TM 11-6625-2411-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL

MAINTENANCE MANUAL

TEST SET, SIGNAL CONVERTER

AN/ASM-416

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1970

WARNING

DANGEROUS VOLTAGES are used in the operation of this equipment.
Observe all safety precautions.

Changes in force: C 1 and C 2

Change No.2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *29 June 1973*

Operator's and Organizational Maintenance Manual
TEST SET, SIGNAL CONVERTER AN/ASM-416

TM 11-6625-2411-12, 28 July 1970, is changed as follows:
Page 4-2, paragraph 4-7.Make the following changes:
Sequence No. 1. In *Reference* column, add: Paragraph 4-13.
Sequence No. 2 In Procedure column, delete entire procedure and substitute: Inspect cables and connectors for general condition and replace if damaged.
Sequence No. 2. In Reference column, delete "Figure 2-1" and substitute: Figure 1-2.
Sequence No.3.In Reference column, delete "or TM 11-5821-290-25".

Page 5-1, paragraph 5-1. After line 3, add: Refer to TM 740-90-1, Administrative Storage of Equipment. Paragraph 5-2, line 5, add: Refer to TM 750-244-2, Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

Page A-1, Appendix A. Add the following references:

TM 11-5821-288-25	Organizational, Direct Support, General Support, and Depot Maintenance Manual: Converter, signal Data CV-2808(V)/ASH-19.
TM 11-5821-289-25	Organizational, Direct Support, and Depot Maintenance Manual: Converter, Signal Data CV-2809/ASH-19.
TM 11-6130-246-12	Operator's and Organizational Maintenance Manual: Power Supply PP-1104C/G.
TM 11-6625-2411-20P	Organizational Maintenance Repair Parts and Special Tools List: Test Set, Signal Converter AN/ASM-416.
TM 740-90-1	Administrative Storage of Equipment
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

Pages B-1, B-2, and B-3, Appendix B. Delete and substitute the following:

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Test Set, Signal Converter AN/ASM-416. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Maintenance Functions

Maintenance functions shall be limited to and de- fined as follows:

a. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

b. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

c. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

d. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

e. Install. The act of emplacing, seating, or fixing

into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of the equipment/system

f. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/ operational condition as prescribed by maintenance standards (e.g., DMWR) in pertinent technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

g. Rebuild. Consists of those services/actions

necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc) considered in classifying Army Equipment/components.

h. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system.

i. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) in a manner to allow the proper functioning of an equipment/system.

j. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/ lubricants/hydraulic fluids or compressed air supplies.

k. Test. To verify serviceability and to detect incipient failure by measuring the mechnical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

l. Symbols. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

B-3. Explanation of Format for Maintenance Allocation Chart

a. Group Number Column. This column lists group numbers, the purpose of which is to match components, assemblies, subassemblies, and modules with the next higher assembly.

b. Functional Group Column. This column lists the next higher assembly group and the item names of components, assemblies, subassemblies, and modules within the group for which maintenance is authorized.

c. Maintenance Functions Column. This column lists the eleven maintenance functions defined in para B-2 above. Each maintenance function required for an item is specified by the symbol among those listed in d below which indicates the level responsible for the required maintenance. Under this symbol is listed an appropriate work measurement time value determined as indicated in e be- low.

d Use of Symbols. The following symbols are used to prescribe work function responsibility:

C-Operator/crew
O-Organization
F-Direct Support
H-General Support
D-Depot

e. Work Measurement Time. The active repair time required to perform the maintenance function is included directly below the symbol identifying the category of maintenance. The manpower figures are developed under conditions corresponding to those that are considered normal for TOE units operating in the field. The skill levels used to obtain the measurement times approximate those found in typical TOE units. Active repair time is the aver- age aggregate time required to restore an item (subassembly, assembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, fault isolation/diagnostic time, and quality assurance/quality control time in addition to the time required to perform specific maintenance functions identified for the tasks authorized in the maintenance allocation chart. This time is expressed in man-hours and carried to one decimal place (tenths of hours).

f Tools and Equipment Column. This column specifies, by code, those tools and test equipments required to perform the designated function.

g. Remarks Column. Self-explanatory.

B-4. Explanation of Format for Tool and Test Equipment Requirements

a. Tools and Equipment. The numbers used in the tools and equipment column of the maintenance allocation chart indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test and maintenance equipment required to perform the maintenance function.

d. Federal Stock Number. This column lists the Federal stock number of the specific tool or test equipment.

e. Tool Number. Not used.

MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTIONS											(4) TOOLS AND EQUIPMENT	(5) REMARKS
		A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD		
	Test Set, Signal Converter AN/ASM-416	0 0.1	0 0.2	0 0.3					0 .05				1 and 2	Perform lamp test, operational test, replace mps cables, gasket, and knobs for positive positioning
		F 0.2	F 0.7						F 1.0	F 1.5			2-8, 13	Testing includes operational test and continuity check of cables.
			H 1.5		H 0.5					H 2.0			2-13	
			D 3.0		D 1.0					D 4.o	D 5.0		2-13	
W1 W2	Cable Assemblies	0 0.2		0 0.3					0 0.1				None	
W3 W4			F 0.5										3-5	
			H 0.5							H 1.0			3-5	
A1	Chassis Assembly	0 0.1		0 0.2									1	
			F 0.5		F 0.2				F 0.1				2-8, 13	Replacement of toggle switches and knobs on the front panel except MAGNASYN and SYNCHRO Knobs adjust FIRE WARNING/ BATTERY, CH-54 TORQUE, EGT/TORQUE, or TACHOMETER.
			H 1.5		H 1.0				H 3.0				2-13	Replace SYNCHRO and MAGNASYN.
A1A1	Circuit Card Assembly		H 1.0		H 1.0				H 0.1				2-13	
			D 2.0		D 1.0					D 4.5			2-13	
A1A2	Circuit Card Assembly		H 1.0		H 1.0				H 0.1				2-13	
			D 2.0	1.0	D					D 4.5			2-13	
A1A3	Component Board Assembly		H 1.0							H 1.0 D 4.0			2-13	

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) GROUP NUMBER	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTIONS											(4) TOOLS AND EQUIPMENT	(5) REMARKS
		A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD		
A1	Synchro Transmitter		H 1.0		H 1.5				H 2.5				2-13	
A1A1	Magnasyn		H 1.0		H 1.5				H 2.5	H 3.0			2-13	

TOOLS AND TEST EQUIPMENT REQUIREMENTS				
TOOLS AND EQUPMENT	**MAINTENANCE CATEGORY**	**NOMENCLATURE**	**FEDERAL STOCK NUMBER**	**TOOL NUMBER**
1	0	Tool Kit, Electronic Equipment TK-10O/G	5180-064-5178	
2	0 F H D	Power Supply, PP-llO4C/G	6130-542-6385	
3	F H D	Tool Kit, Electronic Equipment TK-105/O	5180-610-8177	
4	F H D	Tool Kit, Electronic Equipment TK-100/G	5180-605-0079	
5	F H D	Multimeter, TS-352B/U	6625-553-0142	
6	F H D	Converter, Signal Data CV-2809/ASH-19	5895-463-4039	
7	F H D	Converter, Signal Data CV-2808(V)V/ASH-19	5895-463-4037	
8	F H D	Converter, Signal Data CV-2808(V)2/ASH-19	5895-165-2910	
9	H D	Voltmeter. Electronic M130E/U	6625-643-1670	
10	H D	Voltmeter, Electronic M-202( )/U	6625-709-0288	
11	H D	Oscilloscope, AN/US-81	6625-701-4038	
12	H D	Counter, Electronic, Digital Readout AN/USM-207	6625-911-6368	
13	F H D	Thermometer, Glass	6685-851-4577	

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

Distribution:

To be distributed in accordance with DA Form 12-36, (qty rqr block no.197) Direct and General Support maintenance requirements for AN/ASH-19.

* U.S.GOVERNMENT PRINTING OFFICE: 1973-769620/918

CHANGE
NO.1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 1 January 1989

**OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
TEST SET, NAVIGATIONAL COMPUTER-CONTROL
INDICATOR AN/ASM-386
(NSN 6625-00-404-3280) |**

TM 11-6625-2441-12, 14 December 1971, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the identification number.

Remove pages	Insert pages
1-1 and 1-2	1-1 and 1-2
3-3 and 3-4	3-3 and 3-4

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

CARL E.VUONO
General, United States Army
Official: Chief of Staff

WILLIAM J.MEEHAN II
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-36 Operator and Unit requirements for AN/ASM-386.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual covers the operation and organizational maintenance of Test Set, Navigational Computer-Control Indicator AN/ASM-386 (test set) (fig.1-1).The manual includes instructions for operation under unusual conditions, trouble- shooting, and removal and replacement of parts available at the organizational level.

b. The organizational repair parts and special tools list appears in TM 11-6625-2441-20P.

