on the data-scan scope display. If the intensified patterns are not desired, operate the INTENSITY MARKERS switch to OFF.

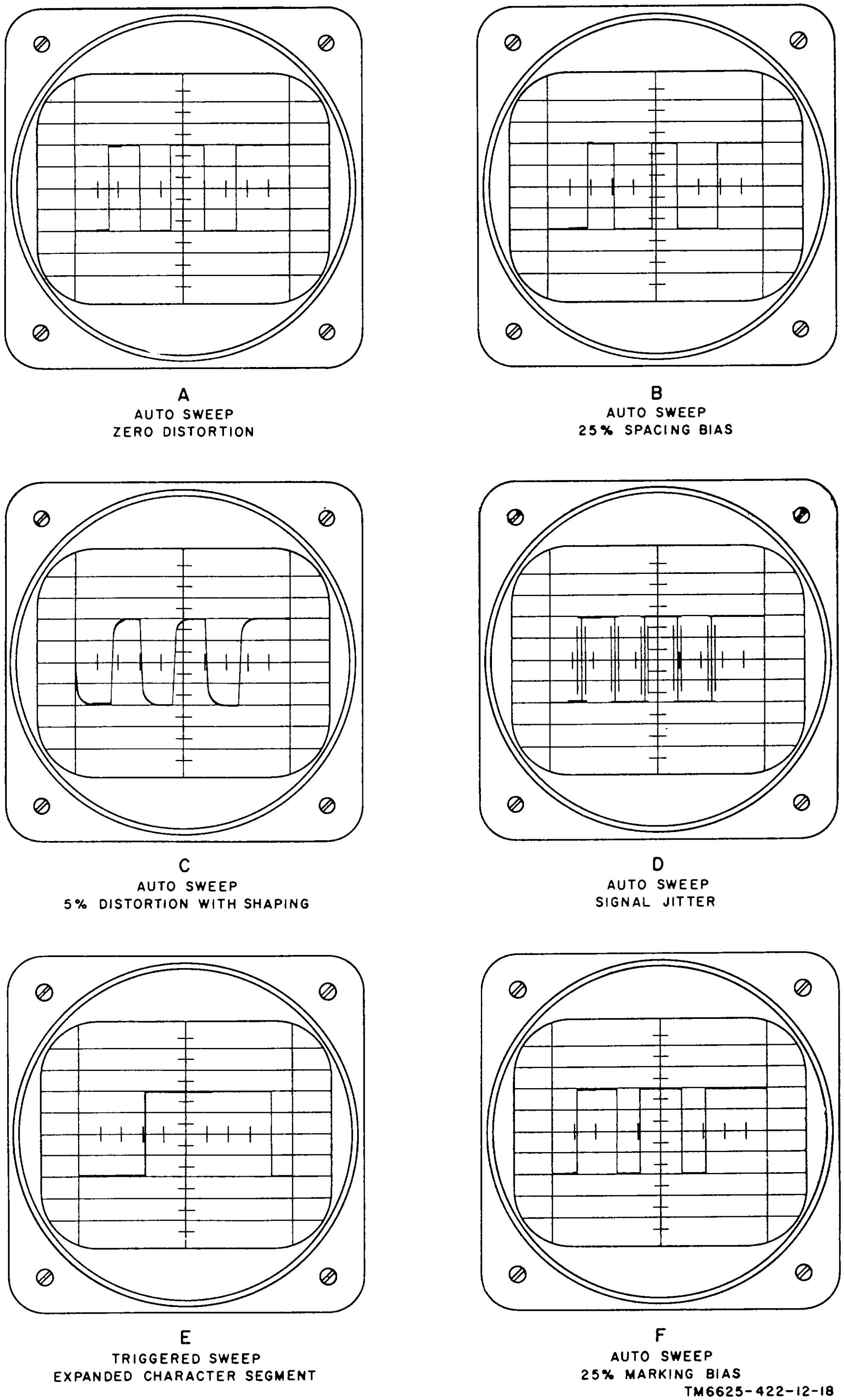

Figure 35. Data-scan scope, typical display waveforms.

(6) Typical AUTO sweep data-scan scope patterns for various distortion conditions are illustrated in A through D and F, figure 35.

e. Operational Procedures for Triggered Display. In the triggered display mode, the data-scan scope is triggered at the start of the character segment, which is selected by the right-hand TRANSITION SELECT switch on the digital distortion analyzer. The sweep speed of the data-scan in the triggered mode is determined by the INTERNAL SWEEP MILLISECONDS COARSE switch and FINE control on the data-scan scope. The speed of the sweep may be adjusted such that a single transition is displayed on the data-scan scope to facilitate the analysis of an individual segment of the incoming signal. To operate the data-scan scope in the triggered mode, proceed as follows:

(1) Perform the procedures given in c above.

(2) Perform the procedures given in d above, and, by observing the intensified segments of the data-scan scope display when the digital distortion analyzer right-hand TRANSITION SELECT switch is operated, select the character segment which is to be examined. Operate the digital distortion analyzer right-hand TRANSITION SELECT switch to the position indicating the desired segment.

(3) Operate the SWEEP OPTIONS switch on the data-scan scope to TRIGGERED.

(4) Adjust the INTERNAL SWEEP MILLISECONDS COARSE switch and FINE control until the desired magnification of the data-scan scope display is obtained. A typical triggered sweep data-scan scope pattern is illustrated in E, figure 35.

(5) Operate the CHARACTER BLANKING SELECT switch and ADJUST control to obtain the desired blanking.

f. Operational Procedures for Free Running Display. In the free running display mode, the data-scan scope sweep is triggered and is generated internally. The sweep speed is controlled by the INTERNAL SWEEP MILLISECONDS COARSE switch and FINE control. Since the sweep is untriggered, the free running mode of operation facilitates the use of the data-scan scope for conventional oscilloscope test purposes. To operate the data-scan scope in the free running mode, proceed as follows:

(1) Perform the procedures given in b above.

(2) Operate the SWEEP OPTIONS switch to FREE.

(3) Operate the CHARACTER BLANKING SELECT switch to OFF.

(4) Disconnect the wire connected to the VERT terminal on the rear of the shelf adapter (sets AN/GGM-1, AN/ GGM-3, and AN/GGM-4 only) and connect a test probe to the terminal.

(5) Connect the probe to the circuit or point to be viewed.

(6) Adjust the INTERNAL SWEEP MILLISECONDS COARSE and FINE controls to obtain the desired pattern.

g. Stopping Procedure. To stop the data-scan scope, operate the POWER switch to the downward (off) position.

45. Power Supply

a. Starting Procedure. To place the power supply in operation, operate the POWER switch to ON.

b. Stopping Procedure. To stop the power supply, operate the POWER switch to the downward (off) position.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

46. General

Difficulty may be encountered in operation of the AN/GGM-(*) where extreme cold, heat, humidity, excessive moisture, sand, or dust conditions prevail. Although the components maintain their technical characteristics over a wide temperature and humidity range, adverse climatic conditions may affect proper operation. Paragraphs 47 through 49 describe procedures that will minimize these effects.

7. Operation in Arctic Climates

a. Keep the AN/GGM-(*) components warm and dry.

b. Keep the power on continuously if possible

c. When equipment that has been exposed to the cold is brought into a warm room, moisture will gather on it and cause a change in operating characteristics. Apply the power and, after the AN/GGM-(*) reaches room temperature, dry the components thoroughly.

48. Operations in Tropical Climates

When the AN/GGM-(*) is operated in tropical climates, the high relative humidity causes condensation on the equipment whenever the temperature of the equipment becomes lower than that of the surrounding air. To minimize this condition, provide as much ventilation as possible. Dry the AN/GGM-(*) components thoroughly before operating.

49. Operation in Desert Climates

a. The main problem that arises with operation of the AN/GGM-(*) in desert areas is the large amount of sand, dust, and dirt that enters the chassis.

b. Keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (par. 51). The AN/GGM-(*) does not require lubrication and should be kept free from oil and grease.

CHAPTER 4

OPERATOR'S MAINTENANCE

50. General

a. The operator's maintenance for Test Set, Teletypewriter AN/GGM-(*) includes the following:

(1) Preventive maintenance (par. 51).

(2) Visual inspection (par. 52).

(3) Troubleshooting (equipment performance checklists (par. 53)).

(4) Replacement of defective indicator lamps and fuses.

b. The materials required by the operator to perform preventive maintenance for Test Set, Teletypewriter AN/GGM-(*) are Cleaning Compound (Federal Stock No. 7930395-9542) and a lint-free cloth.

Warning:

Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.

51. Preventive Maintenance

a. DA Form 11-266. Items 1 through 5, 10, and 11, on DA Form 11-266 (figs. 36 and 37) should be used as a checklist by the operator when performing preventive maintenance on the AN/GGM-(*). Items not applicable to the equipment are lined out in the figures. Reference in the ITEM block in the figures are to the items in this paragraph that contain additional information on the particular item. Instructions for the use of the form appear on the front of the form.

Note.

Delete item 7 on DA Form 11-266 for the AN/GGM-1, AN/GGM-3, AN/GGM-4, and AN/GGM-6.

b. Items. The information contained in the chart below is supplementary to DA Form 11266. The item numbers correspond to the ITEM number on the form.

Items	Maintenance procedures
1	Use a clean cloth to remove dust, dirt, moisture, and grease from the AN/GGM-(*) front panels and controls). If necessary, dampen the cloth with cleaning compound to clean the parts; then wipe the parts with a clean dry cloth.
3	Be sure that all controls work smoothly. The knobs should be tight on their shafts and should not bind in any position.
4	Use the equipment performance checklist to check for proper operation.

52. Visual Inspection

a. When Test Set, Teletypewriter AN/GGM-(*) fails to perform properly, obtain permission to turn off the power and check the items listed below. Do not check any items with the power on.

(1) Incorrect settings of switches and controls (par. 40 through 45).

(2) Burned out power supply or fuses (usually indicates some other fault).

(3) Incorrect or faulty connections.

b. If the above checks do not correct the malfunction, perform the procedures in the appropriate equipment performance checklist (par. 53).

53. Equipment Performance Checklists

a. General. The equipment performance checklists provide procedure for systematically checking the operational performance of Test Set, Teletypewriter AN/GGM-(*). When using a checklist, start at the beginning and follow the steps in order. If the equipment fails to operate correctly during any step, perform the corrective measure given in the corrective measures column. If the measures taken do not correct the defect, request higher echelon maintenance. Note on the repair tag how the equipment performed and what corrective measures were performed.

b. Checklist for AN/GGM-1, AN/GGM-2, and AN/GGM-4.

Note.

Make all the installation connections appropriate for the equipment being checked as covered in paragraphs 18 through 30.

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
TEST EQUIPMENT
(AR 750-625)

EQUIPMENT NOMENCLATURE
TEST SET, TELETYPEWRITER AN/GGM-(*)

EQUIPMENT SERIAL NUMBER
123

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

FOLD

TYPE OF INSPECTION

OPERATOR	2/3 ECHELON	DATE	SIGNATURE
BJ		8 JULY 61	Bill James
	J.S.	9 JULY 61	John Smith

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DA FORM 1 MAY 57 11-266

TM6625-422-12-70

Figure 36. DA Form 11-266, pages 1 and 4.

LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF July 1961

NO.	DAILY ITEM	1 / 17	2 / 18	3 / 19	4 / 20	5 / 21	6 / 22	7 / 23	8 / 24	9 / 25	10 / 26	11 / 27	12 / 28	13 / 29	14 / 30	15 / 31	16	2D 3D ECH-ELON
		BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ	BJ							
1.	CLEAN DIRT AND MOISTURE FROM EXPOSED SURFACES OF HOUSINGS, CASES, CABINETS, CONTROL PANELS, INTER-CONNECTING PLUGS, CABLES, ~~HEADSETS,~~ METER WINDOWS, ETC. PARA 84	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
2.	INSPECT FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS SWITCHES, KNOBS, JACKS, CONNECTORS AND PILOT LIGHTS.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
3.	INSPECT CONTROLS FOR BINDING, SCRAPING. TAP CONTROLS LIGHTLY FOR CUT-OUT DUE TO LOOSE CONTACTS. PARA 84	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
4.	DURING OPERATION BE ALERT FOR ANY UNUSUAL PERFORMANCE OR CONDITION. PARA 84	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5. INSPECT CORDS, CABLES, WIRE ~~AND SHOCK MOUNTS~~ FOR BREAKS, CUTS, KINKS, DETE-RIORATION, STRAIN AND FRAYING.	(X)					(X)
6. ~~INSPECT CANVAS AND LEATHER ITEMS FOR FUNGUS, FRAYING, TEARS, BROKEN ZIPPERS AND SNAP FASTENERS.~~						
7. HAND CHECK FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS HANDLES, LATCHES, HINGES.	✓					✓
8. ~~INSPECT FOR LUBRICATION IN ACCORDANCE WITH APPLICABLE DA LUBRICATION ORDER.~~						
9. ~~INSPECT DRY BATTERIES FOR DIRT, LOOSE TERMINALS AND LEAKAGE.~~						
10. INSPECT EXPOSED METAL SUR-FACES FOR RUST AND CORROSION.	✓					✓
11. INSPECT METERS FOR DAMAGED GLASS AND CASES.	✓					✓

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
12. INSPECT SEATING OF READILY ACCESSIBLE ITEMS OF A PLUCK-OUT NATURE: CRYSTALS, FUSES, CONNECTORS, PLUG-IN COILS, LAMPS, ETC. DO NOT REMOVE, ROCK OR TWIST TO INSPECT. USE ONLY A DIRECT PRESSURE TO INSURE THE ITEM IS FULLY SEATED. PARA 89	✓
13. ~~INSPECT FOR CLEANLINESS AND TIGHTNESS OF SUCH ITEMS AS SHOCK MOUNTS, ANTENNA, ANTENNA MOUNTS AND WAVE GUIDES.~~	
14. INSPECT ~~RELAY AND~~ CIRCUIT BREAKER ASSEMBLIES FOR DIRT, CORROSION, WORN OR BURNED CONTACTS.	✓

2

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. INSPECT RESISTORS, BUSHINGS, INSULATORS FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE. PARA 89	✓
16. INSPECT JACKS AND CONNECTORS FOR SNUG FIT AND GOOD CONTACTS.	✓
17. INSPECT VARIABLE CAPACITORS FOR DIRT AND MOISTURE. PARA 89	✓
18. INSPECT AIR FILTERS FOR CLEANLINESS. PARA 89	✓
19. ~~INSPECT SCREWTYPE TERMINALS OF TRANSFORMERS, FIXED CAPACITORS, RESISTORS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR CORROSION, DIRT AND LOOSE CONTACTS.~~	
20. CLEAN AND TIGHTEN SWITCHES, BLOWERS, RELAY CASES; CLEAN INTERIOR OF CHASSIS AND CABINETS.	✓
21. ~~INSPECT GENERATORS, MOTORS AND DYNAMOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND COMMUTATOR WEAR.~~	
22. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	✓
23. INSPECT GASKETS AND BUSHINGS FOR WEAR AND DAMAGE.	✓
24. INSPECT CATHODE RAY TUBES FOR BURNED SCREEN SPOTS.	✓
25. ~~BEFORE STORING OR SHIPPING— REMOVE ALL BATTERIES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. *(Continue on page 4, if more space is needed)*

3

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Figure 37. DA Form 11-266, pages 2 and 3.

