TM 9-2520-232-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORDNANCE FIELD AND DEPOT MAINTENANCE

TRANSMISSION, MECHANICAL

ASSEMBLY (2520-627-8308)

(NEW PROCESS MODEL NO. 420)

END ITEM APPLICATION:
3/4 TON 4 X 4 CHASSIS M56, M56B1
AND M56C; 3/4 -TON 4 X 4 TRUCKS M37
M37B1, M43, M43B1, M152 AND M201.
TM 9-8030

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1959

TECHNICAL MANUAL
No. 9-2520-232-35

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *13 July 1959*

TRANSMISSION, MECHANICAL ASSEMBLY (2520-627-8308) (NEW PROCESS MODEL NO. 420)

CHAPTER 1

INTRODUCTION

1. Scope

a. This manual contains instructions for field and depot maintenance of the mechanical transmission assembly 2520–627–8308 (New Process model No. 420). It contains descriptions of, and procedures for disassembly, inspection, repair, rebuild, and assembly of the transmission.

b. Appendix I contains a list of current references, including supply manuals, forms, technical manuals, and other available publications applicable to the transmission.

c. This first edition is being published in advance of complete technical review. Any errors or omissions will be recorded on DA Form 468, Unsatisfactory Equipment Report, and forwarded to the Commanding Officer, Raritan Arsenal, Metuchen, N. J., ATTN: ORDJR-CPRA.

2. Field and Depot Maintenance Allocation

Refer to Maintenance Allocation Chart in C 3, TM 9–8030.

3. Forms, Records, and Reports

Refer to TM 9–8030. Additional forms are listed in appendix I.

CHAPTER 2

PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR FIELD AND DEPOT MAINTENANCE

4. General

Tools, equipment, and maintenance parts over and above those available to the using organization are supplied to ordnance field maintenance units and depot shops for maintaining, repairing, and/or rebuilding the materiel.

5. Parts

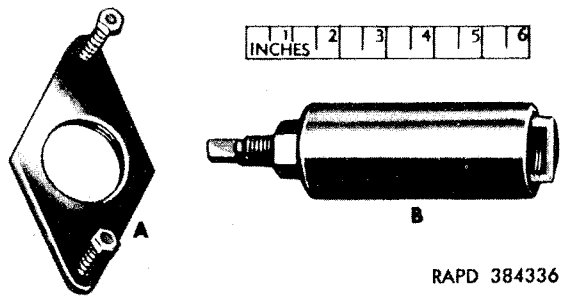
Maintenance parts are listed in Department of the Army Supply Manual ORD 8 SNL G–741, which is the authority for requisitioning replacements. Parts not listed in the ORD 8 supply manual, but required by depot shops in rebuild operations may be requisitioned from the listing in the corresponding ORD 9 supply manual and will be supplied if available. Requisitions for ORD 9 parts will contain a complete justification of requirements.

6. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are listed in ORD 6 SNL J–8, Sections 7 and 13 ORD 6 SNL J–9, Sections 1, 2, 6, 8, and 9; and ORD 6 SNL J–10, Sections 4, 7, and 15; and are authorized for issue by TA and TOE.

7. Special Tools and Equipment

The special tools (fig. 1), tabulated in table I, are listed in Department of the Army Supply Manual ORD 6 SNL J–16, Section 15. This tabulation contains only those special tools and equipment necessary to perform the operations described in this manual, is included for information only, and is not to be used for requisitions.



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Item	*Federal stock No.*	*Ordnance stock No.*	*Ord part No.*
A.—Puller	5120–795–0048	41–P–2956–30	B7950048
B.—Puller	5120–473–7254	41–P–2956–50	B62966132

Figure 1. Special tools.

Table I. Special Tools and Equipment for Field and Depot Maintenance.

Item	Identifying No.	References		Use
		Fig.	Par.	
PULLER	41–P–2956–30	7	17	Main drive gear bearing removal.
PULLER	41–P–2956–50	12	19	Reverse idler gear shaft removal.

CHAPTER 3

TROUBLESHOOTING

Note. Information in this chapter is for use of ordnance maintenance personnel in conjunction with, and as a supplement to, the troubleshooting section in TM 9-8030. It provides continuation of instructions where a remedy in the operation technical manual refers to ordnance maintenance personnel for corrective action.

8. Purpose

Operation of a deadlined vehicle without a preliminary examination can cause further damage to a disabled component and possible injury to personnel. By careful inspection and troubleshooting, such damage and injury can be avoided and, in addition, the causes of faulty operation of a vehicle or component can often be determined without extensive disassembly.

9. General Instructions and Procedures

This chapter contains inspection and troubleshooting procedures to be performed after a disabled component has been removed from the vehicle.

a. The troubleshooting performed while the component is mounted in the vehicle is that which is beyond the normal scope of the using organization. Check the troubleshooting section in the pertinent operation technical manual, then proceed as outlined in this chapter.

b. Inspection after the component is removed from the vehicle is performed to verify the diagnosis made when the component was in the vehicle, to uncover further defects, or to determine malfunctions if the component alone is received by the Ordnance establishment. This inspection is particularly important in the last case, because it is often the only means of determining the malfunction without completely disassembling the component.

10. Troubleshooting Procedures

a. An improperly functioning or damaged transmission is usually apparent, and troubleshooting, as it pertains to transmission, is seldom required. The most satisfactory and approved procedure for determining the source or cause of transmission troubles or failures is to examine the component under shop conditions after its removal from the vehicle. Such inspection is performed to verify the diagnosis made when the component was in the vehicle, to uncover further defects, or to determine faults if the component alone is received by the Ordnance establishment.

b. Abusive operation or manipulation and faulty maintenance have been found to be the two greatest single causes of transmission troubles or failures.

(1) *Abusive operation includes:*

(*a*) Careless or poorly timed shifting.

(*b*) Coasting, either with the clutch disengaged or with the shift lever in the neutral position.

(*c*) Overloading the vehicle.

(*d*) Lugging the engine.

(*e*) Shock loading.

(*f*) Riding clutch pedal.

(2) *Faulty maintenance includes:*

(*a*) Failure to change the lubricant at the required intervals.

(*b*) Allowing the lubricant level to fall too low before replenishing.

(*c*) Filling the transmission case to excess with lubricant.

(*d*) Towing vehicle with propeller shaft connected.

c. Most transmission troubles or failures can be traced to one or another of these causes (*b* above), generally to one of those listed under "abusive operation."

Table II. Troubleshooting

Malfunction	Probable causes	Corrective action
Hard shifting	Shift rails tight or seized in cover openings.	Determine if shift rails are scored or sprung out of alinement. Replace damaged parts (par. 34 *c–e*). If rails are in good condition but tight in cover openings, dress down with crocus cloth to obtain free sliding action.
	Shift rails excessively worn.	Check rails and cover openings for excessive wear. Replace worn parts (par. 34 *c–e*).
	Shift forks worn or bent.	Check forks for wear and misalinement. Replace as necessary (par. 34 *c–e*).
	Clutch operating improperly.	Check operation of clutch and correct as necessary. Refer to TM 9–8030.
	Gears too tight on main shaft splines or splines damaged.	Check for free movement of gears on shaft. If gears are tight on shaft, dress down splines with crocus cloth. If this does not free the gears, replace one or all parts as necessary to obtain the desired results (par. 33*b* and *c*). Check splines for scores or burs. Remove imperfections with file and crocus cloth or replace parts as necessary.
Gears clash	Synchronizer assembly not functioning properly.	Check outer and inner stop rings for wear and/or misalinement. Replace worn or damaged parts (par. 40*b*).
	Worn gear teeth or bearings.	Look for worn or damaged gear teeth. Also, check ball and roller bearings for wear or damage. Replace worn or damaged parts as necessary (pars. 32, 33, 38, and 39).
	Clutch operating improperly.	Check operation of clutch and correct as necessary. Refer to TM 9–8030.
Transmission noisy.	Worn or damaged bearings.	Examine ball and roller bearings for wear, roughness, or other damage. Also, check bushing in reverse idler gear for wear. Replace worn or damaged parts (pars. 32, 33, 38, and 39).
	Worn or damaged gears.	Look for worn or broken gear teeth. Also, check fit of gears on main shaft. Replace worn or damaged parts (pars. 32, 33, 38, and 39).
	Clutch operating improperly.	Check operation of clutch and correct as necessary. Refer to TM 9–8030.
	Insufficient or incorrect grade of lubricant.	Check lubricant level and grade and replenish or drain and refill transmission as required (pars. 15 and 47).
Transmission slips out of gear.	Broken or weak shift rail poppet ball springs.	Check springs with specifications par. 30). Replace weak or

Table II—Continued on page 6

Table II—Continued from page 5

Malfunction	Probable causes	Corrective action
		broken springs (par. 34 *c* through *e*).
	Worn shift rail ball grooves.	Examine shift rails to determine if ball grooves are worn. Replace worn shift rails (par. 34 *c–e*).
	Gears not fully in mesh as result of incorrect shifting, or an internal defect.	To check for internal defects, all gears, shafts, and shifting parts must be examined for wear, breakage, and misalinement. Replace worn or damaged parts.
	Worn or damaged main shaft splines.	Check main shaft splines for wear or damage and replace shaft if necessary (par. 33).
	Worn or tapered gear teeth.	Examine all gear teeth for wear and taper. Replace worn gears (pars. 32, 33, 38, nad 39).
	Excessive side play of third speed gear.	Check gear for side play and replace worn gears or clutch gear snap ring as necessary (par. 33 *b* (4)).
Transmission sticks in gear.	Clutch operating improperly.	Check operation of clutch and correct as necessary. Refer to TM 9–8030.
	Insufficient chamfer on shift rail ball grooves.	Examine grooves and compare chamfer with shift rail known to be in good condition. Replace rails if found to be at fault (par. 34 *c–e*).
	Gears tight on main shaft.	Check for free movement of gears on shaft. If gears are tight

Table II—Continued

Malfunction	Probable causes	Corrective action
		on shaft, dress down splines with crocus cloth. If this does not free the gears, replace one or all parts as necessary to obtain the desired results (par. 33).
Loss of lubricant.	Lubricant level too high.	Check lubricant level and adjust to proper level. Refer to TM 9–840.
	Damaged or incorrectly installed gaskets or oil seal.	Use new gaskets and oil seal when assembling transmission. Make sure oil holes in gaskets for main shaft and main drive gear bearing retainers are alined with corresponding holes in transmission case. Prepare oil seal for installation as explained in paragraph 44*a*.
	Cracked or broken transmission case.	Determine if case is cracked or broken. Replace damaged case.
	Loose power-take-off covers or bearing retainers.	Use new gaskets and tighten retaining screws securely (par. 36).
	Loose drain plug.	Tighten plug securely (par. 37).
	Use of excessively foaming lubricant.	Check lubricant level and grade and drain and refill if necessary. Refer to TM 9–840.
	Overheating	Check for tightness or binding of transmission parts and/or lubricant level and grade of lubricant. Also check engine for overheating. Service component units as necessary.

CHAPTER 4

NEW PROCESS MODEL 420 TRANSMISSION

Section I. DESCRIPTION AND DATA

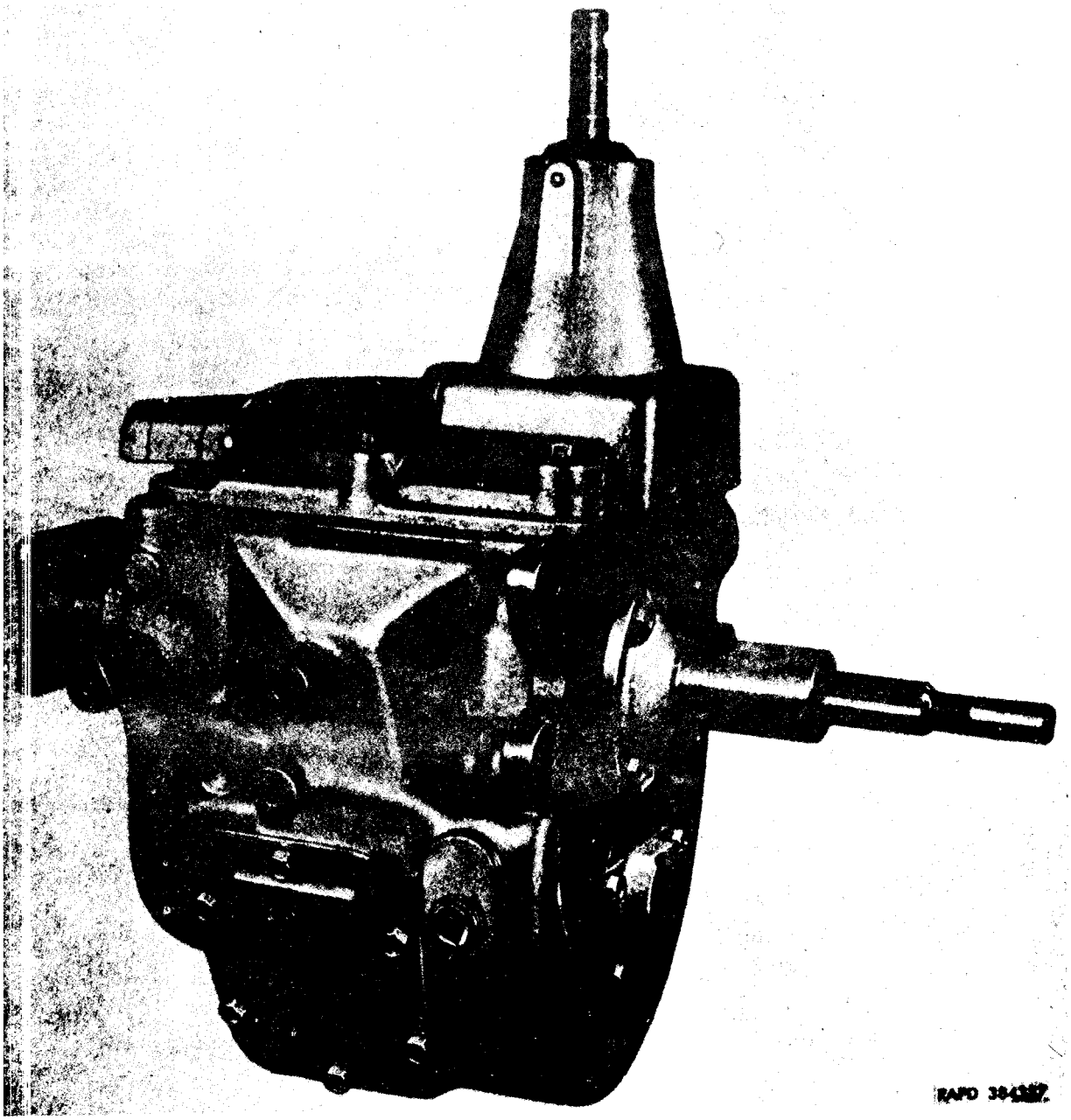


Figure 2. Transmission assembly—right—front view.

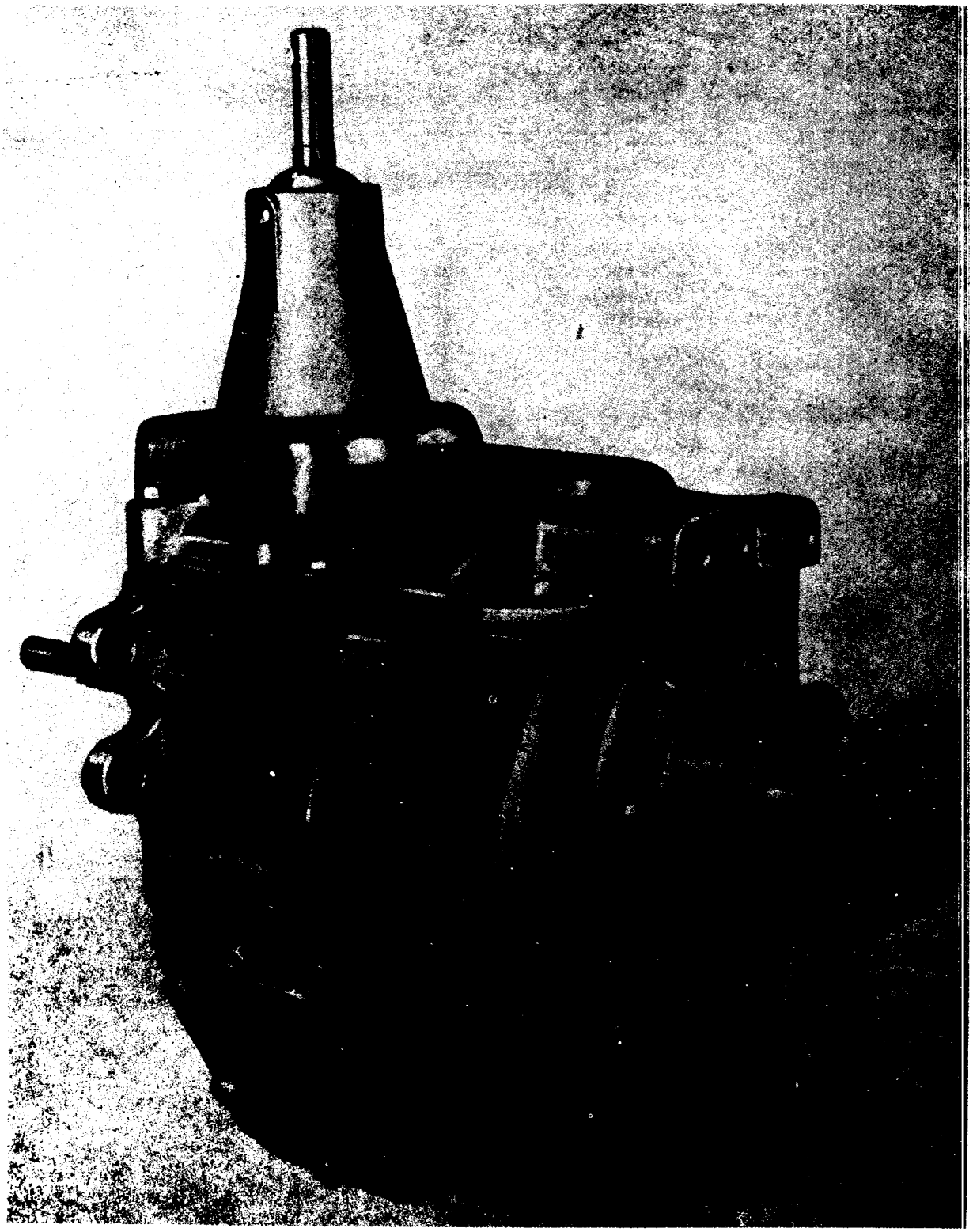


Figure 3. Transmission assembly—left—rear view.

11. Description

The transmission assembly (figs. 2 and 3) has four forward speeds and one reverse. It is designed so that the reverse idler gear is in mesh when the transmission is shifted into first speed or reverse; however, the reverse idler gear is under load only in reverse. The main drive gear, the main shaft, and the countershaft are all mounted on antifriction ball or roller bearings. Helical gears are provided for third and second speeds with straight spur gears for first speed and reverse. Synchronizers are provided for third and fourth speeds to facilitate gear shifting.

12. Data

Federal stock number	2520–627–8308
Make	New Process
Model	420
Type	helical gear—synchroshift
Number of forward speeds	4
Number of reverse speeds	1
Bearings:	
Countershaft:	
Front	ball (M.R. 207 Mfg)
Rear	straight roller (Torrington M–28161)
Main drive gear	ball (M.R. 209 Mfg)
Main shaft:	
Rear	ball (M.R. 207 Mfg)
Pilot	cageless roller
Reverse idler gear	bronze bushing
Gear ratios:	
Fourth speed	1.00 : 1.00
Third speed	1.69 : 1.00
Second speed	3.10 : 1.00
First speed	6.68 : 1.00
Reverse	8.25 : 1.00
Lubricant capacity	5.5 pts
Weight (without lubricant)	approx 125 lb

Section II. DISASSEMBLY OF TRANSMISSION INTO SUBASSEMBLIES

13. General

The transmission assembly is divided into six subassemblies consisting of the cover assembly, the main drive gear assembly, the main shaft assembly, the reverse idler gear and bushing assembly, the countershaft, and the transmission case. The following procedures are based on the assumption that the transmission assembly is removed from the vehicle.

14. Procedure

The disassembly of the transmission is accomplished in two successive steps; first, disassembly into subassemblies; second, disassembly of the subassemblies. Use a separate container for the part of each subassembly of the transmission. This procedure will facilitate the subsequent cleaning, inspection, and repair operations.

Note. For convenience in working on the transmission mount in a repair stand. If no repair stand is available, use a clean work bench.

15. Draining and Cleaning

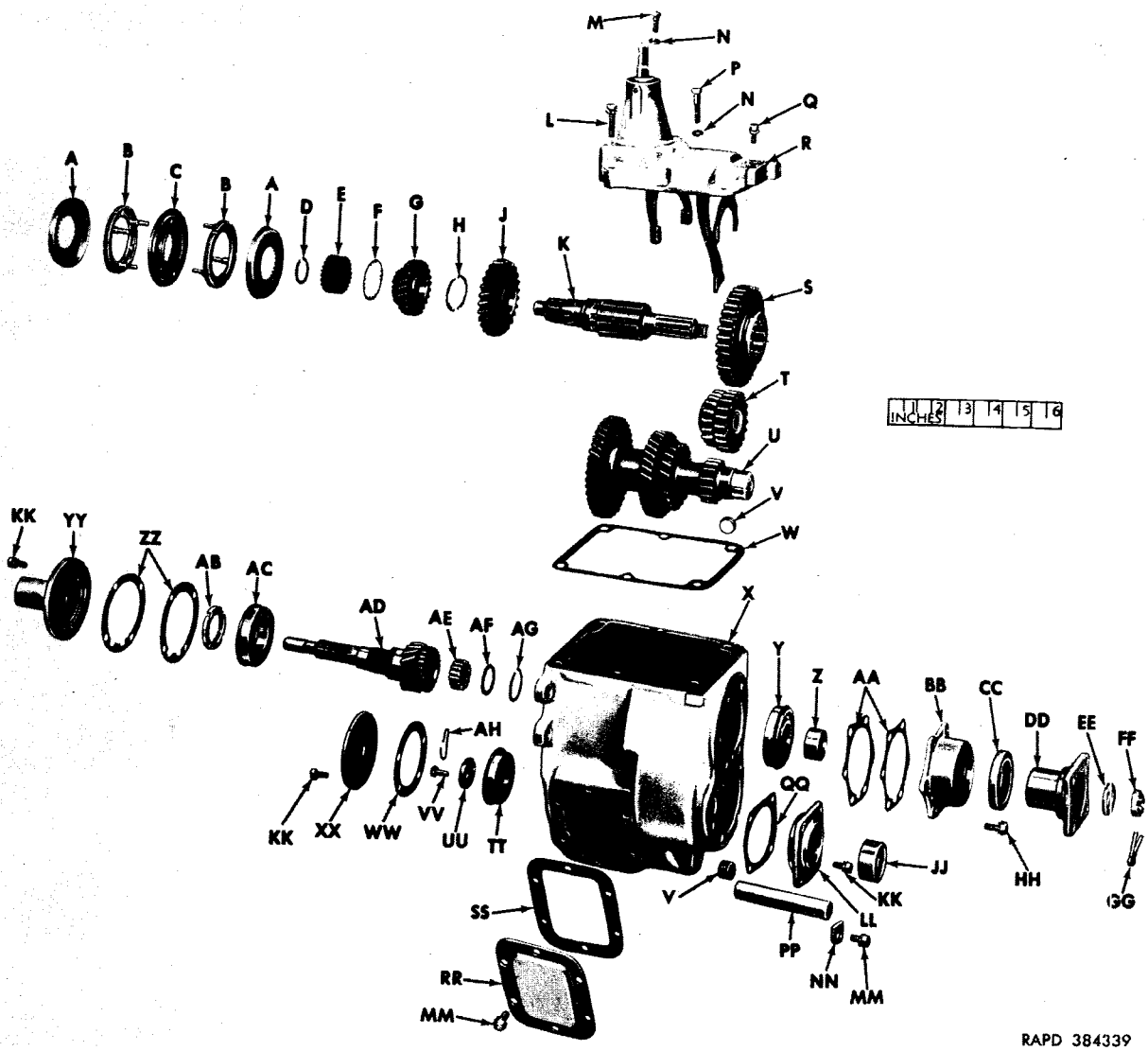
Note. The key letters shown below in parentheses refer to figure 4, except where otherwise indicated.

a Draining. Remove the countersunk headless drain plug (V) at the rear near the bottom of the case (X), using a ½-inch socket wrench extension and drain the lubricant.

b. Cleaning Transmission Assembly Prior to Disassembly.

