

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL

DIRECT AND GENERAL SUPPORT

MAINTENANCE MANUAL

TRUCK, LIFT, FORK EMD, SOLID RUBBER TIRED

WHEELS, 4000LB. CAPACITY
144 and 180 INCH LIFT

ARMY MODEL MHE-227

ALLIS CHALMERS MODELS ACE40AEE144

NSN 3930-00-327-1603

AND ACE40AEE180 NSN 3930-00-327-1600

HEADQUARTERS, DEPARTMENT OF THE ARMY

APRIL 1975

TECHNICAL MANUALS

No. 10-3930-631-34



HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. , 30 April 1975

DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL
TRUCK, LIFT, FORK, EMD, SOLID RUBBER TIRES
4000 LB CAPACITY, 144 and 180 INCH LIFT
ALLIS CHALMERS MODELS ACE40AEE144
NSN 3930-00-327-1603
AND ACE40AEE180 NSN 3930-00-327-1600.

		Paragraph	Page
CHAPTER	1. INTRODUCTION		
Section	I. General	1-1	1-1
	II. Description and data	1-8	1-1
CHAPTER	2. DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS		
Section	I. Repair Parts, Special Tools and Equipment	2-1	2-1
	II. Troubleshooting	2-3	2-1
	III. General Maintenance	2-5	2-3
	IV. Removal and Installation of Major components and assemblies	2-8	2-4
CHAPTER	3. REPAIR OF AXLES		
Section	I. Steering Axle	3-1	3-1
	II. Drive Axle	3-7	3-4
	III. Wheels and Tires	3-11	3-15
CHAPTER	4. REPAIR OF BRAKES		
Section	I. Parking Brake	4-1	4-1
	II. Service Brakes	4-3	4-5
CHAPTER	5. REPAIR OF STEERING SYSTEM		
Section	I. Description and Pressure Check	5-1	5-1
	II. Steering Pump and Cylinder	5-3	5-3
	III. Steering Valve Unit and Hydraulic Lines	5-5	5-6
CHAPTER	6. REPAIR OF FRAME AND COVERS	6-1	6-1
CHAPTER	7. REPAIR OF HYDRAULIC LIFT COMPONENTS		
Section	I. Hydraulic Pump	7-1	7-1
	II. Control Valve	7-3	7-6
	III. Hydraulic Cylinders	7-6	7-13
	IV. Side Shift Installation	7-8	7-21
	V. Mast Assembly	7-14	7-28
	VI. Hydraulic Reservoir & Hoses	7-16	7-33
CHAPTER	8. REPAIR OF ELECTRIC MOTORS		
Section	I. Drive Motor	8-1	8-1
	II. Hydraulic Pump Motor	8-3	8-6
	III. Power Steering Pump Motor	8-5	8-9
CHAPTER	9. REPAIR OF DRIVE CONTROL COMPONENTS		
Section	I. Description	9-1	9-1

	Paragraph	Page
II. Drive Control Tests and Adjustments	9-4	9-8
III. Repair of Drive Control Components	9-22	9-18
APPENDIX A. REFERENCES.....		A-1
INDEX		I-1

