TECHNICAL MANUAL

OPERATOR'S AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR AIRCRAFT HYDRAULIC SYSTEM TEST STAND, TRAILER MOUNTED TYPE MK-1 P/N 56578-7450 MODEL NUMBER D7450 NSN 4920-01-070-0871

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HEADQUARTERS, DEPARTMENT OF THE ARMY

20 FEBRUARY 1987

TECHNICAL MANUAL

No. 55-4920-442-13 & P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 20 February 1987

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Aviation Systems Command, ATTN: AMSAV-MC, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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Functional Group Numbers

00 - Test stand hydraulic, elect. eng. driven, type MK-1
01- Cabinet assembly
02 - Chassis
03 - Electrical system
04 - Hydraulic system
05 - Instrument panel

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CHAPTER 1
INTRODUCTION

SECTION I. GENERAL INFORMATION

1-1. Scope.

Type of Manual: Operator's Aviation Unit Maintenance, and Intermediate Maintenance including Repair Parts and Special Tools List.

Model Number and Equipment Name: Part Number: 4920-01-170-0871, Test Stand, Aircraft Hydraulic System, Type MK-1.

Purpose of Equipment: To facilitate ground checking and maintenance of aircraft hydraulic systems by performing the following test and service operations.

a. Test the aircraft systems for internal and external leakage.

b. Test the function and operation of aircraft hydraulic system components.

c. Drain, flush and refill the aircraft hydraulic systems with micronically filtered hydraulic fluid.

1-2. Maintenance forms, records, and reports. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751, the Functional Users Manual for the Army Maintenance Management System-Aviation (TAMMS-A).

1-3. Destruction of Army material to prevent enemy use. Refer to TM 750-244-1-4, Procedure for Destruction of Aviation Support Equipment (FSC 4920) for instructions on destroying this equipment.

1-4. Preparation for storage and shipment. Refer to TM 55-1500-204-25/1, General Aircraft Maintenance Manual and TM 743-200-1, Storage and Material Handling.

1-5. Quality assurance quality Control (QAQC). For quality assurance quality control requirements refer to FM 55-411.

1-6. Reporting equipment improvement recommendation (EIRs). If your Hydraulic Test Stand needs improvement, let us know. Send us an EiR. You, the user, are the only one who can tell us what you don't like about your equipment. Tell us why you don't like the design or why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Aviation Systems Command, ATTN: AMSAV-QRF, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We'll send you a reply.

1-7. Administrative publication storage. Administrative storage of this publication shall be in accordance with TM 55-1500-204-25/1.

