
TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

RIGHT ANGLE DRIVE, COOLING FAN

M113A1 FOV, M113A2 FOV — 2990-00-712-1280

M113A3 FOV — 3010-01-318-5670

GEARCASE, TRANSFER

M548, M548A1 — 2520-01-047-8613

SERVICE GEARCASE — 2520-01-087-0156

M113A1 FOV — 2520-00-572-8605

M113A2 FOV WITH 100 AMP GENERATOR — 2520-01-061-5570

M113A1 FOV, M113A2 FOV WITH 200 AMP GENERATOR — 2520-01-362-8589

DRIVE ASSEMBLY, FINAL

M113A2 FOV, M113A3 FOV — 2520-01-061-5766

M548, M548A1 — 2520-01-067-8933

DIFFERENTIAL, STEERING CONTROL

M113A1 FOV, M113A2 FOV, M548, M548A1 — 2520-00-714-6135

BRAKE, SINGLE DISK

M113 FOV, M548, M548A1 — 2530-00-088-9866

CYLINDER ASSEMBLY, HYDRAULIC BRAKE

M113 FOV, M548, M548A1 — 2530-00-679-9169

SUPERSEDURE NOTICE — This manual supersedes TM 9-2520-238-34 dated September 1991, including all changes.

DISTRIBUTION STATEMENT A — Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

31 MAY 2001

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 MAY 2001

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeeps.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or email your letter, DA Form 2028 direct to: AMSTA-LC-CI/TECH PUBS, TACOM-RI, Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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TABLE OF CONTENTS

WP Sequence No.

WARNING SUMMARY

HOW TO USE THIS MANUAL

CHAPTER 1 — INTRODUCTORY INFORMATION WITH THEORY OF OPERATION

GENERAL INFORMATION.....	0001 00
EQUIPMENT DESCRIPTION AND DATA.....	0002 00
REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.....	0003 00

CHAPTER 2 —TROUBLESHOOTING PROCEDURES

INTRODUCTION TO HOW TO USE TROUBLESHOOTING.....	0004 00
MALFUNCTION/SYMPTOM INDEX WP.....	0005 00
COOLING FAN RIGHT ANGLE DRIVE LEAKS OIL.....	0006 00
COOLING FAN RIGHT ANGLE DRIVE BINDS OR MAKES GRINDING NOISE.....	0007 00
TRANSFER GEARCASE LEAKS OIL.....	0008 00
DIFFERENTIAL MAKES EXCESSIVE NOISE OR VIBRATES WHILE TURNING.....	0009 00
DIFFERENTIAL MAKES EXCESSIVE NOISE OR VIBRATES WHILE MOVING.....	0010 00
FINAL DRIVE BINDS OR MAKES GRINDING NOISE.....	0011 00
FINAL DRIVE LEAKS OIL.....	0012 00
FINAL DRIVE HAS WATER INSIDE.....	0013 00

CHAPTER 3 — DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR PMCS INCLUDING LUBRICATION PROCEDURES

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS), INCLUDING LUBRICATION INSTRUCTIONS.....	0014 00
---	---------

CHAPTER 4 — DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR REPAIR COOLING FAN RIGHT ANGLE DRIVES

REPAIR COOLING FAN RIGHT ANGLE DRIVES A AND B.....	0015 00
REPAIR COOLING FAN RIGHT ANGLE DRIVE C (M113A3 FOV ONLY).....	0016 00

CHAPTER 5 — DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR REPAIR TRANSFER GEARCASES

REPAIR TRANSFER GEARCASES A, B, AND C.....	0017 00
REPLACE TRANSFER GEARCASE A, B, OR C WITH SERVICE SPARE TRANSFER GEARCASE E.....	0018 00
REPAIR TRANSFER GEARCASE F.....	0019 00

CHAPTER 6 — DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR REPAIR FINAL DRIVE ASSEMBLIES

TABLE OF CONTENTS (cont)

WP Sequence No.

REPAIR FINAL DRIVE ASSEMBLIES A AND B.....	0020 00
CHAPTER 7 — MAINTENANCE INSTRUCTIONS FOR STEERING CONTROL DIFFERENTIAL	
REPLACE STRAIGHT ADAPTER AND BRAKE SHOE ASSEMBLIES.....	0021 00
REPAIR BRAKE SHOE ASSEMBLIES.....	0022 00
REPLACE OUTPUT SHAFT ASSEMBLIES.....	0023 00
REPAIR OUTPUT SHAFT ASSEMBLIES.....	0024 00
REPLACE DIFFERENTIAL STEERING CONTROL ASSEMBLY.....	0025 00
REPAIR DIFFERENTIAL STEERING CONTROL ASSEMBLY.....	0026 00
REPLACE DIFFERENTIAL RIGHT ANGLE GEARBOX.....	0027 00
REPAIR DIFFERENTIAL RIGHT ANGLE GEARBOX.....	0028 00
REPAIR STEERING CONTROL DIFFERENTIAL HOUSING.....	0029 00
CHAPTER 8 — DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR REPAIR SINGLE DISK PIVOT STEER BRAKE AND HYDRAULIC MASTER BRAKE CYLINDER	
REPAIR SINGLE DISK PIVOT STEER BRAKE ASSEMBLY.....	0030 00
REPAIR HYDRAULIC MASTER BRAKE CYLINDER.....	0031 00
CHAPTER 9 — SUPPORTING INFORMATION	
REFERENCES.....	0032 00
COMMON TOOLS AND SUPPLEMENTS AND SPECIAL TOOLS/FIXTURES LIST.....	0033 00
FABRICATED TOOLS.....	0034 00
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.....	0035 00

HOW TO USE THIS MANUAL

HOW TO USE THIS MANUAL

This manual tells you how to perform direct and general support maintenance for transfer gearcases, final drives, cooling fan right angle drives, steering differential control, single disk pivot brake and hydraulic brake master cylinder for the M113 Family of Vehicles.

Before starting a task or procedure, read HOW TO USE THIS MANUAL and GENERAL MAINTENANCE PROCEDURES (WP 0014 00).

WHAT'S IN THE MANUAL — FRONT TO BACK

This TM supplement is divided into front and rear matter and Work Packages (WPs) for ease of use.

The WARNING SUMMARY section provides safety and first aid information. This section includes general warnings not found in the TM text and a list of the most important detailed warnings extracted from the WPs. All of these warnings cover hazards that could kill or injure personnel.

The TABLE OF CONTENTS lists the WPs.

CHAPTER 1 covers general introductory information. The Equipment Description WP gives a brief description of components covered in this manual.

