

TECHNICAL MANUAL
DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
TRUCK, LIFT, FORK, GED, SOLID RUBBER WHEELS
4000 LBS CAPACITY 180 IN. LIFT (ARMY MODEL
MHE209) (ALLIS CHALMERS MODEL F40-24PS)
FSN 3930-459-5948

This copy is a reprint which includes current
pages from Changes I through 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1970

DIRECTSUPPORT AND GENERAL SUPPORTMAINTENANCE MANUAL

TRUCK, LIFT, FORK, GED, SOLID

RUBBER WHEELS, 4000 LBS CAPACITY

180 IN. LIFT (ARMY MODEL MHE 209)

(ALLIS CHALMERS MODEL F40-24PS)

FSN 3930-459-5948

		Paragraph	Page
CHAPTER	1. INTRODUCTION		
Section	I. General.....	1-1	1-1
	II. Description and data	1-3	1-1
CHAPTER	2. GENERAL MAINTENANCE INSTRUCTIONS		
Section	I. Repair parts, special tools, and equipment	2-1	2-1
	II. Troubleshooting.....	2-4	2-1
	III. Removal and installation of major components and auxiliaries	2-5	2-3
CHAPTER	3. ENGINE PEPAIR INSTRUCTIONS		
Section	I. Engine	3-1	3-1
	II. Engine block.....	3-2	3-2
	III. Crankshaft, bearings, and timing gear	3-7	3-4
	IV. Flywheel assembly and housing.....	3-12	3-6
	V. Valves, springs, guides, seats and tappet assemblies	3-16	3-7
	VI. Camshaft, bearings, and drive gear	3-21	3-10
	VII. Pistons and connecting rods	3-25	3-12
	VIII. Bearings.....	3-31	3-14
	IX. Timing gears and cover	3-36	3-15
	X. Lubricating oil pan and pump.....	3-40	3-17
CHAPTER	4. FUEL SYSTEM REPAIR INSTRUCTIONS		
Section	I. Carburetor	4-1	4-1
	II. Fuel tank.....	4-7	4-4
	III. Governor	4-14	4-6
CHAPTER	5. ELECTRICAL AND COOLING SYSTEMS REPAIR INSTRUCTIONS		
Section	I. Alternator	5-1	5-1
	II. Starter motor	5-9	5-5
	III. Radiator.....	5-16	5-7
CHAPTER	6. TRANSMISSION REPAIR INSTRUCTIONS		
Section	I. Transmission assembly.....	6-1	6-1
	II. Torque converter	6-8	6-12
	III. Transmission control valve	6-12	6-13
	IV. Inching control.....	6-19	6-16
CHAPTER	7. AXLE REPAIR INSTRUCTIONS		
Section	I. Drive axle assembly	7-1	7-1
	II. Steering axle	7-5	7-9

CHAPTER	8. BRAKE, WHEEL, AND TIRE REPAIR INSTRUCTIONS	Paragraph	Page
Section	I. Service brake	8-1	8-1
	II. Hand brake assembly	8-7	8-5
	III. Wheel and tire assemblies	8-11	8-7
CHAPTER	9. STEERING SYSTEM REPAIR INSTRUCTIONS		
Section	I. Steering gear assembly.....	9-1	9-1
	II. Power steering cylinder.....	9-7	9-8
CHAPTER	10. HYDRAULIC LIFT SYSTEM REPAIR INSTRUCTIONS		
Section	I. Hydraulic lift system	10-1	10-1
	II. Tilt cylinder	10-3	10-3
	III. Mast assembly	10-9	10-5
	IV. Cylinder cluster	10-16	10-12
	V. Single cylinder assembly	10-22	10-14
	VI. Carriage and backrest assembly	10-28	10-16
	VII. Hydraulic reservoir	10-32	10-19
	VIII. Lift pump	10-37	10-20
	IX. Lift control valve	10-43	10-24
	X. Control levers and linkage	10-50	10-28
Appendix	A. References		A-1

