

DEPARTMENT OF THE TECHNICAL MANUAL

TM 11-6625-667-45

DEPARTMENT OF THE NAVY TECHNICAL MANUAL

NAVSHIPS 0969-249-8010

NAVAL AIR TECHNICAL SERVICES FACILITY TECH. MANUAL NAVAIR 16-30APM123-2

DEPARTMENT OF THE AIR FORCE TECHNICAL MANUAL

TO 33A1-3-367-22

GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

TEST SET, TRANSPONDER

AN/APM-123[V] 1

AN/APM-123[V] 2

AN/APM-123[V] 3

(NSN 6625-00-948-0071)

This copy is a reprint which includes current pages from Changes 1 through 5.

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
JUNE 1968

TECHNICAL MANUAL
No. 11-6625-667-45
TECHNICAL MANUAL
NAVAIR NO. 16-30APM123-2
TECHNICAL ORDER
T031A1-3-367-22

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIRFORCE

WASHINGTON, DC, 26 June 1968

GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

TRANSPONDER TEST SET **AN/APN-123(V)1**

(NSN 6625-00-948-0071) AN/AP/123(V)2,

(NSN 6625-00-948-0077) AND AN/APM-123(V)3

(NSN 6625-00-948-0076)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of away 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, ATTN: DRSEL ME-MQ, Fort Monmouth, NJ 07703.

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, TO 00-5-1. Forward direct to prime ALC/MST.

For Navy, mail comment to the Commander, Naval Electronics Systems Command ATTN: ELEX 45053 (O. H.) Washington, D.C. 20360. In any case, a reply will be furnished direct to you.

		Paragraph	Page
CHAPTER	1. GENERAL	1-1-1-3	1-1
	2. FUNCTIONING	2-1-2-17	2-1
	3. TROUBLESHOOTING		
Section	I. General troubleshooting techniques	3-1-3-4	3-1
	II. Troubleshooting Test Set Transponder AN/APM-123(V)1, 2, 3	3-5-3-11	3-15
	III. General Troubleshooting techniques using AN/TPM-25A	3-12-3-15	3-42
CHAPTER	4. REPAIRS AND ALIGNMENT	4-1-4-8	4-1
	5. GENERAL SUPPORT TESTING PROCEDURES	5-1-5-7.1	5-1
Section	5.1. FUNCTIONING AND MAINTENANCE FOR MODE 4		
	I. Functioning	5.1-1-5.1-4	5.1-1
	II. Troubleshooting	5.1-5-5.1-9	5.1-5
	III. Mode 4 alignment	5.1-10-5.1-14.1	5.1-20

	Paragraph	Page
IV. General support testing procedures	5.1-15-5.1-17.1	5.1-22
V. Mode 4 alignment using AN/TPM-25A	5.1-18-5.1-25	5.1-31
VI. General support testing procedures Using AN/TPM-25A	5.1-26-5.1-30	5.1-34
 CHAPTER		
5.2. GENERAL SUPPORT TESTING PROCEDURES USING AN/TPM-25A	5.2-1-5.2-9	5.2-1
6. DEPOT MAINTENANCE	6-1-6-3	6-1
7. DEPOT OVERHAUL STANDARDS	7-1-7-13	7-1
7.1. DEPOT OVERHAUL STANDARDS USING AN/TPM-25A	7.1-1-7.1-11	7.1-1
8. DIAGRAMS		8-1
APPENDIX		
REFERENCES		A-1
Index		I-1

LIST OF ILLUSTRATIONS

<i>Number</i>	<i>Title</i>	<i>Page</i>
2-1	Encoder timing diagram	2-3
1-2	Typical SIF type replay trains	2-7
2-3	Single train timing diagram	2-8
2-4	Train pulse I P pulse timing diagram	2-9
2-5	Two train timing diagram	2-10
2-6	Train plus 3 Framing pulses timing diagram	2-11
2-7	Typical flip flop multivibrator circuit	2-14
2-8	Typical one shot circuit	2-14
2-9	Typical diode AND gate circuit	2-15
2-10	Typical transistor AND gate circuit	2-15
2-11	Low P2 pulse and main modulator, simplified diagram	2-18
2-12	Receiver section, input and video amplifier, simplified schematic diagram	2-20
2-13	Error detection timing diagram	2-24
3-1.1	Power supply test setup using AN/UPM-137A	3-8.7
3-1	Power supply test setup	3-9
3-2	Transmitter frequency test setup	3-10
3-3	Transmitter power test setup	3-10
3-4	Transmitter pulse characteristics test setup	3-11
3-5	Receiver and decoder test setup	3-12
3-5.1	Receiver and decoder test setup using AN/UPM-137A	3-12.1
3-6	Test point location	3-13
3-7	Adjustment control location	3-14
3-8	12-volt regulator voltage and resistance diagram	3-23
3-9	150-volt power supply voltage and resistance diagram	3-24
3-10	Transmitter A16 voltage and resistance diagram	3-25
3-11	Encoder module A4 voltage and resistance diagram	3-26
3-12	Encoder module A5 voltage and resistance diagram	3-27
3-13	Decoder module A7 voltage and resistance diagram	3-28
3-14	Decoder module A8 voltage and resistance diagram	3-29
3-15	Decoder module A9 voltage and resistance diagram	3-30
3-16	Decoder module A10 voltage and resistance diagram	3-31
3-17	Decoder module A11 voltage and resistance diagram	3-32
3-18	Decoder module A12 voltage and resistance diagram	3-33
3-19	Transistor forward and reverse resistance measurements	3-41
3-20	Transistor leakage current I_{CO} tests	3-41
3-21	Grounded emitter dc gain tests	3-41
3-22	System timing setup using AN/TPM-25A	3-57
3-23	Transmitter frequency test setup using AN/TPM-25A	3-58

