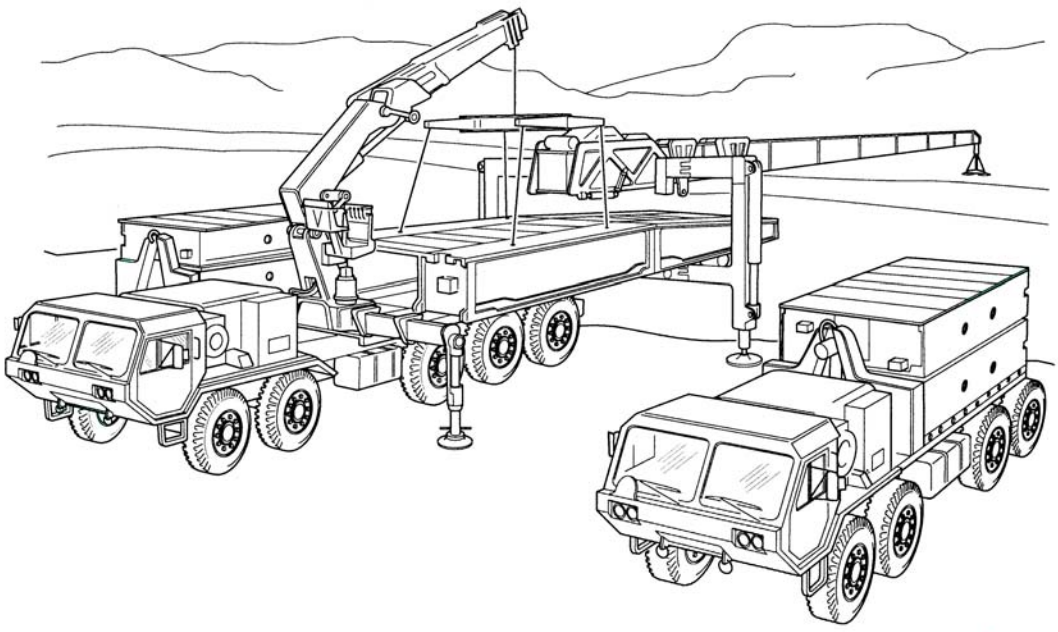
TM-5-5420-279-24

MAINTENANCE MANUAL

FOR

DRY SUPPORT BRIDGE (DSB)

(NSN 5420-01-469-7479)



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08 April 2003 **HEADQUARTERS, DEPARTMENT OF THE ARMY**

HOW TO USE THIS MANUAL

This manual is designed to help you maintain the Dry Support Bridge (DSB). A table of contents is provided at the beginning of this manual.

It should be noted by the reader, that this manual is in a commercial format.

WARNINGS, CAUTIONS NOTES, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

WARNING

A WARNING indicates a hazard, which can result in death or serious injury.

CAUTION

A CAUTION is a reminder of safety practices or directs attention to usage practices that may result in damage to equipment.

NOTE

A NOTE is a statement containing information that will assist in making the procedures easier to perform.

This manual is divided into 6 chapters. There are also 10 appendices which contain information to support the content of the chapters. Unit and Direct Support maintenance procedures are covered in this manual.

Chapter 1 Introduction, Contains a general description and function of the Dry Support Bridge (DSB) and explains briefly how the main bridge components interface.

Chapter 2 DSB System Hydraulic Trouble Shooting, contains a brief overview of the hydraulic system and details the steps necessary to recognize, locate and rectify faults that may occur. The trouble shooting charts should be used with the relevant maintenance procedures in chapters 5 and 6 and the appropriate appendix.

Chapter 3 DSB System Electrical Trouble Shooting, contains a brief overview of the hydraulic system and details the steps necessary to recognize, locate and rectify faults that may occur. The trouble shooting charts should be used with the relevant maintenance procedures in chapters 5 and 6 and the appropriate appendix. Cable route tables are also provided to guide the maintainer along a cable route for specific circuits.

Chapter 4 Crane System Hydraulic and Electrical Trouble Shooting, contains a brief overview of the hydraulic system and details the steps necessary to recognize, locate and rectify faults that may occur. The trouble shooting charts should be used with the relevant maintenance procedures in chapters 5 and 6 and the appropriate appendix.

