CHAPTER 2

TRANSMISSION

TRANSMISSION

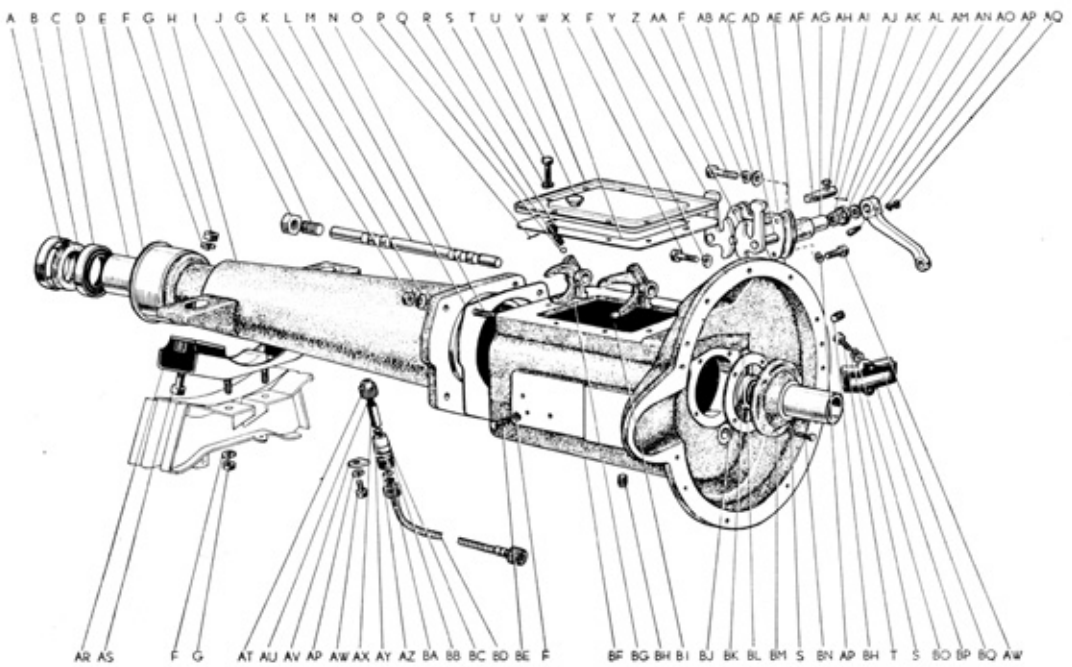

Fig. 2—1 Transmission

A Exteniosn Housing Felt Ring Cover
B Extension Housing Felt Ring
C Extension Housing Oil Retainer Complete
D Extension Housing Bushing
E Transmission Extension Housing Dust Cover
F Spring Washer
G Nut
H Transmiss'on Extension Housing
I Nut
J Gear Shift Fork Shaft Lock Screw
K Wave Washer
L Gear Shift Fork Shaft
M Extension Housing Packing
N Extension Housing Stud Bolt
O Cotter Pin
P Gear Shift Fork Lock Ball
Q Gear Shift Fork Lock Ball Spring
R Gear Shift Fork Plug
S Spring Washer
T Bolt
U Transmission Breather Complete
V Transmission Case Cover Complete
W Transmission Case Cover Packing
X Bolt
Y Low & Reverse Gear Shift Cam Complete
Z Top & Second Gear Shift Cam Complete
AA Bo't
AB Plate Washer
AC Gear Shift Cam Shaft
AD Gear Shitt Cam Retainer Packing
AE Gear Shift Cam Retainer
AF Gear Shift Inter-lock Pin
AG Gear Shift Cam Shaft Bushing
AH Gear Shift Cam Inter-lock Support Shaft Pin
AI Gear Shift Inter-lock Support Shaft
AJ Gear Shift Cam Oil Seal Cork
AK Cotter Pin
AL Gear Shift Cam Oil Seal Cork Cover
AM Plate Washer
AN Gear Shift Lever
AO Gear Shift Lever Lock Pin
AP Spring Washer
AQ Nut
AR Engine Rear Mounting Cushion Rubber Complete
AS Bolt
AT Speedometer Driven Gear

AU Speedometer Shaft
AV Speedometer Shaft Sleeve Stopper
AW Bolt
AX Speedometer Shaft Sleeve Bushing
AY Speedometer Shaft "O" Ring
AZ Speedometer Cable Shaft Packing Collar
BA Speedometer Cable Shaft Packing
BB Speedometer Shaft Sleeve
BC Speedometer Shaft Sleeve "O" Ring
BD Speedometer Flexible Tube Assembly
BE Bolt
BF Transmission Case
BG Low Speed Gear Shift Fork
BH Plug
BI High Speed Gear Shift Fork
BJ Transmission Front Bearing Lock Packing
BK Gear Fork Shaft Front Shim
BL Transmission Front Oil Seal Complete
BM Transmission Front Bearing Lock
BN Bolt
BO Plate Washer
BP Trasmission Case Hole Cover Packing
BQ Transmission Case Hole Cover

* * *

TRANSMISSION ASSEMBLY

Removal

1. Place vehicle on a lift or over a pit.
2. Drain lubricant from transmission.
3. Remove bolts retaining propeller shaft universal joint yoke to differential joint yoke retainer. Pull the propeller shaft out of transmission.

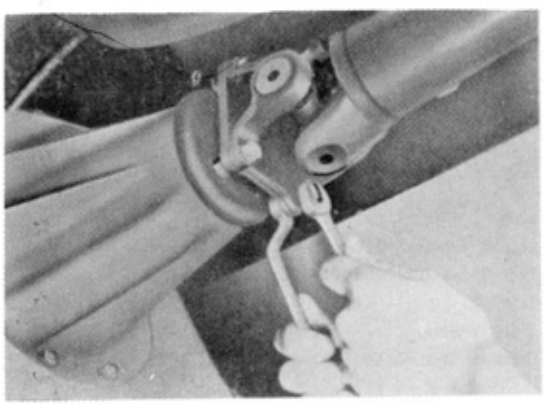

Fig. 2—2 Removing Propeller Shaft

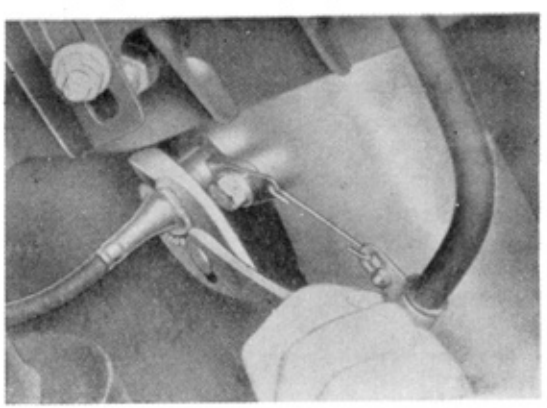

Fig. 2—3 Disconnecting Speedometer Cable

4. Support engine by placing a jack at rear part of engine.
5. Disconnect speedometer cable from speedometer driven gear fitting.
6. Remove clutch release cylinder attached to transmisson.

