1940 Hudson

TRANSMISSION OVERDRIVE

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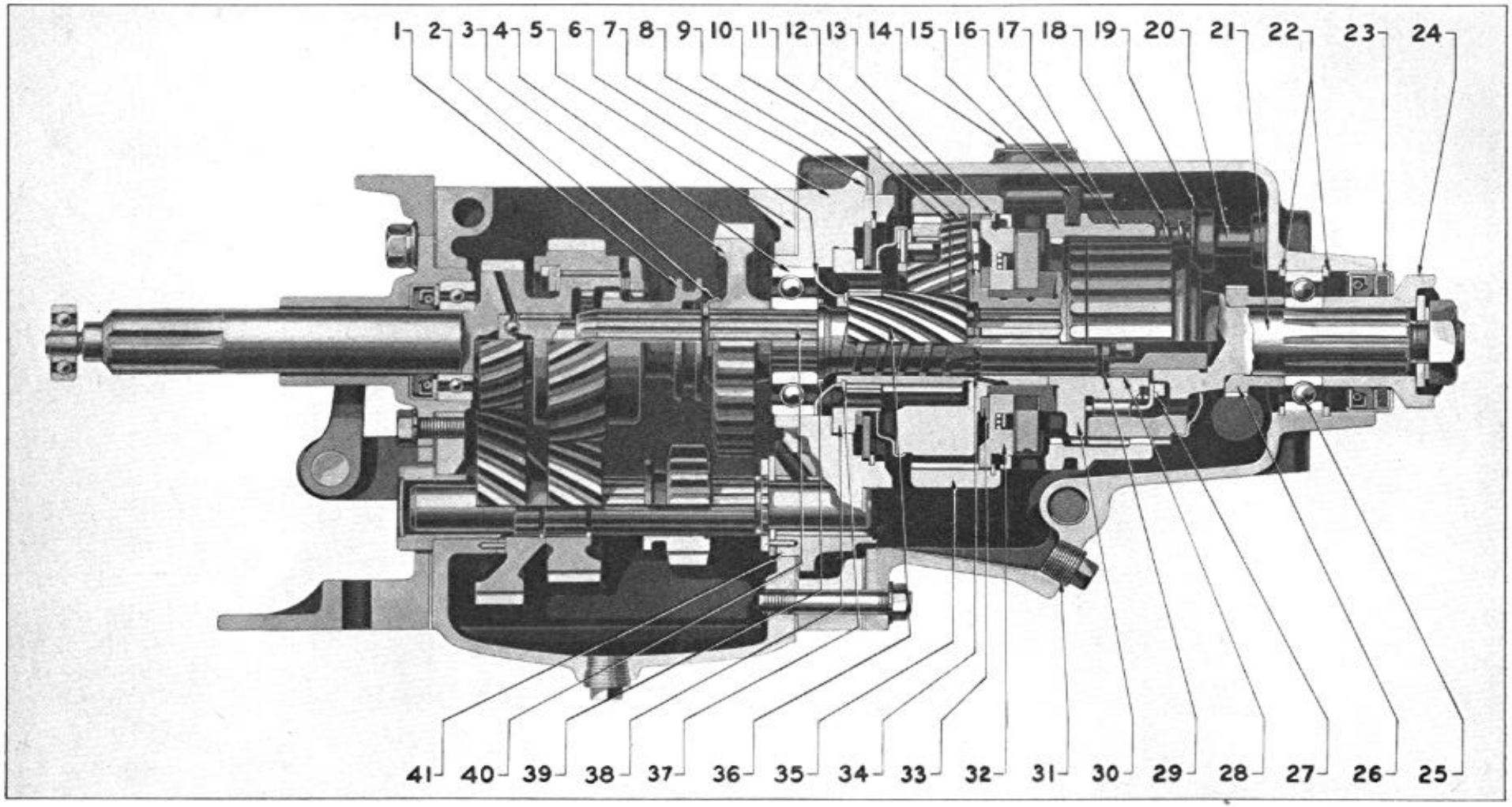

