GRAVELY

SWIFTAMATIC 8 TRANSMISSION

Trouble Shooting

and

Assembly Procedure

GRAVELY
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Studebaker CORPORATION
DUNBAR, WEST VIRGINIA

SWIFTAMATIC 8 TRANSMISSION TROUBLE-SHOOTING

Frequent reference is made to individual parts by number.

This may, at first, appear confusing, but will be of great help when you refer to the parts and price list by part number, to see what a particular part looks like.

Problem: Jaw Clutch will not shift into or out of engagement.

1. Remove any paint found on Part Number 6721 Clutch Sliding Pin. This can cause the pin to bind in the "O" Ring Retainers (Part Number 6713).

2. Test Spring Adjustment:

a. Part Number 6755 Toggle Spring, pictured in Figure Number 1, located on the hand lever, should be adjusted to a height of 29/32 as the over center lock spring guide breaks over center. This is maximum compression of the Toggle Spring when in use.

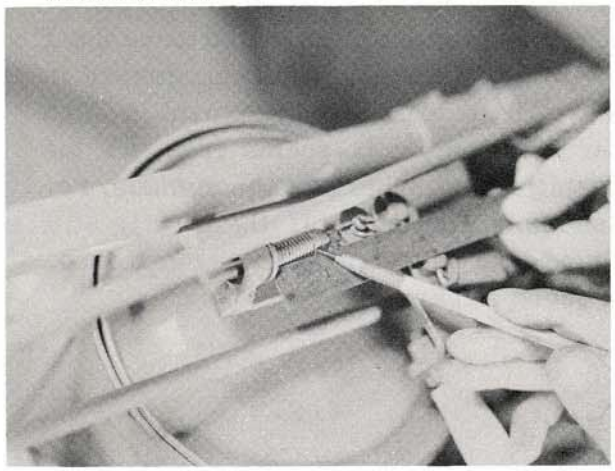

Figure 1

b. Part Number 6750 Clutch Spring, located at the axle, should be adjusted to a height of 2 1/8" x 2 1/4" when the clutch is engaged. Both springs should be set to the same dimensions. See Figure 2.

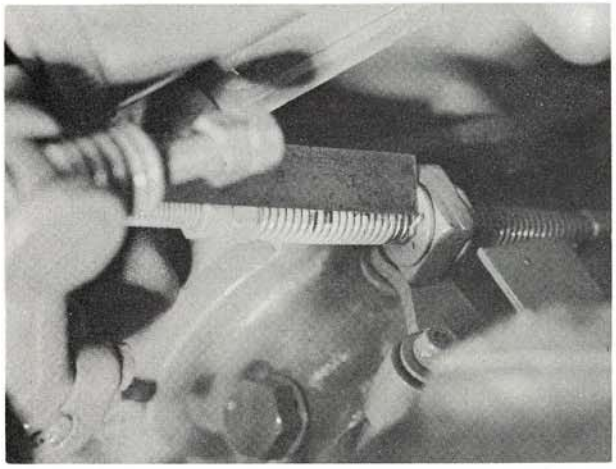

Figure 2

3. Binding may be in the Shifter Mechanism:

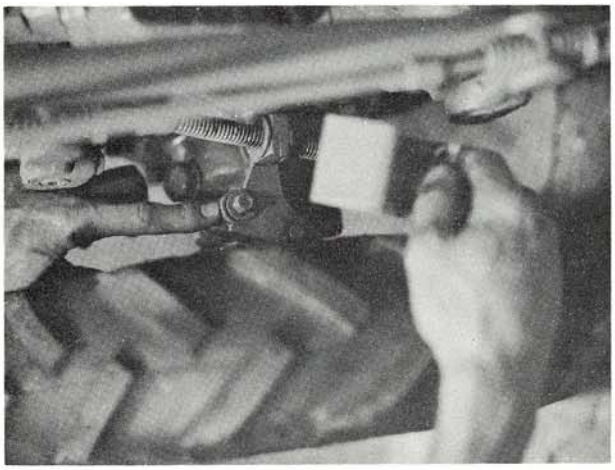

Figure 3

a. Remove Part Number 6731 Shifter Guard, and Part Number 6723 Shifter Arm. Check to determine if the Shifter Arm with the Pivot Bushings (Part Number 6724) is binding on the Pivot Pin--Part Number 6725. The Shifter Arm must operate freely on the Pivot Pin. The Shifter Guard is pictured in Figure 3.