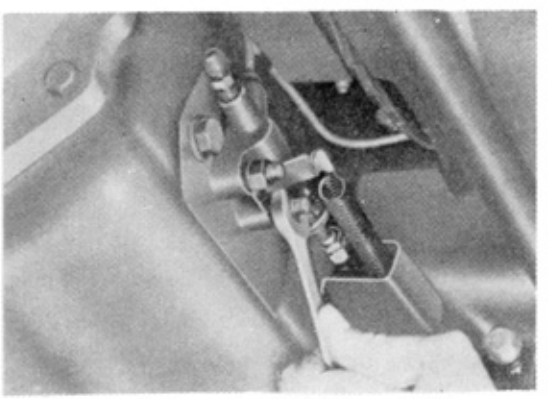

Fig. 2—4 Removing Clutch Release Cylinder

7. Disconnect control rods from the gear shift levers.

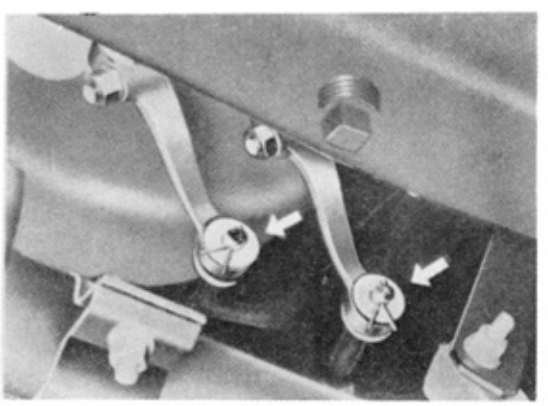

Fig. 2—5 Disconnecting Control Rods

8. Remove clutch housing under cover.

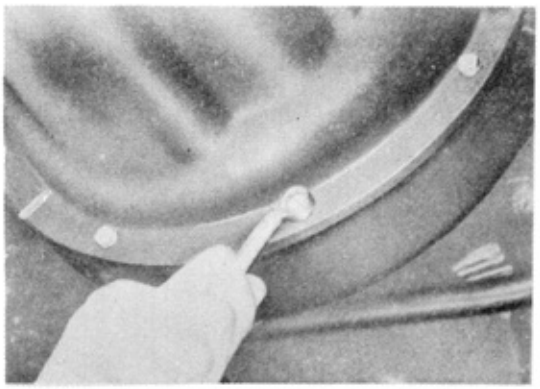

Fig. 2—6 Removing Clutch Housing Under Cover

9. Remove hand brake center lever wire guide and rear flexible wire.

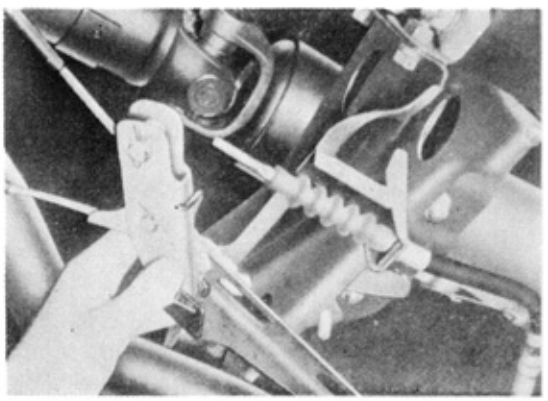

Fig. 2—7 Removing Rear Flexible wire

10. Remove clutch release pipe from transmission case cover.
11. Remove under floor crossmember center.

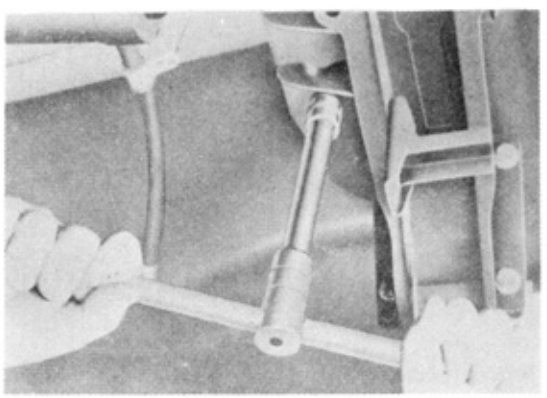

Fig. 2—8 Removing Crossmember Center

12. Remove clutch access hole cover in the vehicle, and unscrew bolts attaching transmission to the cylinder block.
13. Remove transmission from vehicle.
14. Pull out engine rear mounting cushion rubber from transmission.

Installation

1. Install engine rear mounting cushion rubber on the transmission.
2. Install transmission with front exhaust pipe clamp stay.
3. Tighten bolts attaching transmission to the cylinder block.
4. Connect clutch release pipe to the clamp.
5. Install under floor cross member center.
6. Install hand brake rear flexible wire and center lever wire guide.
7. Install clutch housing under cover.
8. Connect control rods to gear shift lever.
9. Install clutch release cylinder to the transmission.
10. Connect speedometer cable to speedometer driven gear fitting.
11. Install propeller shaft, and remove jack. (See page 3—1 "PROPELLER SHAFT".)
12. Install clutch hole cover.
13. Fill transmission with gear oil.

    Grade of oil Gear oil SAE 90

    Amount of oil 1.3 ltr. (1.4 U. S. qt.)
14. Lower the vehicle.

Disassembly

1. Remove clutch release bearing hub tension spring.

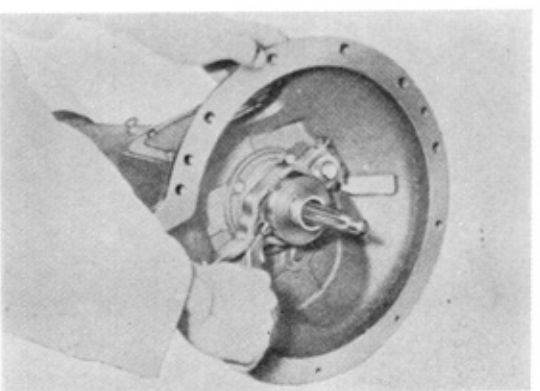

Fig. 2—9 Removing Tension Spring

2. Remove clutch release fork attaching bolt, and remove clutch release fork. Remove front bearing lock at the same time.