(1) Scrape or wire-brush all accumulations of dirt or road mud from the transmission case and attached parts. Note and mark, by scratching the case with a sharp-pointed tool, any moist oil spots or unusually heavy accumulations of oil-soaked road mud, for they are good clues to the location of small cracks or holes which might escape notice in a visual inspection. Do not, however, confuse these accumulations with those that result from leaking gaskets or oil seals. A slight leak at a seal or a gasket is normal on a transmission which has been in service for any length of time, and the area covered is generally localized around the shaft bores, power-takeoff openings, etc.

(2) After marking any questionable areas for later and more thorough inspection, complete the external cleaning operation with steam cleaning equipment and by hand-brushing the case, using drycleaning solvent or mineral spirits paint thinner. The use of stronger cleaning agents, such as caustic sodas or detergents, is pro-



A—Synchronizer outer stop ring CC–1669893
B—Synchronizer stop ring and pin assembly CC–1669891
C—Synchronizer sliding clutch CC–1664334
D—Synchronizer snap ring:
0.086–0.088-inch thick 7057622
0.089–0.091-inch thick 7057623
0.092–0.094-inch thick 7057624
0.095–0.097-inch thick 7057625
E—Synchronizer clutch gear CC–1664335
F—Third speed gear shim:
0.009–0.011 inch thick 7057627
0.014–0.016 inch thick 7057628
G—Third speed gear 7057631
H—Second speed gear snap ring 7057633
J—Second speed gear 7057634
K—Main shaft 7057635
L—Screw and lockwasher long, ⅜–16NC X 1⅞ CC–272524 (2 reqd)
M—Screw—short CC–1664345
N—Lockwasher, 7/16 CC–110405
P—Screw—long CC–1664346
Q—Screw and lockwasher short, ⅜–16NC X ⅞ CC–423353 (2 reqd)
R—Case cover assembly 7057653
S—First and second speed sliding gear 7057632
T—Reverse idler gear and bushing assembly 7057621
Reverse idler gear CC–1664340
Reverse idler gear bushing CC–1664341
U—Countershaft 7057626
V—Plug ¾–14 std pipe thread NDPF 7374954
W—Case cover gasket 7373628
X—Case CC–1796969
Y—Main shaft rear bearing assembly 700909
Z—Main shaft rear bearing spacer CC–1269283
AA—Main shaft bearing retainer gasket 7373396 (2 reqd)
BB—Main shaft bearing retainer CC–1788587
CC—Main shaft oil seal assembly 500134
DD—Main shaft companion flange CC–1268312
EE—Companion flange washer CC–556940
FF—Companion flange retaining nut CC–562586
GG—Companion flange retaining nut cotter pin, ⅛ X 1¼ CC–103386
HH—Screw and lockwasher, 5/16 X 18NC X ⅞ CC–187824 (5 reqd)
JJ—Countershaft rear bearing 713818

Figure 4. Transmission assembly—exploded view.

KK—Screw and lockwasher, 5/16 X 18NC X 3/4 CC–423346 (12 reqd)
LL—Countershaft rear bearing retainer CC–1664338
MM—Screw and lockwasher, 3/8–16NC X 3/4 CC–423351 (13 reqd)
NN—Reverse idler gear shaft lock plate 7373620
PP—Reverse idler gear shaft 7373623
QQ—Countershaft rear bearing retainer gasket 7373618
RR—Power takeoff opening cover CC–556875 (2 reqd)
SS—Power takeoff cover gasket 5214787 (2 reqd)
TT—Countershaft front bearing assembly 700952
UU—Countershaft retainer washer 7373621
VV—Countershaft retainer washer screw CC–1794875 (2 reqd)
WW—Countershaft front bearing retainer gasket CC–1789629
XX—Countershaft front bearing retainer 7373616
YY—Main drive gear bearing retainer 7057659
ZZ—Main drive gear bearing retainer gasket 7373393 (2 reqd)
AB—Main drive gear bearing retainer nut 7057655
AC—Main drive gear bearing assembly 713442
AD—Main drive gear 7057654
AE—Main shaft pilot bearing roller CC–1664327 (14 reqd)
AF—Main shaft pilot bearing washer 7057630
AG—Main shaft pilot bearing snap ring CC–1664329
AH—Lock wire CC–522295

Figure 4—Continued.

hibited because of their injurious effect to bearings.

16. Remove Transmission Case Cover Assembly

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated. Observe the position of the transmission case cover retaining screws (L, M, P, and Q) while removing them, because of their various lengths and shapes. Also note that the two center screws (M and P) are pilot screws.

Remove the four retaining screws and lockwashers (L and Q), screws (M and P), and lockwashers (N). Then, lift the cover assembly (A, fig. 5) and gasket (B, fig. 5) from the transmission case (C, fig. 5).

17. Remove Main Drive Gear Assembly

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated.

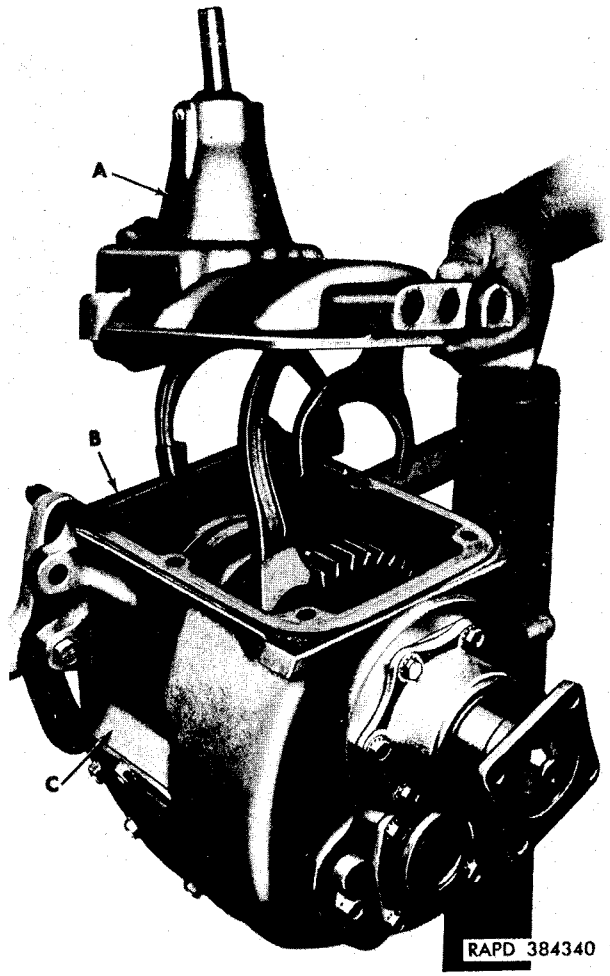
a. Remove Main Drive Gear Bearing Retainer. Remove the four retainer screws and lockwashers (KK) from the bearing retainer (YY). Remove the retainer and gaskets (ZZ).

b. Remove Main Drive Gear Bearing Retaining Nut.

(1) Engage the first and second speed sliding gear (S) with the reverse idler gear and bushing assembly (T) and engage the synchronizer sliding clutch (C) with both the drive gear (AD) and the clutch gear (E) to prevent the drive gear from turning.

(2) Remove the cotter pin (GG) and loosen the companion flange nut (FF) at the rear end of the main shaft (K) while the shafts are locked in position.

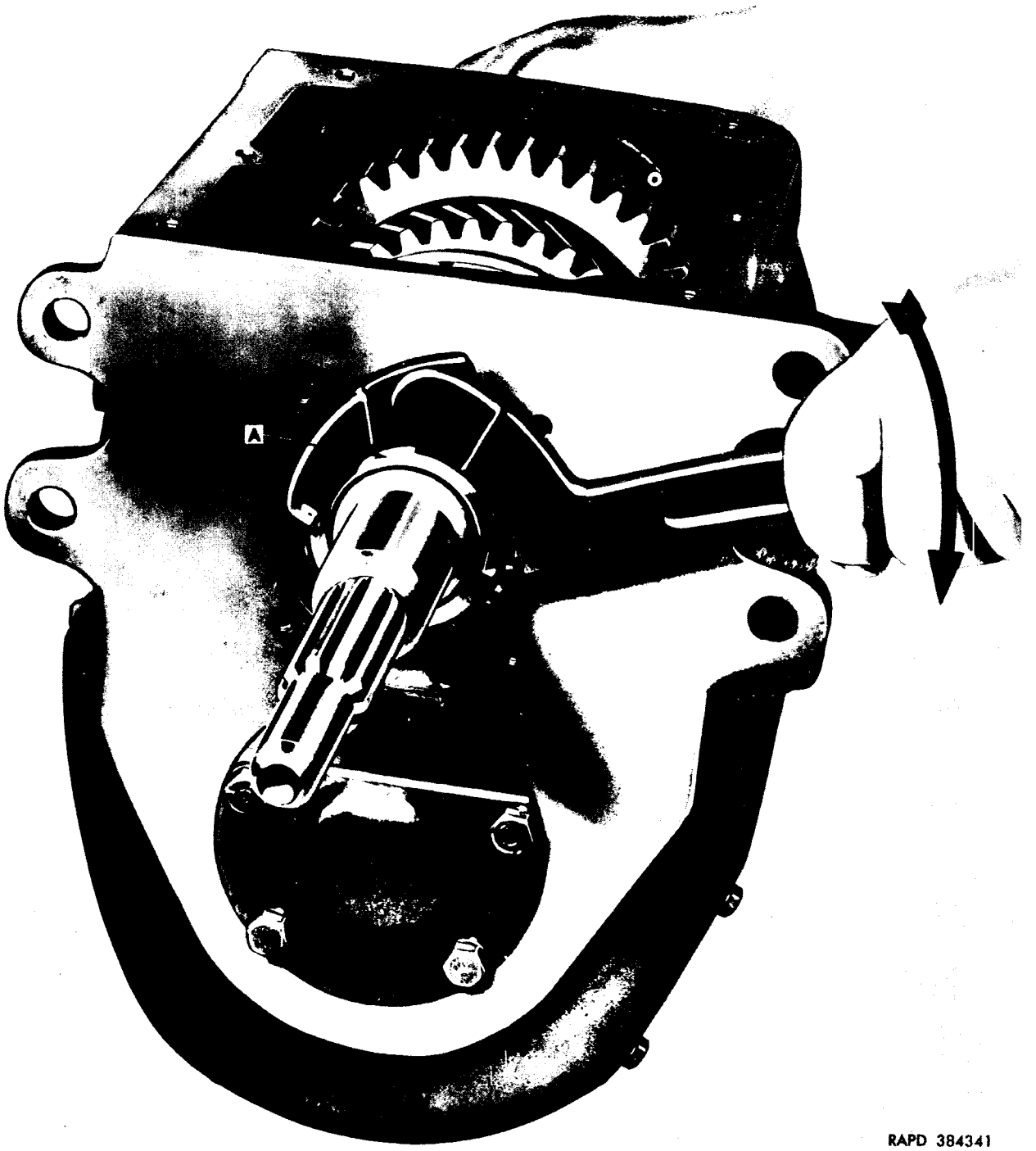
***Caution:* The drive gear bearing retaining nut (A, fig. 6) has left threads.**



A—Case cover assembly 7057653
B—Case cover gasket 7373628
C—Case CC–1796969

Figure 5. Removing transmission case cover assembly.

(3) Remove the drive gear bearing retaining nut (A, fig. 6) with a spanner wrench or a brass drift and hammer.



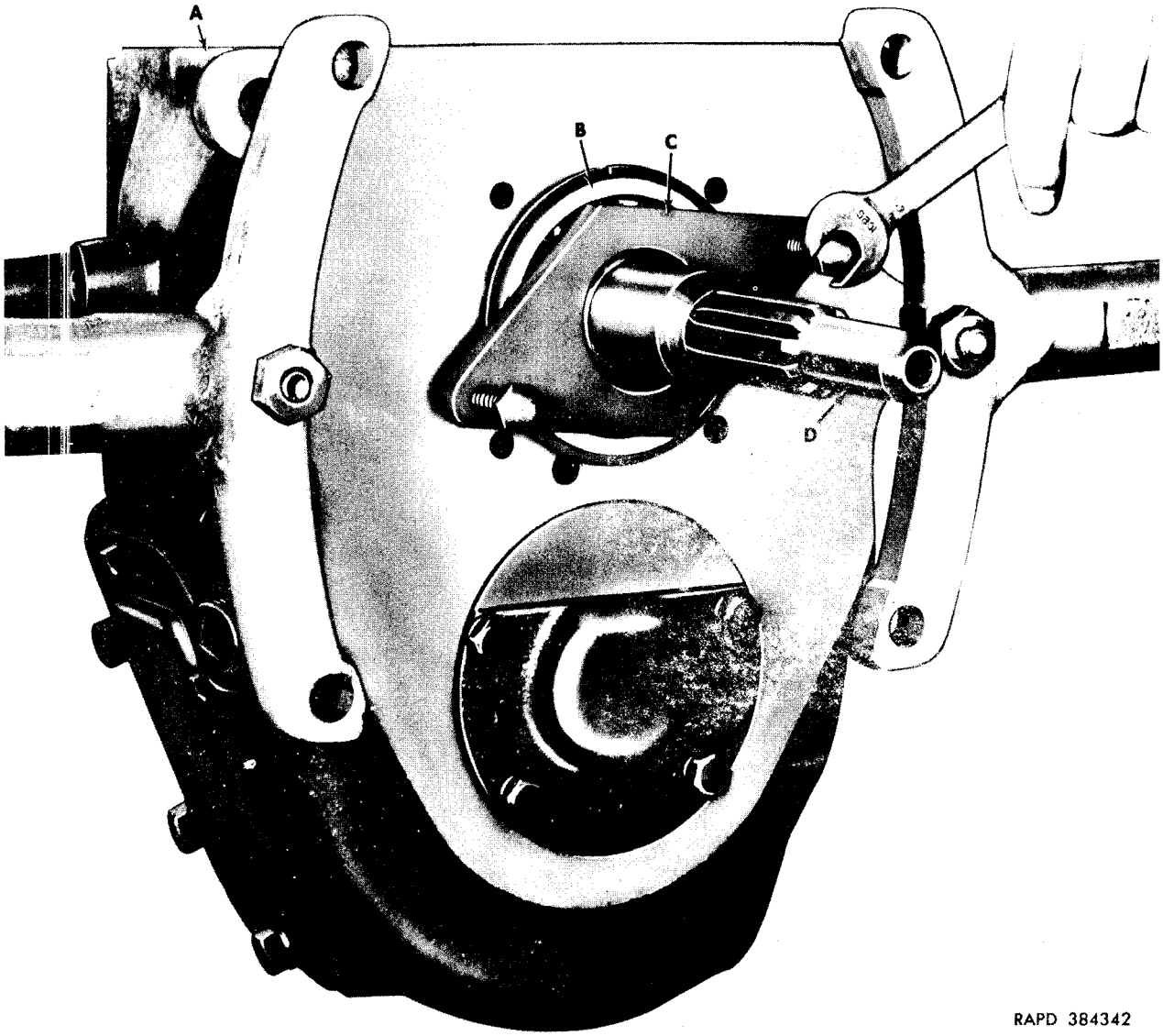
A—Bearing retaining nut 7057655

Figure 6. Removing main drive gear bearing retainer nut.

(4) Place the first and second speed sliding gear (S) and the synchronizer sliding clutch (C) in their neutral positions.

c. Remove Main Drive Gear Assembly.

Install puller 41–P–2956–30 (C, fig. 7) on the threaded portion of the drive gear (D, fig. 7). Then, position the drive gear (A, fig. 8) so that the gear teeth (B, fig. 8) of the clutch gear teeth will aline with the front gear on the countershaft (C, fig. 8). This is necessary to prevent interference between the gear teeth on the drive gear and those on the countershaft. Pull the drive gear (D, fig. 7) and bearing (B, fig. 7) from the transmission case (A, fig. 7) by tightening the two puller screws. Remove the puller from the shaft.



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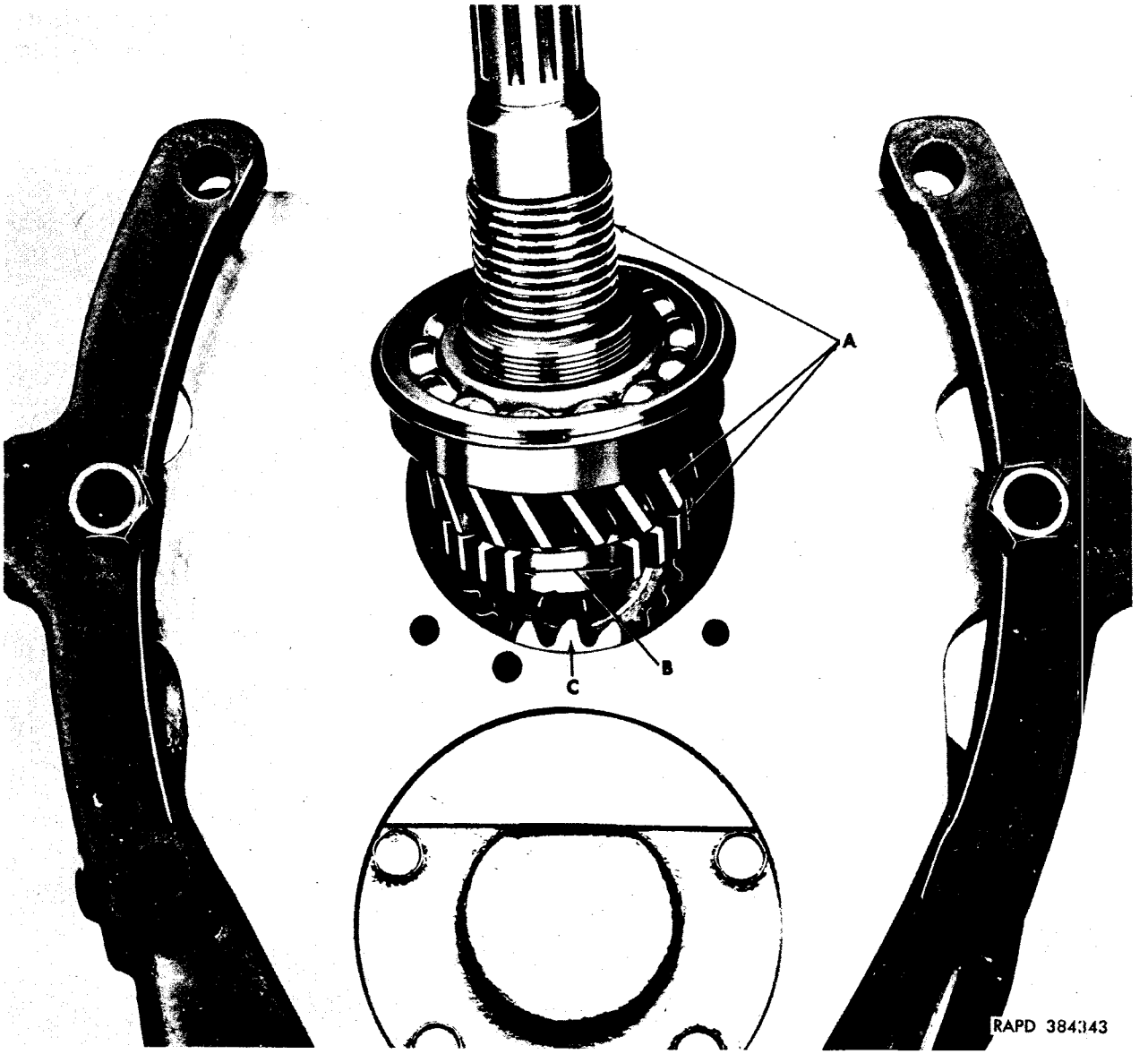
A—Case CC–1796969
B—Bearing assembly 713442
C—Puller 41–P–2956–30
D—Drive gear 7057654

Figure 7. Removing main drive gear and bearing.



A—Drive gear 7057654
B—Open space of clutch gear teeth
C—Countershaft 7057626

Figure 8. Alinement of gear teeth for removal of main drive gear.

18. Remove Main Shaft Assembly

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated.

a. Remove Companion Flange. Remove the nut (FF) and washer (EE). Then, pull the flange (DD) from the main shaft (K).

b. Remove Main Shaft Bearing Retainer Assembly.

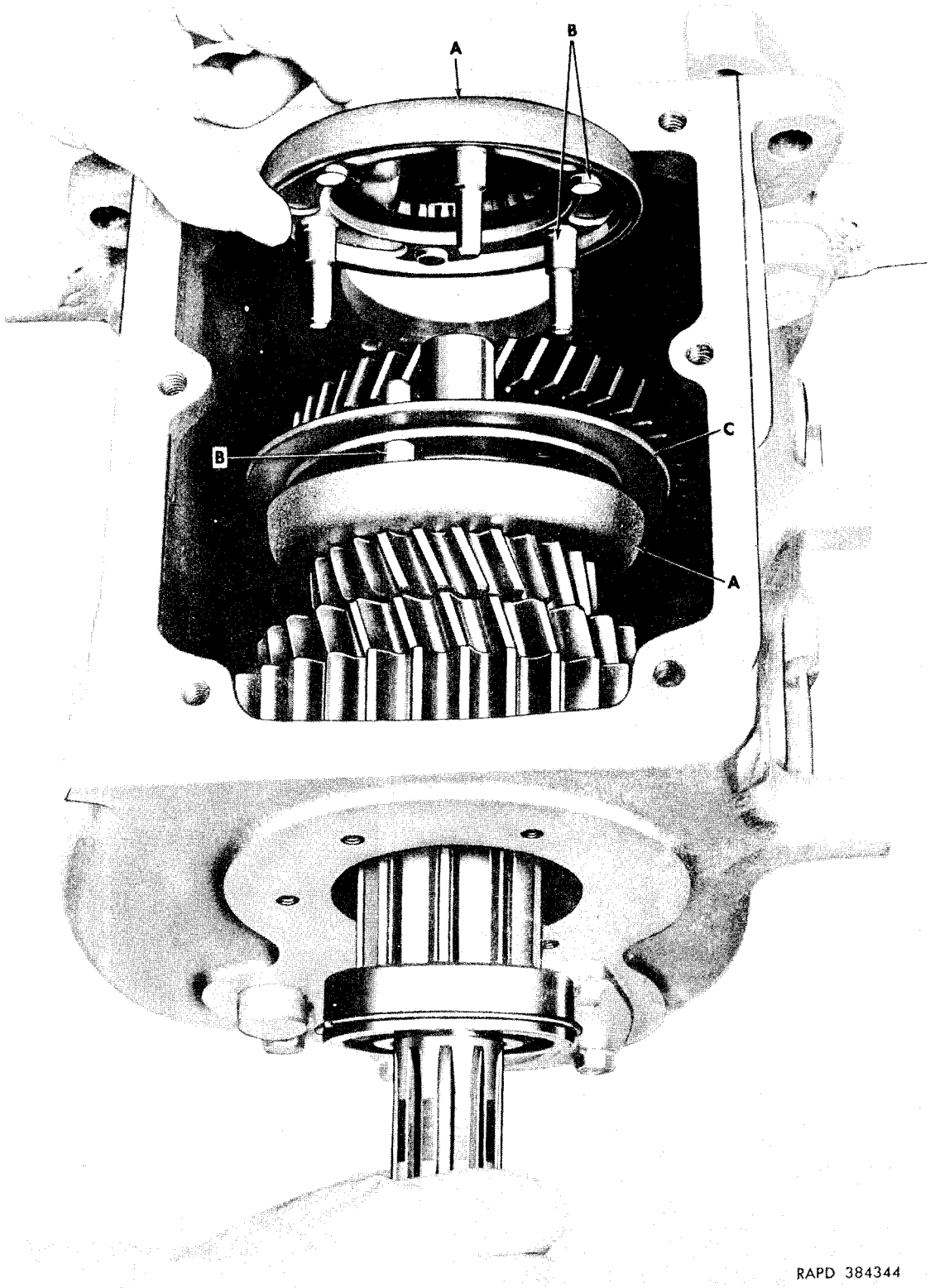
(1) Remove the five retaining screws and lockwashers (HH) and the bearing retainer (BB) with oil seal (CC) and gaskets (AA) from the transmission case (X).

(2) Remove the bearing spacer (Z).

(3) Remove the oil seal (CC) from the bearing retainer (BB) by driving it out with a punch and hammer.