b. If there is binding, ream the teflon bushings or polish the Pivot Pin with emery cloth (as in Figure 4) to correct

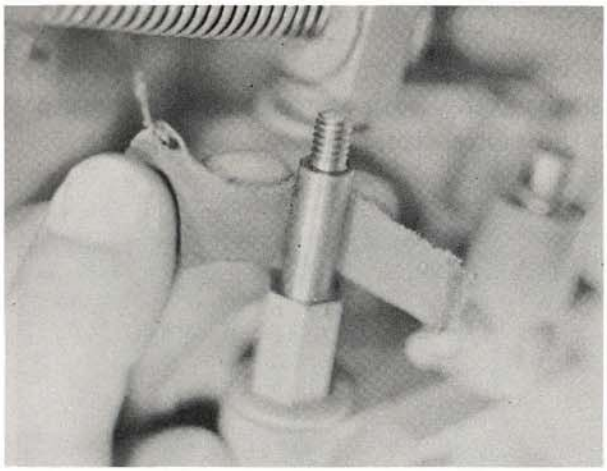

Figure 4

this problem. Also check to see if slotted hole in the Shifter Arm is binding on Part Number 6726 Shifter Pin. The Slot must be smooth and straight on both sides. Burrs found in the center of this slot will cause the pin to bind... see Figure 5.

Figure 5

c. Clutch Sliding Pin may be binding. To check, remove 185 S Hex Head Cap Screw and 242 N Elastic Stop Nut and Part Number 6726 Shifter Pin from Clutch Sliding Pin (Part Number 6721). See if the unit will shift freely. Determine this by grasping the Clutch Sliding Pin with the thumb and fore-finger as shown in Figure 6, and

Figure 6

shifting it in and out of the Axle Housing Part Number 6728. There must not be any binding. If the unit seems to be binding, the Clutch Sliding Pin should be unthreaded 1/2 turn--turning pin 1/2 turn counterclockwise--and see if the unit will shift freely by again working the Clutch Sliding Pin in and out of the axle housing. The Clutch Sliding Pin should move about 13/16 of an inch from full engagement in low range to full engagement in high range. If the unit seems free and the spring adjustments have been made, reassemble the unit. If the unit is still bound after checking the parts mentioned, proceed to part 4.

Note

After reassembling the unit, should it still not shift freely, recheck steps one, two and three, because the problem is with one of the external parts.

4. Binding of the splines; miss mesh of Jaw Clutch Teeth; or insufficient counterbore in the axle housing.

a. Remove Part Number 6728 Axle Housing and assembled parts from the chassis. This includes all the parts attached to or pressed into the Axle Housing and the Shifting Jaw Clutch. See Figure 7. It is not necessary to remove the differential itself--see Figure 13.

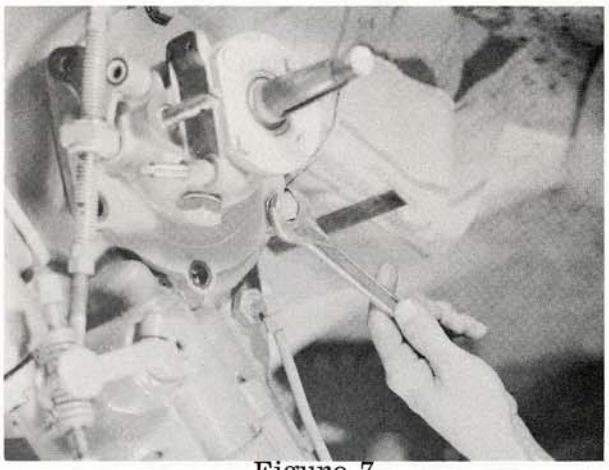

Figure 7

b. Remove the Clutch Sliding Pin from the Shifting Yoke (Part Number 6719) by unthreading with a screwdriver. Do not remove the pin from the Axle Housing.