CHAPTER 2 covers troubleshooting procedures authorized at the DS/GS maintenance level.

CHAPTER 3 includes PMCS procedures.

CHAPTER 4 contains maintenance WPs for the cooling fan right angle drives.

CHAPTER 5 contains maintenance WPs for the transfer gearcases.

CHAPTER 6 contains maintenance WPs for the final drive assemblies.

CHAPTER 7 contains maintenance WPs for the steering control differential.

CHAPTER 8 contains maintenance WPs for the single disk pivot steer brake and the hydraulic master brake cylinder.

CHAPTER 9 contains supporting information for the TM which includes the following WPs:

The REFERENCES WP lists references to be used by personnel in operating and maintaining the carrier.

The COMMON TOOLS and SUPPLEMENTS and SPECIAL TOOLS/FIXTURES WP lists the tools used in the initial setup.

The FABRICATED TOOLS WP lists instructions for making tools authorized to be fabricated at DS or GS maintenance levels.

The EXPENDABLE/DURABLE SUPPLIES and MATERIALS lists the expendable supplies and materials used to maintain or repair the carrier.

The INDEX is an alphabetical listing of all the tasks in the WPs of this TM. Each entry is cross-referenced to the WP number and page number.

The back cover includes a METRIC CONVERSION CHART that can be used to convert U.S. customary measurements to their metric equivalents. Measurements in this manual are given in U.S. customary unit with metric units in parentheses.

HOW TO USE THE WORK PACKAGES

How to find the WP you need

Pick a key word from the carrier part or system to be used during the WP. Look in the INDEX for this key word or the name of the action you will perform. Turn to the page indicated.

The INDEX lists each WP under one or more headings.

How to read the WP

Be sure to read all **warnings**, **cautions** and **notes**. These are in all types of WPs. They help you avoid harm to yourself, other personnel and equipment. They also tell you things you should know about the WP.

HOW TO USE THIS MANUAL (cont)

Before starting, get all tools, supplies, and personnel, listed on the setup page needed to do the WP. Be sure to read the WP before performing the maintenance. If any other WPs are referenced, you must go to the setup page for each of those WPs to find out what tools, parts, and materials will be needed.

Start with step 1 and do each step in given order.

Look at the illustrations. These show you what to look for when reading a maintenance WP.

Maintenance Instructions WPs

Doing maintenance WPs will keep the carrier in shape to operate. Maintenance WPs are used to present maintenance instructions. Each maintenance WP details steps which you need to perform. If the carrier and parts need maintenance that is not included in any WP in the manual, report this to your supervisor.

Read the INITIAL SETUP section carefully before you start a WP. Get the tools and supplies listed and the personnel needed to perform the WP. Be sure that the equipment is in the condition required.

DEFINITION OF WP TERMS

WARNINGS, CAUTIONS, AND NOTES

Be sure to read all warnings and cautions in the WP. Ignoring a warning could cause death or injury to yourself or other personnel. Ignoring a caution could cause damage to equipment. Notes contain facts to make the WP easier. Warnings, cautions, and notes always appear just above the WP step to which they apply.

WARNINGS	Call attention to things that could kill or injure personnel. Warnings are also listed in the Warning Summary section (page a).
CAUTIONS	Call attention to actions or materials that could damage equipment.
NOTES	Contain important facts to make the procedure easier.

HELPER

Helpers are needed for WPs that require more than one person such as lifting heavy objects or acting as an observer.

If a helper is needed to perform a procedure, the INITIAL SETUP will list "Helper" under the PERSONNEL REQUIRED heading.

If helper assists with a step, the step will include: "Have helper assist".

If a helper performs the action alone, the step will start with "HELPER".

REFERENCES

References within a WP refer to a different manual or to another WP in the same manual. A step in one WP may be a complete WP someplace else. Below is an example of a reference step from the WP: REPAIR BRAKE SHOE ASSEMBLIES.

Example: Check wear limits and clearances of parts, (WP 0021 00).

The tools needed to do the task will be listed in that task.

MATERIALS/PARTS

For all WPs, the following comments apply:

Parts which are listed on the setup page will be referred to as "new" in the WP setup when installed.

Examples are: "locknuts", "lockwashers", "cotter pins", and some "gaskets".

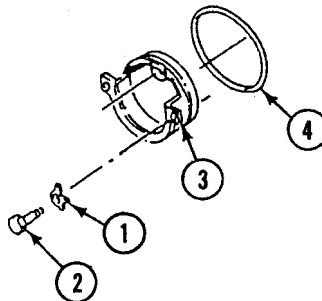
These and other new parts are listed under MATERIAL/PARTS in the initial set up.

GENERAL MAINTENANCE

Cleaning, inspecting, checking for leaks, and similar procedures which apply to most WPs are found in the GENERAL MAINTENANCE PROCEDURES (WP 0014 00). Use these steps to clean and inspect any part being removed, repaired, or installed. Special cleaning will be covered in the WP step. Below is a step that would require general cleaning.

HOW TO USE THIS MANUAL (cont)

11. Straighten tabs on two key washers (1). Remove two cap screws (2), key washers (3) and cover (4) from housing cover. Discard key washers.



After doing this step, you would clean the mating surface with cleaning compound and a wiping rag according to the general cleaning procedures. In other tasks, hoses or rubber hatch seals will need to be checked for leaks. Refer to (WP 0014 00) for general procedures.

HOW TO USE THE REPAIR PARTS AND SPECIAL TOOLS LISTS (RPSTL) WITH THIS MANUAL

The RPSTL TM 9-2520-238-34P gives the National Stock Number (NSN) required to order parts use in the maintenance WPs. To use the RPSTL to identify and order a part, do the following:

In this manual, turn to the first page of the WP to be performed.

Find Materials/Parts under INITIAL SETUP, and read the part(s) that need replacement. If required, find the illustrated part in the WP steps.

Go to the RPSTL and find the same illustrated part. That part will have an item number assigned to it. Look this item number up in the listing for that figure. The NSN can be found in the National Stock Number and Part Number Index in the back of the RPSTL.

If you inspect an item and find that it is damaged, go to the RPSTL and find the SMR code for the item. If the SMR code does not authorize you to repair the item, reassemble it and send it to the authorized level of maintenance.