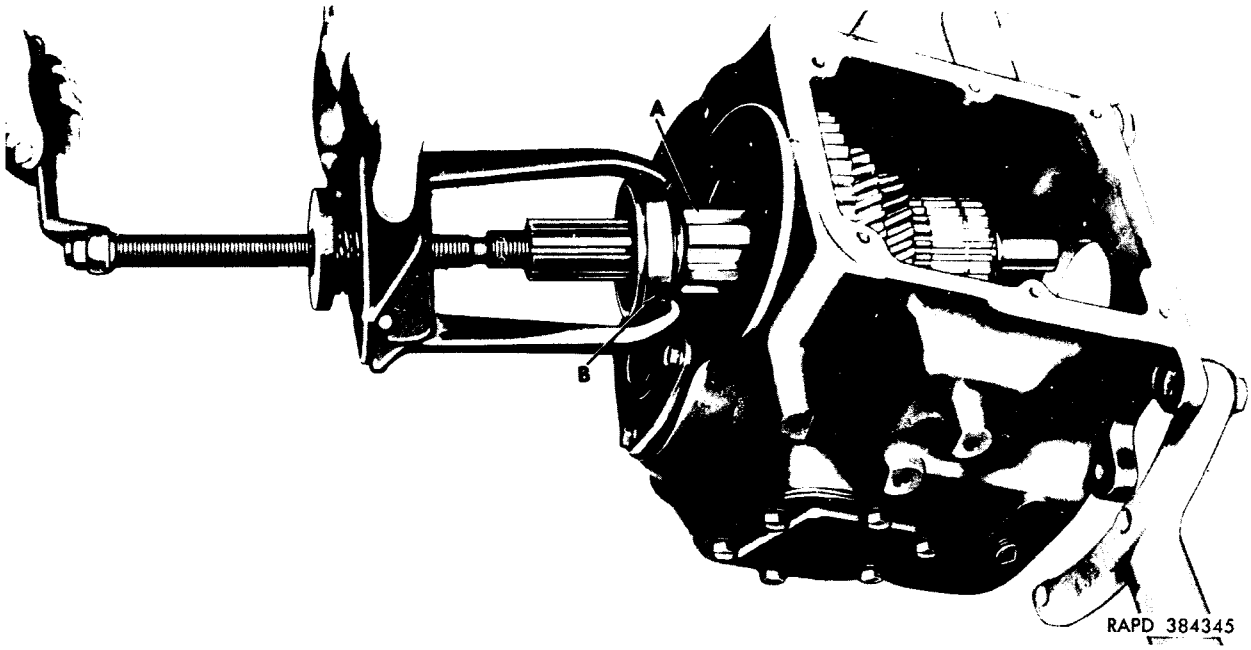
c. Remove Main Shaft Assembly.

(1) Drive the main shaft (K) toward the rear of the transmission case (X) with



A—Synchronizer outer stop ring CC–1669893
B—Synchronizer stop ring and pin assembly CC–1669891
C—Synchronizer sliding clutch CC–1664334

Figure 9. Removing synchronizers and sliding clutch gear.



A—Main shaft 7057635 B—Bearing assembly 700909

Figure 10. Removing main shaft ball bearing with puller.

a brass drift and hammer until the ball bearing (Y) is out of the transmission case. Remove the synchronizer front stop ring (A, fig. 9) together with the front ring and pin assembly (B, fig. 9), the synchronizer sliding clutch (C, fig. 9) and the synchronizer rear ring and pin assembly (B, fig. 9) with the rear stop ring (A, fig. 9).

(2) Pull the ball bearing (B, fig. 10) from the main shaft (A, fig. 10) with a puller. Wrap the ball bearing in paper to protect from abrasives until the bearing is inspected.

(3) Hold the first and second speed sliding gear (C, fig. 11) against the second speed gear (B, fig. 11) and lift the main shaft (A, fig. 11) and gears out of the transmission case (D, fig. 11).

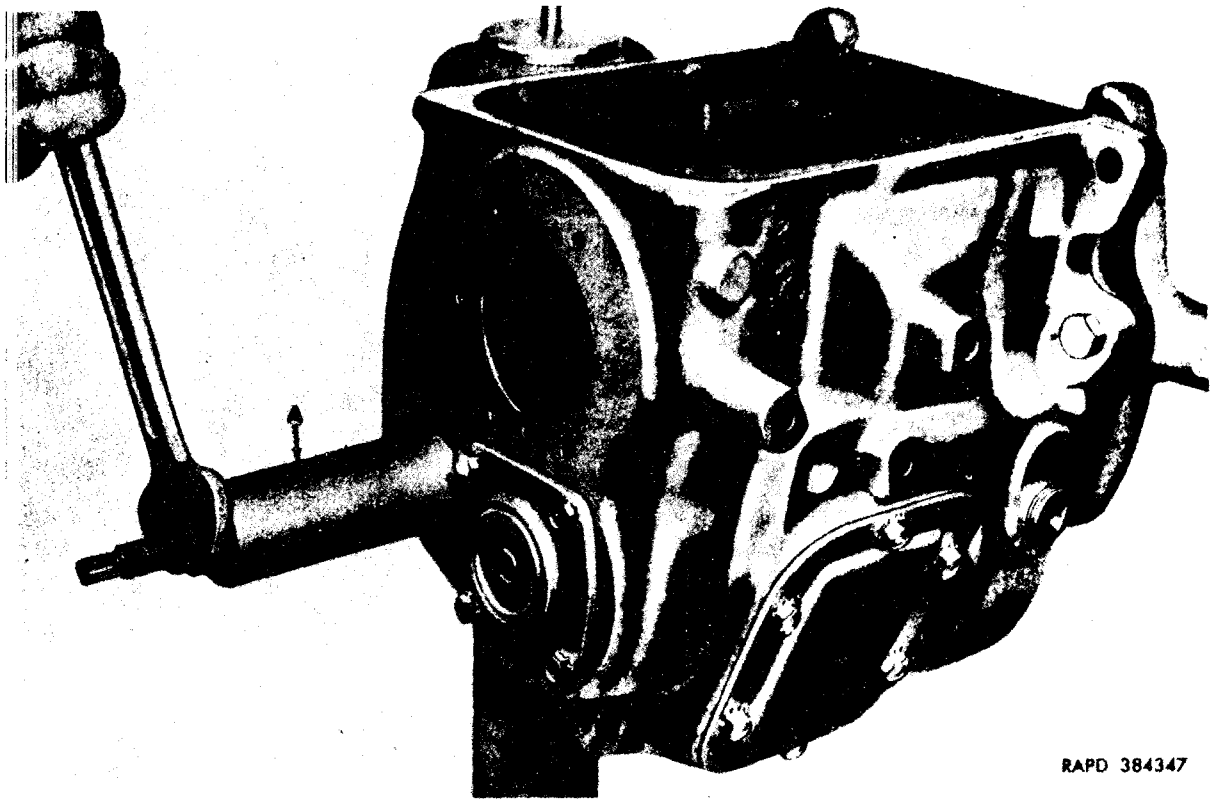
19. Remove Reverse Idler Gear and Bushing Assembly

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated.

a. Remove the screw and lockwasher (MM) and reverse idler gear shaft lock plate (NN) from the transmission case.

A—Main shaft 7057635
B—Second speed gear 7057634
C—First and second speed sliding gear 7057632
D—Case CC–1796969

Figure 11. Removing main shaft assembly less synchronizer assembly.



A—Puller 41–P–2956–50

Figure 12. Removing reverse idler gear shaft.

b. Engage the screw lug of puller 41–P–2956–50 (A, fig. 12) with the slot in the reverse idler gear shaft. Assemble the puller housing on the puller screw and install the nut. Turn the nut on the puller screw clockwise until the reverse idler gear shaft (PP) can be removed from the transmission case (X).

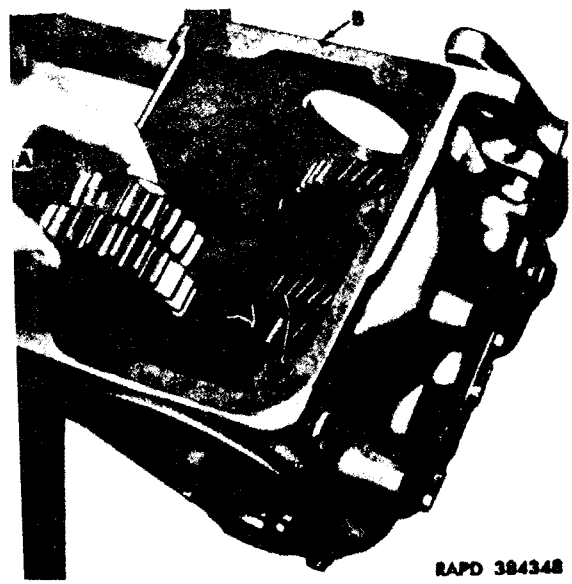
c. Remove the reverse idler gear and bushing assembly (A, fig. 13) from the transmission case (B, fig. 13). Do not remove the bushing.

Note. The bushing bore in the reverse idler gear is accurately machined after the bushing is installed to prevent the possibility of eccentricity; therefore, the bushing cannot be replaced in the field. The reverse idler gear and bushing is serviced only as an assembly.

20. Remove Countershaft

Notes. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated.

a. Remove Countershaft Front Bearing Retainer. Remove the four screws and lockwashers (KK). Remove the bearing retainer (XX) and gasket (WW) from the transmission case (X).



A—Idler gear and bushing assembly 7057621
B—Case CC–1796969

Figure 13. Removing reverse idler gear and bushing assembly.

b. Remove Countershaft Front Bearing Retainer Washer.

(1) Remove the lock wire (AH) from the bearing retainer washer screws (VV).

(2) Place a brass drift between the large gear on the countershaft and the transmission case to prevent the countershaft from turning. Remove the retainer washer screws and the retainer washer (UU). Remove the drift from the transmission case.

c. Remove Countershaft Rear Bearing Retainer Assembly.

(1) Remove the four screws and lockwashers (KK). Remove rear bearing retainer (LL with bearing JJ) and gasket (QQ) from the transmission case (X). If difficulty is encountered in removing the retainer, postpone removal until after the countershaft is driven to the rear as in *d* below.

Note. Do not remove the countershaft rear bearing assembly (JJ) from the retainer (LL) unless inspection reveals that replacement is necessary.

(2) If replacement of the countershaft rear bearing assembly is necessary, press the bearing assembly from the retainer with an arbor press.

d. Remove Countershaft Front Ball Bearing and Countershaft.

(1) Drive the countershaft (U), with a brass drift and hammer, toward the rear of the transmission case (X) as far as it will go or until the gear contacts the reverse idler gear support boss. Then, push down on the rear end of the countershaft to increase the friction between the shaft and the front bearing (TT) and drive the shaft forward with a plastic hammer to force the bearing out of the transmission case and off the shaft. Wrap the ball bearing in paper to protect from abrasives until the bearing is inspected.

A—Case CC–1796969
B—Countershaft 7057626

Figure 14. Removing countershaft.

(2) Remove the countershaft (B, fig. 14) from the transmission case (A, fig. 14). To do this, lift the countershaft slightly and slide it back into the rear bearing opening in the transmission case as far as it will go. Then, raise the front end of the countershaft and lift it out of the transmission case.

21. Remove Power-Takeoff Opening Covers and Filler and Drain Plugs

(fig. 4)

a. Remove Power-Takeoff Opening Covers. Remove the six screws and lockwashers (MM) from each power-takeoff cover (RR) and remove the covers and gaskets (SS).

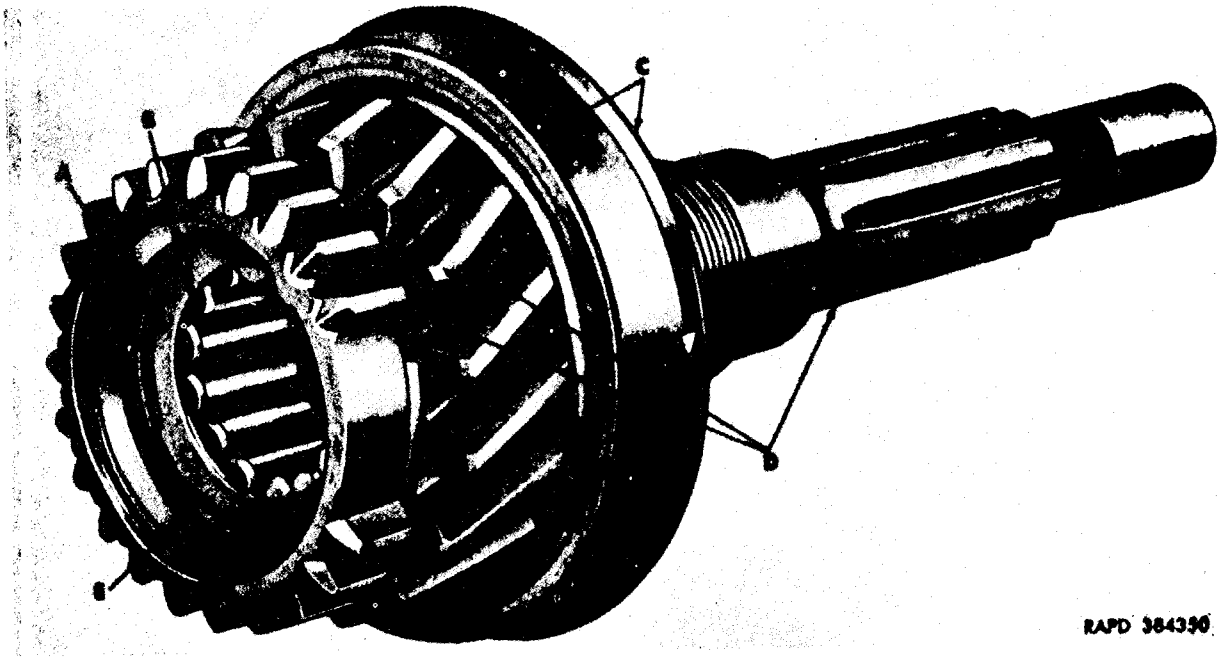
b. Remove Filler and Drain Plugs. Remove the filler plug (V) and the drain plug (V) from the transmission case (X), using a ½-inch socket wrench extension.

Section III. DISASSEMBLY OF SUBASSEMBLIES

22. Disassemble Main Drive Gear Assembly

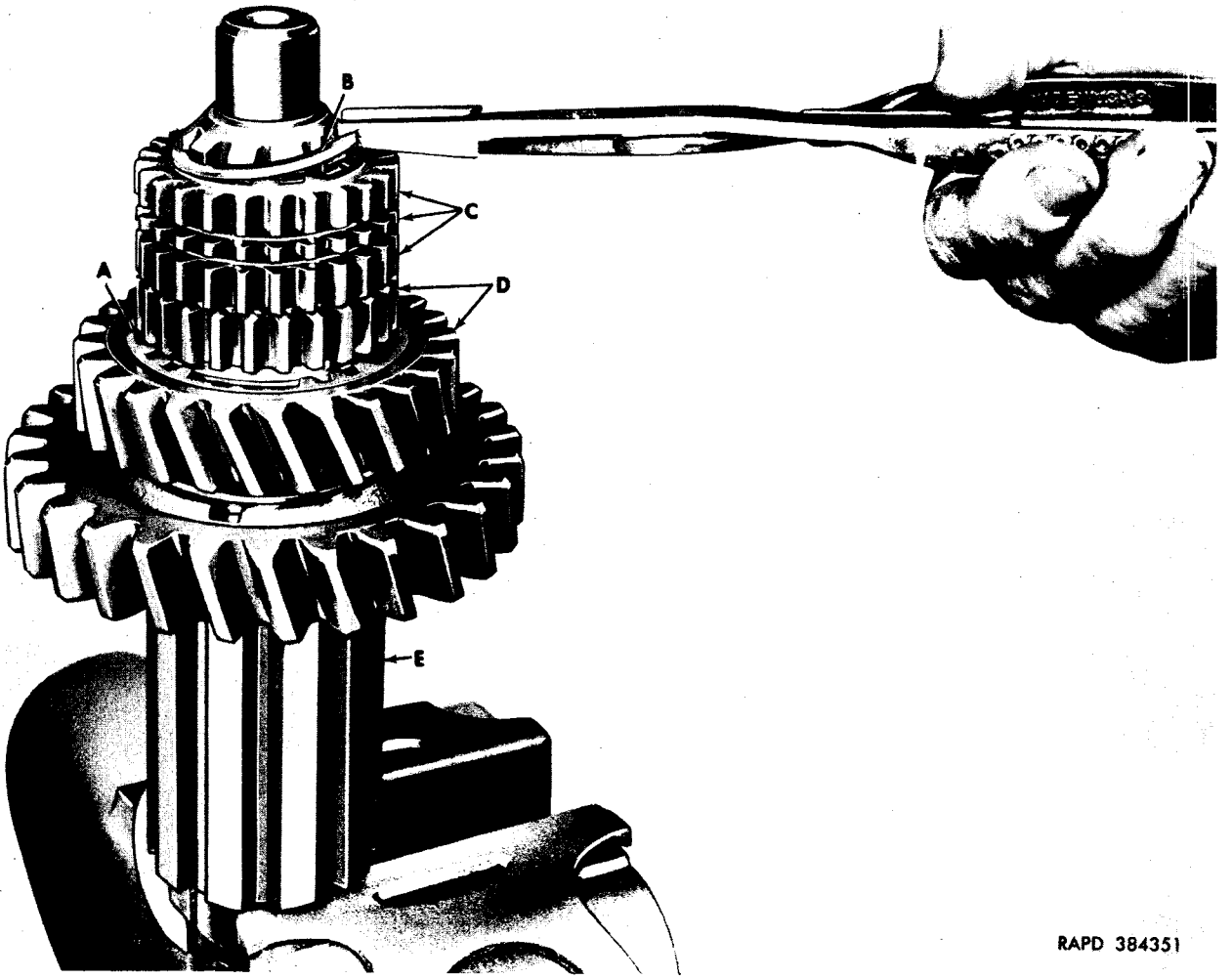
Note. **The key letters shown below in parentheses refer to figure 15 except where otherwise indicated.**

a. Remove Main Drive Gear Ball Bearing. If inspection of the drive gear ball bearing assembly (C) reveals that replacement is necessary,



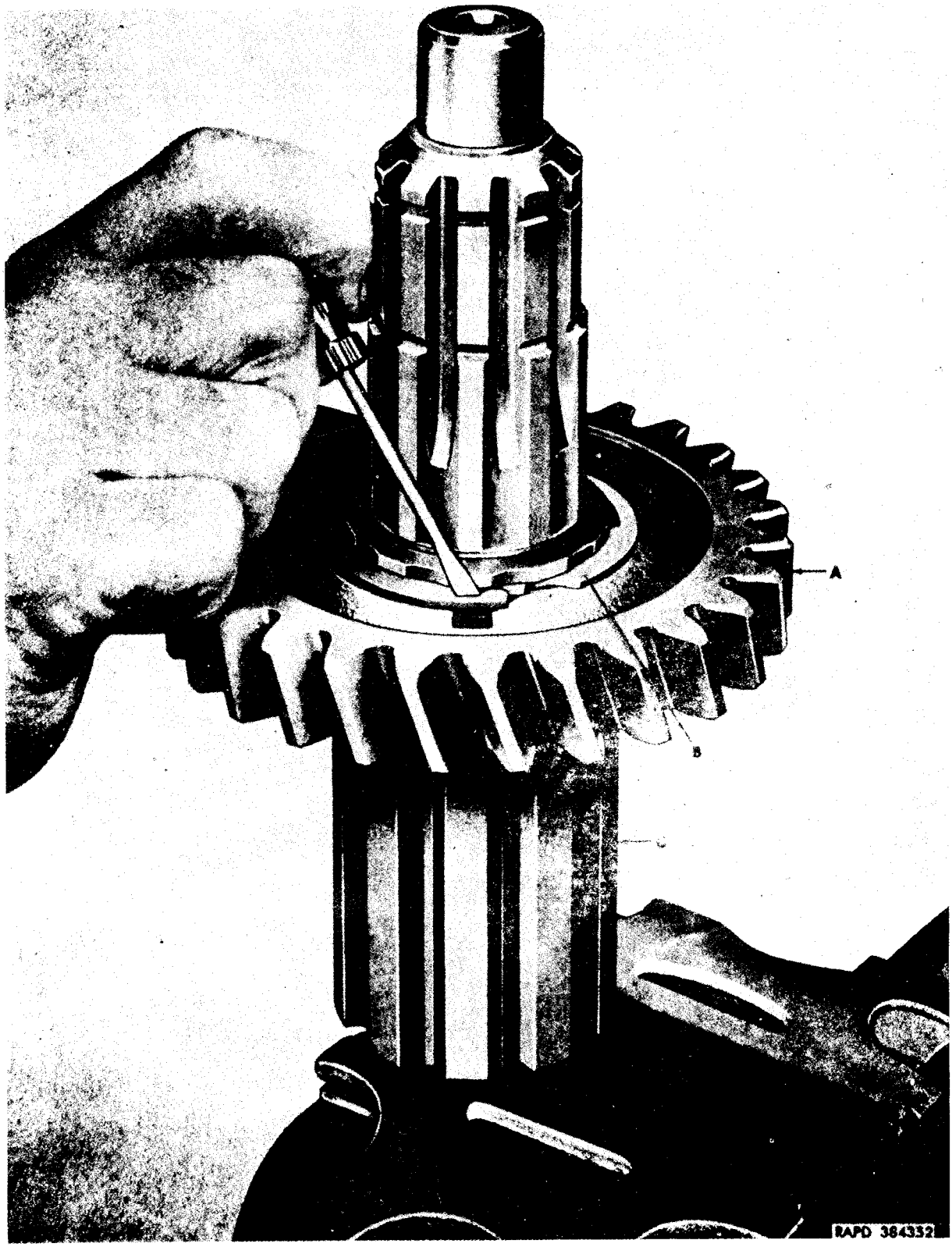
A—Main shaft pilot bearing washer 7057630
B—Main shaft pilot bearing roller CC–1664327 (14 reqd)
C—Bearing assembly 713442
D—Drive gear 7057654
E—Main shaft pilot bearing snap ring CC–1664329

Figure 15. Main drive gear assembly showing main shaft pilot bearing.



A—Third speed gear shim:
0.009–0.011 inch thick 7057627
0.014–0.016 inch thick 7057628
B—Synchronizer snap ring:
0.086–0.088 inch thick 7057622
0.089–0.091 inch thick 7057623
0.092–0.094 inch thick 7057624
0.095–0.097 inch thick 7057625
C—Synchronizer clutch gear CC–1664335
D—Third speed gear 7057631
E—Main shaft 7057635

Figure 16. Removing clutch gear snap ring with snap ring pliers.



A—Second speed gear 7057634 B—Second speed gear snap ring 7057633 C—Main shaft 7057635

Figure 17. Removing second speed gear snap ring.