TRANSMISSION OVERDRIVE—Figure 1

1	160584	M/S 2nd and high shift sleeve
2	160587	M/S low and rev. gear retainer lock
3	160586	M/S low and rev. gear
4	160588	M/S bearing
5	160635	O/D to trans. case gasket
6	161322	M/S oil baffle
7	161265	Housing adapter
8	161262	Housing gasket
9	161281	Pinion cage snap ring
10	—	Pinion (wide)
11	—	Pinion (narrow)
12	—	Pinion cage
13	161327	Ring gear snap ring (.055")
	161328	Ring gear snap ring (.057")
	161329	Ring gear snap ring (.059")
14	161344	Housing lubricant insp. hole plug
15	161341	Shifter rail fork
16	161345	Shifter rail rev. lock up plunger
17	161307	Clutch sleeve
18	161342	Shifter rail retractor spring
19	161333	Control shaft "C" washer
20	161340	Shifter rail
21	161308	O/D main shaft assembly
22	161318	M/S bearing snap ring (.087")
	161319	M/S bearing snap ring (.090")
	161320	M/S bearing snap ring (.093")
	161321	M/S bearing snap ring (.096")
23	161323	M/S oil seal assembly
24	160599	Companion flange
25	170409	O/D main shaft bearing
26	160606	Speedometer gear
27	161353	F/W cam roller retaining snap ring
28	161313	O/D M/S pilot bushing
29	161348	F/W cam retaining washer
30	—	F/W cam
31	170172	Housing drain plug
32	—	Clutch core
33	161296	Clutch core thrust washer
34	161292	Pinion cage retaining snap ring
35	161326	Ring gear
36	161273	Stationary gear
37	161275	Stationary gear snap ring
38	161274	Stationary gear plate
39	161314	M/S bearing snap ring (.087")
	161315	M/S bearing snap ring (.090")
	161316	M/S bearing snap ring (.093")
	161317	M/S bearing snap ring (.096")
40	160582	Trans. main shaft assembly
41	160589	C/S cap assembly

TRANSMISSION OVERDRIVE

Operation

The transmission overdrive is constructed to give overdrive operation at speeds above 30 to 35 miles per hour on cars having standard overdrive rear axle ratios. When higher optional axle ratios are used the cut-in speed will be proportionately higher. The free-wheeling unit used in conjunction with overdrive is constructed to operate only at speeds below this cut-in speed. The operation of the entire overdrive unit is controlled through a button which is located on the instrument panel. By pulling this control button out to the limit of its travel the overdrive and free-wheeling units are held inoperative. In this out position the course of drive, see Figure 2, is from the transmission main shaft to the free-wheeling cam, to the overdrive clutch sleeve, to the overdrive main shaft, through the universal joints and propeller shaft, to the rear axle and wheels.

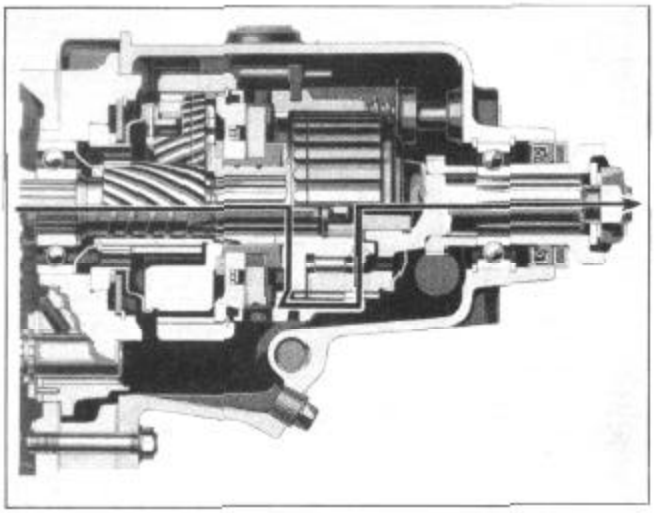

Figure 2

OVERDRIVE POWER CIRCUIT (OVERDRIVE)

1. Transmission main shaft to the–
2. Pinion cage and pinions to the–
3. Ring gear to the
4. Clutch pawl to the-
5. Clutch sleeve to the-
6. Overdrive main shaft and then through the propeller shaft to the rear axle and wheels

With the control button pushed in, both the overdrive and free-wheeling become operative, the overdrive cutting in when the accelerator is released above a speed of 30 to 35 miles per hour. After the overdrive has been engaged it will automatically disengage and the car will free-wheel when the car speed is dropped to about 5 miles per hour below the cut-in speed. With the control button pushed in and overdrive engaged the course of the drive, see Figure 3, is from transmission main shaft to the pinion cage, to the pinions, to the ring gear, to the clutch pawl core, to the clutch pawls, to the clutch sleeve, to the overdrive main shaft, through the universal joints and propeller shaft, to the rear axle and wheels.

