

Reference

TM
9-1768C
25 May 45

UNCLASSIFIED

TM 9-1768C

WAR DEPARTMENT TECHNICAL MANUAL

ORDNANCE MAINTENANCE

45-TON, 12-WHEEL (12dt) TRAILER M9, COMPONENT OF 45-TON TANK TRANSPORTER TRUCK-TRAILER M19

THE ARMY ENGINEER
HEADQUARTERS
WASHINGTON, D. C.

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WAR DEPARTMENT

25 MAY 1945

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WAR DEPARTMENT TECHNICAL MANUAL

TM 9-1768C

This TM, together with TM 9-768, dated 25 October 1944; and SNL G-159, dated 20 August 1944, supersedes TM 10-1242, dated 15 August 1942; TM 10-1242 (revised), dated 15 February 1944; and TM 10-1322, dated 3 November 1941.

ORDNANCE MAINTENANCE

45-TON, 12-WHEEL (12dt)
TRAILER M9,
COMPONENT OF 45-TON
TANK TRANSPORTER
TRUCK-TRAILER M19



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TM 9-1768C, Ordnance Maintenance: 45-ton, 12-wheel (12dt) Trailer M9, Component of 45-ton Tank Transporter Truck-trailer M19, is published for the information and guidance of all concerned.

[A.G. 300.7 (18 Apr 45)
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BY ORDER OF THE SECRETARY OF WAR:

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Chief of Staff.

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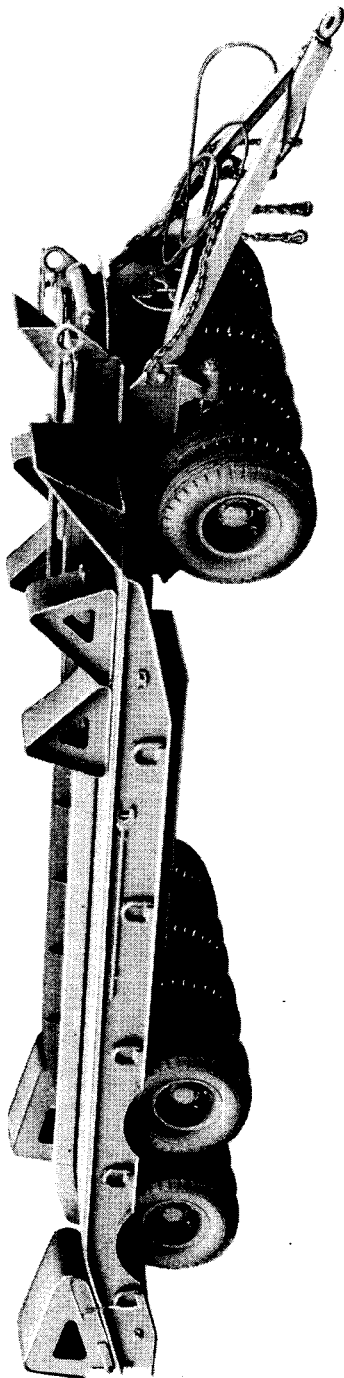
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(Refer to FM 21-6 for explanation of distribution formula.)

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Figure 1—45-ton, 12-wheel (12dt) Trailer M9

RESTRICTED

This TM, together with TM 9-768, dated 25 October 1944; and SNL G-159, dated 20 August 1944, supersedes TM 10-1242, dated 15 August 1942; TM 10-1242 (revised), dated 15 February 1944; and TM 10-1322, dated 3 November 1941.

Section I

INTRODUCTION

1. SCOPE.

a. These instructions are published for information and guidance of personnel responsible for third and higher echelons of maintenance on the 45-ton, 12-wheel (12dt) Trailer M9. They contain information on maintenance which is beyond the scope of the tools, equipment, or supplies normally available to using organizations. This manual does not contain information which is intended primarily for the using arm, since such information is available to ordnance maintenance personnel in 100-series TM's or FM's.

b. This manual contains a description of, and procedure for disassembly, inspection, and repair of the frame, suspension, and brake system, components beyond the extent to which these components are covered in TM 9-768 and TM 9-1827A.

c. TM 9-768 contains instructions for the information and guidance of the personnel responsible for first and second echelons of maintenance on the 45-ton, 12-wheel (12dt) Trailer M9.

d. TM 9-1827A contains instructions for the disassembly, inspection, and repair of the brake system cylinders, diaphragm chambers, relay-emergency valve, and slack adjusters used on this vehicle.

2. RECORDS.

a. Forms and records applicable for use in performing prescribed operations are listed below with a brief explanation of each:

(1) **WAR DEPARTMENT LUBRICATION ORDER.** War Department Lubrication Order No. 9-768-1 prescribes lubrication maintenance for this vehicle. A lubrication order is issued with each vehicle and is to be carried with it at all times. Instructions on the order are binding on all echelons of maintenance and there shall be no deviations.

(2) **W.D., A.G.O. FORM NO. 461, PREVENTIVE MAINTENANCE SERVICE AND TECHNICAL INSPECTION WORK SHEET FOR WHEELED AND HALF-TRACK VEHICLES.** This form will be used for all monthly and semiannual maintenance services and all technical inspections performed on wheeled or half-track vehicles.

(3) **W.D., A.G.O. FORM 468, UNSATISFACTORY EQUIPMENT REPORT.** This form will be used for reporting manufacturing, design,

Introduction

or operational defects in materiel with a view to improving and correcting such defects, and for use in recommending modifications on materiel. This form will not be used for reporting failures, isolated materiel defects, or malfunctions of materiel resulting from fair wear and tear, or accidental damage; nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.

(4) **W.D., A.G.O. FORM NO. 478, MWO AND MAJOR UNIT ASSEMBLY REPLACEMENT RECORD.** This form, carried with the vehicle, will be used by all personnel completing a modification or major unit assembly (engine, transmission, transfer case, tracks, etc.) replacement to record clearly the description of work completed, date, vehicle hours, and/or mileage, and MWO number or nomenclature of unit assembly. Personnel performing the operation will initial in the column provided. Minor repairs, parts, and accessory replacements will not be recorded.

(5) **W.D., A.G.O. FORM NO. 10-144 (TALLY SHEET, INCOMING).** This form may be used to record all incoming materials or supplies pending negotiation of a final voucher. It may also be used in exchanging vehicles, parts, or tools, or in lieu of shipping ticket.

(6) **W.D., A.G.O. FORM NO. 10-145 (TALLY SHEET, OUTGOING).** This form may be used to record all outgoing materials or supplies pending negotiation of the final voucher. It may also be used in exchanging vehicles, parts, or tools, or in lieu of shipping ticket.

(7) **W.D., A.G.O. FORM NO. 9-71 (LOCATOR AND INVENTORY CONTROL CARD).** This form may be used as a bin tag, locator card, or inventory control card in maintaining spare parts stocks. This form is for tactical units only.

(8) **W.D., A.G.O. FORM NO. 9-76 (REQUEST FOR JOB ORDER).** This form may be used by any officer or authorized person requiring production, repair, alteration, inspection, or any other type of work from another organization, department, or echelon. Not required for second or third echelon repairs.

(9) **W.D., A.G.O. FORM NO. 9-77 (JOB ORDER REGISTER).** This form will be prepared, when job orders are used, in single copy only, by service echelons to furnish a chronological order and record of job order numbers and related information.

(10) **W.D., A.G.O. FORM NO. 9-78 (JOB ORDER).** This form, properly executed, may be used as an authority for work. No work

Description

of any nature will be performed in a service echelon shop keeping a cost-accounting type record system without a properly authenticated job order.

(11) W.D., A.G.O. FORM NO. 9-79 (PARTS REQUISITION). This form will be used as an interdepartmental shop requisition to request parts where job orders are required.

(12) W.D., A.G.O. FORM NO. 9-80 (JOB ORDER FILE). This folder may be used to hold under one cover all shop papers and records incident to a particular job order, or to a particular vehicle.

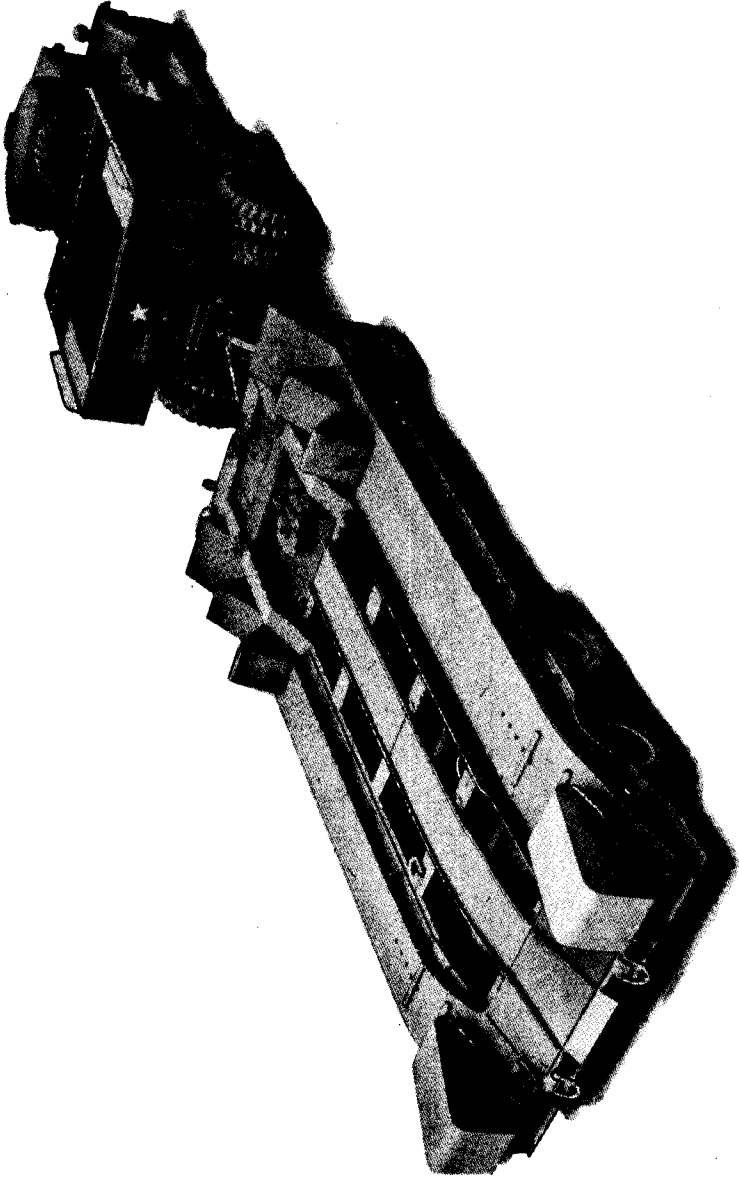
(13) W.D., A.G.O. FORM NO. 9-81 (EXCHANGE PART OR UNIT IDENTIFICATION TAG). This tag, properly executed, may be used when exchanging unserviceable items for like serviceable assemblies, subassemblies, parts, vehicles, and tools.

Section II**DESCRIPTION****3. DESCRIPTION.**

a. **General.** The 45-ton, 12-wheel (12dt) Trailer M9 is a platform-type trailer consisting of the main frame assembly which forms the main portion of the vehicle, and the gear frame assembly which is fundamentally a dolly to form the front suspension assembly of the vehicle. The rear end of the trailer slopes down so that two hinged ramps may be used to facilitate rear loading of heavy tank-like vehicles. A compressed air service brake system is designed to be operated from the towing vehicle. Manual controls and linkage are designed for mechanical application of the brakes to secure the vehicle while parking.

b. **Main Frame Assembly.** The main frame assembly forms the track guides and load bed or runways of the trailer (fig. 2). It is supported at the rear by two tandem axle and trunnion assemblies which are bracket-mounted to the main frame assembly. Sheaves and cable rollers to facilitate the winch loading of disabled vehicles, tool, and equipment compartment, upper fifth wheel plate, and brake operating components comprise the remainder of the main frame assembly.

