UNITED STATES MARINE CORPS
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Training Command
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AIM 5307

STUDENT HANDOUT

REPAIR MK48 FRONT AXLE ASSEMBLY

GENERAL KNOWLEDGE: Initially, this lesson will impart the background knowledge that is required for a mechanic to perform intermediate maintenance level repairs on the MK48 front axle assembly. Material content provides for the impartation of the following information:

1. Composition, design characteristics, and principles of operation of the front (No. 1) axle assembly.

2. Intermediate maintenance responsibilities relative to the front axle assembly.

LEARNING OBJECTIVE

Terminal Learning Objective: Given a MK48 front axle assembly, the required tools, shop supplies, repair parts, and TM 9-2320-297-34, per information contained in the reference, repair the axle assembly. (5.3.8)

Enabling Learning Objectives: Given a MK48 front axle assembly, the required tools, shop supplies, repair parts, and TM 9-2320-297-34, per information contained in the reference:

1. disassemble the axle assembly, (5.3.8a)

2. inspect the disassembled components for serviceability, (5.3.8b)

3. repair or replace the unserviceable components, and (5.3.8c)

4. assemble the axle assembly from serviceable components. (5.3.8d)

OUTLINE

1. COMPOSITION, DESIGN CHARACTERISTICS, AND PRINCIPLES OF OPERATION OF THE FRONT AXLE ASSEMBLY

a. The front axle is an Eaton, DS-381P single reduction, steerable, 5.57:1 gear ratio axle assembly. The front axle consists of a nose box, carrier cover (power divider), inter-axle differential, controlled traction differential (CTD), axle shift unit, lockout chamber, lubrication pump, and two ball and socket assemblies.

b. Nose Box Assembly

(1) The nose box assembly is mounted on the front of the carrier cover. The nose box receives power from the transfer case through a propeller shaft and an input flange. The flange is splined to the top gear. The top gear engages the center gear. The center gear, which drives the lubrication pump, engages the bottom gear. The bottom gear is splined to the input shaft of the inter-axle differential.

(2) The nose box housing provides a sump for lubricating oil, which oils the gears and bearings by splash lubrication.

c. Lubrication Pump. The pump, which is driven by the center gear on the nose box, receives lubricant from the bottom of the axle housing cover and returns it to the top of the carrier cover. It is mounted on the rear of the nose box housing below the input flange.

d. Inter-Axle Differential

(1) The inter-axle differential is controlled by the driver, with the axle lockup switch located in the cab. When unlocked, it allows the No. 1 and No. 2 axles to turn at different speeds. When locked, both axles turn at the same speed.

(2) When the inter-axle differential is locked up and the lockup chamber is engaged, the input shaft, input shaft "floating" helical-side gear and the inter-axle differential rotate as one assembly. Power is then transferred to both axles without differential action. The forward axle drive pinion is driven from the input shaft "floating" helical-side gear to the drive pinion gear. The No. 2 axle drive pinion is driven from the output shaft side gear, through the output shaft and inter-axle propeller shaft.

(3) When the lockout control is released, a spring on the shift fork push rod operates to automatically disengage the sliding clutch

from the helical and differential side gear, and inter-axle differential action is again restored.

e. Controlled Traction Differential (CTD)

(1) From the helical-side gear, power is transmitted through a matched spiral bevel gear and drive pinion and the controlled traction differential.

(2) When the driver activates the axle shift unit, the sliding clutch engages the differential inter-axle and minimizes the differential action. The axle shift unit is activated at the same time the lockout chamber is engaged. The controlled traction differential only limits differential action. It does not lock the differential.

(3) When engaged, operation of the controlled traction differential is automatic, through a spring-loaded, multiple-disc clutch pack of ten compression springs and fifteen friction clutch plates. The coil springs compress the friction plates, and power flow is from the differential case through the friction plates to the axle shafts. In operation, the friction plates resist the difference in wheel speed up to 4,000 foot-pounds of torque. Resistance up to 4,000 foot-pounds of torque allows power to be transmitted to the wheel with traction, rather than be dissipated to a spinning wheel. Beyond the 4,000 foot-pounds of torque, the plates will slip, allowing one wheel to turn faster than the other. This enables the vehicle to negotiate turns in a normal manner.

f. Ball and Socket Assembly. The ball and socket assemblies allow the front axle to turn either left or right without loss of power to the wheels. This is done through an axle shaft containing a universal joint which allows up to a 15 degree deflection angle without binding.