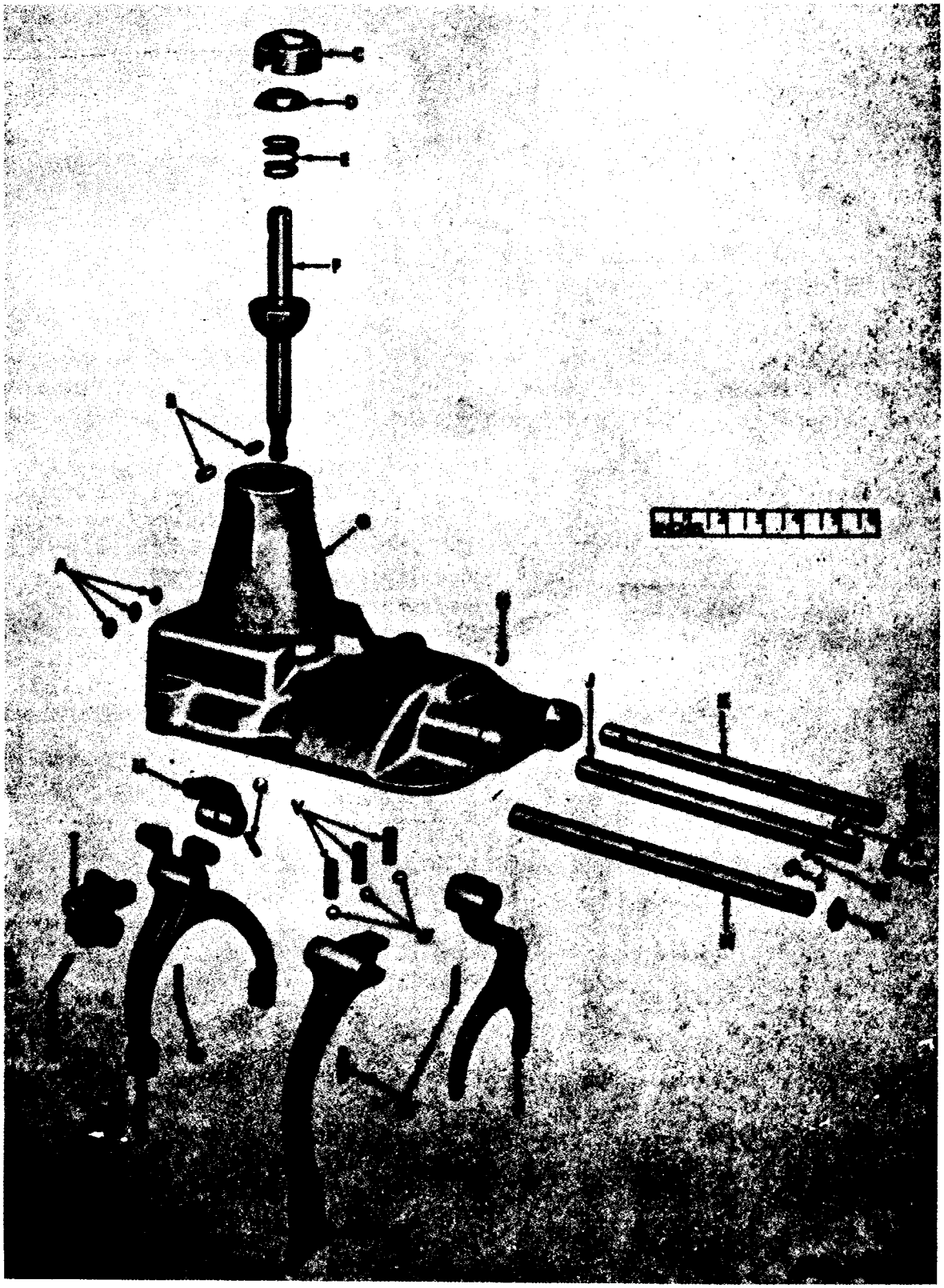
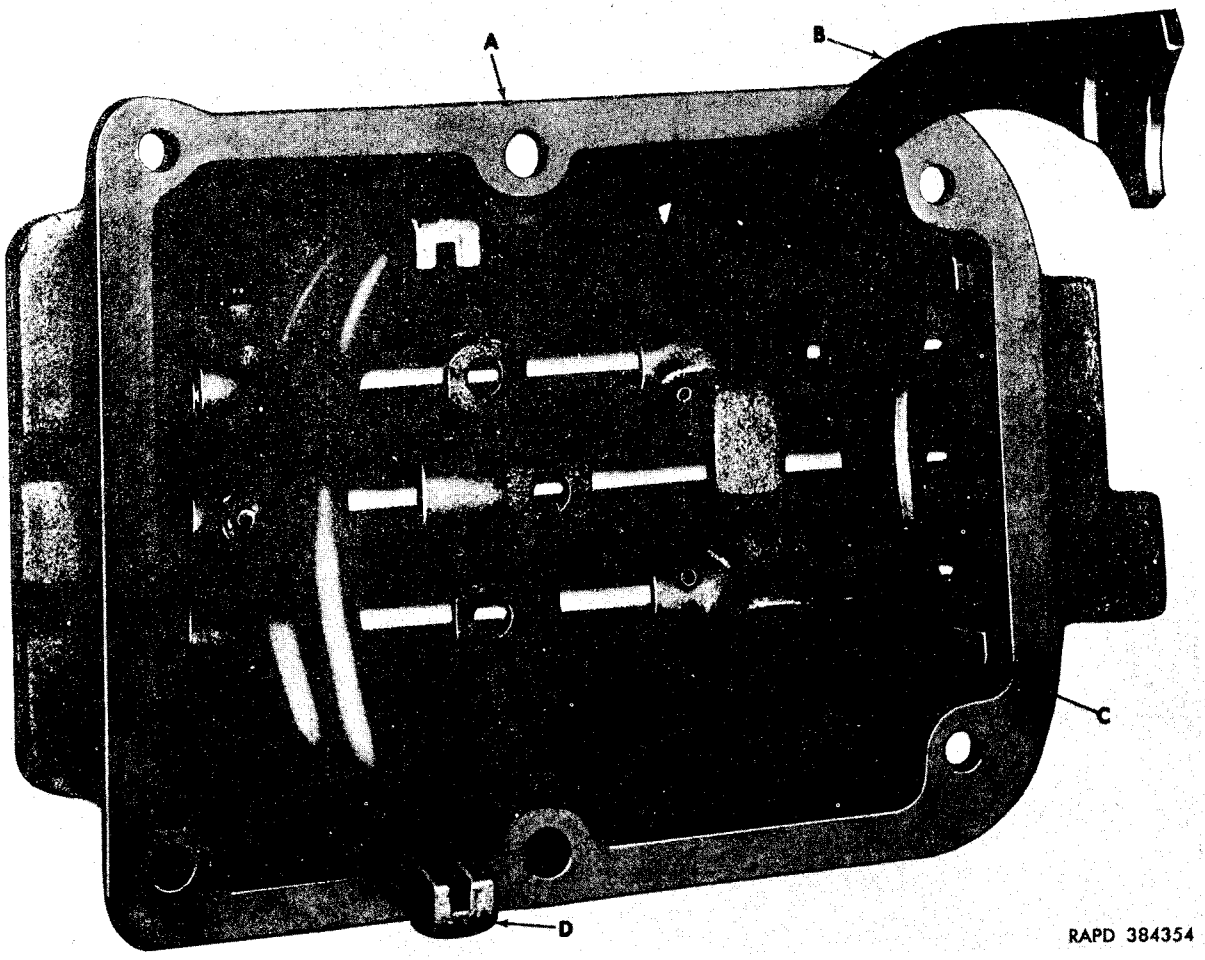


Figure 18. Transmission case cover assembly—exploded view.

H—Gear shift rail hole plug 501593 (6 reqd)
J—Gear shift lever guide pin 7057652 (2 reqd)
K—Gear shift lever ball spring retainer 7057649
L—Gear shift lever ball spring cup CC–1664359
M—Gear shift lever ball spring 7057651
N—Gear shift lever 7057658
P—Case cover CC–1666553
Q—Gear shift rail interlock plug 7373635
R—Third speed and direct drive gear shift rail 7057639
S—First and second speed gear shift rail 7057641
T—Gear shift rail interlock plunger 5250608 (2 reqd)
U—Gear shift rail interlock pin 7373633
V—Reverse gear shift rail 7057640
W—First and second speed gear shift fork 7057642
X—Roll pin 7057647 (5 reqd)
Y—Reverse gear shift fork 7057648
Z—Third speed and direct drive gear shift fork 7057643
AA—Reverse gear shift rail lug assembly CC–1664353
AB—First and second speed shift rail lug 7057645
AC—Gear shift rail poppet ball spring CC–1409551 (3 reqd)
AD—Gear shift rail poppet ball CC–147500 (3 reqd)

Figure 18—Continued.



A—Case cover assembly 7057653
B—Reverse gear shift fork 7057648
C—First and second speed gear shift fork 7057642
D—Third speed and direct drive gear shift fork 7057643

Figure 19. Transmission case cover assembly—bottom view.

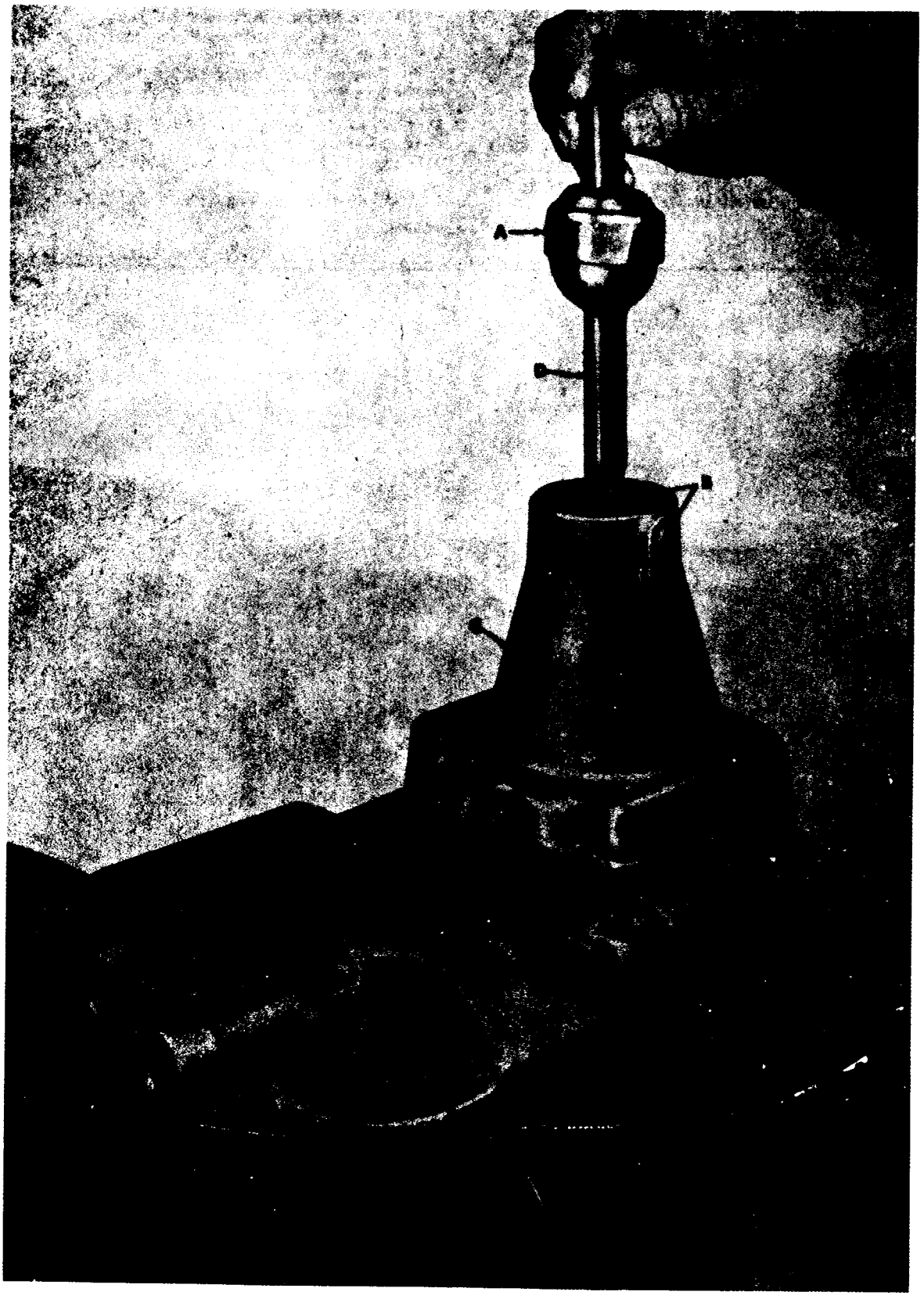


Figure 20. Removing gear shift lever.

A—Ball spring retainer 7057649
B—Lever guide pins 7057652 (2 reqd)
C—Case cover CC-1666553
D—Shift lever 7057658

Figure 20—Continued.

A—Shift fork 7057643
B—Roll pin 7057647

Figure 21. Removing roll pin from third speed and direct drive shift fork.

remove the bearing from the gear (D) with an arbor press.

b. Remove Main Shaft Pilot Bearing. Clamp the drive gear between the brass jaws of a vise with the gear end up and pry out the snap ring (E). Then, remove the bearing washer (A) and the 14 rollers (B).

23. Disassemble Main Shaft Assembly

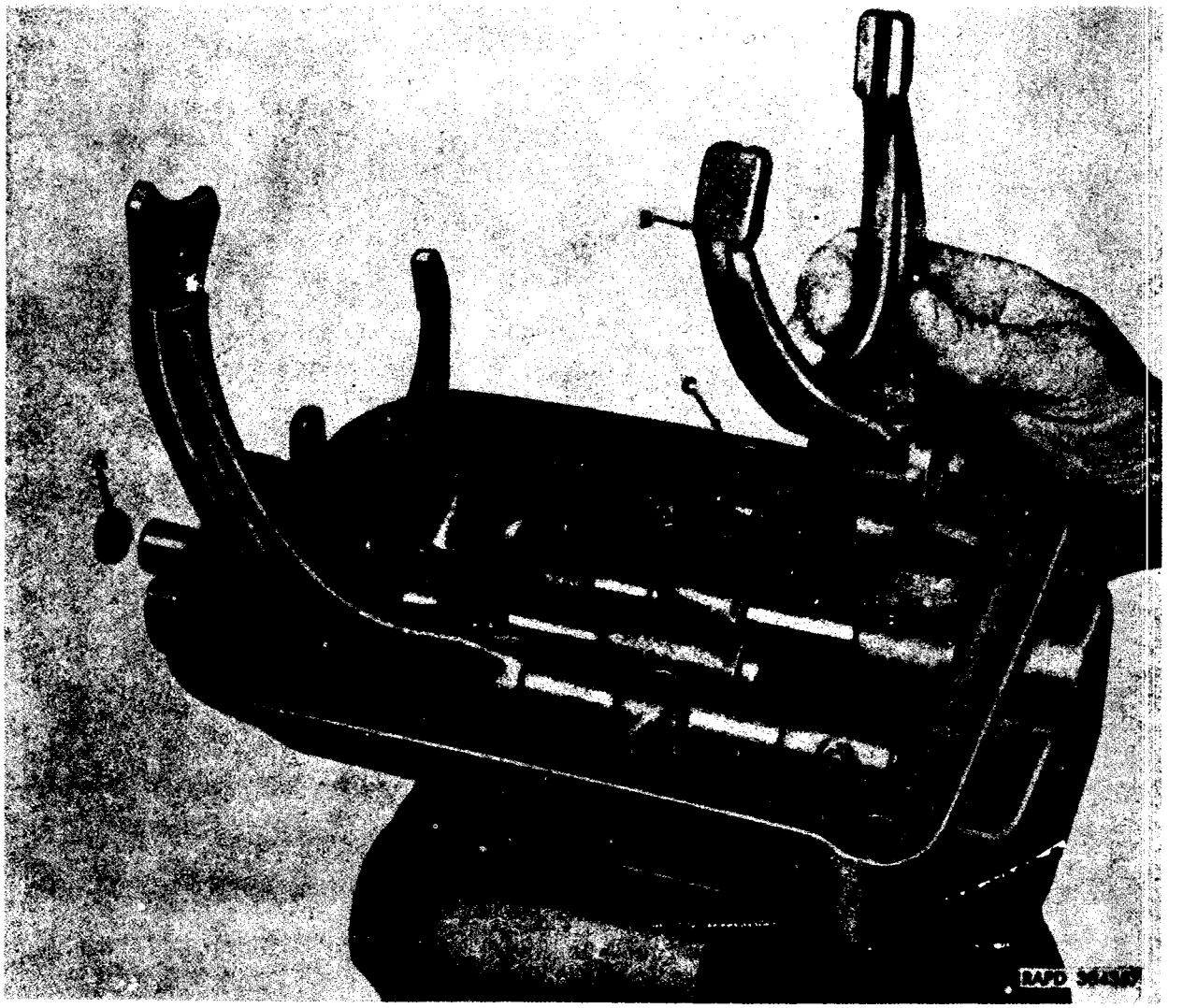
Note. The key letters shown below in parentheses refer to figure 16 except where otherwise indicated.

a. Remove Snap Ring and Clutch Gear from Main Shaft.

(1) Remove the first and second speed sliding gear (S, fig. 4) from the main shaft (K, fig. 4).

(2) Clamp the main shaft (E) vertically between the brass jaws of a vise and remove the clutch gear snap ring (B) with snap ring removing pliers.

(3) Remove the clutch gear (C).



A—Rail hole plug 501593
B—Shift fork 7057643
C—Case cover CC-1666553
D—Hole for poppet ball and spring
E—Shift rail 7057639

Figure 22. Removing third speed and direct drive shift fork.

(4) Remove the third speed gear shim (A) and third speed gear (D).

b. Remove Snap Ring and Second Speed Gear.

(1) Pry out the 2-piece snap ring (B, fig. 17) with a small screwdriver and remove the second speed gear (A, fig. 17).

(2) Remove the shaft (C, fig. 17) from the vise.

14. Disassemble Transmission Case Cover Assembly

Note. The key letters shown below in parentheses refer to figure 18 except where otherwise indicated.

a. General. Care must be exercised in disassembling the transmission case cover assembly as the shift rails (J, K, and N) and the interlock plungers (L) will be damaged if the parts are not removed in the proper order. With the cover assembly (A, fig. 19) upside down, observe the position of the various forks (B, C, and D, fig. 19) to facilitate assembly.

***Caution:* Two shift rail interlock plungers (L) and a pin (M) are provided between the three shift rails (J, K, and N) to prevent movement of more than one shift rail when the shift lever (F) is moved. Therefore, before attempting to disassemble the transmission case cover assembly, place all shift rails in their neutral positions. If resistance is evident when an attempt is made to move a shift rail in the process of disassembly, one of the shift rails is not in its neutral position. Serious damage to the cover assembly may result if this precaution is not observed.**

b. Remove Shift Lever and Related Parts.

Note. The key letters shown below in parentheses refer to figure 20 except where otherwise indicated.

(1) Clamp the transmission case cover assembly in vise, right side up, and disengage the ball spring retainer (A). To do this, force the retainer down against the spring tension and turn counterclockwise to disengage it from the guide pins (B).

(2) Remove the ball spring retainer (A) together with the ball spring cup (D, fig. 18), spring (E, fig. 18), and shift lever (D) from case cover (C).

c. Remove Third Speed and Direct Drive Shift Rail.

Note. The key letters shown below in parentheses refer to figure 22 except where otherwise indicated.

(1) Place the transmission case cover assembly in a vise, upside down, to facilitate the removal of the parts.

Note. Use a sharp square type or closely wound spiral No. 1 screw extractor (easy out) mounted in a tap handle for removing the roll pins from the various shift forks and lugs.

(2) Remove the roll pin (B, fig. 21) from the shift fork (A, fig. 20), using a screw extractor.

***Caution:* Before removing the shift rail, place a finger over the hole (D) in the center boss of the case cover to prevent possible injury to personnel or loss of the shift rail poppet ball when the rail is removed, as the ball is under spring tension.**

(3) Push the shift rail (E) toward the rear of the case cover (C) far enough to dislodge the shift rail rear hole plug (A) and to permit removal of the shift fork (B). Remove the shift fork.

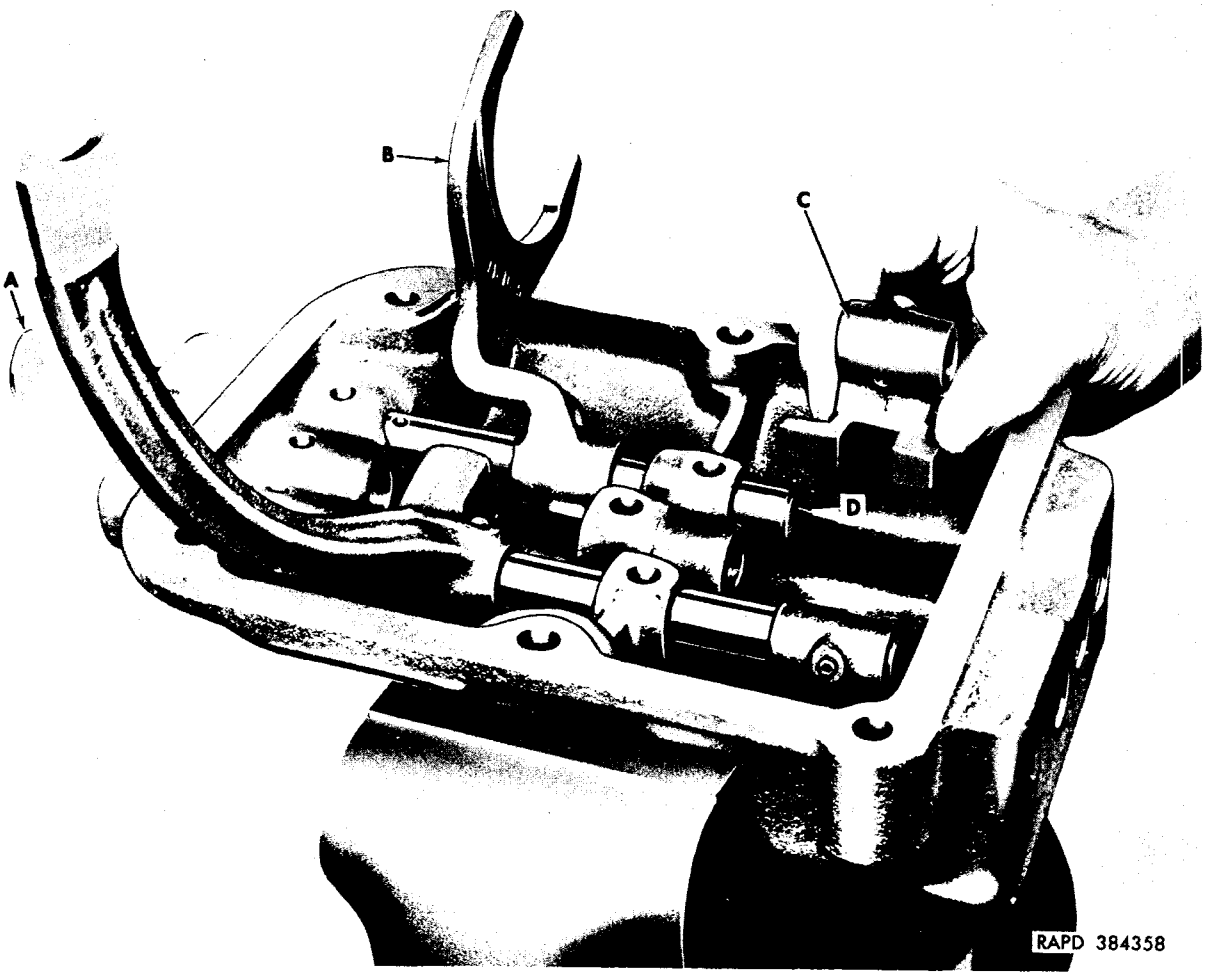
(4) Pull the shift rail (E) out of the case cover (C) being careful not to lose the interlock plunger pin (M, fig. 18) from the hole in the rear end of the shift rail. Remove the rail, poppet ball (W, fig. 18), and poppet ball spring (V, fig. 18).

d. Remove First and Second Speed Shift Rail.

Note. The key letters shown below in parentheses refer to figure 23, except where otherwise indicated.

(1) Remove the roll pins (Q, fig. 18) from the shift fork (P, fig. 18) and lug (U, fig. 18), using a No. 1 screw extractor.

(2) Push the shift rail (D) toward the rear of the case cover far enough to dislodge the shift rail rear hole plug (A), and to permit the removal of the lug (C). Then, remove the lug, the poppet ball (W, fig. 18), ball spring (V, fig. 18), shift fork (B), and rail (D) exercising care in removing the ball and springs as in *c* above.



