DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST TEST SET, CRYOGENIC REFRIGERATOR AN/AAM-40 AND (NSN 4130-00-197-6347) SERVICE KIT, REFRIGERANT MK-1171/AAS-24 (NSN 4940-00-403-1007)

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

HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1970

WARNING

DEATH or SERIOUS INJURY may result from hazards in this equipment. READ and OBSERVE following warnings.

WARNING

DEATH or SERIOUS INJURY may result from contact with 115- vac, 400-lIz, 3-p1hase power existing within this test set.

WARNING

DEATH or SERIOUS INJURY may result from contact with 3500- vac power existing within this test set.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

WARNING

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

WARNING

Two men are required to lift the cryo test set maintenance group or evacuation-charging group.

TECHNICAL MANUAL
No. 11-6625-2446-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *31 August 1970*

Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists
TEST SET, CRYOGENIC REFRIGERATOR AN/AAM-40
(NSN 4130-00-197-6347)
AND
SERVICE KIT, REFRIGERANT MK-1171/AAS-24
(NSN 4940-00-403-1007)

Change No. 3 Current as of August 1977

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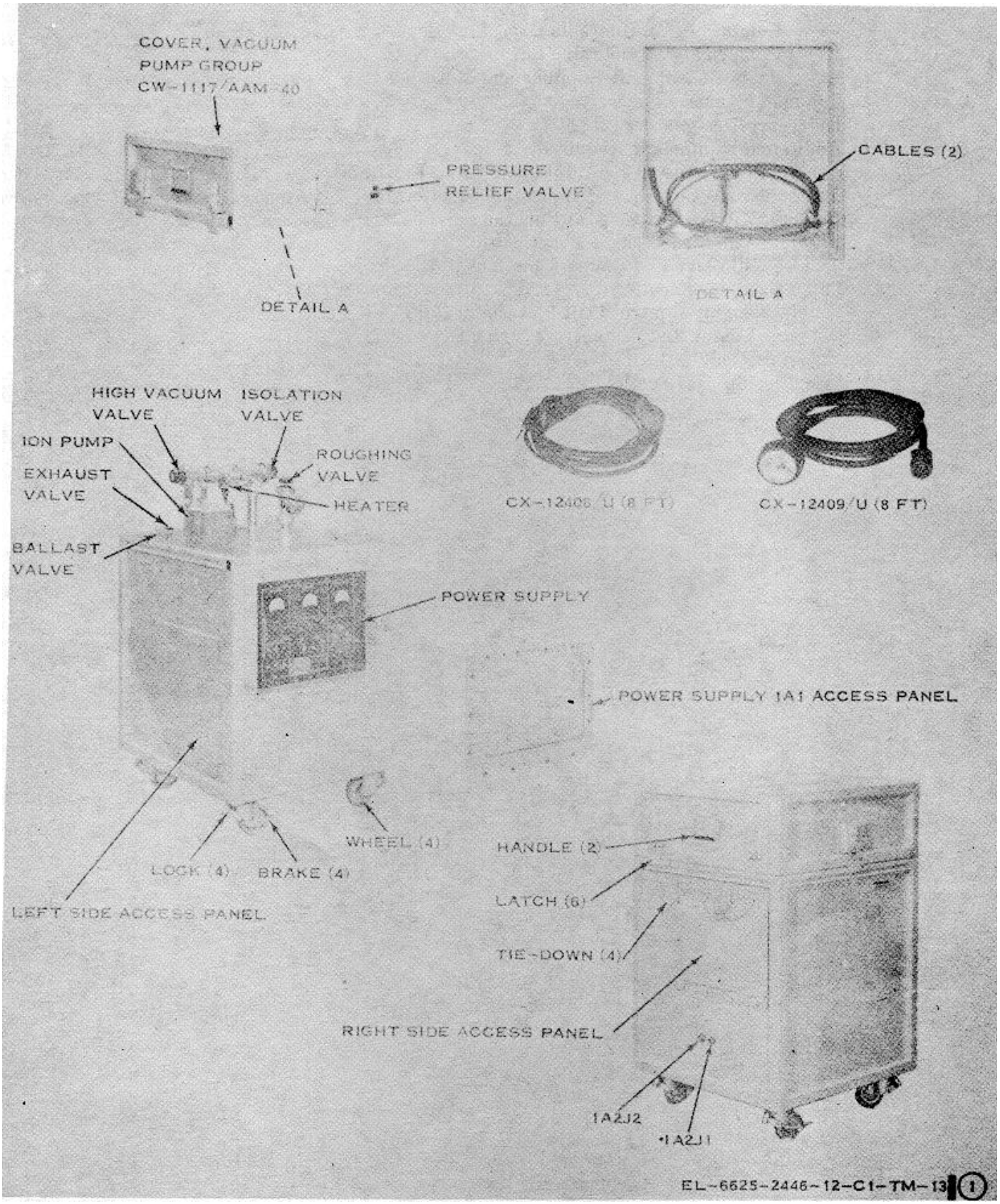
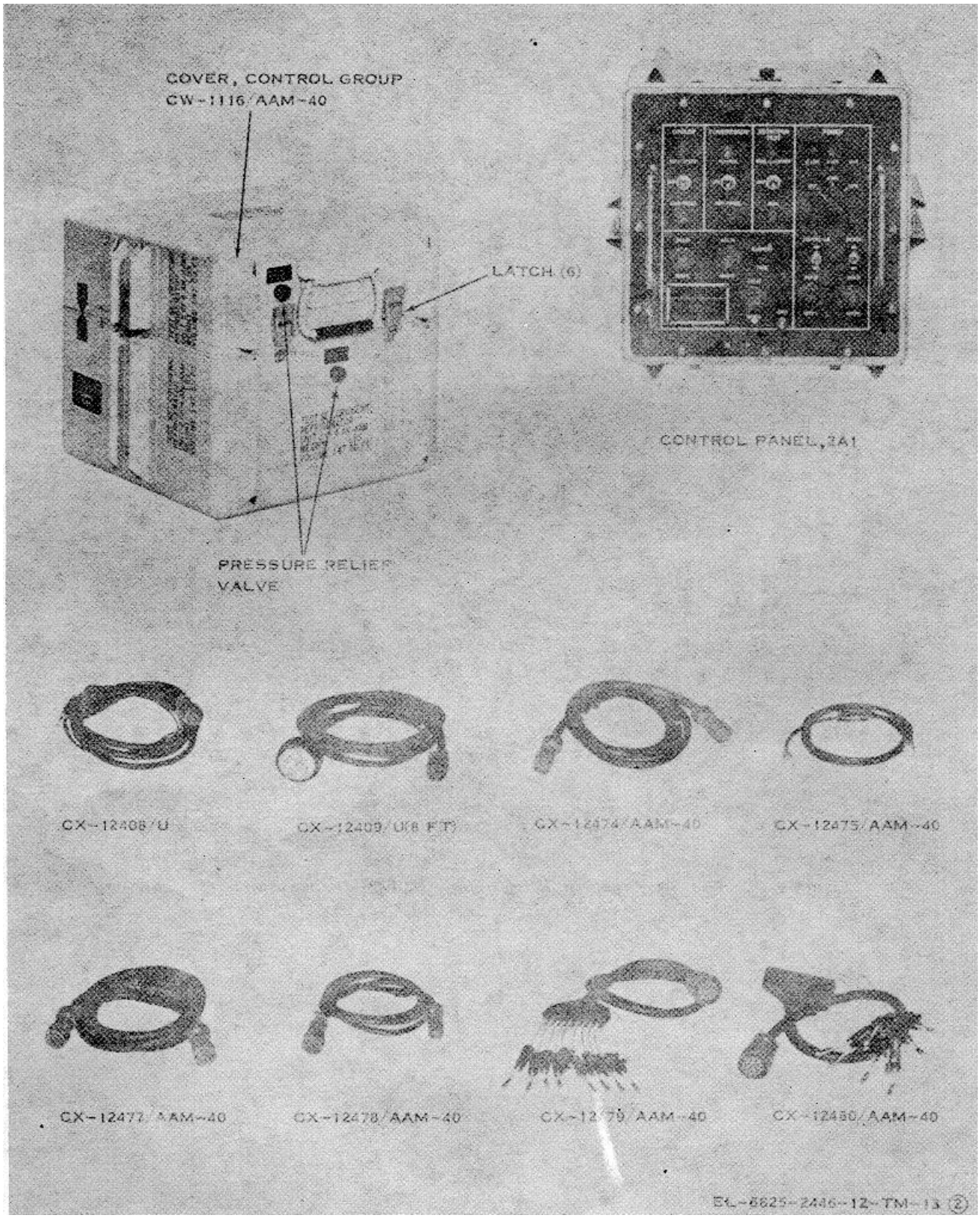


Figure 1-1 (1). Test Set, Cryogenic Refrigerator AN/AAM-40, components (1 of 5).



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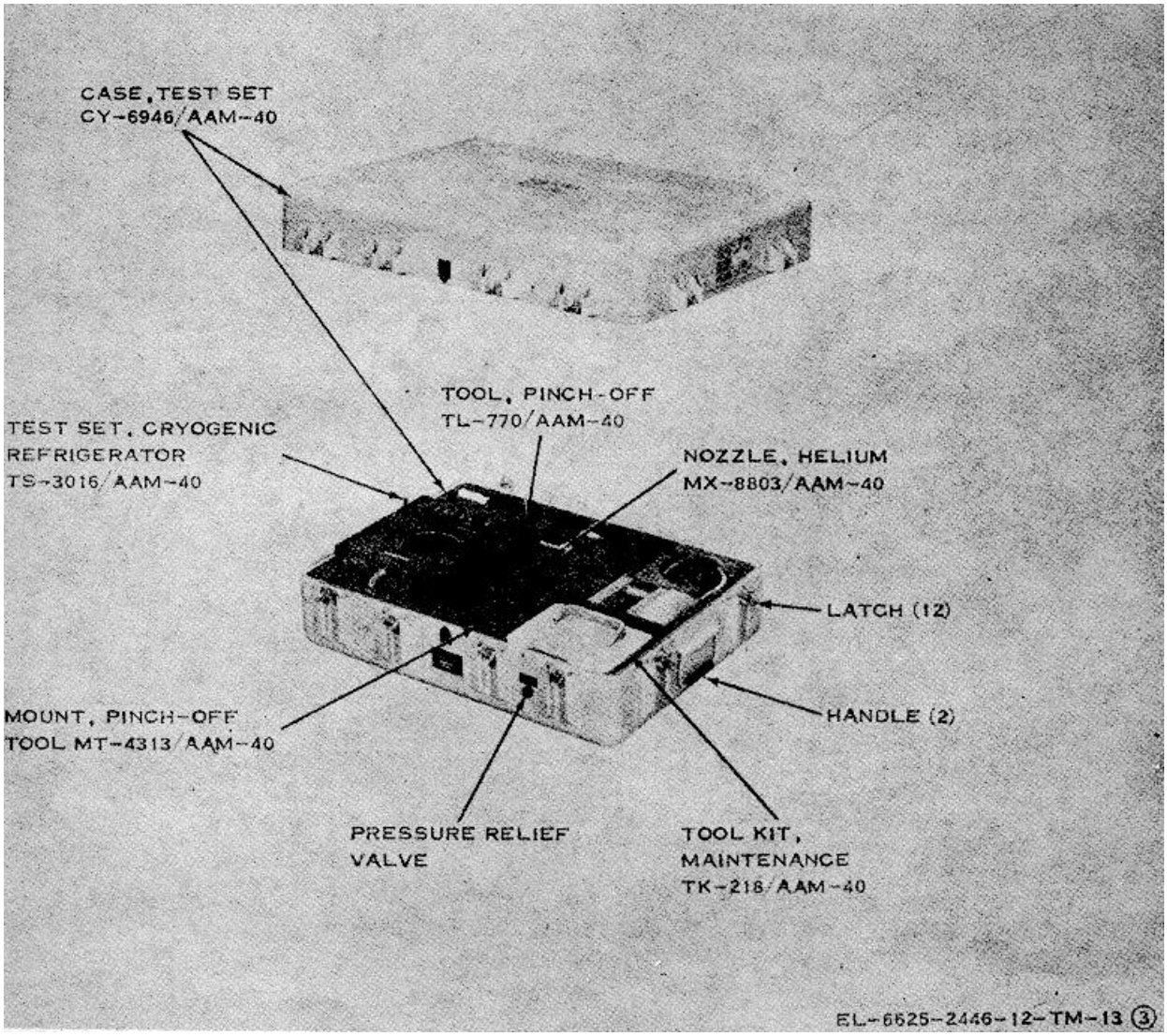


Figure 1-1 (3). Test Set, Cryogenic Refrigerator AN/AAM-40, components (3 of 5).

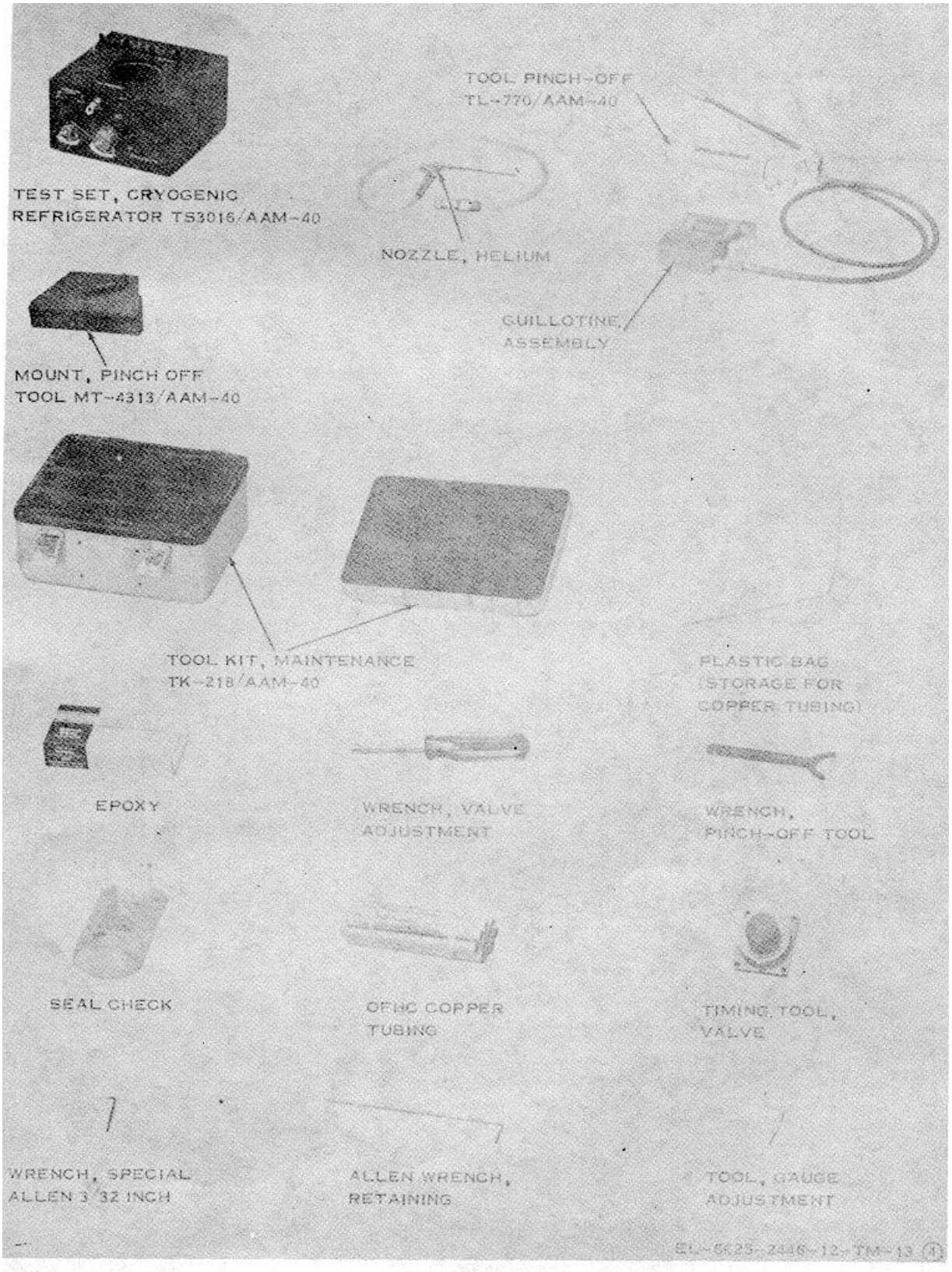


Figure 1-1 (4). Test Set, Cryogenic Refrigerator AN/AAM-40, components (4 of 5).