Description

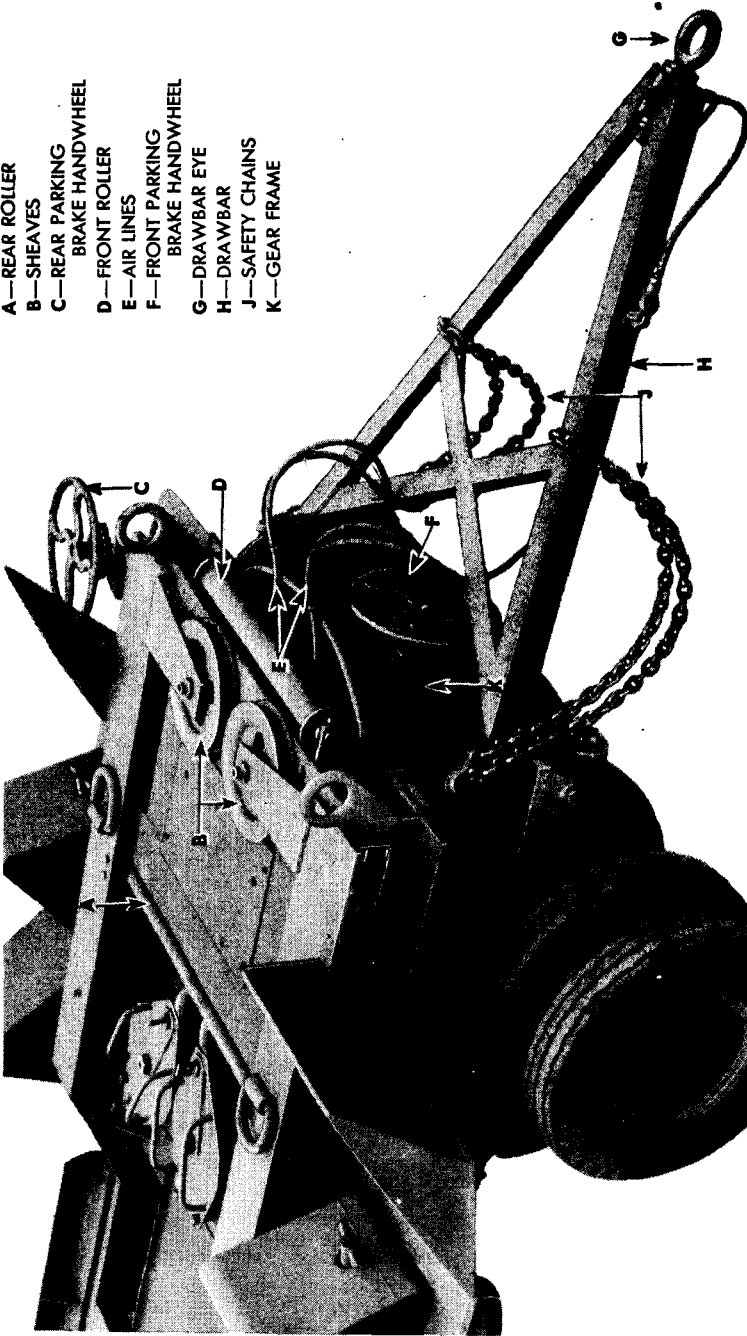


RA PD 321187

Figure 2—Trailer Coupled to Truck

Description

- A—REAR ROLLER
- B—SHEAVES
- C—REAR PARKING
BRAKE HANDWHEEL
- D—FRONT ROLLER
- E—AIR LINES
- F—FRONT PARKING
BRAKE HANDWHEEL
- G—DRAWBAR EYE
- H—DRAWBAR
- J—SAFETY CHAINS
- K—GEAR FRAME



RA PD 321414

Figure 3—Right Front View of Trailer

c. **Gear Frame Assembly** (fig. 3). The gear frame assembly or trailer dolly is formed by a box-like steel structure which supports the front end of the trailer. Two trunnion beam and axle assemblies form the suspension for the gear frame. These are bracket-mounted under the gear frame. The drawbar, parking operating mechanism, and lower fifth wheel plate comprise the remainder of the gear frame assembly.

Section III

FRONT AXLE AND TRUNNION ASSEMBLIES

4. DESCRIPTION AND DATA.

a. **Description.** Two front axle and trunnion beam assemblies are mounted in line across the front of the trailer (fig. 1). The trunnion beam is a cast frame with spindles at either end which pivot in bracket-mounted bronze bushings, allowing traverse movement of the assembly. The trunnion beam is supported at the rear by a main spring and bracket assembly and at the front by a hanger bracket (fig. 4). The front hanger bracket carries a bronze bushing and pivots on a shaft which permits an up-and-down movement of the assembly. The front hanger bracket is mounted in a bracket welded to the underside of the gear frame, and the main spring and bracket assembly is bolted to the gear frame. Each trunnion beam carries the axle and brake shafts which support two wheels with brake drums and two sets of brake shoes. The right and left axle and trunnion assemblies are identical except for the brake shoe camshafts which are right and left and, therefore, not interchangeable.

b. Data.

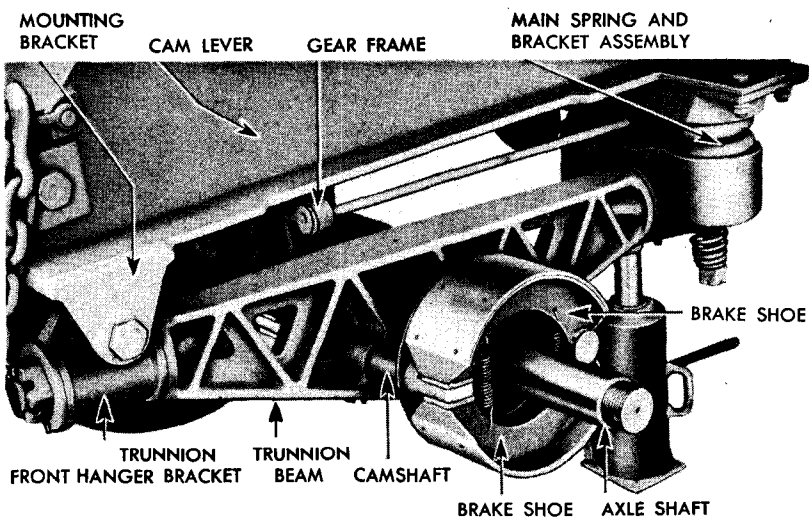
(1) FRONT AXLE SHAFT.

Make	Fruehauf
Model	565070
Material	SAE 4140, steel
Length	37¾ in.
Quantity	2

(2) FRONT BRAKE CAMSHAFT.

Make	Fruehauf
Model	565041 RH 565040 LH
Material	SAE 1020, CRS
Length	19⅞ in.
Quantity	1 RH, 1 LH

Front Axle and Trunnion Assemblies



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Figure 4—Left Front Axle and Trunnion Beam Assembly

- (3) FRONT BRAKE ANCHOR SHAFT.

Make	Fruehauf
Model	565039
Material	SAE 1020, CRS
Length	20 ³ / ₈ in.
Quantity	2

- (4) FRONT TRUNNION BEAM.

Make	Fruehauf
Model	53262
Material	Steel casting
Length	53 ¹ / ₂ in.
Quantity	2

- (5) CAMSHAFT BUSHING.

Make	Fruehauf
Model	565001
Material	SAE 60, bronze
Quantity	4

- (6) FRONT TRUNNION HANGER BRACKET BUSHING.

Make	Fruehauf
Model	565015
Material	SAE 63, bronze
Quantity	2

Front Axle and Trunnion Assemblies

- H—HANGER BRACKET BUSHING
- I—JAM NUT
- J—CAMSHAFT BUSHING
- K—BOLT
- L—LOCK NUT
- M—NUT
- N—BOLT
- O—MAIN SPRING
- P—MAIN SPRING SEAT
- Q—MAIN SPRING BRACKET
- R—MAIN SPRING BRACKET BUSHING
- S—SPRING BRACKET RETAINING NUT
- T—COTTER PIN
- U—WASHER
- V—LUBRICATION FITTING
- W—COTTER PIN
- X—NUT
- Y—SPRING
- Z—ANCHOR SHAFT SET SCREW
- AA—AXLE SHAFT SET SCREW
- AB—LUBRICATION FITTING
- AC—CAMSHAFT BUSHING SET SCREW
- AD—AXLE SHAFT
- AE—TRUNNION BEAM
- AF—FRONT HANGER BRACKET
- AG—LUBRICATION FITTING
- AH—FRONT HANGER BRACKET SHAFT
- AI—COTTER PIN

- A—HANGER BRACKET RETAINING NUT
- B—WASHER
- C—LUBRICATION FITTING
- D—HANGER BRACKET BUSHING
- E—MOUNTING BRACKET
- F—COTTER PIN
- G—HANGER BRACKET SHAFT NUT

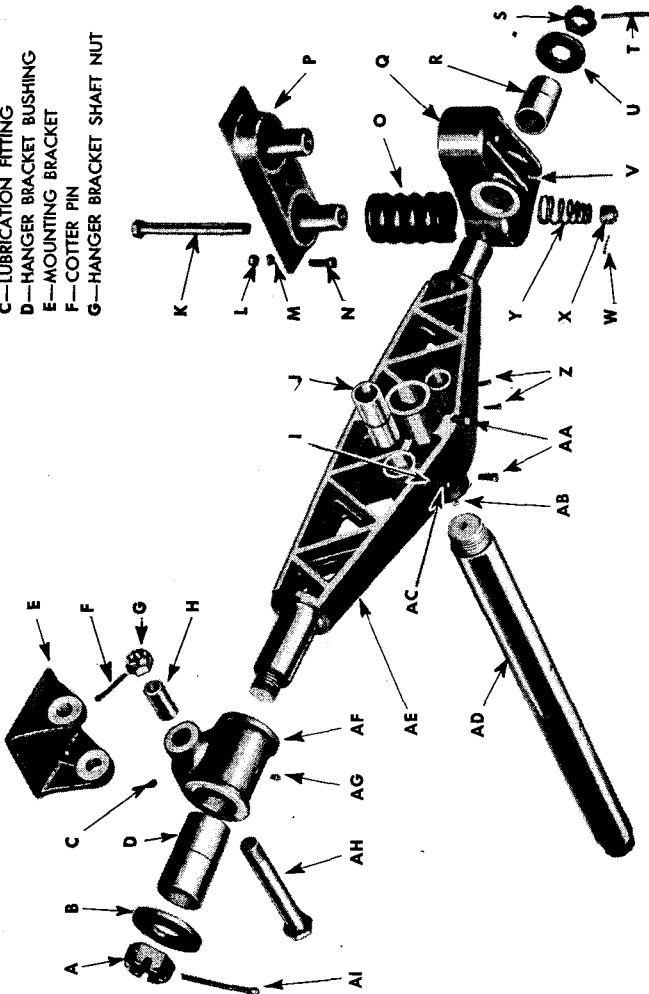


Figure 5—Front Axle and Trunnion Beam Assembly—Disassembled

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Front Axle and Trunnion Assemblies

- (7) FRONT TRUNNION BRACKET BUSHING (TRUNNION BEAM).
 Make Fruehauf
 Model 565013
 Material SAE 63, bronze
 Quantity 2
- (8) FRONT TRUNNION MAIN SPRING BRACKET BUSHING.
 Make Fruehauf
 Model 565013
 Material SAE 63, bronze
 Quantity 2

5. DISASSEMBLY.

a. **Removal and Disassembly** (fig. 5). For procedure on removal from trailer and disassembly of front axle and trunnion assembly, refer to TM 9-768.

b. **Front Trunnion Main Spring Bracket** (fig. 5). Due to the extreme tension placed on springs when assembled at the factory, the main spring bracket should be placed in a clamp or press to compress main springs before removing nuts. Using a bar for leverage, compress the small spring and remove cotter pins, nuts, and springs from the bolts (fig. 5). Release the tension on the main springs, separate the bracket from spring seat, and remove the large main springs.