A—Rail hole plug 501593
B—Shift fork 7057642
C—Lug 7057645
D—Shift rail 7057641

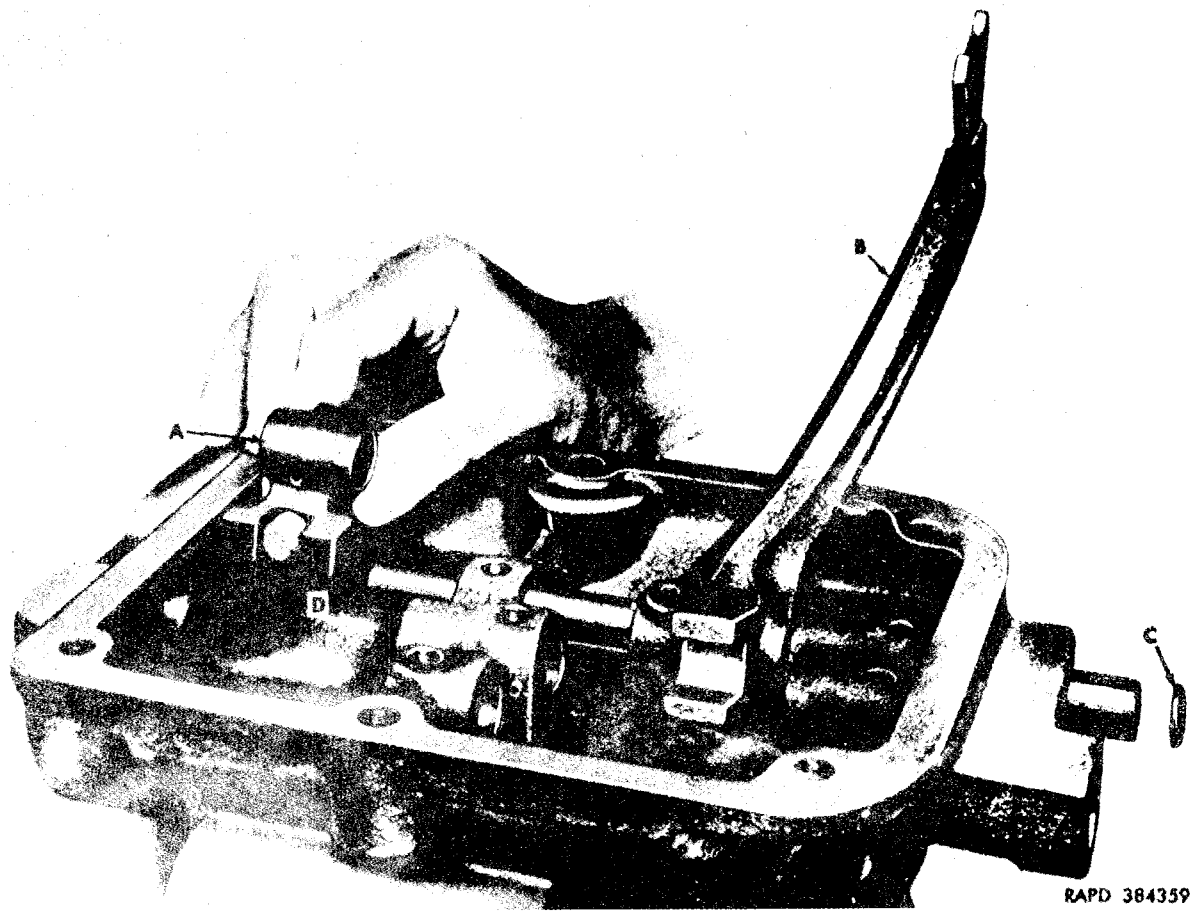
Figure 23. Removing first and second speed shift rail lug.

b. Remove Reverse Shift Rail.

Note. The key letters shown below in parentheses refer to figure 24 except where otherwise indicated.

(1) Remove the roll pins (Q, fig. 18) from the reverse shift fork (R, fig. 18) and the lug assembly (T, fig. 18).

(2) Push the reverse shift rail (D) toward the rear of the case cover far enough to dislodge the shift rail rear hole plug (C) and to permit the removal of the lug assembly (A). Then, remove the lug assembly, poppet ball (W, fig. 18), ball spring (V, fig. 18), shift fork (B), and shift rail (D), exercising care in removing the ball and spring as in *c* above.



A—Lug assembly CC–1664353
B—Shift fork 7057648
C—Rail hole plug 501593
D—Shift rail 7057640

Figure 24. Removing reverse shift rail lug assembly.

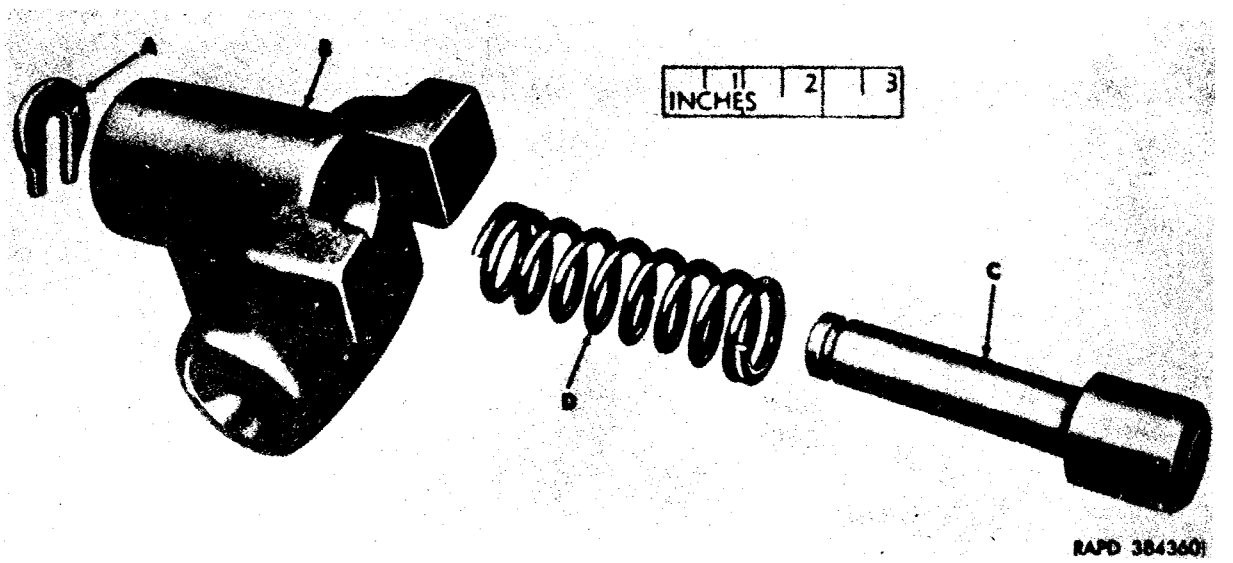
f. Remove Shift Rail Interlock Plungers. Remove the case cover from the vise and shake out the two shift rail interlock plungers (L, fig. 18). These plungers should drop out through the shift rail holes in the case cover.

g. Disassemble Reverse Shift Rail Lug Assembly.

Note. The key letters shown below in parentheses refer to figure 25 except where otherwise indicated. Do not disassemble the reverse shift rail lug assembly (A, fig. 24) unless inspection reveals that replacement of the parts is necessary.

(1) Remove the latch plunger washer (A) from the smaller end of the plunger (C) by pressing the plunger further into the lug (B) and forcing the washer out of position, being careful to catch the washer, spring (D), and the plunger as the plunger is under spring tension.

(2) Release the plunger (C) and remove it and the spring (D) from the lug (B).



A—Latch plunger washer 7412060
B—Lug 7057646
C—Latch plunger 8330144
D—Latch plunger spring 7373688

Figure 25. Reverse shift rail lug assembly—exploded view.

Section IV. CLEANING, INSPECTION, AND REPAIR

25. General

Cleanliness of personnel, tools, and surroundings is not only good practice, but it is also a fundamental requirement where repair operations of a mechanical nature are performed. This is particularly true of areas where transmissions are to be repaired or rebuilt. All of the information and instructions contained in this publication are given on the assumption that these conditions prevail in the working areas. Transmission repairs, except for those of an emergency nature, should never be attempted under any other conditions.

26. Cleaning Component Parts After Disassembly

a. Using bristle brushes having the correct shape and of the proper size for the job to be done, i.e., round brushes for internal bores and square or rectangular hand brushes for flat or external surfaces, scrub each individual part, except ball or roller bearings.

Note. Bearings require special handling. Refer to TM 37-265 or TB ORD 438, and clean, inspect, and prepare for use all ball and roller bearings used in these assemblies according to the instructions given therein.

b. Clean all other parts of hardened oil, lac-

quer deposits, and dirt, paying particular attention to oil passages and to the poppet ball bores in the transmission case cover. Remove all gaskets or parts of gaskets from gasket surfaces, using a putty knife or other suitable scraper. Be careful to avoid scratching or gouging the surface metal.

c. Rinse the parts in clean drycleaning solvent or mineral spirits paint thinner. This is a highly important operation, for even though the dirt or foreign matter is loosened by the scrubbing action, it must be completely washed away by flushing action. Solvent under pressure played over the parts with a hosing action is a preferred method of rinsing, as is suspending the part in a mechanically agitated bath of solvent. In the absence of such facilities, however, the parts may be rinsed by immersing them in a container of clean drycleaning solvent or mineral spirits paint thinner and sloshing them about vigorously. Dry the parts with high pressure air.

27. Inspection Procedure

a. All parts, regardless of their application or use, must be thoroughly examined and inspected to determine whether they are to be used or scrapped. The wear or damage of some parts will be evident to the eye, whereas in others, it may be necessary to use tools or gages to determine the extent of wear. When inspecting parts, bear in mind that the inspection procedure has two objectives: the first is to eliminate any part or parts which are unsuitable for use or doubtful parts which could conceivably cause the premature failure of the rebuilt unit; and the second and equally important objective is to reduce the wasteful and frequently unnecessary practice of scrapping parts which still retain a high percentage of their useful life. Since the decision as to whether a part should be scrapped or used is very frequently a matter of opinion or judgment, this operation should be performed by personnel experienced in maintenance of transmissions.

b. Instructions for the removal of minor imperfections and defects are included in this section, because they facilitate the inspection procedure. Every part on which a repair is made, must be washed, rinsed, and dried upon completion of the repair.

28. Repairs

a. Small holes or cracks in the transmission case or the case cover may be repaired by welding or brazing them closed, provided they do not extend into the various bores or mounting surfaces. It should be noted that these pieces are gray or cast iron and a special technique is required to satisfactorily weld this type of material; ordinary welding methods and materials are not suitable.

b. Remove the short ends of any screws broken off in the tapped holes. Clean out and inspect all tapped holes; retap where necessary. If hole threads are stripped or if holes are misshapen, drill out to next larger size and tap. Install bolt or stud of the correct size to fit the newly tapped hole.

29. Handling Parts After Inspection and Repair

a. All parts, whether new or used, must be lightly coated with preservative lubricating oil, medium grade, immediately after inspection and/or repair and prior to their assembly into the transmission. Oiling the parts gives them a necessary rust-preventive coating, facilitates the assembly operations, and provides initial lubrication.

b. Make sure that new gaskets and replacement parts are available to replace those scrapped.

c. Check to see that all parts are at hand so that the assembly operations may go forward without interruptions.

30. Inspection

a. Inspect Main Drive Gear, Main Shaft, and Countershaft Ball Bearings. Check all ball bearings for looseness, chipped balls, worn or rough races, or damaged or worn ball retainers. If any of these conditions exist, replace the damaged bearings. If the bearings are suitable for further service, wrap them in paper as a protection against abrasives.

b. Inspect Main Shaft Pilot Bearing. Inspect the pilot bearing for worn, chipped, or scored rollers and washer. If any of these conditions exist, replace the bearing parts.

c. Inspect Countershaft Rear Bearing Assembly. Inspect the bearing assembly for wear and damaged rollers or retainer. If any of these

conditions exist, install a new bearing assembly.

d. Inspect Main Drive Gear, Main Shaft, and Countershaft Bearing Retainers. Inspect all bearing retainers for cracks, distorted flanges, and damaged gasket surfaces. Also, inspect the main drive gear bearing retainer for damaged oil seal counterbore. If any of these conditions exist, replace the damaged parts.

e. Inspect Main Drive Gear.

Note. The key letters shown below in parentheses refer to figure 40 except where otherwise indicated.

(1) Check the gear for worn, chipped, or cracked gear teeth. Check the splines and threads for wear and damage. If any of these conditions exist, replace the gear.

(2) Measure the diameter of the bearing surface (B) at the front end of the gear and the diameter of the bore (E) in the gear. Refer to the wear limits in paragraph 52 and replace the gear if the wear is excessive.

f. Inspect Main Shaft.

(1) Inspect the shaft for alinement, scored or worn bearing surfaces, and worn or damaged splines. If any of these conditions exist, replace the shaft.

(2) Measure the diameter of the bearing area (G) at the front end of the shaft. If the dimension is less than the wear limit in paragraph 53, replace the shaft.

(3) Measure the diameter of the shaft at the surface (J) for the second speed gear. If the dimension is less than the wear limit in paragraph 53, replace the shaft.

g. Inspect Main Shaft Gears.

(1) Inspect the first and second speed sliding gear for worn or cracked teeth, worn or damaged splines. If any of these conditions exist, replace the gear.

(2) Inspect the second speed gear for worn or damaged teeth or wear at hub. If teeth are worn or damaged, replace the gear. Measure the diameter of the hub bore (BB) and check against the wear limits in paragraph 53. Replace the gear if it is not satisfactory for further service.

(3) Inspect the third speed gear for wear or damaged teeth and wear at the hub. If the teeth are worn or damaged, replace the gear. Measure the diameter of the hub bore (Z) and check against the wear limits in paragraph 53. Replace the gear if it is not satisfactory for further service.

h. Inspect Main Shaft Third Speed Gear Shim. Inspect the shim for wear, scores, or cracks. If any of these conditions exist, replace the shim.

i. Inspect Main Shaft Synchronizer Assembly.

(1) Inspect the synchronizer outer stop rings for scores, cracks, or wear. If any of these conditions exist, replace the damaged rings.

(2) Inspect the synchronizer ring and pin assemblies for scores, cracks, wear, or loose pins. If any of these conditions exist, replace the damaged parts.

(3) Inspect the synchronizer sliding gear for wear, scores, or cracks. If any of these conditions exist, replace the gear.

(4) Inspect the clutch gear for worn teeth, scores, or cracks. If any of these conditions exist, replace the gear.

j. Inspect Main Shaft Companion Flange and Main Shaft Rear Bearing Spacer. Inspect the companion flange hub for wear, scored spots, or corrosion. If any of these conditions exist, replace the flange. Inspect the flange bolt holes and replace the flange if the holes are worn or elongated. Also, inspect the rear bearing spacer for wear, scored spots, or corrosion. If any of these conditions exist, replace the spacer.

k. Inspect Reverse Idler Gear and Bushing Assembly.

(1) Inspect the gear for worn, chipped, or cracked gear teeth. If any of these conditions exist, replace the gear assembly.

(2) Check the bushing for wear. If the inside diameter (S) exceeds wear limit indicated in paragraph 54, replace the gear assembly.

l. Inspect Reverse Idler Gear Shaft. Measure the diameter of the shaft (R). If the dimensions at the worn spots exceed the wear limit in paragraph 54, replace the shaft.

m. Inspect Countershaft. Inspect the countershaft for worn or damaged gear teeth and worn bearing surfaces. If the diameter of the front and rear bearing surfaces (Y and AA) is less than the wear limits indicated in paragraph 55 or if any of the gear teeth are damaged or worn, replace the countershaft.

n. Inspect Transmission Case. Inspect the case for damaged gasket surfaces, damaged screw threads, or cracks. If any of these conditions exist and cannot be repaired, replace the case. Inspect the bores for the main shaft ball bearing, main drive gear ball bearing, countershaft front ball bearing, and countershaft rear bearing retainer. If there is evidence that any of the bearings have turned in the case, measure the openings and replace the case if the dimensions exceed the wear limits in paragraphs 52, 53, and 55.

o. Inspect Shift Lever and Related Parts.

(1) Inspect the shift lever for wear or damage. If either of these conditions exists, replace the lever.

(2) Inspect the ball spring for compressed length and damage. The maximum closed length is 0.53 inch. It should compress to 0.062 inch under a load of 63 to 70 pounds. It must also compress solid without taking a permanent set. If the spring does not conform to these specifications, replace.

(3) Inspect the ball spring cup for wear, damage, and burs. If any of these conditions exist and the cup cannot be repaired, replace.

(4) Inspect the ball spring retainer for wear or damage. If either of these conditions exists, replace the retainer.

(5) Inspect the shift lever guide pins in the case cover for wear or damage. If either of these conditions exists, replace the pins.

p. Inspect Shift Rails. Inspect the shift rails for wear, scores, or corrosion. If any of these conditions exist, replace the damaged rail or rails.

q. Inspect Shift Forks. Inspect the shift forks for misalinement, wear, scores, or cracks. If any of these conditions exist, replace the damaged fork or forks.

r. Inspect First and Second Speed Shift Rail Lug. Inspect the lug for wear or damage. If either of these conditions exists, replace the lug.

s. Inspect Reverse Shift Rail Lug Assembly.

(1) Inspect the latch plunger for wear or damage. Replace the plunger if either of these conditions exist.

(2) Inspect the latch plunger spring for free length, compressed length and damage. The free length of the spring is $1\frac{1}{16}$ inches. It should compress to one inch under a load of 30 to 35 pounds. If the spring does not conform to these specifications or is damaged, replace.

(3) Inspect the lug for wear or damage. If either of these conditions exists, replace the lug.

t. Inspect Shift Rail Poppet Balls and Shift Rail Poppet Ball Springs. Inspect the poppet balls for wear, chipped spots, or corrosion. Replace all damaged balls. Inspect the poppet ball springs for free length, compressed length, and damage. The minimum free length at the springs is one inch. They should compress to $\frac{21}{32}$ inch under a load of 30 to 32 pounds. If the springs do not conform to these specifications, or if there is evidence of damage, replace the damaged springs.

u. Inspect Shift Rail Interlock Plungers and Pin. Inspect the interlock plungers and pin for wear, distortion, or corrosion. If any of these conditions exist, replace all parts found to be damaged.

v. Inspect Transmission Case Cover. Inspect the case cover for damaged machined surfaces and cracks. If either condition exists and cannot be repaired, replace the cover.

31. Handling Parts After Inspection

Upon completion of the cleaning, inspection, and repair operations, make suitable provisions to keep the parts clean and undamaged until they are assembled in the transmission case. Handle all parts carefully during the assembly operations, taking particular care to avoid nicking or gouging finished surfaces.

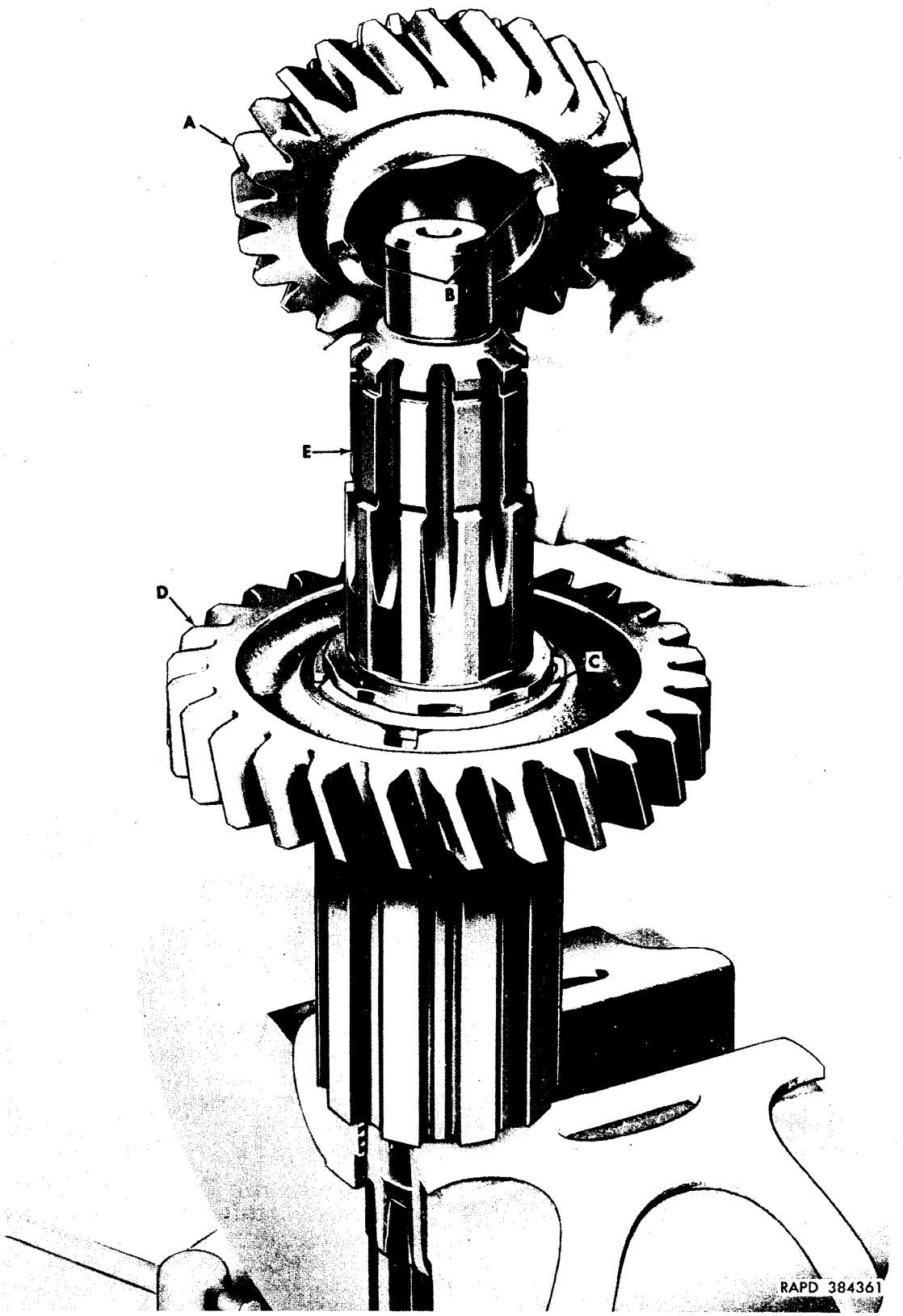


Figure 26. Installing third speed gear on main shaft.

32. Assemble Main Drive Gea Assembly

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated.

a. Install Main Drive Gear Ball Bearing. If for any reason the ball bearing (AC) was removed, press the bearing on the gear (AD) with an arbor press until fully seated. The bearing must be installed with the snap ring toward the outer (front) end of the gear.

b. Install Main Drive Gear Bearing Retaining Nut. Clamp the gear assembly between the brass jaws of a vise and install the bearing retaining nut (AB). This nut has left threads. Tighten the nut with a large spanner wrench or a brass drift and hammer. Shock the end of the spanner wrench with a hammer to make certain the nut is firmly tightened. Stake nut at slot in gear to lock in place.

c. Install Main Shaft Pilot Bearing. Coat the 14 rollers (B, fig. 15) with universal gear lubricant and assemble in position in the bore of the gear (D, fig. 15). Then, install the washer (A, fig. 15) and the snap ring (E, fig. 15).

33. Assemble Main Shaft Assembly

Note. The key letters shown below in parentheses refer to figure 26 except where otherwise indicated.

a. General. The main shaft assembly consists of several precision parts and must be properly inspected and assembled to insure satisfactory operation of the transmission. While the synchronizer assembly is a part of the main shaft assembly, it is installed on the shaft after the shaft and gears are installed in the transmission case.

b. Install Gears and Snap Rings on Main Shaft.

(1) Clamp the main shaft vertically between the brass jaws of a vise with the threaded end down.

(2) Install the second speed gear (D) on the shaft (E) with the engaging teeth for the first and second speed sliding gear down.

(3) Install the second speed gear snap ring (C).

(4) Install the third speed gear (A) on the shaft with the synchronizer sliding gear teeth at the top and the oil grooves (B) at the bottom.

(5) Install the synchronizer clutch gear (A, fig. 27) on the shaft (E, fig. 27) with the oil grooves (B, fig. 27) at the bottom.

(6) Install the synchronizer clutch gear snap ring (B, fig. 16) in the shaft groove. The snap ring must retain the synchronizer clutch gear in position with a tight fit. If any end play is evident, a thicker snap ring must be installed. Synchronizer gear snap ring are available in thicknesses of 0.087 0.090, 0.093, and O.096 inch.

(7) Install the third speed gear shim (C, fig. 27) on the smaller portion of the third speed gear (D, fig. 27).

c. Install First and Second Speed Sliding Gear. Place the first and second speed sliding gear (S, fig. 4) on the main shaft (K, fig. 4) with the shift fork groove toward the rear end of the shaft.

34. Assemble Transmission Case Cover Assembly

a. Assemble Reverse Shift Rail Lug Assembly.

Note. The key letters shown below in parentheses refer to figure 25.

(1) Assemble the latch plunger spring (D) and the latch plunger (C) in the lug (B).

(2) Push the plunger in the lug against the spring tension and install the latch plunger washer (A) on the small end of the plunger. Crimp the ends of the washer to keep it firmly in place.

A—Third speed gear 7057631
B—Oil grooves
C—Second speed gear snap ring 7057633
D—Second speed gear 7057634
E—Main shaft 7057635

Figure 26—Continued.