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
1	Operate power supply POWER switch to ON.	POWER supply blower fan starts.	Check AC LINE fuses on power supply (fig. 29). Check power cord and connections.
		POWER indicator lamp on digital distortion analyzer lights.	Check digital distortion analyzer ±15-vdc fuses (fig. 8). Check digital distortion analyzer POWER indicator lamp.
		POWER indicator lamp on test pattern distortion generator lights.	Check test pattern distortion generator ±15-vdc fuses (fig. 16).
		Note. The Normal indication for the time base generator (below) applies only to the AN/GGM-1 and AN/GGM-2.	Check test pattern distortion generator POWER indicator lamp.
		Time base generator baud-rate oscillator lamps light (those connected to operative oscillator cards).	If all of the oscillator lamps fail to light, check time base generator ±15-vdc fuses (fig. 13).
2	Operate data-scan scope POWER switch to: ON.	Data-scan scope POWER indicator lamp lights.	Check data-scan scope fuse (fig. 10).
3	Operate JACK SIGNAL SELECTOR switch, on rear of the AN/GGM-(*) to MECH.		
4	Arrange test pattern distortion generator controls as follows: Switch — Portion DISTORTION — OFF PERCENT DISTORTION — 0 SYNCHRONOUS, START-STOP — START-STOP MARK-SPACE — Any LEVEL CODE — 5 BAUDS — 37 PATTERN SELECTOR — TEST MESSAGE CHARACTER RELEASE — STEADY MARK	Test pattern distortion generators SIGNAL indicators lamp lights.	Check test pattern distortion generator -120-vdc fuse (fig. 16).
5	Arrange digital distortion analyzer controls as follows: Switch — Position INPUT POLARITY — + INPUT SELECT — POLAR, 20 or 30 MA INPUT FILTER — OUT BAUDS — 37 SYNCHRONOUS, START-STOP — START-STOP		

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
	UNIT INTERVALS 8 TRANSITION SELECT SPACE/MARK ALL DISTORTION SELECT AVG RESET OFF		
6	Using procedures described in paragraph 44, make preliminary adjustments of data-scan scope and then arrange unit for AUTO sweep operation (INTENSITY MARKER switch ON).	As described in paragraph 44.	If crt graticule does not light, check graticule lamps (par. 54).
7	Arrange test pattern distortion generator mechanical relay loop battery for polar 30-ma operation (par. 27).		
8	Connect two-conductor phone plug patch cord between test pattern distortion generator SIGNAL OUTPUT jack and digital distortion analyzer LOW Z INPUT jack.	SIGNAL indicator lamp on digital distortion analyzer lights.	Reverse position of digital distortion analyzer INPUT POLARITY switch. Check SIGNAL indicator lamp. Check -120-vdc fuse (fig. 8).
9	Operate test pattern distortion generator DISTORTION switch to SPACING BIAS and CHARACTER RELEASE switch to FREE RUN.	Successive characters displayed on data-scan scope.	If pattern is not displayed on data-scan scope, check mechanical relay. If relay is not operating (as indicated by check for vibration and buzz), check relay and replace if defective. *Note*. The mechanical relay for the AN/GGM-1 and AN/GGM-2 is located in the time base generators. The mechanical relay for the AN/GGM-1 is located on shelf adapter 2B. Check RELAY F2 fuse on rear of time base generator (fig. 13). *Note*. Relay fuse F2 for the AN/GGM-1 and AN/GGM-2 is located at the rear of the time base genrator (fig. 18). RELAY fuse F2 for the AN/GGM-3 is located on the rear of shelf adapter 2B (fig. 23).
10	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1.	Segment from middle of start space to middle of first bit is intensified on data-scan scope display.	
11	Operate data-scan scope SWEEP OPTIONS switch to TRIGGERED.	Data-scan scope sweep starts with segment selected by digital distortion analyzer right-hand TRANSITION SELECT switch.	
12	Adjust data-scan scope INTERNAL SWEEP MILLISECOND SELECT and ADJUST controls.	As data-scan scope INTERNAL SWEEP MILLISECONDS controls are advanced, scope display is *expanded*.	

13 13	Operatedata-scan scope CHARACTER BLANKING SELECT switch to AUTO. ADJUST CHARACTER BLANKING ADJUST control clockwise.	As character BLANKING ADJUST control is adjusted, time interval between character displays is increased.	
14 s	Operate data-scan scope CHARACTER BLANKING SELECT switch to MANUAL. Depress SINGLE SWEEP RELEASE witch.	Single character is displayed each time SINGLE SWEEP RELEASE switch is operated.	
15	Operate data-scan scope INTENSITY MARKERS switch to OFF.	Intensity modulation of crt display is removed.	
16	Operate data-scan scope POWER switch to off (downward) position.	POWER indicator lamp goes out. Crt display fades out.	
17	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to ALL.		
18	Operate test pattern distortion generator PERCENT DISTORTION TENS switch through each position; observe the digital distortion analyzer indications at each switch position.	As test pattern distortion generator distortion is increased, digital distortion analyzer indicates late space-to-mark distortion of 10, 20, 30, and 40 percent respectively.	Check digital distortion analyzer LATE indicator lamp.
19	Operate digital distortion analyzer DISTORTION SELECT switch to TOTAL PEAK.		
20	Operate test pattern distortion generator PERCENT DISTORTION UNITS switch to 9.	Digital distortion analyzer meter indicates 49-percent distortion.	
21	Operate test pattern distortion generator PERCENT DISTORTION TENS switch and UNITS switch to 0.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
22	Operate digital distortion analyzer RESET switch to MAN.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
23	Operate test pattern distortion generator PERCENT DISTORTION TENS switch to 40.	Digital distortion analyzer meter indicates 40-percent distortion.	
24	Operate test pattern distortion generator PERCENT DISTORTION TENS switch to 0.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
25	Operatedigital distortion analyzer RESET switch to AUTO and wait about 3 seconds.	Digital distortion analyzer meter indication is reset to 0-percent distortion.	
26	Operate digital distortion analyzer RESET switch to OFF.		
27	Operate digital distortion analyzer DISTORTION SELECT switch to EARLY PEAK.		
28	Operate test pattern distortion generator PERCENT DISTORTION TENS switch to 40.	Digital distortion analyzer meter indication remains at 0-percent distortion.	
29	Operate test pattern distortion generator DISTORTION switch to MARKING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion.	
30	Operate test pattern distortion generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
31	Operate digital distortion analyzer RESET switch to MAN.	Digital distortion analyzer meter indication falls to 0-percent distortion.	

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
32	Operate digital distortion analyzer DISTORTION SELECT switch to LATE PEAK.		
33	Operate test pattern distortion generator DISTORTION switch to SPACING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion.	
34	Operate test pattern distortion generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
35	Operate digital distortion analyzer RESET switch to MAN.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
36	Operate digital distortion analyzer DISTORTION SELECT switch to AVG.		
37	Operate test pattern distortion generator DISTORTION switch to SWITCHED BIAS.	Digital distortion analyzer meter indicates 40-percent distortion and EARLY and LATE lamps light alternately.	
38	Operate test pattern distortion generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
39	Operate test pattern distortion generator PATTERN SELECTOR switch to SELECTED CHARACTER.		
40	Operate test pattern distortion generator MARK-SPACE switches as follows: *MARK-SPACE switch* — *Position* 1 — MARK 2 — SPACE 3 — MARK 4 — SPACE 5 — MARK 6 — SPACE 7 — MARK 8 — SPACE		
41	Operate test pattern distortion generator LEVEL CODE switch to 8.		
42	Operate digital distortion analyzer UNIT INTERVALS switch to 10.		
43	Operate test pattern distortion generator DISTORTION switch to SPACING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion and LATE lamp lights.	
44	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1, 3, 5, 7, and 9 and operate RESET switch to MAN in each position.	In each switch position, digital distortion analyzer meter indicates 40-percent distortion and LATE lamp lights.	
45	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 2, 4, 6,	In each switch position, digital distortion analyzer meter indicates O-percent distor-	

	and 8 and operate RESET switch to MAN in tion. each position.		
46	Arrange test pattern distortion generator MARK-SPACE switches as follows: *MARK-SPACE switch* — *Position* 1 — SPACE 2 — MARK 3 — SPACE 4 — MARK 5 — SPACE 6 — MARK 7 — SPACE 8 — MARK		
47	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 2, 4, 6, and 8, and operate RESET switch to MAN in each position.	In each switch position, digital distortion analyzer meter indicates 40-percent distortion and the LATE lamp lights.	
48	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1, 3, 5, 7, and 9, and operate RESET switch to MAN in each switch position.	In each switch position, digital distortion analyzer meter indicates 0-percent distortion.	
49	Operate test pattern distortion generator PATTERN SELECTOR switch to REVERSAL.		
50	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to ALL.	Digital distortion analyzer meter indicates 40-percent distortion and LATE indicator lamp is on.	
51	Operatedigital distortion analyzer and test pattern distortion generator SYNCHRONOUS, START-STOP switches to SYNCHRONOUS.	Digital distortion analyzer meter slowly oscillates and then settles to indicate 40-percent distortion.	
52	Repeat Items No. 49-51 with test pattern distortion generator and digital distortion analyzer BAUDS switch operated to each available baud rate.	Same as items No. 50 and 51.	
53	Operate test pattern distortion CHARACTER RELEASE switch to STEADY MARK and operate the PERCENT DISTORTION TENS and UNITS switches to 0.		
54	Connect output of test pattern distortion generator to a 60-ma loop connected to a teleprinter.		
55	Operate test pattern distortion generator PATTERN SELECTOR switch to TEST MESSAGE.		

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
56	Operate test pattern distortion generator SYNCHRONOUS, START-STOP switch to START-STOP.		
57	Operate test pattern distortion generator BAUDS switch to position indicating speed to which teleprinter is adjusted to operate.		
58	Operate test pattern distortion generator CHARACTER RELEASE switch to FREE RUN.	Teleprinter prints out THE QUICK BROWN (five spaces FOX JUMPS OVER A LAZY DOGS BACK 1234567890 DE (station call letters).	
59	Repeat items No. 53-58 with test pattern distortion generator rear panel JACK SIGNAL SELECTOR switch set to ELECT.	Same as item No. 58.	Check ELECT OUTPUT fuses F1 and F2 on rear of the test pattern distortion generator (fig. 16).

c. Checklist for AN/GGM-4.

Note.

Make all the installation connections for the AN/GGM- covered in paragraphs 18 through 30. References in the checklist to the remote pattern generator are to the test pattern distortion generator contained in the AN/GGM-(*) supplying timing signals to the AN/GGM-4.

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
1	Operate the power supply POWER switch to ON.	Power supply blower fan starts.	Check AC LINE fuses on power supply (fig. 29). Check power cord and connections
		POWER indicator lamp on digital distortion analyzer lights.	Check digital distortion analyzer ±15-vdc fuses (fig. 8). Check POWER indicator lamp.
2	Operate data-scan scope POWER switch to ON.	Data-scan scope POWER indicator lamp lights.	Check data-scan scope fuse (fig. 10). Check data-scan scope POWER indicator lamp.
3	Operate JACK SIGNAL SELECTOR switch, on the rear of AN/GGM-(*) supplying timing signals, to MECH.		
4	Arrange remote pattern generator controls as follows: *Switch* — *Position* DISTORTION — OFF PERCENT DISTORTION — 0 SYNCHRONOUS, START-STOP — START-STOP MARK-SPACE — Any LEVEL CODE — 5		

	BAUDS 37 PATTERN SELECTOR TEST MESSAGE CHARACTER RELEASE STEADY MARK		
5	Arrange digital distortion analyzer controls as follows: *Switch* — *Position* INPUT POLARITY — + INPUT SELECT — POLAR, 20 or 30 MA INPUT FILTER — OUT BAUDS — 37 SYNCHRONOUS, START-STOP — START-STOP UNIT INTERVALS — 8 TRANSMISSION SELECT — SPACE/ MARK ALL DISTORTION SELECT — AVG RESET — OFF		
6	Using procedures described in paragraph 44, make preliminary adjustments of data-scan scope and then arrange unit for AUTO sweep operation. (INTENSITY MARKERS switch ON.)	As described in paragraph 44.	If crt graticule does not light, check graticule lamps (par. 54).
7	Arrange remote pattern generator mechanical relay loop battery for polar 30 ma operation (par. 27).		
8	Connect two-conductor phone plug patch cord between remote pattern generator SIGNAL OUTPUT jack, on AN/GGM-(*) supplying timing signals, to digital distortion analyzer LOWZ INPUT jack.	SIGNAL indicator lamp on digital distortion analyzer lights.	Reverse position of digital distortion analyzer INPUT POLARITY switch. Check SIGNAL indicator lamp. Check digital distortion analyzer -120-vdc fuse (fig. 8).
9	Operateremote pattern generator DISTORTIONswitch to SPACING BIAS, and CHARACTER RELEASE switch to FREE RUN.	Successive characters displayed on data-scan scope.	
10	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1.	Segment from middle of start space to middle of first bit is intensified on data-scan scope display.	
11	Operate data-scan scope SWEEP OPTIONS switch to TRIGGERED.	Data-scan scope sweep starts with segment selected by digital distortion analyzer right-hand TRANSMISSION SELECT switch.	

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
12	Adjust data-scan scope INTERNAL SWEEP MILLISECONDS, SELECT and ADJUST .	As data-scan scope INTERNAL SWEEP MILLISECONDS controls are advanced, data-scan scope display is expanded.	
13	Operate data-scan scope CHARACTER BLANKING SELECT switch to AUTO. Adjust CHARACTER BLANKING, ADJUST control clockwise.	As CHARACTER BLANKING ADJUST control is adjusted, time interval between character displays is increased.	
14	Operate data-scan scope CHARACTER BLANKING SELECT switch to MANUAL. Depress the SINGLE SWEEP RELEASE switch.	Single character is displayed each time SINGLE SWEEP RELEASE switch is operated.	
15	Operate data-scan scope INTENSITY MARKERS switch to OFF.	Intensity modulation of crt display is removed.	
16	Operate data-scan scope POWER switch to off (downward) position.	POWER indicator lamp goes out. Crt display fades out.	
17	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to ALL.		
18	Operate remote pattern generator PERCENT DISTORTION TENS switch through each position, observe digital distortion analyzer indications in each switch position.	As pattern generator distortion is increased, digital distortion analyzer indicates late space-to-mark distortion of 10, 20, 30, and 40 percent respectively.	Check digital distortion analyzer LATE indicator lamp.
19	Operate digital distortion analyzer DISTORTION SELECT switch to TOTAL PEAK.		
20	Operate remote pattern generator PERCENT DISTORTION UNIT switch to 9.	Digital distortion analyzer meter indicates 49-percent distortion.	
21	Operate remote pattern generator PERCENT DISTORTION TENS switch and UNITS switches to 0.	Digital distortion analyzer meter indication remains at 49-percent distortion.	
22	Operate digital distortion analyzer RESET switch to MAN RESET.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
23	Operate remote pattern generator PERCENT DISTORTION TENS switch to 40.	Digital distortion analyzer meter indicates 40-percent distortion.	
24	Operate remote pattern generator PERCENT DISTORTION TENS switch to 0.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
25	Operate digital distortion analyzer RESET switch to AUTO and wait about 10 seconds.	Digital distortion analyzer meter indication is reset to 0-percent distortion.	
26	Operate digital distortion analyzer RESET switch to OFF.		
27	Operate digital distortion analyzer DISTORTION SELECT switch to EARLY PEAK.		

28	Operate remote pattern generator PERCENT DISTORTION TENS switch to 40.	Digital distortion analyzer meter indication remains at 0-percent distortion.	
29	Operate remote pattern generator DISTORTION switch to MARKING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion.	
30	Operate remote pattern generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
31	Operate digital distortion analyzer RESET switch to MAN.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
32	Operate digital distortion analyzer DISTORTION SELECT switch to LATE PEAK.		
33	Operate remote pattern generator DISTORTION switch to SPACING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion.	
34	Operate remote pattern generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
35	Operate digital distortion analyzer RESET switch to MAN RESET.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
36	Operate digital distortion analyzer DISTORTION SELECT switch to AVG.		
37	Operate remote pattern generator DISTORTION switch to SWITCHED BIAS.	Digital distortion analyzer meter indicates 40-percent distortion and EARLY and LATE lamps light alternately.	
38	Operate remote pattern generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
39	Operate remote pattern generator PATTERN SELECTOR switch to SELECTED CHARACTER.		
40	Operate remote pattern generator MARK-SPACE switches as follows: *MARK-SPACE switch* — *Position* 1 — MARK 2 — SPACE 3 — MARK 4 — SPACE 5 — MARK 6 — SPACE 7 — MARK 8 — SPACE		
41	Operate remote pattern generator LEVEL CODE switch to 8.		
42	Operate digital distortion analyzer UNIT INTERVALS switch to 10.		
43	Operate remote pattern generator DISTORTION switch to SPACING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion and LATE lamp lights.	