6. CLEANING, INSPECTION, AND REPAIR.

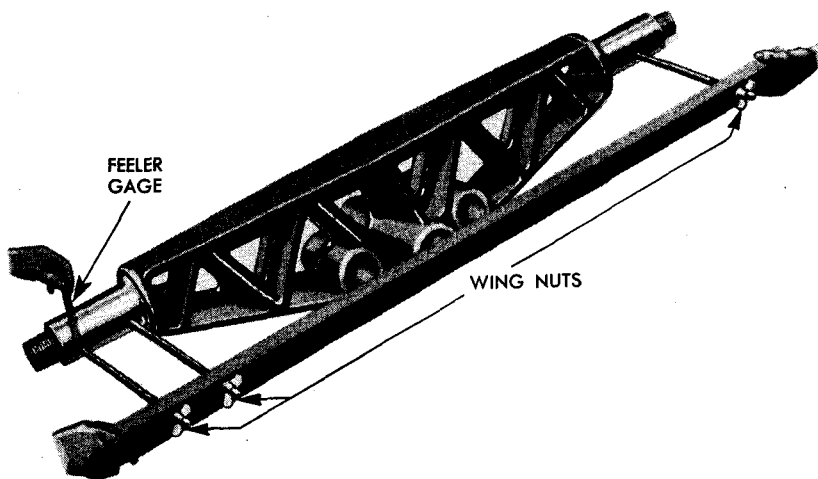
a. **Cleaning.** Remove the lubrication fittings from trunnion beam and brackets (fig. 5). Clean all dirt and grease from the holes with compressed air. Steam-clean all parts of the trunnion beam assembly.

b. Inspection and Repair.

(1) **CHECK TRUNNION BEAM SPINDLE AND AXLE SHAFT THREADS.** Inspect trunnion beam spindles and axle shafts for damage to threads. Clean up threads by using a 6-point, NF, 12-threads-per-inch die with a thread restorer, or by turning nut on spindle or shaft and tapping nut with a hammer.

(2) **CHECK TRUNNION BEAM SPINDLE AND AXLE BEARING SURFACES.** Measure diameter of trunnion beam spindles at bearing surfaces. Diameter of new part is 2.999 ± 0.001 inches. Measure diameter of axle shafts at bearing surfaces. Diameter of new shaft is 2.985 to 3.000 inches.

(3) **CHECK FOR BEND** (fig. 6). Place the gage in position along side of trunnion beam with the single pronged end of the gage held firmly against the extreme outer end of trunnion beam spindle bear-



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Figure 6—Checking Trunnion Beam for Bend

ing surface. Adjust the double prongs on the other end of the gage until they contact the bearing surface; then move the gage over to the rear side of the trunnion beam. If either of the two prongs fail to contact the spindle, a bend in the trunnion beam is indicated. Use a feeler gage to determine the amount of the bend. If the bend is more than 0.025 inch, replace the trunnion beam. If checking both sides of one spindle reveals no bend, turn gage end-for-end and check the other spindle on the opposite end without disturbing the setting of the prongs. If there is a clearance at either of the prong ends, check with a feeler gage. If the prongs are in contact at both points, the trunnion beam is not bent. Check the axle shafts in the same manner. If a bend in excess of 0.010 inch is found, straighten axle or replace with new shaft.

(4) **CHECK BRAKE CAMSHAFT.** Measure diameter of camshaft at bearing surfaces. Diameter of new camshaft is 1.997 to 2.000 inches. Examine key and keyway for damage. If keyway is worn, replace camshaft. Visually inspect flat ends of shaft. If bent, straighten end, or replace camshaft.

(5) **FRONT TRUNNION HANGER BRACKET BUSHINGS** (fig. 5). Clean inside of bracket bushings with dry-cleaning solvent before inspection. Examine bushings for roughness, scores, or looseness in bracket. Measure inside diameter of both bushings. Bracket shaft bushing has a new inside diameter of 1.255 ± 0.001 inches. The larger bracket bushing (for trunnion beam spindle) has a new inside diameter of 3.005 ± 0.001 inches. Remove bushings by pressing or

Front Axle and Trunnion Assemblies

driving them from bracket. Position new bushing in bracket squarely with the hole so that no oilhole in bushing will coincide with lubrication fitting hole in bracket when bushing is pressed into place. Press bushings in bracket until flush with face of hole. Ream bracket shaft bushing to 1.255 ± 0.001 inches. Ream larger bracket bushing to 3.005 ± 0.001 inches.

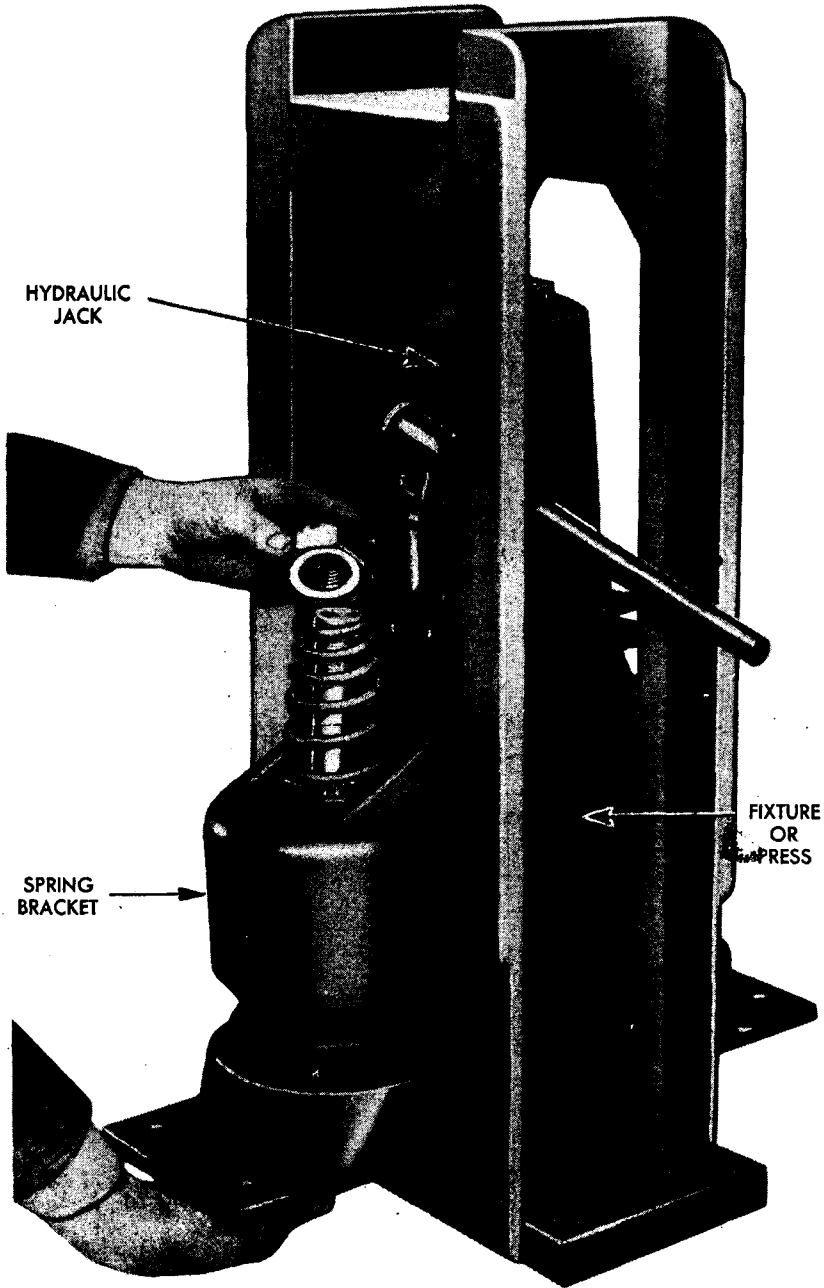
(6) **FRONT BRAKE CAMSHAFT BUSHINGS** (fig. 5). Remove set screws which secure camshaft bushings in trunnion beam. Examine bushings thoroughly for looseness, scored, or worn condition. Measure inside diameter of bushings at several points to detect elongation or out-of-round condition. The new bushing has an inside diameter of 2.005 ± 0.001 inches. Drive out old bushings, using a $\frac{3}{4}$ -inch long tapered punch. Position new bushing squarely aligned with bushing bore and tap lightly all around edge of bushing to start it squarely into hole. Use old bushing to drive new bushing in trunnion beam until seated in hub. Tap bushing soundly all the way around bushing edge to be sure it is seated at all points. Install bushing in opposite side of trunnion beam in the same manner. With bushings in place, drill and tap holes in bushing for $\frac{3}{8}$ -16NC round point set screws. Line-ream bushings to 2.005 ± 0.001 inches inside diameter. Install set screws so they will hold bushing but will not project through bushing walls, and tighten set screw jam nuts.

(7) **FRONT TRUNNION MAIN SPRING BRACKET BUSHING** (fig. 5). Inspect bushing for wear and looseness in bracket. Measure inside diameter of bushing. New bushing measures 3.005 ± 0.001 inches. Remove old bushings by pressing them from spring brackets. Position new bushing so that no oilhole will coincide with lubrication fitting hole and press into place in bracket. Ream bushing to 3.005 ± 0.001 inches.

(8) **MAIN SPRINGS AND BRACKET** (fig. 5). Examine springs for breakage, rusted, or out-of-line condition. Measure the free or extended height of springs. Replace small springs if free height is less than $4\frac{3}{4}$ inches. Replace large springs if free height is less than $8\frac{1}{4}$ inches. Inspect spring seat for fractures or badly worn bolt holes. Examine bracket mounting bolts and nuts for worn condition or damaged threads. Replace bolts and nuts if threads are damaged beyond repair.

7. ASSEMBLY.

a. **Front Trunnion Main Spring Bracket** (fig. 5). Place a thin film of grease in bracket bushing before assembly. Insert the two bolts in spring seat and place in clamp with spring seat down (fig. 7). Place the two large main springs in position on spring seats. Position front trunnion mounting bracket over the two springs and install the small coil springs on the mounting bolts. Compress the assembly,



RA PD 348185

Figure 7—Assembly of Front Trunnion Main Springs and Bracket

Rear Axle and Trunnion Assemblies

forcing the bracket and seat together. Use a bar to compress small springs until the castellated nuts can be installed on the bolts. Turn the nuts on until cotter pin hole in bolt meets slot in nut. Insert and spread new cotter pins.

b. **Assembly and Installation.** For procedure on assembly and installation of the front axle and trunnion assembly, refer to TM 9-768.