1-2. Consolidated Index Of Army Publications And Blank Forms Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records And Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-?50, as contained in Maintenance Management Update.

b. Report of Item Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/MC04430.3J.

c. Transportation Discrepancy Report (TDR) (SF 361).Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610 19D/DLAR 4500.15.

d. Reporting Errors and Recommending Improvements You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-ME-PS, Fort Monmouth, New Jersey 07703-5000.

e. Deleted

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. The test set is an automatic tester that provides digital and analog signals for testing navigational computers and their associated control- indicators such as Computer, Navigation CP-941/ ASN-86 and Control-Indicator ID-1579/ASN-86. When performing self-test, the input and output signals are interconnected, with appropriate resistive loads, through Adapter, Self Test MX-8586/ASM-386.The test set utilizes program punched-tape inputs, and test data is displayed on front panel indicators and digital displays.

b. When testing navigational computers, the input data is processed and converted to simulate input signals from associated avionics. Computer output signals are compared in the test set with programmed data. The results of these comparisons are displayed on the front panel. The test set is capable of filling computer memory and then verifying the stored data for validity. Testing, memory fill, and fault isolation may be performed automatically.

c. Control-indicator testing is performed in the same manner as the computer tests. When manual or visual operations are required, tape-stop instructions are provided in the punched-tape program to permit these manual operations. Control- indicator output signals are compared with programmed data from the punched tape in the tape set. Results of these comparisons are displayed on the control-indicator panel or on the test set front panel.

d. When used in conjunction with the MX-8586/ASM-386, the test set performs an automatic self-test and analysis using computer and control-indicator test cables for input-output inter- connection. The MX-8586/ASM-386 is a passive device which contains load resistors and interconnecting wiring. The analysis of data is also performed by the comparison method and the results are displayed on front panel.

1-5. Technical Characteristics

Characteristics of the Logic Control Unit TS-2912/ASM-386 and Signal Conditioning Unit TS- 2913/ASM-386 are listed in the following chart.

Voltages	Regulation	Load current (A)		Ripple (mV p-p)
		Min	Max	
Inputs				
115 V, 400 Hz, 3-phase	±10%	-	-	-
-28 V	±-2 V	-	-	-
Outputs				
+28 V aux	+2 V, -8 V	0.05	0.50	2000
+28 V	1.5%	0.03	0.30	300
+15 V	1.5%	0.01	0.10	150
+5 V	5.0%	2.5	25	100
+4.7 V	5.0%	0.50	4.5	100
-16 V	1.5%	0.01	0.10	150
-25 V	1.5%	0.01	0.10	250

1-6. Items Comprising an Operable Equipment

(fig.1-1)

a. Components.

Federal Stock No.	Item	Qty	Dimensions (in)			
			Hght	Depth	Width	Wht(lbs)
6625-404-3280	Test Set, Navigational Computer-Control Indicator AN/ASM-386 consisting of:					
6625-234-6147	Logic Control Unit TS-2912/ASM-386 (LCU)	1	20	23	20	116
6625-234-6146	Signal Conditioning Unit TS-2913/ASM-386 (SCU)	1	20	23	20	115
6625-234-6116	Accessory Case, Test Set CY-6757/ASM-386 (Accessory case)	1	20	23	20	86
6625-234-6123	Fixture, Mounting, Navigational Computer MT-4206/ASM-386 (Computer mount)	1				
6625-234-6118	Fixture, Mounting, Control Indicator MT-4205/ASM-386 (C o n t r o 1-indicator mount)	1	3	11 (dia)		5
6625-238-9408	Adapter, Self Test MX-8586/ASM-386 (Self-test adapter)	1	5-3/16	21-5/8	16-3/4	10
6625-491-3491	Tape, Punched Program Self Test-Fault Isolation TW-359/ASM-386 (Self-test tape)					

b. Cable Assemblies.

Federal Stock No.	Item	Qty	Length (inches approx)
	Cable Assembly, Power, Electrical CX-12107/U (2W1)	1	72
	Cable Assembly, Power, Electrical CX-12108/U (2W2)	1	78
	Cable Assembly, Special Purpose, Electrical CX-12110/U (2W6)	1	52
	Cable Assembly, Special Purpose, Electrical CX-12111/U (2W7)	1	58
6625-234-6115	Cable Assembly, Special Purpose, Electrical CX-12127/U (3W4)	1	62
	Cable Assembly, Special Purpose, Electrical CX-12128/U (3W19)	1	92
6625-245-1738	Cable Assembly, Special Purpose, Electrical CX-12129/U (1W20)	1	57 92
6625-245-1740	Cable Assembly, Special Purpose, Electrical CX-12130/U (2W3)	1	57
6625-245-8475	Cable Assembly, Special Purpose, Electrical CX-12131/U (3W21)	1	47
6625-245-1750	Cable Assembly, Special Purpose, Electrical CX-12132/U (3W8)	1	56
6625-245-8476	Cable Assembly, Special Purpose, Electrical CX-12133/U (3W9)	1	50
6625-245-8477	Cable Assembly, Special Purpose, Electrical CX-12134/U (3W10)	1	62

SEQ.	ITEM	PROCEDURE	REFERENCES
9	NCU voltage checks	*a*. Set SCU VOLTAGE MONITOR switch to NCU 26 VAC and NCU POWER 115 VAC, 400 Hz switch to ON Observe the following: (1) SCU NCU POWER 115 VAC, 400 Hz indicator lights (2) Oscilloscope indicates 73.6 (+7.4) V p-p	Higher level of maintenance
		b. Set SCU NCU POWER 115 VAC, 400 Hz switch to OFF. Observe the following: (1) SCU NCU POWER 115 VAC, 400 Hz indicator goes out (2) Oscilloscope indicates less than 02 V p-p	Higher level of maintenance
		c. Set SCU VOLTAGE MONITOR switch to NCU +28 and NCU POWER 28 VDC switch to ON. Observe the following: (I) SCU NCU POWER 28 VDC indicator lights (2) DVM indicates -28.0 (-2.8) V	Higher level of maintenance
		d. Set SCU NCU POWER 28 VDC to OFF and observe the following: (1) SCU NCU POWER 28 VDC indicator goes out (2) DVM indicates 0.00 (+0.20) V	Higher level of maintenance
10	CIU voltage checks	*a*. Set SCU VOLTAGE MONITOR switch to CIU +28 and CIU POWER 28 VDC switch to ON. Observe the following: (1) SCU CIU POWER 28 VDC indicator lights (2) DVM indicates +28.0 (+2.8) V	Higher level of maintenance
		b. Set SCU CIU POWER 28 VDC switch to OFF and VOLTAGE MONITOR switch to OFF. Observe the following: (1) SCU CIU POWER 28 VDC indicator goes out. (2) DVM indicates 0.00 (+020) V *Note*. Insure that tape is positioned with punched nomenclature on leader to right of reader head, using tape reader FORWARD/AUTO/REVERSE switch to position tape. Set LCU MODE switch to AUTO and press START pushbutton switch	Higher level of maintenance
11	Test set check (start)	*a*. Observe that self-test tape drives in a forward direction *b*. Observe that LCU TEST NUMBER MINOR indicator steps through the following: 00, 11, 22, 33, 44, 55, F6.77.88, 99 *c*. DELETED *d*. When tape stops, observe the following: (1) LCU TEST STATUS TEST SET FAULT indicator lights (2) LCU REGISTERS display indicates 4000000000 with first digit blank (3) LCU TEST NUMBER indicators display MAJOR 13 MINOR 00	Paragraph 3-12b
12	Test set check (1)	Press LCU START pushbutton switch. Self-test tape drives forward and stops. Observe the following: *a*. LCU TEST STATUS TEST SET FAULT indicator lights *b*. LCU REGISTERS display indicates 40000040 with first three digits blank *c*. LCU TEST NUMBER indicators display MAJOR 13 MINOR 01	Paragraph 3-12b

SEQ.	ITEM	PROCEDURE	REFERENCES
13	Test set check (2)	Press LCU START pushbutton switch. Self-test tape drives forward and stops. Observe the following: *a*. LCU REGISTERS display indicates 4000000000 *b*. LCU TEST NUMBER indicators display MAJOR 13 MINOR 02	Paragraph 3-12b
14	Test set check (3)	Press LCU START pushbutton switch. Self-test tape starts in forward direction with LCU TEST NUMBER MAJOR indicator stepping through majors 29, 32, 44, 55, 66, 78, 89 and 91.When tape stops, observe the following: *a*. LCU TEST STATUIS TEST SET FAULT and SEIF TEST indicators light *b*. LCIU REGISTERS display indicates 4000000000 *c*. LCIJ TEST NUMBER indicators display MAJOR 91 MINOR 00	Paragraph 3-12b

c. Automatic Self-Test

SEQ.	ITEM	PROCEDURE	REFERENCES
15	Automatic self-test	Press LCU START pushbutton switch. Tape starts in forward direction. As automatic self-test is performed, tape drives in forward and reverse cycles. When tape stops, observe the following: *a*. LCU TEST NUMBER indicators display MAJOR 99 MINOR 99 *b*. LCU TEST STATUS GO indicator lights	Paragraph 3-12b
16	Tape rewind (1)	Press LCU STOP/RESET pushbutton switch. Note that tape rewinds and stops and TEST NUMBER indicators display MAJOR 00 MINOR 00	Paragraph 3-12b
17	Tape rewind (2)	Press LCU STOP/RESET and start pushbutton switches. Note that tape rewinds and stops and TEST NUMBER indicators display MAJOR 00 MINOR 00	
18	Tape removal	Press LCU STOP/RESET and then the start pushbutton switch. Note that tape rewinds, runs off takeup spool, and stops	None

3-7. Weekly Preventive Maintenance Checks and Services Chart

The following checks and services are to be performed in addition to the checks and services listed in paragraph 3-6.