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
44	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1, 3, 4, 7, and 9, and operate RESET switch to MAN RESET in each position.	In each switch position, digital distortion analyzer meter indicates 40-percent distortion and LATE lamp lights.	
45	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 2, 4, 6,1 and 8, and operate RESET switch to MAN RESET in each position.	In each switch position, digital distortion analyzer meter indicates 0-percent distortion.	
46	Arrange remote pattern generator selected character MARK-SPACE switches as follows: MARK-SPACE switch — Position 1 — MARK 2 — SPACE 3 — SPACE 4 — MARK 5 — SPACE 6 — MARK 7 — SPACE 8 — MARK		
47	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 2, 4, 6, and 8, and operate RESET switch to MAN RESET in each position.	In each switch position, digital distortion analyzer meter indicates 40-percent distortion and the LATE indicator lamp lights.	
48	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1, 3, 5, 7, and 9, and operate RESET switch to MAN RESET in each position.	In each switch position, digital distortion analyzer meter indicates O-percent distortion.	
49	Operate remote pattern generator PATTERN SELECTOR switch to REVERSAL.		
50	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to ALL. on.	Digital distortion analyzer meter indicates 40-percent distortion. LATE indicator lamp is	
51	Operate digital distortion analyzer and remote pattern generator S Y N C H R O N O U S, START-STOP switches to SYNCHRONOUS.	Digital distortion analyzer meter slowly oscillates and then settles to indicate 40-percent distortion.	
52	Repeat items No. 49-51 with the remote pattern generator and digital distortion analyzer BAUD switches operated to each available baud rate.	Same as items No. 50 and 51.	

d. Checklist for AN/GGM-5.

Note.

Make all the installation connections for the AN/GGM-5 covered in paragraphs 18 through 30. The checklist below includes instructions for checking one digital distortion analyzer of the AN/GGM-5; repeat the checklist procedure to check the other digital distortion analyzer. References in the checklist to the remote pattern generator are to the test pattern distortion generator contained in the AN/GGM-(*) supplying timing signals to the AN/GGM-5.

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
1	Operate power supply POWER switch to ON.	Power supply blower fan starts. POWER indicator lamps on digital distortion analyzers light.	Check AC LINE fuses on power supply (fig. 29). Check power cord and connections. Check digital distortion analyzer -15-vdc fuse (fig. 8). Check POWER indicator lamp.
2	Operate JACK SIGNAL SELECTOR switch, on rear of AN/GGM-(*) supply timing signals, to MECH.		
3	Arrange remote pattern generator controls as follows: *Switch* — *Position* DISTORTION — OFF PERCENT DISTORTION — 0 SYNCHRONOUS, START-STOP — START-STOP MARK-SPACE — Any LEVEL CODE — 5 BAUDS — 37 PATTERN SELECTOR — TEST MESSAGE CHARACTER RELEASE — STEADY MARK		
4	Arrange the digital distortion analyzer controls as follows: *SwitchPosition* INPUT POLARITY — + INPUT SELECT — POLAR 20 or 30 MA INPUT FILTER — OUT BAUDS — 37 SYNCHRONOUS, START-STOP — START-STOP UNIT INTERVALS — 8 TRANSITION SELECT — SPACE/MARK-ALL DISTORTION SELECT — AVG RESET — OFF		

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
5	Arrange remote pattern generator mechanical relay loop battery for polar 30 ma operation (par. 27).		
6	Connect a two-conductor phone plug patch cord between remote pattern generator digital Distortion SIGNAL OUTPUT jack and digital distortion analyzer LOW Z INPUT jack.	SIGNAL indicator lamp on digital distortion analyzer lights.	Reverse position of digital distortion analyzer INPUT POLARITY switch. Check SIGNAL indicator lamp. Check digital distortion analyzer -120-vdc fuse (fig. 8).
7	Operate remote pattern generator DISTOR-TION switch to SPACING BIAS, and CHARACTER RELEASE switch to FREE RUN.		
8	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to ALL.		
9	Operate remote pattern generator PERCENT DISTORTION TENS switch through each position; observe digital distortion analyzer indications after each movement	As pattern generator distortion is increased, digital distortion analyzer indicates LATE space-to-mark distortion of 10, 20, 30 and 40 . percent, respectively.	Check digital distortion analyzer LATE indicator lamp.
10	Operate digital distortion analyzer DISTOR-TION SELECT switch to TOTAL PEAK.		
11	Operate remote pattern generator PERCENT DISTORTION UNITS switch to 9.	Digital distortion analyzer meter indicates 49-percent distortion.	
12	Operate remote pattern generator PERCENT DISTORTION TENS switch and UNITS switch to 0.	Digital distortion analyzer meter indication remains at 49-percent distortion.	
13	Operate digital distortion analyzer RESET switch to MAN RESET.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
14	Operate remote pattern generator PERCENT DISTORTION TENS switch to 40.	Digital distortion analyzer meter indicates 40-percent distortion.	
15	Operate remote pattern generator PERCENT DISTORTION TENS switch to 0.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
16	Operate digital distortion analyzer RESET switch to AUTO and wait about 10 seconds.	Digital distortion analyzer meter indication is reset to O-percent distortion.	
17	Operate digital distortion analyzer RESET switch to OFF.		
18	Operate digital distortion analyzer DISTOR-TION SELECT switch to EARLY PEAK.		
19	Operate remote pattern generator PERCENT DISTORTION TENS switch to 40.	Digital distortion analyzer meter indication remains at 0-percent distortion.	
20	Operate remote pattern generator DISTOR-TION switch to MARKING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion.	

21	Operate remote pattern generator DISTORTION switch to OFF.	Digital distort. analyzer meter indication remains at 40-percent distortion.	
22	Operate digital distortion analyzer RESET switch to MAN.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
23	Operate digital distortion analyzer DISTORTION SELECT switch to LATE PEAK.		
24	Operate remote pattern generator DISTORTION switch to SPACING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion.	
25	Operate remote pattern generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication remains at 40-percent distortion.	
26	Operate digital distortion analyzer RESET switch to MAN.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
27	Operate digital distortion analyzer DISTORTION SELECT switch to AVG.		
28	Operate remote pattern generator DISTORTION switch to SWITCHED BIAS.	Digital distortion analyzer meter indicates 40-percent distortion and EARLY and LATE indicator lamps light alternately.	
29	Operate remote pattern generator DISTORTION switch to OFF.	Digital distortion analyzer meter indication falls to 0-percent distortion.	
30	Operate remote pattern generator PATTERN SELECTOR switch to SELECTED CHARACTER.		
31	Operate remote pattern generator MARK-SPACE switches as follows: *MARK-SPACE switch* — *Position* 1 — MARK 2 — SPACE 3 — MARK 4 — SPACE 5 — MARK 6 — SPACE 7 — MARK 8 — SPACE		
32	Operate remote pattern generator LEVEL CODE switch to 8.		
33	Operate digital distortion analyzer UNIT INTERVALS switch to 10.		
34	Operate remote pattern generator DISTORTION switch to SPACING BIAS.	Digital distortion analyzer meter indicates 40-percent distortion and LATE indicator lamp lights.	
35	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1, 3, 5, 7, and 9 and operate RESET switch to MAN RESET in each position.	In each switch position, digital distortion analyzer meter indicates 40-percent distortion and LATE indicator lamp lights.	

ITEM NO.	INSTRUCTIONS	NORMAL INDICATORS	CORRECTIVE MEASURES
36	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 2, 4, 6, and 8 and operate RESET switch to MAN RESET in each position.	In each switch position, digital distortion analyzer meter indicates 0-percent distortion.	
37	Arrange remote pattern generator MARK-SPACE switches as follows: *MARK-SPACE switch* — *Position* 1 — SPACE 2 — MARK 3 — SPACE 4 — MARK 5 — SPACE 6 — MARK 7 — SPACE 8 — MARK		
38	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 2, 4, 6, and 8 and operate RESET switch to MAN in each position.	In each switch position, digital distortion analyzer meter indicates 40-percent distortion and the LATE lamp lights.	
39	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to 1, 3, 5, 7, and 9 and operate RESET switch to MAN in each position.	In each switch position, digital distortion analyzer meter indicates 0-percent distortion.	
40	Operate test pattern distortion generator PATTERN SELECTOR switch to REVERSALS		
41	Operate digital distortion analyzer right-hand TRANSITION SELECT switch to ALL	Digital distortion analyzer meter indicates 40-. percent distortion and LATE indicator lamp is on.	
42	Operate digital distortion analyzer and remote pattern generator S Y N C H R O N O U S, START-STOP switches to SYNCHRONOUS.	Digital distortion analyzer meter slowly oscillates and then settles to indicate 40-percent distortion.	
43	Repeat items No. 40-42 with remote pattern generator and digital distortion analyzer BAUDS switch operated to each available baud rates	Same as items No. 41 and 42-	

54. Replacement of Data-Scan Scope Graticule Lamps

a. Remove the four screws that secure the crt bezel on the data-scan scope (fig. 33). After the bzel is removed, the four graticule lamps are exposed.

b. Replace defective graticule lamps.

c. Replace the bezel and replace and tighten the four screws to secure the bezel in position.

CHAPTER 5

SECOND ECHELON MAINTENANCE

55. General

a. The second echelon maintenance for Test Set, Teletypewriter AN/GGM-(*) includes:

(1) Preventive maintenance (par. 56).
(2) Visual inspection (par. 57).
(3) Troubleshooting (pars. 58 through 62).
(4) Replacement of defective tubes (par. 63) as appropriate.
(5) Replacement of defective printed circuit assemblies (par. 64).
(6) Replacement of component equipments (digital distortion analyzer, power supply, time base generator, test pattern distortion generator, and data-scan scope), as appropriate (par. 65).

b. Except as noted, the tools and test equipment required for second echelon maintenance of the AN/GGM-(*) are listed below.

(1) Tool Equipment TE-123.
(2) Test Set, Electron Tube TV-7/U (not required for AN/GGM-5).
(3) Voltmeter TS-443/U.
(4) Multimeter TS-352/U (not required for AN/GGM-5).

56. Preventive Maintenance

a. Use of DA Form 11-266. In addition to the items specified in paragraph 84, items 12 .through 25 on DA Form 11-266 (figs. 36 and 37) constitute the preventive maintenance checklist to be used by the organizational maintenance repairman. Items not applicable to the equipment are lined out in the figures. References in the ITEM block in the figures are to paragraphs that contain additional maintenance information on the particular item. Instructions for the use of the form appear on the form.

Note.

Additional changes on DA Form 11-266, for specific equipment, are as follows:

Item 13: Delete CRYSTALS and PLUG-IN COILS for the AN/GGM-3 through AN/GGM-5.
Item 14: Delete Item 14 entirely for the AN/ GGM-1 and AN/GGM-3 through AN/ GGM-5.
Item 17: Delete Item 17 entirely for the AN/ GGM-3 through AN/GGM-5.
Item 24: Delete Item 24 entirely for the AN/ GGM-5.

b. Items. The information given in the chart below is supplementary to DA Form 11-266. The item number corresponds to the ITEM number on the form.

Item	Maintenance procedure
12	Inspect seating of all printed circuit assemblies.
15	Check the printed circuit assemblies of the digital distortion analyzer, time base generator and test pattern distortion generator for burns, chipping, cracked or broken conductors, and dirty contacts.
17a	Check the variable capacitors in the time base generator for dirt or moisture.
18	Check air filter on power supply front panel for dirt.

* Not applicable to the AN/GGM-4 and AN/GGM-5.

c. Additional Maintenance Information. In addition to the items specified on DA Form 11266, the items listed in the chart below should be checked.

Item	Time interval	Maintenance procedure
Power supply output voltages.	Monthly	Use the procedure paragraph 30a.
Test pattern distortion generator loop currents'.	Weekly and each time connections are changed.	Use the procedure in paragraph 30b.

Item	Time interval	Maintenance procedure
Relay bias adjustment.	Weekly and each time relay connections are changed (neutral to polar, etc).	Use the procedure in paragraph 30c.

* Not applicable to the AN/GGM-4 and AN/GGM-5.

57. Visual Inspection

Before proceeding to troubleshoot the equipment, inspect it thoroughly to detect obvious defects. The items listed below should be checked.

a. Seating and proper arrangement of all printed circuit assemblies (figs. 7, 12, and 15).

b. Seating of all pluck-out items (tubes, relays, etc.).

58. Digital Distortion Analyzer, Troubleshooting Procedure

When a trouble is suspected in the digital distortion analyzer, first check the unit by the visual inspection techniques described in paragraph 57. If these measures fail to locate the defect, apply the printed circuit substitution troubleshooting method described below to correct the defect.

a. Starting with printed circuit card assembly A1 (fig. 7), replace each printed circuit card assembly, in turn, with a new assembly (par. 64). If the new printed circuit card assembly does not correct the defect, remove the new assembly and replace the original. Repeat this procedure with each printed circuit card assembly until the defective assembly is located.

Note

the operational symptoms caused by the defective printed circuit card assembly on the repair tag and request higher echelon maintenance.

b. When applying the printed circuit substitution troubleshooting method, always replace the original assembly before removing the next one. Never remove more than one assembly at a time.

c. If, after replacing all of the printed circuit card assemblies, the trouble is still not corrected, replace the suspected digital distortion analyzer with one known to be in good operating condition. If the AN/GGM-(*) operates properly with the replacement digital distortion analyzer, note the symptoms on a repair tag, and forward the defective digital distortion analyzer to higher echelon maintenance for repair. If the AN/GGM-(*) does not operate properly with the replacement digital distortion analyzer, replace the original digital distortion analyzer and troubleshoot the shelf adapter interunit wiring by making continuity checks of the wires connected to jack 1J3. Use the shelf adapter interunit wiring diagram (fig. 46, 47, 48, 49, or 50) as appropriate as a guide when making the checks.

59. Test Pattern Distortion Generator, Troubleshooting Procedure

When a defect is suspected in the test pattern distortion generator, first check the unit by the visual inspection techniques described in paragraph 57. If these measures fail to locate the defect, apply the assembly substitution troubleshooting method described below to correct the defect.

a. Starting with printed circuit card assembly A1 (fig. 15), replace each printed circuit card assembly in turn, with a new assembly (par. 64). If the new printed circuit card assembly does not correct the defect, remove the new assembly and replace the original. Do not remove more than one assembly at a time. Repeat this procedure with each printed circuit card assembly until the defective one is located.

Note

the operational symptoms caused by the defective printed circuit card assembly on the repair tag and request higher echelon maintenance.

b. If the test pattern distortion generator operates correctly with the mechanical relay output, but the electronic relay output is defective, replace electronic relay assembly A1A3 (fig. 15). Request higher echelon maintenance for defective electronic relay assembly A1A3.

c. If, after replacing all of the printed circuit card assemblies, the trouble is still not corrected, replace the suspected test pattern distortion generator with one known to be in good operating condition. If the AN/GGM-(*) operates properly with the replacement test pattern distortion generator, note the symptoms on a repair tag and forward the defective test pattern distortion generator to higher echelon maintenance for repair.

If the AN/GGM-(*) does not operate properly with the replacement test pattern distortion generator, replace the original test pattern distortion generator and troubleshoot the shelf adapter interunit wiring by making continuity checks of the wires connected to jack 2J1. Use the shelf adapter interunit wiring diagram (fig. 46, 47, or 48 as appropriate) as a guide when making the checks.

60. Power Supply, Troubleshooting Procedure

a. When the component units of the AN/GGM-(*) fail to operate, which indicates a defective power supply, carefully inspect the unit; check for blown fuses and incorrect seating in the shelf adapter. If the defect cannot be located by this method, request higher echelon maintenance.

b. If the fault appears to be the distribution of the power supply input and output voltages, check the distribution wiring on the shelf adapters for continuity to power supply jack (1J2) and the other component equipments the AN/GGM-(*). Use the shelf adapter interunit wiring diagram (fig. 46, 47, 48, 49, or 50, as appropriate) as a guide when making the checks.

61. Time Base Generator, Troubleshooting Checklist

The chart below is provided as an aid in localizing troubles in the time base generator to a printed circuit card oscillator assembly. If replacing the indicated assembly does not restore normal equipment operation, request higher echelon maintenance. Note on the repair tag what corrective action was taken; then remove the defective time base generator from the AN/'GGM-(*) (par. 65) and replace it with one known to be in operating condition.

a. General. Before using the troubleshooting chart, examine the repair tag to determine whether the trouble has been sectionalized. If there has been no sectionalization, perform the procedures outlined in the appropriate equipment performance checklist (par. 53).

b. Troubleshooting Chart. When performing the checks outlined below, refer to figure 12.