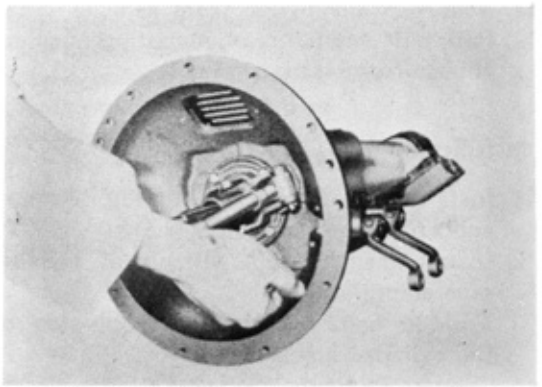

Fig. 2—10 Removing Clutch Release Fork

3. Remove transmission case cover.

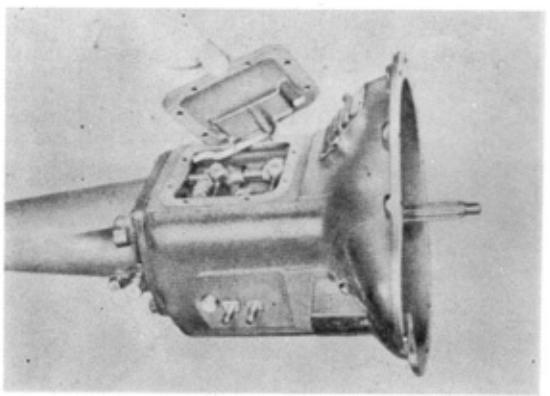

Fig. 2—11 Removing Transmission Case Cover

4. Loosen lock nut and remove gear shift fork shaft lock screw.

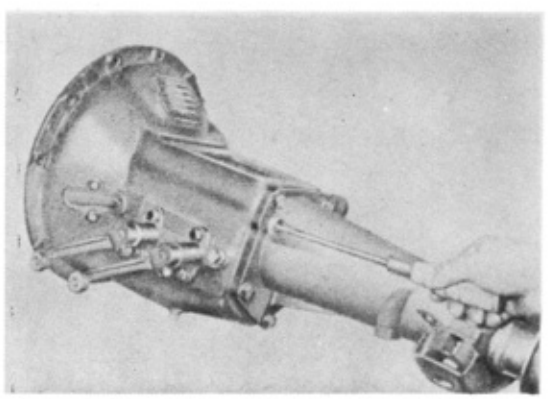

Fig. 2—12 Removing Gear Shift Fork Shaft Lock Screw

5. Remove cotter pins and unscrew fork plugs. Remove springs and lock balls.

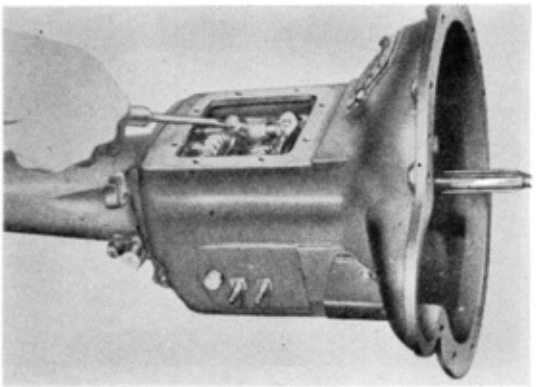

Fig. 2—13 Removing Spring & Lock Balls

6. Place a brass rod against the front end of the gear shift fork shaft and tap it out.

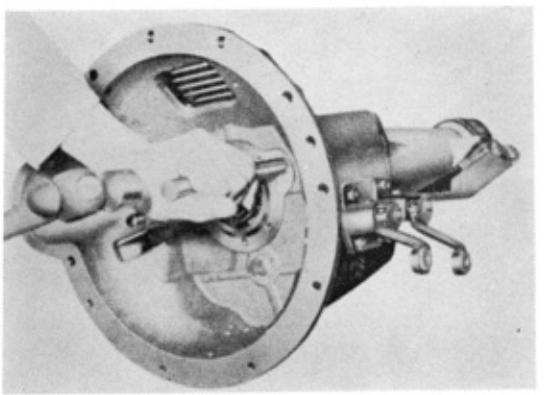

Fig. 2—14 Removing Gear Shift Fork Shaft

7. Remove both forks.

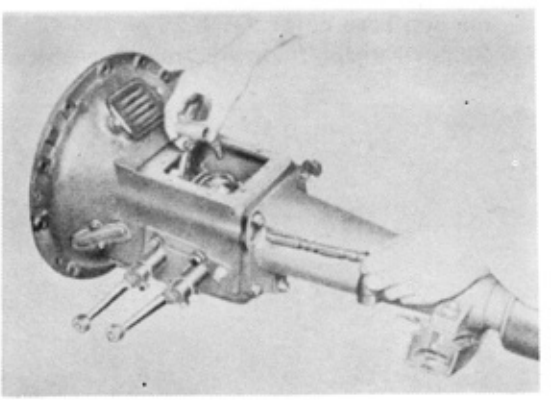

Fig. 2—15 Removing Forks

8. Remove bolts that retain extension housing to the transmission case.

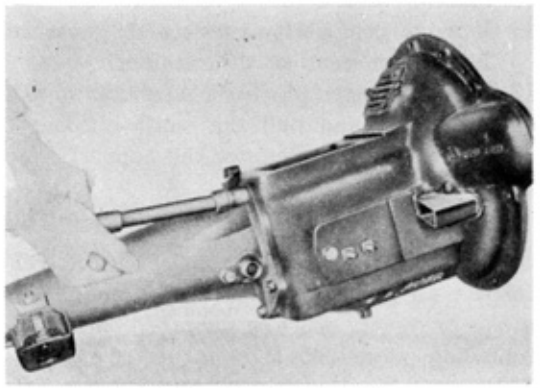

Fig. 2—16 Removing Bolts

9. Tap clutch sleeve out toward front about ½", then remove extension housing with the spline shaft and gears supporting clutch sleeve with hand.

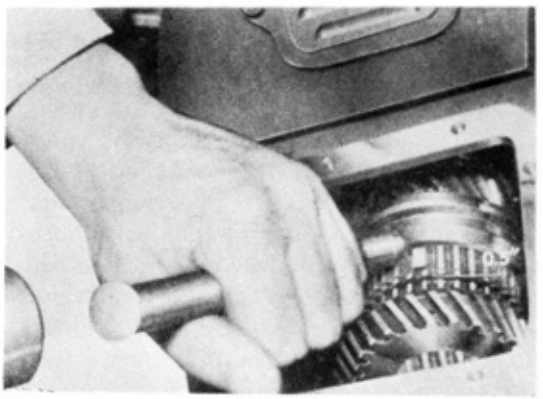

Fig. 2—17 Removing Exension rousing

10. Place a brass rod against the front end of the counter gear shaft and tap it out. The shaft must always be tapped out from the front end towards the rear end, as a Woodruff key is fitted into the rear end of shaft to prevent it from turning. Leave the counter gear unit in the transmission case.

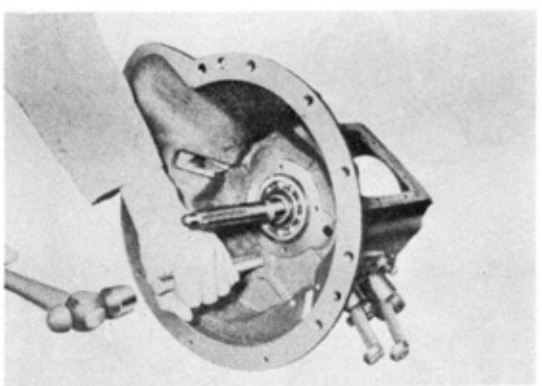

Fig. 2—18 Removing Counter Gear Unit

11. Remove main drive gear using Main Drive Gear Puller (BX SST-1081). Attach main drive gear puller. Strike the hammer against the handle repeatedly along the puller shaft and pull it out.