SEQ.	ITEM	PROCEDURE	REFERENCES
1	Metal surfaces	Inspect metal surfaces for rust or corrosion. Clean and touch up paint as required	Paragraph 3-10
2	Control panel connectors	Check control panel connectors for bent or damaged pins and cracked or chipped porcelain	Higher level of maintenance
3	Power cables	Check cable connectors for looseness or binding when fastened to control panel connectors. Check for cracked or frayed insulation, broken wires, or damaged connectors	Higher level of maintenance

TECHNICAL MANUAL
No. 11-6625-2411-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *28 July 1970*

Operator's and Organizational Maintenance Manual
TEST SET, SIGNAL CONVERTER AN/ASM416

Figure 1-1. Test Set, Signal Converter AN/ASM-416.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope.

a. This manual describes Test Set, Signal Converter AN/ASM-416 (fig.1-1) and provides instruction for unpacking, setup, general operation, and operator and organizational maintenance. It includes instructions for operation, cleaning and inspection of the equipment, and replacement of parts available to the operator and organizational repairman.

b. The organizational repair parts and special tools lists will appear in TM 11-6625-2411-20P.

1-2. Indexes of Publications

a. *DA Pam 310-4*. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. *DA Pam 310-7*. Refer to the latest issue of DA Pam 310-7 to determine whether there are any modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

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

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Re- port of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army), NAVSUP Pub 378 (Navy), AFR 71-4 (Air Force), and MCO P4030-29 (Marine Corps).

c. Discrepancy in Shipment Report (Disrep) (SF 361).Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as pre- scribed in AR 55-38 (Army), NAVSUP Pub 459 (Navy), AFM 75-34 (Air Force), and MCO P4610.19 (Marine Corps).

d. Reporting of Equipment Publication Improvements. 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 forwarded direct to Commanding General, U.S Army Electronics Command, ATTN: AMSELME- NMP-EM, Forth Monmouth, N.J.07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Test Set, Signal Converter AN/ASM-416 is a portable unit for testing Converters, Signal Data CB-2807(V)/ASH-19, CV-2808(V)/ASH- 19, and CV-2809/ASH-19 (signal converters).It provides analog and discrete type signals inputs to the signal converter under test and monitors the discrete signal response from the signal converter.

b. The output characteristics of various analog test signals can be controlled for monitoring the threshold response of the signal converter under test. Synchro signals, magnasyn signals, various low level ac and dc voltages, resistance, and a variable audiofrequency signal are provided. The signal characteristics can duplicate the outputs of the analog transducers which the signal converter under test is expected to respond to.

c. Discrete signals such as ground, open, and +26 volts are generated and selectively applied by the AN/ASM-416 to the signal converter under test. These discrete type signals can duplicate the outputs of the discrete transducers (relays, switches, etc.) which the signal converter under test is expected to respond to.

d. Responses from the signal converter under test are

selectively channelled to indicators on the AN/ASM-416.These indicators verify the presence of the appropriate signal output expected from the signal converter under test.

1-5. Technical Characteristics

Power input requirements:

27 +2 vdc, 3 ampere minimum (includes signal converter under test), 90 watts.

Output signals:

Signal converter power, 26 -+2 vdc, 2 amperes ground return.

Battery tests, 0 to +30 vdc, 15 K ohm resistive maximum load, ground return.

DC torque tests, 0 to 500 mvdc, 10 K ohm resistive maximum load, floating return.

Exhaust gas temperature (EGT) tests, 0 to 50 mvdc, 10 K ohm resistive maximum load, floating return.

Synchro tests, 3 phase, 26/11.8 v-400 +40 Hz excitation, 10 K ohm-rotor, 5 K ohm each stator resistive maximum load, 0 to 360 degrees positioning.

Magnasyn tests, 3 phase, 115 V vrms-400 +25 Hz excitation, 25 K ohm (excitation and each tap) resistive maximum load, 0 to 360 degrees positioning.

Anti-icing tests, 0 to 1.5 vrms, 400 +40 Hz, 100 K ohm resistive maximum load, floating return.

Tachometer tests, 40 to 90 Hz, symmetrical triangular waveform, 12 vpp, 3 K ohm resistive maximum load, ground return.

Fire warning tests, 0 to 30 vp, 400 +40 Hz, half sine waveform, 15 K ohm resistive maximum load, ground return.

CH-54 torque tests, 500 to 1500 ohms, 1 W floating.

Discrete tests, preselected, four types:

open or ground

open or +26 vdc

+26 vdc or ground

+26 vdc or +7.5 vdc

Hook delay tests, two types:

CH-47 Tests:

Command-+26 vdc level

Released-+ 19 v pulse

Short-1.45 + 0.05 seconds duration after leading edge of command level.

Long-2.0 +0.05 seconds duration after leading edge of command level.

CH-54 Tests:

Command-+24 vdc pulse, 100 milliseconds duration.

Released-+24 vdc pulse, 20 milliseconds duration.

Short-0.975 +0.025 seconds between command and released pulses (leading edges).

Long-1.200 +0.025 seconds between command and released pulses (leading edges).

Input signals:

Channel and caution indicators, preselected singular connection pin application, +22 +4 volts, 0.13 amperes, ground return for activation.

Deoverride indicator, preselected channel input (see above), 30 to 50 ms interruption (equal to or less than 15 v) of +22 +4 volt level for activation.

Weight:

38 pounds.

1-6. Components of Test Set, Signal Converter AN/ASM-416 NOTE

This listing is based on original shipment of Contract No. DAAB07-70-C-0024.

Quantity	Item	Dimensions (in.) Unit				Figure
		Height	Depth	Width	Weight	No.
	Test Set, Signal Converter AN/ASM-416	10.35	13.5	19.0	38 lbs	1-1
1	Test Set, Signal Converter TS-3028/ASM-416	7.75	10.8	16.8	14 lbs	1-2
1	Cable CX-12488/U (3 ft)	2.0	2.0	36.0	1.5 lbs	1-2
1	Cable CX-12489/U (3 ft)	2.0	2.0	36.0	1.5 lbs	1-2
1	Cable CX-12490/U (3 ft)	2.0	2.0	36.0	1.5 lbs	1-2
1	Cable CX 12491/U (3 ft)	2.0	2.0	36.0	1.5 lbs	1-2
1	Extractor (RCA Part No.2147995-1)	0.5	4.0	8.0	0.5 lbs	1-2
2	TM 11-6625-2411-12	11	0.5	8.5		

1-7. Description of Test Set, Signal Converter AN/ASM-416

The AN/ASM-416 (fig.1-2) is portable, externally powered, and provides signals for completely testing Converter, Signal Data CV-2807 (V)/ASH-19, CV-2808(V)/ASH-19, and CV- 2809/ASH-19.The equipment is self-contained, except for an external power source of 28 vdc, which is not supplied with this equipment. The case is of ruggedized aluminum construction and contains Test Set, Signal Converter TS-3028/ ASM-416 (includes case), four cables, and an extractor tool.

The cables and extractor are stored in the re- movable hinged lid section of the AN/ASM-416. The TS-3028/ASM-416 portion is mounted in the bottom section of the case.

The contents of the AN/ASM-416 are protected from the affects of dirt and moisture by the pressure latched lid when the case is closed. An air valve is provided for pressure equalization during transport at high altitudes.