Chapter 5 Unit Maintenance Procedures, oils and lubrication materials, tools and test equipment and a PMCS are listed in this chapter. A list of procedures that can be carried out at unit level are detailed.

Chapter 6 Direct Support Maintenance Procedures, a list of procedures that can be carried out at direct support level are detailed in this chapter.

Appendix A References, a list of publications that are referenced to in the DSB maintenance manual.

Appendix B Maintenance Allocation Chart, detailing the completion times for tasks and the tools required to carry out a maintenance procedure.

Appendix C Torque Limits, a table containing the torque specifications for all bolts on the DSB.

Appendix D Launcher Hydraulic and Electric Assembly Location Drawings, provides a top level quick reference guide to finding the name and location of a hydraulic or electrical assembly on the DSB. Cable runs are also included in this appendix.

Appendix E Launcher Hydraulic System Drawings, a set of hydraulic circuit diagram which can be used to trace hydraulic circuits. A top level over view of the hydraulic system is also provided.

Appendix F Launcher Hydraulic Manifold Assembly Drawings, a top level quick reference guide to identifying an individual hydraulic manifold, the solenoid valves and test points fitted to each manifold are also detailed.

Appendix G Launcher Electrical System Drawings, a set of electrical circuit diagram which can be used to trace electrical circuits form a consumer unit to the power source. A series of tables provides a quick reference guide as to which solenoid valve is operated when a particular operation is being performed, this is a synopsis of the solenoid energisation chart.

Appendix H Launcher Electrical Component Drawings, this chapter details the cables used throughout the DSB less the crane. Each cable is clearly identified, which junction boxes or electrical components the cable is connected to is detailed. The physical make up and a circuit diagram of the cable is also shown.

Appendix J Crane Hydraulic and Electrical System Circuit Diagram, a quick reference of where the crane electrical components can be found is detailed in this chapter. Hydraulic and electrical circuit diagram are also provided to assist with trouble shooting.

Appendix K DSB Weld Repairable Items Procedures and Descriptions, details the weld procedures that should be used when repairing specific components. Items considered repairable, in-process inspections and welding parameters are also covered by this appendix.

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INTRODUCTION

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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1 SCOPE

This is a maintenance manual for the use of Unit and Direct Support maintenance functions. The manual covers the Bridge, Launcher, A-Frame, slide frame and associated components as allocated by the Maintenance Allocation Chart in Appendix B of this manual. Further maintenance instructions can be found in TM 5-5420-279-10 Operator's Manual.

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 738-750, The Army Maintenance Management System (TAMMS) (Maintenance Management UPDATE).

1-3 DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

Command decision, according to tactical situation, will determine when the destruction of the truck will be accomplished. A destruction plan will be prepared by the using organization unless one has been prepared by a higher authority.

For general destruction procedures for this, refer to TM 750-244-3.

1-4 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

a. If your DSB needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance.

b. Put it on an SF368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CIP-WT, Rock Island, Illinois 61299-7630. We'll send you a reply.

1-5 WARRANTY INFORMATION

The DSB is covered under warranty by Williams Fairey Engineering Ltd for a period of 12 months. For information covering this warranty refer to (Warranty Technical Bulletin No. TB 5-5420-279-14) Warranty Procedures for Dry Support Bridge (NSN: 5420-01-469-7479) DSB.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9 GENERAL DESCRIPTION

a. The DSB system consists of a launcher, launch beam and bridging modules including end beams and approach ramps. It is compatible with the pallet loading system and is transported on four PLS flatracks. It is lightweight in construction and easy to construct by a crew of only eight personnel. It provides a bridging span of 137 ft 9 in (42 m) and 14 ft 1 in (4.3 m) width.

b. A launcher attached to the transport vehicle consists of a crane, a slide frame, a launch frame and a fold out A-Frame for leveling and stabilization.

c. The crane is operated separately while the launcher is operated via hydraulic circuits controlled from a chest pack. The chest pack includes a joystick and illuminated panels to indicate the current action being or about to be executed. Leads from a control cabinet on the vehicle terminate at either end of the vehicle to facilitate connection of the chest pack lead.

d. The launch frame also carries the first section of the launch beam upon which the forward and rear carriages, used to support the bridge sections during assembly and placement, are already in place. The launch frame features a launch beam drive unit to move the launch beam forward or rearward as required and winches, attached to the launch frame, control the movement of the carriages and the raising or lowering of the bridge.