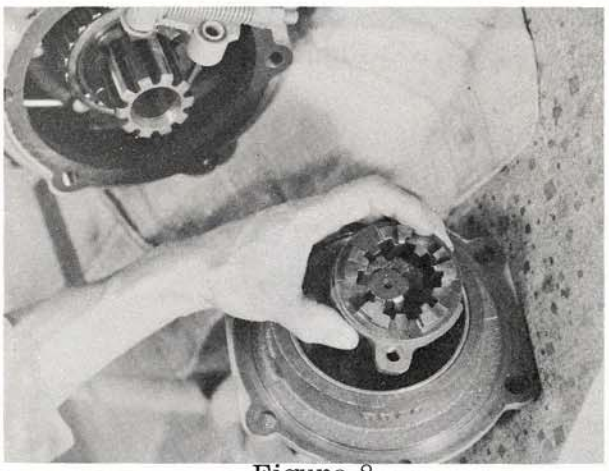

Figure 8

c. Remove Part Number 6718 Shifting Jaw Clutch (Figure 8) and the Shifting Yoke (Figure 9) from the Axle Housing.

d. Place Part Number 6718 Shifting Clutch on the spline portion of the Shifting Gear, Part Number 6704--which remains inside the tractor on the differential assembly, as noted in Figure 10, and

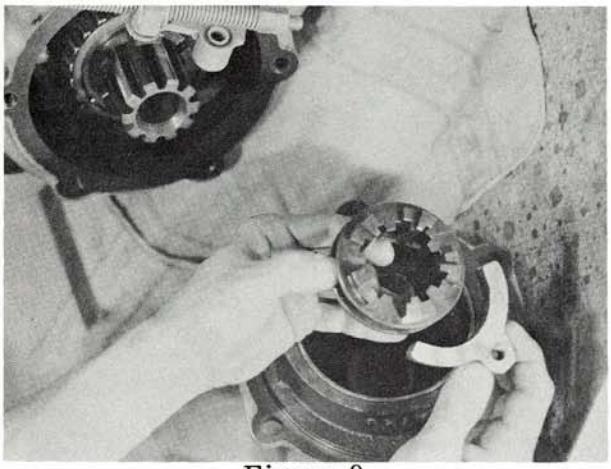

Figure 9

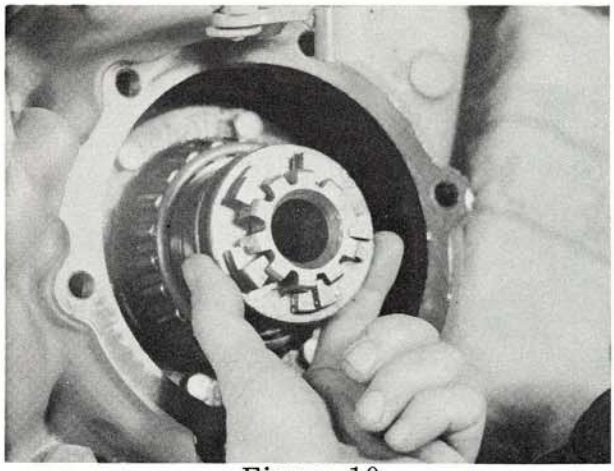

Figure 10

check to see if it will move freely on the Gear Hub. If the Clutch will <u>not</u> slide freely on the Gear Hub, the splines are too tight. This can be corrected by filing the spline portion of the Shifting Jaw Clutch as shown in Figure 11.