LIST OF ILLUSTRATIONS

Number	Title	Page
2-1	Transmission, installed view	2-5
3-1	Engine components	3-2
3-2	Engine block and parts	3-4
3-3	Crankshaft	3-5
3-4	Crankshaft removal	3-6
3-5	Flywheel assembly	3-7
3-6	Camshaft, valves, and tappets	3-8
3-7	Removing camshaft	3-11
3-8	Piston and connecting rod	3-12
3-9	Check ring gap	3-13
3-10	Checking piston clearance	3-13
3-11	Timing gear cover	3-16
3-12	Lubricating oil pan	3-17
3-13	Lubricating oil pump	3-19
4-1	Carburetor	4-3
4-2	Fuel tank	4-5
4-3	Internal governor parts	4-7
4-4	Driving out governor shifter lever pins	4-8
4-5	Governor	4-9
5-1	Alternator	5-2
5-2	Rotor testing	5-3
5-3	Stator testing	5-3
5-4	Diode testing	5-4
5-5	Starter	5-6
5-6	Radiator and connections	5-8
6-1	Transmission hydraulic oil schematic	6-2
6-2	Transmission assembled	6-2
6-3	Torque converter assembly	6-4
6-4	Removing housing and drum	6-5
6-5	Removing disc and drum assembly	6-5
6-6	Single speed transmission	6-7
6-7	Disc and drum assembly	6-8
6-8	Checking pump and converter pressure	6-11
6-9	Checking converter tang depth	6-12
6-10	Checking converter alinement	6-13
6-11	Transmission control valve	6-15
6-12	Inching control pedal	6-17
6-13	Inching control adjustment	6-19
7-1	Drive unit	7-1
7-2	Pulling axle shaft	7-2
7-3	Drive axle housing and shafts	7-3
7-4	Removing spindle	7-4
7-5	Removing differential from carrier	7-5
7-6	Differential assembly	7-6
7-7	Adjusting backlash	7-8
7-8	Differential gear tooth patterns	7-8
7-9	Steering axle	7-10
8-1	Brake wheel cylinder	8-2
8-2	Master brake cylinder	8-3
8-3	Brake pedal and parts	8-4
8-4	Parking brake assembly	8-6
8-5	Drive wheel assembly	8-7
8-6	Steering wheel assembly	8-8
8-7	Tire positioning for replacement	8-9
9-1	Steering gear assembly	9-2
9-2	Checking control spool rotation	9-3
9-3	Removing check valve seal plug	9-4
9-4	Installing centering spring set	9-6
9-5	Drive-gear alinement	9-7
9-6	Power steering cylinder with yoke	9-9

LIST OF ILLUSTRATIONS-Continued

Number	Title	Page
10-1	Hydraulic lift system schematic	10-2
10-2	Tilt cylinder	10-4
10-3	Mast assemblies	10-7'
10-4	Mast bearing stud locations	10-9
10-5	Bearing stud welding procedure	10-10
10-6	Cylinder cluster	10-13
10-7	Single cylinder assembly.....	10-15
10-8	Backrest and carriage	10-17
10-9	Carriage roller stud location	10-18
10-10	Hydraulic oil reservoir.....	10-20
10-11	Hydraulic pump	10-22
10-12	Hydraulic control valve	10-26
10-13	Control levers	10-29

CHAPTER 1

INTRODUCTION

Section I. General

1-1. Scope

This manual contains instructions for the use of Direct Support and General Support Maintenance personnel maintaining the Truck, Lift, Fork, Gasoline, Solid Rubber Tired Wheels, 4, 000 pound capacity as allocated by the Maintenance Allocation Chart. It provides information on the maintenance of the equipment, which is beyond the scope of the tools, equipment, personnel, or supplies normally available to Operator and Organizational Maintenance.

1-2. Forms and Records

- a. DA forms and records used for equipment maintenance will be only those prescribed in TM 38-750.
- b. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Section II. DESCRIPTION AND DATA

1-3. Description

A general description of the Model MHE-209 Fork Lift Truck and information pertaining to the identification plates are contained in TM 10-3930-621-12. A more detailed description of specific components and assemblies is contained in the applicable section(s) of this manual. Detailed descriptions of the components of the Model MHE-209 Fork Lift Truck are provided in the applicable maintenance paragraphs of this manual.

1-4. Tabulated Data

a. *General.* This paragraph contains all maintenance data pertinent to Direct Support and General Support maintenance personnel. Refer to TM 10-3930-621-12 for the wiring diagram.

b. Engine Classification and Rating.

Make	Waukesha
Model	FCB4-G5943
Valve arrangement	Valve in block
Number of cylinders and arrangement	4, L-head
Piston stroke	4 in.
Piston displacement	133 cu. in.
Compression ratio	6.5:1
Firing order	1-3-4-2
Under load speed	2000 rpm
No-load speed	2200 rpm
Idle speed	600 rpm
Main crankshaft bearings	3
Connecting rod hearings	4
Piston type	Aluminum
Piston pin type	Full floating
Connecting rod type	Forged I section

c. Steering Unit Classification and Rating.

Make	Char-Lynn
Type	Hydraulic

d. Hydraulic Unit Classification and Rating.

Make	Cesna Aircraft Co.
rpm	1400
psi	1000
gpm	2.5

e. Hydraulic Contol Valve Classification and Rating.

Make	Hydraulic Unit
Control	Specialities
	2 plunger

f. Distributor Classification and Rating.

Make	Delco-Remy
Model	111712
Voltage	12
Rotation	Clockwise viewed at rotor end.
Type	Grounded
Timing range	22 ° automatic

g. Starter Motor Classification and Rating.

Make	Delco-Remy
Model	1107324
Type	Bendix drive
Voltage	12
No load test:	
Volts	11.6
Max., amperes	70.0
Min., RPM	6,000

h. Voltage Regulator Classification and Rating.

Make	Delco-Remy
Model	1116381
Type	150 (transistor)
Voltage	L2
Ground polarity	Negative

Voltage setting ranges (suggested):

65c°	13.5 to 15.5 volts
850°	13.3 to 15.3 volts
105°	13.1 to 15.1 volts
1250°	12.9 to 14.9 volts
1450°	12.8 to 14.8 volts

i. Alternator Classification and Rating.

Make	Delco-Remy
Model	1100877

Rotation (drive-end)	Either
Ground	Negative
Amps	22
Volts	12

j. Repair and Replacement Standards. Table 1- 1 lists manufacturer's sizes, tolerances, desired clearances, and maximum allowable wear and clearances.