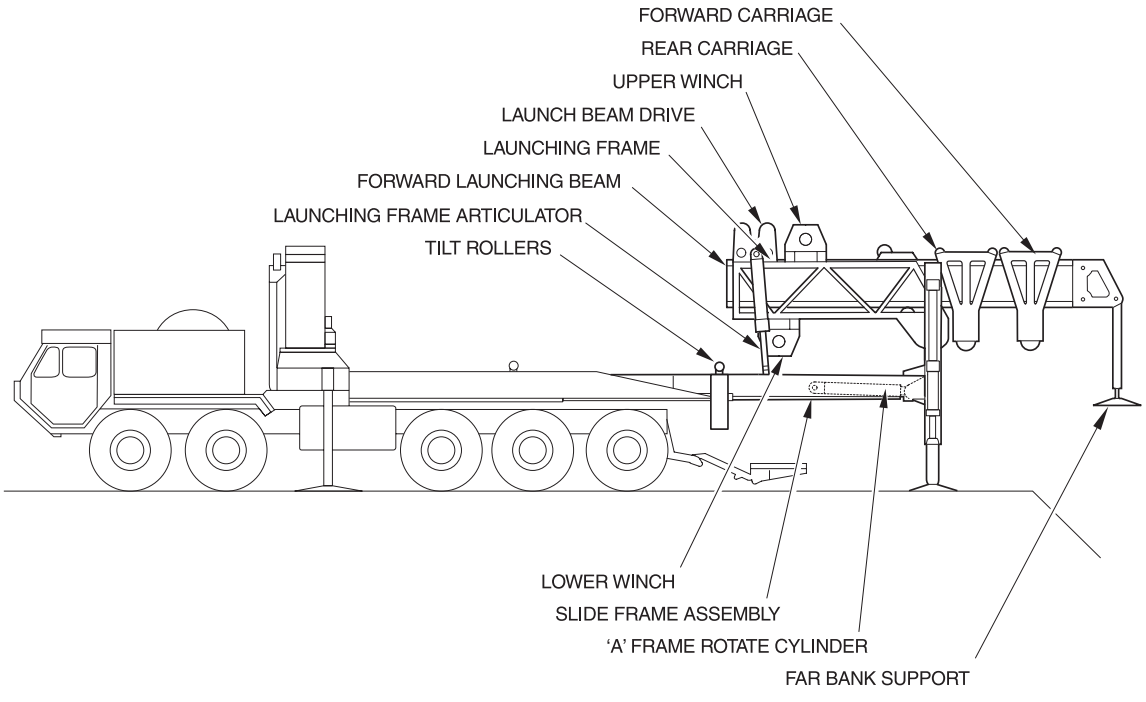

Fig 1.1 Launcher Vehicle

e. The A-Frame assembly consists of foldout support legs that allow the vehicle to be leveled and stabilized for bridge deployment and an upper beam that supports the launch frame. This upper beam is used in its lower position for launch beam deployment and is raised to provide clearance for the modular bridge sections during bridge deployment.

f. The operation of the drive mechanism, winches and hydraulic cylinders is controlled via the chest pack. The operator of the chest pack controls the whole bridge deployment operation, which relies on coordinated actions of the 8-man crew in order to achieve minimum deployment times.

1-10 DETAILED DESCRIPTIONS

1-10-1 Power Take Off (PTO) and Hydraulic Pump

a. A pump provides the hydraulic power to operate the equipment services. The pump powers the bridging hydraulic circuits and the crane services from a power take-off on the vehicle transmission.

b. The pump is a Standard A11VO75 variable displacement swash plate piston pump driven via a power take-off (PTO) and drive shaft from the vehicle transmission.

c. The pump weighs approximately 132 lb. (60 kg) and can produce a flow of 26.4 to 31.68 US gallons (100 to 120 liters) per minute at a pressure of 4423 Psi (30495.51 kPa). It contains pressure cut-off and load sensing control facilities, which match the flow and pressure outputs of the pump to the service required. When no services are being selected, the pump reverts to an idling pressure of 294 Psi (2027.05 kPa) which reduces pump and other hydraulic component wear and extends their working life.