LIST OF ILLUSTRATIONS—Continued

<i>Number</i>	<i>Title</i>	<i>Page</i>
3-24	Transmitter pulse characteristics test setup using AN/TPM-25A	3-59
3-25	Receiver and decoder test setup or video enable delay and period test using AN/TPM-25A.	3-60
5-1	Transmitter frequency test setup.	5-2
5-2	Transmitter power test setup.	5-4
5-3	Transmitter output pulse test.	5-8
5-4	Receiver and decoder test setup	5-12
5-5	Receiver and decoder test setup using AN/UPM-98	5-15
5-6	Receiver and decoder test setup	5-19
5-7	Reply evaluation percentage test setup using AN/UPM-98.	5-22
5-7.1	Reply evaluation percentage test setup using AN/UPM-137A	5-23
5.1-1	Test point location	5.1-11
5.1-2	Current limiting measurements.	5.1-12
5.1-3	Module A1 resistance diagram	5.1-14
5.1-4	Module A2 resistance diagram	5.1-15
5.1-5	Module A3 voltage and resistance diagram	5.1-16
5.1-6	PNP transistor resistance measurements	5.1-17
5.1-7	Mode 4 test connections	5.1-26.10
5.1-7.1	Mode 4 test connections using AN/UPM-137A.	5.1-26.11
5.1-8	Module A1 socket waveforms	5.1-27
5.1-9	Module A2 socket waveforms	5.1-28
5.1-10	Adjustment control locations	5.1-29
5.1-11	Mode 4 timing test setup using AN/TPM-25A	5.1-10.15
5.1-12	Mode 4 test connections using AN/TPM-25A	5.1-10.16
5.2-1	System timing setup using AN/TPM-25A.	5.2-4
5.2-2	Transmitter frequency test setup using AN/TPM-25A	5.2-5
5.2-3	Transmitter pulse characteristics test setup using AN/TPM-25A	5.2-9
5.2-4	Receiver frequency and bandwidth test setup using AN/TPM-25A	5.2-12
5.2-5	Video enable delay and period test, setup using AN/TPM-25A.	5.2-15
5.2-6	Reply evaluation percentage tests	5.2-19
6-1	Cavity A16A1ZI, exploded view	6-3
7-1.1	Receiver frequency, sensitivity, and bandwidth test setup using AN/UPM 137A	7-4
7.1-1	Depot system timing setup using AN/TPM-25A	7.1-2
7.1-2	Depot overhaul standards basic test setup	7.1-3
8-0.1	Color code marking for MILSTD resistors	8-2
8-0.2	Color code marking for MILSTD capacitors	8-3
8-1	Test set generator, block diagram	8-5
8-2	Encoder, logic diagram	8-7
8-3	Video enable and reset gating, logic diagram	8-9
8-4	Comparison pulse generator, logic diagram	8-11
8-5	Error detector circuit, logic diagram.	8-13
8-6	Power supply section, schematic diagram	8-15
8-7	Transmitter modulator, schematic diagram	8-17
8-8	Encoder module A4, schematic diagram	8-19
8-9	Encoder module A5, schematic diagram	8-21
8-10	Decoder module A7, schematic diagram	8-23
8-11	Decoder module A8, schematic diagram	8-25
8-12	Decoder module A9, schematic diagram	8-27
8-13	Decoder module A10, schematic diagram	8-29
8-14	Decoder module A11, schematic diagram	8-31
8-15	Decoder module A12, schematic diagram	8-33
8-16	Front panel A15, schematic diagram (part 1 of 2)	8-35
8-16 ①	Front panel A15, schematic diagram (part 2 of 2)	8-37
8-17 ②	Encoder module A4, transistor socket waveforms	8-39
8-18	Encoder module, transistor socket waveforms	8-41
8-19	Decoder module A7, transistor socket waveforms	8-43
8-20	Decoder module A9, transistor socket waveforms	8-45
8-21	Decoder module A10, transistor socket waveforms	8-47