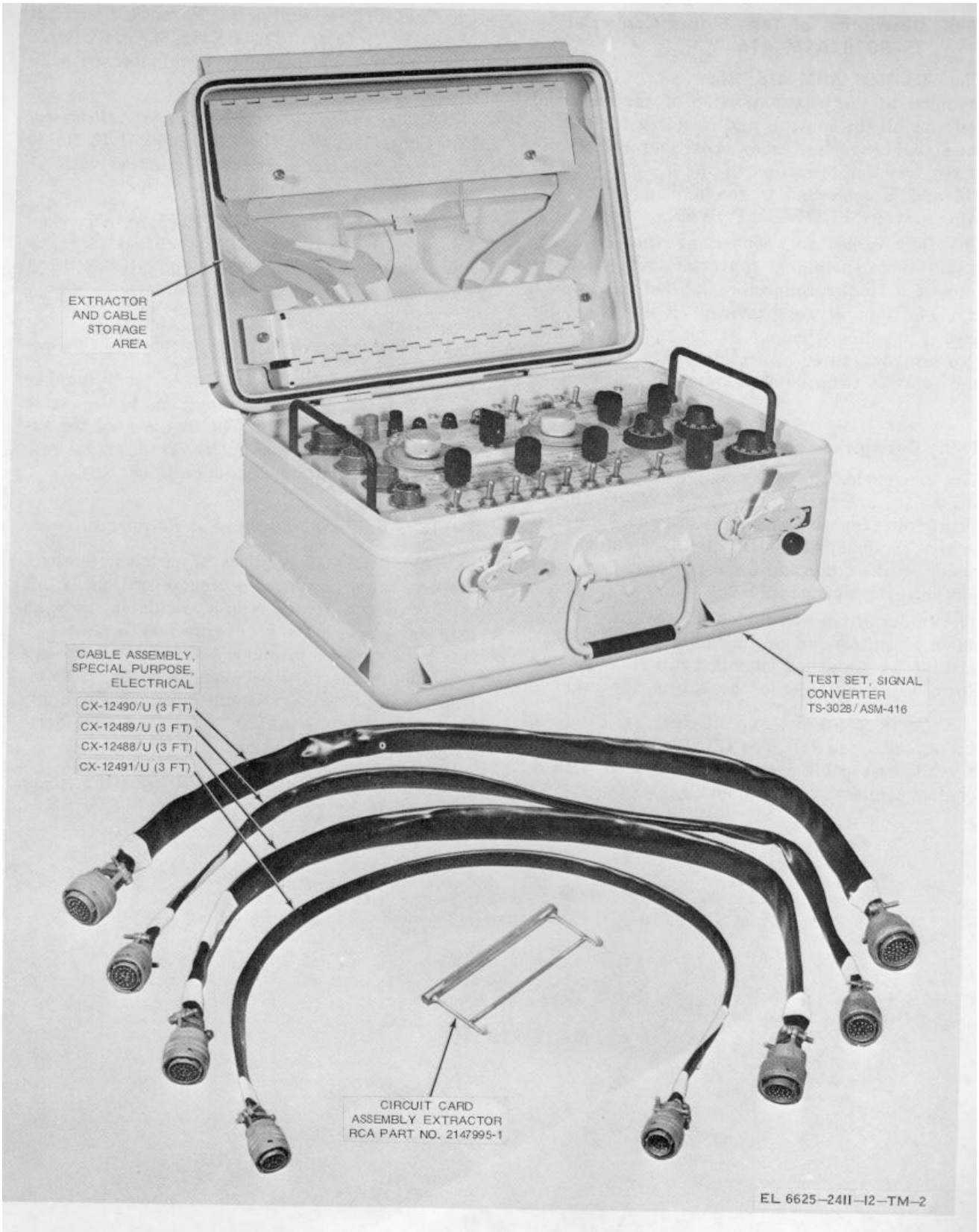

Figure 1-2. Test Set, Signal Converter AN/ASM-416 components.

1-8. Description of Test, Signal Converter TS-3028/ASM-416

The TS3028/ASM-416 (fig.1-2) is screw mounted to the bottom portion of the case and contains all the controls and circuitry for testing the signal converter. An external source of 28 vdc is required for operation of the TS-3028/ASM- 416 and is connected to the red and black terminals labeled PRIMARY POWER.

The four cables for connecting the TS-3028/ ASM-416 to the signal converter under test are connected to the connectors labeled J1, J2, J3, and J4.Handles are provided on the panel for ease of handling when not packed up. The handles also provide limited protection of the front panel and controls from damage by accidental contact.

1-9. Description of Cables

The four cables (fig.1-2) supplies with the AN/ ASM-416, are each three feet long, terminated with a pin plug (male) on one end for connection to the TS-3028/ASM-416, and a receptacle (female) on the other end for connection to the signal converter under test.

The cables are stored under the two hinged hold down assemblies on the inside of the AN/ASM- 416 lid. Two knurled thumbscrews on each holddown assembly release the cables for removal.

a. Cable Assembly, Special Purpose, Electrical CX-12486/U (3 ft). The CX-12488/U (3 ft) is a multi-wire cable assembly terminated with 32 contact connectors on each end.

b. Cable Assembly, Special Purpose, Electrical CX-12489/U (3 ft). The CX-12489/U (3 ft) is a multi-wire cable assembly terminated with 26 contact connectors on each end.

c. Cable Assembly, Special Purpose Electrical CX-12490/U (3 ft). The CX-12490/U (3 ft) is a multi-wire cable assembly terminated with 41 contact connectors on each end.

d. Cable Assembly, Special Purpose, Electrical CX-12491/U (3 ft). The CX-12491/U (3 ft) is a multi-wire cable assembly terminated with 12 contact connectors on each end.

1-10. Extractor

The extractor (fig.1-2), RCA part number 2147995-1, is held by retaining clips to the inside of the AN/ASM-416 lid. The tool is used for extracting circuit card assemblies from signal converters during maintenance operations.

1-11. Additional Equipment Required

The AN/ASM-416 requires 27 + 2 vdc at three amperes input power for normal operation. If this type of power is not readily available, then an external power supply or converter is required. Since the type of primary power and converters available might vary between locations, the unit below is listed as a recommended power supply for use with 105 to 120 volts, 50 to 60 hertz primary power applications.

Model	*Description*	*FSN*
PP-1104C/G	DC Power Supply	6130-635-4900

CHAPTER 2
INSTALLATION

2-1. Unpacking

a. Packaging Data. When packed for shipment (fig. 2-1) the Test Set, Signal Converter AN/ ASM-416 is placed in a close fitting cardboard inner container which also contains two copies of TM 11-6625-2411-12, a humidity exposure indicator, and desiccant material. This inner container is completely enveloped by an airtight foil barrier material which is further protected by a weatherproof outer container. The dimensions, volume, and weight of the carton are-

Dimensions (in)	*Volume* (cu lt)	*Weight* (tb)
25% x 18 x 16%	4.4	43

b. Removing Contents.

(1) Open the outer carton.

(2) Open the moisture-vaporproof barrier and open the inner carton.

(3) Remove the bag that contains the manuals.

(4) Remove the equipment.

(5) Close air vent valve on handle side of case.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been dam- aged, report the damage on DD Form 6 (para 3).

b. See that the equipment is complete as listed on the packing slip. Report all discrepancies in accordance with TM 38-750.Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO).If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. If modified, see that any operational instruction changes resulting from the modification have been entered in the equipment manual.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

2-3. Connections

After checking the unpacked equipment the AN/ ASM-416 is ready for service. Connections for use involve connecting four cables stored in the lid between the AN/ASM-416 and the signal converter under test, and connection to a source of 28 vdc power. The following chart lists the cables and shows nomenclature, length, and connection points.

Cable No.	Cable	Required No.	Length (ft.	Connects	
				AN/ASM-416	Signal converter
W1	CX-12488/U (3 ft)	1	3	J1	J1
W2	CX-12489/U (3 ft)	1	3	J2	J2
W3	CX-12490/U (3 ft)	1	3	3	J3
W4	CX-12491/U (3 ft)	1	3	4	J4
	Not specified (min # AWG, 18 cond)	1	3	PRIMARY POWER	External Power Supply