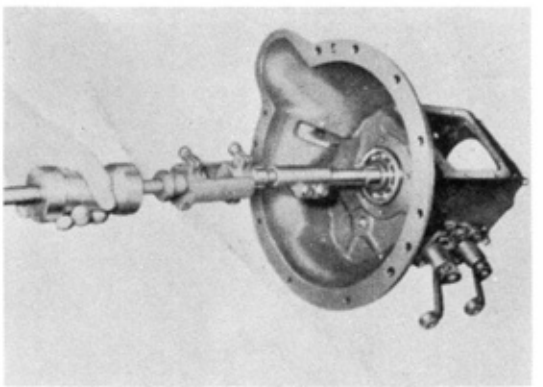

Fig. 2—19 Removing Mnin Drive Gear

12. Take counter gear unit out of transmission case. Take care not to lose the needle rollers inside the counter gear unit.

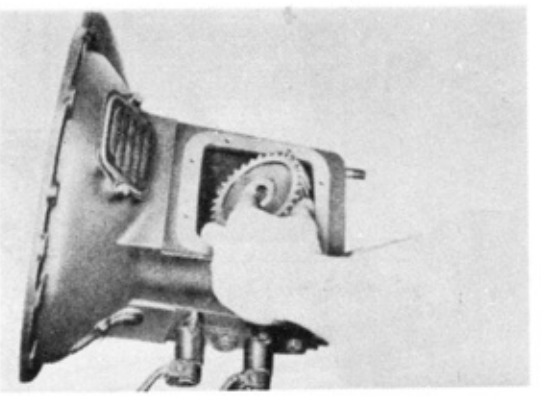

Fig. 2—20 Taking out Counter Gear Unit

13. Remove reverse idlcr gear. A Woodruff

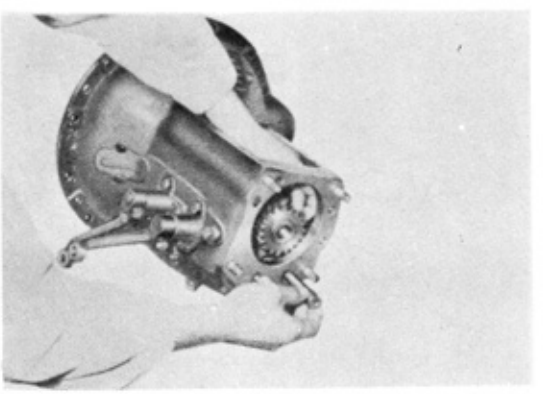

Fig. 2—21 Removing Reverse idller Gear

key is fitted in the rear end of the shaft to lock the shaft in the transmission case, so that the shaft must always be removed towards rear.

14. Remove lock pin nut, and knock out the lock pin, then remove the gear shift lever.

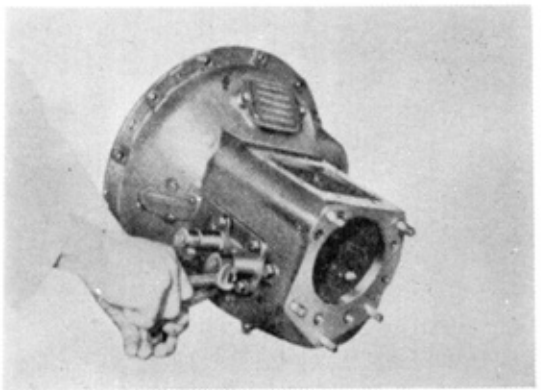

Fig. 2—22 Removing Gear Shift Lever

15. By removing the gear shift levers, the shift cams can be taken out of the transmission case.
16. Remove gear shift cam retainer attaching bolts, then remove the retainer.
17. Remove cotter pin from interlock support shaft pin, and pull the shaft pin out of support shaft. Remove the support shaft.

Inspection

Wash all disassembled parts with solvent. Inspect all parts for wear and damage, and repair or replace worn or damaged parts. The following points should be inspected carefully.

1. Damage in counter gear and reverse idler gear.
2. Wear in needle rollers.
3. Wear in counter gear side thrust washers and case side thrust washers.
4. Wear in reverse idler gear bushing.
5. Wear in shift fork lock balls and weak lock ball springs.
6. Damage or crack in transmission case.