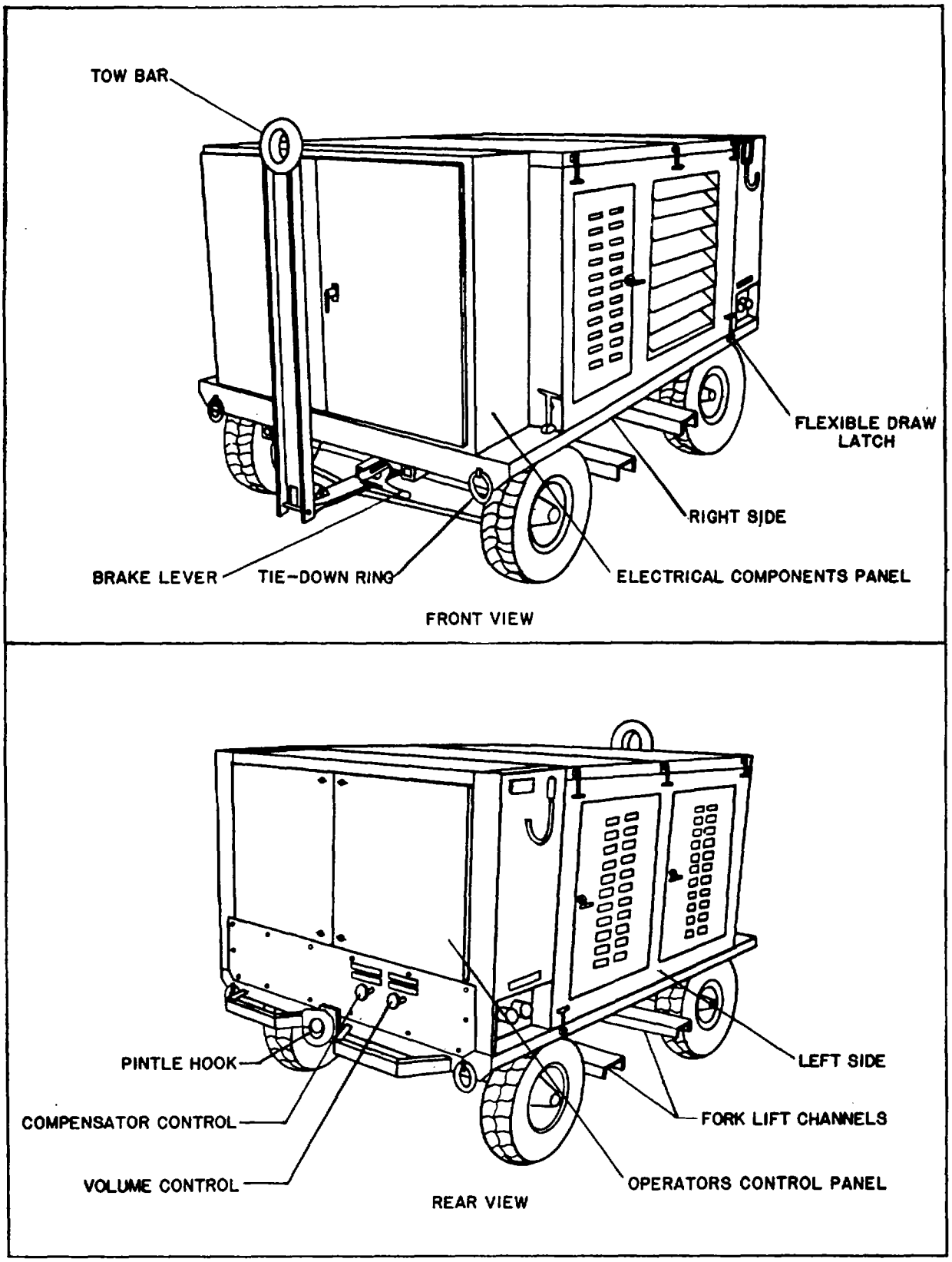

FIGURE 1-1. AIRCRAFT HYDRAULIC SYSTEM TEST STAND TRAILER MOUNTED TYPE MK-1

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1-8. Physical description. The test stand, as illustrated in figure 1-1 incorporates one hydraulic piping system, high pressure pump driven by a 60 horsepower, 230/460 volt, 3 phase motor.

Operator's controls and instruments are located at the rear of this test stand and the electrical components panel is located at the front of the unit. External hose connections are located on the right and left sides of the test stand near the rear end, adjacent to the operator's control panel.

Hanging devices are located above the external hose connections to stow the hoses between tests.

1-9. Test stand capabilities. The stand is capable of supplying 0 to 30 GPM (gallons per minute) of hydraulic fluid conforming to MIL-H-83282 at 3000 PSI (pounds per square inch), or 0 to 15 GPM at 5000 PSI. It is powered by an electric motor.

Completely mobile, the test stand is mounted on a four wheel trailer which may be towed at speeds up to 20 miles per hour over improved roads or surfaces; 10 MPH over rough terrain. The unit is air transportable, having been designed to withstand the gravitational forces which might be encountered in normal flight. The stand weight is 3060 pounds (wet). To familiarize using personnel with the equipment characteristics and physical makeup, a table of equipment data is presented in table 1-1 and some of the major components are identified in figure 1-2.

1-10. Descriptive details. The stand operating components, including the control panel, are enclosed in a steel, weather resistant housing, mounted on the four wheel trailer. Hand operated mechanical-type parking brakes which act upon the rear wheels, hold the test stand in a fixed position, while in operation or when parked on a grade. The unit may be fork lifted by inserting fork lift tines under the unit frame at marked channels. The major components and systems of the test stand are as follows: trailer and running gear, housing, electric motor, fill pump and bleed system, hydraulic reservoir, hydraulic filters, instruments and controls and the electrical system.

Trailer and running gear assembly. The trailer frame is of welded steel construction. The trailer rolls easily on four steel wheels equipped with 6.00/6.90-9, 6 ply tires. Individual leaf springs for each wheel give the stand good cushioning against road shocks and rough terrain, protecting the components of the test stand. A hinged towbar (figure 1-1) permits ease of positioning of the test stand and towing. The front wheel steering is the conventional type with steering knuckles, tie rods, and king pins. A hand lever (figure 1-1) sets the rear wheel brakes, holding the test stand in a fixed position during test operation or in parking on a grade. Two tiedown rings (figure 1-1) are provided on both the front and rear of the trailer frame to permit tie down of the test stand for storage or shipment. A pintle hook is provided for coupling and towing the vehicle (figure 1-1).