CHAPTER 1

INTRODUCTORY INFORMATION WITH THEORY OF OPERATION

WORK PACKAGE INDEX

<u>Title</u>	<u>Sequence No.</u>
GENERAL INFORMATION.....	0001 00
EQUIPMENT DESCRIPTION AND DATA.....	0002 00
REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.....	0003 00

GENERAL INFORMATION**0001 00****SCOPE**

Type of Manual: Direct and General Support Maintenance

Model Number and Equipment Name:

Table 1. TABLE 1-1: COMPONENTS COVERED AND END ITEM APPLICATION

Component	Alpha Symbol	NSN	Part No. (CAGE)	End Item and TM Reference
Gearcase, Transfer	A	2520-00-572-8605	10932770 (19207)	M106A1, M113A1, M125A1, M132A1, M577A1 (TM 9-2300-257 series). Replaced 2520-00-771-8377.
Gearcase, Transfer	B	2520-01-061-5570	12253625 (19207)	M106A2, M113A1, M113A2, M125A1, M125A2, M577A1, M577A2, M901A1, M981, M1059, M1064, M1068 (TM 9-2350-261 series) (Carriers with 100 ampere generators).
Gearcase, Transfer	C	2520-01-362-8589	12349527 (19207)	M113A2, M577A2, M981, M1059, M1064 (TM 9-2350-261 series) (Carriers with 200 ampere generators).
Gearcase, Transfer	E	2520-01-087-0156	12268757 (19207)	Service spare for transfer gearcases A, B, C
Gearcase, Transfer	F	2520-01-047-8613	12253385 -1 (19207)	M548, M548A1 (TM 9-2350-247 series).
Differential, Steering Control	A	2520-00-714-6135	10875026 (19207)	M106A1, M113A1, M125A1, M577A1 (TM 9-2300-257 series), M548, M548A1 (TM 9-2350-247 series), M106A2, M113A2, M125A2, M577A2, M901A1, M1059, M1064, M1068, M981 (TM 9-2350-261 series).

GENERAL INFORMATION — Continued

0001 00

Brake, Single Disk, Pivot	A	2530-00-088-9866	11660974 (19207)	M106A1, M113A1, M125A1, M577A1 (TM 9-2300-257 series), M548, M548A1 (TM 9-2350-247 series), M106A2, M113A2, M125A2, M577A2, M901A1, M1059, M1064, M1068, M981 (TM 9-2350-261 series). Replaced 2520009991998.
Master Cylinder, Hydraulic Brake	A	2530-00-679-9169	10861712 (19207)	M106A1, M113A1, M125A1, M577A1 (TM 9-2300-257 series), M548, M548A1 (TM 9-2350-247 series), M106A2, M113A2, M125A2, M577A2, M901A1, M1059, M1064, M1068, M981 (TM 9-2350-261 series). Replaced 2530009749266.
Drive Assembly, Final	A	2520-01-067-8933	12253630 (19207)	M548, M548A1 (TM 9-2350-247 series).
Drive Assembly, Final	B	2520-01-061-5766	12253512 (19207)	M106A2, M113A2, M125A2, M577A2, M901A1, M1059, M1064, M1068, M981 (TM 9-2350-261 series), M113A3, M981A3, M1064A3, M1068A3, M577A3, M1059A3, M901A3, M58 (TM 9-2350-277 series).

GENERAL INFORMATION — Continued

0001 00

Right Angle Drive, Cooling Fan	A	2900-00-712-1280	10863320 (19207)	M106A1, M113A1, M125A1, M577A1 (TM 9-2300-257 series), M106A2, M113A2, M125A2, M577A2, M901A1, M1059, M1064, M1068, M981 (TM 9-2350-261 series). Replaced 2992227818193.
Right Angle Drive, Cooling Fan	B		10863320-1	M113A2, M901A1, M981, M1068, M577A2, M1059, M1064, M106A2, M125A2, M741A2 (TM 9-2350-261 series). M548A3 (TM 9-2350-247 series).
Right Angle Drive, Cooling Fan	C	3010-01-318-5670	12349762-1 (19207)	M113A3, M981A3, M1064A3, M1068A3, M577A3, M1059A3, M901A3, M58 (TM 9-2350-277 series).

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pamphlet 738-750, The Army Maintenance Management System (TAMMS).

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your equipment 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. The preferred method for submitting EIRs is through the Army Electronic Product Support (AEPS) website, under the Electronic Deficiency Reporting System (EDRS). The web address is <https://aeps2.ria.army.mil>. This is a secured site requiring a password, which can be applied for on the front page of the website. The mailing address for submitting EIRs is: Department of the Army, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CIP-W, Rock Island, IL 61299-7630. We'll send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368 (Quality Deficiency Report). Use of key words such as "corrosion," "rust," "deterioration" or "cracking" will assure that the information is identified as a CPC problem.

The preferred method for submitting QDRs is through the Army Electronic Product Support (AEPS) website, under the Electronic Deficiency Reporting System (EDRS). The web address is <https://aeps2.ria.army.mil>. This is a secured site requiring a password, which can be applied for on the front page of the website. The mailing address for submitting QDRs is: Department of the Army, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E-PQDR, MS 267 Warren, MI 48397-5000.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

See the following technical manuals for information on destruction of Army materiel:

TM 750-244-2 Procedures for Destruction of Electronics Materiel to Prevent Enemy Use.

TM 750-244-5-1 Procedures for Destruction of Conventional Ammunition and Improved Conventional Munitions to Prevent Enemy Use.

TM 750-244-6 Procedures for Destruction of Tank Automotive Equipment to Prevent Enemy Use.

TM 750-244-7 Procedures for Destruction of Equipment in Federal Supply Classifications 1000, 1005, 1010, 1520, 2530, 5590, 5595 to Prevent Enemy Use.

PREPARATION FOR STORAGE OR SHIPMENT

See TM 740-90-1 for information about administrative storage or shipment of the component in this manual.

NOMENCLATURE CROSS-REFERENCE

This listing includes nomenclature cross references used in this manual.

COMMON NAME

Lock screw	Self-locking bolt
Lockwasher	Lockwasher

SAFETY, CARE, AND HANDLING

Read warnings in Warning Summary in front of manual.