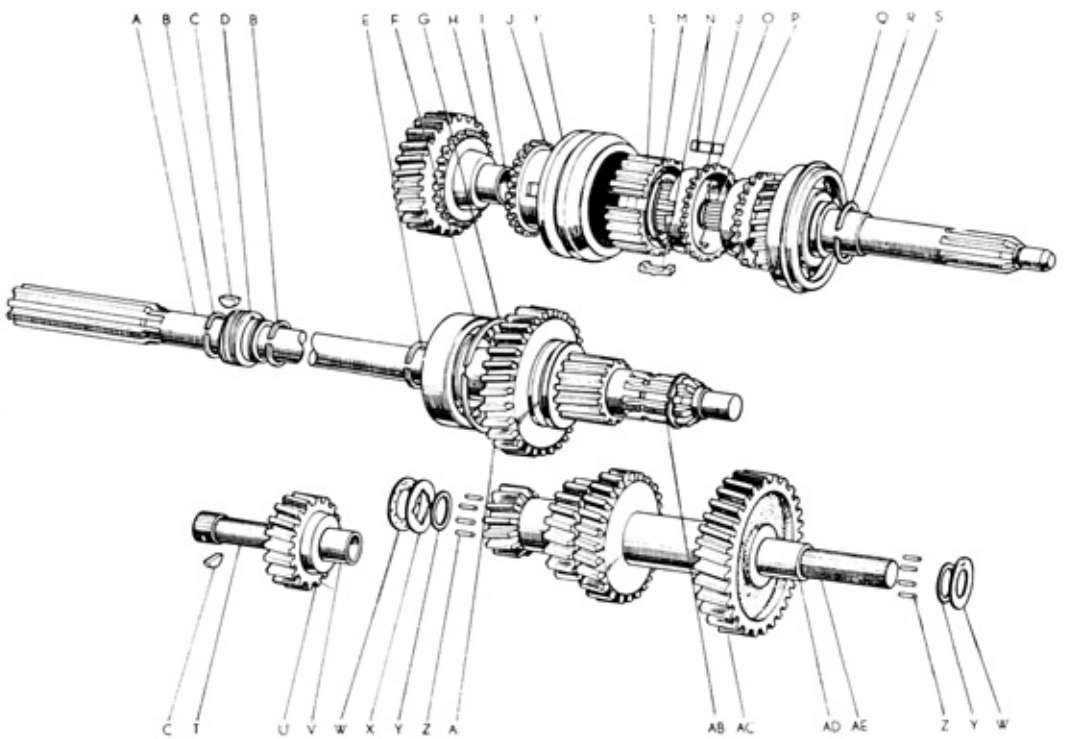

Fig. 2—23 Trasmission Gear

A Spline Shaft
B Speedometer Drive Gear Snap Ring
C Key
D Speedometer Drive Gear
E Snap Ring
F Bearing
G Spline Shaft Rear Bearing Snap Ring
H Second Gear
I Second Gear Bushing
J Synchronizer Ring
K Clutch Hub Sleeve
L Second & Top Clutch Hub
M Synchromesh Shifting Key Spring
N Synchromesh Shifting Key
O Spline Shaft Needle Roller Snap Ring
P Spline Shaft Needle Roller
Q Transmission Front Bearing
R Main Drive Gear Snap Ring
S Main Drive Gear
T Reverse Idler Gear Shaft
U Reverse Idler Gear
V Reverse Idler Gear Bushing
W Counter Gear Case Side Thrust Washer
X Counter Gear Side Thrust Washer
Y Counter Gear Needle Roller Spacer
Z Counter Gear Needle Roller
AA Low & Reverse Sliding Gear
AB Spline Shaft Snap Ring
AC Counter Gear
AD Counter Gear Needle Roller Spacer Pipe
AE Counter Gear Shaft

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Assembly

Note : Replace all the packings.

1. Install interlock support shaft on gear shift cam retainer.
2. Install gear shift cam retainer on the transmission.
3. Insert shaft pin into interlock support shaft and lock it with a cotter pin.
4. Insert gear shift cam from the inside of case.

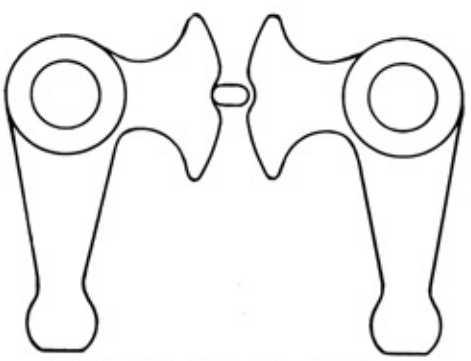


Fig. 2—24 Installing Gear Shift Lever

5. Install gear shift levers, and lock them with lock pins.
6. To install reverse idler gear, place gear as shown in the figure and tap the rear of gear shaft.

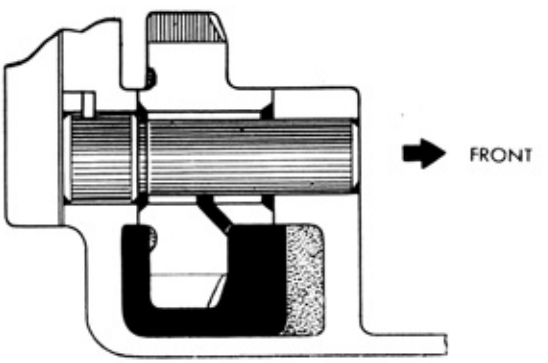


Fig. 2—25 Installing Rever Seldler Gear

7. Coat the inside of the counter gear shaft with chassis grease and insert Counter Gear Needle Roller Guide Shaft (RS SST-2089) to install needle rollers as shown in the figure, and place the counter gear unit in the bottom of transmission case.

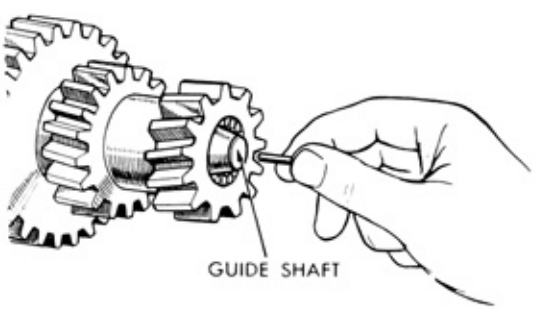


Fig. 2—26 Installing Needle Bearings

8. Install main drive gear in the transmission

case.

9. To install counter gear, coat the case side thrust washers with chassis grease and place them at both ends of the shaft.
   Gear side thrust washer should be installed at the rear.
   Insert counter gear shaft, and install the counter gear unit on the shaft, then lock the assembly with the Woodruff key.
10. Counter gear thrust gap should be 0.05 mm to 0.20 mm (0.002″ to 0.008″).

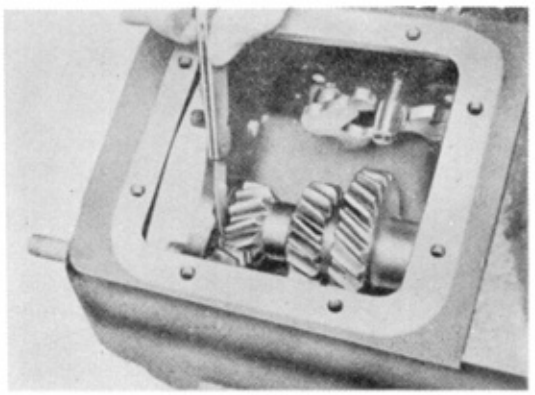


Fig. 2—27 Measuring Counter Gear Thrust Cap

The adjustment of the gap is made by selecting gear side thrust washers of three different thickness.

Thickness of Counter Gear Case Side Thrust Washer.

No.1	1.45~1.50mm	(0.057″~0.059″)
No.2	1.50~1.55mm	(0.059″~0.061″)
No.3	1.55~1.60mm	(0.061″~0.063″)

11. Install extension housing with all gears installed on spline shaft.
12. Install low and high speed gear shift forks on the grooves of low and reverse sliding gear and hub sleeve.
    Insert shift fork shaft from the rear.
13. Install lock balls and lock ball springs into each shift fork, and screw the plugs in. Lock the plugs with cotter pins.
14. Install transmission front bearing lock.
15. Install clutch release fork and related parts.

MAIN DRIVE GEAR

Disassembly

1. Remove needle roller snap ring and 12 needle rollers.
2. Remove main drive snap ring using Snap Ring Expander (RS SST-2003).
3. Remove transmission front bearing using Universal Puller (BX SST-2034).

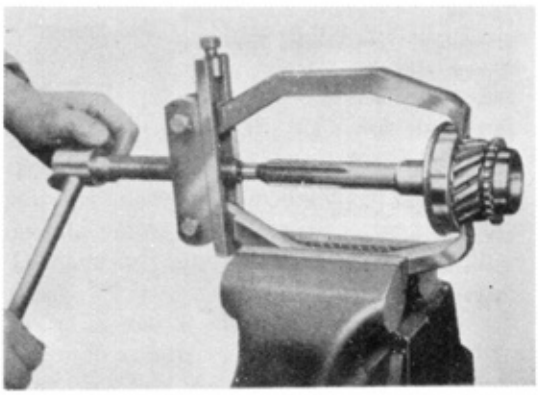


Fig. 2—28 Removing Transmission Front Bearing

Inspection

Wash all disassembled parts with cleaning solvent. Inspect all parts for wear and damage, and repair or replace worn or damaged parts. The following points should be inspected carefully.

1. Wear in main drive gear front bearing.
2. Wear in synchronizer ring.
3. Wear in needle rollers.

Assembly

1. Install transmission front bearing using a press. Snap ring must be selected so as to give a minimum play to the front bearing. Snap rings are available in two different thickness.