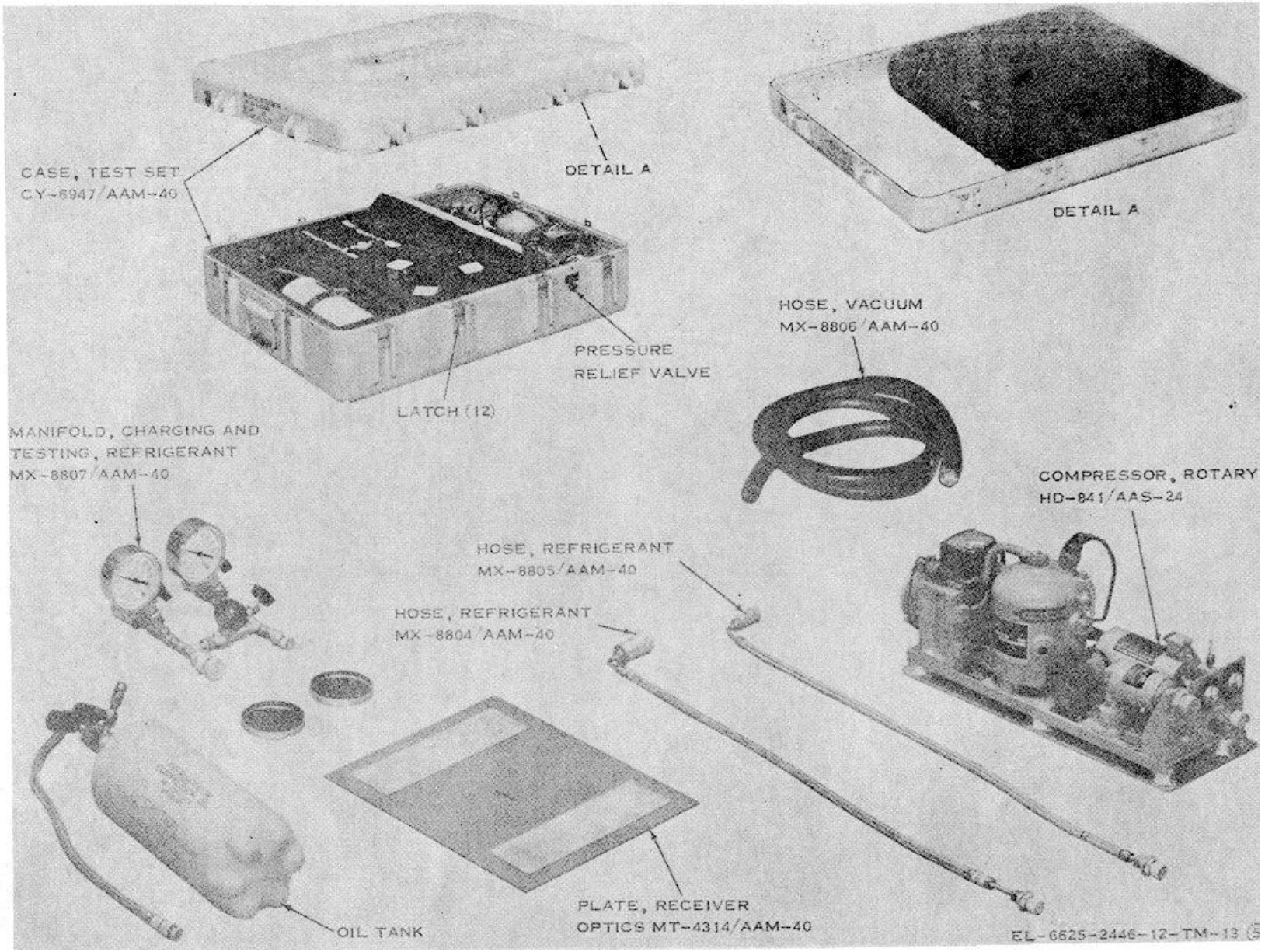


Figure 1-1 (5). Test Set, Cryogenic Refrigerator AN/AAM-40, components (5 of 5).

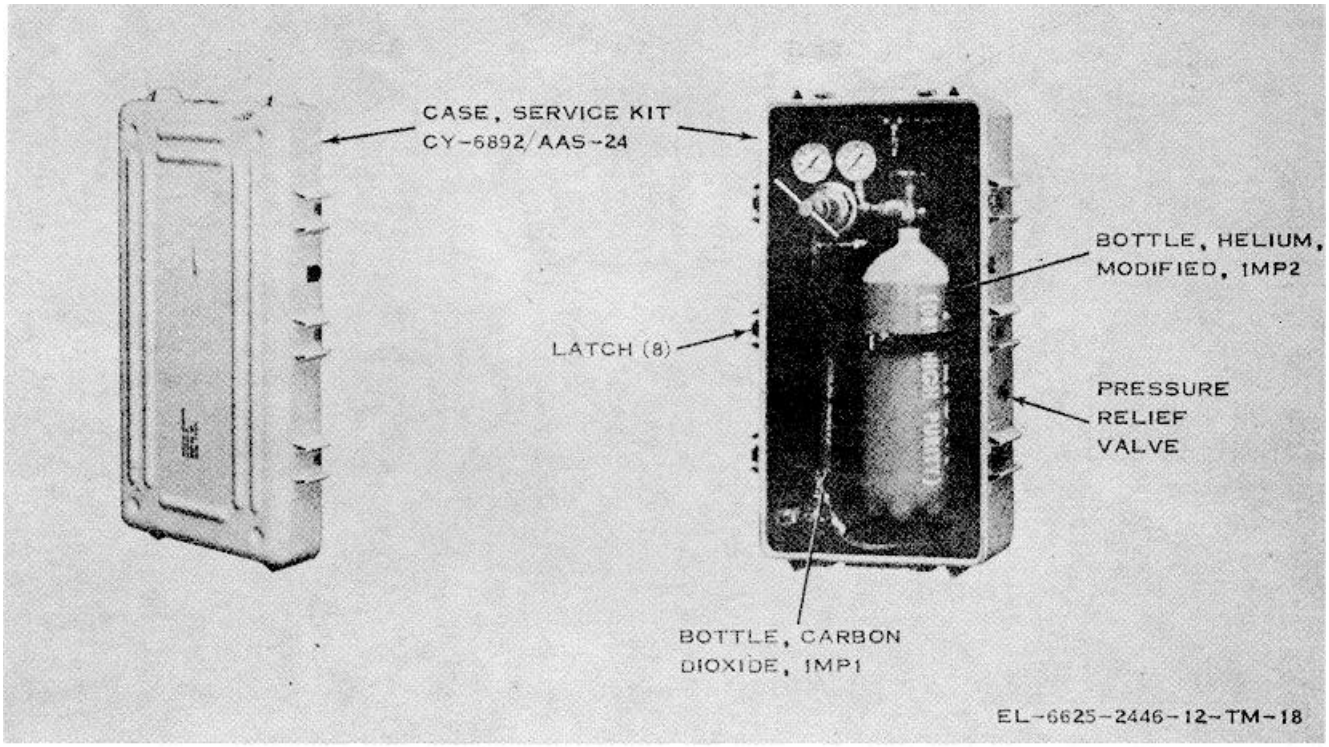


Figure 1-2. Service Kit, Refrigerant MK-1171/AAS-24.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope of Manual

a. This manual describes Test Set, Cryogenic Refrigerator AN/AAM-40 (cryo test set) and Service Kit, Refrigerant, MK-1171/AAS-24 (service kit) and covers installation, operation, and organizational maintenance. It includes instructions for operation under unusual conditions, performing preventive and periodic maintenance services, and replacement of parts available to the organizational maintenance repair- man. Instructions for using the cryo test set and service kit are contained in Technical Manual (TM) 11-5850-241-34 and TM 11-5850-241-12 respectively.

b. Major heads and paragraphs throughout this manual are applicable to the cryo test set. Information applicable to the service kit appears as required throughout the manual.

c. Appendix A contains references; appendix B contains the basic issue items list and items troop installed or authorized list; appendix C contains the maintenance allocation chart; and appendix D contains the repair parts and special tools list.

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

1-3. Forms and Records

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

b. **Report of Packaging and Handling Deficiencies.** Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-.58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

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 4610.33A/AFR 75-18/ MCO P4610.19B, and DSAR 4500.15.

1-3.1. Reporting of Errors

You can help improve this manual by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL- MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using DA Form 2407 (Maintenance Request). Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIRs should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

1-3.3. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

1-3.4. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Cryo Test Set. The cryo test set provides facilities for bench testing Compressor, Rotary HD-842/AAS-24 (compressor) and Refrigerator, Cryogenic HD-868/AAS-24 (refrigerator assembly), components of Detecting Set, Infrared AN/AAS- 24. When used with additional equipment (para 1-11) the cryo test set facilitates the following tests.

(1) Compressor, Rotary HD-841/AAS-24.

(a) Phase reversal test.

(b) Bit test.

(2) Refrigerator, Cryogenic HD-868/AAS-24.

(a) Cool down test.

(b) Motor speed test.

(c) Leak detector test.

b. Service Kit. The service kit provides servicing for the refrigerator assembly without removing it from the aircraft. The service kit is used to purge or replenish the helium (He) and carbon dioxide (CO_2 in the refrigerator assembly.

1-5. Technical Characteristics

a. Vacuum Pump Group.

(1) Input Power.

(a) 115± 11.5 volts alternating current (vac), 400 ±20 Hertz (Hz), 3-phase, 4-wire, 20 amperes (amp) maximum (max.) per phase.

*(*b) +27 ±2.0 volts direct current (vdc), 3.0 amp max.

(2) Output power. 3.5 kilovolts ac, 50 milliamp max.

(3) Vacuum pump assembly output.

(a) 5 X 10^{-4} Torr.

(b) 5 X 10^{-8} Torr.

NOTE

One Torr is the pressure of 1 millimeter of Mercury (Hg) at zero degrees centigrade (0° C.) and at standard gravity.

b. Test Set, Control Group.

(1) Input power.

*(*a) 115 ±11.5 vac, 400 ±20 Hz, 3-phase, 4- wire, 10 amp max. each phase.

*(*b) 27 +2.0 vdc, 3.0 amp max.

(2) Output power.

*(*a) 115 +11.5 vac, 400 +20 Hz, 3-phase, 4-10 amp max. each phase.

*(*b) 27 +2.0 vdc, 3.0 amp max.

c. Test Set, Maintenance Group.

(1) Detector tester input power.

(a) 115 +11.5 vac, 400 +20 Hz, 3-phase, 4- wire (supplied from control group.)

*(*b) 27±2.0 vdc (supplied from control group).

(2) Detector tester output power. Conditioned output of 0 to 3.0 vdc, 50 milliamp max.

d. Evacuation - Charging Group.

(*1) Compressor oil charging tank contents.* Cooling oil and high-purity (99.99 percent or better) helium; chemical symbol, He.

(2) Compressor oil charging tank pressure. 300 psig (pounds per square inch gauge).

e. Atmospheric Conditions.

(1) Operating. 10, 000 feet above sea level max., -25°F. to 131°F. temperature range.

(2) Non-operating. 50, 000 feet above sea level maximum, -65°F. minimum to 155°F. maximum during shipment or storage.

f. Service Kit.

(1) Helium cylinder fluid. High-purity (99.99 percent or better) helium; chemical symbol, He.

(2) Helium cylinder pressure. 1800 psig.

(3) Helium cylinder capacity. 20 cubic feet at 1 atmosphere.

(4) Atmospheric conditions (operating and nonoperating). -40C, 550 C., 0 to 100 percent relative humidity.

(5) Helium cylinder delivery pressure. 255 psig.

(6) CO^2 bottle capacity. 5.7 cubic feet at 1 atmosphere.

1-6. Items Comprising on Operable Equipment

The major components of the cryo test set and the service kit and their dimensions are listed in table 1-1 and table 1-1.1.

Table 1-1. Items Comprising an Operable Cryo Test Set

FSN	QTY	Nomenclature part No., and mfg code	Wt (lbs)	Dimensions (in.)			Fig. No.
				Height	Dept	Width	
4130-197-6347	1	Test Set, Cryogenic Refrigerator AN/AAM-40 **NOTE** The part number is followed by the applicable 5digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc.					1-1
4130-197-6350	1	Vacuum Pump Group OA-8590/AAM-40 (Group 1), consisting of:	370	29.5	28	47.6	1-1

FSN	QTY	Nomenclature part No., and mfg code	Wt (lbs)	Dimensions (in.) Height	Dept	Width	Fig. No.
4130-197-6351	1	Power Supply PP-6527/AAM-40 (1A1)	28	13.3	19	14	1-1
4130-407-7032	1	Vacuum Pump Assembly HD-882/AAM-40 (1MP13)	294	29.5	28	46	1-1
6625-196-2844	1	Cable Assembly, Power Electrical CX-12408/U (1W1)	1.6	96(lg)	…	…	1-1
6625-470-4315	1	Cable Assembly, Power Electrical CX-12409/U(1W2)	1.5	96(lg)			1-1
4130-197-6350	1	Cable Assembly, Special Purpose, Electrical CX-12476/AAM-40 (1W3)	0.4	60(lg)			1-1
4130-197-6346	1	Control Group, Test Set OK-155/AAM-40 (Group 2), consisting of:	35	15.6	16.6	13.5	1-1
4130-197-6349	1	Control, Test Set C-8595/AAM-40 (2MP1I)	20	15.6	15.6	10	1-1
6625-196-2844	1	Cable Assembly, Power, Electrical CX-12408/U (2W1)	1.6	96(lg)	…	…	1-1
6625-470-4315	1	Cable Assembly, Power, Electrical CX-12409/U (2W2)	1.6	…	…	96(lg)	1-1
4130-152-0890	1	Cable Assembly, Special Purpose Electrical CX-12480/AAM-40 (2W6)	1.1			36(lg)	1-1
4130-433-2337	1	Cable Assembly, Special Purpose Electrical CX-12479/AAM-40 (2W7)	1.2			36(lg)	1-1
4130-403-5824	1	Cable Assembly, Special Purpose Electrical CX-12478/AAM-40 (2W3)	0.6			60(lg)	1-1
4130-433-2338	1	Cable Assembly, Special Purpose Electrical CX-12477/AAM-40 (2W4)	1.4			60(lg)	1-1
4130-403-5822	1	Cable Assembly, Special Purpose Electrical CX-12475/AAM-40 (2W8)	0.25			60(lg)	1-1
4130-403-5821	1	Cable Assembly, Special Purpose Electrical CX-12474/AAM-40 (2W5)	1.4	…	…	60(lg)	1-1
4130-197-6338	1	Test Set, Maintenance Group OQ-75/AAM-40 (Group 3), consisting of:	80	22	29.7	11.6	1-1
4130-197-6348	1	Test Set, Cryogenic Refrigerator TS-3016/AAM-40 (3A1)	19	10.4	10.9	7.4	1-1
5110-252-5748	1	Mount, Pinch-Off Tool MT-4313/AAM-40 (3MP2)	1.7	2.0	8.7	5.3	1-1
4130-197-6339	1	Nozzle, Helium MX-8803/AAM-40 (3MP3)	0.6	37.8	0.8	7.5	1-1
5180-252-5750	1	Tool Kit, Maintenance TK-218/AAM-40 (3MP5) consisting of:		6.0	7.8	9.0	1-1
	1	Detector, Leak: 69001 (28968)					1-1
5210-071-9099	1	Tool, Gauge, Adjustment: 535788-3 (96214)					1-1
6625-431-8438	1	Tool, Timing, Valve: B3734-119 (31945)					
5895-946-2771	10	Tubing, OFHC, Copper: 530095-2 (96214)					1-1
5120-191-1670	1	Key, Socket-Head Screw: 69226-1 (96214)					1-1
5120-136-9022	1	Wrench, Pinch-Off-Tool 665743-1 (96214)					1-1
5120-191-1685	1	Key, Socket-Head Screw: 696175-1 (96214)					1-1
5120-189-6130	1	Wrench, Valve Adjustment: 696073-1 (96214)					1-1
5110-252-5749	1	Tool, Pinch-off TL-770/AAM-40 (3MP6)	16	60(lg)			1-1
4130-197-6343	1	Evacuation-Charging Group OA-8591/AAM-40 (Group 4), consisting of:	97	26.6	33.6	11.5	1-1