EQUIPMENT DESCRIPTION AND DATA

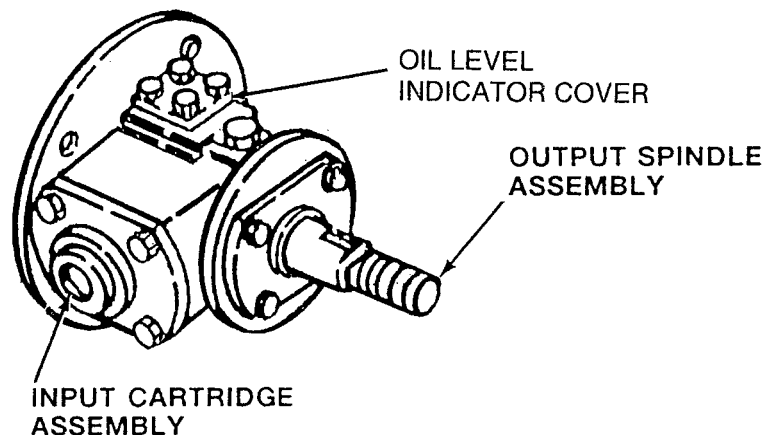
0002 00

EQUIPMENT FUNCTIONAL DESCRIPTION

COOLING FAN RIGHT ANGLE DRIVES

RIGHT ANGLE DRIVE A. Each cooling fan right angle drive A consists of an input cartridge assembly and an output spindle assembly encased in a magnesium or aluminum housing. When installed in a carrier, see Table 1-1, (WP 0001 00), the right angle drive receives torque through an input gearshaft and, by means of a 26-tooth spiral bevel gear in the cartridge assembly and a 27-tooth spiral bevel gear in the spindle assembly, drives a rotor (fan) mounted on the output shouldered shaft. The bevel gear and bevel gearshaft are a matched set and are mounted on matched sets of ball bearings. The gears and bearings are adjusted by inserting or removing laminated shims.

RIGHT ANGLE DRIVES A AND B. Each cooling fan right angle drive A consists of an input cartridge assembly and an output spindle assembly encased in a magnesium or aluminum housing. When installed in a carrier, see Table 1-1, (WP 0001 00), the right angle drive receives torque through an input gearshaft and, by means of a 26-tooth spiral bevel gear in the cartridge assembly and a 27-tooth spiral bevel gear in the spindle assembly, drives a rotor (fan) mounted on the output shouldered shaft. The bevel gear and bevel gearshaft are a matched set and are mounted on matched sets of ball bearings. The gears and bearings are adjusted by inserting or removing laminated shims. When viewed from the input gearshaft, the gearshaft rotates counterclockwise. The output shouldered shaft rotates clockwise and has left-hand threads at the lower end which act as an oil pump. Oil is forced down the outside of the shaft, through the threads and up the center of the shaft to the spindle assembly. A hollow pin in the shaft allows oil to spray against the gears. Some oil continues up the inside of the shaft to lubricate the upper bearings. Angle drive A has a plastic oil level indicator cover. Angle drive B has a visible liquid sight indicator glass.



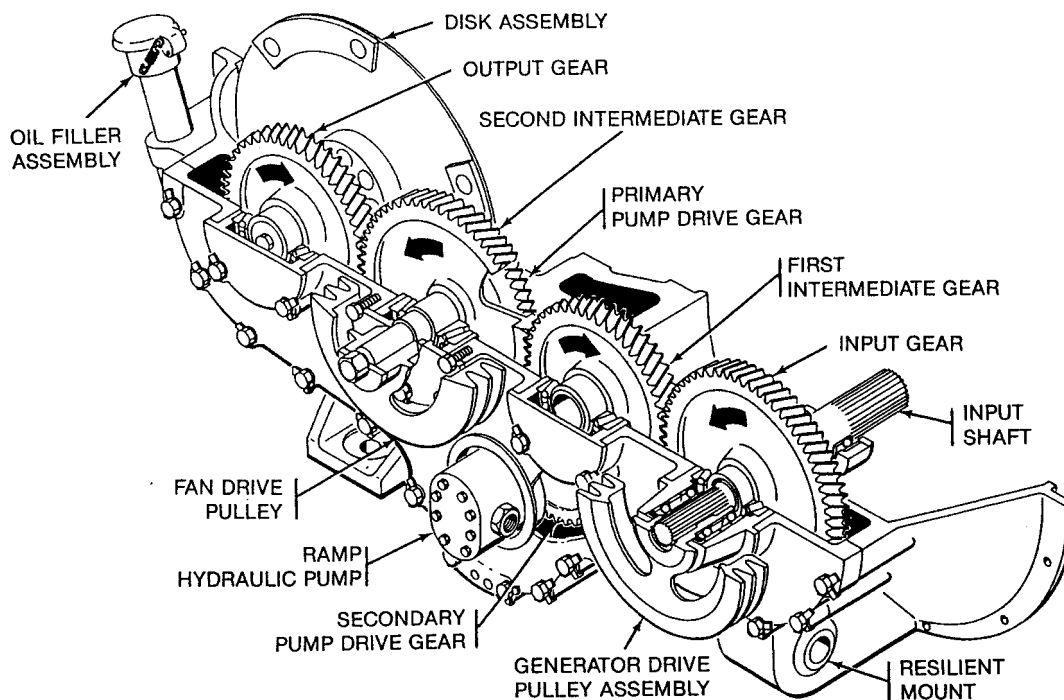
Cooling Fan Right Angle Drive

RIGHT ANGLE DRIVE C. Cooling fan right angle drive C consists of an input cartridge assembly and an output spindle assembly encased in an aluminum housing. When installed in a carrier, see Table 1-1, (WP 0001 00), the right angle drive receives torque through an input shouldered shaft and, by means of a 28-tooth spiral bevel gear in the cartridge assembly and a 21-tooth spiral bevel pinion gear in the spindle assembly, drives a cooling fan mounted on the shaft and bearing assembly. The bevel gear and bevel pinion gear are a matched set. This gear arrangement allows higher fan speed than angle drives A and B, with more cooling air flow. Like angle drives A and B, the shaft and bearing assembly act as an oil pump to lubricate the gears and bearings. When viewed from the input shaft, the shouldered shaft and bevel gear rotates clockwise, and the fan shaft and bearing and pinion gear rotates clockwise. The gears and bearings are adjusted by inserting or removing laminated shims. Angle drive C has a glass oil level sight indicator like right angle drive B.

TRANSFER GEARCASES

TRANSFER GEARCASE TORQUE PATH. The transfer gearcase delivers variable torque, generated at the input shaft by the engine and transferred through a series of four helically meshed gears, to the output gear and disk assembly. Any gear (input, first intermediate, second intermediate, or output gear) may drive an externally mounted power takeoff (pulley) assembly. Two additional gears (primary and secondary pump-drive gears) are coupled in series with the second intermediate gear to provide torque to externally mounted oil and hydraulic pumps.

GEAR ROTATIONS. Torque applied to the input shaft causes the shaft and input gear to rotate in a counterclockwise direction. The first intermediate gear rotates clockwise; the second intermediate gear and primary pump-drive gear rotate counterclockwise; and the output gear, output disk assembly, and secondary pump-drive gear rotate clockwise.