Section IV

REAR AXLE AND TRUNNION ASSEMBLIES

8. DESCRIPTION AND DATA.

a. **Description.** The trailer is supported at the rear by two axle and trunnion assemblies, mounted side-by-side to the main frame. Each assembly is provided with two axles mounted in identical axle brackets which carry the wheels, brakes, and brake shafts. Two wheels with dual tires are mounted on each axle so that each axle and trunnion assembly carries four wheels and eight tires (fig. 1). The axle brackets are mounted on a trunnion shaft with a rocker beam between them which allows transverse movement of the assembly while the rocker beam is free to oscillate on its axis. The trunnion rocker beam pivots on a shaft mounted in a bracket which is welded to the trailer main frame. A brake camshaft extends through each axle bracket for operation of the right and left brake assemblies (fig. 8). The trunnion shaft, rocker beam shaft, and brake camshaft turn in heavy, bronze bushings which are held in place by set screws (fig. 9).

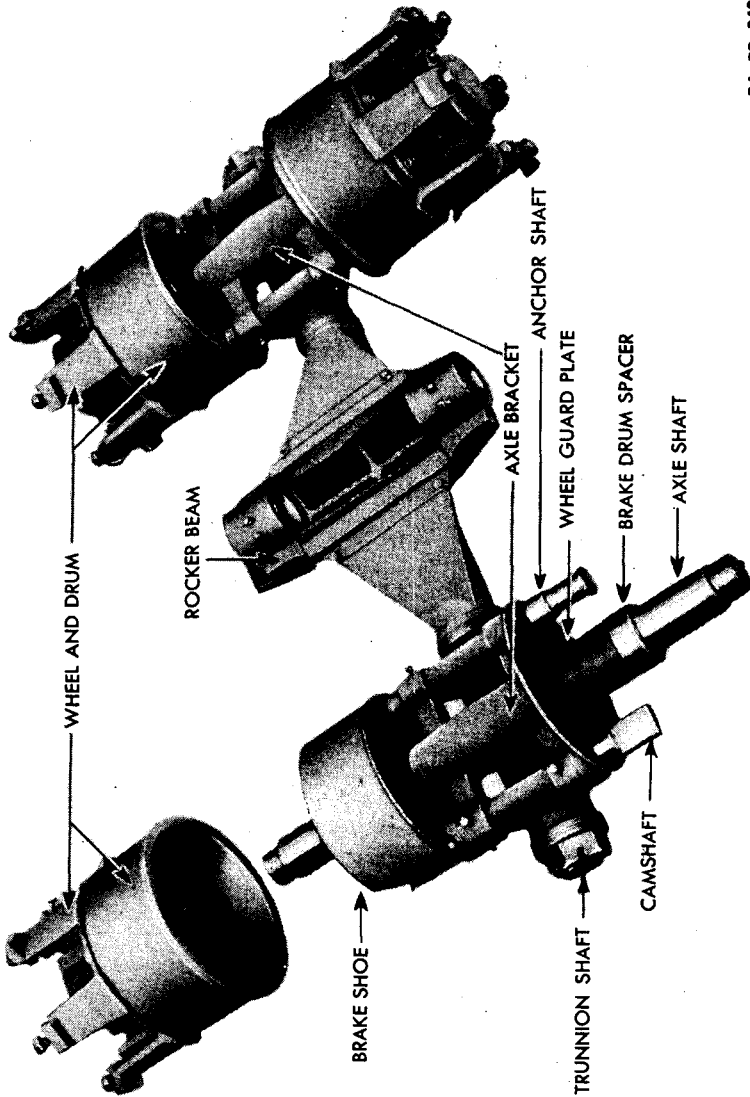
b. **Data.**

(1) **REAR AXLE SHAFT.**

Make	Fruehauf
Model	565070
Material	(heat-treated) SAE 4140, steel
Length	37 ³ / ₄ in.
Quantity	4

(2) **TRUNNION SHAFT.**

Make	Fruehauf
Model	565048
Material	(heat-treated) SAE 4140, steel
Length	59 ± 1 ¹ / ₃₂ in.
Quantity	2



RA PD 348186

Figure 8—Rear Axle and Trunnion Assembly

Rear Axle and Trunnion Assemblies

(3) TRUNNION BRACKET SHAFT.		
Make	Fruehauf	
Model	565069	
Material	SAE 1020, CRS	
Length	23½ in.	
Quantity	2	
(4) REAR BRAKE CAMSHAFT.		
Make	Fruehauf	
Model	565094 LH 565095 RH	
Material	SAE 1020, CRS	
Length	19⅞ in.	
Quantity	2 LH—2 RH	
(5) REAR BRAKE ANCHOR SHAFT.		
Make	Fruehauf	
Model	565039	
Material	SAE 1020, CRS	
Length	20¾ in.	
Quantity	4	
(6) TRUNNION ROCKER BEAM BUSHING.		
Make	Fruehauf	
Model	565005	
Material	SAE 63, bronze	
Quantity	4	
(7) TRUNNION AXLE BRACKET BUSHING.		
Make	Fruehauf	
Model	565000	
Material	SAE 63, bronze	
Quantity	8	
(8) REAR BRAKE CAMSHAFT BUSHING.		
Make	Fruehauf	
Model	565001	
Material	SAE 60, bronze	
Quantity	8	

9. DISASSEMBLY.

a. **Removal and Disassembly.** For procedure for removal and disassembly of the rear axle and trunnion assemblies, refer to TM 9-768

10. CLEANING, INSPECTION, AND REPAIR.

a. **Cleaning.** Steam-clean all parts of the assembly. Remove lubrication fittings, and clean dirt and grease from the holes. Clean inside of bushings with dry-cleaning solvent.

Rear Axle and Trunnion Assemblies

A—ROCKER BEAM BRACKET SHAFT BUSHING

B—LUBRICATION FITTING

C—SET SCREW

D—BRACKET

E—JAM NUT

F—LUBRICATION FITTING

G—SET SCREW

H—JAM NUT

I—WASHER

J—ROCKER BEAM SHAFT NUT

K—COTTER PIN

L—ROCKER BEAM BUSHING

M—CAP SCREW

N—LOCK WASHER

O—FELT RETAINER

P—FELT DUST SHIELD

Q—AXLE BRACKET

R—SET SCREWS

S—JAM NUTS

T—LUBRICATION FITTINGS

U—TRUNNION SHAFT

V—TRUNNION SHAFT NUT

W—COTTER PIN

X—WASHER

Y—SPACER

Z—AXLE BRACKET BUSHING

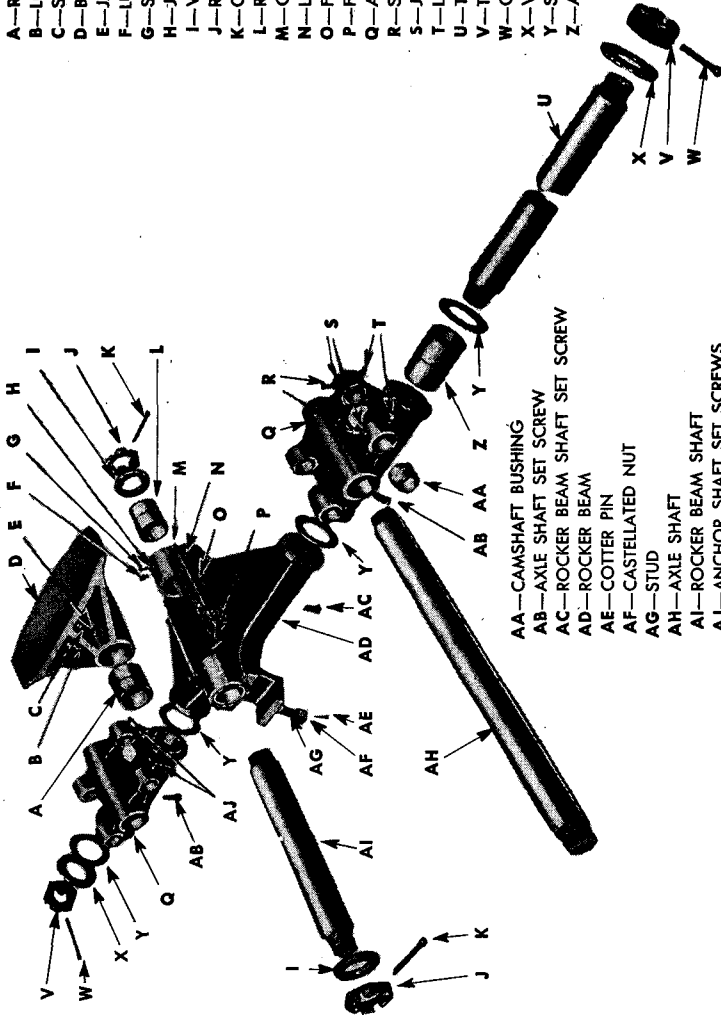


Figure 9—Rear Axle and Trunnion Assembly—Disassembled

RA PD 348187

Rear Axle and Trunnion Assemblies

b. Inspection and Repair.

(1) **SHAFTS** (fig. 9). Use an axle gage and check axle and trunnion shafts for bend (par. 6 b (3)) (fig. 6). Straighten shafts if bent or replace if necessary. Inspect axle and trunnion shaft for damage to threads. Clean up burrs with a fine file or replace shaft if threads are stripped. Measure axle shaft bearing surfaces. Diameter of new shaft is 2.985 to 3.000 inches. Measure diameter of trunnion shaft. Diameter of new shaft is 3.245 ± 0.001 inches. Check brake camshaft as outlined in paragraph 6 b (4).

(2) **CAMSHAFT BUSHINGS** (fig. 9). Check inside diameter of camshaft bushings and examine bushings for looseness in the bracket. Camshaft bushings have new diameter of 2.005 ± 0.001 inches. To replace bushings, remove set screws holding bushings in axle bracket and drive out the bushings. *NOTE: To prevent bending the axle bracket when removing bushings, place a brace between the two sections of the bracket.* Press bushings into place in axle bracket. Drill $\frac{3}{16}$ -inch holes in bushings at lubrication fitting hole. Line-ream bushings to 2.005 ± 0.001 inches. With bushings in place, drill and tap holes in bushing for $\frac{3}{8}$ -16NC round point set screws. Install set screws so they will not project through bushing walls. Tighten set screw jam nuts securely.

(3) **TRUNNION AXLE BRACKET BUSHING** (fig. 9). Check axle bracket bushing for worn and scored condition. Check inside diameter. Inside diameter of new bushing is 3.251 ± 0.001 inches. If worn, replace the bushing. If a bushing remover is not available, cut down one side of bushing with a cape chisel and drive out old bushing. Press new bushing in each end of axle bracket but do not press bushing beyond end of bracket. Ream bushings to 3.251 ± 0.001 inches.

(4) **TRUNNION ROCKER BEAM BUSHING** (fig. 9). Measure inside diameter of trunnion rocker beam bushing. Inside diameter of new bushing is 3.005 ± 0.001 inches. To remove bushings, remove set screws from rocker beam, and drive out old bushings. Position bushing so that no oilhole in bushing will coincide with lubrication fitting hole when pressed into place. Install new bushings in each side of rocker beam so that oil groove in bushing meets lubrication fitting hole in rocker beam. With bushings in place, drill and tap holes for $\frac{3}{8}$ -16NC round point set screws. Install set screws so that they will not project through bushings and tighten jam nuts.

(5) **TRUNNION AXLE BRACKET** (fig. 9). Inspect axle bracket for cracks, rusted condition or other damage. Check the set screw tapped holes at camshaft sections for damaged threads. If necessary, retap holes using a $\frac{3}{8}$ -16NC tap. Examine lubrication fittings and replace if damaged.