LIST OF ILLUSTRATIONS—Continued

<i>Number</i>	<i>Title</i>	<i>Page</i>
8-22	Decoder module All, transistor socket waveforms	8-49
8-23	Decoder module A12, transistor socket waveforms	8-51
8-24 (1)	Front panel A15, wiring diagram (part 1 of 4)	8-53
8-24 (2)	Front panel A15, wiring diagram (part 2 of 4)	8-55
8-24 (3)	Front panel A15, wiring diagram (part 3 of 4)	8-57
8-24 (4)	Front panel A15, wiring diagram (part 4 of 4)	8-59
8-25 (1)	Transmitter A16, wiring diagram and parts location (part 1 of 2)	8-61
8-25 (2)	Transmitter A16, wiring diagram and parts location (part 2 of 2)..	8-63
8-26	12-volt regulator module A13, wiring diagram and parts location.	8-65
8-27	150-volt power supply module A14, wiring diagram and parts location	8-67
8-28	Encoder module A4, wiring diagram and parts location	8-69
8-29	Encoder module A5, wiring diagram and parts location	8-71
8-30	Decoder module A7, wiring diagram and parts location	8-73
8-31	Decoder module A8, wiring diagram and parts location	8-75
8-32	Decoder module A9, wiring diagram and parts location	8-77
8-33	Decoder module A10, wiring diagram and parts location	8-79
8-34	Decoder module A11, wiring diagram and parts location	8-81
8-35	Decoder moduled A12, wiring diagram and parts location	8-83
8-36	Test point waveform diagram.	8-85
8-37	28-Volt power supply, parts location diagram	8-87
8-38	Mode 4 section, logic diagram (part 1 of 2)	8-89
8-38	Mode 4 section, logic diagram (part 2 of 2)	8-91
8-39	5-volt regulator module A3, block diagram	8-93
8-40 (1)	Mode 4 module A1, schematic diagram (part 1 of 2)	8-95
8-40 (2)	Mode 4 module A1, schematic diagram (part 2 of 2)	8-97
8-41 (1)	Mode 4 module A2, schematic diagram (part 1 of 2)	8-99
8-41 (2)	Mode 4 module A2, schematic diagram (part 2 of 2)	8-101
8-42	5-volt regulator modulator A3, schematic diagram	8-103
8-43	Mode 4 module A1, parts location diagram	8-105
8-44	Mode 4 module A2, parts location diagram	8-107
8-45	5-volt regulator module A3, parts location diagram	8-109
8-46	Cable assembly, special purpose, electrical CX-1226/APM-123(V) schematic diagram.	8-111

CHAPTER I

GENERAL

1-1. Scope

a. This manual contains general support and depot maintenance instructions for Test Set, Transponder AN/APM-123V. It includes instructions for troubleshooting, testing, aligning, and repairing the equipment. It also lists tools, materials, and test equipment required for general support and depot maintenance. Functional analysis of the equipment is covered in chapter 2. A schematic diagram of the cable required to perform mode 4 checks with the auxiliary computer is shown in figure 8-46.

NOTE

For equipment modified by MWO 11-6625-667-40-1, a visual indicator light (A15XDS4) to provide a code zeroize alarm and protection diode (A15CR6) to prevent overloading of the power supply have been added. In addition, MWO 11-6625-667-40-2 changed the prf from 400 pps to 230 pps and eliminated the SPI pulse.

b. The complete manual for this equipment includes one other publication, TM 11-6625-667-12.

1-2. Indexes of Publication

a. *DA Pam 310-4*. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, additional publications, or modification work orders 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 TM 38-750, The Army Maintenance Management System (Army). Air Force personnel will use AFM 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Navy personnel will report maintenance performed

utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2, Vol 3 and unsatisfactory material conditions (UR submissions) IAW OPNAVINST 4790.2, Vol 2, chapter 17.

b. *Report of Packaging and Handling Deficiencies*. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

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 4610.33B/AFR 75-18 MCO 4610.19C/DLAR 45.0015.

1-4. Report Equipment Improvement Recommendation (EIR)

a. *Army*. If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report. Mail it to Commander, US Army Communications Electronics Command, ATTN: DRSEL ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

b. *Air Force*. Air Force personnel are encouraged to submit EIRs in accordance with AFM 900-4.

c. *Navy*. Navy personnel are encouraged to submit EIRs through their local Beneficial Suggestion Program.

1-5. (Army Only) Destruction of Army Materiel to Prevent Enemy Use

Demolition of the test set will be accomplished only upon the order of the Commander. Refer to TM 750-244-2 for procedures to prevent the enemy from using or salvaging this equipment.

1-6. (Army Only) Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be maintained in a maximum Readiness Condition (REDCON). Equipment placed in administrative storage should be capable of being readied to perform its mission within a 24 hour period or as otherwise prescribed by the approving authority. Before equipment is placed in administrative storage, current maintenance service should be performed; shortcomings and deficiencies should be corrected; and all modification work orders

(MWOs) as listed in DA Pam 310-4 should be applied. Particular attention is directed to security and calibration of installed electronic equipments in or out of aircraft or surface equipment prior and during administrative storage. Special procedures include protection from dust and humidity and the cleanliness and inspection of the electronic equipments. Upon removal from storage, the electronic equipments must be prepared for operation and tested in accordance with the PMCS charts and procedures in pertinent technical manuals.