Typical Transfer Gearcase Torque Path

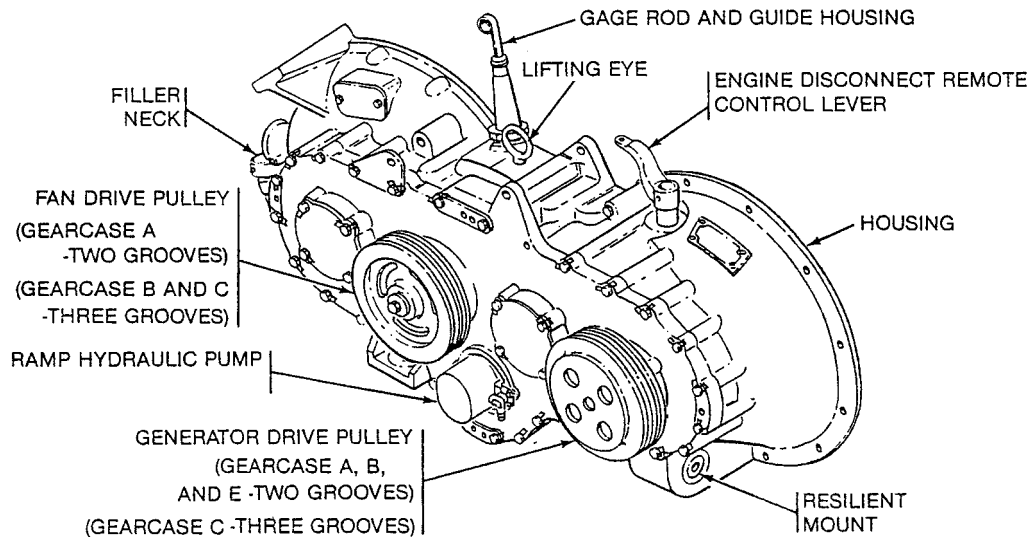
REMOTE CONTROL DISCONNECT LEVER. A manually operated remote control engine disconnect lever disengages the input shaft from the gear train to stop torque flow through the transfer gearcase. This enables the engine to operate with very little load for easier cold weather starting.

HOUSING AND COVER. The housing and cover of the transfer gearcases are made of aluminum and machined as a unit. They must be replaced as a matched pair.

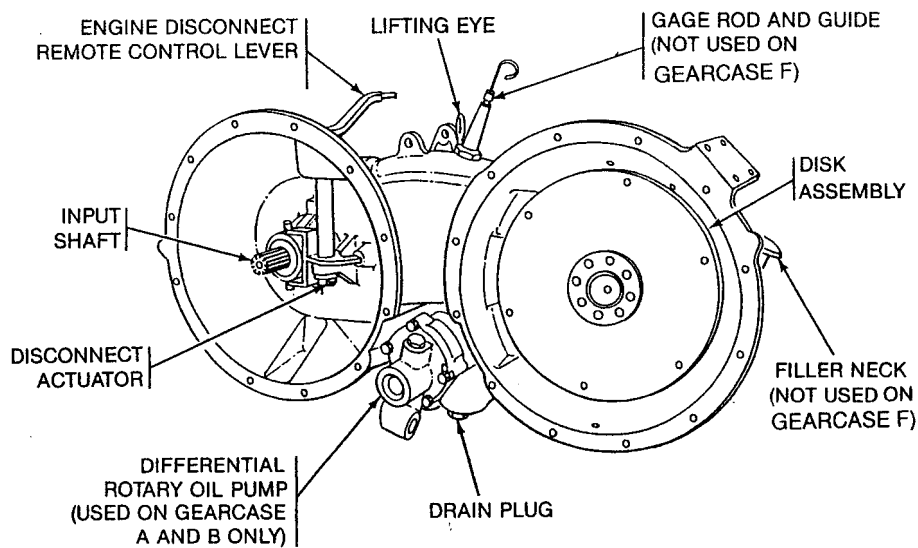
EQUIPMENT DESCRIPTION AND DATA — Continued

0002 00

CONFIGURATIONS. The transfer gearcases are similar to each other, differing where the input shaft engages the input gear and the manner in which the engine disconnect remote control lever operates. Other differences are the type and location of externally mounted power takeoff (pulley) assemblies, the installation of externally mounted pumps, and installation of a drive adapter. For specific differences between gearcases, see the following paragraphs.