(6) **TRUNNION ROCKER BEAM** (fig. 9). Examine rocker beam for worn or rusted condition. Inspect threads in set screw holes at top of rocker beam. Retap if necessary, using a $\frac{3}{8}$ -16NC tap. Inspect the felt strips and retainers. If damaged or worn beyond serviceability, remove retainers and install new felt strips and retainers.

11. ASSEMBLY.

a. **Assembly and Installation.** For procedure on assembly and installation of rear axle and trunnion assemblies, refer to TM 9-768.

Section V

MAIN FRAME AND BRACKETS

12. DESCRIPTION (figs. 10 and 11).

a. The main frame is of all-welded construction, fabricated of structural steel. The frame supports two steel plate runways, which are equipped with four steel chock blocks bolted in selective positions at the ends of the runway (fig. 2). Two adjustable track guides are bolted to the inner sides of the runways and two loading ramps are hinged to the frame rear crossmember (fig. 2). Steel plates form the main frame front cover, apron, cable trough, and stowage compartment. Two winch cable rollers and sheaves mounted on the forward top side of the frame are provided to assist in guiding the winch cable when loading the trailer, by using the winch mounted on the towing vehicle (fig. 3). A kingpin is welded to the apron plate under the forward end of the trailer main frame to provide the connecting link between the trailer main frame and gear frame.

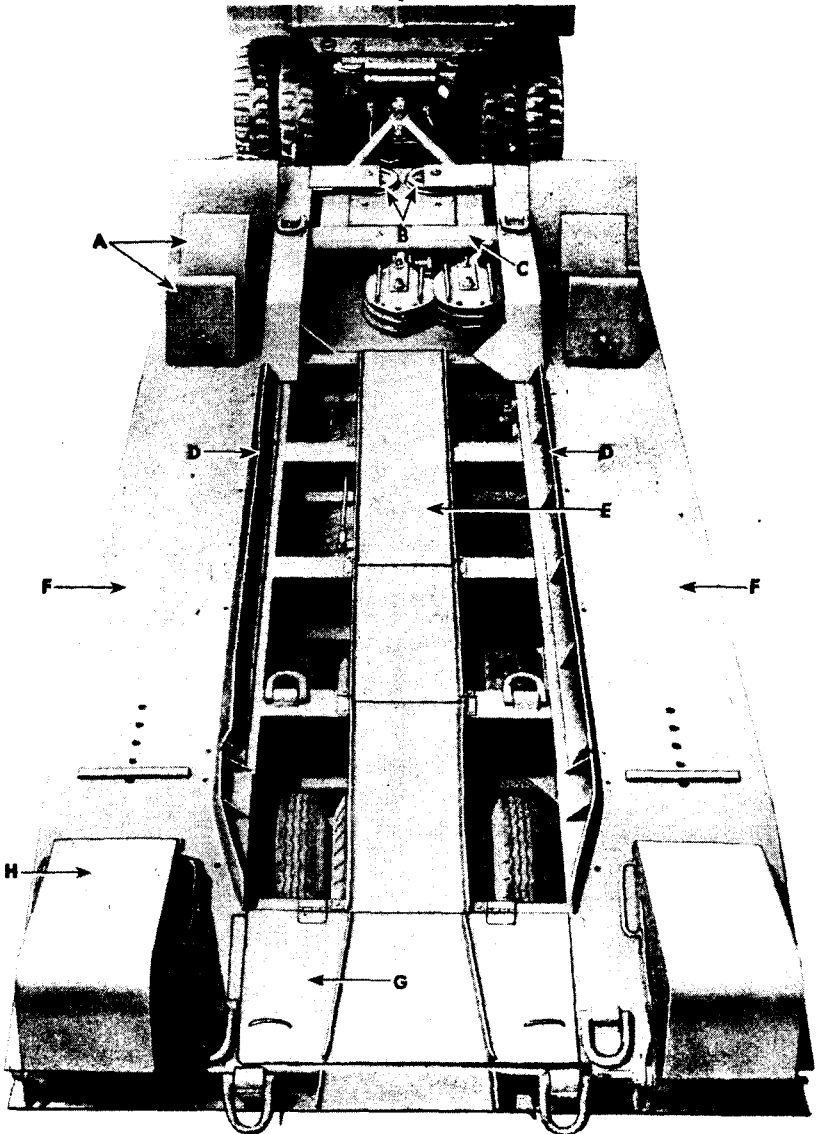
13. REPAIR OF FRAME MEMBERS.

a. **General.** Due to the rugged design and construction, repair of the main frame consists of welding, straightening, or replacing damaged steel brackets, plates, or members.

b. **Straightening Bent Frame Members.** Use combinations of hydraulic jacks and chains working against heavy I-beams to straighten frame members. Heat the member to be straightened if cold straightening is not possible. **CAUTION:** *Do not heat the metal above a cherry red, as extreme heat will weaken the structural characteristics of the frame members.*

c. **Replacing Frame Members** (fig. 12). Cut out frame member, or section, to be replaced, making a cut at a 30-degree angle to the retained portion. Insert the new section which has been cut to fit

Main Frame and Brackets



A—CHOCK BLOCKS

E—CABLE TROUGH

B—SHEAVES

F—RUNWAYS

C—REAR ROLLER

G—STORAGE COMPARTMENT

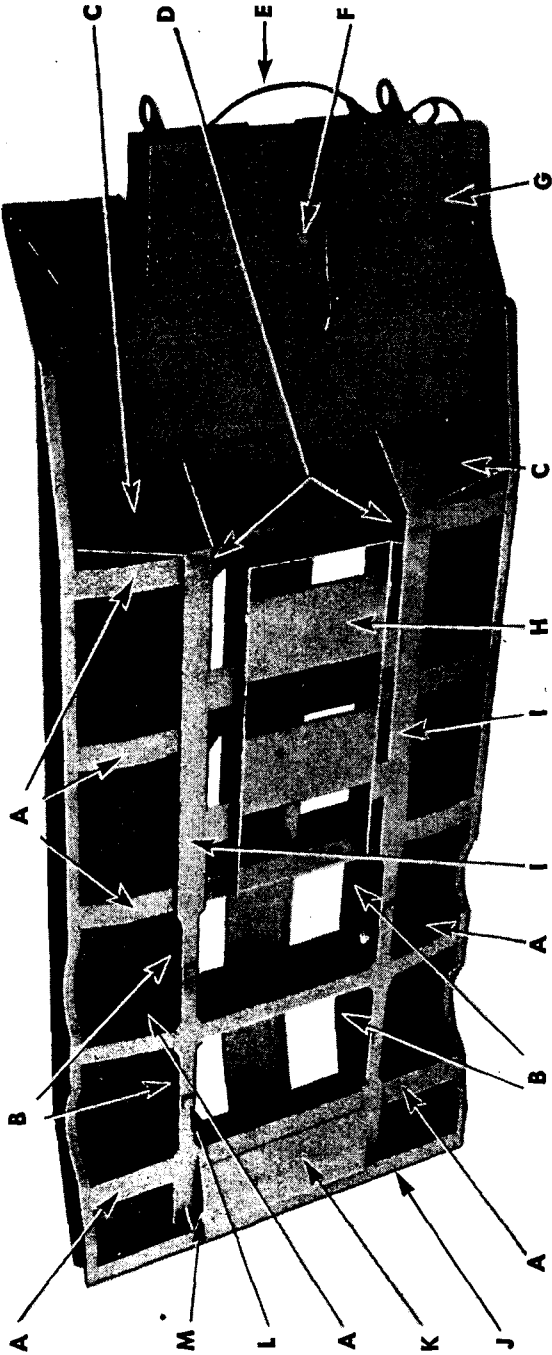
D—TRACK GUIDES

H—LOADING RAMP

RA PD 321441

Figure 10—Top View of Trailer

Main Frame and Brackets

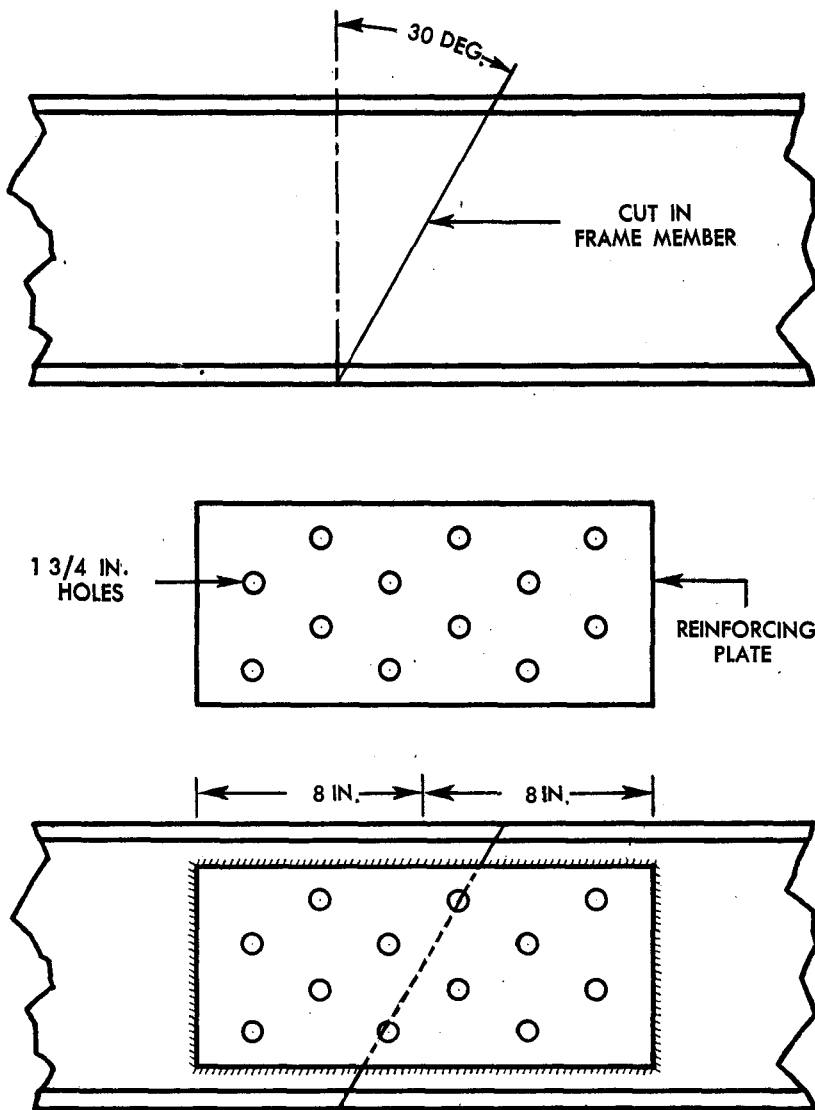


- A—OUTER FRAMING MEMBERS
- B—RUB PLATES
- C—FLANGE PLATES
- D—GUSSET PLATES
- E—HOSE GUARD
- F—KING PIN ASSEMBLY
- G—MUD GUARD
- H—TIRE CARRIER
- I—MAIN LONGITUDINAL BEAMS
- J—REAR CROSS BEAM
- K—TOOL BOX FLOOR PLATE
- L—STOP BLOCK
- M—TOOL BOX SIDE PLATE