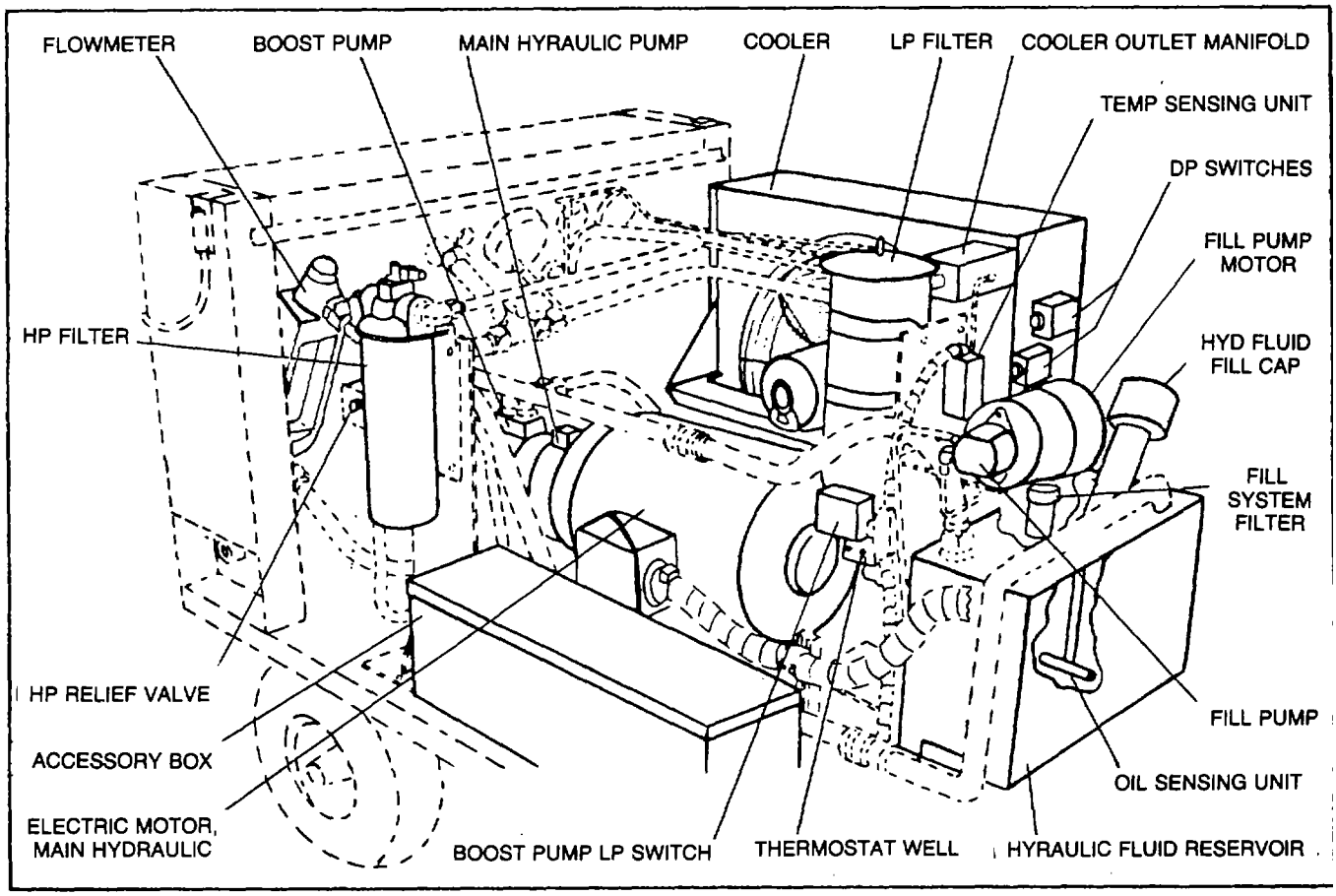

FIGURE 1-2. INTERNAL COMPONENTS ASSEMBLY

Housing. Hinged doors on the sides of the cabinet permit access to all internal components. A hinged instrument panel cover protects the controls when the test stand is not in use. The accessory box is located near the center of the unit on the right side (figure 1-2).

Electric motor. Power for the test stand is supplied by a 60 horsepower, 230/460 volt, 3 phase, 60 hertz, 3535 RPM electric motor (figure 1-2).

Electrical components panel. The circuit breaker and starter for the electric pump motor is located in the electrical components panel (figure 1-1) at the front of the unit as are the circuit breakers and starters for the fill pump and cooling fan.