FSN	QTY	Nomenclature part No., and mfg code	Wt (lbs)	Dimensions (in.) Height	Dept	Width	Fig. No.
4720-409-8081	1	Hose, Refrigerant MX-8804/AAM-40 (4MP5)	1.2	60(lg)			1-1
4720-409-8082	1	Hose, Refrigerant MX-8805/AAM-40 (4MP6)	.85	60(lg)	…	…	1-1
4720-409-8083	1	Hose, Vacuum MX-8806/AAM-40 (4MP7)	1.7	60(lg)	…	…	1-1
4130-197-6344	1	Manifold, Charging and Testing, Refrigerant MX-8807/AAM-40 (4MP8)	4.5	9.6	10.3	6.2	1-1
5850-197-1765	1	Plate, Receiver Optics MT-4314/AAM-40 (4MP10)	2.6	11.1	15.9	0.1	1-1
6625-480-5710	1	Tank, Oil Charging, Compressor 695932-1 (96214) (4MP13)	15.0		5.3	12.6	1-1
5855-466-0155	1	Compressor, Rotary HD-841/AAS-24	26	21.12	6.00	9.5	1-1

Table 1-1.1. Items Comprising an Operable Service Kit

FSN	QTY	Nomenclature part No., and mfg code	Wt (lbs)	Dimensions (in.) Height	Dept	Width	Fig. No.
4940-403-1007	1	Service Kit, Refrigerant MK-1171/AAS-24, consisting of :	50	16.6	30.9	10.0	1-2
8120-493-9628	1	Bottle, Carbon Dioxide: 694652-1 (96214) (1MP1)	3.5	2.0	2.0	15.0	1-2
8120-657-5068	1	Bottle, Helium, Modified: 63099-1 (96214) (1MP2)	17.0	…	6.3	18.3	1-2
4720-491-3485	1	Hose Assembly, Helium Bottle: 692238-1 (96214) (1MP6)	8.0	72(lg)	…	…	3-5

1-6.1. Expendable Consumable Supplies and Materials

Expendable consumable supplies and materials are listed in table 1-1.2.

Table 1-1.2. Expendable Consumable Supplies and Materials

The supplies and materials listed in this table are required for operation of this equipment and are authorized to be requisitioned by SB 700-50. The FSN for the applicable unit of issue required can be found in appropriate supply catalogs. The FSCM is used as an element in item identification to designate manufacturer or distributor or Government agency, etc., and is identified in SB 708-42.

Item	*Description*	Ref No. and FSCM	FSC
1	Bottle, Charged, Carbon Dioxide Bone Dry	…	6830
2	Bottle, Charged, Helium 99.999 Percent Pure, Fed Specification BB-H-1168	…	6830
3	OF-HC Copper Tubing	…	5895
4	Epoxy		
5	Sealant and Adhesive		
6	Ucon-150 Oil, Pressurized with Helium		
7	Leak Check		
8	Cleaning Compound	…	6810

1-7. Common Names

Common names are listed in table 1-2.

Table 1-2. Common Names

Nomenclature	*Common name*
Test Set, Cryogenic Refrigerator AN/AAM-40	Cryo test set
Vacuum Pump Group OA-8590/AAM-40	Pump group
Power Supply PP-6527/AAM-40	Power Supply
High Vacuum Assembly HD-882/AAM-40	Vacuum assembly
Control Group, Test Set OK-155/AAM-40	Control group
Control, Test Set C-8595/AAM-40	Cryo control unit
Test Set, Maintenance Group OQ-74/AAM-40	Maintenance group
Test Set, Cryogenic Refrigerator TS3016/AAM-40	Detector tester
Tool, Pinch-Off TL770/AAM-40	Pinch-off tool
Mount, Pinch-Off-Tool MT-4313/AAM-40	Pinch-off-tool support
Nozzle, Helium MX-8803/AAM-40	Helium probe
Tool Kit, Maintenance T K-218/AAM-40	Maintenance tool kit
Evacuation-Charging Group OA-8591/AAM-40	Evacuation-charging group
Manifold, Charging and Testing, Refrigerant *MX-8807/AAM-40*	Test manifold
Hose, Refrigerant MX-8804/AAM-40	Refrigerant hose no.1
Hose, Refrigerant M-8805/AAM-40	Refrigerant hose no.2
Hose, Vacuum MX-8806/AAM-40	Vacuum hose
Plate, Receiver Optics MT-4214/AAM-40	Receiver optics plate
Compressor, Rotary HD-841/AAS24	Compressor
Service Kit, Refrigerant MK-1171/AAS-24	Service kit
Bottle, Carbon Dioxide	$C0_2$: bottle
Bottle, Helium, Modified	Helium bottle

1-8. Reference Designators

Reference designators are listed in table 1-3.

Table 1-3. Reference Designators

Reference designators	*Nomenclature*	*Manufacturer's part number*
1	Pump Group, Vacuum OA-8590/AAM-40	694747-1
1A1	Power Supply, PP-6527/AAM-40	694738-1
1A1A1	Leak Detector	692424-1
1A1A2	High Vacuum Unit, Cryogenic	692427-1
1AIA3	Power Supply, High Voltage	69624-1
1A2	Filter Assembly	696277-1
2	Test Set, Control Group OK-155/AAM-40	694743-1
2A1	Panel Assembly, Control, Unit 2	694737-1
2A1A1	Filter Assembly, Unit 2	696107-1
3	Test Set, Maintenance Group OQ75/AAM-40	694744-1
3A1	Test Set, Cryogenic Refrigerator TS-3016/AAM-40	694734-1
4	Evacuation-Charging Group OS-859 1/AAM-40	694745-1
1	Service Kit, Refrigerant MK-1171/AAS24	692479-1
1MP1	Bottle, Carbon Dioxide	694652-1
1MP2	Bottle, Helium, Modified	6330991
1MP6	Hose Assembly, Helium Bottle	692238-1

1-9. Description of Test Set, Cryogenic Refrigerator AN/AAM-40

(fig. 1-1)

a. General. The cryo test set consists of four groups; pump group, control group, maintenance group, and evacuation-charging group. Each group is housed in a portable, air-tight case.

b. Pump Group. The pump group consists of the power supply, filter assembly, and vacuum assembly. The power supply provides controls, indicators, meters, and connectors for controlling the pump group. To open the power supply disengage 8 captive screws on the front side of the transit case and remove the panel cover. The vacuum assembly provides connections to external equipment through vacuum hoses attached to the top of the pump group. These connections are accessible by disengaging 6 clamp-type latches securing the cover to the case. A pressure relief valve located on the cover equalizes pressure when activated. The pump group cover provides storage for two power cable assemblies. Primary power is applied to the pump group through two external connectors located on the lower right side of the case. Two lifting points on each side on the case facilitate lifting the pump group. Four casters, with swivel locks and wheel brakes provide portability for the pump group. Once in place, the pump group is lifted to the desired level with a skid jack assembly located on each side of the case. The pump group weighs 370 pounds and occupies a volume of 22.7 cubic feet.

c. Control Group. The control group consists of a cryo control unit and cover. The cryo control unit provides all the controls, indicators, and connectors to test the infrared detecting set compressor and cooled and to operate the cryo test

set detector tester (maintenance group). To open the cryo control unit disengage 6 clamp-type latches holding the cover on and lift the cover from the cryo control unit. Two pressure relief valves located on the cover and the cryo control unit equalize pressure when activated. The cover provides storage for eight electrical cable assemblies. Two handles on the cover facilitate carrying the control group. The control group weights 35 pounds and occupies a volume of 1.5 cubic feet.

d. Maintenance Group. The maintenance group is comprised of items used to service and support Detecting Set, Infrared AN/AAS-24. The items are the detector tester, pinch-off-tool, pinch-off- tool support, helium probe, and maintenance tool kit. To open the case, disengage the 12 clamp- type latches and lift the cover. A pressure relief valve located on the cover equalizes internal pressure when activated. Two handles on the cover facilitate carrying the maintenance group. The maintenance group weighs 80 pounds and occupies a volume of 3.4 cubic feet.

e. Evacuation-Charging Group. The evacuation-charging group is comprised of items used to service and support Detecting Set, Infrared AN/AAS-24. The items are the test manifold, refrigerant hose no. 1, refrigerant hose no. 2, vacuum hose, receiver optics plate, and compressor. To open the case, disengage the 12 clamp-type latches and lift the cover. A pressure relief valve on the cover equalizes pressure when activated. Two handles on the cover facilitate carrying the evacuation-charging group. The evacuation-charging group weighs 97 pounds and occupies a volume of 4.7 cubic feet.

1-10. Description of Service Kit, Refrigerant MK-1 171 /AAS-24

(fig. 1-2)

The service kit is a portable unit used to replenish the helium in the refrigerator assembly while the assembly remains in the aircraft. The service kit contains a 20-cubic foot capacity helium bottle charged to 1800 psig, a hose assembly, and a CO: bottle, capacity 1 2 lb. The CO: bottle is used to replenish the CO. in the vacuum jacket of the cryogenic refrigerator. To open the service kit disengage the 10 clamp-type latches and lift the cover. A pressure relief valve located on the case equalizes pressure when activated. The service kit weighs 50 pounds and occupies a volume of 3.25 cubic feet.

1-11. Additional Equipment Required

The additional equipment listed in table 1-4 is used with the cryo test set to test the compressor and refrigerator assembly of Detecting Set, Infrared AN/AAS-24.

Table 1-4. Additional Equipment Required

Nomenclature	*Applicable publications*
Oscilloscope AN/USM-281A	TM 11-6625-1703-15
Digital Voltmeter (Non-Linear Systems Model X-2) with dual-function converter, part number 37-42, and ac converter, part number 37-45.	

CHAPTER 2

INSTALLATION

2-1. General

This chapter contains instructions for unpacking, checking upon receipt, power connections and preoperational checks of Test Set, Cryogenic Refrigerator AN 'AAM-40 and Service Kit, Refrigerant MK-1171 AAS-24.

2-2. Packaging Data

(fig. 2-1)

a. The cryo test set is shipped in four plywood shipping containers. Each shipping container is lined on all sides, top and bottom, with foam pad- ding. The cable assemblies for the pump group and control group are packed in the cover of each respective case. The pump group, including ship- ping container, measures 371/2 by 36 by 60 inches, weighs approximately 575 pounds, and occupies a volume of 34.3 cubic feet. The control group, including shipping container, measures 19 by 19 by 13 inches, weighs approximately 65 pounds and occupies a volume of 2.7 cubic feet. The maintenance group, including shipping container, measures 35 by 28 by 17 inches, weighs approximately 115 pounds and occupies a volume of 9.6 cubic feet. The evacuation-charging group, including shipping container, measures 39 by 32 by 17 inches, weighs approximately 135 pounds and occupies a volume of 12.3 cubic feet.

b. The service kit is shipped in a plywood container, measures 36 by 22 by 17 inches, weighs approximately 85 pounds, and occupies a volume of 7.8 cubic feet.

2-3. Unpacking the Equipment

To remove the cryo test set and the service kit from the shipping containers, proceed as follows.

a. Place the shipping containers on a suitable, clean work area, making certain the top of each container is facing up.

b. Carefully remove the top and sides of the pump group shipping container. Use a nail puller, and take care not to damage the case. Remove the top and one side from each of the other three containers.

c. Remove the eight bolts securing the pump group to the base of the shipping container and slide the two 2 by 8 inch anchor boards from the cart fork lift rails.

d. Using a fork lift (of sufficient capacity) inserted in the fork lift rails at the front of the pump group, lift the pump group six to eight inches above the bottom of the shipping container.

e. Remove the base of the shipping container from beneath the pump group.

f. Release the wheels by withdrawing the one transport pin from each wheel; position the wheels in rolling position and insert the two locking pins for each wheel.

g. Slowly lower the pump group to the floor. Remove the fork lift.

h. Level the pump group by using the ratchet provided to adjust the leveling jacks.

WARNING

Two men are required to lift the cryo test set maintenance group or evacuation-charging group.

i. Activate the pressure relief valves on the cryo test set and the service kit to equalize pressure.

j. Loosen all covers by disengaging the cover latches on the cryo test set and the service kit; remove the covers.

k. Remove the cables and hoses from the cryo test set.

2-4. Checking Unpacked Equipment

a. Inspect the equipment for physical damage that may have occurred during shipment. If the equipment has been damaged, fill out and for- ward DD Form 6 (para 1-3b).

b. Check to see that the equipment is complete

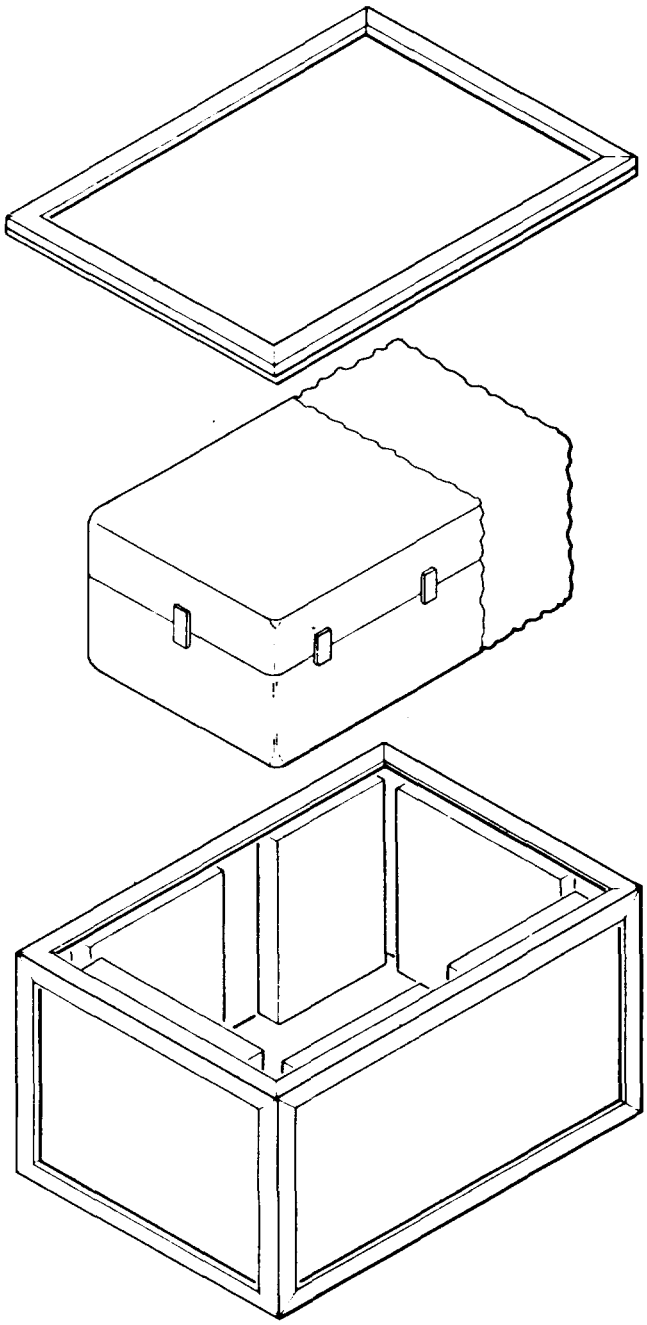


Figure 2-1. Cryo test set and service kit packaging.

as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (app B). Report all discrepancies in accordance with paragraph 1-3c. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check also to see whether all MWO's current at the time the equipment is placed in use have been applied (DA Pam 310-7).

d. Check the latest issue of DA Pam 310-4 and its latest changes to see whether you have the latest editions of all applicable maintenance literature.