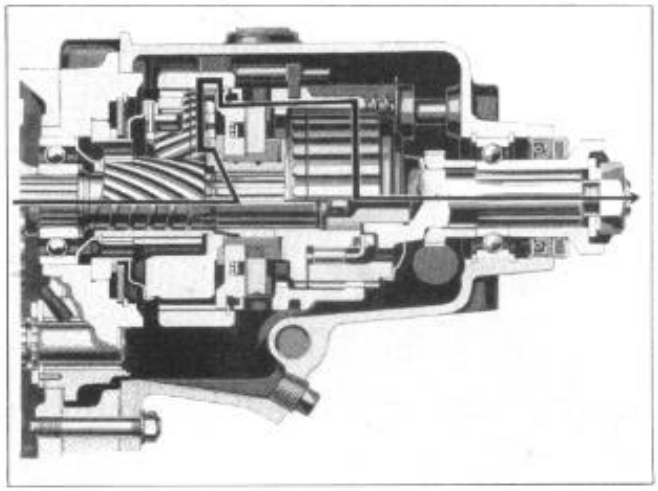

Figure 3

OVERDRIVE POWER CIRCUIT (DIRECTDRIVE)—Button Pulled Out

1. Transmission main shaft to the—
2. Free-wheel cam to the—
3. Clutch sleeve to the—
4. Overdrive main shaft and then through the propeller shaft to the rear axle and wheels.

With the control button pushed in and overdrive not engaged, the course of the drive with car speed of approximately 27 miles per hour and less, free-wheeling is from the transmission main shaft to the free-wheeling cam and rollers, to the overdrive main shaft, through the universal joints and propeller shaft, to the rear axle and wheels.

When the circuit is operating in the free-wheeling position, the overdrive clutch pawls are disengaged from the shell.

If in overdrive operation additional speed is required for a quick pickup, the overdrive unit may be cut out, by pressing the accelerator beyond the wide-open position. This action automatically disengages the freewheeling and overdrive unit. The car will then be driven in the conventional manner, engine and propeller shaft speeds being the same. To again get back into overdrive after this added acceleration it is necessary to momentarily release the accelerator and then press it again. The overdrive will remain engaged and the freewheeling unit will be locked out until the car speed is dropped to about 27 miles per hour, when the unit will automatically unlock and the engine will again drive the car, through the free-wheeling unit.

This automatic step-down feature is accomplished electrically by a solenoid mounted in the left side of the overdrive adapter between the transmission and the overdrive cases.

When the accelerator is pressed beyond the wide-open throttle position, the solenoid switch is operated and closes the circuit in the solenoid relay which in turn closes the circuit in the solenoid (51), Figure 4. Closing of the circuit energizes the solenoid and sets up magnetic force which draws the operating rod (57) and pawl (56) outward against pressure of spring (58). This action also cuts

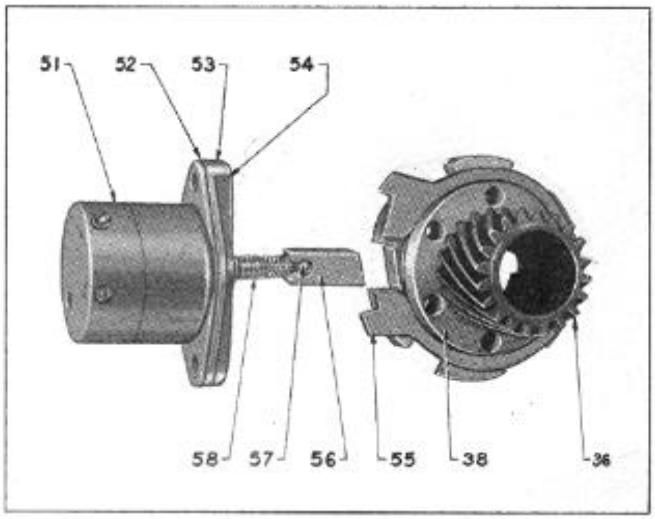

Figure 4

OVERDRIVE STATIONARY GEAR AND PLATE ASSEMBLY AND SOLENOID

36—161273 Stationary gear
38—161274 Stationary gear plate
51—161266 Solenoid assembly
52—161267 Solenoid gasket
53—161268 Solenoid base
54—161269 Solenoid base gasket
55—161280 Stationary gear balk ring
56—161276 Stationary gear pawl
57—161277 Stationary gear pawl operating rod
58—161279 Stationary gear pawl operating rod spring