   Thickness of Main Drive Gear Snap Ring

No.1	2.43~2.57mm	(0.096″~0.101″)
No.2	2.30~2.42mm	(0.090″~0.095″)

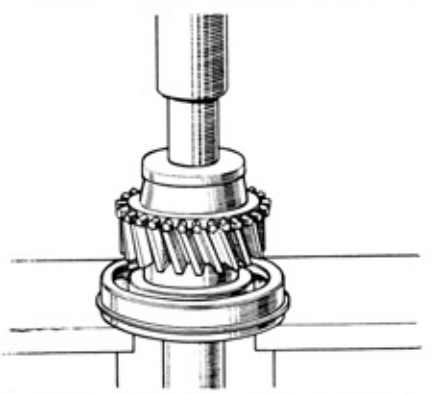


Fig. 2—29 Installing Transmission Front Bearing

2. Install 12 needle rollers, and lock them with snap ring.

SPLINE SHAFT & EXTENSION HOUSING

Disassembly

1. Remove spline snap ring from the spline shaft using Snap Ring Expander (RS SST-2003). Then remove the clutch hub, second gear synchronizer ring, second gear, and low and reverse sliding gear.

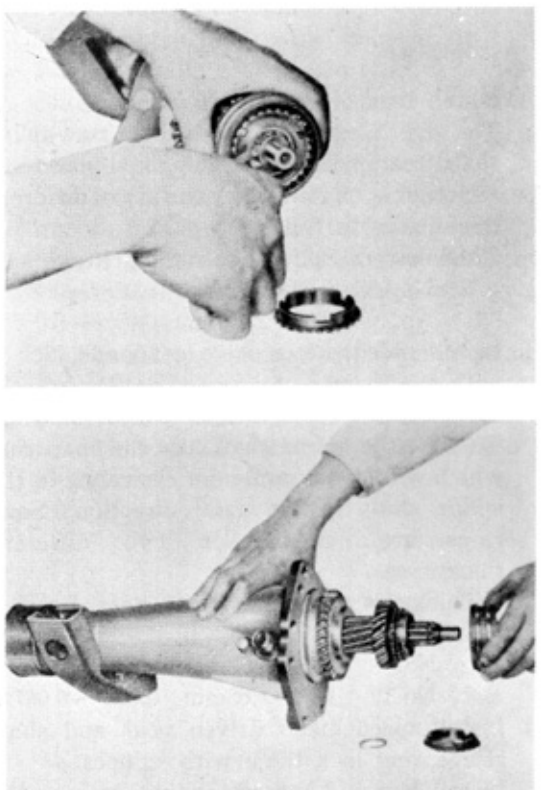


Fig. 2—30 Removing Clutch Hub Synchronizer Ring etc.

2. Remove speedometer driven gear.
3. Remove spline shaft rear bearing snap ring from extension housing using a screw driver and take the spline shaft out of the extension housing.

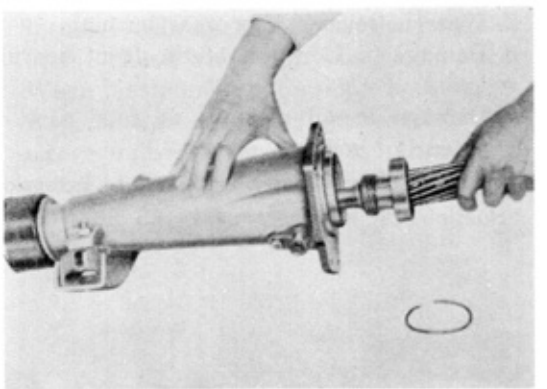


Fig. 2—31 Removing Spline Shaft

4. Remove snap ring, speedometer drive gear, spacer, and spline shaft rear bearing from the spline shaft.
5. Remove rear bearing using a press.

Inspection

Wash all disassembled parts with solvent. Inspect all parts for wear and damage, and repair or replace worn or damaged parts. The following points should be inspected carefully.

1. Wear in main drive gear front bearing and spline shaft rear bearing.
2. Damage in all gears.
3. Wear in synchronizer ring.
   When synchronizer ring is pressed to the cone of gear, the clearance between ring and gear should be 1.50 to 1.85mm (0.059″ to 0.073″).

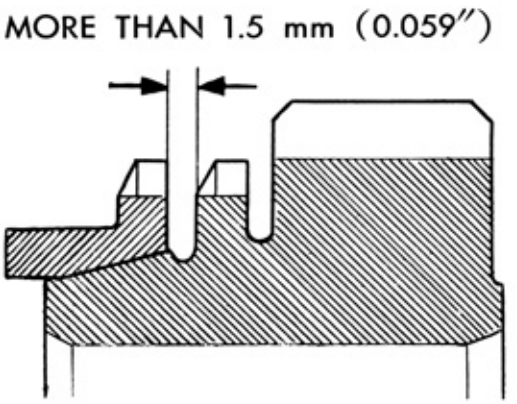
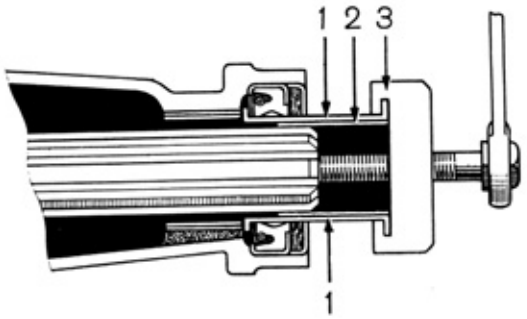


Fig. 2—32 Clearance between Ring and Gear

4. Wear in second gear bushing.
5. Wear in needle rollers.
6. Wear in counter gear side thrust washers and case side thrust washers.

7. Wear in reverse idler gear bushing.
8. Damage in front oil of the front bearing lock.
9. Damage in oil retainer at rear part of extension housing.

Note : To remove oil retainer, use Extension Housing Oil Retainer Puller (RS SST-1086).



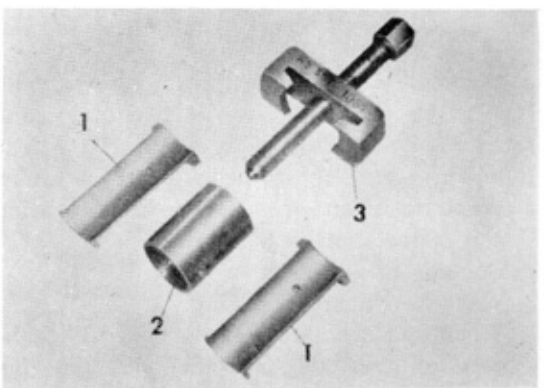


Fig. 2—35 Removing Extension Oil Retainer

10. Weak or damaged extension housing bushing.

Note : To install extension housing bushing, use Extension Housing Metal Tool (RS SST-1085).