Symptom	Probable trouble	Corrective measures
AN/GGM-(*) operation is defective used with timing signals from variable frequency oscillator (VAR).	Defective variable frequency oscillator assembly.	Replace variable frequency when oscillator assembly.
AN/GGM-(*) operation is defective when operated at 37.5 bauds.	Defective 37.5-baud oscillator assembly.	Replace 37.5-baud oscillator assembly.
AN/GGM-(*) operation is defective when operated at 45.5 bauds.	Defective 45.5-baud oscillator assembly.	Replace 45.5-baud oscillator assembly.
AN/GGM-(*) operation is defective when operated at 61.1 bauds.	Defective 61.1-baud oscillator assembly.	Replace 61.1-baud oscillator assembly.
AN/GGM-(*) operation is defective when operated at 74.2 bauds.	Defective 74.2-baud oscillator assembly.	Replace 74.2-baud oscillator assembly.
AN/GGM-(*) operation is defective when operated at 112.5 bauds.	Defective 112.5-bauds oscillator assembly.	Replace 112.5-baud oscillator assembly.
AN/GGM-(*) operation is defective when operated at 150 bauds.	Defective 150-baud oscillator assembly.	Replace 150-baud oscillator assembly.
Faulty distribution of timing signals to AN/GGM-(*) component equipments. 48 as appropriate, as guide when making the checks.	Defective interunit wiring.	Make continuity checks of interunit wiring to the time base generator jack (2J2). Use figure 46, 47, or
Time base generator oscillator alarm functions incorrectly.	Defective alarm assembly.	Replace oscillator alarm assembly.

62. Data-Scan Scope, Troubleshooting Chart

The chart below is provided as an aid in localizing troubles in the data-scan scope. Only those corrective measures that the second echelon maintenance man can perform are given. If the suggested corrective measure does not restore normal equipment operation, request higher echelon maintenance. Note on the repair tag what corrective actions were taken; then remove the defective data-scan scope from the AN/GGM-(*) and replace it with one known to be in good operating condition.

a. General. Before using the troubleshooting chart, examine the repair tag to determine whether the trouble has been sectionalized. If there has been no sectionalization, perform the procedure outlined in the appropriate equipment performance checklist (par. 53).

b. Troubleshooting Chart. When performing the checks outlined below, refer to figure 38.

Symptom	Probable trouble	Corrective measures
Insufficient or no vertical deflection.	Defective vertical cathode follower.	Check tube V5. Replace if defective.
	Defective vertical deflection amplifier.	Check tube V5. Replace if defective.
	Defective interunit wiring.	Check shelf adapter wiring (fig. 46, 47, 48, or 49, as appropriate) for continuity to jack 1J1.
No horizontal deflection in AUTO sweep mode. Operation normal in other sweep modes.	Defective horizontal cathode follower.	Check tube V5. Replace if defective.
	Defective interunit wiring.	Check shelf adapter wiring (fig. 46, 47, 48, or 49, as appropriate) for continuity to jack 1J1.
No horizontal deflection in TRIGGERED and FREE sweep modes. Operation normal in AUTO mode.	Defective retrace trigger tube.	Check tube V1. Replace if defective.
	Defective sweep reset trigger tube.	Check tube V3. Replace if defective.
	Defective sweep cathode follower.	Check tube V8 Replace if defective.
	Defective sweep discharge tube.	Check tube V9. Replace if defective.
	Defective sweep charge gate.	Check tube VS. Replace if defective.
	Defective interunit wiring.	Check shelf adapter wiring (fig. 46, 47, 48, or 49 as appropriate) for continuity to jack 1J1.
No horizontal deflection in any sweep mode.	Defective horizontal sweep amplifier.	Check tube V10. Replace if defective.
	Defective horizontal deflection amplifier.	Check tube V1. Replace if defective.
No character blanking in AUTO and MAN modes.	Defective blanking delay tube.	Check tube V2. Replace if defective.
	Defective interunit wiring.	Check shelf adapter wiring (fig. 46, 47, 48, 49, as appropriate) for continuity to jack 1J1.
No horizontal deflection in TRIGGERED sweep mode. Retrace blanking defective in AUTO sweep mode.	Defective sync gate.	Check tube V1. Replace if defective.
	Defective sweep gate generator.	Check tube V4. Replace if defective.
	Defective interunit wiring.	Check shelf adapter interunit wiring (fig. 46, 47, 48, or 49, as appropriate) for continuity to jack 1J1.
No retrace blanking in any sweep mode.	Defective retrace blanking gate.	Check tube V7. Replace if defective.
No intensity modulation of data-scan scope display.	Defective intensity gate.	Check tube V7. Replace if defective.

Symptom	Probable trouble	Corrective measures
	Defective interunit wiring.	Check shelf adapter interunit wiring (fig. 46, 47, 48, or 49, as appropriate) for continuity to jack 1J1.
No vertical or horizontal deflection. Data-scan scope screen is blank.	Defective high voltage rectifier.	Check tube V15. Replace if defective.
	Defective voltage regulator.	Check tube V14. Replace if defective.
	Defective cathode ray tube.	Request higher echelon maintenance.
Data-scan scope display cannot be positioned properly.	Defective regulator tube.	Check tubes V16, V17, V18, and V19. Replace if defective.

63. Tube Testing and Replacement

When a trouble occurs in the data-scan scope and tube failure is suspected, use the applicable procedure below to check the tubes.

Caution:

Do not rock or rotate a tube when removing it from its socket; pull it straight out with a tube puller.

a. Use of Tube Tester. Remove and test one tube at a time. Discard a tube if its defect is obvious or if the TV-7/U shows it to be defective. Do not discard a tube that tests at or near its minimum test limit on the tube tester. Put back the original tube, or insert a new tube if required, before testing the next one.

b. Tube Substitution Method. Replace a suspected tube with a new one. If the equipment still does not work, remove the new tube and put back the original one. Repeat this procedure with each suspected tube until the defective tube is located.

64. Removal and Replacement of Printed Circuit Card Assemblies

Use the following procedures to remove and replace the printed circuit card assemblies, when the printed circuit card assembly substitution troubleshooting method is applied to the digital distortion analyzer (par. 58) and test pattern distortion generator (par. 59), or when the printed circuit card oscillator assemblies are to be replaced (par. 61) in the time base generator:

a. Removal. To remove the printed circuit card assemblies, first loosen the quarter-turn lock screws which secure the retaining straps across the card; then remove the straps. Carefully lift upward on the appropriate card lever handle at the top of the card. When the card connector is free, the card may be withdrawn from the chassis.

b. Replacement. Make sure that identical printed circuit assemblies are used as replacements. Forcing an incorrect assembly into the equipment will damage the assemblies, cause faulty operation, and may severely damage the equipment. Carefully align the card with the guide slots in the chassis and press the card firmly into the connector. Replace the retainer straps and secure them by tightening the lock screws on the straps.

65. Removal and Replacement of Component Equipments

a. Removal. To remove the component equipments from the AN/GGM-(*), proceed as follows:

(1) Operate the power supply POWER switch to the off (downward) position.

(2) Loosen the chassis securing knob at the bottom center of the front panel of the component equipment to be removed.

(3) Grasping the chassis securing knob, pull firmly outward until the chassis is free from the shelf adapter plug.

(4) Holding the equipment chassis by the front and side panels, carefully withdraw it from the AN/GGM-(*).

b. Replacement. To replace the component equipments in the AN/GGM-(*), proceed as follows:

(1) Support the component equipment on a level with the applicable opening in the shelf adapter and insert the chassis into the opening. Press firmly on the front panel to insure a good electrical connection.

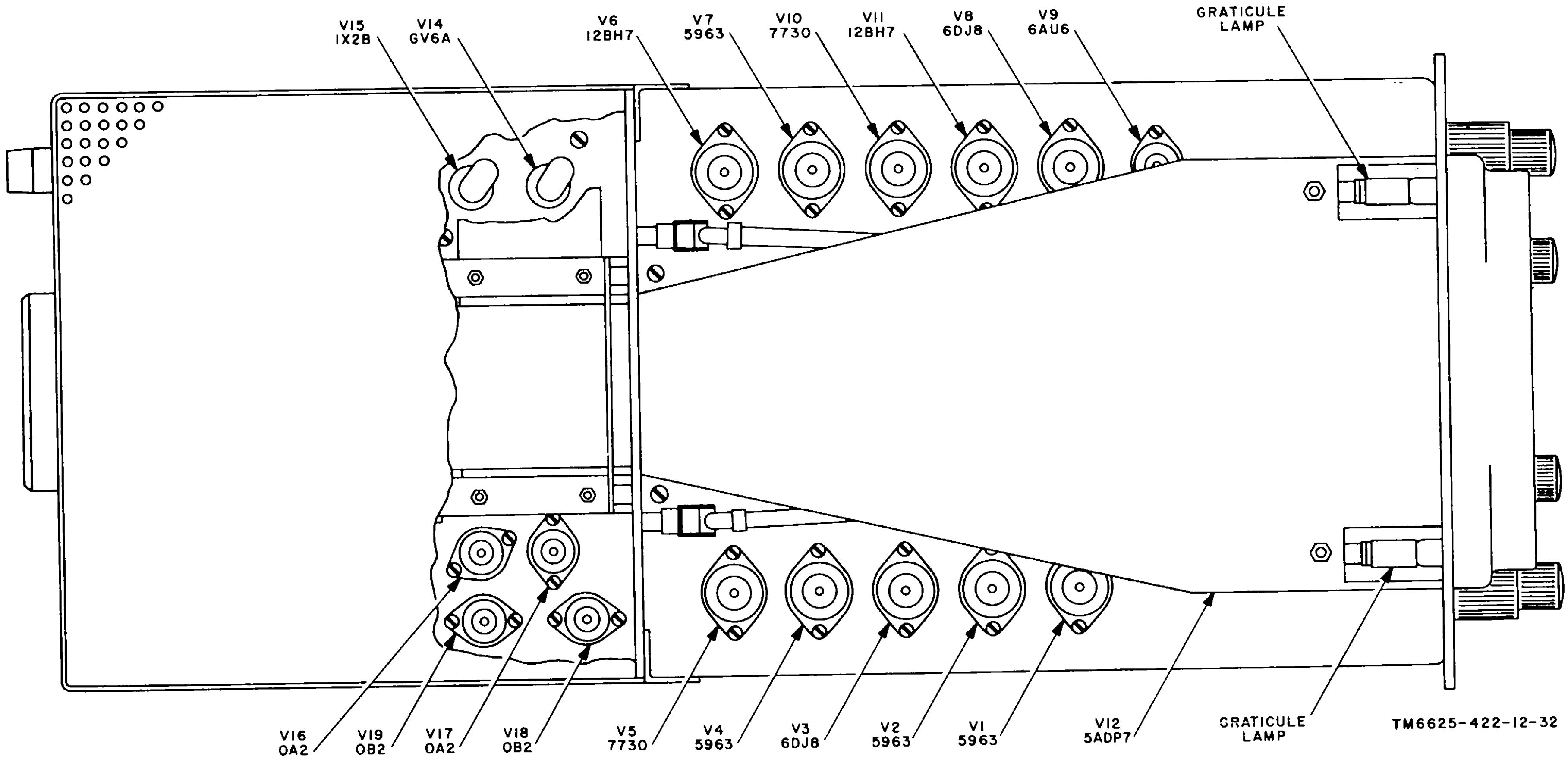


Figure 38. Data-scan scope, tube locations

(2) Tighten the chassis securing knob at the bottom center of the unit front panel to secure the equipment in place.

(3) Operate the power supply POWER switch to ON.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION

TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

66. Disassembly

a. Disconnect and remove all leads connected to the AN/GGM-(*) rear panel terminals from external equipment, telegraph lines, loop batteries, and the power source.

b. If used, disconnect the time base generator coaxial cables from the coaxial connectors on the AN/GGM-(*).

c. If used, remove the leads and plugs connected to the AN/GGM-(*) front panel jacks.

Note. When an AN/GGM-1, AN/GGM-2, or AN/ GGM-3 is to be shipped to another site, test pattern distortion generator printed circuit assembly A17 (fig. 21) must be forwarded to higher echelon maintenance for replacement of call letter programming resistors.

67. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the AN/GGM-(*) is to be shipped or stored. Adapt the procedures outlined below whenever possible. The information concerning the original packaging (ch. 2) will also be helpful.

a. Material Requirements. The following materials are required for packaging an AN/ GGM-(*). For stock numbers of materials, consult SB 38-100.

Material	AN/GGM-1	AN/GGM-2	AN/GGM-3	AN/GGM-4	AN/GGM-5
Waterproof paper	40 sq ft	80 sq ft	40 sq ft	30 sq ft	30 sq ft
Waterproof tape	40 ft	75 ft	40 ft	30 ft	30 ft
Corrugated cardboard	30 sq ft	60 sq ft	30 sq ft	20 sq ft	20 sq ft
Corrugated cardboard carton	1 each	2 each	1 each	1 each	1 each
Filler material	20 lb	25 lb	20 lb	15 lb	15 lb

b. Repacking. Package the AN/GGM-(*) as outlined below. Refer to figure 19.

(1) Make corrugated cardboard corner supports. Place the supports at each corner of the shelf adapter housing or cart.

(2) Place the AN/GGM-(*) or equipment cart in the corrugated cardboard carton.

(3) Wrap the spare parts in waterproof paper with applicable filler material for cushioning and seal with waterproof tape. Place the package on top of the AN/GGM-(*) in the corrugated cardboard carton.

(4) Place a sheet of corrugated cardboard over the spare parts package and close and seal the carton with waterproof tape.

(5) Wrap the sealed corrugated cardboard carton in waterproof paper and seal with waterproof tape.

(6) Pack the wrapped carton in a wooden box and nail the cover securely to the box.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

68. Authority for Demolition

Demolition of the AN/GGM-(*) will be accomplished only upon the order of the commander. The destruction procedure outlined in paragraph 69 will be used to prevent enemy use of the equipment.

69. Methods of Destruction

Use any of the following methods to destroy the AN/GGM-(*):

a. Smash. Smash the chassis, shelf adapters, equipment housing, equipment cart, subassemblies, controls, meter, and interior parts; use sledges, axes, handaxes, hammers and crowbars.

b. Cut. Cut the cables and wiring; use axes, handaxes, or machetes.

c. Burn. Burn the technical manuals and other combustible items; use gasoline, kerosene, oil, flamethrower, or incendiary grenades.