out the ignition momentarily by shorting out the breaker contacts and grounding the coil directly causing the engine to miss several firing impulses. As soon as this action is made pressure on the gear teeth is removed, momentarily, and the operating rod which is attached at one end to the pawl and which is held in overdrive position by the operating rod spring is drawn in, which releases the stationary gear plate (38) and the stationary gear (36). This leaves the plate and stationary gear to rotate freely for direct drive. During the action of the operating rod it automatically opens the ignition contacts and restores the ignition. Part of the solenoid remains energized sufficiently to hold the pawl out of engagement. When the accelerator pedal is returned to any position, below open throttle, the solenoid relay switch is opened and cuts out all electric current in the solenoid. When a reduction in engine speed is made by releasing the accelerator, the opening in the stationary gear balk ring (55) comes in line with the pawl and the pawl spring pushes the pawl into the opening. Since the operating rod is attached to the end of the pawl it is also pulled along with the pawl. In doing this the contact points of the solenoid are ready for the next application of the solenoid relay switch which is operated by the accelerator.

The entire solenoid operation is so rapid and the ignition is cut out for so short an interval that it is hardly apparent to the operator. If for any reason the solenoid is unable to withdraw the pawl the current draw of the solenoid will cause the relay fuse to blow, restoring the ignition. The car will then operate in a normal manner except that it will not be possible to return to direct drive from overdrive.

The stationary gear (36), Figure 1, is free to revolve on the transmission main shaft (40) and is held stationary when in overdrive by the spring loaded, solenoid controlled, stationary gear pawl (56), Figure 4, which is mounted on the overdrive adapter. This pawl engages in the stationary gear balk ring (55) and plate (38) and holds these two units stationary. When this pawl is withdrawn by the solenoid (51) to free the stationary gear (36) the stationary gear and plate revolve freely and the balk ring is dragged around sufficiently to block the pawl in the withdrawn position. When the engine torque is reversed by accelerator pedal release, the balk ring returns to its original position so that the pawl can engage.

The balk ring rotates only about 20° in either direction and is a snug fit on the hub of the stationary gear plate, Figure 4. Further rotation of the balk ring is prevented by lugs on the balk ring which strike the top and bottom of the pawl. It is this slight friction which causes the balk ring to revolve and thus blocks the pawl in its withdrawn position. When the rotation of the balk ring is completed the stationary gear plate continues to rotate and when this condition is obtained the overdrive unit is not operating. However, when the stationary gear and stationary gear plate are held rigid by the stationary gear pawl the overdrive is operating.

The overdrive clutch sleeve (17), see Figure 1, is constructed with two internal gears, one gear at the rear which is constantly in mesh with the external teeth on the front end of the overdrive main shaft. The other internal gear is at about the center of the sleeve and is meshed with the external teeth of the free-wheeling cam (30), when the overdrive control button is pulled out.The clutch sleeve slides back and forth by means of a shifter fork (15) operated by the control button. This shifter fork rides in a groove cut on the outside surface of the clutch sleeve and when the control button is pushed in, it actuates this shifter fork and moves the clutch sleeve forward. By pulling the control button out the clutch sleeve is moved backward which meshes the internal teeth of the sleeve with the external teeth of the free-wheeling cam. When the clutch sleeve and freewheeling cam are in this position they are locked to the overdrive main shaft (21) through the internal teeth in the sleeve, causing all three pieces to rotate together as a solid unit, thereby preventing free-wheeling and overdrive operation.

The overdrive clutch pawls (42), see Figure 5, are held out of engagement from the overdrive clutch sleeve by spring pressure. With the control button pushed in and with car speed of approximately 30 to 35 miles per hour centrifugal force overcomes the tension of these springs (45) and the outer ends of the pawls engage with the holes in the overdrive clutch sleeve (17), Figure 1. However, if the control button is in the out position the holes in the clutch sleeve will not line up with the pawls and the pawls are then held in a disengaged position by the pawl locking ring (47), Figure 5, which prevents the pawls from engaging with the sleeve, thus preventing overdrive operation.

The transmission of power from the transmission main shaft to the propeller shaft while in conventional drive and overdrive are depicted by Figures 2 and 3.

Figure 2 illustrates the transmission of power when the overdrive control button is pulled out, while Figure 1 illustrates the parts involved:

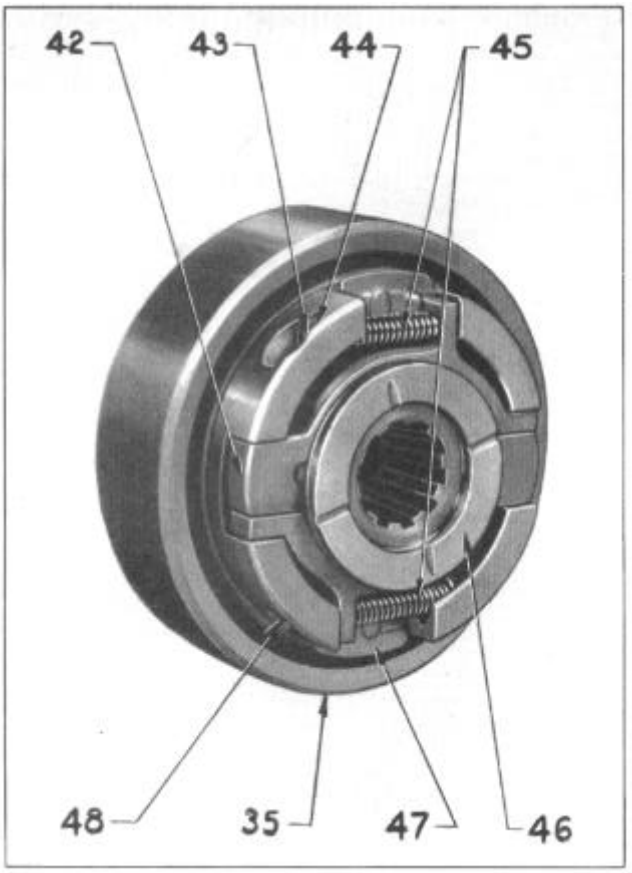

Figure 4

OVERDRIVE CLUTCH PAWL AND CORE ASSEMBLY-COMPLETE

36—161326	Ring gear
42—	Clutch pawl
43—161304	Clutch pawl adj. spring screw (slotted)
44—161305	Clutch pawl adj. spring washer
45—161396	Clutch pawl adj. spring
46—	Clutch core hub
47—	Clutch pawl locking ring
48—161303	Clutch pawl adj. spring screw

From transmission main shaft (40) to free-wheeling cam (30).

From free-wheeling cam to clutch sleeve (17).

From clutch sleeve to overdrive main shaft (21), through universal joints and propeller shaft, to rear axle and wheels.

Figure 3 illustrates the power path when the overdrive control button is pushed in and overdrive is engaged. The circuit in procedure is as follows. Figure 1 illustrates the parts:

From transmission main shaft (40) to pinion cage (12) which is splined on end of main shaft and therefore rotates with shaft. The pinions (10) and (11) are mounted in and rotate with the pinion cage while the teeth mesh with the stationary gear (36) and ring gear (35). Due to the number of teeth in the stationary gear and ring gear, the ring gear revolves at a faster rate than the transmission main shaft.

From the ring gear the power is transmitted to the clutch core (32) to the overdrive clutch pawls (42). Figure 5. These pawls are revolving fast enough to overcome pressure of springs (45) centrifugally which causes them to slide into the holes in the clutch sleeve (17). Power is then transmitted to the overdrive main shaft (21) through the internal teeth of the clutch sleeve and the external teeth of the overdrive main shaft.

From this point the power is transmitted through the universal joints and propeller shaft to the rear axle and wheels.

SERVICE PROCEDURES

To remove transmission and overdrive assembly from car:

1. Drain lubricant from transmission and overdrive cases.
2. Remove accelerator pedal.
3. Push rubber steering column hole cover up on column.
4. Remove floor mat.
5. Remove front seat cushion.
6. Remove transmission floor cover plate.
7. Disconnect propeller shaft at front universal joint.
8. Remove clutch pedal return spring.
9. Remove clutch control link clevis pin.
10. Remove clutch pedal assist spring
11. Release transmission side bumper and rod assemblies
12. Remove transmission Handy Shift connections at transmission.
13. Remove speedometer cable at overdrive case.
14. Remove wires from solenoid.
15. Remove overdrive control cable clevis at lever on overdrive case.
16. Raise car and remove lower flywheel guard.
17. Raise rear of engine off frame and remove transmission to clutch housing bolts.
18. Pull transmission and overdrive assembly back and lift out of car.

Overdrive Disassembly

1. Place transmission and overdrive on holding fixture J-814
2. Remove two (2) screws holding case to adapter.
3. Move shifter lever to forward position and remove case by pulling off toward rear. Free-wheel cam rollers (50), Figure 6, will fall out into case (12 rollers).
4. Remove speedometer drive pinion from case.
5. Remove universal joint flange with tool J 820.
6. Remove overdrive main shaft (21), Figure 1, through front of case.
7. Lift out clutch sleeve (17).
8. Remove overdrive main shaft bearing inner snap ring (22) and tap bearing (25) out towards front of case.
9. Remove overdrive main shaft bearing outer snap ring (22).
10. Tap main shaft oil seal assembly (23) out towards rear of case.
11. Remove free-wheel cam bolt in end of transmission shaft.
12. Slide free-wheel cam assembly (30) and ring gear assembly (35) off transmission shaft towards the rear.
13. Lift thrust washer (33) off pinion cage.
14. Remove snap ring (13) and lift pawl and core unit (32) out of the ring gear.