2. INTERMEDIATE MAINTENANCE RESPONSIBILITIES RELATIVE TO THE MK48 FRONT AXLE ASSEMBLY

a. The intermediate maintenance mechanic is responsible for repairing the following components:

(1) lockout chamber,

(2) axle shift unit,

(3) axle housing cover,

(4) differential carrier,

(5) differential carrier cover,

(6) inter-axle differential,

(7) output shaft,

(8) nose box assembly,

(9) front axle, and

(10) ball and socket.

b. The intermediate maintenance mechanic is also responsible for replacing the following components:

(1) axle shift unit,

(2) nose box lube pump,

(3) nose box input flange,

(4) ball socket bushing and oil seal,

(5) ball socket and trunnion bearing,

(6) ball wiper seal,

(7) axle housing cover,

(8) front axle shaft, and

(9) nose box, differential carrier cover, and differential carrier.

3. DISASSEMBLY OF THE MK48 FRONT AXLE ASSEMBLY

a. Detailed instructions for repairing the MK48 front axle assembly are contained in the manuals that were issued to you at the beginning of this block of instructions. Follow those instructions carefully to effect those repair procedures on the training aid axle assembly to which you have been assigned.

b. Have the instructor assigned to your station check your work at each point designated in this student handout.

c. Refer to TM 9-2320-297-34, chapter 9 for the procedures used to perform the repair steps listed. Read the instructions carefully

before performing each step of the task. The page and step number are listed to the right of each step.

d. Disassemble Nose Box And Carrier Assembly

(1) Remove lube pump. 9-12; 2

(2) Remove axle shift unit. 9-6; 7 & 8

(3) Remove lower cover. 9-44; 2

(4) Remove bottom gear lock nut. 9-44; 6

(5) Install flange holding bar, break torque. 9-44; 6

(5a) Remove companion flange. 9-44; 7

(6) Remove center cover. 9-44; 8 thru 11

(7) Remove top cover. 9-44; 8 thru 12

(8) Remove bearing support and bearing. 9-45; 13, 14, & 15

(9) Remove nose box cover. 9-46; 16, 17, & 18

(10) Remove upper gear. 9-46; 19

(11) Remove center gear. 9-46; 19

(12) Remove lower gear. 9-46; 19

(13) Remove nose box housing. 9-46; 20 & 21 and 9-47; 27 & 28

(14) Remove nose box spacer. 9-48; 33

(15) Remove lockout chamber. 9-49; 2, 4, 5 & 6

(16) Remove carrier cover. 9-49; 1 & 2

(17) Remove input shaft. 9-49; (step not in TM) 2.a

(18) Remove inter-axle differential. 9-49; 3

(19) Remove output shaft. 9-49; 4

STOP! Have instructor initial.

e. Remove Differential Carrier Assembly.

(1) Remove gear. 9-58; 1, 2, & 3

(2) Remove two capscrews and lock from bearing cap. 9-59; 4 & 5

(3) Remove cotter pin and lock from bearing cap. 9-59; 6

(4) Remove shift fork shaft and shift fork from sliding clutch. 9-59; 8

(5) Remove sliding clutch. 9-59; 9

(6) Remove bearing adjusters and caps. 9-60; 10, 11, & 12

(7) Remove differential carrier assembly from nose box housing. 9-60; 13, 14, & 15

STOP! Have instructor initial.

f. DISASSEMBLE DIFFERENTIAL AND CARRIER ASSEMBLY.

(1) Remove clutch pack cover. 9-61; 16, 17, & 18

(2) Remove springs. 9-61; 19

(3) Remove clutch pack. 9-61; 20 & 21

(4) Remove ring gear. 9-61; 22 & 23

(5) Remove twelve capscrews. 9-62; 25 & 26

(6) Remove plain case half, thrust washer and side gear.9-62; 27

(7) Remove spider, four thrust washers and pinion gears from flanged case half. 9-62; 28

(8) Remove four thrust washers and pinion gears from spider. 9-62; 29

(9) Remove side gear and thrust washer. 9-62; 30

STOP! Have instructor initial.

g. Inspect and repair the DIFFERENTIAL and carrier assembly.

(1) Clean all the differential carrier components. 9-64; 1

(2) Inspect differential and carrier assembly components. 9-64; 2, 3, 4, 5, 6, 7 & 8

(3) Measure clutch plates and record reading. _____ 9-64; 5

STOP! Have instructor initial.

h. Assemble differential AND CARRIER ASSEMBLY.

(1) Install thrust washer and side gear into flanged case half. 9-68; 29

(2) Install four pinion gears and thrust washers onto spider. 9-68; 30

(3) Install spider into flanged case half. 9-68; 31

(4) Install side gear and thrust washer onto washer. 9-68; 32

(5) Install twelve capscrews. 9-68; 33, 34, & 35

(6) Install ring gear. 9-69; 42

(7) Install clutch pack. 9-69; 36 thru 39

(8) Install ten springs. 9-70; 45

(9) Install clutch pack cover. 9-70; 46

(10) Install eight capscrews and locknuts. 9-70; 47 thru 50

(11) Install sliding clutch and measure clutch clearance.
NOTE: If clearance exceeds 2 inches, recheck clutch pack installation.