2-5. Installation Instructions

Initial installation of the cryo test set requires connection of four power cables to the pump and control group of the cryo test set.

a. Set the 28 VDC and 115 VAC circuit breakers on the pump group and control group to OFF. Set the power mode switches to OFF.

b. Connect the pump group cable assembly 1W1 between connector 1A2J1 and the 28-vdc power source.

c. Connect the pump group cable assembly 1W2 between 1A2J2 and the 115-vac, 3-phase, 4- wire power source.

d. Connect the control group cable assembly 2W1 between 2A1J1 and the 28-vdc power source.

e. Connect the control group cable assembly 2W2 between 2A1J2 and the 115-vac, 3-phase, 4- wire power source.

2-6. Initial Checking of Equipment

Upon completion of installation, the cryo test set will be given an initial checkout by performing the starting procedure (para 3-6) and the stop- ping procedure (para 3-7).

CHAPTER 3

OPERATION

Section I. OPERATOR'S CONTROLS, INDICATORS AND CONNECTORS

3-1. Control and Indicator Functions

a. Pump Group (fig. 3-1). The controls, indicators, valves and connectors for the pump group are listed in table 3-1.

Table 3-1. Pump Group Control, Indicator, and Valve Functions

Control or indicator	*Function*
MECH PUMP:	
MICRONS (meter)	Indicates vacuum condition.
ON/OFF (2-position toggle switch)	Sw Pos Action ON Applies ac power to the mechanical pump. OFF Removes ac power from the mechanical pump.
ON (press-to-test lamp assembly)	When lighted indicates power is applied to the mechanical pump.
TEMP OUT OF LIMITS (press-to-test lamp assembly)	When lighted indicates the mechanical pump oil temperature is too low for satisfactory operation.
ION PUMP:	
CURRENT/VOLTAGE (meter)	Meter indicates the ion pump current or voltage (selected by METER RANGE switch).
METER RANGE (5-position rotary switch)	Selects the current range or 5K volts for the CURRENT, / VOLTAGE meter.
PUMP SELECT (3-position rotary switch)	*Sw* *Action* APP Power is applied to the ion pump on the cryogenic refrigerator under test. MAIN Power is applied to the vacuum assembly ion pump. BOTH Power is applied to both the ion pump of the cryogenic refrigerator under test and the vacuum assembly ion pump.
RUN, START (2-position toggle switch)	*Sw* *Action* START Applies 0.5 ampere current to start the ion pump. RUN Applies 50 milliampere to ion pump for normal operation.
START (press-to-test lamp assembly)	When lighted, indicates the ion pump power is in the start mode of operation.
RUN (press-to-test lamp assembly)	When lighted, indicates the ion pump power supply is in the run mode of operation.
ON/OFF (2-position circuit breaker)	Provides ion pump overload protection for the 115-vac, 3-phase circuit.
ELAPSED TIME (meter)	Indicates the total operating time of the pump group.
LEAK DETECTOR: (meter)	Counterclockwise deflection indicates leakage into the vacuum chamber.
ZERO COARSE (potentiometer)	Provides coarse adjustment for zero of LEAK DETECTOR meter.
ZERO FINE (potentiometer)	Provides fine adjustment for zero of LEAK DETECTOR meter.
SENS (potentiometer)	Adjusts the sensitivity of leak detector as required for different size leaks.
HEATER CONTROLS:	
ON/OFF (MECH PUMP) (2-position circuit breaker)	*Sw* *Action* ON Applies ae power to the mechanical pump heaters. OFF Removes power from the mechanical pump heaters.
MECH PUMP (press-to-test lamp assembly)	When lighted, indicates power is applied to the mechanical pump heater.

Control or indicator	*Function*
ON/OFF (FORELINE TRAP) (2-position circuit breaker)	*Sw Pos* *Action* ON Applies ac power to the foreline trap heater. OFF Removes ac power from the foreline trap heater.
FORELINE TRAP (press-to-test lamp assembly)	When lighted indicates power is applied to the foreline trap heater.
ON/OFF (H VAC ASSY) (2-position circuit breaker)	*Sw* *Action* ON Applies ac power to the vacuum assembly heater. OFF Removes power from the vacuum assembly heater.
H VAC ASSY (press-to-test lamp assembly)	When lighted, indicates power is applied to the vacuum assembly heater.
POWER:	
28 VDC (2-position circuit breaker)	Provides protection for the 28-vdc circuits. *Sw* *Action* ON Applies 28 vdc to the power supply. OFF Removes 28 vdc from the power supply.
115 VAC 30 (2-position circuit breaker)	Provides protection for the 115-vac, 3-phase circuits. *Sw* *Action* ON Applies 115 vac to the power supply. OFF Removes 115 vac from the power supply.
Power mode switch (3-position rotary switch)	*Sw Pos* *Action* OFF Removes power from the power supply and the vacuum assembly. STBY Provides power to the power supply indicator lamps. OPR Provides power to the power supply and vacuum assembly.
0 ERR (press-to-test lamp assembly)	When lighted, indicates the applied power has incorrect phase sequence.
STBY (press-to-test lamp assembly)	When lighted, indicates power is applied to the power supply in standby mode.
OPR (press-to-test lamp assembly)	When lighted, indicates power is applied to the power supply in operate mode.
Exhaust valve	Opens the port by which the evacuated gases escape from the roughing pump.
Ballast valve	Releases any moisture that collects in the roughing pump.
High vacuum valve	Isolates the high vacuum ion pump from the rest of the system.
Isolation valve	Isolates the roughing pump from the upper tubing manifold and the ion pump.
Roughing valve	Isolates the roughing pump from the cryogenic refrigerator helium chamber.

b. Control Group (fig. 3-2). The controls and indicators for the control group are listed in table 3-2.

Table 3-2. Control Group Control and Indicator Functions

Control or indicator	*Function*
COOLER:	
HIGH SPEED (press-to-test lamp assembly)	When lighted, indicates the high speed mode power is applied to the cooler.
Switch (3-position toggle switch)	*Sw Pos* *Action* HIGH SPEED (up) Applies high speed mode power to cooler. OFF Removes power from cooler. LOW SPEED (down) Applies low speed mode power to cooler.
LOW SPEED (press-to-test lamp assembly)	When lighted, indicates low speed mode power is applied to the cooler.
COMPRESSOR:	
NORMAL (press-to-test lamp assembly)	When lighted, indicates the correct phase power is applied to the compressor.
Switch (3-position toggle switch)	*Sw Pos* *Action* NORMAL (up) Applies 115-vac, 3-phase power to the compressor in normal phase. OFF Removes power from the compressor. REV PHASE (down) Applies 115-vac, 3-phase power to the compressor in reverse phase.
REV PHASE (press-to-test lamp assembly)	When lighted, indicates the reverse phase power is applied to the compressor.

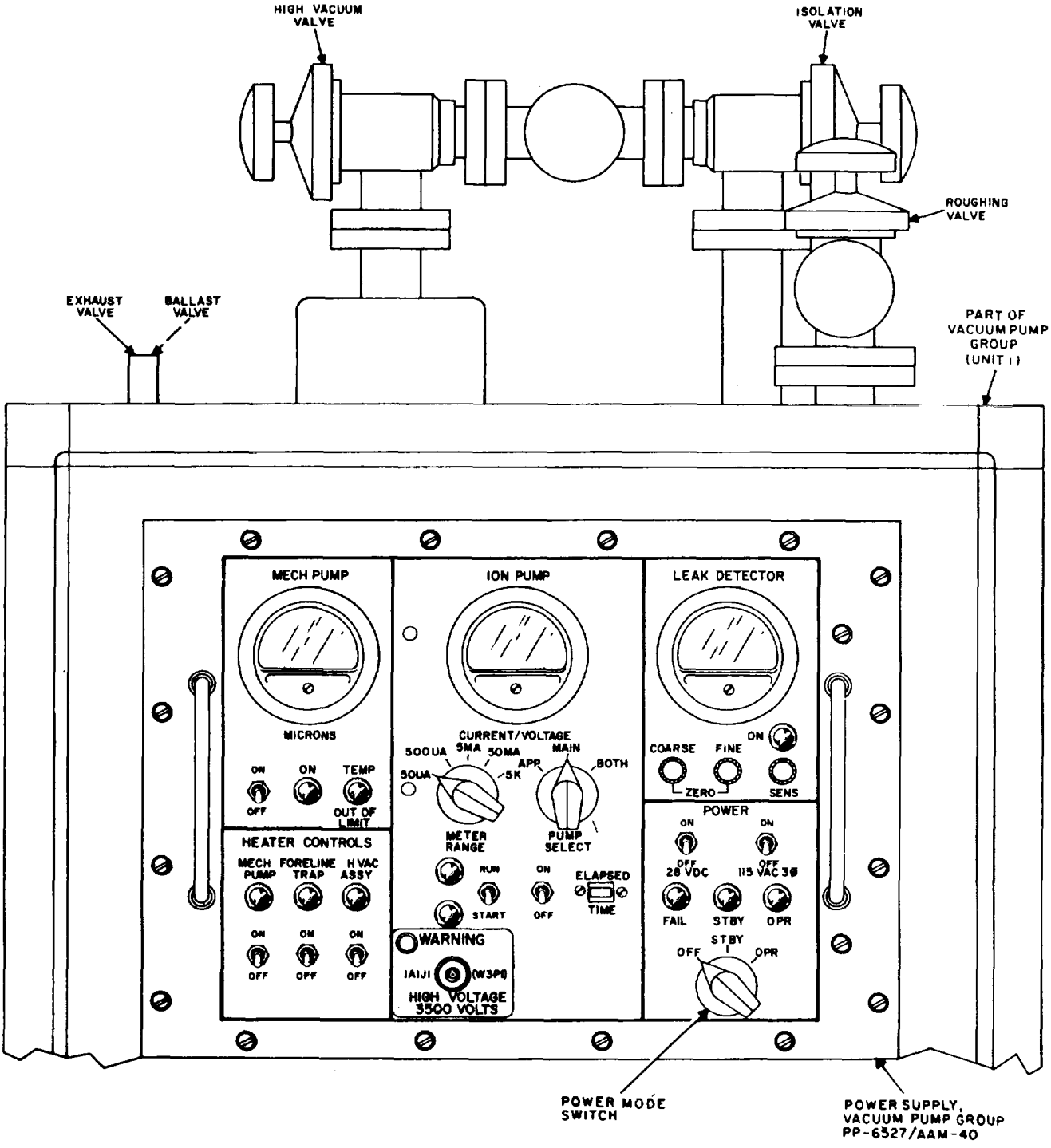


Figure 3-1. Pump group controls, indicators, valves and connectors.

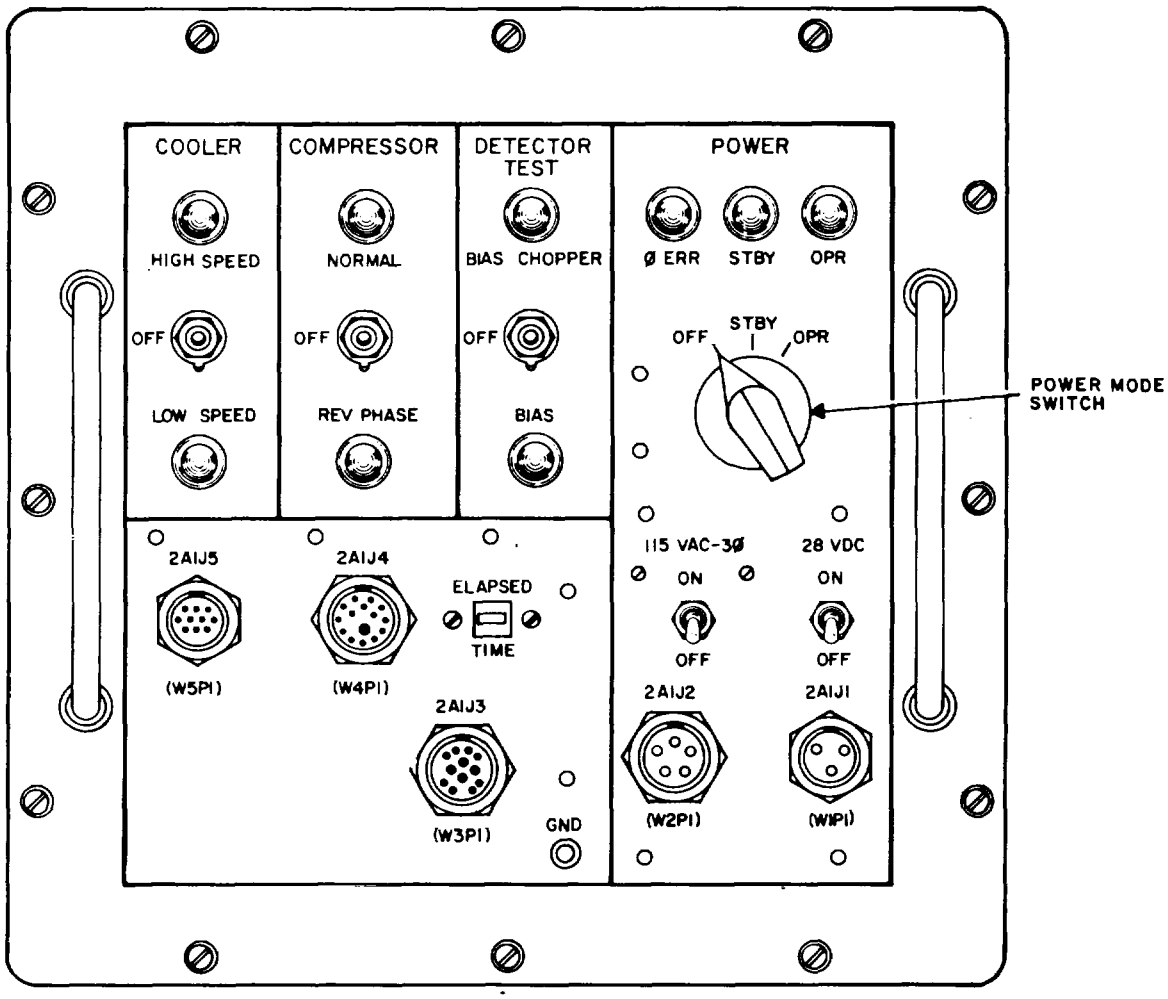


Figure 3-2. Control grows controls, indicators and connectors.

Control or indicator	*Function*
FOR TEST:	
CHOPPER (as-to-test assembly)	Indicates power is applied to detector tester bias and chopper circuitry.
Position switch)	*Sw Pos Action* BIAS Provides power to CHOPPER the detector (up) tester to activate the bias circuitry and chopper motor. OFF Removes power from the detector tester. BIAS Provides power to (down) the detector tester to activate the bias circuitry.