15. Slide pinion cage (12) to rear, off transmission shaft splines. If tight use puller J 354-A. Do not pry off; doing so may damage oil thrower on front side. Remove snap ring (39) from transmission shaft.
16. Remove stationary gear (36), plate (38) and balk ring (55), Figure 4, from transmission shaft. Remove pawl (56) by sliding it to rear, off end of operating rod (57).
17. Remove two screws holding solenoid (51) to adapter and take off solenoid and lift out operating rod.
18. Thickness of gasket (52) between solenoid and base flange (54) controls plunger travel. Reassemble, using the same gasket or one of exactly the same thickness.
19. Energize solenoid with a 6-volt battery current. Check clearance between pawl and balk ring. This should be maintained at .015". Adjust by adding or subtracting solenoid gaskets. Assemble other parts in reverse order of disassembly.

Reassembling

20. Replace main shaft bearing outer snap ring (22), Figure 1, and replace bearing (25), locking in place with inner snap ring (22).
21. Replace main shaft oil seal assembly (23), leaving it protrude 9/32" from outer edge of case.
22. Assemble clutch sleeve (17) in case, making sure groove in sleeve rides on shifter fork (15).
23. Place speedometer drive gear (26) on overdrive main shaft (21) with bevel facing the rear and install main shaft in case.
24. Install universal joint flange washer and nut and draw up snug.
25. Grease free-wheel cam (30) and install rollers, holding in place with a rubber band. (Do not remove rubber band as this will dissolve in lubricant.)
26. Move shifter to forward position. Support clutch sleeve with finger thru drain hold and lift case into position.
27. Hold case assembly at a slight angle so that bore in overdrive main shaft rests on free-wheel cam rollers.
28. Turn shaft sharply counter-clockwise while pushing forward on case, causing free-wheeling rollers to enter bore in overdrive main shaft.
29. Guide clutch sleeve with finger through drain hole and rock universal joint flange to line up internal teeth of clutch sleeve with those on the free-wheeling cam assembly.
30. Slide case forward into place and attach to adapter and assemble unit to transmission case.
31. Replace transmission and overdrive assembly.
32. When connecting overdrive control wire adjust length at the button to provide 1/8" clearance between control button and bracket when lever is in the extreme rear position and secure wire at shifter lever.

Pinion Cage and Main Shaft Oil Slinger

The oil slinger is spun onto the pinion cage in the process of manufacture and these parts are not serviced separately.

Free-Wheel Cam and Roller Assembly

1. Remove the free-wheeling snap ring (27), Figure 6, from the free-wheel cam (30).
2. Pull roller retainer (49) partly off the cam and, with pliers, pull the end of one spring out of the hub of the cam, then pull the retainer further off

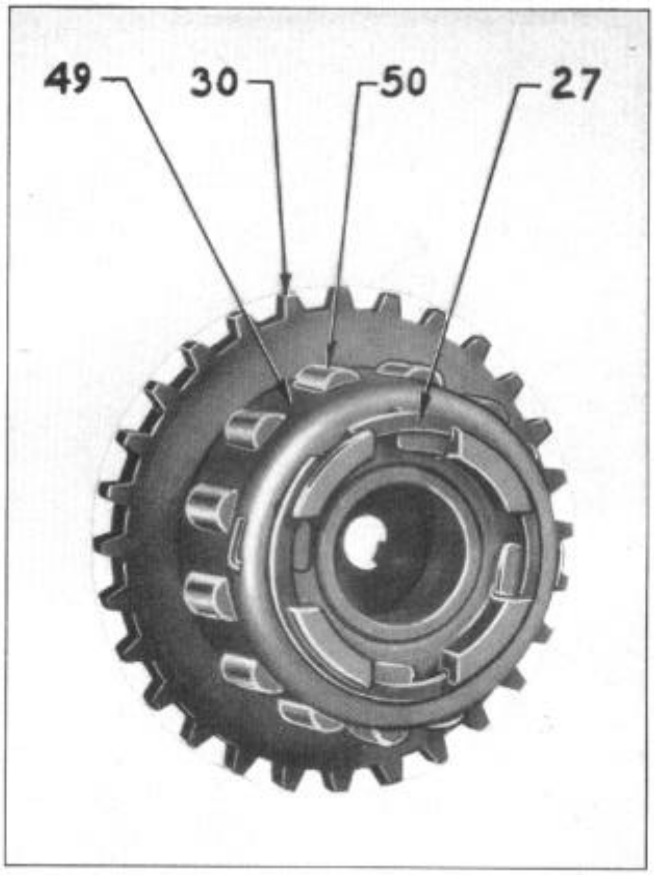

Figure 6

OVERDRIVE FREE-WHEEL CAM ASSEMBLY

27—161353	F/W cam roller retaining snap ring
30—	F/W cam
49—161351	F/W cam roller retainer
50—161350	F/W cam roller

the hub and pull the end of the second spring out of the hub of the cam.