Warning:

Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent

d. Explode. If explosives are necessary, use firearms, grenades, or TNT.

e. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

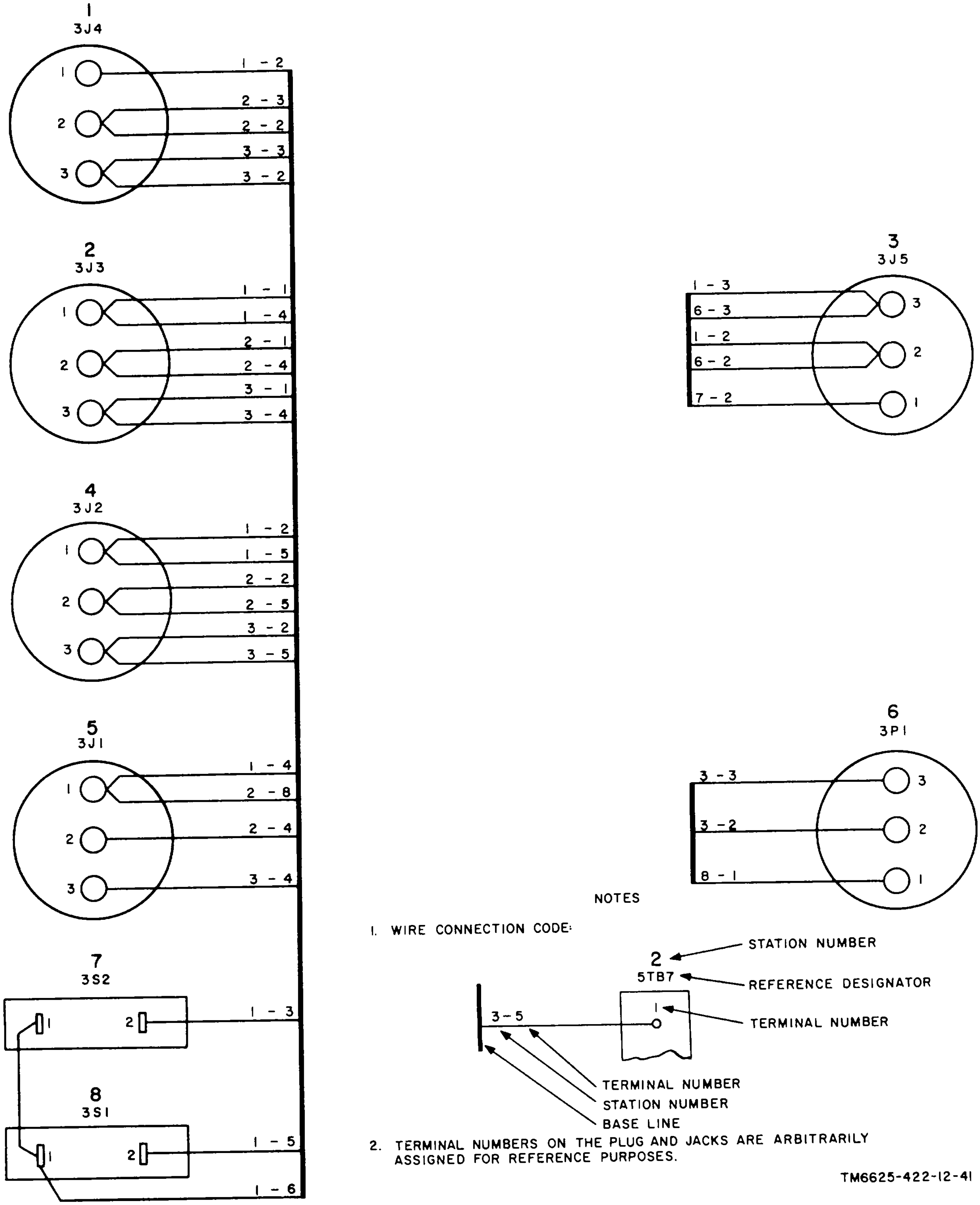
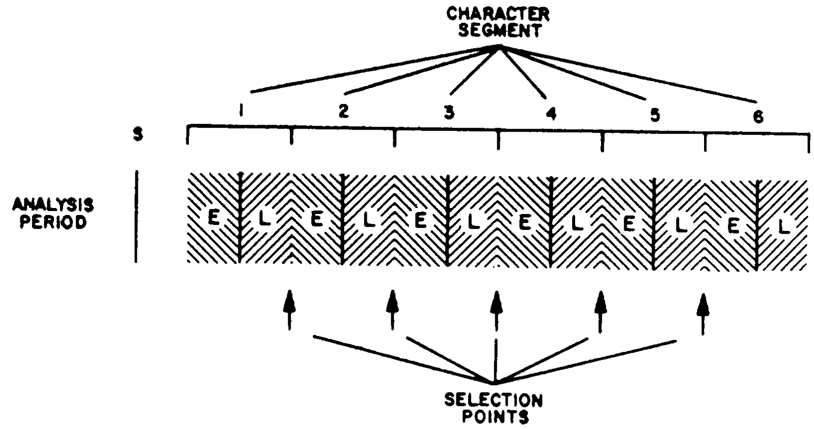


Figure 39. Equipment cart wiring diagram.

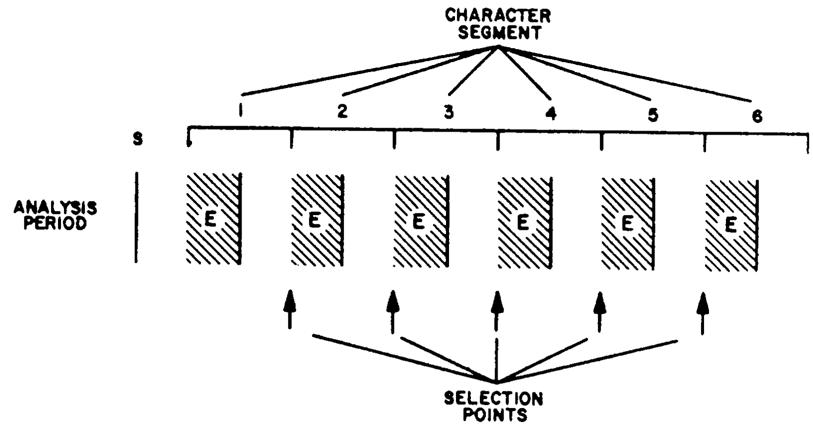
STEP	SWITCH POSITIONS		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	ALL	ANY
2	AVG	ALL	MARK/SPACE
3	AVG (NOTE)	ALL	SPACE/MARK

NOTE
WITH SWITCH POSITIONS FOR STEP 3, IF EARLY LAMP LIGHTS, MARKING BIAS IS INDICATED AND IF LATE LAMP LIGHTS, SPACING BIAS IS INDICATED.



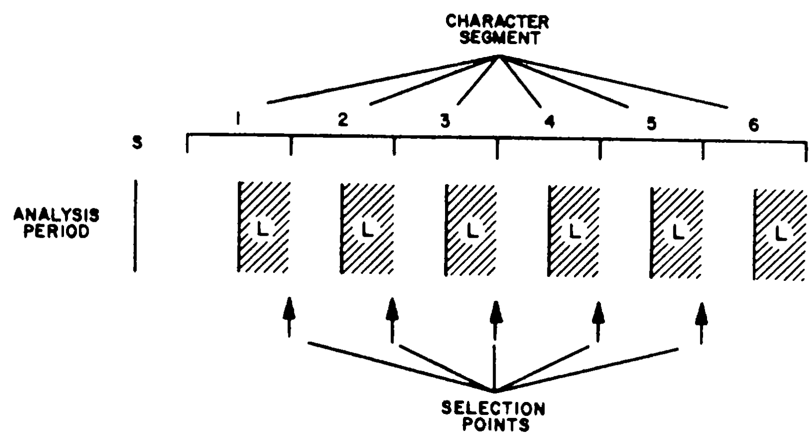
A. TOTAL PEAK AND AVERAGE DISTORTION MEASUREMENT

STEP	SWITCH POSITIONS		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	ALL	SPACE/MARK
2	EARLY PEAK	ALL	MARK/SPACE



B. EARLY PEAK DISTORTION MEASUREMENT

STEP	SWITCH POSITIONS		
	DISTORTION SELECT	TRANSITION SELECT	
1	LATE PEAK	ALL	SPACE/MARK
2	LATE PEAK	ALL	MARK/SPACE



C. LATE PEAK DISTORTION MEASUREMENT

TM6625-422-12-44

Figure 40. Analysis periods for measurement of all character segments.

Figure 41. Analysis periods for total peak and average measurement of selected character segments.
(Located in back of manual)

Figure 42. Analysis periods for early peak measurement of selected character segments.
(Located in back of manual)

Figure 43. Analysis periods for late peak measurement of selected character segments.
(Located in back of manual)

Figure 44. Test Sets, Teletypewriter AN/GGM-1 and AN/GGM-3, test pattern distortion generator output circuit configuration.
(Located in back of manual)

Figure 45. Test Set, Teletypewriter AN/GGM-2, test pattern distortion generator output circuit configuration.
(Located in back of manual)

Figure 46. Shelf adapters 1A and 2A interunit wiring diagram.
(Located in back of manual)

Figure 47. Equipment housing interunit wiring diagram.
(Located in back of manual)

Figure 48. Shelf adapters 1A and 2A interunit wiring diagram.
(Located in back of manual)

Figure 49. Shelf adapter 1A interunit wiring diagram.
(Located in back of manual)

Figure 50. Shelf adapter 1B interunit wiring diagram.
(Located in back of manual)

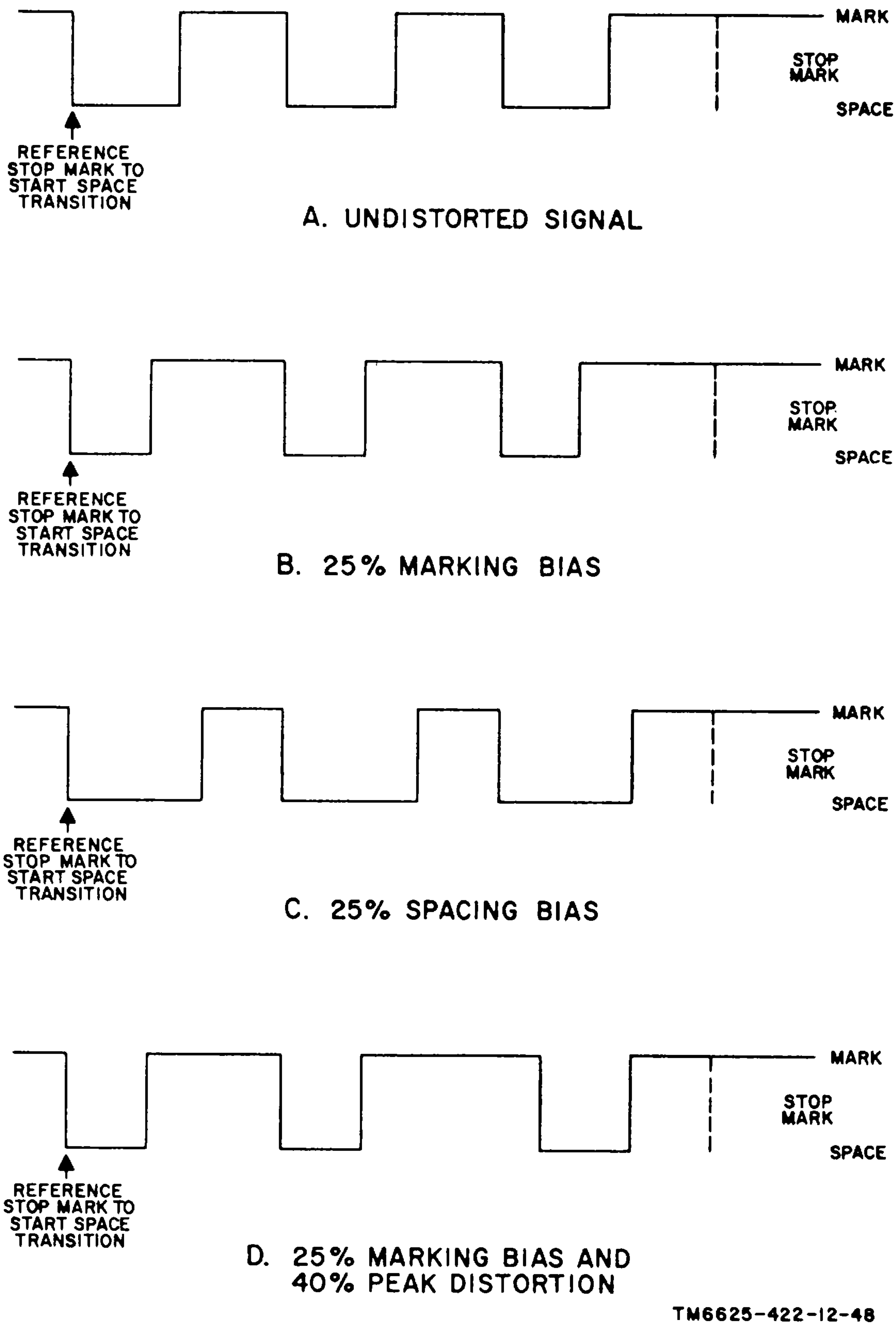


Figure 51. Data/telegraph signals with various bias distortion conditions.

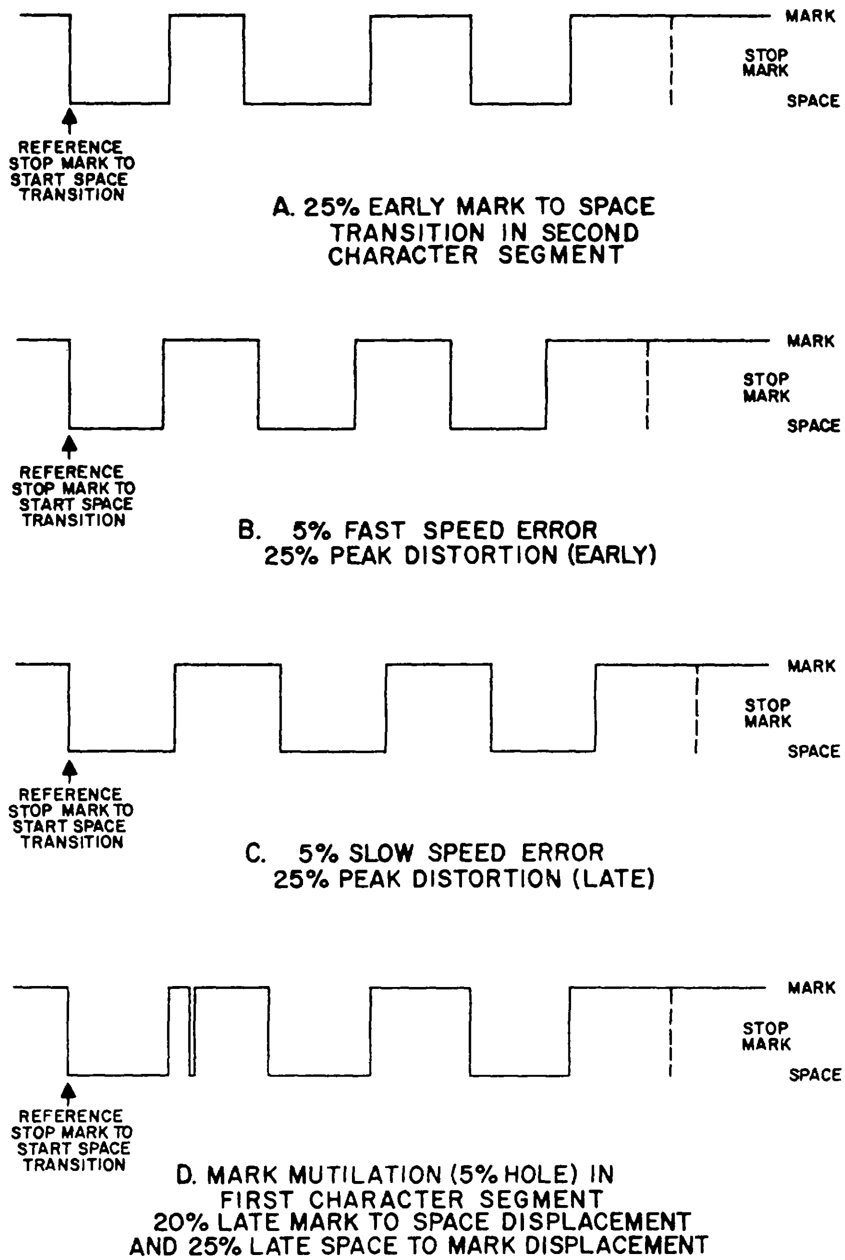


Figure 52. Data/telegraph signals with various speed error and distortion conditions.

APPENDIX

REFERENCES

Following is a list of references applicable and available to the operator of Test Set, Teletypewriter AN/GGM-1, AN,/GGM-2, AN/GGM-3, AN/GGM-4, and AN/GGM-5. In addition to the references listed below, Instruction Data on the Use of Weston Class 50 Model, 1 Voltmeter, Voltmeter TS-44,,/U, is available.