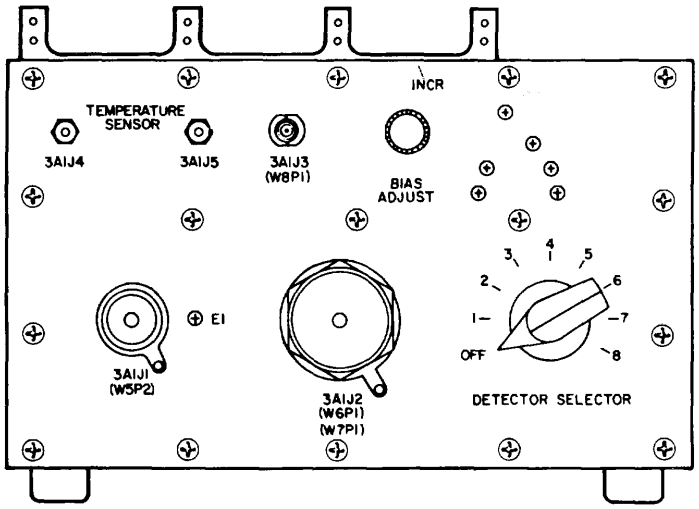
Control or indicator	*Function*
POWER:	
0 ERR (press-to-test lamp assembly)	When lighted, indicates power is out of phase.
STBY (press-to-test lamp assembly)	When lighted, indicates power is applied to the cryo control unit when in standby mode.
OPR (press-to-test lamp assembly)	When lighted, indicates power is applied to the cryo control unit when in the operate mode.
Power Mode Switch (3-position rotary switch)	*Sw Pos Action* OFF Removes power from the units under test and the detector tester. STBY Provides 28 vdc to the cryo-

Control or indicator	*Function*
	genic refrigerator control unit indicator lamps for press-to-test.
	OPR Provides power to the units under test and detector tester.
115 VAC-30 (2-position circuit breaker)	Provides protection for 115-vac, 3 phase circuits. *Sw Pos Action* ON Applies 115-vac to cryogenic refrigerator control unit. OFF Removes 115-vac from cryogenic refrigerator control unit.
28 VDC (2-position circuit breaker)	Provides protection for 28-vdc circuits. *Sw Pos Action* ON Applies 28 vdc to the cryo control unit. OFF Removes 28 vdc from the cryo control unit.
ELAPSED TIME	Action indicates the number of hours the control group has been in operation.

c.Detector Tester 3Al (fig. 3-3). The controls for the detector tester are listed in table 3-3.

Table 3-3. Detector Tester 3A1 Control Functions

Control	*Function*
DETECTOR SELECTOR 9-position rotary switch)	*Action Sw Pos* OFF No detector is 1 through 8 selected for test. Selects the detectors in sequence for test.
BIAS ADJUST (potentiometer)	Varies bias voltage on detector under test.



EL-6625-2446-12-TM-9

Figure 3-3. Detector tester 3A1 controls and connectors.

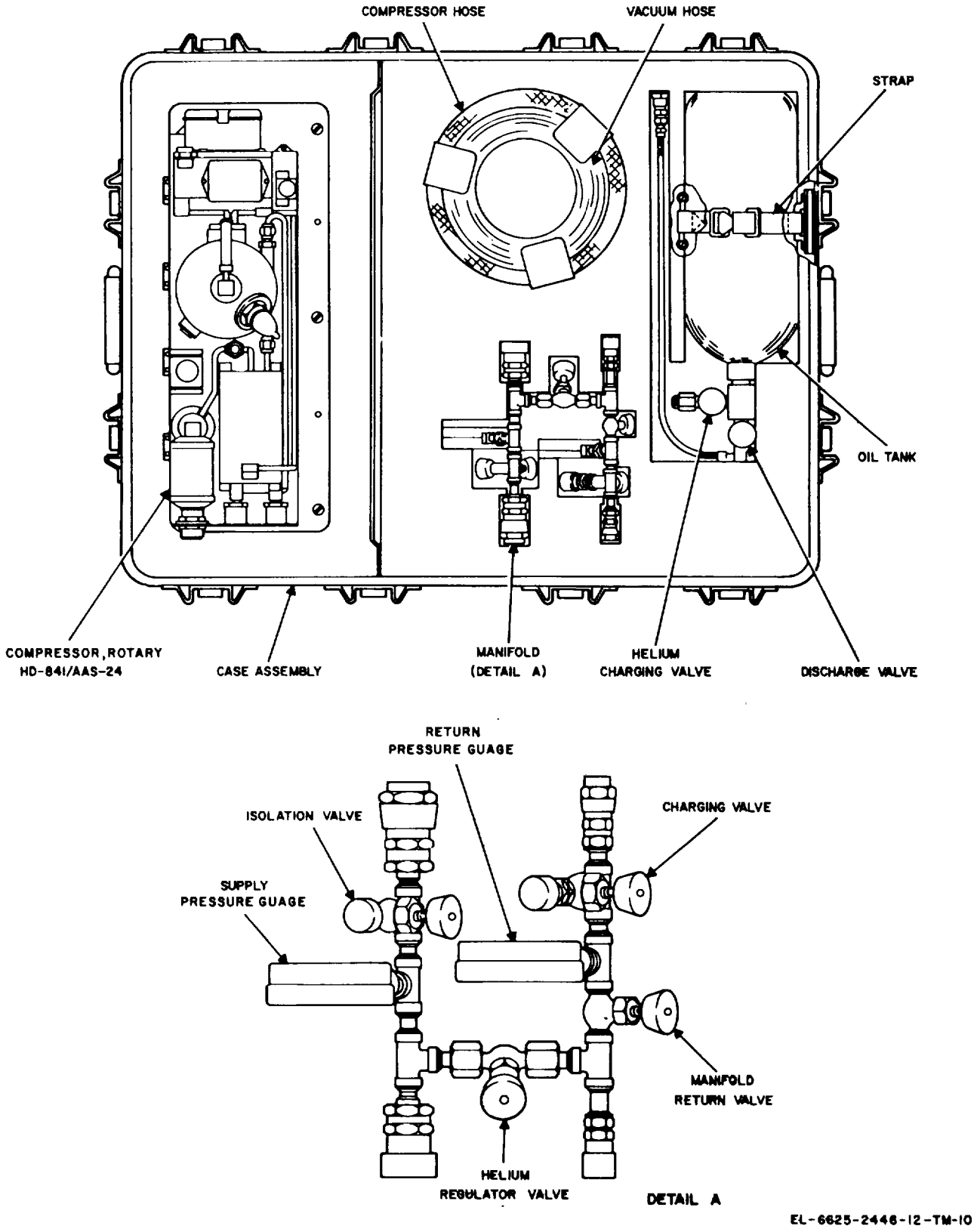


Figure 3-4. Evacuation-charging group valves and gauges.

d. Manifold Valves and Gauges (fig. 3-4). The valves and gauges for the charging and testing manifold are listed in table **3-4.**

Table 3-4. Manifold Valve and Gauge Functions

Valve or gauge	*Function*
Isolation Valve	Isolates a vacuum in the manifold and cryogenic refrigerator.
Helium Regulation Valve	Regulates the compressor helium supply and return flow to obtain pressure drops equal to that when a cryogenic refrigerator is connected to the compressor.
Manifold Return Valve	Prevents a vacuum from being pulled through the return port of the compressor during the evacuation stage.
Charging Valve	Regulates the helium that charges the compressor after a vacuum is obtained.
Supply Pressure Gauge	Indicates the helium supply pressure to the compressor.
Return Pressure Gauge	Indicates the helium return pressure from the compressor.

e. Compressor Rotary, HD-841/AAS-24. The compressor included in the cryo test set is identical to the compressor used in Detecting Set, Infrared AN/AAS-24 and is covered in TM 11-5850-241-12.

3-2. Service Kit, Valves and Gauges

(fig. 3-5)

The valves and guages for the service kit are listed in table **3-5.**

Table 3-5. Service Kit Valve and Gauge Functions

Valve or gauge	*Function*
CO_2 Bottle Shut-Off Valve	Opens or closes the supply of CO_2 contained in the bottle.
High Pressure Gauge (CO_2)	Indicates the CO, pressure in the bottle.
Low Pressure Gauge (CO_2)	Indicates the delivery pressure from the regulator.
Relief Valve (CO_2)	Relieves delivery pressure above desired limit.
Regulator (CO_2)	Regulates the CO_2 supply to the desired purge pressure.
CO_2 Purge Isolation Valve	Used in the purge process.
CO_2 Bleed-Off Valve	
Low Pressure Gauge (He)	Indicates the delivery pressure out of the regulator.
Regulator (He)	Regulates the helium supply to the desired charge pressure.
High Pressure Gauge (He)	Indicates the He pressure in the bottle.
Relief Valve (He)	Relieves pressure above desired limit.
Helium Bottle Shut-Off Valve	Opens or closes the helium supply contained in the bottle.

3-3. Connectors

a. Pump Group *(fig.* 1-1 and 3-1). The connectors, associated cables, and destinations for the vacuum assembly and pump control unit are listed in table 3-6.

Table 3-6. Pump Group Connectors (Figure 1-1)

WARNING

DEATH or SERIOUS INJURY may result from contact with 3500 vac power existing at 1A1J1.

Control unit connector	*Connects cable assembly*	*To*
1A2J1	1W1	Dc power source
1A2J2	1W2	Ac power source
1A1J1	1W3	Not used

b. Panel Assembly, Control, Unit 2A1 (fig. 3-3). The connectors, associated cables, and destinations for the panel assembly control unit are listed in table 3-7.

Table 3-7. Panel Assembly Control Unit 2A1 Connectors

Control unit connector	*Connects cable assembly*	*To*
2A1J1	2W1	Dc power source
2A1J2	2W2	Ac power source
2A1J3	2W3	Cooler 1A3 (unit under test)
2A1J4	2W4	Compressor, Rotary, HD-841/AAS-24 (part of cryo test set)
2A1J5	2W5	Detector tester (part of cryo test set)

c. Detector Tester 3A1 (fig. 3-4). The connectors, associated cables, and destination for the detector tester are listed in table 3-8.

Table 3-8. Detector Tester 3A1 Connectors

Connector	*Connects cable assembly*	*To*
3A1J1	2W5*	Panel assembly control unit (part of cryo test set)
3A1J2	2W6**	Receiver video preamplifier 1A2 (unit under test)
3A1J2	2W7**	Refrigerator 1A3 (unit under test)
3A1J3	2W8	Oscilloscope (additional equipment required)
3A1J4	Test cable	External test equipment
3AIJ5	Test cable (gnd)	External test equipment

*Cable used with detector tester are included with crtyo test unit no. 2.
**Cable W6 and W7 are used optionally.

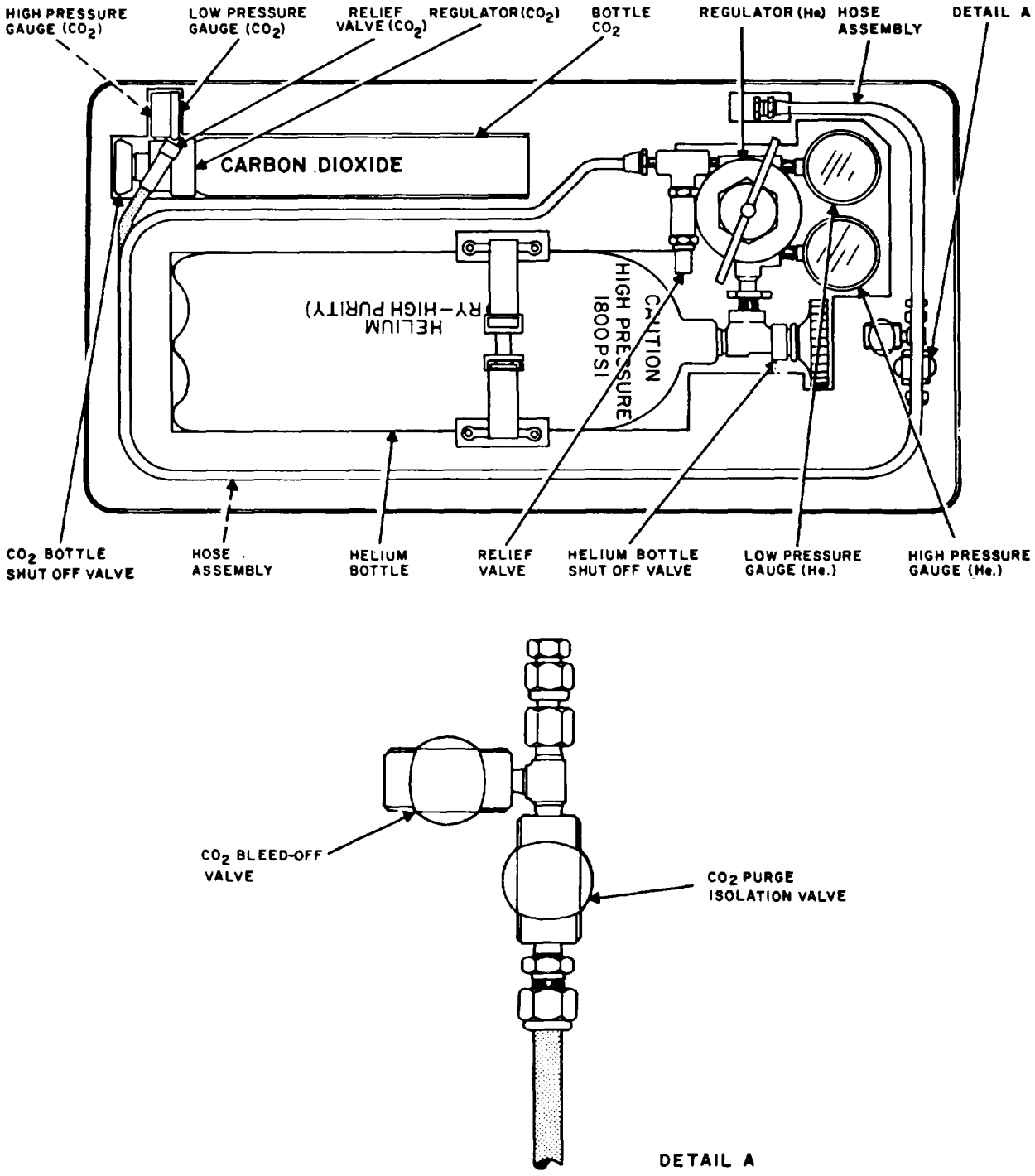


Figure 3-5. Service kit, valves and gauges.

Section II. OPERATION UNDER USUAL CONDITIONS

3-4. Operating Procedures

a. Preparation for use (para 3-5).

b. Preliminary starting procedures (para 3-6).

c. Test procedure for unit under test (TM 11- 5850-241-34).

d. Stopping procedure (para 3-7).

3-5. Preparation for Use

a. Place the four cryo test set groups in the location where they are to be used.

b. Disengage the latches holding the covers to the cases and lift the covers from the cases.

c. Remove the cover on the front of the pump group.

d. Remove the cables from the covers of the pump group and control group.

e. On the vacuum pump control unit (fig. 3-1), set the 28 VDC and 115 VAC 30 circuit breakers to ON. Set the power mode switch to OFF.

f. On the control group (fig. 3-2), set the 28 VDC and 115 VAC 30 circuit breakers to ON. Set the power mode switch to OFF.

g. Connect the pump group cable assembly 1WI between connector 1A2J1 and the 28-vdc power source.

h. Connect the pump group cable assembly 1W2 between connector 1A2J2 and the 115-vac, 3-phase, 4-wire power source.

i. Connect the control group cable assembly 2W1 between connector 2AlJ1 and the 28-vdc power source.

j. Connect the control group cable assembly 2W2 between connector 2A1J2 and the 115-vac, 3-phase, 4-wire power source.

k. Connect the group cable assembly 2W4 between connector 2A1J4 and Compressor, Rotary HD-841/ASS-24, 1A4J1.

l. Connect the control group cable assembly 2W5 between connector 2A1J5 and detector tester 3AlJ1.

3-6. Preliminary Starting Procedure

a. Set the pump group (fig. 3-1) and control group (fig. 3-2), 28 VDC and 115 VAC 3p circuit breakers to ON.

b. Set the pump group and control group power mode switches to STBY. Verify that the STBY indicator lamps light.

3-7. Stopping Procedure

a. Set the pump group and control group power mode switches to OFF. Verify that the STBY indicator lamps extinguish.

b. Set the pump group and control group 28 VDC and 115 VAC 3V circuit breakers to OFF.

c. Disconnect all power and interconnecting cables from the units. Replace the power and inter- connecting cables in the covers of the pump group and the control group. Replace the covers on the units. Replace the removable panel cover on the pump group.

3-8. Preliminary Starting Procedure for the Service Kit (Preparation for Use)

Applicable starting or stopping procedures for the service kit are contained in the test procedures for the unit under test (TM 11-5850-241-12). However, the helium and CO2 bottle should be checked to ensure the pressure sufficient for operation. Per- form the following steps to ensure pressure of the helium and C02 bottles is sufficient for operation.

a. Close the helium bottle regulator valve (ccw). Open the helium bottle shut off valve (fig. 1-2). Ensure the high pressure gauge indicates 800 psig or greater.

b. Close the C02 bottle regulator valve (ccw) Open the CO2 bottle shut off valve (fig. 1-2). Ensure that the high pressure gauge indicates 20 psig or greater.