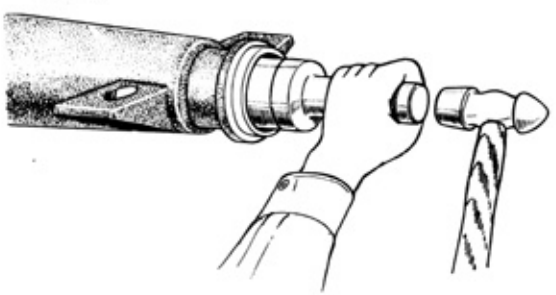


Fig. 2—33 Installing Extension Housing Bushing

11. Weak or damaged key springs.

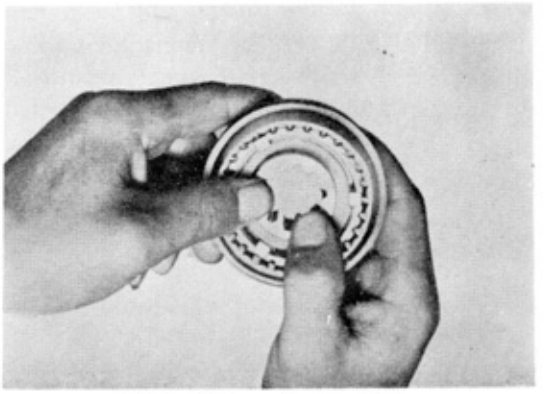


Fig. 2—34 Inspecting Key Spring

12. Damage or crack in extension housing.

Assembly

1. Install rear bearing using a press.
   To give a minimum play to the spline shaft rear bearing in the axial direction, select one of snap rings of two different thicknesses as follows.
   Thickness of Spline Shaft Snap Ring.
   No.1 2.25~2.35mm (0.088″~0.093″)
   No.2 2.35~2.45mm (0.093″~0.096″)
2. Install speedometer drive gear, and lock it with snap ring.
3. Install spline shaft into extension housing. To lock the spline shaft, use the snap ring which will give a minimum clearance to the spline shaft in the axial direction. Snap rings are available in two different thicknesses.
   Thickness of Spline Shaft Rear Bearing Snap Ring.
   No.1 1.51~1.78mm (0.060″~0.070″)
   No.3 1.58~1.68mm (0.062″~0.067″)
4. Install speedometer driven gear and shaft sleeve, and lock them with stopper.
5. Install low and reverse sliding gear on the spline shaft.
6. Install second gear.
7. Install three shifting keys and hub sleeve to the clutch hub, and lock them with key springs.

A Clutch Hub Sleeve
B Shifting Key
C Key Spring
D Clutch Hub
E Synchronizer Ring

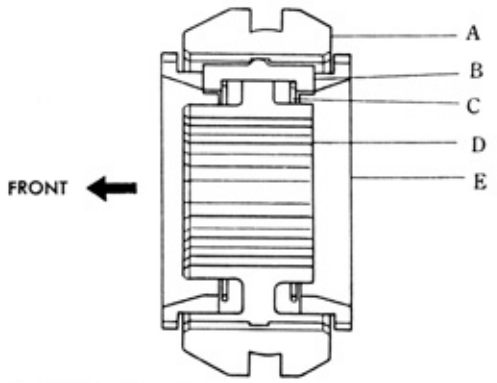


Fig. 2—36 Cross Section of Synchronize Mechanism

8. Install synchronizer ring to the short side of the clutch hub spline boss.
9. Install clutch hub to the spline shaft. When installing, the short side of the clutch hub spline boss should be faced toward the second gear.
10. Install spline shaft snap ring to lock. The second gear thrust gap should be 0.08 mm to 0.23 mm (0.003″ to 0.009″). Snap rings are available in two different thicknesses. Use the one which will give above clearance.
    Thickness of Spline Shaft Rear Bearing Snap Ring.
    No.1 2.25~2.35mm (0.088″~0.092″)
    No.2 2.15~2.25mm (0.084″~0.088″)
11. Install synchronizer ring to the long side of the clutch hub spline boss.
12. When installing extension housing to transmission case, pull the clutch hub sleeve toward front adout ½″, then insert spline shaft supporting it with a hand.