STOP! Have instructor initial.

i. REMOVE THE PINION ASSEMBLY.

(1) Remove six capscrews and remove pinion assembly from carrier housing. 9-63; 32

(2) Disassemble the pinion assembly.

(a) Press pinion out of pinion bearing cage. 9-63; 35 & 36

(b) Remove spacer from pinion. 9-64; 38 & 40

STOP! Have instructor initial.

(3) Assemble pinion assembly. 9-65; 3 thru 11

(a) Install spacer onto pinion.

(b) Install bearing cage.

(c) Install outer bearing onto pinion.

(d) Preload bearing.

STOP! Have instructor initial.

j. Disassemble INPUT shaft . 9-78; 1 & 2

(1) Remove snapring, side gear, thrust washer and D-washer.

(2) Remove clutch.

STOP! Have instructor initial.

k. Assemble INPUT shaft. 9-78; 5 & 6

(1) Install clutch onto input shaft.

(2) Install D-washer, thrust washer, and side gear onto input shaft.

(3) Install snapring onto input shaft.

STOP! Have instructor initial.

l. Repair inter-axle differential. Inspect inter-axle differential for serviceability. 9-80; b. 1, 2, & 3

STOP! Have instructor initial.

m. Repair inter-axle differential output shaft. Inspect inter-axle differential output shaft for serviceability. 9-81; b. 1, 2, & 3

STOP! Have instructor initial.

n. Install Pinion Assembly Onto Carrier Housing.

(1) Install shims onto carrier housing. 9-67; 23

(2) Install pinion assembly. 9-67; 24

(3) Install six capscrews. 9-67; 25

(4) Install gear and nut. 9-67; 26 & 27 then install roll pin

STOP! Have instructor initial.

o. Install differential assembly.

(1) Install differential and carrier assembly. 9-70; 51 thru 54

(2) Install bearing caps and adjusters. 9-71; 55 thru 59

(3) Adjust backlash. Record reading. _____ 9-72; 1 thru 4/ and 9-73; 5

STOP! Have instructor initial.

(4) Check tooth contact pattern. 9-73, 74, & 75; 6

(5) Install shift fork. 9-75; 7

(6) Install sliding clutch. 9-75; 8

(7) Install shift fork shaft. 9-75; 9 & 10

(8) Install lock and cotter pin. 9-76; 11

(9) Install lock and two capscrews. 9-76; 12 & 13

(10) Install lockwires. 9-76; 14

STOP! Have instructor initial.

p. Assemble front axle nose box carrier cover and carrier assembly.

(1) Install output shaft. 9-50; 1 & 3

(2) Install inter-axle differential. 9-50; 4

(3) Install input shaft. Step not in TM.

(4) Install carrier cover. 9-50; 6

(5) Install lockout chamber. 9-5; 1, 2, 4, 5, 7, & 8

STOP! Have instructor initial.

(6) Install spacer. 9-52; 3 Install shims with spacer.

(7) Install shim pack. 9-52; 6

(8) Install nose box housing. 9-52; 8, 9, & 10

(9) Check end play of input shaft. 9-52; 8, 9, & 10

STOP! Have instructor initial.

(10) Install lock wire. 9-52; 12

STOP! Have instructor initial.

(11) Install lower gear. 9-52; 15.3

(12) Install lower gear locknut. Do not torque. 9-52.2; 15.8 finger tight

(13) Install center gear. 9-53; 16

(14) Install upper gear. 9-53; 17

(15) Install nose box cover. 9-53; 19

STOP! Have instructor initial.

(16) Install top gear cover. 9-54; 23 thru 29

(17) Check end play of top gear. Record reading. _____

(18) Install center gear cover. 9-55; 30

(19) Check end play of center gear. Record reading. _____
9-55; 31 thru 34

STOP! Have instructor initial.

(20) Install bearing support. 9-56; 35

(21) Install companion flange and torque lower gear locknut.
9-56; 36 & 37

(22) Measure gap between bearing support and cover. Record reading. _____ 9-56; 38 thru 41

STOP! Have instructor initial.

(23) Install bottom support cover. 9-57; 51

(24) Install elbow and plug into covers. 9-57; 52 & 53

STOP! Have instructor initial.

q. Repair Axle Shift Unit.

(1) Disassemble Axle Shift Unit. 9-6; 1, 2, 6, 7, & 8

(a) Remove Cover.

(b) Remove lockout body. 9-6; b. 1, 2, 3, & 4

(c) Remove piston.

STOP! Have instructor initial.

(2) Inspect axle shift unit components. 9-6; b. 1 thru 4

(3) Reassemble Axle Shift Unit.

(a) Install lockout body.

(b) Install piston.

(c) Install cover.

REFERENCE:

TM 9-2320-297-34