Main hydraulic pump. The main hydraulic pump (figure 1-2) supplies fluid at high pressure for testing of a high pressure pump section and integral boost pump section. The pump contains a manual compensator control (figure 1-1) for varying the output pressure and volume control (figure 1-1) to regulate the output volume by changing the stroke length of the pumping pistons. Change in piston stroke length is controlled by system pressure so that when the pump is operating at a pressure less than the maximum setting of the compensator

control, the pump delivers full volume. When the system pressure reaches the compensator control setting, the pump output is automatically reduced to the amount of flow required to maintain this pressure throughout the system. The compensator control provides an adjustable range of 750 to 5000 psig with the flow varying to 30 gpm maximum. Further reduction to 500 psig can be achieved by adjusting the minimum volume stop adjustment located on the side of the main pump. The volume control permits regulation of maximum volume output by limiting the angle of a cam plate through a threaded mechanism within the pump. The return lines for the test system also include a flowmeter located on the control panel (figure 1-2) to monitor fluid flow.

Reservoir. The reservoir (figure 1-2) supplies hydraulic fluid for test stand functions including filling and bleeding of test stand system, and filling of aircraft system under test. A cleanout cover is accessible on the top of the reservoir. A fill neck, which is located on top of the reservoir, allows manual filling of reservoir. A fluid level indicator is provided on the control panel.

Oil cooler. The oil cooler (figure 1-2) consists of a two-section radiation type heat exchanging cooler with a cooling fan. The cooling fan is driven by a fractional horsepower motor. Both sections of the cooler serve the hydraulic system. The fan draws air through the cooler for cooling the hydraulic oil. Air is exhausted through vents in the cabinet.

High pressure filter. A filter (figure 1-2) is located in the high pressure output line. A micron filter element gives the pressurized fluid a final cleaning before outlet to the aircraft. A warning light displayed on the operator's control panel (figure 1-1) indicates a high differential pressure condition between the filter inlet and outlet should the filter elements become clogged with sediment removed from the hydraulic fluid.

Low pressure filter. A low pressure filter (figure 1-2) in the outlet line from the system boost pump is incorporated to clean hydraulic fluid of contamination before entering the high pressure pump section. The filter is maintained by removing top panel for replacement of the filtering element.

A drain is provided for the low pressure filter.

Fill pump system. (refer to figures 1-3 and 1-4). This system is used to fill the test stand hydraulic system with fluid in the preparatory operation of readying the test stand for scheduled operation. It also functions to fill the aircraft reservoir with pressurized fluid from the stand reservoir. The system includes an electric motor driven fill pump with filter, system actuating valves on control panel, relief valve and check valve. This filter is provided with a differential pressure (P) light on the control panel to indicate clogging.

Bleed system. (refer to figure 1-4). The test stand hydraulic system incorporates a bleed valve (4) to eliminate entrapped air from the system and sight glass to observe the fluid flow to the hydraulic reservoir. The valve is actuated by pressing in on the spring loaded valve stem with a push-type handle on the control panel. Air and fluid are bled to the reservoir from the low pressure filter and the cooler. A thermal relief valve in parallel with the bleed valve prevents increased pressure in the cooler and filter caused by thermal expansion.

Protective Devices and Instrumentation (Refer to figures 1-3 and 1-4).

a. A thermal relief valve limits pressure in the low pressure section caused by thermal expansion of fluid.

b. A thermoswitch in the high pressure pump inlet circuit actuates to shut down the unit when the fluid temperature reaches 165 ± 5F.

c. Low pressure switches protect the high pressure pumps against cavitation due to low inlet pressure or boost pump failure. If the pressure drops below 40 ± 5 psig, the automatic shutdown of the unit is executed automatically.

d. Check valves prevent reverse flow to the fill pump system.

e. Differential pressure switches across filter ports of the high pressure filter illuminate red warning light on control panel to indicate a clogged filter element.

f. Circuit breakers are provided for overload protection of various circuits. Refer to figure C-7 for location of electrical components and figure 1-3 for wiring schematic.

g. Complete instrumentation and controls are located on the control panels. Refer to Section IV. for description of function and location.

Electrical system. (see figure 1-3). The system provides the circuits and control for proper functioning of electrical components.

a. Electrical power is supplied by an external source through No. AWG 00 4/c extra flexible cable, 50 ft. long.

b. The fill pump motor is controlled by a switch on the control panel and a circuit breaker in the electrical components panel.

c. A time delay relay (1TR) is actuated when the start pushbutton (2PB) is depressed to allow a 1 second delay for pressure build-up.