Transfer Gearcases A through C, and E – Rear View

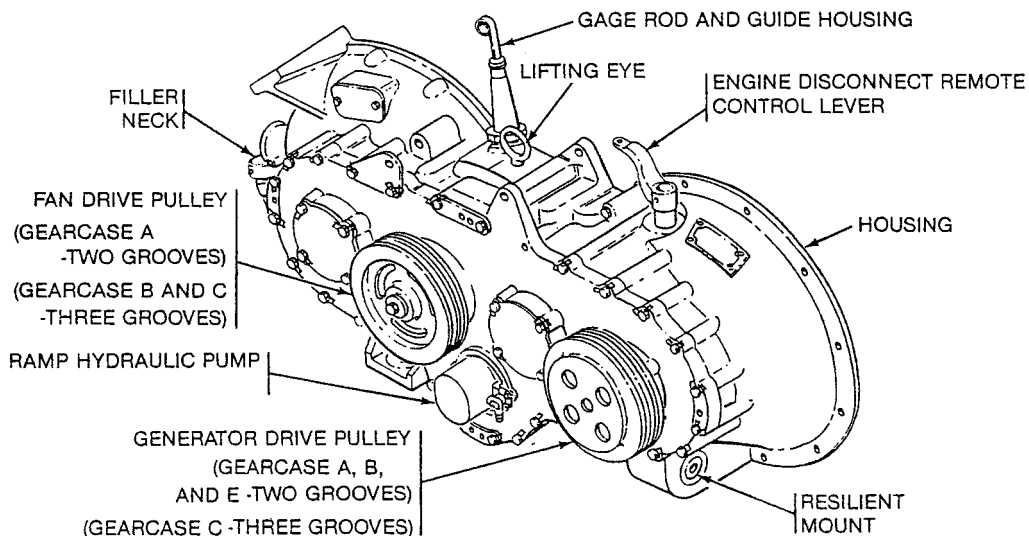


Transfer Gearcases A through F – Front View

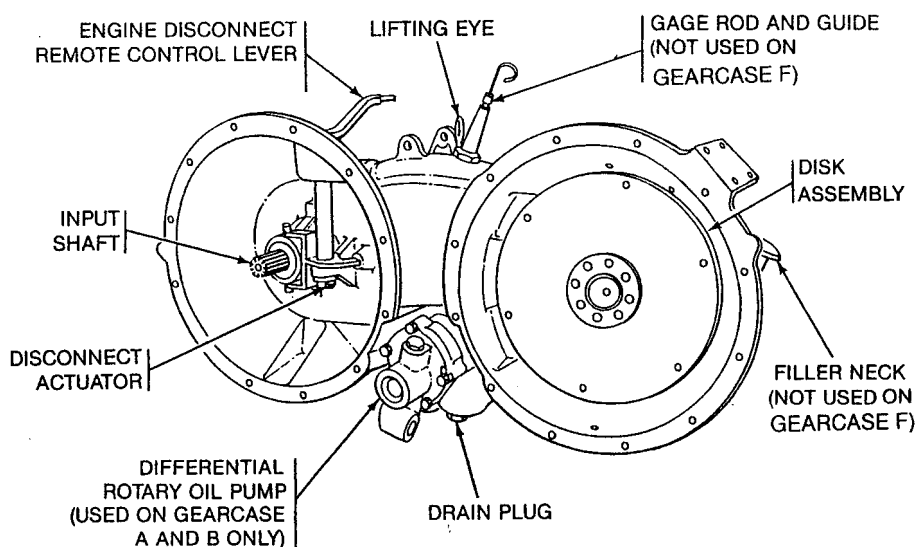
EQUIPMENT DESCRIPTION AND DATA — Continued

0002 00

TRANSFER GEARCASE A. Like gearcases B and C, transfer gearcase A is converted from service spare transfer gearcase E. Gearcase A is used on the M113A1 Family of Vehicles (FOVs). The gearcase has two two-grooved pulleys (one installed on the input shaft and the other on the hub of the second intermediate gear), a manual engine disconnect remote control lever, an oil filler assembly, an oil level gauge rod and guide, a differential oil pump, and a ramp hydraulic pump. The two pumps are driven internally by the secondary pump-drive gear. The gearcase is filled with oil through a filler assembly and is drained through a hole at the bottom of the housing. The output gear ratio is 1.268:1, and the maximum input speed is 2800 rpm. When the manually operated engine disconnect remote control lever is actuated, the splined input shaft mounted on the roller bearings and supported by the input gear, is disengaged from the input gear and the gear train but remains engaged with the power source (engine) to provide a couple between the engine and drive pulley.



Transfer Gearcases A through C, and E – Rear View

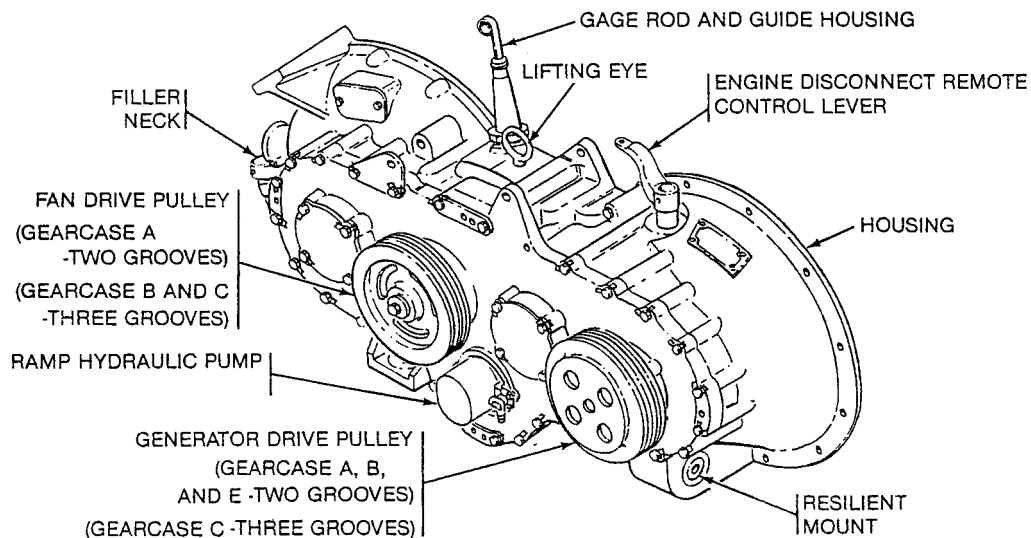


Transfer Gearcases A through F – Front View

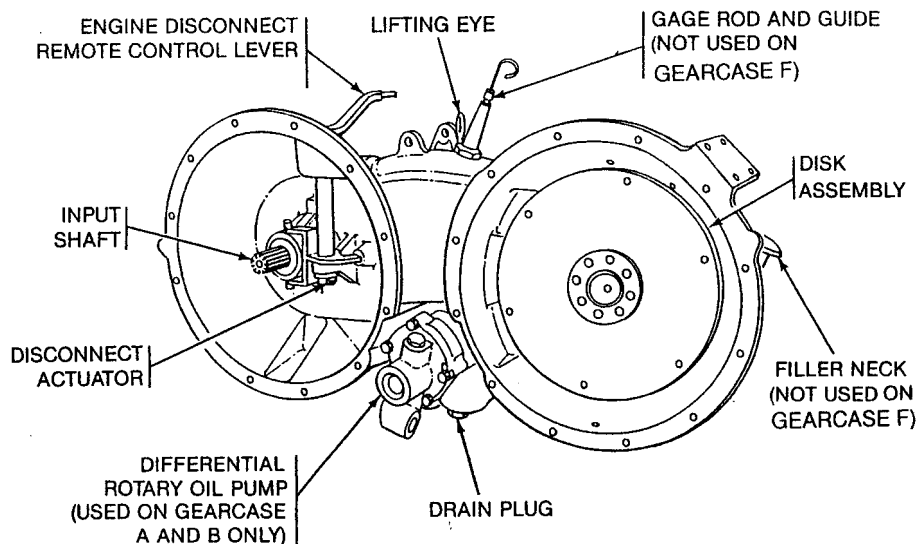
EQUIPMENT DESCRIPTION AND DATA — Continued

0002 00

TRANSFER GEARCASE B AND C. Transfer gearcases B and C are used on the M113A2 FOVs. They are identical to gearcase A except the pulleys on the hubs of the second intermediate gears has three grooves and both have a different type of manual actuating engine disconnect remote control lever. Gearcase B has a two-groove pulley installed on the input shaft for carriers with 100 ampere generators. Gearcase C has a three-groove pulley installed on the input shaft for carriers with 200 ampere generators.