3. Insert ends of spring in cam roller retainer (49) so ends point in a clockwise direction.
4. With small screw-driver work spring around hub of cam and insert ends in holes in cam.
5. Replace lock ring (27).
6. Pack grease into roller retainer and press rollers(50) into their poc the bore of the main shaft put rubber band around outside of rollers.

Overdrive Clutch Pawl and Core and Pinion Cage Assembly

1. Remove clutch pawl and core assembly from pinion cage.
2. Remove snap ring (13), Figure 1, holding clutch pawls (42), Figure 5, and core in ring gear (35).
3. Remove clutch pawl adjusting screws (43 and 48), washers (44) and springs (45).
4. Replace clutch pawl adjusting screws (43 and 48), washers (44) and springs (45).5.
5. When replacing and adjusting screws and springs be sure to give each screw the same number of turns so as to equalize tension of the springs.

These adjusting screws and springs control the over drive cut-in speed and both pawls of the clutch should engage the clutch sleeve at the same time. Therefore, equal tension of springs is necessary.The tighter the screws are turned the higher will be the cut-in speed. The bushing or clutch core (46) must have its bore concentric with the gear teeth. Since it is impossible to ream this bushing or core to the required accuracy after assembly without elaborate equipment, separate parts for this clutch assembly will not be available for service replacement and, therefore, this unit should not be disassembled further.

6. Place clutch pawl and core assembly in ring gear and secure in place with snap ring.

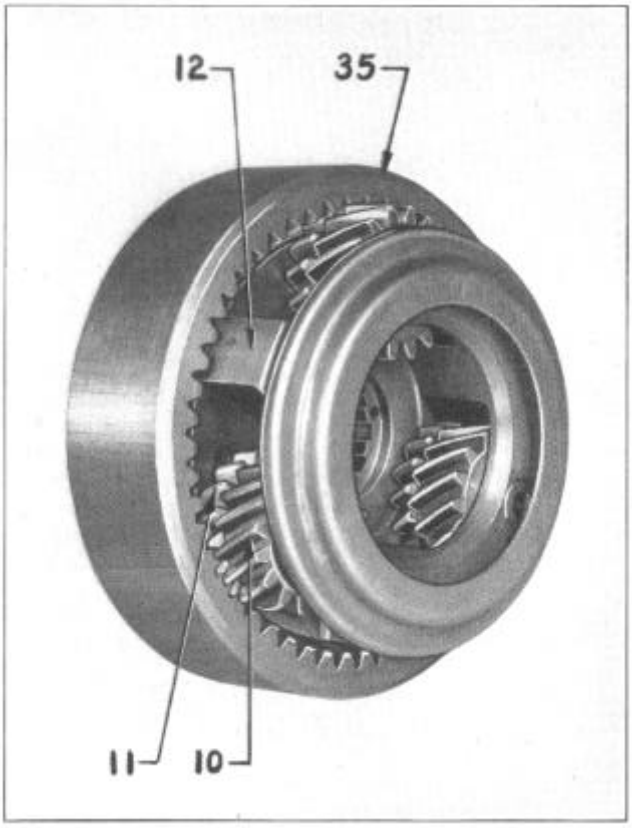

Figure 7

OVERDRIVE PINION CAGE ASSEMBLY AND RING GEAR

10—	Pinion (wide)
11—	Pinion (narrow)
12—	Pinion cage
35-161326	Ring gear

Replacing Clutch Pawl and Core Assembly on Pinion Cage Assembly

1. Place pinion cage assembly (12), Figure 7, on transmission main shaft and mesh wide pinions (10) with stationary gear (36), Figure 1.
2. Lock stationary gear with gear pawl (56), Figure 4.
3. Place transmission main shaft in vise, holding between two pieces of wood, two by four, and clamp securely.
4. Drop punch or screw-driver through one of openings in adapter to keep it from turning.
5. Place clutch pawl (42), Figure 5, and core assembly over narrow pinions (11), Figure 7, and wind assembly clockwise so that teeth of narrow pinions pass 1 teeth of wide pinions or until marked teeth on each pinion line up. Then push clutch pawl and core assembly onto pinions.