LIST OF ILLUSTRATIONS

Number	Title	Page
2-1	Underside of truck.....	(TS009134) 2-5
2-2	Steering pump and motor	(TS009135) 2-7
2-3	Steering valve unit.	(TS009136) 2-8
2-4	Hydraulic pump and motor.....	(TS009137) 2-9
2-5	Side shift carriage	(TS009138) 2-11
2-6	Side shift hoses and hose reel.....	(TS009139) 2-12
2-7	Contactor panel.....	(TS009140) 2-14
2-8	Static panel	(TS009141) 2-15
3-1	Power steering system.....	(TS009142) 3-1
3-2	Steering axle, exploded view	(TS009143) 3-2
3-3	Pivot arm bearings	(TS009144) 3-3
3-4	Drive unit.....	(TS009145) 3-5
3-5	Drive axle, exploded view	(TS009146) 3-6
3-6	Removing axle shaft	(TS009147) 3-7
3-7	Removing spindle	(TS009148) 3-7
3-8	Differential carrier, exploded view.....	(TS009149) 3-9
3-9	Differential carrier and differential case	(TS009150) 3-10
3-10	Removing differential from carrier	(TS009151) 3-10
3-11	Differential assembly, exploded view.....	(TS009152) 3-11
3-12	Fabricated tool	(TS009153) 3-12
3-13	Measuring for bearing shims	(TS009154) 3-13
3-14	Adjusting backlash	(TS009155) 3-14
3-15	Checking ring or bull gear runout.....	(TS009156) 3-15
3-16	Drive wheel, exploded view.....	(TS009157) 3-16
3-17	Spring pin installed.....	(TS009158) 3-17
3-18	Lubricating ring or bull gear	(TS009159) 3-17
3-19	Installing cushion tire	(TS009160) 3-18
4-1	Parking brake, installed view	(TS009161) 4-2
4-2	Brake caliper assembly, exploded view.....	(TS009162) 4-3
4-3	Parking brake linkage, exploded view	(TS009163) 4-4
4-4	Service brake linkage, exploded view.....	(TS009164) 4-6
4-5	Master cylinder, exploded view.....	(TS009165) 4-8
4-6	Wheel cylinder, exploded view.....	(TS009166) 4-9
4-7	Service brake, exploded view	(TS009167) 4-10
4-8	Improper lining wear	(TS009168) 4-11
5-1	Pressure gage location	(TS009169) 5-1
5-2	Power steering pump, exploded view	(TS009170) 5-2
5-3	Steering cylinder and drag link.....	(TS009171) 5-5
5-4	Steering valve unit, exploded view.....	(TS009172) 5-7
5-5	Checking spool rotation	(TS009173) 5-8
5-6	Loosening spool assembly.....	(TS009174) 5-8
5-7	Installing spring set	(TS009175) 5-9
5-8	Steering hydraulic system, exploded view.....	(TS009176) 5-11
6-1	Frame and covers, exploded view.	(TS009177) 6-2
7-1	Hydraulic system, schematic diagram	(TS009179) 7-2
7-2	Hydraulic pump, exploded view	(TS009180) 7-4
7-3	Pump screw location.....	(TS009181) 7-6
7-4	Checking low volume inlet pressure	(TS009182) 7-7
7-5	Control valve	(TS009183) 7-7
7-6	Control valve, removal and installation.	(TS009184) 7-8
7-7	Control valve, exploded view	(TS009185) 7-9
7-8	Control valve linkage, exploded view.....	(TS009186) 7-12
7-9	Tilt cylinder, exploded view.....	(TS009187) 7-14
7-10	Lift chain.....	(TS009188) 7-15
7-11	Mast assembly, exploded view	(TS009189) 7-16
7-12	Cluster cylinder, exploded view	(TS009190) 7-18
7-13	Single hoist cylinder, exploded view	(TS009191) 7-20
7-14	Side shift cylinder, exploded view.....	(TS009192) 7-22
7-15	Side shift carriage, exploded view	(TS009193) 7-24
7-16	Carriage roller stud locations	(TS009194) 7-25
7-17	Bearing stud welding procedure	(TS009195) 7-26
7-18	Side shift hoses, exploded view.....	(TS009196) 7-27
7-21	Mast bearing stud locations	(TS009199) 7-31

Number	Title	Page
7-22	Mast bearing adjustment	(TS009200) 7-32
7-23	Hydraulic hose, exploded view.....	(TS009201) 7-34
7-24	Hydraulic reservoir, exploded view	(TS009202) 7-36
8-1	Drive motor brush location.....	(TS009204) 8-1
8-2	Checking brush spring pressure	(TS009205) 8-2
8-3	Drive motor, exploded view.....	(TS009206) 8-3
8-4	Removing bearing housing	(TS009207) 8-4
8-5	Testing armature for shorts	(TS009208) 8-4
8-6	Check for open coils	(TS009209) 8-4
8-7	Undercutting mica.....	(TS009210) 8-5
8-8	Checking field winding for grounds.....	(TS009211) 8-5
8-9	Installing bearing housing	(TS009212) 8-6
8-10	Hydraulic pump motor, exploded view.....	(TS009213) 8-7
8-11	Hydraulic pump motor brush location	(TS009214) 8-8
8-12	Power steering motor, exploded view.....	(TS009215) 8-9
9-1	Wiring diagram.	(TS009216) 9-2
9-2	Block diagram	(TS009217) 9-3
9-3	Accelerator control	(TS009218) 9-4
9-4	Control cycles.	(TS009219) 9-6
9-5	Battery cables and receptacle.....	(TS009221) 9-9
9-6	Static panel, top view	(TS009222) 9-11
9-7	Waveform for control board output	(TS009223) 9-12
9-8	Waveforms for drive regulator module	(TS009224) 9-13
9-9	Diode test.....	(TS009225) 9-15
9-10	Diode suppressor module	(TS009226) 9-16
9-11	Charging the capacitor.....	(TS009227) 9-17
9-12	Discharging the capacitor	(TS009228) 9-17
9-13	Contactors and points.....	(TS009229) 9-18
9-14	Accelerator Control, exploded view	(TS009230) 9-19
9-15	Accelerator control box, exploded view	(TS009231) 9-21
9-16	Instrument panel and control lever, exploded view.....	(TS009232) 9-24
9-17	Forward and reverse switch, exploded view	(TS009233) 9-26
9-18	Contactors pane harness wiring diagram	(TS009234) 9-28
9-19	Cable diagram.....	(TS009235) 9-29
9-20	Wiring Harness	(TS009236) 9-30
9-21	Contactors panel, exploded view.....	(TS009237) 9-32
9-22	Pump and Emergency cutout contactor, exploded view.....	(TS009238) 9-34
9-23	Forward and reverse contactor, exploded view	(TS009239) 9-36
9-24	Diode and resistor assembly, exploded view.....	(TS009240) 9-38
9-25	Static panel assembly, exploded view	(TS009241) 9-40