CAUTION

Do not attempt to use the helium bottle if you are unable to regulate to a pressure of 265 psig as indicated on the low pressure gauge. There must be sufficient helium pressure within the helium bottle when the helium is to be replenished or extra effort must be expended to purge the helium bottle prior to charging.

c. Close the helium bottle shut-off valve.

d. Close the CO2 bottle shut-off valve.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

3-9. Operation at Low Temperatures

Freezing or subfreezing temperatures affect the efficient use of the cryo test set and the service kit. Extreme changes from cold to warm areas such as movement of the equipment into a heated area will cause condensation. To maintain operating efficiency under these conditions, exercise the following precautions:

a. Operate the cryo test set in a heated area.

b. When cold equipment is brought into a warm area, allow the equipment to reach room temperature. Wipe condensation off with a clean, dry cloth before putting cryo test set into operation.

3-10. Operation in Tropical Climates

In tropical climates, moisture conditions are more acute than normal. Ventilation in closed areas is usually very poor, and the high relative humidity causes condensation of moisture on the equipment. Wipe the cryo test set and service kit with a clean, dry cloth, and turn the cryo test set on once a day to eliminate moisture.

3-11. Operation in Desert Climates

a. When operating in desert climates, sand, dust, or dirt will reach the moving parts of the cryo test set causing binding of controls and switches. Foreign particles in connectors may cause faulty operation and test results. Make the operating area as dustproof as possible with available materials. If the cryo test set is to be located in a tent, secure the side walls with sand to prevent their flapping in the wind. When the equipment is not in use, secure the removable panel cover of the pump group and the covers of the cryo test set units and the service kit using latches provided.

b. A drastic fall in temperature at night often causes condensation. To prevent condensation, cover the cryo test set and service kit with a tarpaulin or similar covering material.

c. Wipe off accumulated sand, dust, dirt, or condensation with a clean, dry cloth. Inspect connectors and clean as necessary before making test connections.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S MAINTENANCE

4-1. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of the cryo test set and service kit are listed below, together with a reference to the paragraph covering the specific functions. The materials required for operator's maintenance are listed in paragraph 4-2.

a. Operator's daily preventive maintenance checks and services (para 4-5).

b. Cleaning (para 4-6).

c. Operator's weekly preventive maintenance check and services (para 4-7).

4-2. Materials Required for Operator's Maintenance

The following materials are required to perform operator's maintenance on the cryo test set and service kit.

a. Cleaning Compound, trichloroethane (app B).

b. Cleaning brush.

c. Cleaning cloth.

4-3. Preventive Maintenance

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

a. Systematic Care. The procedures given in paragraphs 4-5, 4-6, 4-7 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 (chart 4-1 and 4-2) outline functions to be performed at specific intervals. These checks and services are to maintain Army equipment in a serviceable condition; that is, in good physical condition and in good operating condition. To assist operators in maintaining serviceability, the charts indicate what to check, how to check, and the normal condition; the *Reference* column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher category maintenance 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 Service Periods

Preventive maintenance checks and services of the cryo test set and service kit are required on a daily and weekly basis.

a. Paragraph 4-5 specifies the checks and services that must be accomplished daily and under the following conditions:

(1) When the equipment is installed initially.

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

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

b. Paragraph 4-7 specifies additional checks and services that must be performed on a weekly basis.

4-5. Operator's Daily Preventive Maintenance Checks and Services

The operator's daily preventive maintenance checks and services are listed in chart 4-1.

Chart 4-1. Operator's Daily Checks and Services

Sequence number	Item	Procedure	Reference
1	Exterior surfaces	Clean exterior surfaces, including control panels and inside storage areas of the cryo test set. Clean exterior surfaces, including interior of the service kit case.	Para 4-6
2	Connectors	Check connectors on equipment and cables for security or attachment, proper fit, and cleanliness.	Para 4-6c
3	Controls and Indicators	During operation of equipment (sequence no. 4), observe that each control and indicator functions properly. Mechanical action of each knob, dial, and switch should be smooth and free of external binding. Tighten loose controls as required.	None
4	Operation	When operating equipment (para 3-4 through 3-8), be alert for any unusual performance or condition.	None
5	Recharge of bottles	*a. DO NOT* dispose of the helium c. CO0 bottle when the pressure is too low for use. b. The compressor oil tank must be returned to depot when oil or helium is depleted. Depot will return to vendor for recharge.	AR 700-68

4-6. Cleaning

Inspect the exteriors of the cryo test set and service kit. The exterior surfaces should be free of dust, dirt, grease, and fungus.

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

WARNING

The fumes of trichlororethane are toxic. Provide thorough ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

b. Remove grease, fungus, and ground-in dirt from the transit case of the service kit and from the exterior surfaces of the cryo test set transit cases; use a cloth dampened (not wet) with cleaning compound.

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

d. Clean the control units and control knobs of the cryo test set using a soft clean cloth. If dirt is difficult to remove, dampen the cloth with water; use a mild soap if necessary.

4-7. Operator's Weekly Preventive Maintenance Checks and Services

The operator's weekly preventive maintenance checks and services are listed in chart 4-2.

Chart 4-2. Operator's Weekly Checks and Services

Sequence number	Item	Procedure	Reference
1	Cables	Inspect cable assemblies for signs of mechanical damage, such as chafed, cracked, or frayed insulation. Refer damaged cables to higher category maintenance for repair.	None
2	Gaskets	Inspect gaskets of transit cases for looseness, deterioration, or damage. If gaskets require replacement, refer to higher category maintenance.	None

Section II. ORGANIZATIONAL MAINTENANCE

4-8. Scope of Organizational Maintenance

a. This section contains instructions covering organizational maintenance for the cryo test set and service kit. Included are instructions for performing preventive and periodic maintenance services, troubleshooting, and repair functions to be accomplished by the organizational repairman.

b. Organizational maintenance of the cryo test set and service kit include:

(1) Organizational monthly preventive maintenance checks and services (para 4-12).

(2) Organizational quarterly preventive maintenance checks and services (para 4-14).

(3) Touchup painting (para 4-15).

(4) Troubleshooting (para 4-17).

(5) Replacement of defective lamps (para 4-18).

4-9. Tools and Materials Required

Authorized organizational maintenance repair parts appear in appendix D. The tools and materials required for organizational maintenance are listed below:

a. Tools. The tools required for organizational maintenance are provided in Tool Kit, Electronic Equipment, TK-101,/G.

b. Materials. The materials required are listed in table 4-1.

Table 4-1. Materials Required

Material	*Federal stock number*
Trichloroethane cleaning compound (1 pint)	6810-664-0273
Cleaning cloth	
Lubricating oil, general purpose, preventive (PL-Special)	9150-185-0629
Grease, Aircraft and Instrument (GL)	
Fine sandpaper	5350-235-0124
Insulation tape, Electrical (pressure sensitive adhesive plastic tape)	5970-644-2636
Paint brush (1 inch)	

4-10. Organizational Preventive Maintenance'

a. Preventive maintenance is the responsibility of all categories concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and test indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the test set at the organizational category are made at monthly and quarterly intervals unless other- wise directed by the commanding officer.

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

4-11. Organizational Monthly Maintenance

Perform the maintenance functions indicated in the organizational monthly preventive maintenance checks and services chart (chart 4-3) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is used more often or under ad- verse conditions, the monthly preventive maintenance checks and services should be performed at 20- or 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby condition must have monthly preventive maintenance checks and services performed on it. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

4-12. Organizational Monthly Preventive Maintenance Checks and Services

The organizational monthly preventive maintenance checks and services are listed in chart 4-3.

Sequence number	*Item*	*Procedure*	*Reference*
1	Cables	Inspect cable assemblies (fig. 1-1) for cuts or other damage. Repair cut insulation by covering cut with plastic insulation tape.	None
2	Handles, latches, etc	Inspect handles, latches, hinges, screws, and other such hardware for looseness. Tighten or replace as required.	None
3	Metal surfaces	Inspect exposed metal parts of equipment for rust and corrosion. Clean and touch-up paint as required. *Note.* If equipment is operated in tropical climate. dampen cloth with oil (PL-Special) and apply light film of oil to metal parts and surfaces.	Para 4-15

4-13. Organizational Quarterly Maintenance

Periodic weekly and monthly services constitute a part of the organizational quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with requirements of TM 38-750.

4-14. Organizational Quarterly Preventive Maintenance Checks and Services

The organizational quarterly preventive maintenance checks and services are listed in chart 4-4.

Chart 4-4. Organizational Quarterly Checks and Services

Sequence number	*Item*	*Procedure*	*Reference*
1	Publications	Check to see that all pertinent publications are current, complete and serviceable. Requisition pertinent publications not on hand.	DA Pam 310-4 and App A
2	Modifications	Determine whether new applicable MWO's have been published. All URGENT MWO's must be applied. All NORMAL MWO's must be scheduled (TM 38-750).	DA Pam 310-7
3	Completeness	Check to see that equipment is complete.	App B
4	Lubrication	Lubricate cryo test set.	Para 4-16
5	Paint	Inspect equipment for condition of paint. If surfaces bear only slight scratches, retouch these with paint. If surfaces bear many scratches, turn equipment in for higher category maintenance painting.	Para 4-15
6	Operation	*a.* Prepare cryo test set for use.	Para 3-4
		b. Perform preliminary starting procedure. Observe all indicator lamps (press-to-test) and verify each light.	Para 3-5
		c. Perform stopping procedure.	Para 3-6

4-15. Touchup Painting

Remove rust and corrosion from metal surfaces by lightly sanding with fine sandpaper . Brush two thin coats of paint (only on those parts meant to be painted) on the bare metal to protect it from further rust or corrosion. Refer to the applicable cleaning and refinishing practices specified in TB 746-10. Refer to SB 11-573 for paint to be used.

4-16. Lubrication

a. Apply grease to the grooves and hinges of each jack.

b. Apply a thin film of oil to the grooves and bearings of the wheel casters.

Section III. TROUBLESHOOTING

4-17. Preliminary Troubleshooting

Troubleshooting of the cryo test set is based upon the operational check contained in the quarterly preventive maintenance checks and services chart. To troubleshoot the cryo test set, perform sequence number 6 in the quarterly preventive maintenance checks and services chart (chart 4-4) and proceed until an abnormal condition or result is observed. Perform the checks and corrective measures indicated in the troubleshooting chart (chart 4-5). If the corrective measures indicated do not result in correction of the trouble, higher category of maintenance is required.

4-18. Troubleshooting

The troubleshooting procedures for the cryo test set are listed in chart 4-5.

Chart 4-5. Troubleshooting.

Item no.		*Probable Trouble*	*Corrective Measures*
1	Any indicator lamp does not light.	Defective indicator lamp.	Replace lamp (para 4-19).
2	All indicators do not light.	Defective power cable.	Replace power cable.
3	STBY indicator(s) do not light.	Defective cryo test set unit.	Higher category maintenance required.
4	ELAPF'SED TIME meter fails to operate	Defective ELAPSED TIME meter.	Higher category maintenance required.
5	Insufficient high pressure in the oil tank.	Insufficient oil or helium.	Replace the oil tank.

4-19. Lamp Removal and Replacement Procedure

a. Unscrew the metal lampholder counterclockwise until free.

b. Grasp the lamp base at its rim and pull from the lampholder.

c. If a new lamp is required, press it into the holder and screw the holder into its control unit.

4-20. Service Kit Helium Bottle and $C0_2$ Bottle Removal and Replacement

a. Perform the following steps in the given sequence to remove or replace the helium bottle in the service kit.

(1) Disconnect the securing strap from the helium bottle (fig. 1-2).

(2) Remove the helium bottle from the transit case.

(3) Close the helium bottle shut-off valve.

(4) While firmly supporting the helium bottle, loosen the regulator assembly from the helium bottle shut-off valve assembly (fig 1-2) by turning it counter-clockwise (ccw).

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal surface forms highly toxic phosgene gas.

NOTE

Before attaching the new bottle of helium or $C0_2$, clean (brush lightly) both the shut off valve and regulator valve fittings with trichloroethane.

(5) Loosely thread (ccw) regulator assembly on the new helium bottle, and slowly bleed off a little gas, in order to purge air and moisture, while tightening the assembly.

(6) Close the helium bottle shut off valve.

(7) Position the new helium bottle in the transit case.

(8) Connect the securing strap to the helium bottle.

b. Perform the following steps in the given sequence to remove or replace the CO_2 bottle in the service kit.

(1) Remove the $C0_2$ bottle from the transit case.

(2) Close the CO_2 bottle shut-off valve.

(3) Unscrew the regulator assembly counterclockwise from the shut-off valve.

(4) Attach a new CO_2 bottle to the regulator assembly by burning it clockwise on the threads of the $C0_2$ shut-off valve assembly.

(5) Position the $C0_2$ bottle and hose into the transit case.

4-21. General Instructions for Charging of Service Kit Helium and Carbon Dioxide Bottles

The bottles must be removed from the kit prior to recharging (para 4-20). In addition to the normal tools and test equipment required the following items are required for recharging the bottles.

a. Helium Recharging Equipment.

(1) Bulk helium - NSN 6830-00-660-0027.

(2) Empty tank - NSN 8120-00-286-5815.

NOTE

It is necessary to requisition both bulk helium and the empty tank in order to receive helium of the correct high purity (99.99 percent or better) required in the supply tank. This grade helium should be specified on the requisition form. It must be specified on the requisition form that *this* helium is required in *this* tank.

b. Carbon Dioxide Recharging Equipment.

(1) Bulk carbon dioxide, NSN 6830-00-245-0199

(2) Empty tank, NSN 8120-00-285-4723.

(3) Scale, NSN 6670-00-892-5158.

(4) Gloves, NSN 5850-00-078-4889.

NOTE

For overseas requisitions, a filled tank of carbon dioxide (NSN 6830-00-281-3053) should be requested. However, the requestor should also indicate that if the full tank is not available the supply source should furnish the bulk carbon dioxide (NSN 6830-00-245-0199) in the specific tank (NSN 8120-00-285-4723).

c. Additional References. The following references contain data applicable to charging and purging procedures.

(1) MIL-STD-101A. Military Standard for Pipelines and for Compressed - Gas Cylinders.

(2) AR 700-68. Logistics: Army Regulation for Safe Handling, Storing, Shipping, Use and Disposal of Compressed Gas Cylinders.

4-22. Service Kit Helium Bottle Charging and Purging Procedures

WARNING

Perform the following procedure as presented. Failure to perform the following procedures is dangerous and may result in injury or death.

Keep the helium bottle and the helium supply tank strapped to a secure wall, post, or work bench to prevent damage to the valves and fittings. A ruptured fitting

(2) Open (fully ccw) the $C0_2$ bottle shut-off valve and close (fully ccw) the transfer hose valve.

(3) Open the $C0_2$ supply tank shut-off valve (ccw) and wait approximately five (5) seconds; then, close (ccw) the valve.

WARNING

Make sure that the opening in the transfer hose valve is aimed away from the operator and other personnel when blowing off $C0_2$. Escaping CO2 may cause eye or skin damage if exposure is prolonged.

(4) Open (ccw) the transfer hose valve and allow the $C0_2$ to blow off.

(5) Close (ccw) the transfer hose valve and repeat the procedures in (3) and (4) above; then proceed to (6) below.

(6) Make sure that the transfer hose valve is closed (fully ccw).

(7) Open (ccw) the CO_2 supply tank shut-off valve and wait approximately five (5) seconds.

(8) Close (ccw) the $C0_2$ bottle shut-off valve.

(9) Close (ccw) the CO_2 supply tank shut-off valve; then, open (ccw) the transfer hose valve and allow the CO_2 remaining in the transfer hose to blow off.

(10) Disconnect the transfer hose from the $C0_2$ bottle; close (ccw) the valves.