RA PD 348188

Figure 11—Bottom View of Main Frame

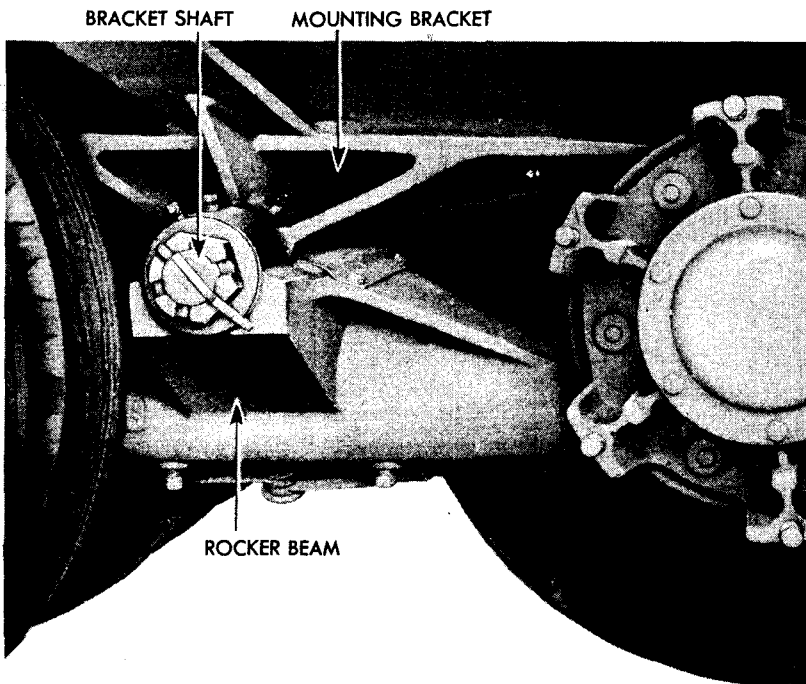
Main Frame and Brackets



RA PD 348189

Figure 12—Method of Splicing Frame Members

Main Frame and Brackets



RA PD 321412

Figure 13—Trunnion Shaft Bracket

and tack-weld it in position. Weld with a $\frac{1}{2}$ - x $\frac{1}{2}$ -inch continuous weld. Back up each splice weld seam using steel plate at least $\frac{1}{8}$ inch greater in thickness than the metal spliced. Cut the plate so it will extend 8 inches on each side of the splice weld. Drill a $1\frac{3}{4}$ -inch hole in every 4 square inches of reinforcement plate to be used for plug welding. Tack-weld the plate in position over the splice weld in the frame member and weld the $1\frac{3}{4}$ -inch holes solid using bare wire. Weld around the edge of the reinforcing plate using coated welding rod.

14. TRUNNION SHAFT BRACKET.

a. **Description.** The two trunnion shaft brackets are drop-forged, steel castings welded to the bottom of the main frame (fig. 13). The brackets are fitted with bronze bushings to support the trunnion shaft assemblies.

b. **Cleaning and Inspection.** Clean inside bore of bushings with dry-cleaning solvent. Remove lubrication fittings and clean dirt

Main Frame and Brackets

and grease from the hole. Inspect bushing for scores or looseness in bracket. Measure inside diameter. Inside diameter of new bushing is 3.005 ± 0.001 inches. If inside diameter of bushing measures more than 3.012 inches, replace bushing.

c. **Repair.** Remove set screw holding bushing in bracket. Using a long drift, drive alternately on each side to remove bushing. If difficulty is experienced in removing bushing by this method, remove bushing by cutting down one side of bushing with a caping chisel and drive bushing out from either side. Carefully aline new bushing so that set screw hole in bushing is in line with set screw hole in bracket. Start bushing into bracket by tapping lightly around edge of the bushing to be sure it starts into hole squarely. Use the old bushing to drive the new bushing into place, or until the outer edge of bushing is flush with bracket bore; then use a drift to drive the bushing the rest of the way in until it seats. Install set screw. After both bracket bushings have been replaced, line-ream bushings to 3.005 ± 0.001 inches.

15. KINGPIN.

a. **Description.** The drop-forged, steel kingpin is welded to the upper fifth wheel plate or apron plate under the forward end of the main frame (fig. 11). A mounting flange above the apron plate helps to support the kingpin. The lower end of the kingpin is threaded as a means of locking it into the gear frame with the kingpin nut.

b. **Cleaning and Inspection.** Clean kingpin with dry-cleaning solvent and blow out the grease pipe hole with compressed air. Inspect pin for scores, worn bearing surface, or damage to threads. Diameter of new pin is $4.998 + 0.002$ inches. If kingpin is worn excessively, metallize and refinish or replace with new pin.

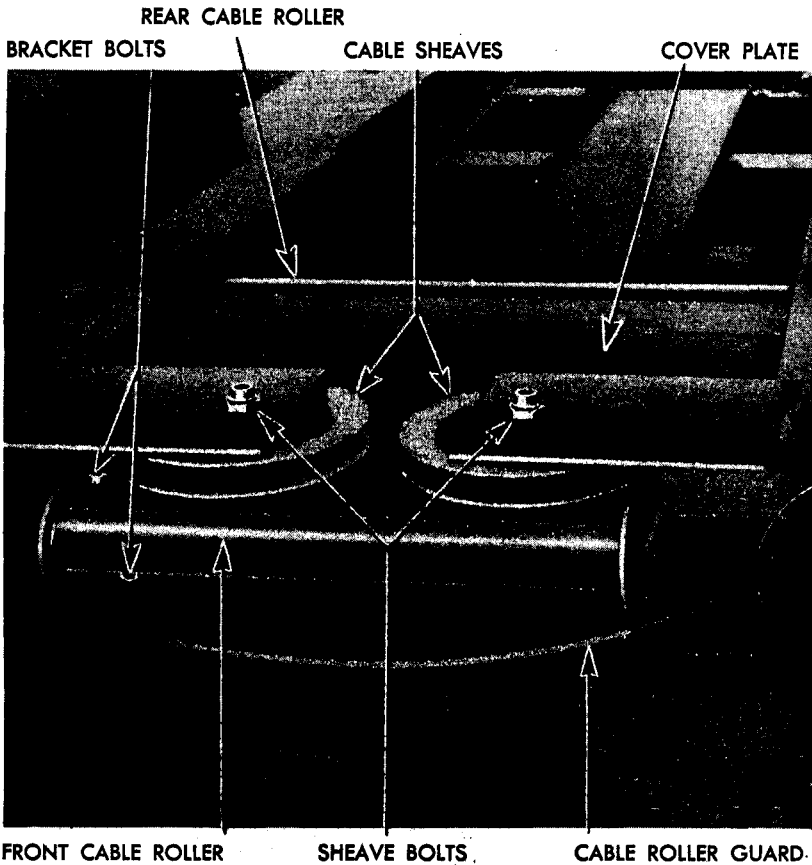
c. **Replacement.** Cut the fill weld securing the kingpin flange to apron plate and drive kingpin out of plate. Working from other side of plate bevel, grind surplus weld material from hole, grinding at a 45-degree angle so that upper diameter of hole is $5 \frac{3}{32} \pm \frac{1}{32}$ inches. Center new kingpin in hole and clamp pin in position. Fill 45-degree bevel cut with fill weld, being careful not to let weld extend below plate.

16. CABLE ROLLERS AND BRACKETS (figs. 10 and 14).

a. **Description.** Two cable rollers are bracket-mounted, one to the front and one to the rear of the cable sheaves at the top of the main frame. Shafts, extending from each end of the cable rollers, rotate in bronze bushings mounted in the cable roller brackets.

b. **Cleaning, Inspection, and Repair.** Remove cable roller brackets and remove rollers from brackets. Clean all parts with dry-

Main Frame and Brackets



RA PD 348194

Figure 14—Front Cable Rollers and Sheaves

cleaning solvent. Inspect to see that roller shafts are secure in ends of rollers. Measure diameter of shaft and inner diameter of bracket bushing for indication of excessive wear. Original diameter of shaft is 1.251 ± 0.002 inches. Inside diameter of bracket bushing is 1.262 ± 0.003 inches. If clearance between shaft and bushing is excessive, replace bushing. To replace bushing, remove lubrication fitting and press bushing from bracket. Position new bushing so that grease hole in bushing lines up with hole in roller bracket and press bushing into place. Finish line-ream roller bracket bushings to 1.262 ± 0.003 inches diameter. Clean threads in bracket lubrication hole and install new lubrication fitting. To repair roller shafts, metallize and turn down to 1.251 ± 0.003 inches.

Gear Frame and Drawbar Assembly

17. SHEAVES (figs. 10 and 14).

a. **Description.** Two cast-steel sheaves for $\frac{7}{8}$ -inch wire rope are pin-mounted between flat brackets on top of the main frame front plate. The sheaves are 15 inches in diameter.

b. **Cleaning, Inspection, and Repair.** Clean sheaves with dry-cleaning solvent. Inspect for cracks or dents which would interfere with free operation. Measure diameter of sheave pin hole. Original diameter is $1\frac{1}{2}$ inches. If sheave is unserviceable, replace. Inspect sheave pin threads to see that they are not damaged. Measure diameter of pin. If diameter is less than 1.480 inches, replace pin.

Section VI**GEAR FRAME AND DRAWBAR ASSEMBLY****18. DESCRIPTION.**

a. The gear frame and drawbar assembly forms the trailer dolly and is connected under the front end of the main frame by the kingpin (fig. 3). The gear frame and drawbar are of all-welded construction. The gear frame consists of steel channels and plates and is hinged to the A-shaped drawbar by means of two hinge pins. The drawbar eye is secured to the drawbar frame by a slotted nut with cotter pin (fig. 16). The top plate of the gear frame serves as a lower fifth wheel (fig. 15). Brackets, for mounting the front end of the front axle and trunnion assemblies, are welded to the front of the gear frame; and brackets, for mounting the spring end of the front axle and trunnion assembly, are bolted to the rear of the gear frame (fig. 4).

19. REPAIR OF GEAR FRAME MEMBERS.

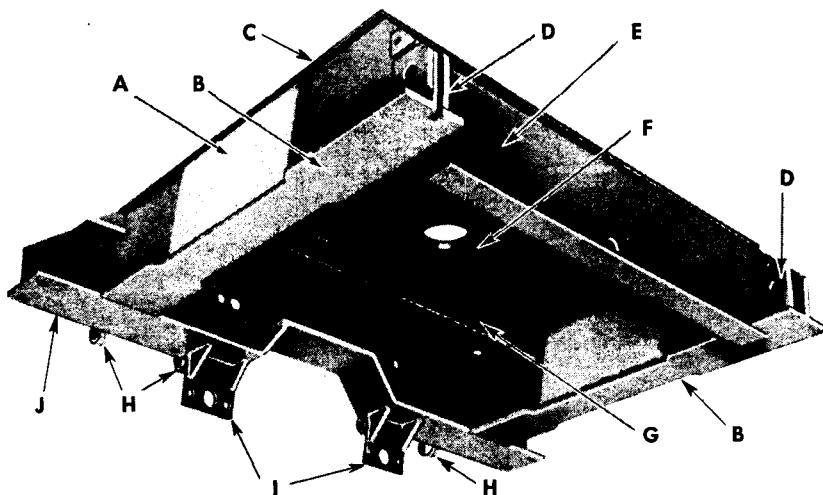
a. Repair of the gear frame and drawbar assembly consists of welding, straightening or replacing damaged steel channels, plates, or other frame members. For instructions for repair of the gear frame members, refer to paragraph 13.