Solenoid Plunger and Stationary Gear Pawl Assembly

1. Remove two (2) screws holding solenoid (51), Figure 4, to adapter.
2. Remove solenoid and gaskets.
3. Disengage stationary gear pawl operating rod (57) and remove solenoid base (54) and stationary gear pawl operating rod spring (58).
4. Replace in reverse manner
5. In reassembly use same gaskets between solenoid and solenoid base or gasket of same thickness.This gasket controls clearance between pawl (56) and balk ring (55) which should be .015".

Stationary Gear and Balk Ring

1. Remove snap ring (37), Figure 1, from stationary gear that holds stationary gear plate (38) to stationary gear (36) and slide plate off the gear.
2. The balk ring grips the stationary gear plate so that a pull of 8-10 lbs. is required to rotate the balk ring on the stationary gear plate.
3. In reassembling be sure that oil slots in stationary gear plate align with the oil slots in the stationary gear.

OVERDRIVE ADJUSTMENTS AND MAINTENANCE

Overdrive Solenoid

No servicing of this unit is required other than that of keeping contacts clean and parallel so as to make good electrical contact. The cover may be removed for inspection of contacts by first disconnecting the wires at the coil and removing the flat head screw that holds the cover to the base. Inspect lower face of contact disc on small plunger and the contact plates (which short out ignition) and make certain that these faces are clean and smooth. These faces may be cleaned by scraping with knife. The main contacts which control the starting coil circuit must be both smooth and parallel and may be resurfaced with a file so that they contact each other squarely.

Overdrive Control Cable

The overdrive control cable is adjustable for length at the lever on the overdrive case. The cable should be released at the binding screw and the overdrive lever on the case pushed back as far as possible. With the lever in this position the overdrive unit is in the engaged position. Move the control button in as far as it will go and then back our approximately N" to insure full travel of the button. With the control button in this position tighten the binding screw on the wire at the lever on the overdrive case.

Solenoid Throttle Switch (Adjustment)

The solenoid throttle switch should operate only when the accelerator is depressed beyond open throttle. This adjustment is made so that when the accelerator is depressed to wide-open throttle, the contact washer should just be making contact with the plunger in the throttle switch. In making this adjustment there is a threaded portion on the accelerator linkage and the contact washer is held in position on this rod by two adjusting nuts, .one above and one below the washer. The air cleaner should be removed from the carburetor so that the exact position of the butterfly valve may be observed. With the butterfly valve in the wide-open position adjust the contact washer by means of the adjusting nuts so that it just touches the throttle switch.

This adjustment will allow operation of the car with wide-open throttle and, at the same time, complete the electrical circuit for shift from overdrive to conventional drive by pressing the throttle just beyond the wide-open position.

Overdrive Solenoid Relay Fuse

The principal function of the solenoid is to cause a momentary shorting of the ignition primary circuit so that the stationary gear pawl will disengage the stationary gear. If, for any reason, the pawl cannot be disengaged by the solenoid, the continued shorting of the ignition would stall the engine. To prevent this, a fuse, Figure 8, is inserted in the solenoid relay battery feed circuit. This fuse will blow if the duration of the flow of current through the solenoid exceeds a few seconds. When this happens, the ignition will be re-established but the step down will be inoperative until a new fuse is installed.

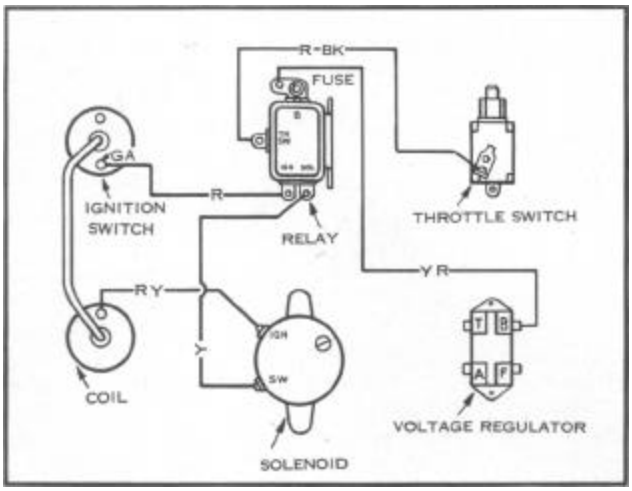

Figure 8
Wiring Diagram for Overdrive