(11) Place the C02 bottle on the scale. The scale shall indicate between 7.5 to 9.5 ounces more than recorded in ***a***(7) above. (This is the recommended weight for a full $C0_2$ bottle.)

(12) If the weight (11) above) is as required, proceed to (13) below; or, if the weight is less than required perform the procedure in (***a***) below; or, if the weight is more than required perform the procedure in (b) below.

(a) Underweight.

1. Reconnect the transfer hose to the CO_2 bottle.
2. Open (ccw) the transfer hose valve.
3. Open (ccw) the CO_2 bottle shut-off valve and allow CO_2 to blow off until the sound of escaping gas is barely heard.
4. Repeat the procedures in (1) through (11) above, except that in step (3) allow more than five (5) seconds.

(b) Overweight.

1. Slightly open (ccw) the shut-off valve on the CO_2 bottle and allow a small amount of CO_2 to vent; then, close (ccw) the shut-off valve.
2. Weigh the bottle (11 above); if necessary, repeat this procedure until the required weight is obtained.

(13) Replace the regulator assembly on the $C0_2$ bottle in the position marked in a(2) above. Make sure that the regulator assembly retaining nut secure and that valves are securely closed.

(14) Secure all items in their appropriate cases.

CHAPTER 5

SHIPMENT, LIMITED STORAGE AND DEMOLITION TO PREVENT' ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5-1. Repackaging for Shipment and Limited Storage

a. Repackaging of equipment for shipment or extended storage normally will be performed at a packaging facility or by a repackaging team. Should emergency packaging be required, select the materials from those listed in SB 38-100. Package the equipment in accordance with the original packaging so far as possible, using avail- able materials.

b. The exact procedure for repackaging depends upon the material available and the conditions under which the equipment is to be stored or shipped. In most cases, the original shipping container will be available for repackaging procedures outlined in TM 38-230 and paragraph 5-2b.

c. The cryo test set and service kit may be stored for limited periods in their transit cases with the covers closed.

5-2. Cryo Test Set and Service Kit Packaging Procedure

a. Original Shipping Container Available.

(1) Remove cover from shipping containers.

(2) Place test set unit in container as shown in figure 2-1, making certain that polyurethane foam cushioning material is in place on bottom of container and along sides.

(3) Place cushioning material (4 pieces) on top of the test set unit and replace and secure container cover.

NOTE

This procedure must be followed for all units of the cryo test set and the service kit.

b. Original Shipping Container Not Available.

(1) Select a cleated plywood box, conforming to Military Specification MIL-601, of the approximate size of the original container (para 2-2). If a plywood container is not available, use a suitable wooden box.

(2) Cut 3-inch polyurethane foam cushioning for the top, bottom, and four sides of the container (fig. 2-1).

(3) Place foam inside container on bottom and four sides, using Adhesive MIL-A-140, if necessary, to hold in place.

NOTE

If container is slightly larger than original container, it may be necessary to provide additional cushioning material to insure proper fit of the test set unit in the container.

(4) Place the test set unit in the container making certain that cushioning material is in place along the sides.

(5) Place cushioning material on top of the test set unit.

(6) Place the cover on the container and secure in place with nails, spaced sufficiently close together to insure that the cover is securely attached to the container.

Section II. DEMOLITION TO PREVENT ENEMY USE

5-3. Authority for Demolition

The demolition procedures given in paragraph 5-4 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.

5-4. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available for destruction will be the major factor in determining the method to be used. The tactical situation will also determine the manner of destruction.

THE FOLLOWING PAGES MISSING NOT AVAILABLE FOR DIGITIZATION.

PAGE #
5-2 AND A-1

APPENDIX B

BASIC ISSUE ITEMS LIST (Bill) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

B-1. Scope
This appendix lists only basic issue items required by the crew/operator for installation, operation, and maintenance of the Test Set, Cryogenic Refrigerator AN/AAM-40 and Service Kit, Refrigerant MK-1171/AAS-24.

B-2. General
This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Items List - Section II. A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

b. Items Troop Installed or Authorized *List-Section III.* Not applicable.

B-3. Explanation of Columns
The following provides an explanation of columns found in the tabular listings:

a. Illustration. This column is divided as follows:

(*1) Figure Number.* Indicates the figure number of the illustration in which the item is shown.

(*2) Item Number.* The number used to identify each item called in the illustration.

b. Federal Stock Number. Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. Indicates the Federal item name and a minimum description required to identify the item.

(*1) Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

(*2) Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 708-42.

d. Quantity Furnished With Equipment (Basic Issue Items Only). Indicates the quantity of the basic issue item furnished with the equipment.

SECTION II. BASIC ISSUE ITEMS LIST

(1) ILLUSTRATION (A) Fig NO.	(1) ILLUSTRATION (B) ITEM NO	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER & FSCM / USABLE ON CODE	(4) QTY FURN WITH EQUIP
			NOTE THE NUMBER 1 REFERS TO AN/AAM-40; NUMBER 2 REFERS TO MK-1171/AAS-24.	
1-1	2MP2	4130-197-6337	COVER, CONTROL GROUP CW-1116/AAM-40 1	
1-1	4MP3	4130-197-6345	CASE, EVACUATION-CHARGING GROUP CY-6947/AAM-40 1	
1-1	3MP1	4130-197-6342	CASE, TEST SET-MAINTENANCE GROUP CY-6946/AAM-40 1	
1-1	1MP7	4130-407-7035	COVER, VACUUM PUMP GROUP CW-1117/AAM-40 1	
1-1	MP3	5850-449-0710	CASE, SERVICE KIT CY-6872/AAS-24 2	

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Test Set, Cryogenic Refrigerator AN/AAM-40 and Service Kit, Refrigerant MK-1171/AAS-24. 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.

C-2. Maintenance Functions

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

a. Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc. This is accomplished with external test equipment and does not include operation of the equipment and operator type tests using internal meters or indicating devices.

c. Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

d. Adjust. To rectify to the extent necessary to bring into proper operating range.

e. Align. To adjust two or more components or assemblies of an electrical or mechanical system so that their functions are properly synchronized. This does not include setting the frequency control knob of radio receivers or transmitters to the desired frequency.

f. Calibrate. To determine the corrections to be made in the readings of instruments of test equipment used in precise measurement. Consists of the comparison of two instruments, one which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

g. Install. To set up for use in an operational environment such as an encampment, site, or vehicle..

h. Replace. To replace unserviceable items with serviceable like items.

i. Repair. To restore an item to serviceable condition through correction of 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.

j. Overhaul. Normally, the highest degree of maintenance performed by the Army to minimize time work in process and is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

k. Rebuild. The highest degree of material maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category.

Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

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

C-3. Explanation of Format

a. Column 1, group number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, functional group. Column 2 lists the noun names of components, assemblies, subassemblies and modules on which maintenance is authorized.

c. Column 3, maintenance functions. Column 3 lists the maintenance category at which performance of the specific maintenance functions is authorized. Authorization to perform a function at any category also includes authorization to per- form that function at .higher categories. The codes used represent the various maintenance categories as follows:

Code	*Maintenance Category*
C	Operator/Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

d. Column 4, tools and test equipment. Column 4 specifies, by code, those tools and test equipment required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in table 1.

e. Column 5, Remarks. Self-explanatory.

C-4. Explanation for Format of Table 1, Tool and Test Equipment Requirements

The columns in Table 1, Tool and Test Equipment Requirements are as follows:

a. Tools or Test Equipment Reference Code. Not used.

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 functions.

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

e. Tool Number. The numbers in this column coincides with the numbers in the tools and equipment column of the maintenance allocation chart (Section II).

Section II. MAINTENANCE ALLOCATION CHART TEST SET, CRYOGENIC REFRIGERATOR AN/AAM-40 AND SERVICE KIT, REFRIGERANT MK-1 171/AAS-24

(1) Group No.	(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, Cryogenic Refrigerator AN/AAM-40	O	H	O	H			O	O	H	D	D	4 1, 3, 5 1, 2, 3, 5	
1	Pump Group Vacuum OA-8590, AAM-40	O	H	O	H			O	O	H	D	D	4 1, 3, 5 1,2,3,5,8,9,12	
1A1	Power Supply PP-6527;AAM-40		H							H	D		1, 3, 5 1, 2 ,3, 5	
1A1A1	Leak Detection Assembly		H		H					H	D	D	1, 3, 5 1,3,5,6,7,10,11	
1A1A2	High Vacuum Unit, Cryogenic		H		H					H	D	D	1,1,-5 1, 3, 5, 6	
1A1A3	Power Supply, High Voltage		H		H					H	D	D	1, 3, 5 1, 3, 5, fi	

Maintenance Allocation Chart

(1) Group No.	(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		
1A2	Filter Assembly		H							H			1, 3, 5	
											D		1, 2, 3, 5	
1MP7	Cover, Vacuum Pump Group	O							O				4	
	CW-1117/AAM-40									D	D		3	
1MP13	Assembly, Vacuum Pump		H	H					H				1, 3, 5	
	HD-882/AAM-40									D	D		1, 3, 5	
1W1 &	Cable Assembly, Power,	O							O				4	
1W2	Electrical CX-12408/U,		H							H			3, 5	
	CX-12409/U										D		3, 5	
1W3	Cable Assembly, Special	O							O				4	
	Purpose, CX-12476,/AAM-40		H							H			3, 5	
											D		3, 5	
2	Test Set, Control Group	O		O				O	O				4	
	OK-155/AAM-40		H		H					H			1, 3, 5	
											D	D	1, 2, 3, 5	
2A1	Panel Assembly, Control, Unit 2		H						H	H			1, 3, 5	
											D		1, 2, 3, 5	
2A1A1	Filter Assembly, Unit 2		H						H	H			1, 3, 5	
											D		1, 2, 3, 5	
2MP1	Control, Test Set	O							O				4	
	C-8595/AAM-40									D	D		3	
2MP2	Cover, Control Group	O							O				4	
	CX-1116/AAM-40									D	D		3	
2W1 &	Cable Assembly, Power,	O							O				4	
2W2	Electrical, CX-12408/U,		H							H			3, 5	
	CX-12409/U										D		3, 5	
2W3	Cable Assembly, Special Purpose,	O							O				4	
thru	Electrical CX-12474/AAM-40,		H							H			3, 5	
2W8	CX-12475/AAM-40,										D		3, 5	
	CX-12477/AAM-40 thru													
	CX-12480/AAM-40													
3	Test Set, Maintenance Group	O		O				O	O				4	
	OQ-75/AAM-40		H		H					H			3, 5	
											D	D	3, 5	
3A1	Test Set, Cryogenic		H		H				H				3, 5	
	Refrigerator TS-3016/AAM-40									D	D		3,5	
3MP1	Case, Test Set CY-6946/AAM-40	O							O				4	
										D	D		3	
3MP2	Mount, Pinch-off Tool	H							H				3	
	MT-4313/AAM-40									D	D		3	
3MP3	Nozzle, Helium	H							H				3	
	MX-8803 /AAM-40									D	D		3	
3MP5	Tool Kit, Maintenance	H							H				3	
	TK-218/AAM-40										*	D	3	* Reparable unless a consummable item.
3MP6	Tool Pinch-off TL-770/AAM-40	H							H				3	
										D	D		3	
4	Evacuation-Charging Group	O		O				O	O				4	
	OA-8591/AAM-40		H		H					H			3, 5	
											D	D	3, 5	

Maintenance Allocation Chart

(1) Group No.	(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		
4MP3	Case, Test Set CY-6947/AAM-40	O							O				4	
										D	D		3	
4MP4	Assembly, Compressor and Mounting Plate	H							H	H			3	
											D		3	
4MP5	Hose, Refrigerant MX-8804/AAM-40	H							H				3	
										D	D		3	
4MP6	Hose, Refrigerant MX-8805/AAM-40	H							H				3	
										D	D		3	
4MP7	Hose, Vacuum MX-8806/AAM-40	H							H				3	
										D	D		3	
4MP8	Manifold, Charging and Testing Refrigerant MX-8807/AAM-40	H							H				3	
										D	D		3	
4MP10	Plate, Receiver Optics MT-4314/AAM-40	H							H	H			3	
											D		3	
1	Service Kit, Refrigerant MK-1171/AAS-24	O					O*	O					4	
			H						H				3	
				D						D	D		3	
1MP3	Case, Service Kit CY-6872/AAS-24	O					O*		O				4	
										D	D		3	*Charge to specified pressure,
1MP1	Bottle, Carbon Dioxide	O					O*	O					4	
			H						H				3	
				D						D	D		3	
1MP2	Bottle, Helium Modified	O					O*	O					4	
			H						H				3	
				D						D	D		3	

Table 1. Tool and Test Equipment Requirements Test Set, Cryogenic Refrigerator AN/AAM-40 and Service Kit, Refrigerant MK-1171/AAS-24

TOOL AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
	H, D	Multimeter TS-352B/U	6625-553-0142	1
	H, D	Oscilloscope AN/USM-281A	6625-228-2201	2
	H, D	Tool Kit, Electronic Equipment TK-105/G	5180-605-0079	3
	O	Tool Kit, Electronic Equipment TK-101/G	5180-069-5178	4
	H, D	Voltmeter, Digital, (Non-Linear Systems Model X-2)	Commercial	5
	D	Test Set, Electronic Circuit Plug-In Unit AN/'AAM-39	6625-459-3403	6
	D	Function Generator (Wavetek 111)	Commercial	7

Table 1. Tool and Test Equipment Requirements Test Set, Cryogenic Refrigerator AN/AAM-40 and Service Kit, Refrigerant IK-1171/AAS-24 - Continued

TOOL AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
	D	Heater Tape		8
	D	Variac CN-16/U		9
	D	Resistance Bridge ZM-16/U		!0
	D	Power Supply PP-2309A/US130-752-2215		11
	H	Maintenance Kit, Electronic Equipment M-1172/AAS -24	5850-434-5539	12

APPENDIX D
ORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

D-1. Scope
This appendix lists repair parts and special tools required for the performance of organizational maintenance of the Test Set, Cryogenic Refrigerator AN/AAM-40 and Service Kit, Refrigerant MK-1171/AAS-24.

D-2. General
This Repair Parts and Special Tools List is divided into the following sections:

a. Prescribed Load Allowance (PLA)-Section II. A composite listing of the repair parts, special tools, test and support equipment having quantitative allowances for initial stockage at the organizational level.

b. Repair Parts-Section III. A list of Test Set, Cryogenic Refrigerator AN/AAM-40 and Service Kit, Refrigerant MK-117/AAS-24 re- pair parts authorized for the performance of maintenance at the organizational level in figure and item number sequence.

c. Special Tools, Test and Support Equipment. Not applicable.

D-3. Explanation of Columns
The following provides an explanation of columns.

a. Source, Maintenance, and Recoverability Codes (SMR), Column 1:

(1) Source code, indicates the selection status and source for the listed item. Source codes are:

Code ***Explanation***

P--Repair parts which are stocked in or supplied from the GSA/DSA, or Army supply system and authorized for use at indicated maintenance categories.

M--Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.

A--Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately and can be assembled to form the required assembly at indicated maintenance categories.

Code ***Explanation***

X1-Repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.

X2-Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain same through cannibalization. Where such repair parts are' not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels.

G-Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DS and GS level or returned to depot supply level.

(2) Maintenance code, indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

Code ***Explanation***

C .....Crew or operator maintenance.
O .....Organizational maintenance.
F.....Direct support maintenance.
H .....General support maintenance.
D .....Depot maintenance.

(3) Recoverability code, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

Code ***Explanation***

R .....Repair parts and assemblies which are economically reparable at DSU and GSU activities and normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomically reparable, they will be evacuated to a depot for evaluation and analysis before final disposition.

S .....Repair parts and assemblies which are economically reparable at DSU and GSU activities

Code ***Explanation***

and which normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomic- ally reparable, they will be evaluated to a depot for evaluation and analysis below final disposition.

T ..... High dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance activities.