d. Cross connection is provided to allow another suitable hydraulic system to be connected to the DSB Launcher system in the event of a pump failure due to pump or prime mover failure. This allows the Launcher to complete its mission at a lower speed.

e. The cross connection system is designed to use the donor vehicle hydraulic system to drive the DSB without interchanging fluid and the risk of overfilling one or the other reservoirs due to cylinder motion. It also intensifies the pressure to allow the crane to lift the maximum even if the donor vehicle does not give sufficient pressure.

f. It works by having a hydraulic motor driven by the hydraulic system of the donor vehicle driving a hydraulic pump that works off the DSB hydraulic reservoir.

1-10-2 Crane System

The crane system is used to transfer the launch beam and bridging modules from their transportation vehicles to the launcher vehicle during bridging operations. The system comprises an Atlas 390.1 LM Plus crane, a launch beam lifter for the launch beam modules and a two-position bridge module lifter for use with the bridging modules.

1-10-3 Crane

a. The crane is hydraulically powered and controlled and installed on the vehicle, the use of a knuckle boom system enables the boom of the crane to be folded hydraulically within the limited mounting space for transit. When folded, the crane occupies an area approximately 7 ft 10 in (2.4 m) high by 4 ft 3 in (1.3 m) at the front end of the launcher vehicle.

b. The crane usage is restricted to bridge deployment or retrieval activities.

c. The crane base is a welded fabrication and incorporates a stabilizer beam and a pivot beam for three-point crane support. The supporting framework extends rearwards from the crane itself along the length of the vehicle and attaches to the vehicle chassis at four positions to distribute the weight of the crane and any load suspended from it during operation.

d. Incorporated into each side of the crane base is a stabilizer leg, deployed and operated by stabilizer hydraulic cylinders, which is attached to a load-spreading pad at a knuckle joint and lowered to the ground to level and support the crane and the forward end of the vehicle. Lock valves are flanged to the hydraulic cylinders to prevent cylinder retraction in the event of hose or hydraulic system failure. The crane cannot be operated unless both its stabilizer legs are deployed and down. A level is provided for each stabilizer leg and, with both stabilizer legs grounded, horizontal setting is achieved by adjustment of one stabilizer leg only.

e. The crane column is supported and rotates on a low-friction ball bearing rotate ring, which is protected by lip seals from dirt and foreign body ingress. The rotate system is driven from a hydraulic piston motor with a hydraulically-operated, spring-loaded, multi-disc brake via a planetary gear reduction.

f. The knuckle boom system consists of a main boom and a three-part telescopic jib. Mounted on the jib is a rotatable load hook with a safety catch. The boom and jib are welded fabrications and the jib is of hexagonal section. The telescopic sections of the extendible jib slide on wear resistant guide pads. The boom and jib are actuated by the lift, the jib and the three telescopic extension hydraulic cylinders.

g. The crane hydraulic system is comprised of the hydraulic lift cylinder, jib hydraulic cylinder, rotate motor, three jib-extension hydraulic cylinders and two stabilizer-leg hydraulic cylinders.

h. Hydraulic power is supplied to the crane hydraulic system from the transmission-driven pump and controlled by an operator seated at the main control valve bank at the side of the crane column. The operator seat is stowed for transportation and released to the operating position by shoot bolt. A ladder, with non-slip rungs and extending above the operator seat, provides safe access to the control station and seat.

i. The main control valve bank is a four-‘slice’ selector valve and a load-sensing system is incorporated. A further control valve, for the operation of each stabilizer leg, is fitted at each side of the crane base. All controls are spring loaded to return to the ‘off’ position when released.

j. Multi-function, pilot-valve-controlled load, hold valves are fitted to every hydraulic cylinder as protection against hose rupture, system overload, cavitation, overspeed under load and uncontrolled movement in the direction of load movement.

k. The crane incorporates an overload protection shut-off system. In the event of any overload situation, however caused, the system prevents any further movement of the crane boom, which will increase the load moment. This system allows movements, which reduce the load moment and continued operation within the rated capacity of the crane.

l. An emergency stop button is located at the control position on the crane. In the event of electrical failure, operation of two valves stops all functions except manual emergency control to safely recover the load and stow the crane.

m. For further information on the operation and maintenance of the crane, refer to the manufacturer's literature supplied.