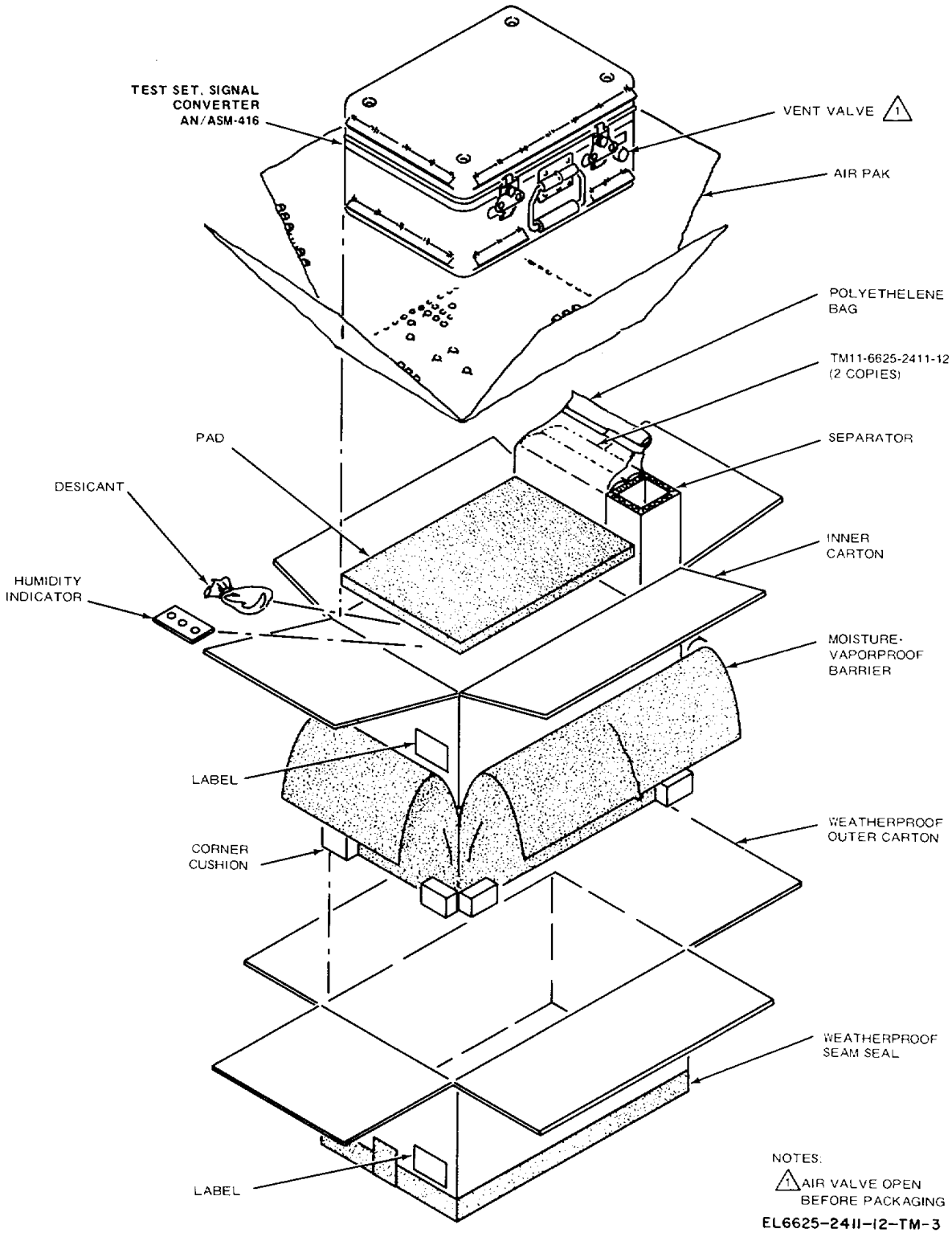

Figure 2-1. Test Set, Signal Converter AN/ASM-416 packaging.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS AND INDICATORS

3-1. Test Set, Signal Converter AN/ASM-416 Operating Controls and Indicators
(fig. 3-1)

Control or indicator	Function
J1, J2, J3, and J4 connectors.	Connectors for attaching cables between AN/ASM-416 and signal converter under test. Cables required are stored in the lid of AN/ASM-416.
PRIMARY POWER (+ -) terminals.	Connection point for external source of 28 vdc power for operation of AN/ASM-416 and the signal converter under test.
CH-54 CAUTION PANEL indicator.	Lights on certain tests of the Converter, Signal Data CV-2809/ASH-19 which simulates the aircraft's converter under test.
AN/ASH-19 CHANNEL indicator.	Lights when the selected channel to the AN/ASH-19 has been activated by the signal converter under test.
DEOVERRIDE	Lights for 2-3 seconds when a deoverride signal on the selected channels has been activated by the signal converter under test.
HOOK DELAY switch	Selects either LONG or SHORT delay for testing of hook delay circuits in the signal converter under test.
POWER	
PUSH TO RESET circuit breaker.	Overload protection for the AN/ASM-416 and the signal converter under test.
ON switch.....	Controls primary power (28 vdc) to the AN/ASM-416 and the signal converter under test.
TEST SET indicator.	Lights when AN/ASM-416 circuits are energized.
MAGNASYN control.....	Adjusts the magnasyn signal output to the signal converter under test.
AIRCRAFT switch.....	Selects AN/ASM-416 circuit compatible with the type (aircraft use) of signal converter under test.

Control or indicator	Function
	Position — *Aircraft use* CH-54 ..... CH-54 OV-1 ..... OV-1A, OV-1B, and OV-1C OV-1D ..... OV-1D CH-47 ..... CH-47A and CH-47B CH-47C..... CH-47C
SYNCHRO control...	Adjusts the synchro signal output to the signal converter under test.
ANTI-ICING control.....	Adjusts the amplitude of the anti-icing signal output to the signal converter under test.
FIRE WARNING/ BATTERY control.	Adjusts the fire warning/battery signal output to the signal converter under test.
CH-54 TORQUE control.	Adjusts the torque potentiometer output to the CH-54 aircraft type signal converter under test.
EGT/TORQUE control	Adjust the exhaust gas temperature and dc torque signal outputs to the signal converter under test.
CHANNEL SELECT switches.	Three switch matrix that selects the channel to be tested. *Position* — *Channel* 1 ..... 1 2 ..... 2 3 ..... 3 4 ..... 4 5 ..... 5 6 ..... 6 7 ..... 7 8 ..... 8 9 ..... 9 10 ..... 10 11 ..... 11 12 ..... 12 13 ..... 13 14 ..... 14 15 ..... 15 16 ..... 16 17 ..... 17 18 ..... 18 19 19

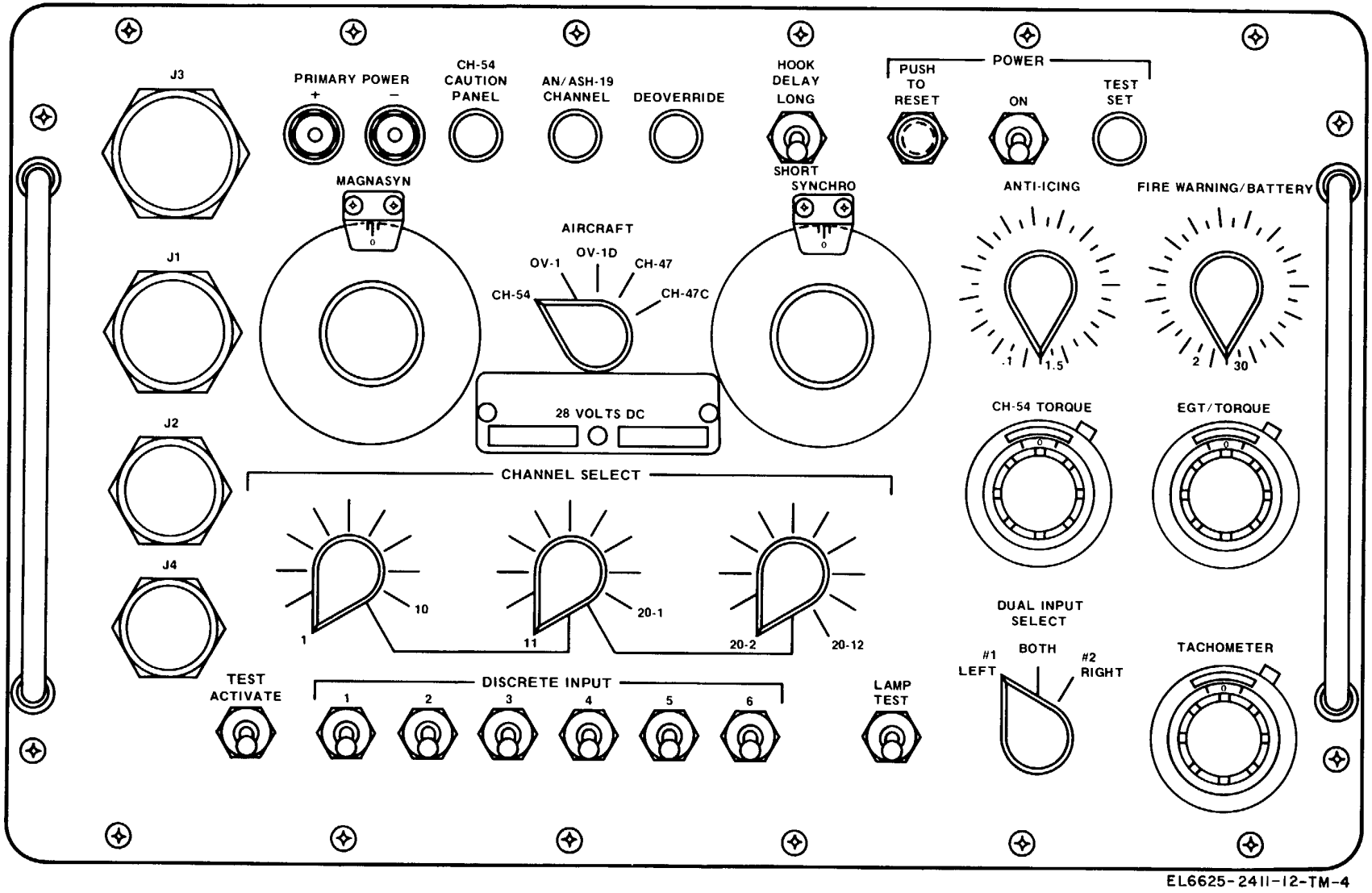

Figure 3-1. Test Set, Signal Converter AN/ASM-416, controls and indicators.

Control or indicator	Function
	Position Channel 20-1..... 20- 1 20-2..... 20- 2 20-3..... 20- 3 20-4..... 20- 4 20-5..... 20- 5 20-6..... 20- 6 20-7..... 20- 7 20-8..... 20- 8 20-9..... 20- 9 20-10..... 20-10 20-11..... 20-11 20-12..... 20-12
TEST ACTIVATE switch.	When held in the ACTIVATE position, applies one or mor of the following signals to the signal converter under test. •All selected DISCRETE IN-PUT signal when CHANNEL SELECT is in positions 20-1 through 20-12. • MAGNASYN, SYNCHRO, ANTI-ICING, FIRE WARN-ING/BATTERY, and EGT/TORQUE.
DISCRETE INPUT switches.	Six switches which provide simultaneous (fixed level) signal outputs to the signal converter under test.