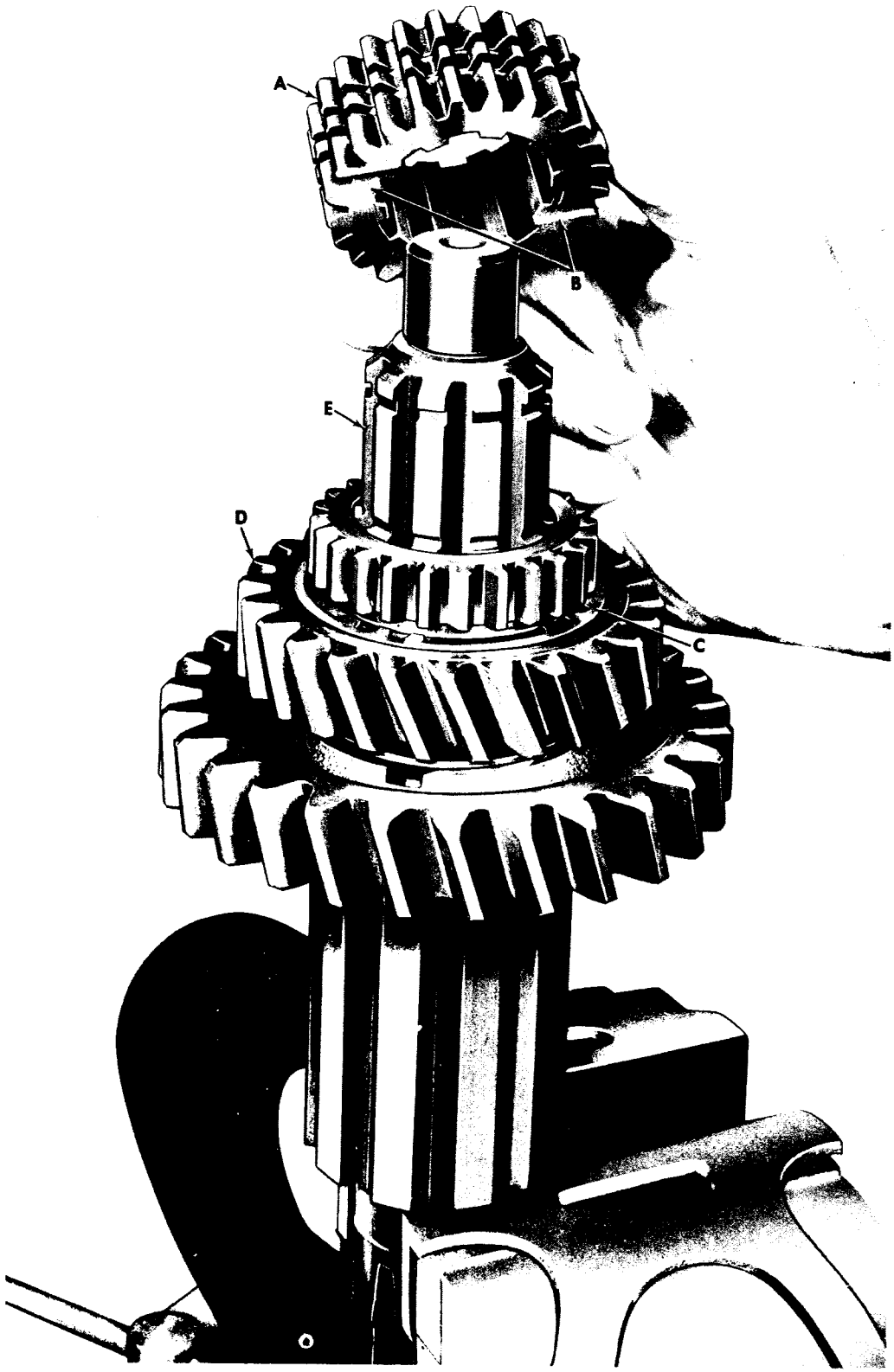


Figure 27. Installing synchronizer clutch gear on main shaft.

A—Synchronizer clutch gear CC-1664335
B—Oil grooves
C—Third speed gear shim:
0.009–0.011 inch thick 7057627
0.014–0.016 inch thick 7057628
D—Third speed gear 7057631
E—Main shaft 7057635

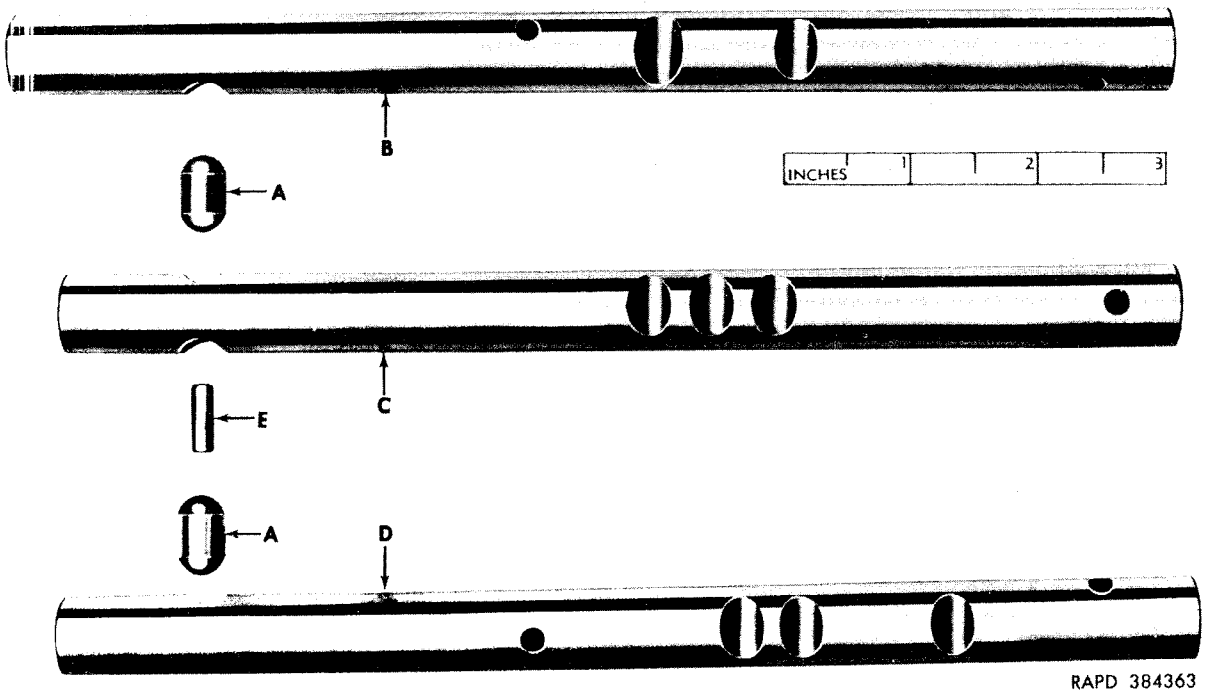
Figure 27—Continued.

b. Install Shift Rail Interlock Plungers.

Note. The key letters shown below in parentheses refer to figure 28.

(1) Place the transmission case cover in a vise, upside down, to facilitate assembly of the parts.

(2) Coat the two shift rail interlock plungers (A) with universal gear lubricant and install in the drilled passage at the end of the transmission case cover. The installation of these plungers can be accomplished through the gear shift rail holes in the cover boss. Aline the interlock plungers so that one plunger will be between the reverse gear shift rail (B) and the third speed and direct drive shift rail (C), and the other plunger will be between the third speed and direct drive shift rail (C) and the first and second speed shift rail (D).



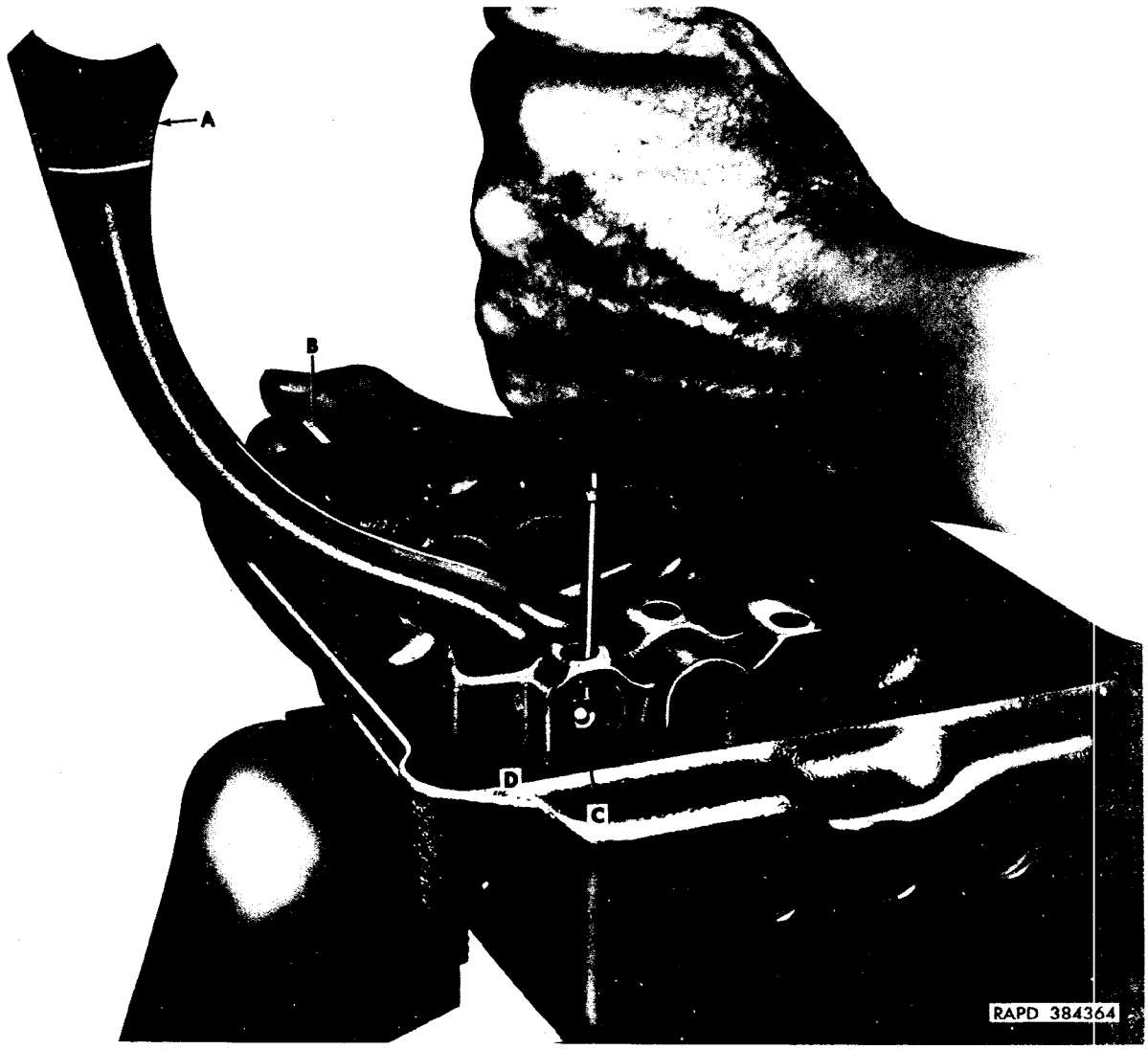
A—Gear shift rail interlock plunger 5250608 (2 reqd)
B—Reverse gear shift rail 7057640
C—Third speed and direct drive gear shift rail 7057639
D—First and second speed gear shift rail 7057641
E—Gear shift rail interlock pin 7373633

Figure 28. Shift rails showing interlock plungers and pin—top view.

c. Install Reverse Shift Rail.

Note. The key letters shown below in parentheses refer to figure 29 except where otherwise indicated.

(1) Insert the reverse gear shift rail (B) in the case cover with the slot for the interlock plunger at the rear, and place the reverse shift fork (A) on the rail. Then, push the rail in the case cover until it just enters the hole in the boss across the center of the cover.

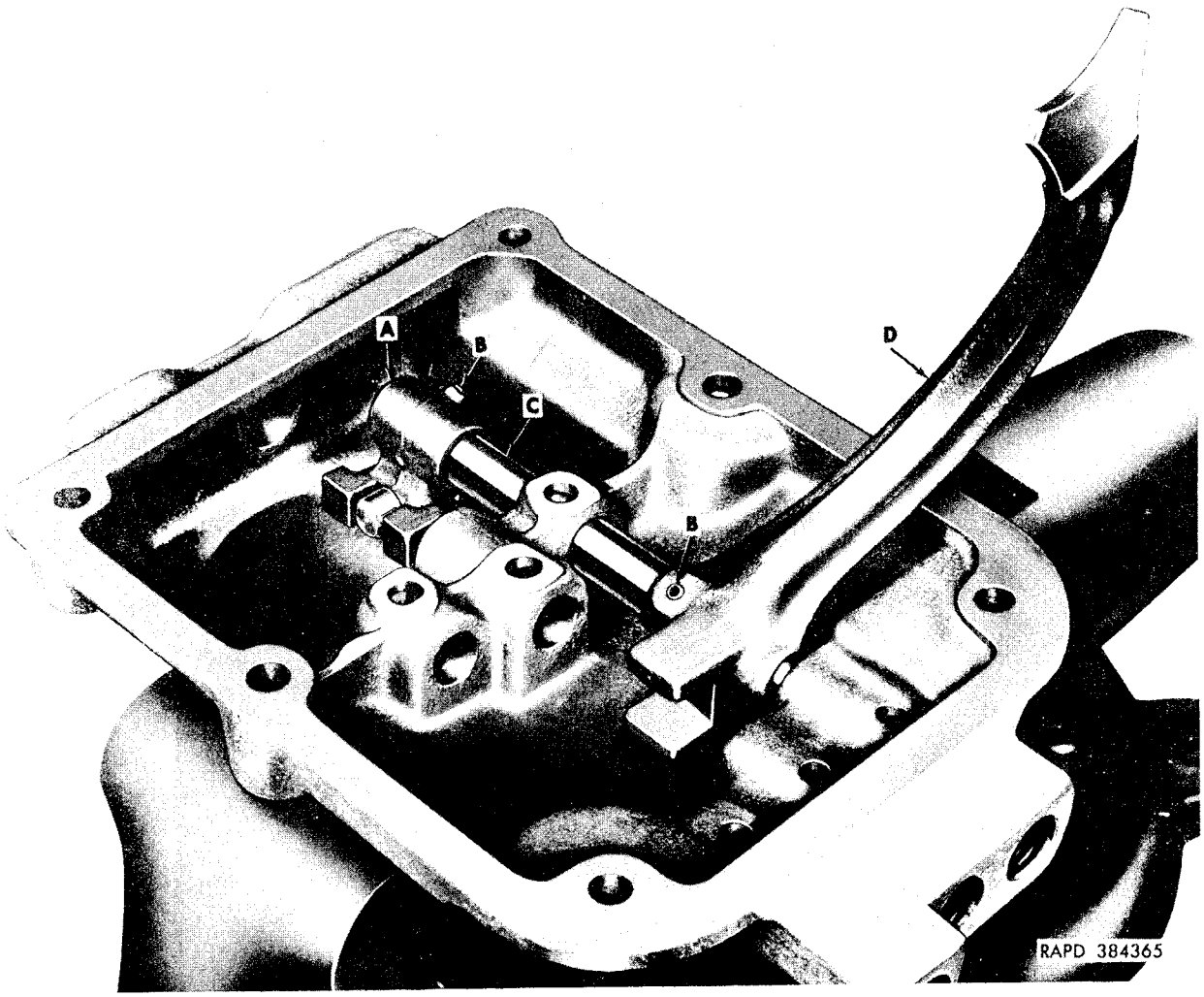


A—Reverse gear shift fork 7057648
B—Reverse gear shift rail 7057640
C—Gear shift rail poppet ball CC–147500
D—Drilled recess for gear shift rail poppet ball and spring

Figure 29. Installing reverse shift rail over poppet ball.

(2) Place the gear shift rail poppet ball spring (V, fig. 18) and the ball (W, fig. 18) in the drilled recess (D) of the cover center boss and hold the ball (C) down against the spring tension with a $\frac{3}{16}$-inch drift. Force the shift rail (B) in against the drift and remove the drift when the rail starts over the poppet ball. Then, push the rail through the boss.

(3) Position the reverse shift rail lug assembly (A, fig. 30) on the shift rail (C, fig. 30) and push the rail forward in the cover until the pin holes in the lug and the shift fork (D, fig. 30) can be alined with the corresponding pin holes in the shift rail.



A—Reverse gear shift rail lug assembly CC–1664353
B—Roll pin 7057647 (2 reqd)
C—Reverse gear shift rail 7057640
D—Reverse gear shift fork 7057648

Figure 30. View showing reverse shift rail, fork, and lug assembly installed in transmission case cover.

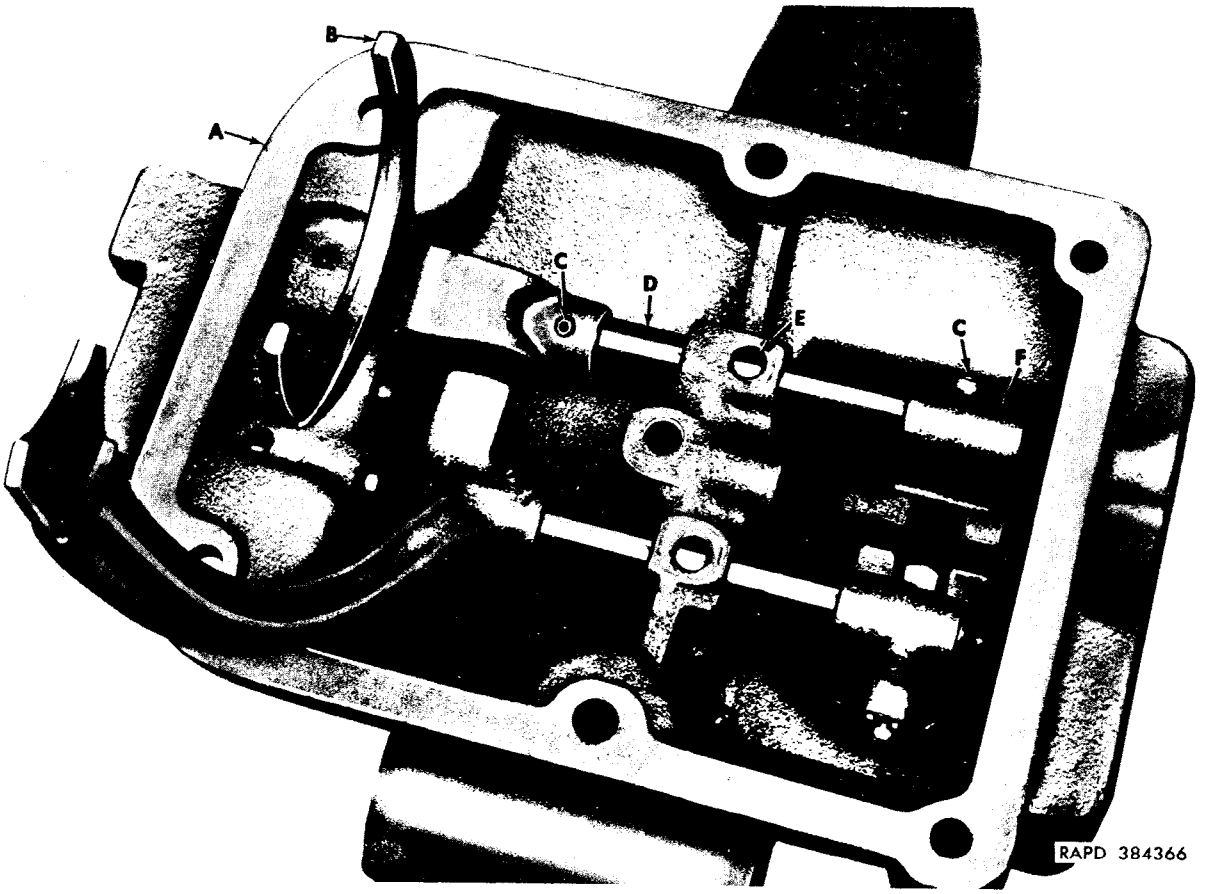
(4) Install new roll pins (B, ng. 30) in the reverse shift rail fork and lug assembly.

d. Install First and Second Speed Shift Rail.

Note. The key letters shown below in parentheses refer to figure 31 except where otherwise indicated.

(1) Insert the first and second speed shift rail (D) in the transmission case cover (A) with the slot for the interlock plunger at the rear and place the first and second speed shift fork (B) on the rail.

(2) Place the first and second speed shift rail poppet ball spring (V, fig. 18) and the poppet ball (W, fig. 18) in the drilled recess (E) of the cover center boss and hold the ball down against the spring tension with a $\frac{3}{16}$-inch drift as in *c* above. Then, push the shift rail (D) into the center boss of the cover and remove the



A—Case cover CC–1666553
B—First and second speed gear shift fork 7057642
C—Roll pin 7057647 (2 reqd)
D—First and second speed gear shift rail 7057641
E—Drilled recess for gear shift rail poppet ball and spring
F—First and second speed shift rail lug 7057645

Figure 31. View showing reverse shift rail and first and second speed shift rail installed in transmission case cover.

dift after the rail starts over the poppet ball.

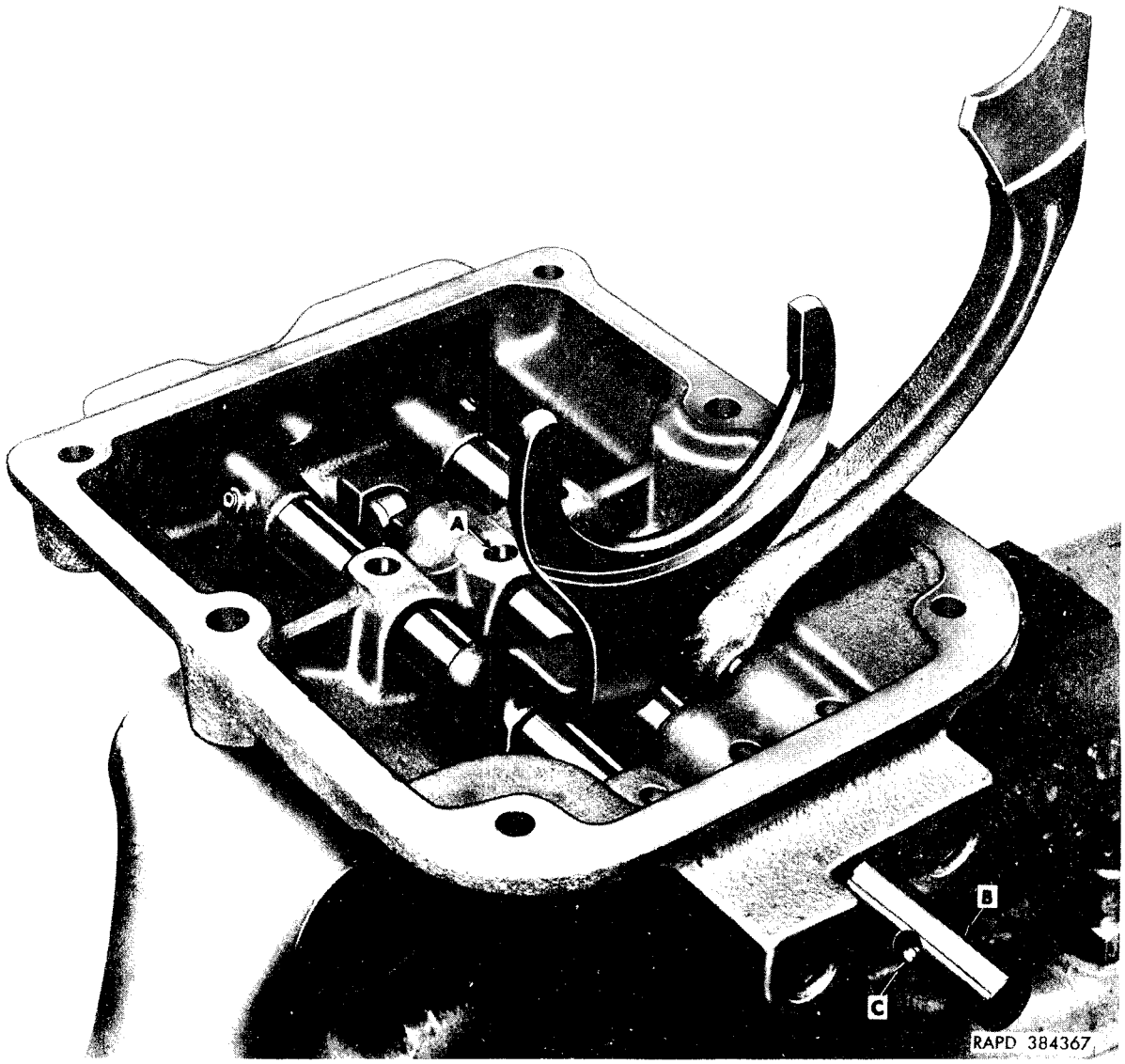
(3) Continue to push the shift rail (D) through the cover boss and install the first and second speed shift rail lug (F).