SB 38100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army
SM 11-45180-S07	Stock List of Components of Sets, Kits, and Outfits for Tool Equipment TE-123
TB SIG 225	Radioactive Electron Tube Handling
TM 11-655	Fundamentals of Telegraphy (Teletypewriter)
TM 11-5527	Multimeters TS-352/U, TS352A/U, and TS-352B/U
TM 11-6625-274-12	Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U

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USATC Engr (2)
USATC FA (2)
USATC Inf (2)
USAOMC (3)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (2) except
Atlanta GENDEP (None)
Sig Sec, GENDEP (5)
Sig Dep (12)
WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
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AFIP (1)
AMS (1)
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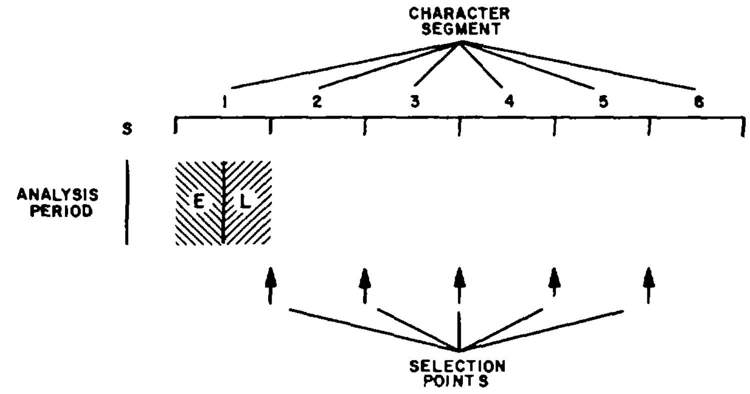
Yuma Test Sta (2)
USACA (3)
USASSA (20)
USASSAMRO (1)
USASEA (1)
USA Caribbean Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
JBUSMC (2)
AFSSC (1)
Units org under fol TOE:
(2 each UNOINDC)
11-7
11-16
11-57
11-97
11-117
11-155
11-500 AA-AE (4)
11-557
11-587
11-592
11-597

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

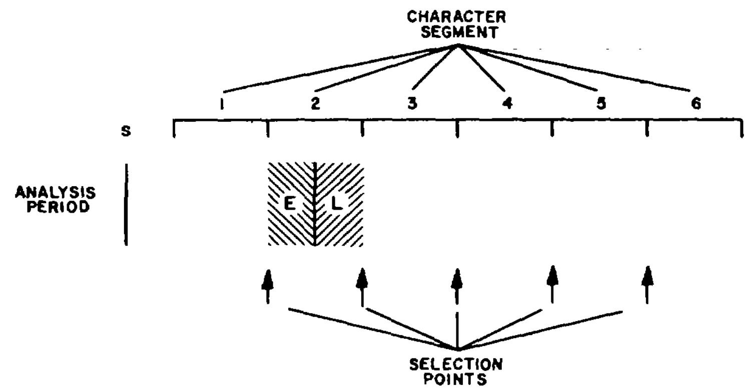
☆ U.S. Government Printing Office: 1987 0-181-421 (61087)

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	1	ANY
2	AVG	1	SPACE/MARK
3	AVG	1	MARK/SPACE



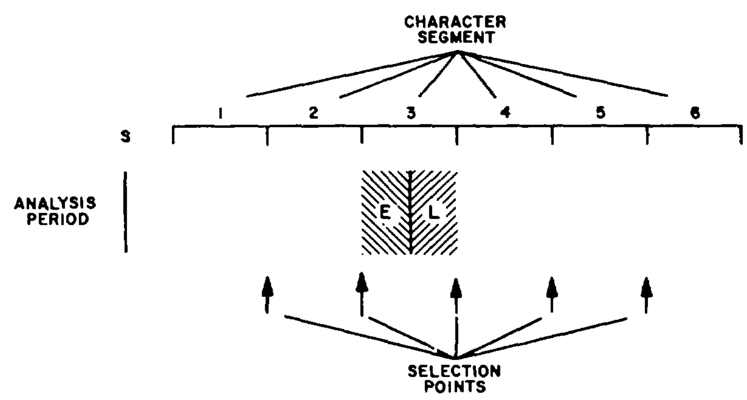
A. ANALYSIS OF FIRST CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	2	ANY
2	AVG	2	SPACE/MARK
3	AVG	2	MARK/SPACE



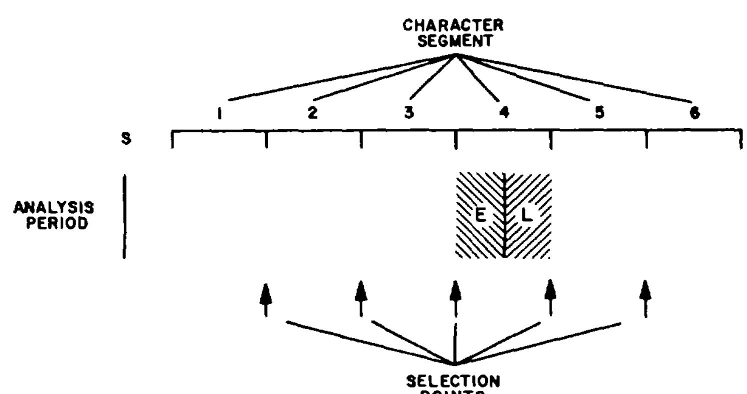
B. ANALYSIS OF SECOND CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	3	ANY
2	AVG	3	SPACE/MARK
3	AVG	3	MARK/SPACE



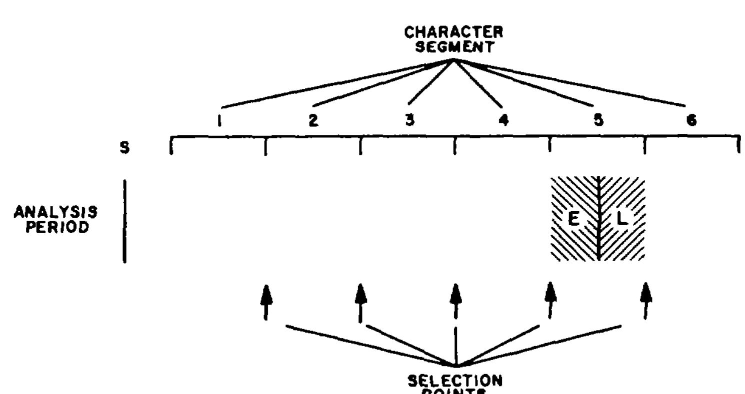
C. ANALYSIS OF THIRD CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	4	ANY
2	AVG	4	SPACE/MARK
3	AVG	4	MARK/SPACE



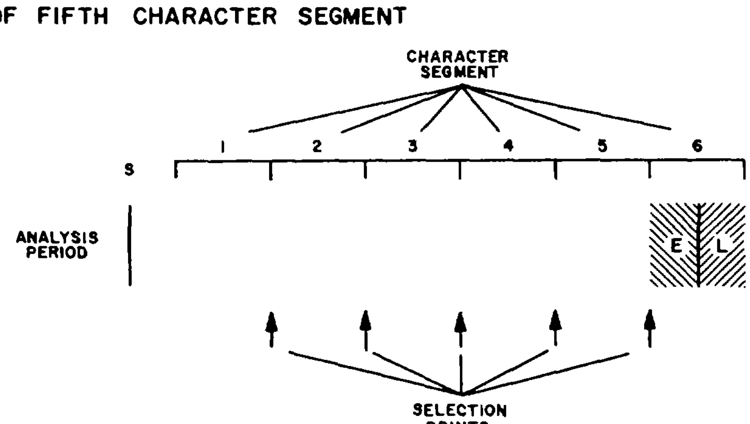
D. ANALYSIS OF FOURTH CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	5	ANY
2	AVG	5	SPACE/MARK
3	AVG	5	MARK/SPACE



E. ANALYSIS OF FIFTH CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	TOTAL PEAK	6	ANY
2	AVG	6	SPACE/MARK
3	AVG	6	MARK/SPACE

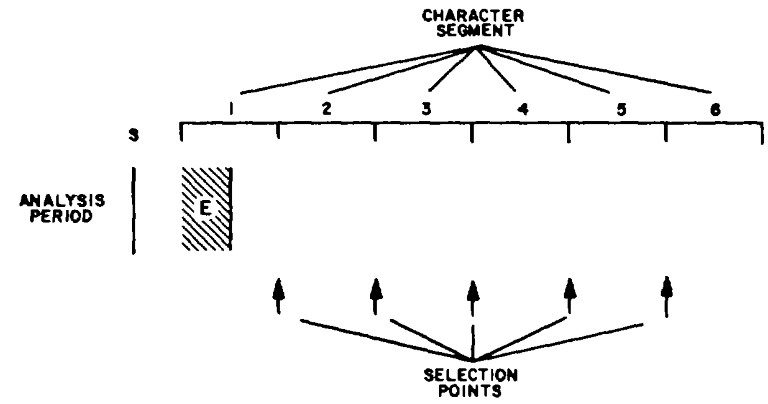


F. ANALYSIS OF SIXTH CHARACTER SEGMENT

Figure 41. Analysis periods for total peak and average measurement of selected character segments.

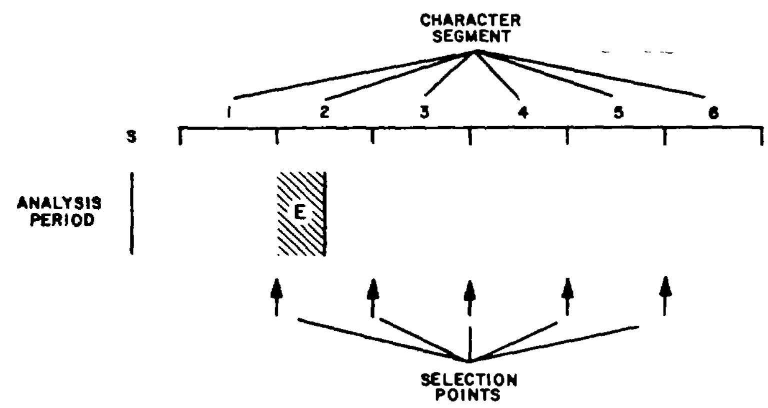
Figure 41.

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	1	SPACE/MARK
2	EARLY PEAK	1	MARK/SPACE



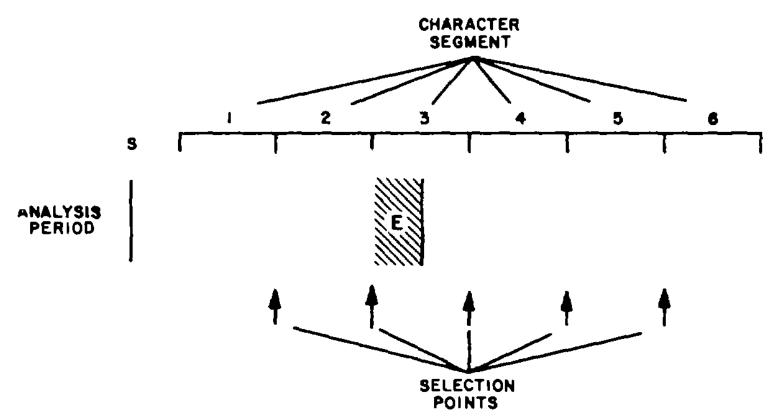
A. ANALYSIS OF FIRST CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	2	SPACE/MARK
2	EARLY PEAK	2	MARK/SPACE



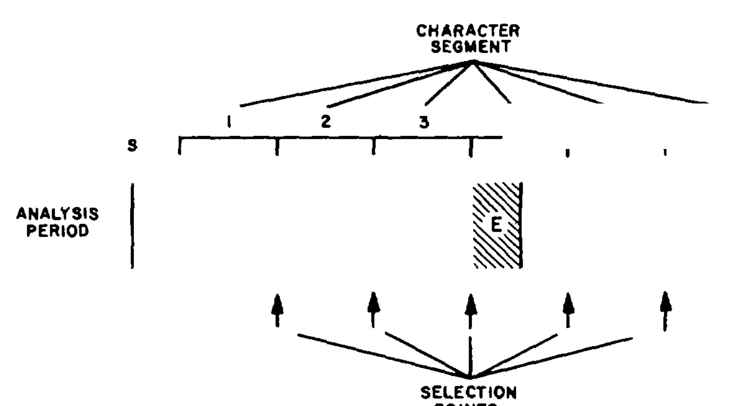
B. ANALYSIS OF SECOND CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	3	SPACE/MARK
2	EARLY PEAK	3	MARK/SPACE



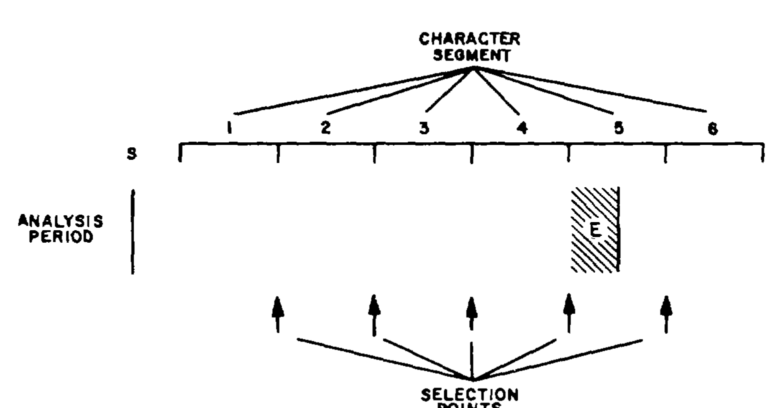
C. ANALYSIS OF THIRD CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	4	SPACE/MARK
2	EARLY PEAK	4	MARK/SPACE



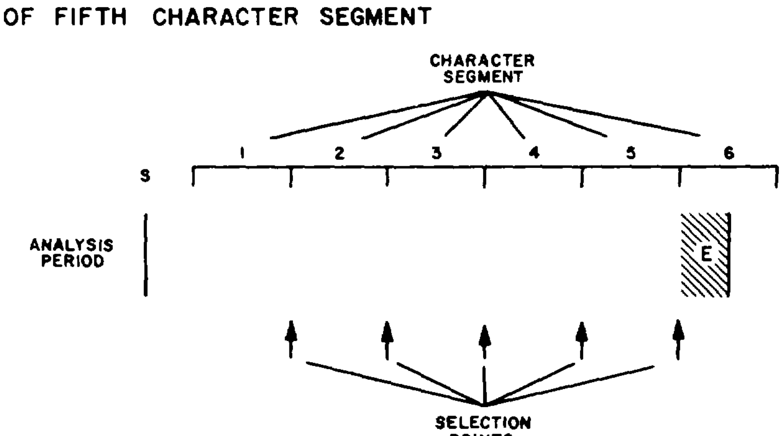
D. ANALYSIS OF FOURTH CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	5	SPACE/MARK
2	EARLY PEAK	5	MARK/SPACE



E. ANALYSIS OF FIFTH CHARACTER SEGMENT

STEP	SWITCH POSITION		
	DISTORTION SELECT	TRANSITION SELECT	
1	EARLY PEAK	6	SPACE/MARK
2	EARLY PEAK	6	MARK/SPACE



F. ANALYSIS OF SIXTH CHARACTER SEGMENT

Figure 42. Analysis periods for early peak measurement of selected character s...

Figure 42.