20. KINGPIN BUSHING.

a. **Description.** The aluminum bronze kingpin bushing is mounted in the gear frame top plate and provides the bearing surface for the kingpin.

b. **Cleaning and Inspection.** Clean bushing with dry-cleaning solvent, inspect for scores, and secure fit in gear frame plate. Measure

Gear Frame and Drawbar Assembly



- | | |
|---------------------------------|-----------------------------|
| A-SIDE MEMBER REINFORCING PLATE | F-KINGPIN REINFORCING PLATE |
| B-SIDE MEMBER | G-REAR REINFORCING CHANNEL |
| C-TOP PLATE | H-BRAKE SHAFT HANGER |
| D-DRAWBAR BRACKET | I-BRAKE CHAMBER HANGER |
| E-FRONT CROSSMEMBER | J-REAR CROSSMEMBER |

RA PD 348190

Figure 15—Gear Frame

inside diameter of bushing. If diameter is more than 5.019 inches, replace bushing.

c. **Repair.** Remove bushing with bushing remover or drive out with drift. Aline new bushing squarely with hole and, using old bushing, drive new bushing into place until flush with top of gear frame plate.

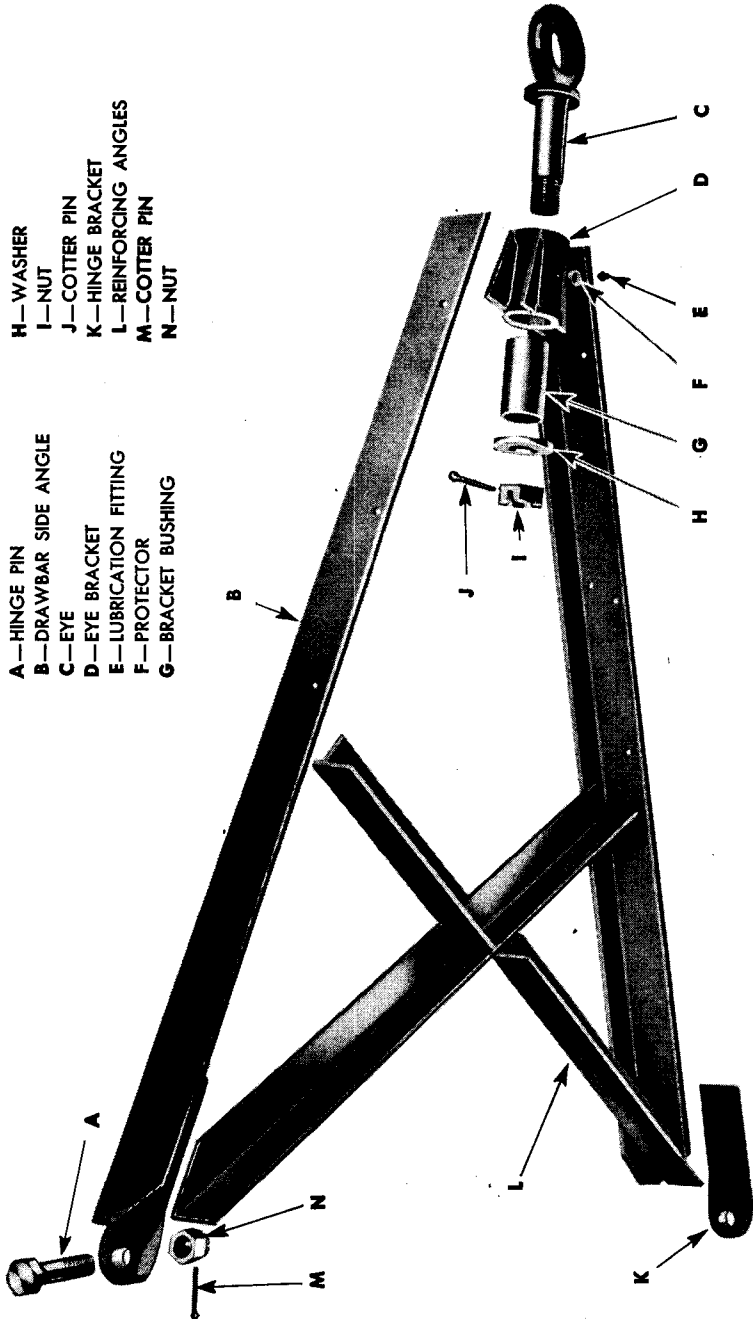
21. FRONT BRAKE SHAFTS AND HANGERS (figs. 17 and 18).

a. **Description.** The two front brake shafts are mounted to the gear frame rear crossmember by means of bracket-supported, bushed bearings known as hangers. The hangers are welded to the frame crossmember.

b. **Removal.** Remove the slack adjuster from brake operating shaft. Disconnect brake rod clevis and brake chamber push rod clevis from brake operating shaft lever. Loosen set screw in brake operating shaft collar and pull shaft and lever assembly from hangers.

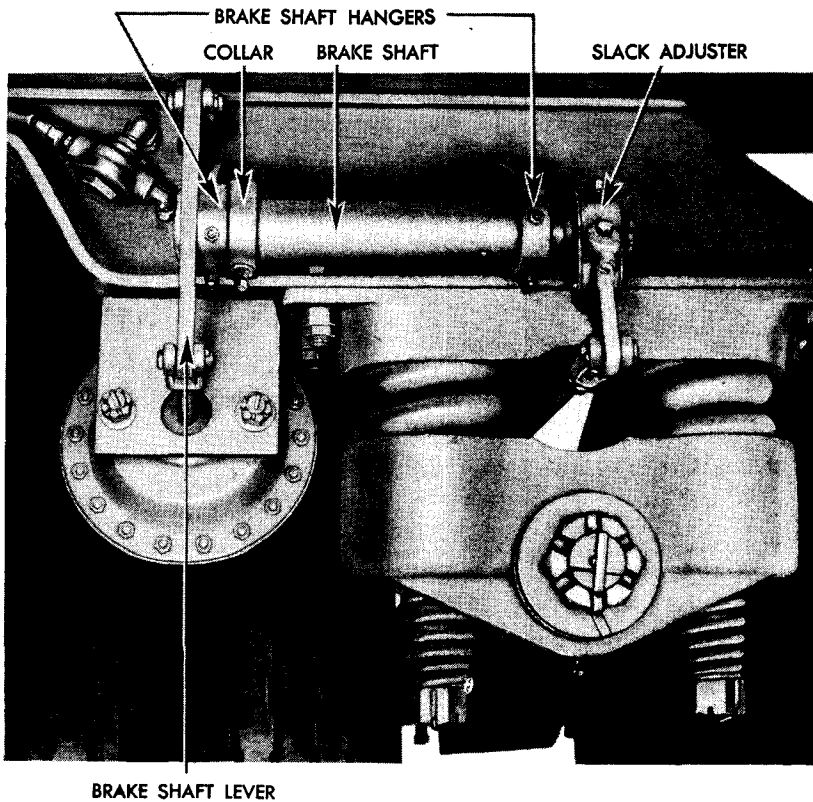
c. **Cleaning, Inspection, and Repair.** Clean hanger bushing with dry-cleaning solvent. Inspect shaft and bushings for damage

Gear Frame and Drawbar Assembly



RA PD 348191

Figure 16—Drawbar Assembly



RA PD 348192

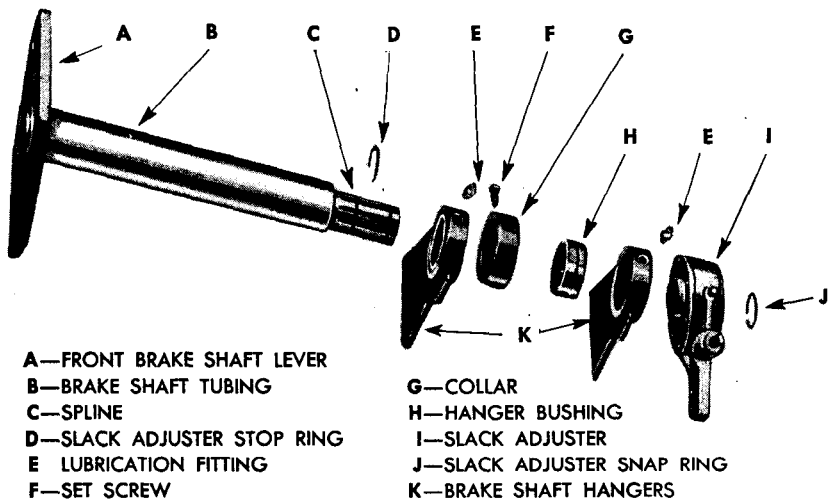
Figure 17—Right Front Brake Shaft

and replace, if unserviceable. Original inside diameter of bushings is 2.012 to 2.014 inches. Original diameter of shaft is 2.005 ± 0.005 inches. If shaft to bushing clearance at either bushing exceeds 0.020 inch, replace the shaft or bushing or both. To replace bushing, drive bushing from hanger. Drive new bushing into place, being sure to aline grease holes in hanger and bushing, and install new lubrication fitting.

22. DRAWBAR EYE BRACKET (fig. 16).

a. **Description.** The drawbar eye bracket is a bushed steel casting welded to the apex of the A-shaped drawbar frame. The bracket supports the drawbar eye shank.

Service Brake System



RA PD 348193

Figure 18—Front Brake Shaft Assembly—Disassembled

b. **Cleaning and Inspection.** Clean the bushing with dry-cleaning solvent and measure inside diameter at several points. New bushing measures 2.251 ± 0.001 inches.

c. **Repair.** Remove lubrication fitting. Using bushing remover, remove bushing. If remover is not available, cut down one side of bushing with a cape chisel and drive out bushing. Position bushing so that none of the oilholes in bushing will coincide with lubrication fitting hole in bracket, after bushing is pressed into place. Using old bushing, drive or press new bushing into place. Ream bushing to 2.251 ± 0.001 inches.

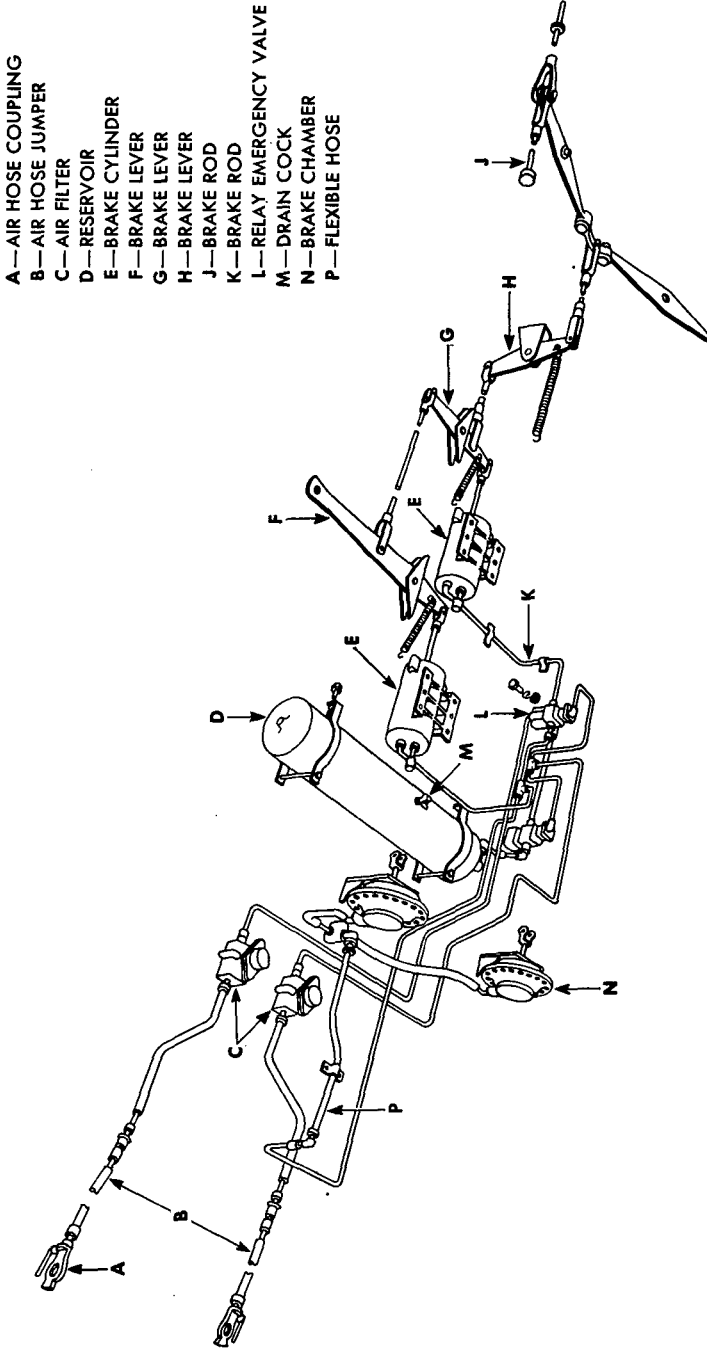
Section VII

SERVICE BRAKE SYSTEM

23. DESCRIPTION AND DATA.

a. **Description** (fig. 19). The service brake system is air-operated from the towing vehicle. The front wheel brakes are diaphragm-operated by means of brake chambers and the rear wheel brakes are piston-operated by means of brake cylinders.