Control or indicator	Function
	Switch Output 1 First 2 Second 3 Third 4 Fourth 5 Fifth 6 Sixth
LAMP TEST switch	When in the up position causes all lamps (except TEST SET) on the AN/ASM-416 to light.
DUAL INPUT SELECT switch.	Three position switch which applies certain output signals to either one of, or both inputs to the signal converter under test. The signal converter must require two of the same signal types for the same channel before this control is effective.
TACHOMETER control.	Adjusts the frequency of the tachometer signal output to the signal converter under test.

Section II. OPERATION

3-2. General

Test Set, Signal Converter AN/ASM-416 may be operated as a test set or as a signal simulator for maintenance operations on signal converters. It may be used to verify the operation of a signal converter by using the step-by-step procedures contained in the particular signal converter technical manual. It may also be used to generate input signals for the signal converter for adjustment or troubleshooting purposes.

3-3. Starting Procedure

To start the equipment, remove the four cables from the storage lid and connect the AN/ASM-416 to the signal converter under test per figure 3-2.

Test set	*Cable Signal*	*converter*
J1--------	CX-12488/U (3 feet) ----	J1
J2--------	CX-12489/U (3 feet) ----	J2
J3--------	CX-12490/U (3 feet) ----	J3
J4--------	CX-12491/U (3 feet) ----	J4

Connect a 28-vdc power source (3 ampere minimum) PRIMARY POWER terminals. The polarity of these terminations must be strictly observed for proper operation of the AN/ASM-416 and signal converter. Reversal of polarity will not cause damage to either unit, but the units will not operate. Set the AIRCRAFT selector for the particular type of signal converter.

Aircraft type	*Sign-al converter type*	*AIRCRAFT selector*
OV-1A, OV-1B, OV-1C ------	CV-2807(V)/ASH-19----------	OV-1
OV-1D----------	CV-2807(V)/ASH-19----------	OV-1D
CH-47A, CH-47B ----------	CV-2808(V)/ASH-19----------	CH-47
CH-47C ---------	CV-2808(V)/ASH-19----------	CH-47C
CH-54 ----------	CV-2809/ASH-19----------	CH-54

Energize the AN/ASM-416 and signal converter by setting the POWER switch to ON. The POWER TEST SET indicator should be lit. If the indicator is not lit, momentarily depress POWER PUSH TO RESET curcuit breaker. At this point, verify the operation of the three output indicators on the AN/ASM-416 by holding the LAMP TEST switch in the up position.

3-4. Operating Procedure

Specific test and maintenance instructions for the use of the AN/ASM-416 are contained in the technical manuals of the equipment to be tested. Reference to these manuals is required for operation of the AN/ASM-416 during testing of a signal converter.

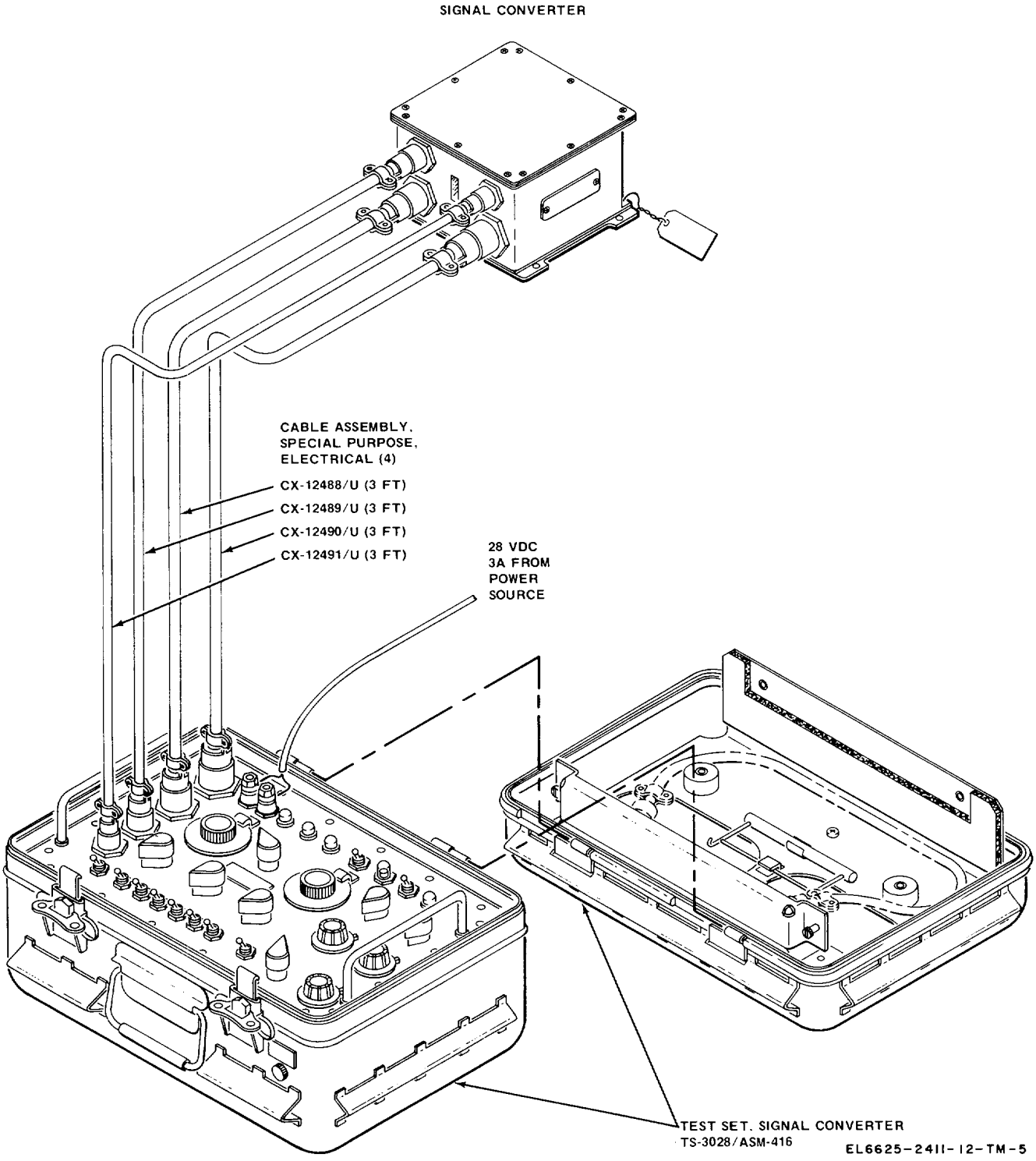

Figure 3-2. Test Set, Signal Converter AN/ASM-416 to signal converter connection.

The following subparagraphs describe the general operation of the AN/ASM-416 in relationship to a signal converter under test.

a. Aircraft Selector. The AIRCRAFT selector switch is set during the starting procedure for the particular type of signal converter according to the type of aircraft application.

b. Channel Section. The AN/ASM-416 provides the different signal converters with the proper type signal inputs in accordance with a predetermined channel numbering system. The channel number/type of test assignment is unique to each type of signal converter. As an example, channel 1 of CV-2807(V)/ASH-19 is two discrete inputs (grounds), channel 1 of CV-2808 (V)/ASH-19 is the independent or combined fire warning signal, while channel 1 of CV-2809/ASH-19 is the hook release test. Through the channel selection controls, only the output signals associated with the channel under test are conected to the AN/ ASM-416 indicators.

c. Magnasyn Tests. The AN/ASM-416 provides the signal converter a variable (0 through 360 degrees) signal which stimulates the output of the magnasvn fuel flow sensor(s) located on the aircraft. The magnasyn output is switched through the AIRCRAFT and DUAL INPUT SELECT selectors before application to the signal converter. The magnasyn signal output is only energized while the TEST ACTIVATE switch is in the ACTIVATE position.

d. Synchro Tests. The AN/ASM-416 provides the signal converter a variable (0 through 360 degrees) signal which simulates the output of the synchro transducer(s) located on the aircraft. The synchro output is switched through the AIRCRAFT and DUAL INPUT SELECT selectors before application to the signal converter. The synchro signal output is only energized while the TEST ACTIVATE switch is in the ACTIVATE position.

e. Anti-Icing Tests. The AN/ASM-416 provides the signal converter a variable (0 to 1.5 Vac, 400 Hz) signal which stimulates the anti-icing voltage in the aircraft. The anti-icing output is switched through the AIRCRAFT selectors before application to the signal converter. The Anti-Icing signal output is only energized while TEST ACTIVATE switch is in the ACTIVATE position.

f. Fire Warning Tests. The AN/ASM-416 provides the signal converter a variable (0 to 30 volts, 400 Hz) signal which simulates the output of the fire warning device on the aircraft. The fire warning output is switched through the AIRCRAFT and DUAL INPUT SELECT selectors before application to the signal converter. The fire warning output is only energized while the TEST ACTIVATE switch is in the ACTIVATE position.

g. Battery Test. The AN/ASM-416 provides the signal converter a variable (0 to 30 Vdc) signal which simulates the battery voltage of the aircraft. The battery output is switched through the AIRCRAFT selector before application to the signal converter. The battery output is only energized while the TEST ACTIVATE switch is in the ACTIVATE position.