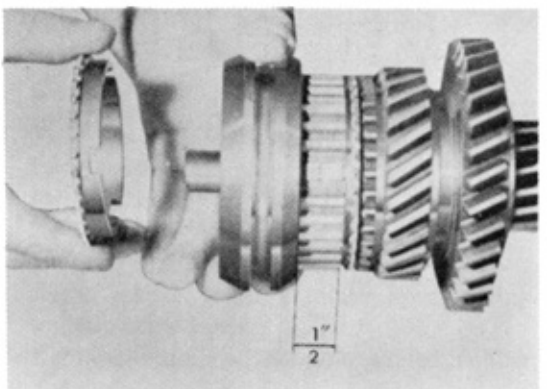


Fig. 2—37 Pulling Clutch Hub Sleeve

CONTROL SHAFT

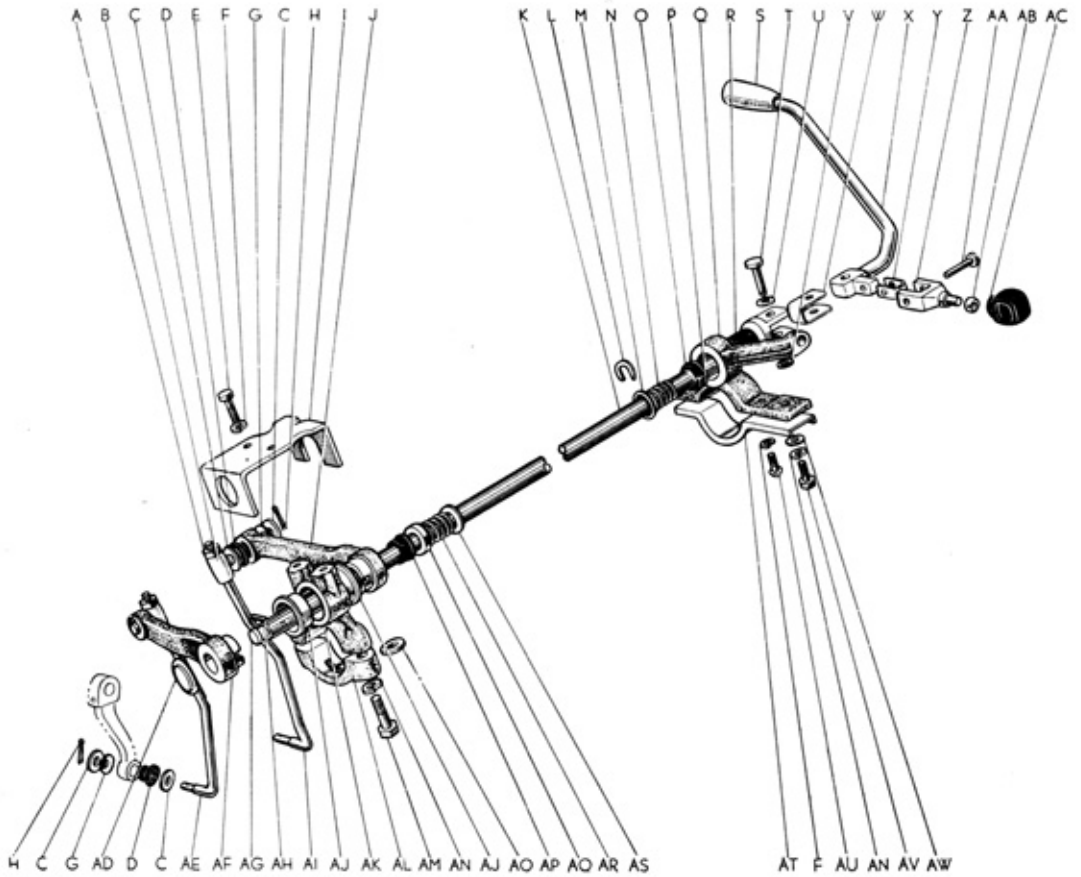


Fig. 2—37 Control Shaft

A Nut
B Control Rod Joint Pin
C Plate Washer
D Gear Shift Lever Grommet
E Bolt
F Spring Washer
G Control Rod Joint Washer
H Cotter Pin
I Control Shaft Lever Retainer
J Control Shaft Low Speed Lever
K Control Shaft
L Control Shaft Upper Spring Thrust "C" Washer
M Control Shaft Upper Spring Thrust Washer
N Control Shaft Upper Spring
O Control Lever Brake Upper Piece
P Control Lever Brake Lower Piece
Q Control Shaft Upper Bracket
R Control Shaft Upper Bushing Complete
S Control Lever Knob Complete
T Pin
U Washer
V Control Lever Snap Ring
W Control Lever Bushing
X Control Lever
Y Control Lever End Bushlng
Z Control Lever End
AA Control Lever End Pin
AB Control Lever End Bushing
AC Control Lever End Dust Cover
AD Control Shaft Lower End
AE Top & Second Control Rod
AF Control Shaft High Speed Lever

AG Control Lever Selecting Key Holder
AH Control Lever Selecting Key
AI Low & Revers Control Rod
AJ Control Shaft Lower Bracket Bushing
AK Control Shaft Lower Bracket
AL Control Shaft Lower Bracket Clamp
AM Bolt
AN Spring Washer
AO Plate Washer
AP Control Shaft Lower Bushing Complete
AQ Control Shaft Lower Spring Retainer
AR Control Shaft Lower Spring
AS Control Shaft Lower Spring Thrust Washer
AT Steering Column Clamp
AU Bolt
AV Bolt
AW Plate Washer

* * *

Removal

1. Remove control shaft assembly with steering gear box. (See page 8—7 "STEERING REMOVAL".)
2. Remove steering column clamp.
3. Remove lower bracket clamp and control shaft assembly from steering gear box.

Installation

1. Install control shaft assembly to the steering gear box. Fit the protrusion of control shaft upper bracket in the slot of column clamp grommet, and install upper bracket to column clamp.
2. To install lower bracket clamp, fit the slit of mast jacket to the key slot of gear box. Insert the plate washer serving as a key as shown in the figure.

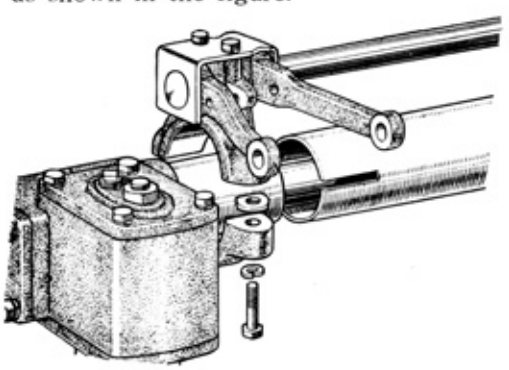


Fig. 2—38 Installing Control Shaft

3. Install control shaft assembly with the gear box on the vehicle.
4. Adjust control shaft. (See page 2—14 "ADJUSTMENT".)

Disassembly

1. Remove control shaft lever retainer and lower end cover.
2. Remove high speed lever.
3. Pull control lever selecting key out of the lower end of the control shaft.
4. Remove lower bracket.
5. Remove low speed lever.
6. Remove lower bushing.
7. Remove lower spring retainer, lower spring and thrust washer.
8. Remove mast jacket hole sealed rubber and hole cover.
9. Remove control lever complete.
10. Remove control lever end dust cover.
11. Remove end bushing.
12. Remove upper spring thrust "C" washer and remove thrust washer and upper spring.
13. Remove brake upper piece and lower piece.
14. Remove upper bracket.
15. Remove upper bushing.

Inspection

Wash disassembled parts with cleaning solvent.

Inspect following points for wear and damage, and repair or replace worn or damaged parts.

Note : Do not wash rubber parts with gasoline.

1. Deformation and wear in control shaft.
2. Damage in all gears.
3. Damage and wear in all bushings.

Assembly

Befor assembling, apply oil on all sliding parts except rubber bushing.

1. Insert upper bushings to control shaft.
2. Insert upper bracket.
3. Install brake upper piece and brake lower piece

Note : Take care to fit the protrusion of the upper piece in the slot of shaft.

4. Insert upper spring and thrust washer to the control shaft. Insert "C" washer into the slot of shaft by pressing the spring.
5. Install control lever end bushing on the upper bracket.
6. Install control lever end dust cover.
7. Insert control lever end bushing to control lever end and install control lever complete with lever bushing.
8. Insert mast jacket hole cover and sealed rubber to the shaft.
9. Insert lower spring thrust washer, lower spring, retainer and lower bushing.
10. Install low speed lever on the shaft.
11. Install lower bracket into the low speed lever.
12. Instrt control ever selecting key into the control shaft.
13. Install high speed lever on the shaft.
14. Install lever retainer to the lower end cover and install end cover pressing the lower spring.

Adjustment

Adjust control shaft after installing control shaft assembly on the vehicle.

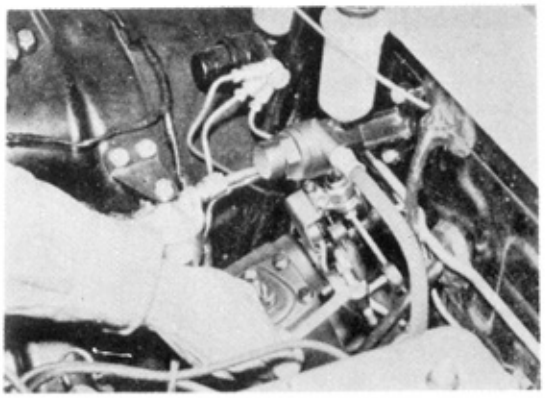


Fig. 2—39 Adjusting Control Shaft

1. Disconnect low and reverse control rod from the low speed lever, and second and top control rod from the high speed lever.
2. Line up three holes of high speed lever, low speed lever and control shaft bracket. Connect low and revese control rod with low speed lever, and top and second control rod with the high speed lever.
3. Make sure that gear shifting can be performed smoothly.