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains information necessary for the maintenance of the Truck, Lift, Fork, Electric, Solid Rubber Tired Wheels, 4000 pound capacity by Direct Support and General Support Maintenance personnel as allocated by the Maintenance Allocation Chart. The manual provides information on the maintenance of the equipment which is beyond the scope of tools, equipment, personnel or supplies normally available to Operator and Organizational Maintenance.

1-2. Maintenance Forms and Records

Maintenance Forms and Records that are required for use are explained in DA Pam 738-750.

1-3. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes, or 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, U. S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

1-4. Equipment Serviceability Criteria

This equipment is not covered by an ESC.

1-5. Enemy Use

Procedures to be used for destruction of enemy equipment to prevent enemy use are defined in TM 750-244-6,

1-6. Administrative Storage

Refer to TM 740-90-1 for instructions pertaining to administrative storage of the fork lift truck.

1-7. Orientation

Throughout this manual the terms right, left, front and rear with respect to the truck and components are determined from the viewpoint of the operator sitting on the seat of the truck.

Section II. DESCRIPTION AND DATA

1-8. Description

A general description of the Fork Lift Truck and information pertaining to identification plates are contained in TM 10-3930-631-12. A more detailed description of components and assemblies is contained in the applicable sections of this manual. Detailed descriptions of the components of the truck are provided in the applicable paragraphs of this manual.

1-9. Identification and Tabulated Data

a. General. This paragraph contains the maintenance data pertinent to direct and general support maintenance personnel

b. Identification. The lift truck has two identification plates mounted on the right front of the truck.

(1) *Army data plate.* This plate includes the type of truck, type of tires and model number. It also includes the contract number, serial and registration numbers, federal stock number and capacity.

(2) *Shipping data plate.* The shipping plate includes capacity of lift, shipping weight and wheel loading weights. It also shows the center of gravity and applicable heights and distances for the important parts of the truck.

c. Drive Motor Classification and Rating.

Make	Allis Chalmers
Part Number	48494363 2
Horsepower	5. 1 HP
Current Draw	100 Amps
Voltage.....	36 Volts
Speed	1450 RPM
Winding Type.....	Series Wound
Cooling.....	Fan Cooled
Insulation	Class F
Rotation	Clockwise

d. Hydraulic Pump Motor Classification and

Rating.

Make Allis Chalmers

Part Number..... 450D3
Horsepower..... 10. 7 HP
Current Draw..... 260 Amps
Voltage..... 36 Volts
Speed..... 1950 RPM
Winding Type Series Wound
Cooling..... Fan Cooled
Insulation..... Class F
Rotation..... Counterclockwise
e. Steering Hydraulic Pump Motor Classification and Rating.
Make J. S. Barnes Corp.
Part Number..... MHR4004
Horsepower..... 1. 65 HP
Current Draw..... 36 Amps
Voltage..... 36 Volts
Speed..... 2700 RPM
Winding Type Series Wound
Cooling..... Fan Cooled
Insulation..... Class F
Rotation..... Clockwise
f. Steering Unit Classification and Rating.
Make Allis Chalmers
Part Number..... 4802629-8
Type Hydraulic
g. Hydraulic Control Valve Classification and Rating.
Make Hydraulic Unit Specialties

Part Number 5000-3-55
Control 3 Plunger
h. Hydraulic Pump Classification and Rating
Make Cessna Aircraft Co.
Part Number 24386 RAM
Capacities at 2015 RPM:
Primary Section:
Gallons per Minute 9.5 gpm (35. 9 lit/min.)
Pressure 1500 psi (105. 4 kg/m²)
Secondary Section:
Gallons per Minute . 2. 3 gpm (8. 7 lit/min.)
Pressure 1500 psi (105. 4 kg/m²)
Rotation Clockwise
i. Power Steering Pump Classification and Ratings.
Make John S. Barnes Corp.
Part Number..... GC5000A14BA
Rotation..... Clockwise
Relief Valve Setting..... 800-850 psi
(56. 2-59. 7 kg/m²)
j. Drive Axle Classification and Rating.
Make Allis Chalmers
Part Number..... 4849428-0
Type Full Floating:
..... Double Reduction
Ratio..... 3. 1875:1
Capacity 5 pints (2. 3 lit)