h. CH-54 Torque Tests. The AN/ASM-416 provides the signal converter a variable resistance (500 to 1500 ohms) which simulates the torque potentiometer(s) on the aircraft. The torque resistance value is switched through the AIRCRAFT selector before application to the signal converter.

i. Exhaust Gas Temperature (egt). The AN/ ASM-416 provides the signal converter a variable (0 to 50 mvdc) signal which stimulates the output of the exhaust gas temperature sensors on the aircraft. The egt voltage is only energized while the TEST ACTIVATE switch is in the ACTIVATE position.

j. Torque Tests. The AN/ASM-416 provides the signal converter a variable (0 to 500 mvdc) signal which simulates the dc output signals of the torque sensor on the aircraft. The dc torque signal is switched through the DUAL INPUT SELECT and AIRCRAFT selectors. The torque voltage is only energized while the TEST ACTIVATE switch is in the ACTIVATE position.

k. Discrete Input Signals. The AN/ASM-416 provides the signal converter with various types of discrete (fixed level) signals. These discrete signals simulate the various discrete of transducers on the aircraft. The particular two levels involved for a given channel test is selected by the CHANNEL SELECT selector. The DISCRETE INPUT switches (1 through 6) select one of the two levels for application to the signal converter when the TEST ACTIVATE switch is held in the ACTIVATE position. Normally when the signal converter requires only one discrete input, switch 1 is used, for two inputs two switches are used.

l. Dual Input Selection. Some AN/ASM-416 and signal converter inputs and outputs are switched by the DUAL INPUT SELECT selector on the AN/ASM416. This function allows independent or dual application of certain outputs and inputs. When a single input is selected, the opposite output is disregarded.

m. Tachometer Tests. The AN/ASM-416 provides the signal converter a variable (O to 100 Hz) frequency signal which simulates the output of the tachometer on the aircraft. The tachometer signal is energized when the AN/ASM-416 power is on.

n. Test Indications. Monitoring of test results is accomplished by observing the AN/ASH-19 CHANNEL, DEOVERRIDE, and CH-54 CAUTION PANEL indicators on the AN/ASM-416.

(1) The AN/ASH-19 CHANNEL indicator lights when the test signal supplied by the AN/ ASM-416 has exceeded the limit set into the signal converter for the particular channel. In the case of analog voltages such as synchro, egt, and tachometer, the limits could be at either or both ends of a range, according to the particular signal converter and channel. Only the signal converter channel of interest will cause the indicator to light, other channels are disregarded regardless of signal input and limit condition.

(2) The CH-54 CAUTION PANEL indicator lights when the test signal supplied by the AN/ASM-416 has exceeded the limit set into the signal converter. The indicator operation is meaningful only when the AN/ASM-416 is used with Converter, Signal Data CV-2809/ASH-19 for CH-54 type aircraft and simulates the caution panel indicator on the aircraft. In some cases the indicator is used independently of the AN/ASH19 CHANNEL indicator. One example of this is the channel 6 test of (CH-54) whereby exceeding the lower limit of egt lights both indicators, but exceeding the upper limit of egt, lights only the CH-54 CAUTION PANEL indicator. Operation of this indicator while the AN/ASM-416 is connected to other than Converter, Signal Data CV2809/ASH-19 should be disregarded.

(3) The DEOVERRIDE indicator lights for 2 to 3 seconds when the output from the signal converter contains a deoverride signal. On second and subsequent out of limit conditions applied to certain types of signal converters cause a 30- to 50-millisecond interruption of the output signal displayed on the AN/ASH-19 CHANNEL indicator. The DEOVERRIDE indicator provides a visually observable indication that the interruption has occurred within specified limits.

o. Hook Delay Tests. The AN/ASM-416 provides a test of the hook delay timing circuits of the signal converter. The signal converter is tested for an output indication on the AN/ASH-19 CHANNEL INDICATOR when a longer-than- limit hook delay signal is generated by the AN/ ASM-416. The long delay is provided by the HOOK DELAY control in the LONG position. In the SHORT position, a near normal delay signal is generated and the signal converter should not provide an output indication. The hook delay signal is switched through the AIRCRAFT selector and is energized only when DISCRETE INPUT switch 6 is in the up position.

3-5. Stopping Procedure

a. To shut down the AN/ASM-416 and the signal converter (if connected), set the POWER switch to off (down) and verify that the POWER TEST SET indicator is not lit.

b. Before disconnecting the 28-volt supply cable from the PRIMARY POWER terminals, shut down the equipment supplying the 28 volts. Accidental shorting of the leads could cause damage to the external supply.

CHAPTER 4
MAINTENANCE

4-1. Scope

The maintenance duties assigned to the operator of Test Set, Signal Converter AN/ASM-416 are listed below together with a reference to the paragraphs covering the specific maintenance function. These duties do not require special tools or test equipment.

a. Daily preventive maintenance checks and services (para 4-5).

b. Weekly preventive maintenance checks and services (para 4-6).

c. Monthly preventive maintenance checks and services (para 4-7).

d. Quarterly preventive maintenance checks and services (para 4-8).

e. Troubleshooting (para 4-11).

f. Repairs.

(1) Replacement of lamps (para 4-13).

(2) Replacement of lid gasket (para 4-14).

4-2. Special Tools and Equipment Required for Maintenance

a. Tool equipment. The only tool equipment required is Tool Kit DK-105.

b. Test Equipment.

4-3. Preventive Maintenance

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

a. Systematic Care. The procedures given in paragraphs 4-5 through 4-8 cover routine systematic care and cleaning essential to proper upkeep of this equipment when it is used separately. When this equipment is used as part of a set or system, follow the procedures established in the set or system manual.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (para 4-5 through 4-8) outline functions to be performed at specific intervals; however, if the equipment is used as part of a set or system, follow the procedures established in the set or system manual. For equipments operated separately, these checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist in maintaining combat serviceability, the chart indicates what. to check, how to check, and what normal conditions are; the Reference column lists the illustrations, paragraphs or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions indicated, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

4-4. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the AN/ASM-416 are required daily, weekly, monthly, and quarterly.

a. Paragraph 4-5 specifies checks and services that must be accomplished daily and when the equipment is initially received.

b. Paragraphs 4-6 through 4-8 specify additional checks and services that must be performed on a weekly, monthly, and quarterly basis. Items in the longer interval charts (weekly, monthly, and quarterly) are in addition to those in the shorter interval charts.

4-5. Daily Preventive Maintenance Checks and Services Chart

SEQ.	ITEM	PROCEDURE	REFERENCES
1	Completeness	See that the equipment is complete	Paragraph 1-6
2	Controls	See that the mechanical action of each knob and switch is smooth and free of external or internal binding and no excessive looseness is apparent. Refer AN/ASM-416 to higher category maintenance when knobs are loose on other than positive positioning switches.	Figure 3-1

4-6. Weekly Preventive Maintenance Checks and Services Chart

SEQ.	ITEM	PROCEDURE	REFERENCES
1	Cables	Inspect cables and connectors. Replace cables that are cut, chafed, or damaged through the outer layer. Replace cables if connectors are broken, worn excessively, or pins are bent, broken or arced.	Figure 1-2
2	Handles and latches	Inspect handles and latches for looseness	Figure 1-2
3	Connectors	Inspect the four connectors mounted on the TS-3028/ASM-416 for cracked inserts, stripped threads, or foreign material.	Figure 1-2
4	Metal surfaces	Inspect exposed metal surfaces for corrosion. Clean and touch up as required.	Paragraph 4-10
5	Case seal	Inspect lid seal and case mating surfaces for cracks or other irregularities. Replace gasket if required.	Paragraph 4-14

4-7. Monthly Preventive Maintenance Checks and Services

SEQ.	ITEM	PROCEDURE	REFERENCES
1	Lamp check	Connect an external 28-volt power source to the AN/ASM-416. Perform a lamp test and replace defective lamps as required.	Figure 3-2. Paragraph 3-3.
2	Cables	Check for continuity between pins of each cable end. Pins with the same letters are connected together. Replace cables with discontinuities.	Figure 2-1.
3	Operation	Connect the AN/ASM-416 to a known operable signal converter. Conduct the tests detailed in the manual for the signal converter.	Figure 3-2, TM 11-5821-288-25 or TM 11-5821-289-25 or TM 11-5821-290-25.

4-8. Quarterly Preventive Maintenance Checks and Services

SEQ.	ITEM	PROCEDURE	REFERENCES
1	Publications	See that all publications are complete, service able, and current.	DA Pam 310-4.
2	Modifications	Check DA Pam 310-7 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately; all NORMAL MWO's must be scheduled.	TM 38750 and DA Pam 310-7.
3	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. No overstock should be evident and all shortages must be on valid requisitions.	Para 1-6 and TM 11-6625-2411-20P.

4-9. Cleaning

Inspect the exterior surfaces of the AN/ASM-416. The exterior surfaces should be clean, free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

WARNING

Trichloroethane cleaning compound fumes are toxic. Provide adequate ventilation. DO NOT use near a flame.

b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust or dirt from plugs and jacks with a brush.

d. Clean the cables, front panel, and control knobs; use a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; use mild soap if necessary.