Transfer Gearcases A through C, and E – Rear View



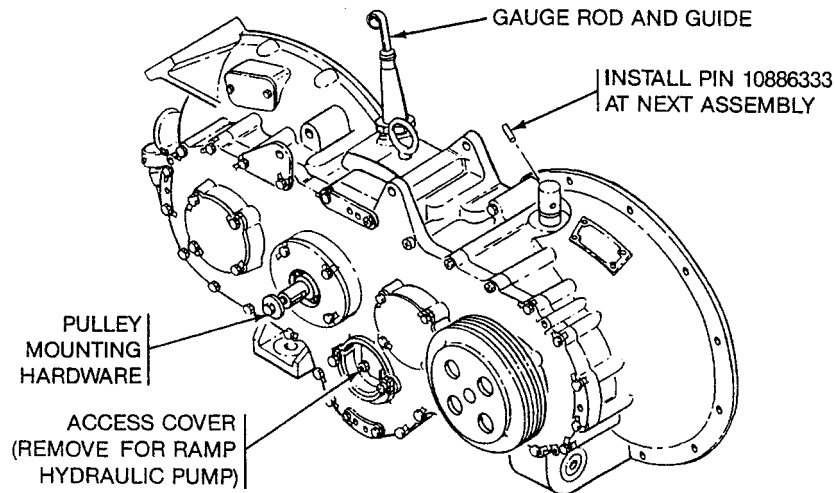
Transfer Gearcases A through F – Front View

TRANSFER GEARCASE E. Transfer gearcase E is used as the service spare transfer gearcase for gearcases A through C. This gearcase has one two-grooved pulley mounted on the input shaft. Mounting hardware is provided for a pulley on the second intermediate gear and for a manual engine disconnect remote control lever. A dummy shaft replaces the differential oil pump. In place of the ramp hydraulic pump there is an access cover plate.

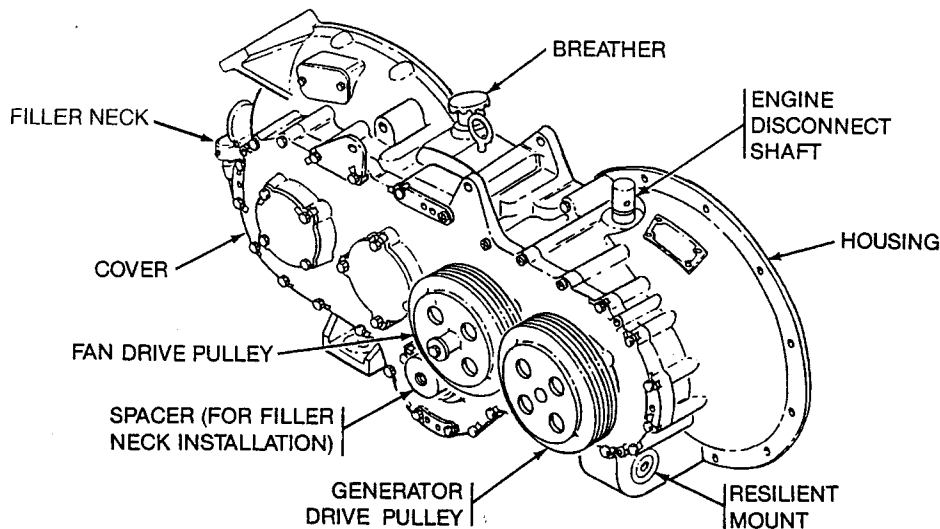
EQUIPMENT DESCRIPTION AND DATA — Continued

0002 00

TRANSFER GEARCASE F. Transfer gearcase F is used on the M548A1 carrier. There is no engine disconnect remote control lever. In place of a hydraulic pump there is a spacer and instead of an oil level gauge rod and guide, there is a breather. Unlike gearcases A through C and E, the two-groove pulley is mounted on the hub of the first intermediate gear, not the second.



Transfer Gearcase E Service Spare for Gearcases A through C – Rear View

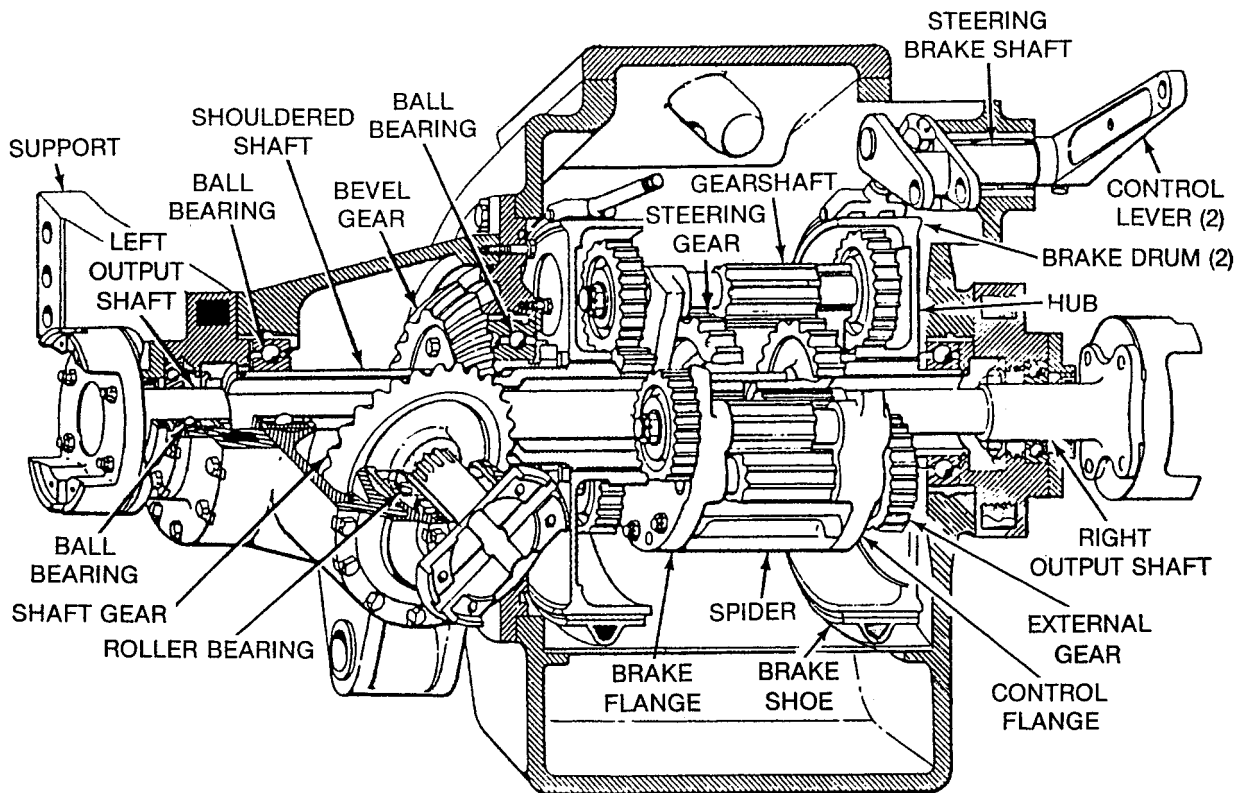


Transfer Gearcase F – Rear View

STEERING CONTROL DIFFERENTIAL

GENERAL. The steering control differential steers the carrier by means of internal brakes which control gear trains to provide rotational velocity differences between output shafts. A thorough understanding of the construction and function of each assembly as described below is essential for proper maintenance of the differential.