(4) Aline the pin holes in the first and second speed shift rail fork (B) and the shift rail lug (F) with the mating holes in the shift rail (D). Install new roll pins (C).

e. Install Third Speed and Direct Drive Shift Rail.

Note. The reverse shift rail and the first and second speed shift rails must be in their neutral positions with the interlock plungers in the rail slots to prevent interference with the interlock plungers when the third speed and direct drive shift rail is installed.

(1) Coat the interlock pin (C, fig. 32) with universal gear lubricant and install it in the hole in the rear end of the third speed and direct drive gearshift rail (B, fig. 32).



A—Drilled recess for gear shift rail poppet ball and spring
B—Third speed and direct drive gearshift rail 7057639
C—Gearshift rail interlock pin 7373633

Figure 32. Installing third speed and direct drive shift rail.

(2) Insert the shift rail in the transmission case cover and push it in close to the center boss of the cover.

(3) Install the third speed and direct drive shift rail poppet ball spring (V, fig. 18) and the poppet ball (W, fig. 18) in the drilled recess (A, fig. 32) of the cover center boss, and hold the ball down against the spring tension with a $\frac{3}{16}$-inch drift as in *c* above. Then, continue to push the shift rail through the cover boss after removing the drift and install the third speed and direct drive shift fork (B, fig. 22).

(4) Aline the pin holes in the shift fork with the mating hole in the shift rail. Install a new roll pin (Q, fig. 18).

(5) Remove the transmission case cover from the vise.

f. Install Shift Lever and Related Parts.

(1) Place the transmission case cover in a vise, right side up, and install the shift lever (D, fig. 20) in the tower of the cover, followed by the shift lever ball spring (E, fig. 18) and the shift lever ball spring cup (D, fig. 18).

(2) Install the shift lever ball spring retainer (C, fig. 18) by forcing the cap down against the spring tension and turning it clockwise for engagement with the guide pins (B, fig. 18).

(3) Remove the transmission case cover from the vise.

g. Install Gearshift Rail Hole Plugs.

(1) Test all of the shift rails for proper operation.

Note. The gearshift rail hole plugs must be installed with the convex surface out and driven in place with a flat drift of approximately the same diameter as the plugs.

(2) Install new plugs (A, fig. 18) in the shift rail holes in the transmission case cover. Plugs (A, fig. 18) at the opposite end of the cover need not be replaced unless damaged or leak lubricant.

Section VI. ASSEMBLY OF TRANSMISSION FROM SUBASSEMBLIES

35. General

Before installing the transmission subassemblies, it is important to remove all traces of dirt or rust-preventive compounds.

36. Install Power Takeoff Opening Covers (fig. 4)

Position the power takeoff opening covers (RR) and new gaskets (SS) on the transmission case and install the screws and lockwashers (MM). Tighten the screws.

37. Install Filler and Drain Plugs in Transmission Case

Install the filler plug (V, fig. 4) and the drain plug (V, fig. 4) in the transmission case openings, using a $\frac{1}{2}$-inch socket wrench extension.

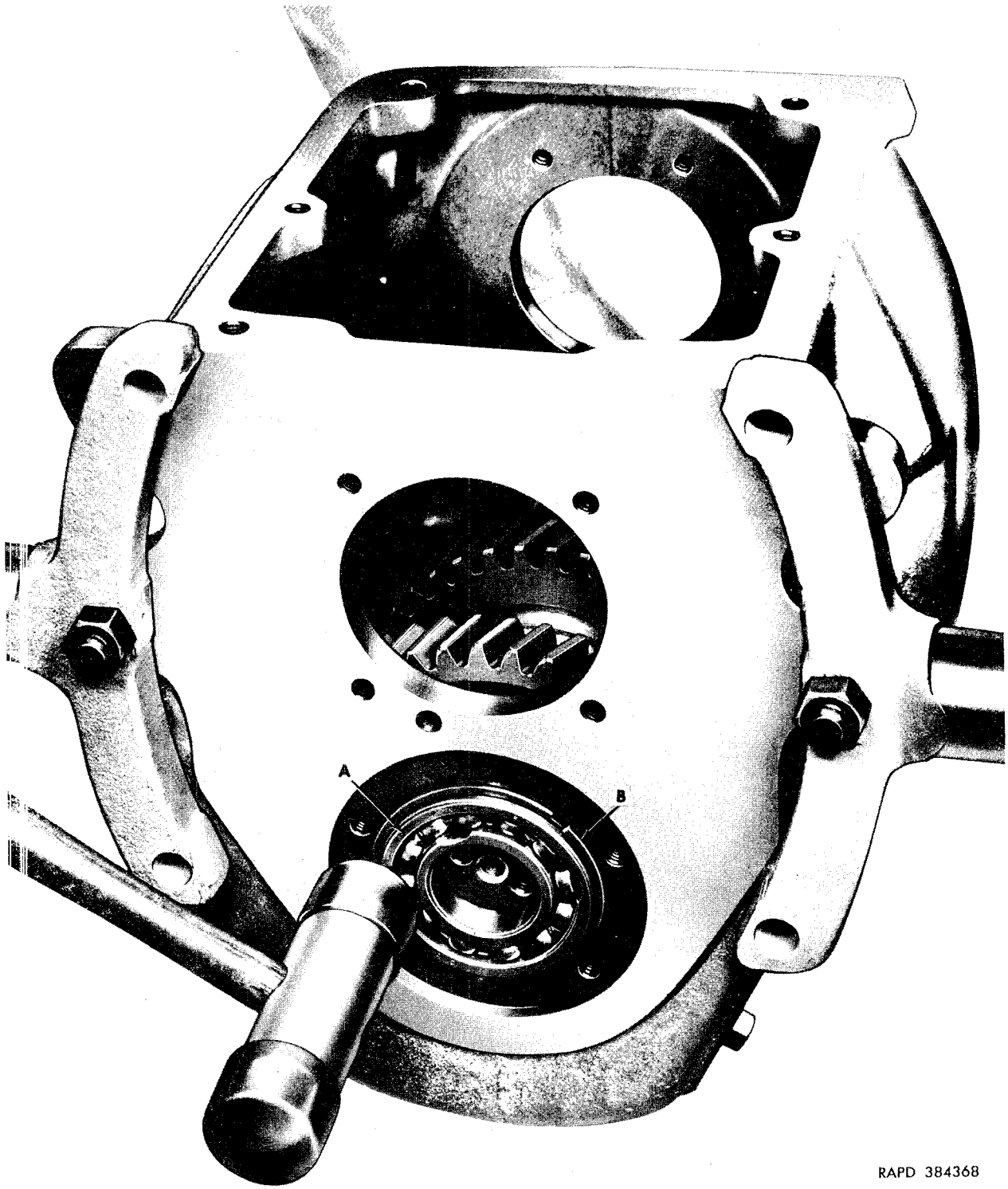
38. Install Countershaft and Bearings

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated.

a. Place the countershaft (B, fig. 14) in the transmission case (A, fig. 14), large gear forward, and extend the countershaft out through the rear bearing opening. Start the countershaft front ball bearing (A, fig. 33), snap ring (B, fig. 33) end out, into the case and on the shaft. While holding the rear end of the countershaft in approximate operating alinement, tap on the outer race of the bearing with a plastic hammer to force the bearing into position in the case opening. Tap the shaft through the bearing with a plastic hammer and install the countershaft retainer washer (UU) and the washer screws (VV). If difficulty is encountered in getting the countershaft through the bearing, perform the operations in *b* below, and use the retainer washer screws to pull the shaft through the bearing.

b. Place a brass drift between the large gear on the countershaft and the transmission case to prevent the countershaft from turing. Then, tighten the front bearing retainer washer screws (VV). Install lock wire (AH) through the screw heads. Remove the brass drift.

Note. The outside machined surface of the countershaft front bearing retainer (XX) must be at the top.



RAPD 384368

A—Front bearing assembly 70C952
B—Bearing snap ring (part of front bearing assembly 70C952)

Figure 33. Installing countershaft ball bearing.

c. Position the new countershaft front bearing retainer gasket (WW) and the bearing retainer (XX) on the transmission case. Install the screws and lockwashers (KK). Tighten the screws.

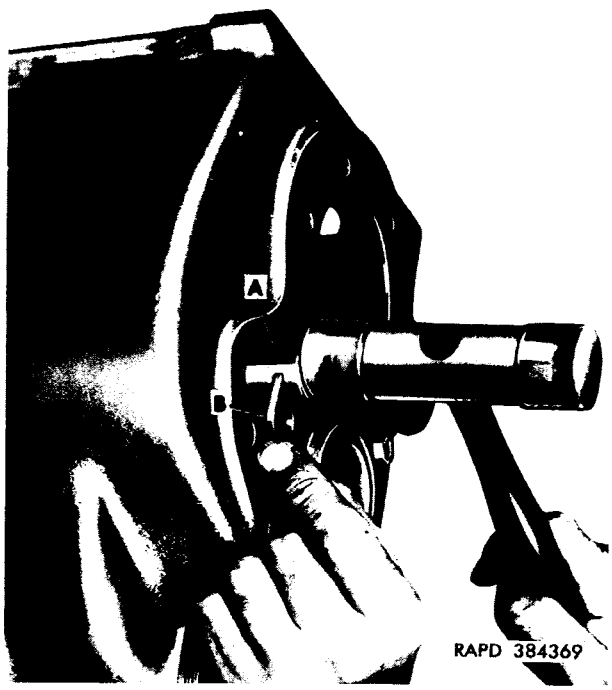
d. If inspection reveals that replacement of the countershaft rear bearing assembly (JJ) is necessary, coat the outside surface of the new bearing with a plastic-type gasket cement and press the bearing into the bearing retainer (LL) until the outside surfaces of the bearing and retainer are flush. After installation, the rollers must be free to turn.

e. Position the new countershaft rear bearing retainer gasket (QQ) and the bearing retainer assembly on the transmission case.

f. Install the screws and lockwashers (KK) to attach the bearing retainer to the transmission case. Tighten the screws.

39. Install Reverse Idler Gear and Bushing Assembly

Place the reverse idler gear and bushing assembly (A, fig. 13) in the transmission case with the large gear toward the rear. Insert the reverse idler gear shaft (A, fig. 34) in the hole in the transmission case with the slot in the shaft for the lock plate (B, fig. 34) at the bottom. Hold the lock plate in the shaft slot as the shaft is installed so that it will not be driven in too far. Aline the lock plate and install the screw and lockwasher (MM, fig. 4). Tighten the screw.



A—Reverse idler gear shaft 7373623
B—Reverse idler gear shaft lock plate 7373620

Figure 34. Installing reverse idler gear shaft.

40. Install Main Shaft Assembly

Note. The key letters shown below in parentheses refer to figure 36 except where otherwise indicated.

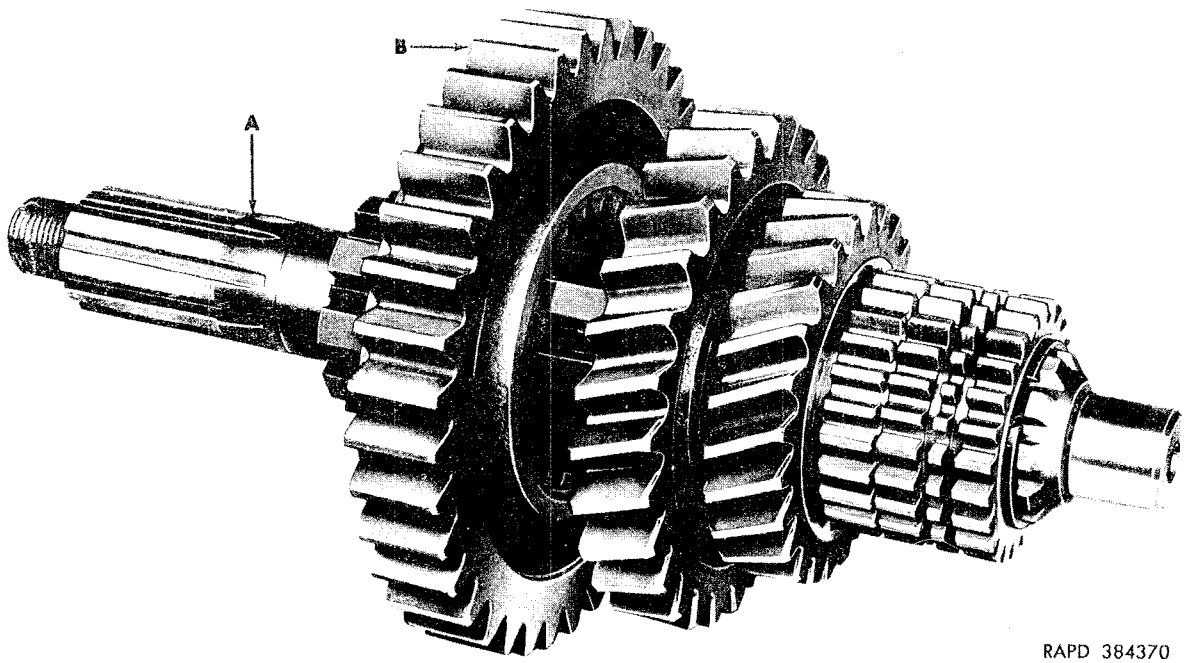
a. General. It is necessary to partially install both the main shaft assembly and the main drive gear assembly to check and correct any desirable end play of the synchronizer assembly.

b. Install Main Shaft Assembly in Transmission Case.

(1) Hold the first and second speed sliding gear (B, fig. 35) on the main shaft (A, fig. 35) and place the assembly in the transmission case so that the rear end of the shaft will protrude out through the bearing opening in the case.

Note. When installing the synchronizer assembly, make sure the outer stop rings are alined on the inner ring.

(2) Move the shaft assembly to the rear of the transmission case and install the synchronizer assembly, consisting of the outer stop rings (A, fig. 9), the inner ring and pin assemblies (B, fig. 9), and the sliding clutch (C, fig. 9).



A—Main shaft 7057635
B—First and second speed sliding gear 7057632

Figure 35. Main shaft assembly with first and second speed sliding gear—less synchronizer assembly.

(3) Install the main shaft ball bearing (B) with the snap ring (A) toward the rear end of the shaft (C).

Caution: **Do not drive the main shaft bearing on the shaft with a hammer as this will damage the bearing balls and races.**

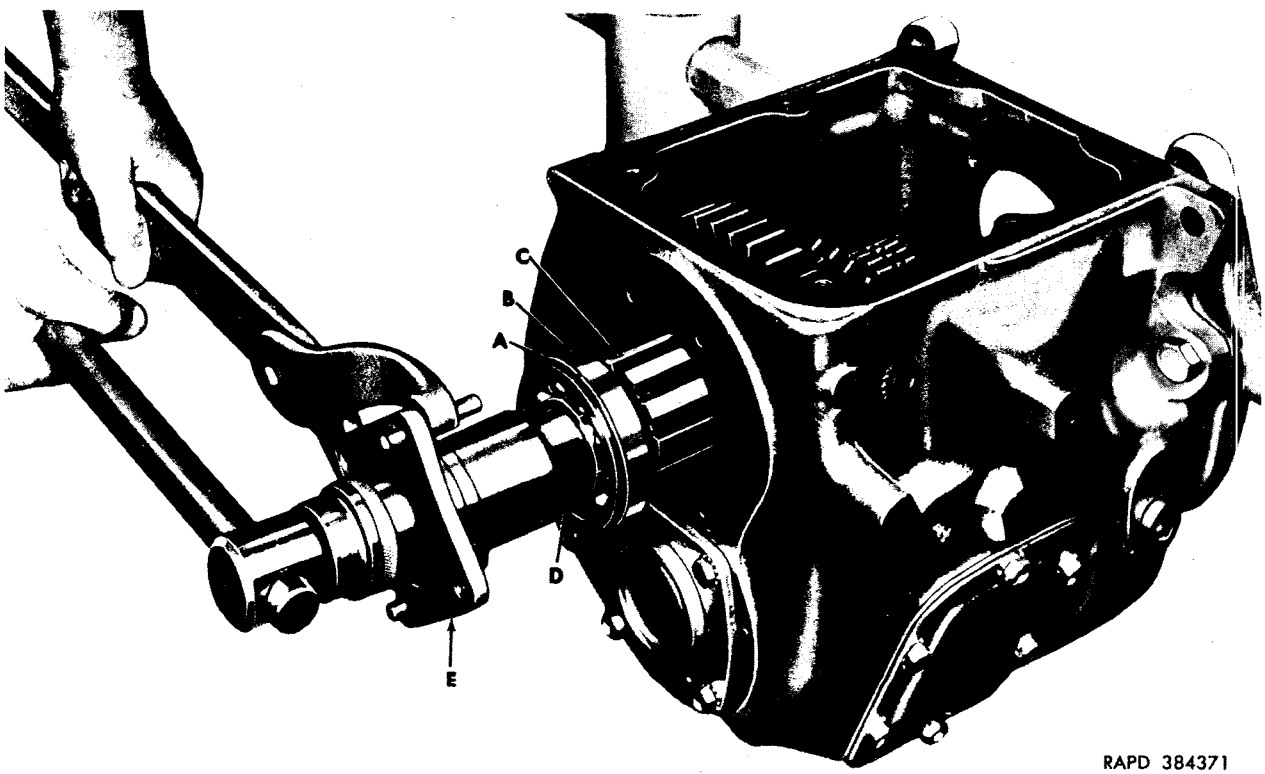
(4) If ball bearing is a tight fit on the shaft, install the bearing spacer (D), the companion flange (E), the companion flange washer (EE, fig. 4), and the companion flange retaining nut (FF, fig. 4). Hold the companion flange with a wrench and tighten the companion flange nut until the ball bearing is firmly seated against the shaft shoulder.

Caution: **Do not force the main shaft bearing in the transmission case by striking the end of the shaft, as this will damage the bearing balls and races.**

(5) Position the main shaft assembly so the synchronizers are properly alined and start the ball bearing (B) in the transmission case. Force the ball bearing in the case by striking the outer ball race with a plastic hammer until the bearing snap ring is firmly seated against the case.

(6) Remove the companion flange nut, washer, and companion flange from the main shaft.

(7) Make a temporary installation of the main shaft bearing retainer (BB, fig. 4) and the gaskets (AA, fig. 4). Make sure that the oil holes in the gaskets aline with the oil return hole in the transmission case. The pur-



RAPD 384371

A—Bearing snap ring (part of bearing assembly 700909)
B—Bearing assembly 700909
C—Main shaft 7057635
D—Bearing spacer-CC-1269283
E—Companion flange CC-1268312

Figure 36. Installing main shaft ball bearing—holding companion flange with wrench.

pose of this temporary installation is to insure proper positioning of the main shaft ball bearing during the measuring of the synchronizer end play as described in paragraph 42.

41. Install Main Drive Gear Assembly

Caution: **Do not strike the end of the main drive gear to force the ball bearing into the transmission case, as this will damage the bearing balls and races. Strike the outer race of the ball bearing to force the bearing in the transmission case.**

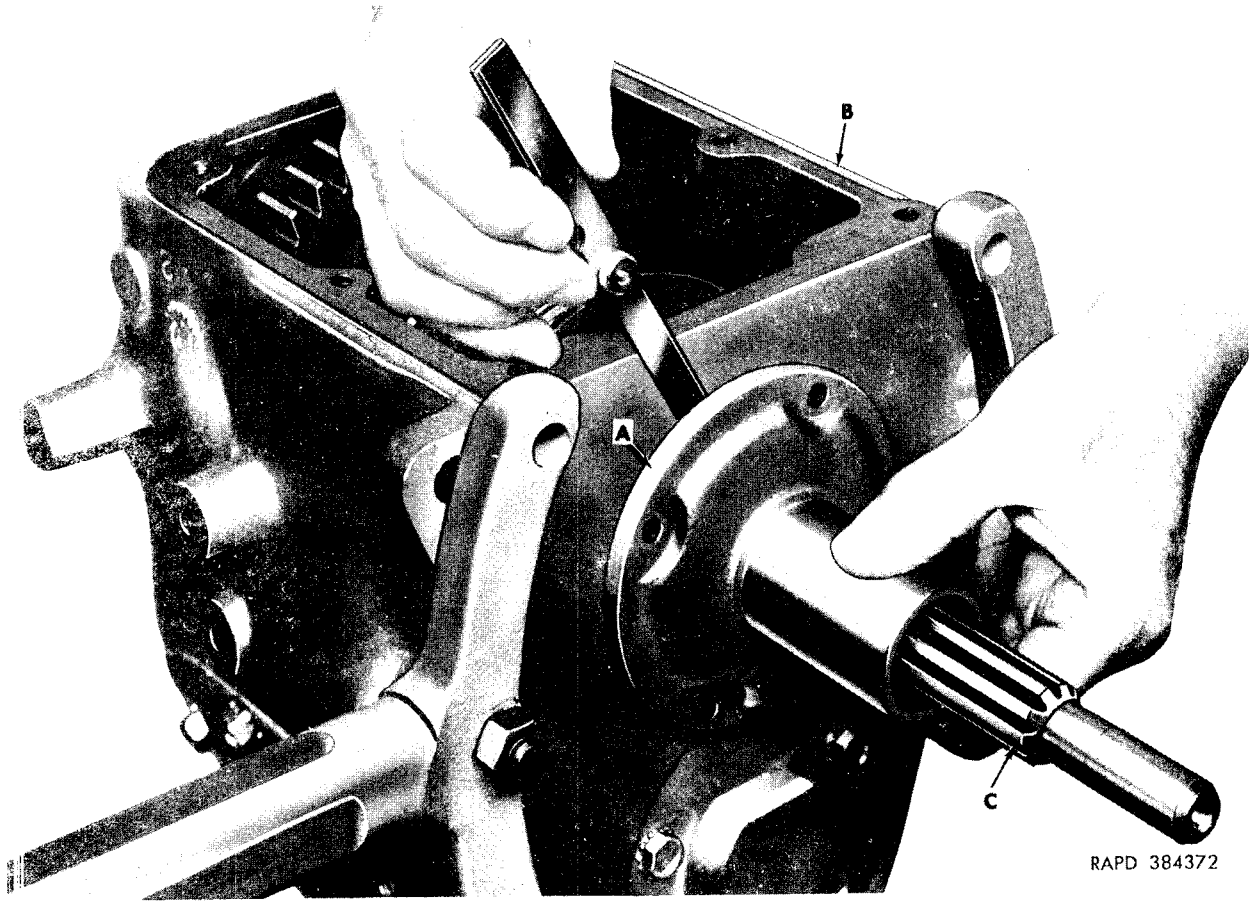
Rotate the main drive gear (A, fig. 8) so that the open space of clutch gear teeth (B, fig. 8) in the gear teeth will be at the bottom alined with the front gear on the countershaft (C, fig. 8) to provide installation clearance. Then, install the drive gear assembly in the transmission case, tapping the bearing in position if necessary with a plastic hammer. Also, make certain that the gear is properly engaged with the internal teeth of the synchronizer outer stop ring (A, fig. 9).

42. Check Gasket Clearance Between Main Drive Gear Bearing Retainer and Transmission Case

(fig. 37)

a. Place the main drive gear bearing retainer (A) without the gasket in position over the shaft end of the gear (C).

b. Hold the bearing retainer tight against the bearing and measure the clearance between the retainer (A) and the transmission case (B) with a feeler gage.