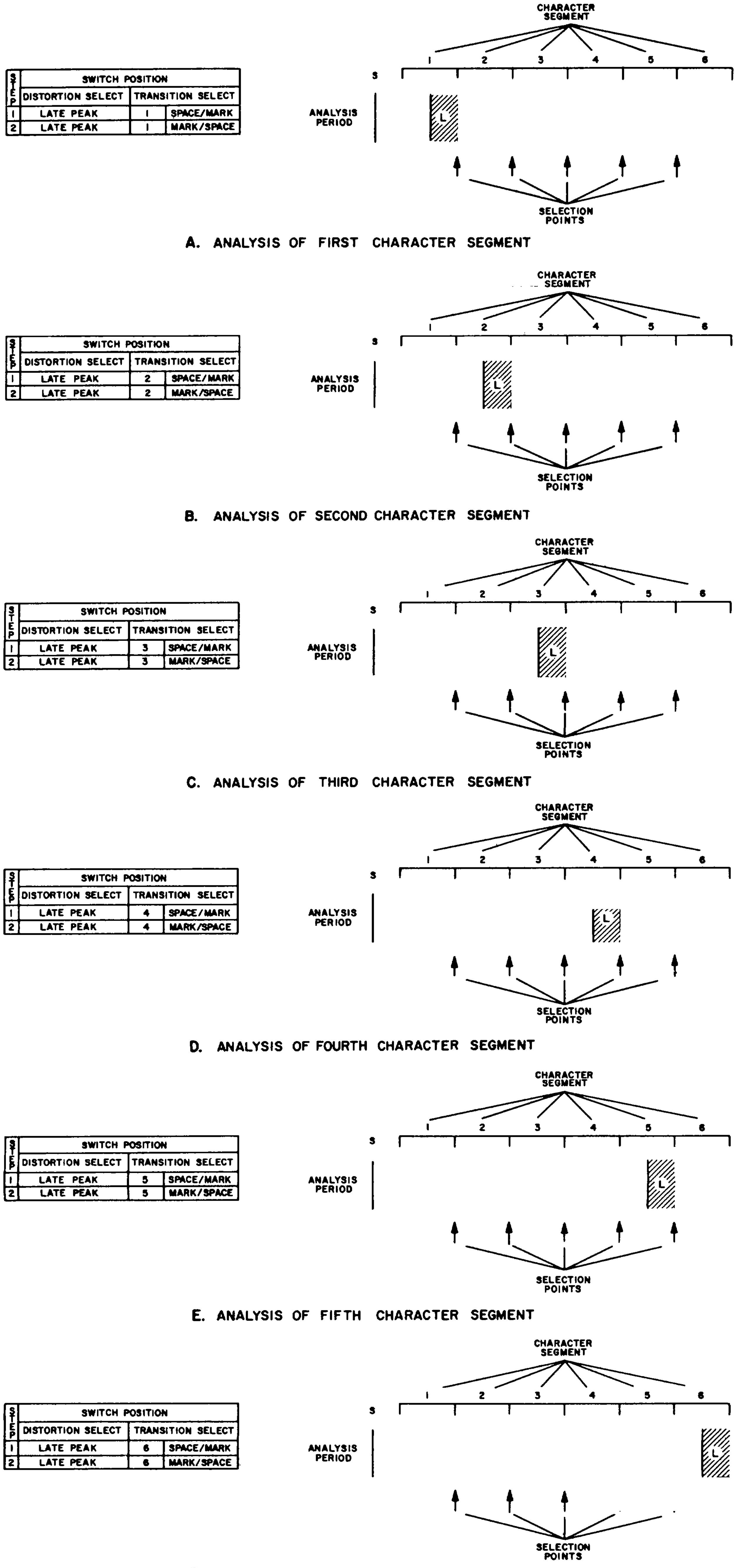


Figure 43. Analysis periods for late peak measurement of selected character segments.

Figure 43.

NOTES:

1. THE LOOP BATTERIES CONNECTED TO THE ELECTRONIC RELAY LOOP MUST NOT EXCEED 60 VOLTS FOR POLAR OPERATION OR 130 VOLTS FOR NEUTRAL OPERATION. IF THESE VOLTAGE LIMITS ARE NOT OBSERVED, THE KEYING TRANSISTORS WILL BE PERMANENTLY DAMAGED.
2. WHEN A PLUG IS INSERTED INTO THE SIGNAL OUTPUT JACK, CONTACTS 2-3 AND 4-5 OPEN THE SIGNAL PATH TO THE MECH LOOP OUT OR ELECT LOOP OUT TERMINALS (ACCORDING TO THE POSITION OF THE JACK SIGNAL SELECTOR SWITCH).
3. WHEN THE JACK SIGNAL SELECTOR SWITCH IS OPERATED TO ELECT (MECH OFF), THE MECH RELAY DRIVER CIRCUIT IS INHIBITED BY THE APPLICATION OF -15 VOLTS FROM SECTION B OF SWITCH S9.
4. A JUMPER MUST BE CONNECTED ACROSS THE RELAY DRIVE A AND B TERMINAL FOR OPERATION OF THE MECHANICAL RELAY.
5. THE FOLLOWING CHART LISTS THE CONTACT CONNECTIONS WHICH ARE MADE AS THE JACK SIGNAL SELECTOR SWITCH IS OPERATED TO EACH POSITION.

SWITCH SECTION	SWITCH POSITION		
	MECH	ELECT	ELECT (MECH OFF)
B FRONT	3-1	3-1	3-2
B REAR	1-2, 3-4, 5-6	1-6, 2-3, 4-5	1-6, 2-3, 4-5
A REAR	1-2, 3-4, 5-6	1-6, 2-3, 4-5	1-6, 2-3, 4-5

6. [ ] INDICATES EQUIPMENT MARKINGS.

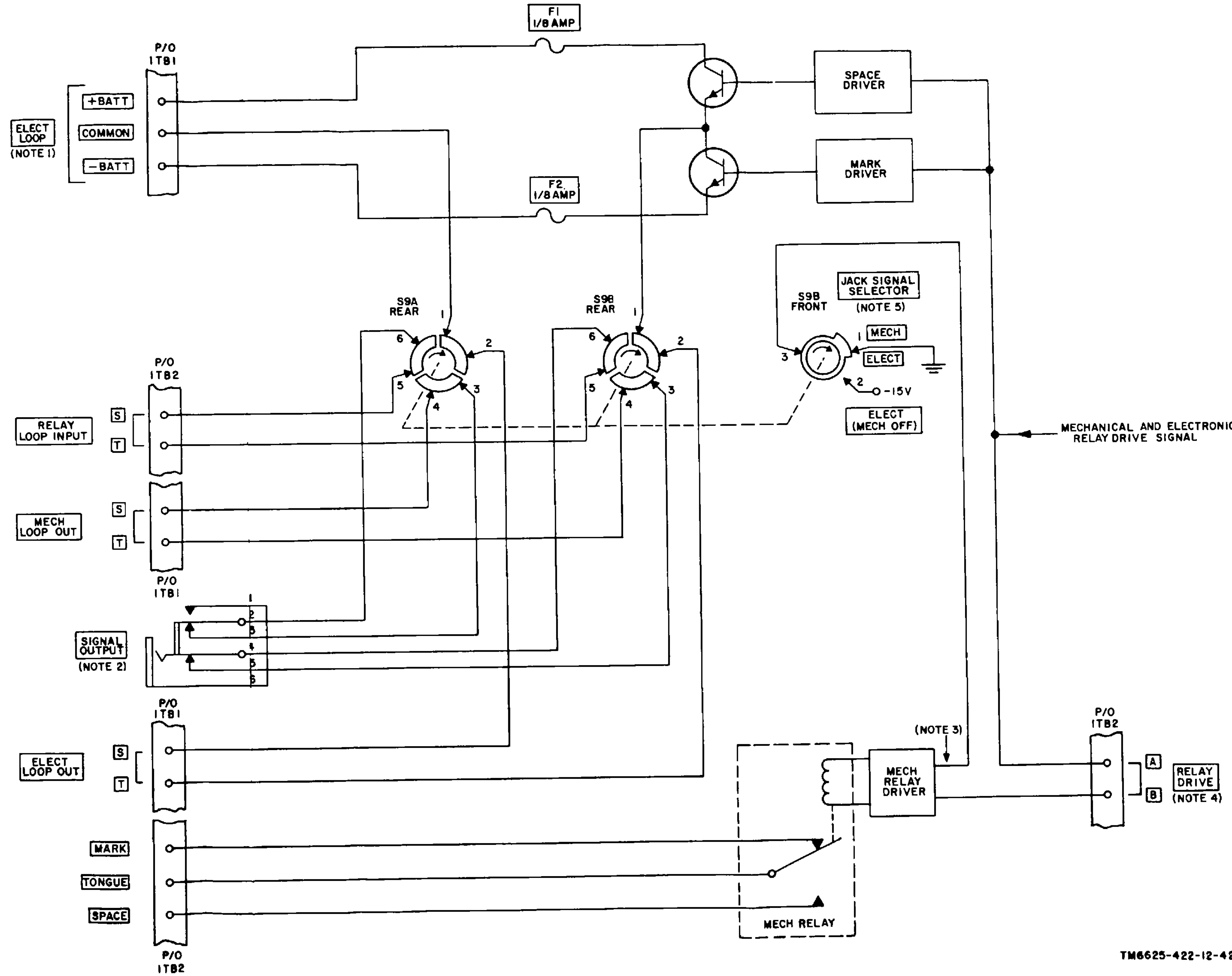


Figure 44. Test Sets, Teletypewriter AN/GGM-1 and AN/GGM-3, test pattern distortion generator output circuit configuration.

Figure 44.

NOTES:

1. THE LOOP BATTERIES CONNECTED TO THE ELECTRONIC RELAY LOOP MUST NOT EXCEED 60 VOLTS FOR POLAR OPERATION OR 130 VOLTS FOR NEUTRIL OPERATION. IF THESE VOLTAGE LIMITS ARE NOT OBSERVED, THE KEYING TRANSISTORS WILL BE PERMANENTLY DAMAGED.
2. WHEN A PLUG IS INSERTED INTO THE SIGNAL OUTPUT JACK, CONTACTS 2-3 AND 4-5 OPEN THE SIGNAL PATH TO THE MECH LOOP OUT OR ELECT LOOP OUT TERMINALS (ACCORDING TO THE POSITION OF THE JACK SIGNAL SELECTOR SWITCH).
3. WHEN THE JACK SIGNAL SELECTOR SWITCH IS OPERATED TO ELECT (MECH OFF), THE MECH RELAY DRIVER CIRCUIT IS INHIBITED BY THE APPLICATION OF -15 VOLTS FROM SECTION B OF SWITCH S9.
4. THE FOLLOWING CHART LISTS THE CONTACT CONNECTIONS WHICH ARE MADE AS THE JACK SIGNAL SELECTOR SWITCH IS OPERATED TO EACH POSITION.

SWITCH SECTION	SWITCH POSITION		
	MECH	ELECT	ELECT (MECH OFF)
B FRONT	3-1	3-1	3-1
B REAR	1-2,3-4,5-6	1-6,2-3,4-5	1-6,2-3,4-5
A REAR	1-2,3-4,5-6	1-6,2-3,4-5	1-6,2-3,4-5

5. ▭ INDICATES EQUIPMENT MARKINGS.
6. RELAY LOOP INPUT TERMINALS.
7. MECH LOOP OUT TERMINALS.
8. ELECT LOOP OUT TERMINALS.
9. A JUMPER MUST BE CONNECTED ACROSS THE RELAY DRIVE A AND B TERMINALS FOR OPERATION OF THE MECHANICAL RELAY.

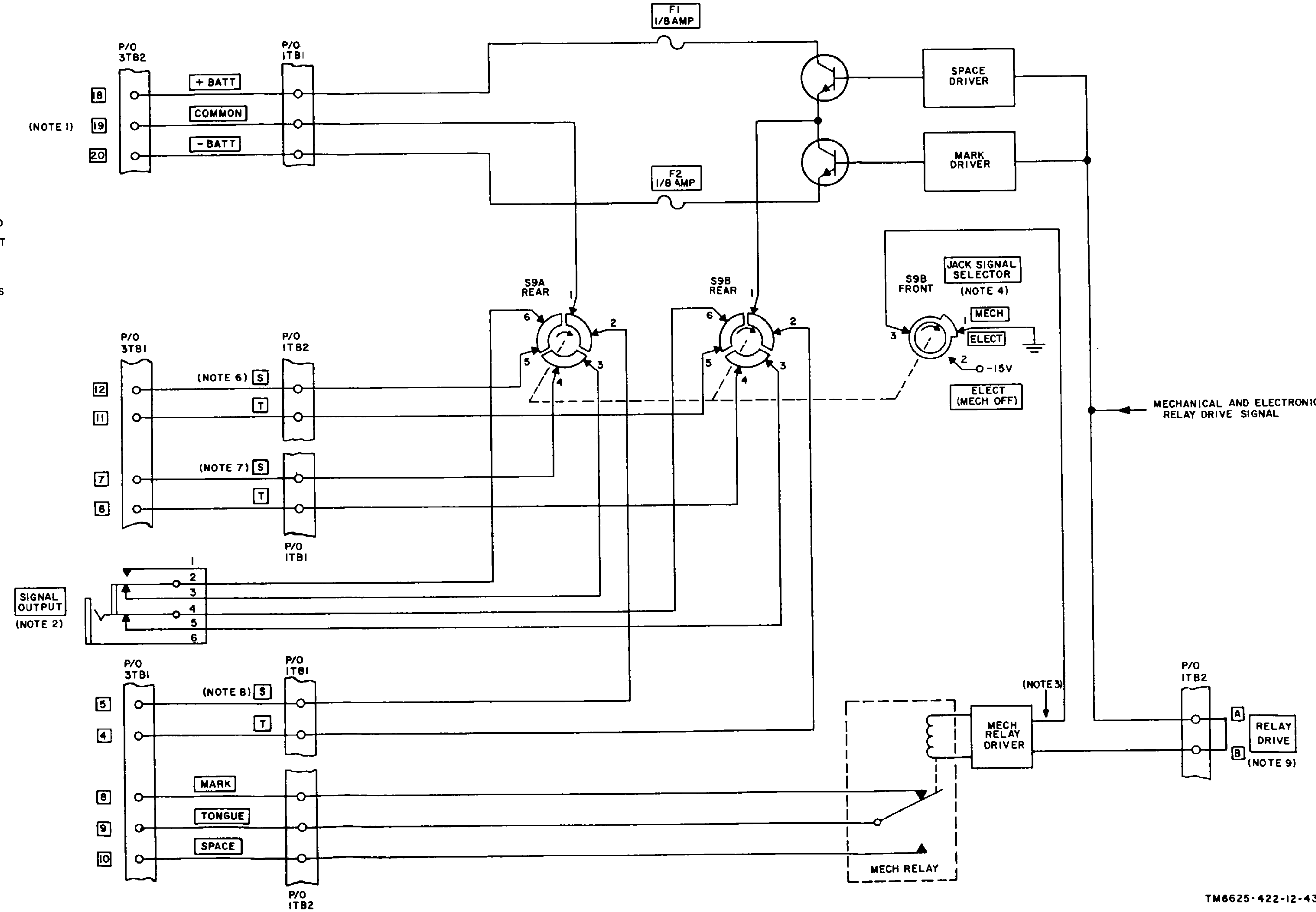


Figure 45. Test Set, Teletypewriter AN/GGM-2, test pattern distortion generator output circuit configuration.

Figure 45.

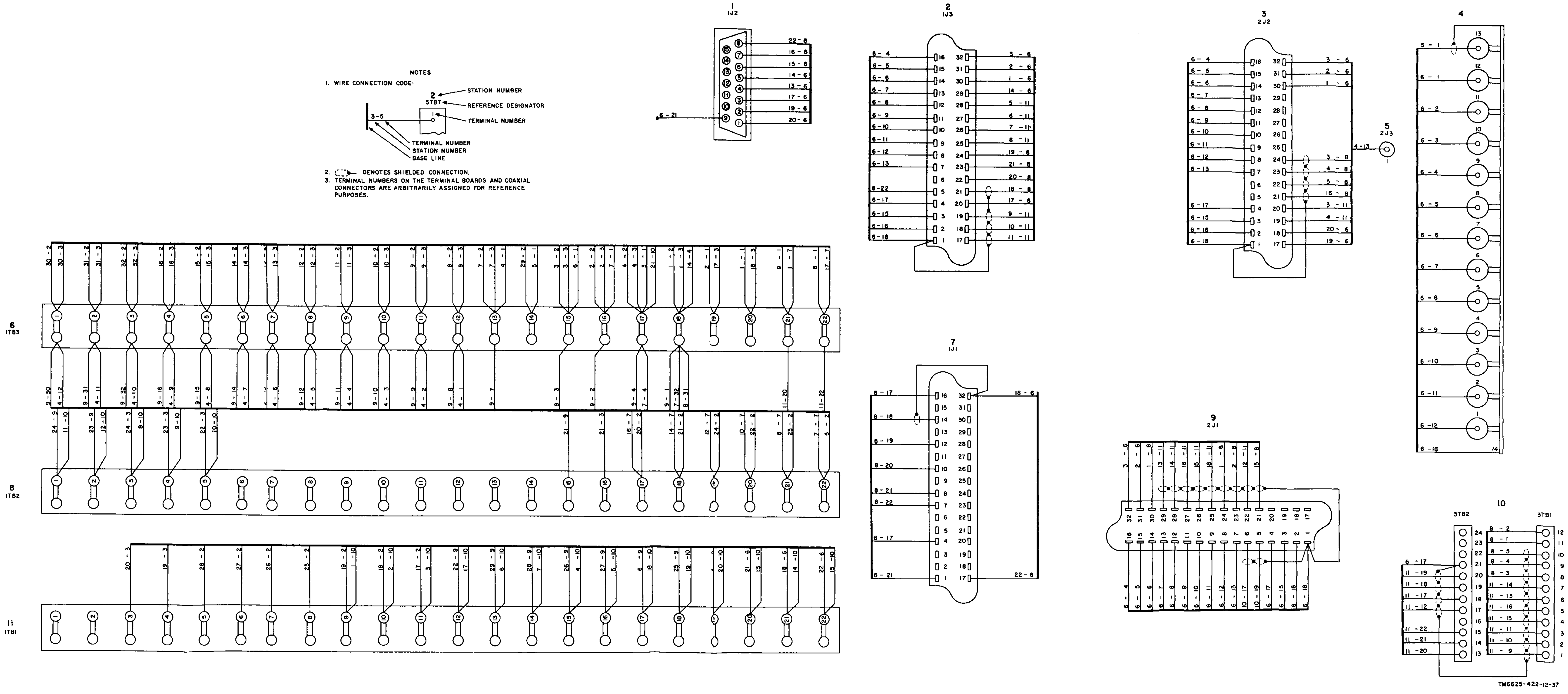


Figure 47. Equipment housing interunit wiring diagram.