DIFFERENTIAL RIGHT ANGLE GEARBOX. A splined propeller shaft couples the right angle gearbox, through a universal joint, to the carrier transmission output shaft. The splined shaft drives a matched spiral bevel gear set consisting of an input shaft gear and an output bevel gear bolted to a shouldered shaft. The input shaft gear is mounted in roller bearings, and the output bevel gear is mounted in ball bearings. The gears and bearings are adjusted by inserting or removing laminated shims.



Steering Control Differential – Cutaway View

STEERING UNIT ASSEMBLY. The steering unit assembly consists of two planetary gear trains, a common carrier, and two brake drums. Brake drum and control flange assemblies are rigidly coupled by a differential spider to form the carrier. Each of the two gear trains consists of a brake drum hub with integral gear, three external spur gears, three spur gearshafts, and steering spur gear. The external gears are fixed to their respective gearshafts and mesh with the integral hub which is bolted to the hub brake drum, and the gearshafts mesh with the steering gear. The gearshafts of both gear trains are positioned in groups of three, with the opposite gearshafts of each group meshing. The brake drums provide differential control.

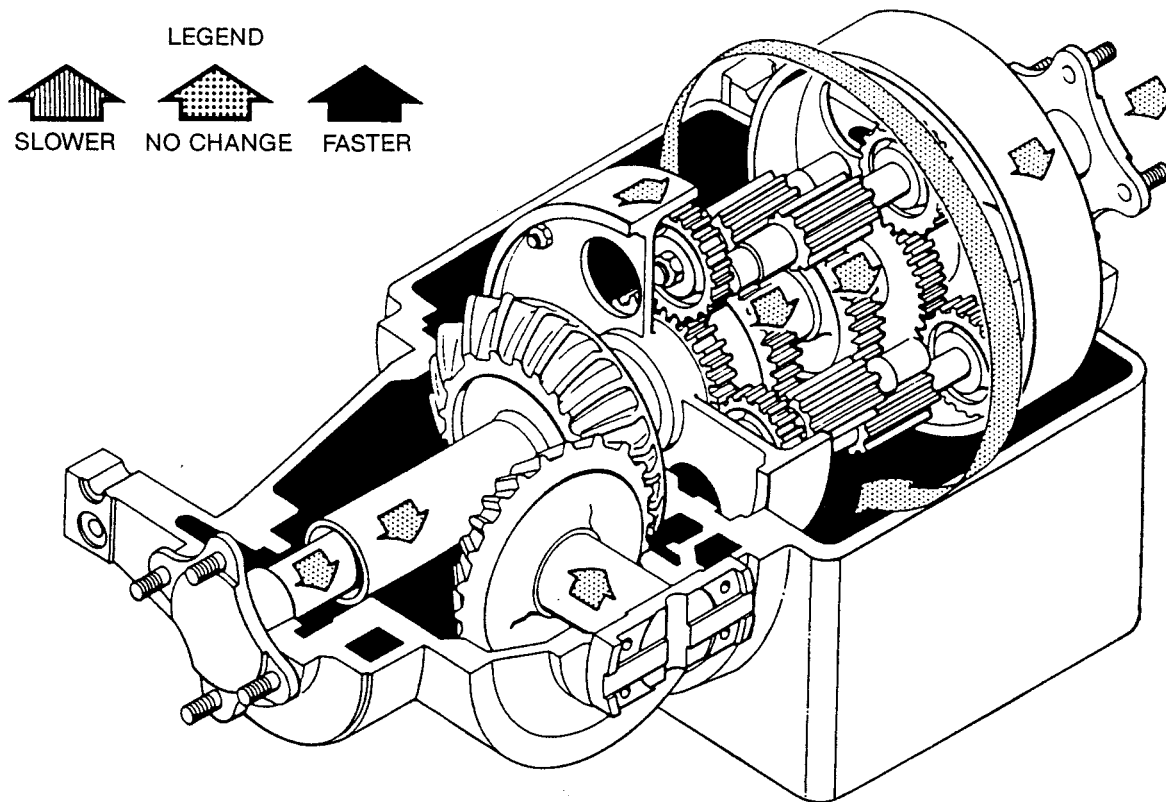
BRAKE SHOE ASSEMBLY. Each brake shoe assembly consists of three brake shoes with replaceable brake friction linings. Each set of brake shoes is held together by pins. They are of the contracting type arranged around the outside of the brake drums. When the right or left brake control lever is pulled, the torque action of the steering brake shaft contracts the diameter of the corresponding set of brake shoes and slows the rotation of that brake drum. When the brake control lever is released, a spring enlarges the diameter of the set of brake shoes allowing the brake drum to increase speed.

OUTPUT SHAFT ASSEMBLY. The splines of the left or right output shaft mate with a left or right steering gear of the steering unit assembly. Each shaft is ball bearing mounted, with bearings pressed on the shaft. The left output support is fixed to the right angle gearbox. The right output support is fixed to the differential housing.

OPERATION

GENERAL. Understanding the movement of parts in relation the movement of the carrier is important for proper maintenance of the differential. Each steering function, in relation to the operation of parts when the carrier is moving ahead, is described below. When the carrier is in reverse, all parts rotate in the opposite direction.

CARRIER MOVING STRAIGHT AHEAD. The right angle gearbox receives torque into the differential, changes torque direction 90°, and transmits the torque to the left flange of the steering unit assembly. When the carrier is moving straight ahead, the steering unit assembly revolves as a unit about a central axis. The output shafts and brake drums revolve at the same velocity as the steering unit, with no change in gear rotation, and the external spur gears and gearshafts do not revolve on their own axis.



Steering Control Differential Straight Forward Torque Path