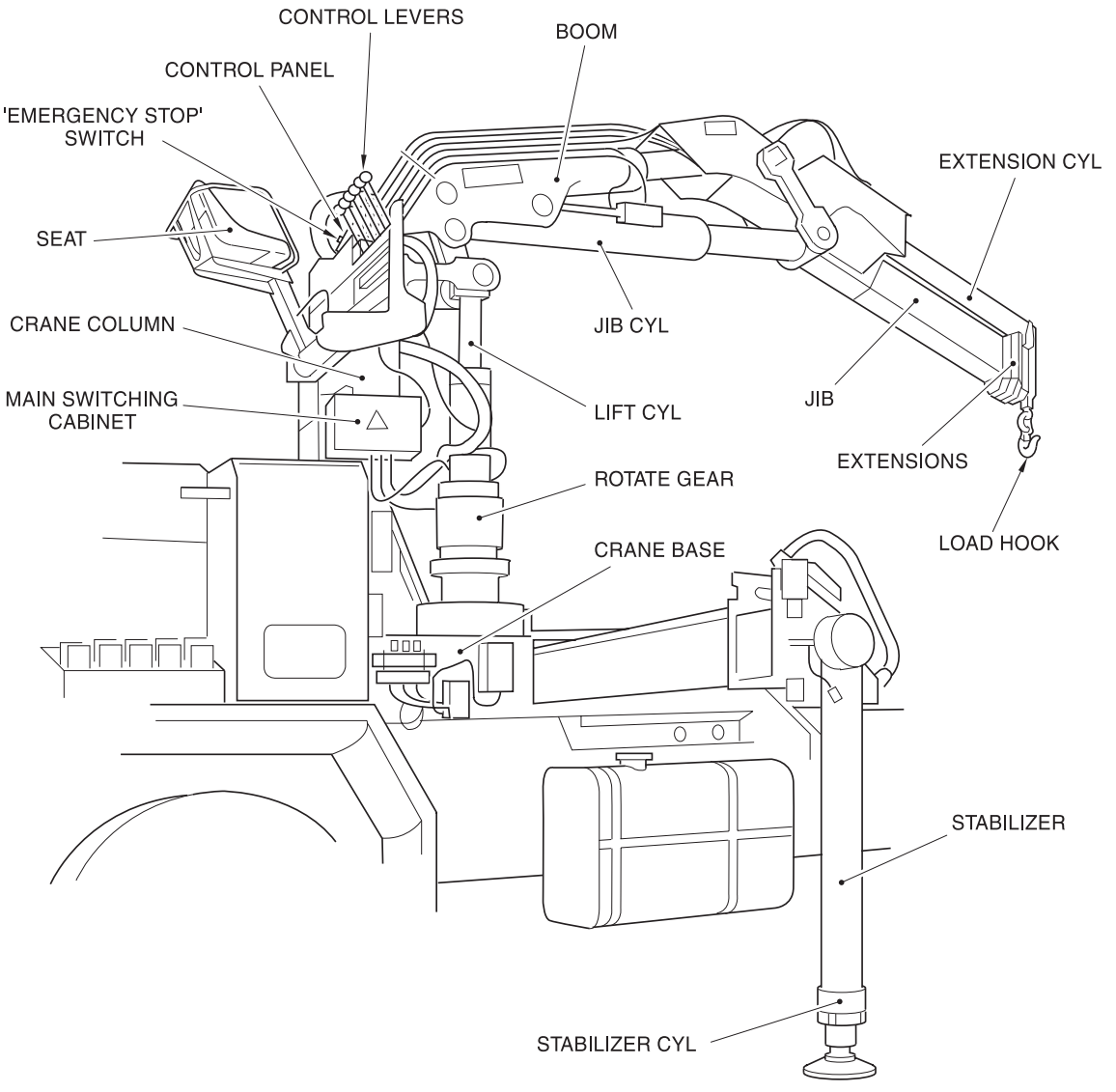

Fig 1.2 Crane