4-10. Touchup Painting Instructions

Refinish chipped areas of the case and storage lid. Use fine sandpaper to feather chipped area and apply two thin coats of matching paint. Refer to applicable cleaning and refinishing practices specified in TM 9-213.

4-11. General Troubleshooting Information

Troubleshooting this equipment is limited to the lamp test and operational check contained in the monthly preventive maintenance checks and services chart. To troubleshoot the equipment, perform all functions starting with Item number 1 in the monthly preventive maintenance checks and services chart (para 4-7) and proceed through the items until an abnormal condition or result is observed. When an abnormal condition or result is observed, note the item number and turn to the corresponding item number in the troubleshooting chart (para 4-12). Perform the checks and corrective measures indicated in the troubleshooting chart. If the corrective measures indicated do not result in correction of the trouble, higher category maintenance is required. Paragraph 4-13 (referenced in the chart) contains additional information for corrective measures to be used during the troubleshooting procedures.

4-12. Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Corrective measure
1	*a*. All indicators will not light. open or faulty external source or 28 volts dc. nections from external 28-volt power supply.	*a*. Push to reset circuit breaker TO-RESET circuit breaker or check power to/con-	*a*. Momentarily depress PUSH-
	b. Particular indicators will not light.	*b*. Defective lamp	*b*. Replace lamp (para 4-13).
2	Known operable Signal Converter does not check out within expected limits.	Faulty AN/ASM-416 .	Refer to higher category maintenance for repair.

4-13. Replacement of Lamps

Unscrew (counterclockwise) the colored plastic lens and remove. Remove the defective lamp from the lens by pulling the base flange straight out. Insert a new lamp in the lens and screw the lens finger-tight into the panel.

4-14. Replacement of Lid Gasket

Remove the lid from the bottom portion of the case and strip out defective gasket. The gasket can be easily removed by first cutting through the gasket with a small sharp blade, and then lifting by one end with long-nose pliers. Clean the gasket channel with a rag dampened in cleaning compound (nonaromatic, i.e. alcohol). Apply a thin coat of silicon grease to the new gasket and press into the cleaned channel. Use your thumb or a blunted tool handle. Insure gasket is sealed properly and wipe away excess lubricant.

CHAPTER 5
SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5-1. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored.

a. Material Requirements. The following materials are required for packaging Test Set, Signal Converter AN/ASM-416. For stock numbers of materials, refer to SB 38100.

Material	*Quantity*
Fiberboard, corrugated	20 sq ft
Tape, gummed paper	20 ft
Barrier material, waterproof	20 sq ft
Tape, cloth backing, waterproof	20 ft
Bag, polyethelene plastic	10 in x 14 in

b. Packaging. Package the equipment as outlined below.

(1) Check the equipment for completeness (para 1-6).

(2) Insure cables and extractor are properly stored and secured.

(3) Prepare packing list and shipping label.

(4) Open air vent valve.

(5) Secure the case lid latches.

(6) Place the equipment within a wrap of corrugated fiberboard. Secure the wrap with gummed tape.

(7) Wrap the equipment in waterproof barrier material. Carefully smooth all surfaces against the unit eliminating as much air space as possible. Seal all seams and laps with waterproof tape.

(8) Place the two manuals in a polyethelene bag. Seal the bag closed with waterproof tape.

c. Packing

(1) Place the wrapped unit and the bagged manuals in a weatherproof container. If an oversize container is used, fill voids between the bagged unit and outer container with cushioning material. Seal all seams and laps with waterproof tape.

(2) Attach packing list and shipping label to outer container.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

5-2. Authority for Demolition

The demolition procedures given in paragraph 5-3 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

5-3. Methods of Destruction

The tactical situation and time available will determine the method to be used when destruction of equipment is ordered. In most cases, it is preferable to demolish completely some portions of the equipment rather than partially destroy all the equipment units. The complete destruction of the front panel and the circuitry under the panel is preferred over destruction of the case, lid, and cables.

a. Smash. Use sledges, axes, hammers, crowbars or any other heavy tools available to smash the interior components of the AN/ASM416.

(1) Remove the test panel from the case. With a heavy hammer or bar, smash as many of the exposed parts as possible.

(2) Use the heaviest tool on hand to smash the connectors, knobs, indicators, and other controls on the front panel.

b. Cut. Use axes, handaxes, and similar tools to

cut cabling and wiring. Use a heavy axe or machete to cut the four test cables. Cut all wiring and cables in a number of places.

WARNING

Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

c. Burn. Burn the technical manuals first. Burn as much of the equipment as is flammable, use gasoline, oil, flamethrowers, and similar materials. Pour gasoline on the cut cables and internal wiring and ignite it. Use a flamethrower to burn spare parts or pour gasoline on the spares and ignite them. Use incendiary grenades to complete the destruction of the unit.

d. Explode. Use explosives to complete demolition as to cause maximum damage, before burning, when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Incendiary grenades usually are most effective for destruction of small parts and wiring.

(1) Use a fragmentation grenade to destroy the interior of the AN/ASM-416. Remove the screws from the outer edge of the test panel securing it to the case. Tilt the test panel up, drop the grenade into the case, and release test panel.

(2) For quick destruction of the AN/ASM-416, place an incendiary grenade on top of the test panel. Get away from the unit after the grenade is placed.

e. Dispose. Bury or scatter destroyed parts or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

APPENDIX A
REFERENCES

Following is a list of references available to the operator and organizational repairman of Test Set, Signal Converter AN/ASM-416.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 9-213	Painting Instructions for Field Use.
TM 38-750	The Army Maintenance Management System (TAMMS).

APPENDIX B
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operation covered in the equipment literature for Test Set AN/ASM-416. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Group numbers correspond to the reference designation prefix assigend in accordance with ASA Y32.16, Electrical and Electronics Reference Designations. They indicate the relation of listed items to the next higher assembly.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform a function at higher categories. The codes used represent the various maintenance categories as follows:

Code	*Maintenance category*
C	Operator/crew
0	Organizational maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section IIII.

e. Remarks. Self-explanatory.

B-3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. Not applicable.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance function.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. The numbers appearing in this column correspond to the numbers appearing under the Tools and Equipment column of the maintenance allocation chart.

SECTIN II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTIONS											(4) TOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	Test Set AN/ASM-416	F		F					F				3 and 6	Replace if defective
			H		H	H				H			1,2,3,5,6,7,8	Replace Circuit Boards
			D							D	D		1,2,3,5,6,7,8	Repair Circuit Boards
W1	Cable Assemblies	F	F						0				3,7,8	Replace if defective
W2		H		H						H			3,7,8	Replace connectors if
necessary														
W3														
W4														
A1	Chassis Assembly	F		F									7	
		H	H		H	H			H	H			1,2,3,5,6,7,8	Replace components
		D	D		D	D				D	D		1,2,3,5,6,7,8	Realign and adjust
A1A1	Printed Circuit Assembly	H	H	H	H				H				1,2,3,5,6,7,8	Replace boards
			D		D					D			1,2,3,5,6,7,8	Repair boards
A1A2	Printed Circuit Assembly	H	H	H	H				H				1,2,3,5,6,7,8	Replace boards
			D		D					D			1,2,3,5,6,7,8	Repair boards
A1B1	Synchro Transmitter					H				H			3,7	Replace if defective
						D				D			3,7	
A1Z1	Magnasyn					H				H			3,7	Replace if defective
						D				D			3,7	

SECTION III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
	H D	Electronic Counter, HP-522B or equivalent	6625-752-8622	1
	H D	Oscilloscope, AN/USM-281 or equivalent	6625-053-3112	2
	F H D	Multimeter, TS-352B/U	6625-553-0142	3
	H D	Voltmeter, Electronic ME-30E/U	6625-643-1670	4
	H D	Voltmeter, Electronic AN/ASM-98 or equivalent	6625-753-2115	5
	F H D	Power Supply, PP-1104C/G or equivalent	6130-635-4900	6
	F H D	Tool Kit, Electronic Equipment TK-100/G	5180-605-0079	7
	F H D	Tool Kit, Electronic Equipment TK-105/G	5180-610-8177	8

GLOSSARY

Analog--Signals represented by directly variable quantities such as voltages, resistances, phase, etc.

Caution Panel--The systems status display panel on the CH-54 aircraft.

Deoverride--A pulsed interruption of the output signal from the signal converter under test.

Discrete--Signals represented by two distinct levels such as open or ground, +20 V or ground, +20 V or open, etc.

Hook Delay--The time between the command signal which initiates release of the cargo hook on the aircraft, and the released signal feed back.

Magnasyn--A magnetically coupled device used for indicating aircraft fuel flow in the fuel line(s). The AN/ASM-416 contains a modified magnasyn which stimulates the signals generated from the aircraft installed type.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staffs

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

Distribution:
To be distributed in accordance with DA Form 12-36, Direct and General Support requirements for OV-1A, OV-1B, OV-1C, CH-47, and CH-54 aircrafts.

* U.S. GOVERNMENT PRINTING OFFICE: 1970--431-133/3

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS 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.

PIN: 016345-000