U ..... Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high collar value reusable casings or castings.

b. Federal Stock Number, Column 2. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. ***Description, Column 3.*** This column indicates the Federal item name and any additional description of the item required. The abbreviation "w/e", when used as a part of the nomenclature, indicates the Federal stock number includes all armament, equipment, accessories, and repair parts issued with the item. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parentheses. Repair parts quantities included in the kits, sets, and assemblies are shown in front of the repair part name. Material required for manufacture or fabrication is identified.

d. Unit of Measure (U/M), Column 4. *A 2* character alphabetic abbreviation indicating the amount of quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity Incorporated in Unit, Column 5. This column indicates the quantity of the item used in the unit. A "V" appearing in this column in lieu of a quantity indicates that a definite quantity cannot be indicated (e.g., shims, spacers, etc).

f. 15-Day Organizational Maintenance Allowance, Column 3.

(1) The allowance columns are divided into four subcolumns. Indicated in each subcolumn opposite the first appearance of each item is the total quantity of items authorized for the number of equipments supported. Subsequent appearances of the same item will have the letters "REF" in the allowance columns. items authorized for use as required but not for initial stockage are identified with an asterisk in the allowance column.

(2) The quantitative allowances for organizational level of maintenance represents one initial prescribed load for a 15-day period for the number of equipments supported. Units and organizations authorized additional prescribed loads will multiply the number of prescribed loads authorized by the quantity of repair parts reflected in the density column applicable to the number of items supported to obtain the total quantity of repair parts authorized.

(3) Organizational units providing maintenance for more than 100 of these equipments shall determine the total quantity of parts required by converting the equipment quantity to a decimal factor by placing a decimal point before the next to last digit of the number to indicate hundredths, and multiplying the decimal factor by the parts quantity authorized in the 51-100 allowance column. *Example,* authorized allowance for 51-100 equipments is 40; for 150 equipments multiply 40 by 1.50 or 60 parts required.

(4) Subsequent changes to allowances will be limited as follows: No change in the range of items is authorized. If additional items are considered necessary, recommendation should be for- warded to the Maintenance Engineering Directorate, AMSEL-ME-NMP-RS, Fort Monmouth, N.J., for exception or revision to the allowance list. Revisions to the. range of items authorized will be made by the Maintenance Engineering Directorate based upon engineering experience, demand data, or TAERS information.

g. Illustration, Column 7. This column is divided as follows:

(*1) Figure Number, Column 7a.* Indicates the figure number of the illustration in which the item is shown.

(*2) Item Number, Column 7b.* Indicates the callout number used to reference the item in the illustration.

D-4. Special Information

a. Parts which require manufacture or assembly at a category higher than the authorized for installation will indicate in the source column the higher category.

b. For end items authorized mandatory stock- age of repair parts by the Department of the Army, on a case by case basis, the mandatory stockage items are indicated by a plus "+" sign as the first character in the end item density columns of both the Repair Parts List and the Prescribed Load Allowance for each such authorized allowance quantity.

D-5. How to Locate Repair Parts

Locate the sequence number in the Repair Parts List Sequence Number/SMR Code column which is in ascending alphanumeric order, to find the repair part.

D-6. Abbreviations.

Code	*Manufacturer*
00624	Aeroquip Corp, Aircraft Div., Jackson Plant
02570	Crawford Fitting Co.
11649	Cajon Co.
26952	ENERPAC, an Activity of Applied Power Industries Inc.
28968	Hoke Inc.
30780	Parker-Hannifin Corp, Tube Fitting Div.
36346	Union Carbide Corp, Linde Div.
42527	Chemetron Corp, National Cylinder Gas Div.
45681	Parker-Hannifin Corp.
88044	Aeronautical Standards Group Dept. of Navy and Air Force
91816	James Pond and Clark Inc.
96214	Texas Instruments Inc. Apparatus Div.
96906	Military Standards
97576	The Lenz Co.
99401	Dallas Radionics Corp.

Section II. PRESCRIBED LOAD ALLOWANCE

(1) FEDERAL STOCK NUMBER	(2) DESCRIPTION / USABLE ON CODE	(3) 15-DAY ORG. MAINT. ALLOWANCE (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100
6625-196-2844	CABLE ASSEMBLY, POWER, ELECTRICAL CX-12408/U-(8 FT)	*	*	2	2
6625-470-4315	CABLE ASSEMBLY, POWER, ELECTRICAL CX-12409/U-(8 FT)	*	*	2	2
	CARBON DIOXIDE, BONE DRY: DALROO999 (99401)	*	*	2	2
	HELIUM, GASEOUS: 417569-1 (36346)	*	*	2	2
6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)	2	2	3	6
5330-585-6663	PACKING, PREFORMED: MS28775-110 (96906)	*	*	2	2

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION REF NUMBER & MFR CODE	USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 15-DAY ORGANIZATIONAL MAINTENANCE ALW (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(7) ILLUS-TRATION (a) FIG. NO.	(b) ITEM NO. OR REFERENCE DESIGNATION
A003 P--O-S	6625-196-2844	CABLE ASSEMBLY, POWER, ELECTRICAL CX-12408/U-(8 FT)		EA	2	*	*	2	2	1-1	2W1
A009 P--O-S	6625-470-4315	CABLE ASSEMBLY, POWER, ELECTRICAL CX-12409/U- (8 FT)		EA	2	*	*	2	2	1-1	2W2
A015 P--O-S	4130-152-0890	CABLE ASSE**MB**LY, SPECIAL PURPOSE, ELECTRICAL CX-12480/AAM-40		EA	1	*	*	*	2	1-1	2W6
A040 P--O-S	4130-433-2337	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-12479/AAM-40		EA	1	*	*	*	2	1-1	2W7
A065 P--O-S	4130-403-5824	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-12478/AAM-40		EA	1	*	*	*	2	1-1	2W3
A073 P--O-S	4130-433-2338	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX- 12477/AAM-40		EA	1	*	*	*	2	1-1	2W4
A081 P--O-S	4130-403-5822	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-12475/AAM-40		EA	I	*	*	*	2	1-1	2W8
A087 P--O-S	4130-403-5821	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-12474/AAM-40		EA	1	*	*	*	2	1-1	2W5
A178 P--O--	6240-155-7836	LAMP, INCANDESCENT: **MS**25237-327 (96906)		EA	19	2	2	3	6	1-1	2A1DS1
A179 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	2A1DS2
A180 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	**REF**	REF	REF	REF	REF	1-1	2A1DS3
A181 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	2A1DS4
A182 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	2A1DS5
A183 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	**REF**	REF	REF	REF	REF	1-1	2A1DS6
A184 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	2A**1DS7**
A186 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	2A1DS9
A483 P--O--	4730-220-1799	PLUG, DUST AND MOISTURE SEAL: 540**0S**8-4 (00624)		EA	3	*	*	*	*	1-1	5MP58MP2
A487 P--O--	5340-437-8898	CAP, DUST AND MOISTURE SEAL: 5400S6-4 (00624)		EA	3	*	*	*	2	1-1	5MP59MP1
A488 P--O--	4730-613-9866	PLUG, DUST AND MOISTURE SEAL: 5400S8-8 (00624)		EA	2	*	*	*	2	1-1	5MP59MP2
A498 P--O--	4720-409-8081	HOSE, REFRIGERANT MX-8804/AAM-40		EA	1	*	*	*	2	1-1	4MP5
A501 P--O--	4720-409-8082	HOSE, REFRIGERANT MX-8805/AAY-40		EA	1	*	*	*	2	1-1	4MP6
A503 P--O-S	4720-409-8083	HOSE, VACUUM MX-8806/AAM-40		EA	1	*	*	*	2	1-1	4MP7
A504 P--O--	4730-493-9257	ADAPTER, TUBE TO PIPE: 201A4F316 (02570)		EA	1	*	*	*	*	1-1	**4M**P7MP1
A516 P--O--	5340-437-8898	CAP, DUST AND **MO**ISTURE SEAL: 5400S6-4 (00624)		EA	**REF**	REF	REF	REF	REF	1-1	4MP8MP8
A516 P--O--	5340-437-8898	CAP, DUST AND MOISTURE SEAL: 5400S6-4 (00624)		EA	REF	REF	REF	REF	REF	1-1	4MP8MP9
A517 P--O--		CAP, PIPE: 415755-1025 (96214)		EA	1	*	*	*	*	1-1	4M**P8MP10**

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION REF NUMBER & MFR CODE	USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 15-DAY ORGANIZATIONAL MAINTENANCE ALW (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(7) ILLUS-TRATION (a) FIG. NO.	(b) ITEM NO. OR REFERENCE DESIGNATION
A531 P--O--	4730-220-1799	PLUG, DUST AND **MO**ISTURE SEAL: 5400S8-4 (00624)		EA	REF	REF	REF	REF	REF	1-1	4MP8MP24
A532 P--O--	4730-613-9866	PLUG, DUST AND MOISTURE SEAL: 540**0S**8-8 (00624)		EA	REF	REF	REF	REF	REF	1-1	4MP8MP25
A533 P--O--		CAP, DUST AND MOISTURE SEAL: 540**0S**6-8 (00624)		EA	1	*	*	*	*	1-1	4MP8MP26
A556 P--O-S	6625-480-5710	TANK, **OIL** CHARGING, COMPRESSOR: 695923-1 (96214)		EA	1	*	*	*	*	1-1	4MP13
A645 P--O--	5355-985-6888	KNOB, CONTROL: MS91528-2M2B (96906)		EA	4	*	*	*	2	1-1	3A1**M**P14MP4
A646 P--O--	5355-989-4269	KNOB, CONTROL: MS91528-1D2B (96906)		EA	1	*	*	*	*	1-1	3A1**M**P14MP5
A729 P--O-S	5110-252-5749	TOOL, PINCH-OFF TL-770/AAM-40		EA	1	*	*	*	*	1-1	3MP6
A750 P--O--	4320-976-5874	PUMP, HYDRAULIC RAM, HAND DRIVEN: P14 (26952)		EA	1	*	*	*	*	1-1	3MP6MP4
A798 P--O-S	4130-230-3760	CABLE ASSE**MB**LY, INTERNAL CONTROL: 696239-1 (96214)		EA	1	*	*	*	2	1-1	1W4
A804 P--O-S	6625-196-2844	CABLE ASSEMBLY, POWER, ELECTRICAL CX-12408/U-(8 FT)		EA	REF	REF	REF	REF	REF	1-1	1W1
A811 P--O-S	6625-470-4315	CABLE ASSEMBLY, POWER, ELECTRICAL CX-12409/U-(8FT)		EA	REF	REF	REF	REF	REF	1-1	1W2
A817 P--O--	4130-197-6350	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-12476/AAM-40		EA	1	*	*	*	2	1-1	1W3
A987 P--O--	5355-616-7669	KNOB, CONTROL: MS91528-2D2B (96906)		EA	3	*	*	*	2	1-1	1A1MP9
A988 P--O--	5355-616-7669	**KN**OB, CONTROL: MS91528-2D2B (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1MP10
A989 P--O--	5355-616-7669	KNOB, CONTROL: MS91528-2D2B (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1MP11
A990 P--O--	5355-985-6888	**KN**OB, CONTROL: MS91528-2M2B (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1MP12
A991 P--O--	5355-985-6888	KNOB, CONTROL: MS91528-2M2B (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1MP13
A992 P--O--	5355-985-6888	KNOB, CONTROL: MS91528-2M2B (96906)		EA	REF	REF	**REF**	REF	REF	1-1	1A1MP14
B005 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1DS1
B007 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1DS3
B008 P--O--	6240-155-7836	LAMP, INCANDESCENT: **MS**25237-327 (96906)		EA	REF	**REF**	REF	REF	REF	1-1	1A1DS4
B009 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	**REF**	**REF**	**REF**	1-1	1A1DS4
B010 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1DS6
B011 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	1A1DS7
B012 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	1**A1**DS8
B014 P--O--	6240-155-7836	LAMP, **INCANDESCENT: M**S25237-327 (96906)		EA	REF	REF	REF	REF	REF	1-1	1**A1**DS10

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION REF NUMBER & MFR CODE USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 15-DAY ORGANIZATIONAL MAINTENANCE ALW (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(7) ILLUSTRATION (a) FIG. NO.	(b) ITEM NO. OR REFERENCE DESIGNATION
B015 P--O--	6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)	EA	**REF**	REF	REF	REF	REF	1-1	1**A1**DS11
B374 P--O--		ROSE, TRANSFER, CO2 BOTTLE: 670329-1 (96214)	EA	1	*	*	*	*	1-1	MP2
B375 P--O--		HOSE, TRANSFER, HELIUM BOTTLE: 670328-1 (96214)	EA	1	*	*	*	*	1-1	MP1
B378 P--O--		ADAPTER, PIPE TO TUBE: 6CM2-316 (2**89**68)	EA	2	*	*	*	*	1-1	1MP1MP1
B379 P--O--		ADAPTER, PIPE TO TUBE: 6CM2-316 (28968)	EA	REF	REF	REF	REF	REF	1-1	1MP1MP2
B380 P--O--	4730-954-3809	ADAPTER, TUBE TO PIPE: 40102F316 (02570)	EA	1	*	*	*	*	1-1	1MP1MP3
B381 P_-O--		BOTTLE, CARBON DIOXIDE, MODIFIED: 694650-1 (96214)	EA	1	*	*	*	*	1-1	1MP1MP4
B382 P--O--		BOTTLE, LECTURE CAP, TUBE: 536186-1 (96214)	EA	1	*	*	*	*	1-1	1MP1MP4MP1
B384 P--O--	4730-491-3488	CAP, TUBE: 400C316 (02570)	EA	1	*	*	*	*	1-1	1MP1MP5
B385 P--O--	4730-491-3486	ELBOW, PIPE: 2ME316 (30780)	EA	1	*	*	*	*	1-1	1MP1MP6
B387 P--O--	4730-481-3017	TEE, ROSE: 1-8RRSSS (30780)	EA	1	*	*	*	*	1-1	1MP1**MP8**
B388 P--O--	4730-481-9498	TEE, PIPE TO PIPE: 2PTSS (97576)	EA	1	*	*	*	*	1-1	**1M**P1MP9
B395 P--O--		VAL**VE,** CYLINDER, GAS: 204 (42527)	EA	1	*	*	*	*	1-1	1**M**P2MP1
B396 P--O--		CYLINDER, COMPRESSED GAS: 244346 (42527)	EA	1	*	*	*	*	1-1	1MP2MP2
B419 P--O--		CARBON DIOXIDE, BONE DRY: DALROO999 (99401)	EA	1	*	*	2	2	1-1	**1M**P4
B420 P--O--		HELI**UM,** GASEOUS: 417569-1 (36346) (GRADE A, TYPE I, G)	EA	1	*	*	2	2	1-1	1MP5
B421 P--O--	4720-491-3485	HOSE ASSEMBLY, HELIUM BOTTLE: 692238-1 (96214)	EA	1	*	*	*	*	1-1	1MP6
B422 P--O--	4730-482-1057	ADAPTER: 696309-1 (96214)	EA	1	*	*	*	*	1-1	1MP6MP1
B427 P--O--	5330-585-6663	PACKING, PREFOR**ME**D: MS28775-110 (96906)	EA	1	*	*	2	2	1-1	1MP6MP6
B428 P--O--	4730-220-1799	PLUG, DUST AND MOISTURE SEAL: 45540058-4 (00624)	EA	**REF**	REF	**REF**	REF	REF	1-1	1**M6M**P7
B429 P--O--		NIPPLE, PIPE: 1-4FFS (45681)	EA	1	*	*	*	*	1-1	1MP7
B435 P--O--	4730-222-9075	TEE, INTERNAL, PIPE THR**E**AD: AN9**17**-2S (88044)	EA	1	*	*	*	*	1-1	**1M**P11
B437 P--O--		VALVE, **RE**GULATING: N1618 (42527)	EA	1	*	*	*	*	1-1	1MP12MP1
B438 P--O--	4820-493-9260	VALVE, RELIEF: 51**20**T2M**6**00 (91816)	EA	1	*	*	*	*	1-1	1MP13

By Order of the Secretary of the Army:

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General, United States Army,
Chief of Staff.

Official:

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Major General, United States Army,
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