A—Bearing retainer 7057659
B—Case CC–1796969
C—Drive gear 7057654

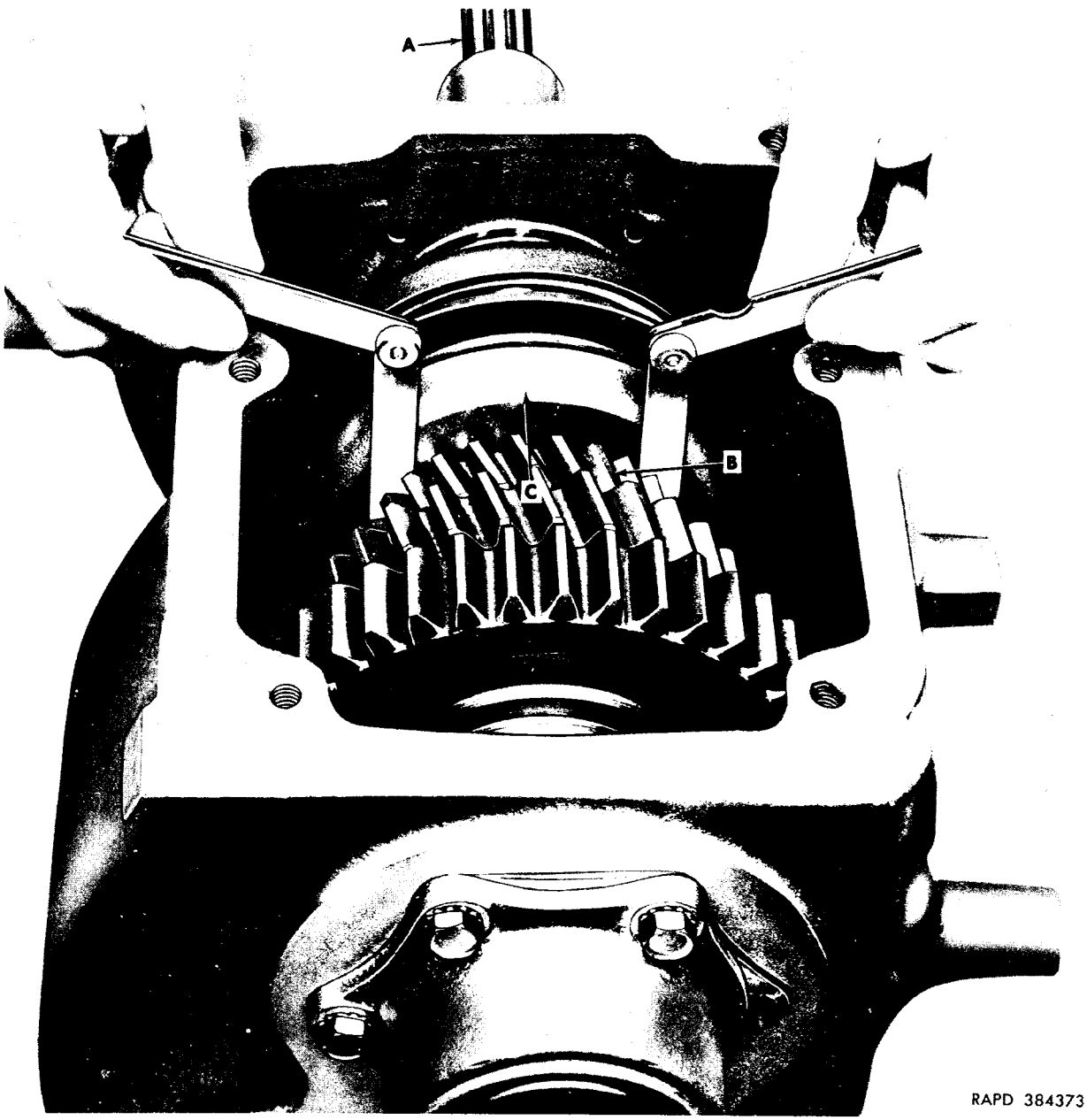
Figure 37. Checking for gasket thickness between main drive gear bearing retainer and transmission case.

Note. The clearance between the main drive gear bearing retainer and the transmission case may require the use of more than one gasket.

c. Select a gasket approximately 0.005 inch thicker than the measured clearance between the main drive gear bearing retainer and the transmission case and temporarily install the retainer and gasket or gaskets. Make sure that the oil hole in the gasket alines with the oil return hole in the transmission case.

43. Check End Play of Synchronizer Assembly

Note. The key letters shown below in parentheses



A—Main drive gear 705654
B—Third speed gear 7057631
C—Synchronizer outer stop ring CC-1669893

Figure 38. Checking end play of synchronizer assembly with thickness gages.

refer to figure 38 except where otherwise indicated. This operation of checking end play of the synchronizer assembly must be carefully performed to insure satisfactory operation of the transmission.

a. Aline the synchronizer inner and outer rings and force the synchronizer assembly forward against the main drive gear (A).

b. With two thickness gages placed diagonally opposite each other, measure the space or clearance between the rear stop ring (C) and the third speed gear (B). A clearance of 0.050 to 0.070 inch is necessary to give the synchronizer the proper amount of float.

c. If the clearance between the rear stop ring and third speed gear is insufficient or excessive, remove the main drive gear (A) and the main shaft ball bearing retainer (BB, fig. 4) and gaskets (AA, fig. 4) and drive the main shaft (K, fig. 4) back far enough to remove the synchronizer parts. Replace the third speed gear shim (F, fig. 4) with one of the required thicknesses. Shims are available in thicknesses of 0.010 and 0.015 inch. Install the main shaft assembly and the main drive gear assembly (pars. 40 and 41).

44. Install Main Drive Gear and Main Shaft Bearing Retainers (fig. 4)

Note. Care must be taken when installing the main drive gear and the main shaft bearing retainers, to aline the oil holes in the gaskets with the oil return holes in the transmission case.

a. Prepare a new oil seal (CC) for assembly into the bearing retainer (BB) by soaking it in castor oil or Neatsfoot oil for about 30 minutes and work the leather by rolling with a smooth round bar before installing.

b. Coat the outside surface of the oil seal with plastic-type gasket cement and position the seal in the bearing retainer with the edge of the leather toward the transmission case and drive the seal in flush with the outer edge of the retainer.

c. Install the rear bearing spacer (Z) on the main shaft. Position the gaskets (AA) and the bearing retainer (BB) on the transmission case and install the five screws and lockwashers (HH). Tighten the screws.

d. Position the gaskets (ZZ) and the main drive gear bearing retainer (YY) on the transmission case. Install the four screws and lockwashers (KK). Tighten the screws.

45. Install Companion Flange on Main Shaft (fig. 4)

a. Install the companion flange (DD) followed by the flange washer (EE) and the flange nut (FF). Engage the first and second speed sliding gear (S) with the reverse idler gear and bushing (T) and the synchronizer sliding clutch (C) with the main drive gear (AD) and clutch gear (E), which will lock the main shaft assembly so that the companion flange nut can be tightened. Tighten the companion flange nut to 140 to 160 pound-feet torque with a torque indicating wrench. Install a new cotter pin (GG).

b. Place the first and second speed sliding gear and the synchronizer sliding clutch in their neutral positions.

46. Install Transmission Case Cover Assembly

Note. The key letters shown below in parentheses refer to figure 4 except where otherwise indicated. Extreme care must be exercised in the installation of the transmission case cover to insure satisfactory operation of the transmission.

a. Place the synchronizer clutch (A, fig. 39) and the first and second speed sliding gear (B, fig. 39) in their neutral positions.

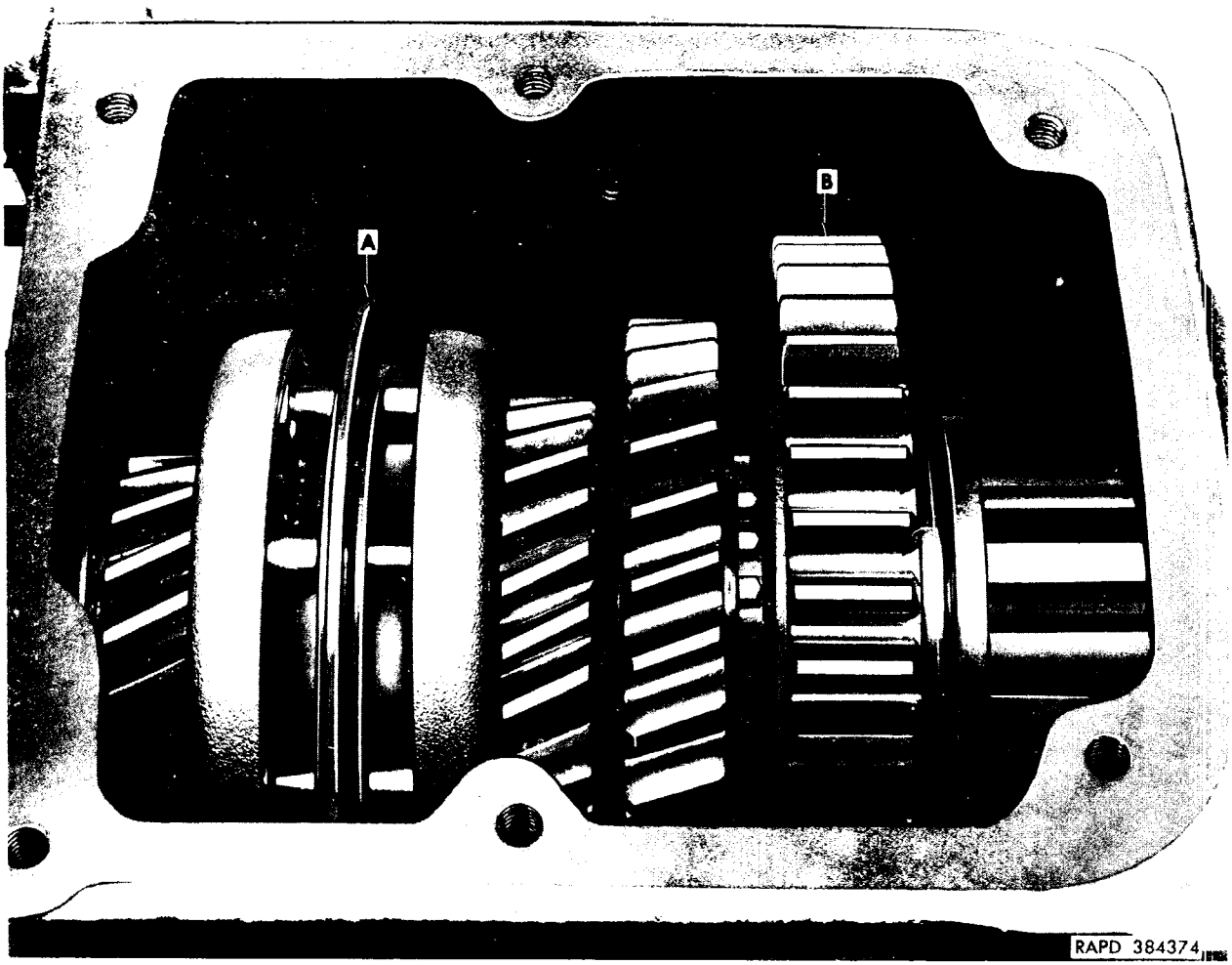
b. Place a new cover gasket (W) on the transmission case. Install the cover assembly (A, fig. 5) on the case (C, fig. 5) carefully engaging the shift forks with the proper gears.

c. Install the center pilot screws (M and P) and lockwashers (N) and check the operation of the transmission gears by shifting the gears into the various speed positions.

d. Install the remaining four cover retaining screws and lockwashers (L and Q). Tighten all screws.

47. Transmission Lubrication

Refer to Section I of this chapter and TM 9–840 and install the required quantity of universal gear lubricant in the transmission. Rotate the main drive gear (AD, fig. 4) sufficiently to insure distribution of the lubricant over all parts.



A—Synchronizer sliding clutch CC–1664334
B—First and second speed sliding gear 7057632

Figure 39. View showing transmission gears in neutral for installation of cover assembly.

Section VII. TRANSMISSION ASSEMBLY TEST

48. General

If the transmission and its component parts have been correctly assembled, the internal gears will rotate freely and without bind, when the main shaft companion flange is turned by hand.

49. Procedure

To test the transmission assembly, turn the companion flange (DD, fig. 4) through at least eight complete revolutions in each gear position. Begin with the gears in neutral position and proceed through each of the five gear positions. Do not expect the gears to spin or "coast," but they should turn freely under normal hand pressure. There are no parts in a transmission assembly that are expected to "wear-in." If there is any bind, noise, or looseness in the transmission assembly, the transmission must be disassembled and the cause found and corrected before releasing the transmission for use in a vehicle. Upon completion of tests, remove drain plug (V, fig. 4) and drain lubricant from transmission case. Transmission lubricant is not to be added until the transmission is installed in the vehicle.

CHAPTER 5

REPAIR AND REBUILD STANDARDS

50. General

The repair and rebuild standards included herein give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement, in order to receive maximum service with minimum replacement. Normally, all parts which have not been worn beyond the dimensions shown in the "Wear limits" column or damaged from corrosion will be approved for service. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond the limits given in the "Sizes and fits of new parts" column. In the "Sizes and fits of new parts" column, the letter L indicates a loose fit (clearance) and the letter T indicates a tight fit (interference).

51. Main Drive Gear Assembly

(par. 30)

a. Drive Gear.

Figure No.	Reference letter	Point of measurement	Sizes and fits of new parts	Wear limits
40	B	Outside diameter of end	0.747 to 0.748	0.745
	C	Outside diameter of spiral threads	1.374 to 1.376	1.373
	D	Outside diameter for bearing	1.7712 to 1.7717	(*)
	E	Inside diameter of gear	1.5478 to 1.5484	1.5504
	V–D	Fit of bearing on gear	0.0005L to 0.0005T	

b. Main Shaft Pilot Bearing.

40	F	Outside diameter of roller	0.2810 to 0.2812	0.2809

c. Drive Gear Bearing.

40	U	Outside diameter	3.3460 to 3.3465	(*)
		Inside diameter of case bore	3.466 to 3.3471	(*)
		Fit of bearing in case bore	0.0011Lto 0.0005T	(*)
	V	Inside diameter	1.7712 to 1.7717	(*)

d. Drive Gear Bearing Retainer.

40	A	Outside diameter	1.744 to 1.746	1.742
	T	Inside diameter	1.381 to 1.383	1.385
	T–C	Fit over spiral threads	0.005L to 0.009L	

52. Main Shaft Assembly and Related Parts

(par. 30)

a. Main Shaft.

40	G	Outside diameter of end	0.9835 to 0.9839	0.9815
	H	Outside diameter for third speed gear	1.7490 to 1.7495	1.748
	J	Outside diameter for second speed gear	2.1245 to 2.1250	2.1235
	K	Outside diameter for rear bearing	1.3775 to 1.3780	(*)

b. Third Speed Gear.

40	Z	Inside diameter	1.7515 to 1.7520	1.753
	Z–H	Fit on main shaft	0.002L to 0.003L	

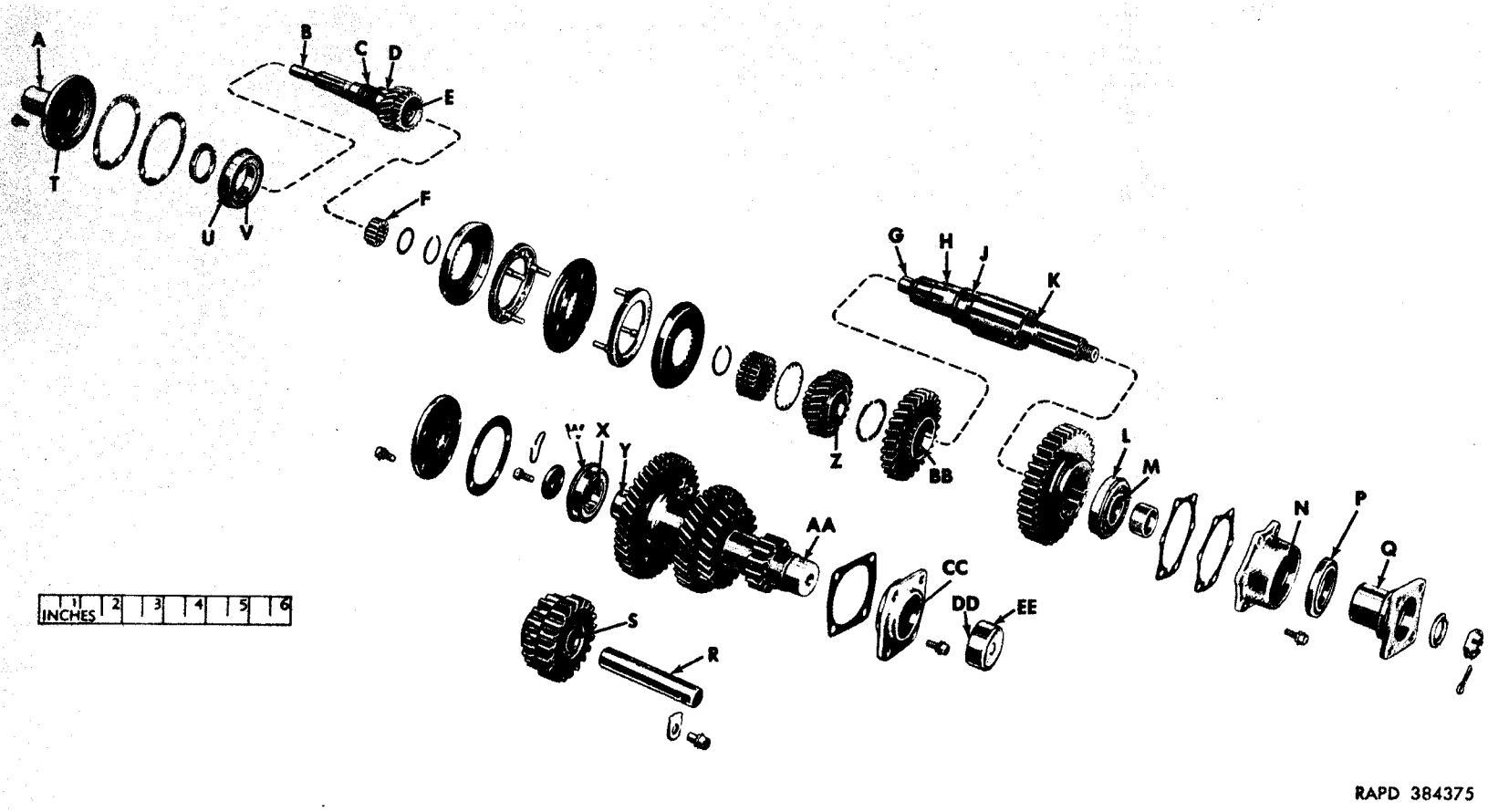


Figure 40. Repair and rebuild standard points of measurement for the various gears, shafts, and synchronizer parts.

Figure No.	Reference letter	Point of measurement	Sizes and fits of new parts	Wear limits
c. Second Speed Gear.				
40	BB	Inside diameter	2.1265 to 2.1270	2.128
	BB–J	Fit on main shaft	0.001L to 0.0025L	
d. Main Shaft Rear Bearing.				
40	L	Outside diameter	3.1491 to 3.1496	(*)
		Inside diameter of case bore	3.1497 to 3.1502	(*)
		Fit of bearing in case bore	0.0001L to 0.0011L	
	M	Inside diameter	1.3775 to 1.3780	(*)
	M–K	Fit on main shaft	0.0005L to 0.0005T	
e. Rear Bearing Retainer and Oil Seal.				
40	N	Inside diameter of retainer bore	3.061 to 3.063	(*)
	P	Outside diameter of oil seal	3.064 to 3.068	(*)
	P–N	Fit of oil seal in retainer	0.001T to 0.007T	
f. Companion Flange.				
40	Q	Outside diameter	2.125 to 2.130	2.123
	P–Q	Fit in oil seal	Must be smooth and free of nicks	

53. Reverse Idler Gear and Bushing Assembly (par. 30)

40	S	Inside diameter	0.9895 to 0.9905	0.992
	R	Outside diameter of shaft	0.9872 to 0.9877	0.9855
	R–S	Fit on shaft	0.0018L to 0.0033L	

54. Countershaft (par. 30)

a. Countershaft.

40	Y	Front end outside diameter for bearing	1.3775 to 1.3780	(*)
	AA	Rear end outside diameter for bearing	1.7495 to 1.7500	1.748

b. Front Bearing.

40	W	Outside diameter	2.8341 to 2.8346	(*)
		Inside diameter of case bore	2.8347 to 2.8352	(*)
		Fit of bearing in case bore	0.0001L to 0.0011L	
	X	Inside diameter	1.3775 to 1.3780	(*)
	X–Y	Fit on countershaft	0.0005L to 0.0005T	

c. Rear Bearing and Retainer.

40	CC	Inside diameter of retainer bore	2.1245 to 2.1255	(*)
	EE	Outside diameter of bearing	2.1245 to 2.1255	(*)
	CC–EE	Fit in retainer bore	0.001L to 0.001T	
	DD	Inside diameter of bearing	1.7505 to 1.7518	1.752
	DD–AA	Fit on countershaft	0.0005L to 0.00023L	

55. Transmission Torque Wrench Specifications

Figure No.	Reference letter	Location	Torque (ft-lb)
4	N	Cover screw—long	25
4	P	Cover pilot screw—short	25
4	R	Cover pilot screw—short	25
4	T	Cover screw—short	25
4	Y	Filler plug	30
4	JJ	Main shaft companion flange nut	140 to 160

Figure No.	Reference letter	Location	Torque (ft-lb)
4	LL	Main shaft bearing retainer screws	180 (in.-lb)
4	NN	Countershaft rear bearing retainer screws	180 (in.-lb)
4	QQ	Reverse idler gear shaft lock plate screw	25
4	UU	Drain plug	20
4	VV	Power-takeoff opening cover screws	25
4	AB	Countershaft retainer washer screws	20
4	AE	Countershaft front bearing retainer screws	180 (in.-lb)
4	AF	Main drive gear bearing retainer screws	180 (in.-lb)

APPENDIX I

REFERENCES

1. Publication Indexes

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

Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings.	DA Pam 108–1
Index of Administrative Publications	DA Pam 310–1
Index of Blank Forms	DA Pam 310–2
Index of Graphic Training Aids and Devices	DA Pam 310–5
Index of Supply Manuals—Ordnance Corps	DA Pam 310–29
Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.	DA Pam 310–4
Index of Training Publications	DA Pam 310–3

2. Supply Manuals

Introduction	ORD 1
Motor Vehicles, Trailers, and Cycles	SM 9–5–2300
Organizational Maintenance Allowances; Chassis, truck: ¾-ton, 4 x 4 M56; truck, ambulance: M43; truck, cargo: M37; truck, command: M42; truck maintenance: M201.	ORD 7 SNL G–741
Field and Depot Maintenance Allowances: Chassis, truck: ¾-ton, 4 x 4 M56; truck, ambulance: M43; truck, cargo: M37; truck, command: M42; truck maintenance: M201.	ORD 8 SNL G–741

3. Forms

DA Form 9–79, Parts Requisition
DA Form 9–80, Job Order File
DA Form 9–81, Exchange Part or Unit Identification Tag
DA Form 468, Unsatisfactory Equipment Report
DA Form 1546, Request for Issue or Turn-in

4. Other Publications

a. General.

Logistics (General): Motor Vehicles	AR 700–2300–1
Unsatisfactory Equipment Report	AR 700–38
Military Symbols	FM 21–30
Military Terms, Abbreviations, and Symbols:	
Authorized Abbreviations and Brevity Codes	AR 320–50
Dictionary of United States Army Terms	AR 320–5
Military Training	FM 21–5
Ordnance Service in the Field	FM 9–5
Packaging and Packing for Shipment and Storage of Spare Parts for Military Vehicles.	MIL–P–11443 (ORD)

Safety: Accident Reporting and Recording	AR 385–40
Techniques of Military Instruction	FM 21–6
b. Operation.	
Operation and Organizational Maintenance Manual ¾-ton 4 x 4 Cargo Truck M37, Command Truck M42, Ambulance Truck M43, Telephone installation Light Maintenance and Cable Splicing Truck V–41 ( )/GT.	TM 9–8030
c. Maintenance and Repair.	
Disposal of Supplies and Equipment: Uneconomically Repairable Ordnance Vehicles.	AR 755–2300–2
Welding Theory and Application	TM 9–237
Maintenance of Supplies and Equipment: Expenditure Limits for Repair of Tactical Type Transport Vehicles.	AR 750–2300–7
Ordnance Maintenance and General Supply in the Field	FM 9–10

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[AGO470.81 (3 June 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

L. L. LEMNITZER,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

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ASA (2)
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CofT (2)
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USCONARC (3)
US ARADCOM (2)
US ARADCOM Rgn (2)
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Mil Msn (1)
JBUSMC (2)
JUSMAC (Greece) (2)
Fld Comd, Def Atomic Spt Agcy (1)
Units org under fol TOE:
29–55 (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320–50.