Figure 47.

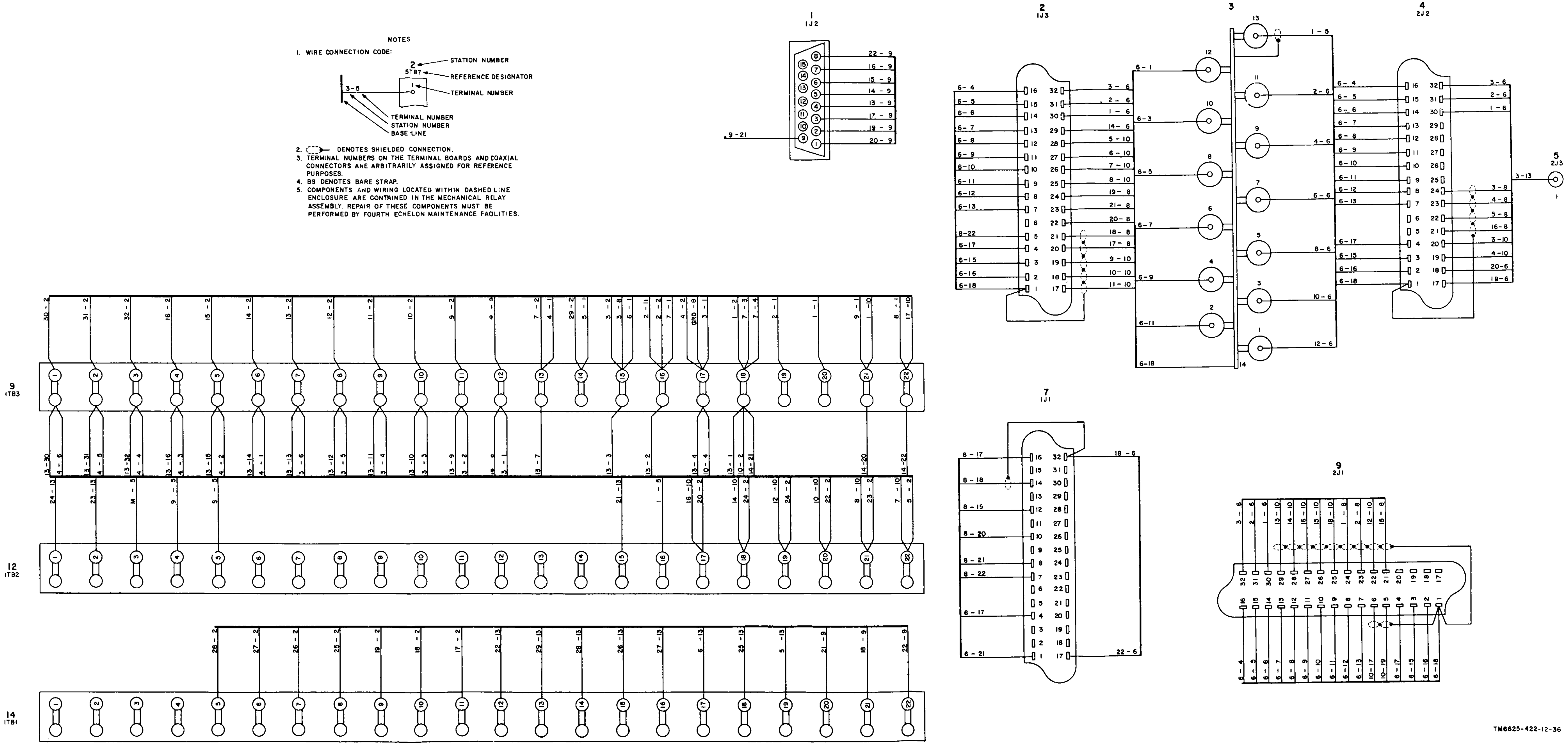


Figure 48. Shelf adapters 1A and 2A interunit wiring diagram.

Figure 48.

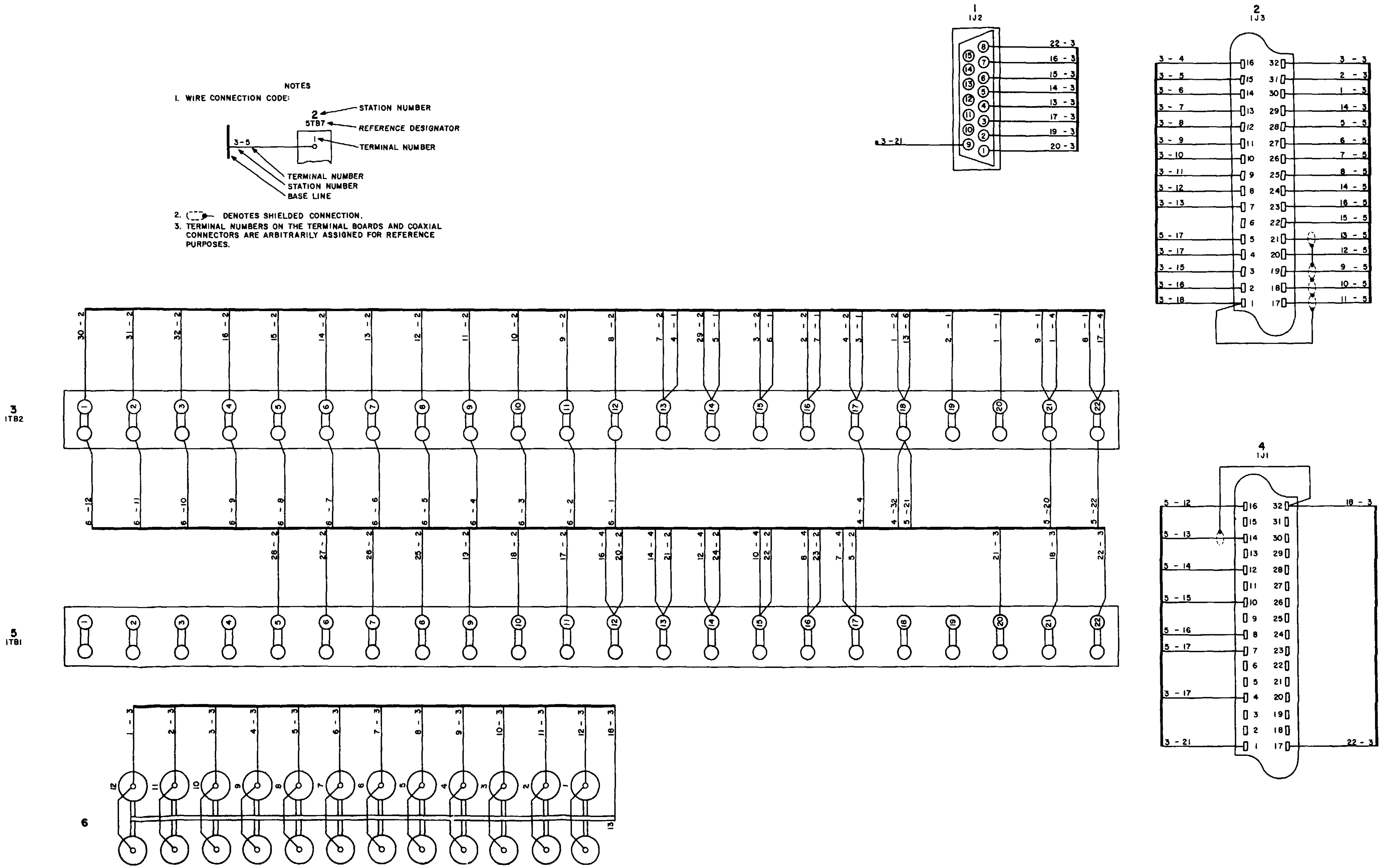


Figure 49. Shelf adapter 1A interunit wiring diagram.

Figure 49.

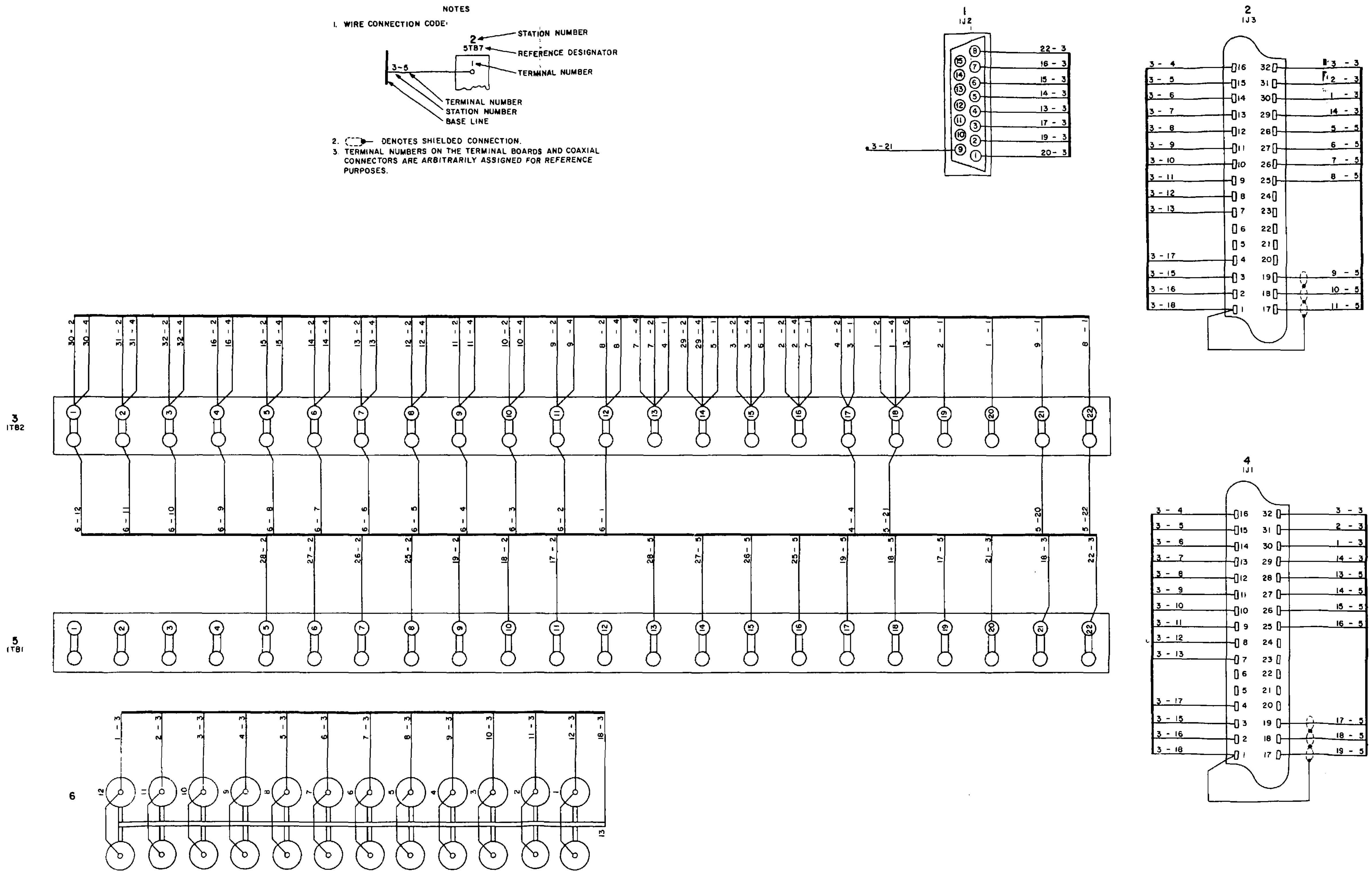


Figure 50. Shelf adapter 1B interunit wiring diagram.

Figure 50.

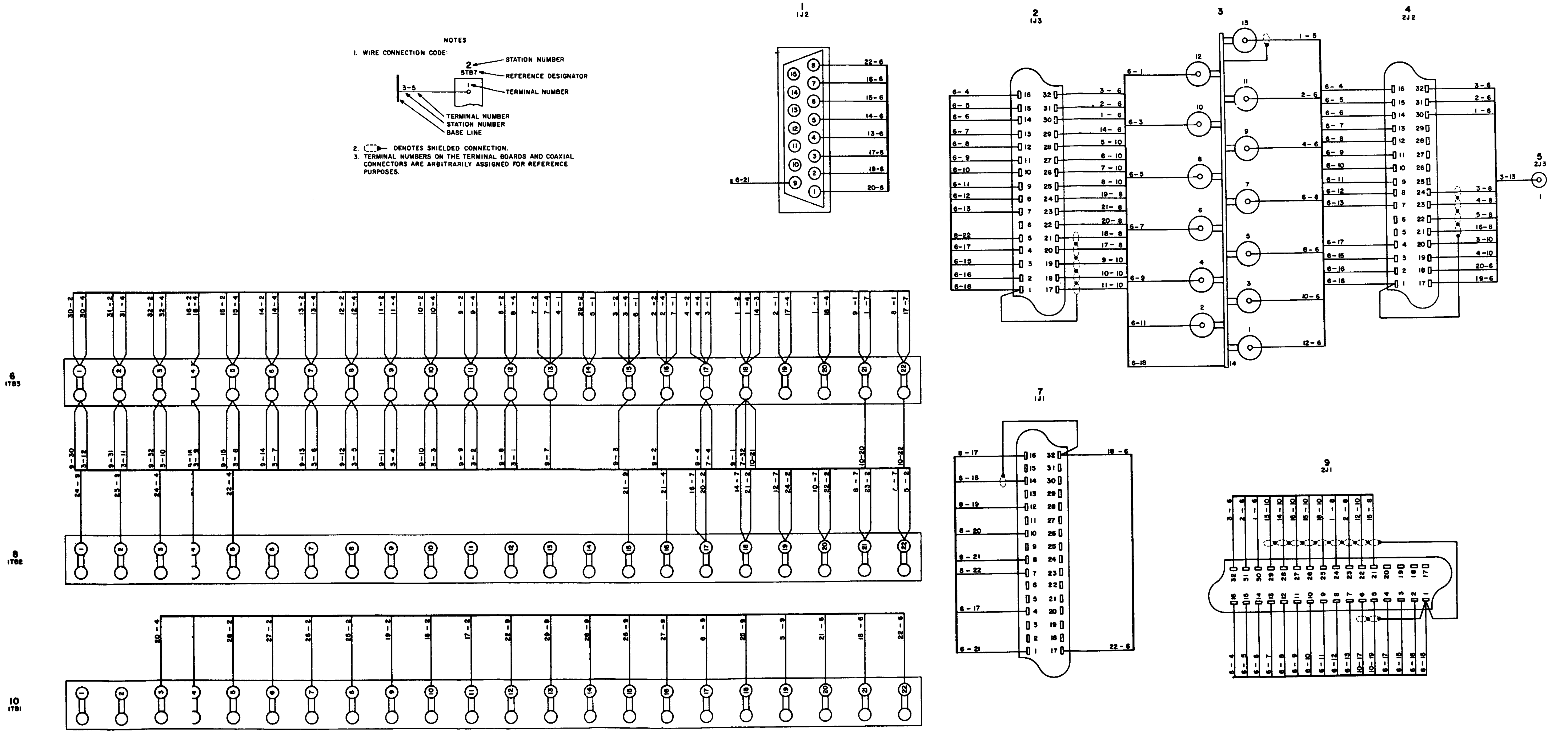


Figure 46. Shelf adapters 1A and 2A interunit wiring diagram.

Figure 46.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 023263-000