Service Brake System



RA PD 321434

Figure 19—Service Brake System

Serviceability Standards

b. Data.	
(1) BRAKES.	
Type	Internal-expanding
Power	Air
(2) CHAMBERS.	
Make	Westinghouse
Model	WAB-220899
Size	9 in.
(3) CYLINDERS.	
Make	Westinghouse
Model	WAB-220878
Size	6 in.
(4) RELAY-EMERGENCY VALVE.	
Make	Westinghouse
Model	WAB-220353
Exhaust fitting	WAB-221087
(5) BRAKE LINING.	
Size	5½ x 13½ x ¼ in.
Area (sq in. per shoe)	74.25
(6) SLACK ADJUSTERS.	
Make	Westinghouse
Model	217900
Body	D-1½-in. spline

24. RELINING BRAKE SHOES.

a. Remove lining rivets using a 3/16-inch punch, and wash shoes with dry-cleaning solvent. Buff or scrape all dirt off shoe face. Install new lining on shoe by first installing two center rivets. Clamp end of lining to shoe to correctly aline lining with shoe and install end rivets. Remove clamp and install remaining rivets.

Section VIII

SERVICEABILITY STANDARDS

25. FRONT AXLE AND TRUNNION BEAM.

a. Axle Shaft.	
Point of Measurement	Dimensions of New Parts
OD	2.9990 to 2.9995 in.
Length	37¾ in.
Shaft threads	NF, 12-thread-per-in.
b. Camshaft.	
OD	1.997 to 2.000 in.
Length	19⅞ in.

Serviceability Standards

c. Anchor Shaft.

Point of Measurement	Dimensions of New Parts
OD	1.997 to 2.000 in.
Length	20 ³ / ₈ in.

d. Camshaft Bushing.

OD	2.381 to 2.383 in.
Ream diameter (after assembly)	2.004 to 2.006 in.
Bushing length	2 in.

e. Front Trunnion Bracket Bushing.

OD	1.506 to 1.508 in.
Ream diameter (after assembly)	1.254 to 1.256 in.
Bushing length	6 in.

f. Front Trunnion Bracket Bushing (Trunnion Beam).

OD	3.381 to 3.383 in.
Ream diameter	3.004 to 3.006 in.
Bushing length	5 ⁵ / ₈ in.

g. Front Main Spring Bracket Bushing.

OD	3.381 to 3.383 in.
Ream diameter	3.004 to 3.006 in.
Bushing length	5 ⁵ / ₈ in.

h. Front Trunnion Beam.

OD spindle bearing surface	2.998 to 3.000 in.
Spindle threads	USF, 12-threads-per-in.
Camshaft bushing hole	2.379 to 2.381 in.
Axle shaft hole	3.004 to 3.006 in.
Anchor shaft hole	2.002 to 2.005 in.

i. Front Trunnion Bracket.

Trunnion beam bushing hole	3.379 to 3.381 in.
Hanger bolt bushing hole	1.504 to 1.506 in.

j. Front Main Springs (Large).

Coil diameter	1 ³ / ₁₆ in.
Coils	5 ⁷ / ₈ in.
Free length	8 ¹ / ₄ ± ¹ / ₈ in.
	0 in.
Solid length	6 ⁹ / ₁₆ in.
OD	5 ⁷ / ₁₆ ± ¹ / ₁₆ in.
	0 in.
ID	3 ¹ / ₁₆ in.
Initial load and height	7,400 lb @ 7 ¹ / ₄ in.
Final load and height	12,500 lb @ 6 ⁹ / ₁₆ in.

Serviceability Standards

k. Front Retainer Springs (Small).

Point of Measurement	Dimensions of New Parts
Coils (effective)	5½ in.
Free length	4¾ in.
OD (large end)	3 ¹ / ₁₆ in.
OD (small end)	2 in.

26. REAR AXLE AND TRUNNION ASSEMBLY.

a. Rear Axle Shaft.

OD	2.9990 to 2.9995 in.
Length	37¾ in.
Shaft threads	NF, 12-threads-per-in.

b. Trunnion Shaft.

OD	3.244 to 3.246 in.
Length	59 ± 1 ¹ / ₃₂ in.
Shaft threads	NF, 12-threads-per-in.

c. Trunnion Bracket Shaft.

OD	2.996 to 3.000 in.
Length	23½ in.
Shaft threads	NF, 12-threads-per-in.

d. Trunnion Rocker Beam Bushing.

OD	3.381 to 3.383 in.
Ream diameter (after assembly)	3.004 to 3.006 in.
Bushing length	3 ³ / ₃₂ in.

e. Trunnion Axle Bracket Bushing.

OD	3.631 to 3.633 in.
Ream diameter (after assembly)	3.250 to 3.252 in.
Bushing length	2 ³¹ / ₃₂ in.

f. Axle Bracket.

Trunnion shaft hole	3.629 to 3.631 in.
Axle shaft hole	3.004 to 3.006 in.
Camshaft hole	2.379 to 2.381 in.
Anchor shaft hole	2.002 to 2.005 in.

g. Rocker Beam.

Trunnion bracket shaft bushing hole	3.379 to 3.381 in.
Trunnion shaft hole	3.252 to 3.255 in.

27. MAIN FRAME.

a. Trunnion Shaft Bracket Bushing.

ID	3.005 ± 0.001 in.
OD	3.381 to 3.383 in.

Serviceability Standards

b. Cable Roller Shafts.

Point of Measurement	Dimensions of New Parts
OD of shaft	1.251 ± 0.002 in.

c. Cable Roller Bracket Bushings.

ID	1.262 ± .003 in.
OD	1.500 to 1.502 in.

d. Kingpin.

Large diameter	4.996 to 5.000 in.
Small diameter	3 in., 12-threads

e. Sheaves.

Sheave pin hole (diam)	1 ¹⁷ / ₃₂ in.
Sheave pin (diam)	1.500 in.

28. GEAR FRAME.

a. Kingpin Bushing.

ID	5.009 ± 0.001 in.
OD	5.503 to 5.504 in.

b. Front Brake Shaft Hanger Bushings.

ID	2.012 to 2.014 in.
Each set of brake shaft hanger bushings must be line-reamed after both bushings have been installed.	

c. Front Brake Shafts.

Diameter	2.005 ± 0.005 in.
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d. Drawbar Eye Bracket.

(1) BUSHING.

ID	2.251 ± 0.001 in.
OD	2.628 ± 0.001 in.

(2) BRACKET BORE.

Diameter	2.626 ± 0.001 in.
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Section IX
REFERENCES

29. PUBLICATIONS INDEXES.

The following publications indexes should be consulted frequently for latest changes to or revisions of the publications given in this list of references and for new publications relating to materiel covered in this manual:

- a. Introduction to ordnance catalog (explaining SNL system) ASF Cat.
ORD 1 IOC
- b. Ordnance publications for supply index (index to SNL's) ASF Cat.
ORD 2 OPSI
- c. Ordnance major items and combinations and pertinent publications SB 9-1
- d. List of publications for training (listing CCBP's, FM's, FT's, MTP's, TB's, TM's, TR's, TC's, and LO's) FM 21-6
- e. List of miscellaneous publications (lists MP's, MWO's, SB's, RR's, and war department pamphlets) WD Pamphlet
12-6
- f. List of training films, film strips and film bulletins FM 21-7
- g. Military training aids (listing graphic training aids, models, devices and displays) FM 21-8

30. STANDARD NOMENCLATURE LISTS.

- a. **Vehicular.**
Truck, trailer, 45-ton, tank transporter M19 ASF Cat.
ORD SNL
G-159
- b. **Maintenance.**
Cleaning, preserving and lubricating materials:
recoil fluids, special oils, and miscellaneous
items ASF Cat.
ORD 5 SNL
K-1

References

Lubricating equipment, accessories and related dispensers	ASF Cat. ORD 5 SNL K3
Soldering, brazing and welding material, gases and related items	ASF Cat. ORD 5 SNL K-2
Tool sets, for Ordnance service command automotive shops	ASF Cat. ORD 6 SNL N-30
Tool sets (common), specialists' and organizational	ASF Cat. ORD 6 SNL G-27 (Section 2)
Tool sets (special), automotive and semi-automotive	ASF Cat. ORD 6 SNL G-27 (Section 1)

31. EXPLANATORY PUBLICATIONS.

a. Fundamental Principles.

Basic maintenance manual	TM 37-250
Care and maintenance of ball and roller bearings	TM 37-265
Driver's manual	TM 21-305
Driver selection and training	TM 21-300
Electrical fundamentals	TM 1-455
Military motor vehicles	AR 850-15
Motor vehicle inspections and preventive maintenance service	TM 9-2810
Ordnance service in the field	FM 9-5
Precautions in handling gasoline	AR 850-20
Standard military motor vehicles	TM 9-2800

b. Operation of Materiel.

45-ton tank transporter truck-trailer, M19	TM 9-768
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References

c. Maintenance and Repair.

- Cleaning, preserving, sealing, lubricating and welding materials and related materials issued for ordnance materiel TM 9-850
- Maintenance and care of pneumatic tires and and rubber treads TM 31-200
- Ordnance maintenance: Power brake systems (Bendix-Westinghouse) TM 9-1827A

d. Protection of Materiel.

- Camouflage, basic principles FM 5-20
- Decontamination TM 3-220
- Decontamination of armored force vehicles.... FM 17-59
- Defense against chemical attack FM 21-40
- Explosives and demolitions FM 5-25

e. Storage and Shipment.

- Ordnance company, depot FM 9-25
- Ordnance packing and shipping (posts, camps, and stations) TM 9-2854
- Ordnance storage and shipment chart, group G SB 9-OSSC-G
- Protection of ordnance materiel in open storage SB 9-47
- Registration of motor vehicles AR 850-10
- Rules governing the loading of mechanized and motorized army equipment, also major caliber guns, for the United States Army and Navy, on open top equipment published by Operations and Maintenance Department of Association of American Railroads.
- Storage of motor vehicle equipment AR 850-18

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