Figure 11

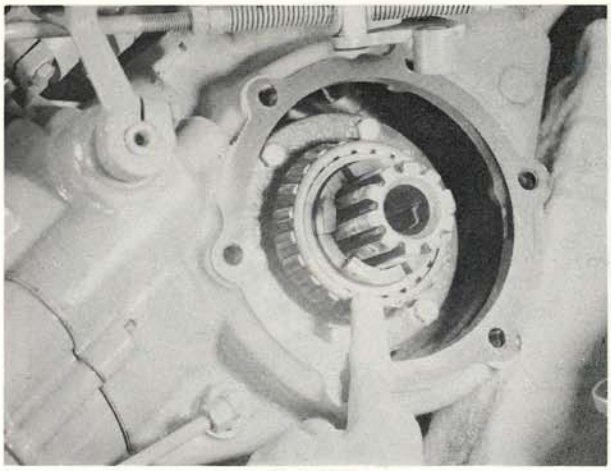

Figure 12

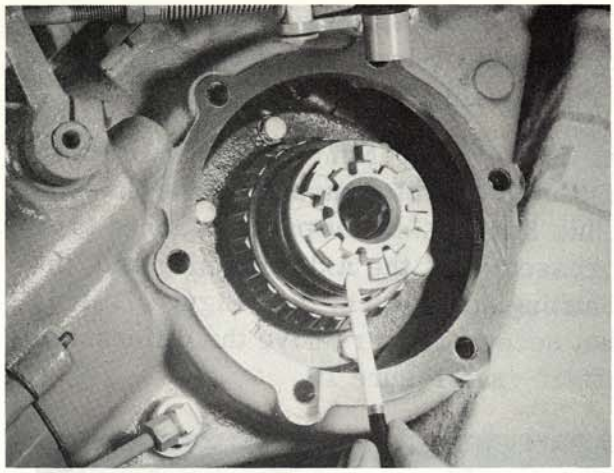

Figure 13

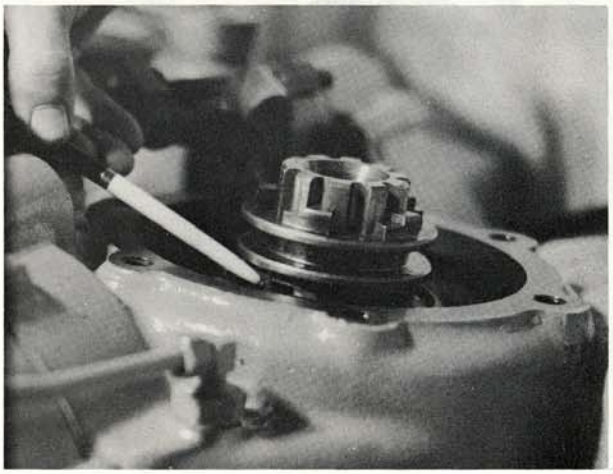

Figure 14

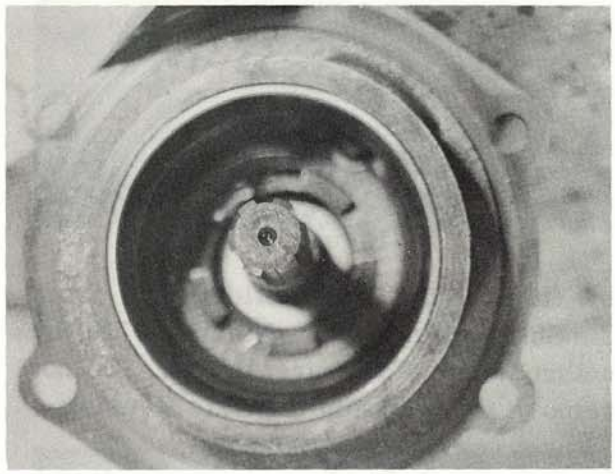

Figure 15

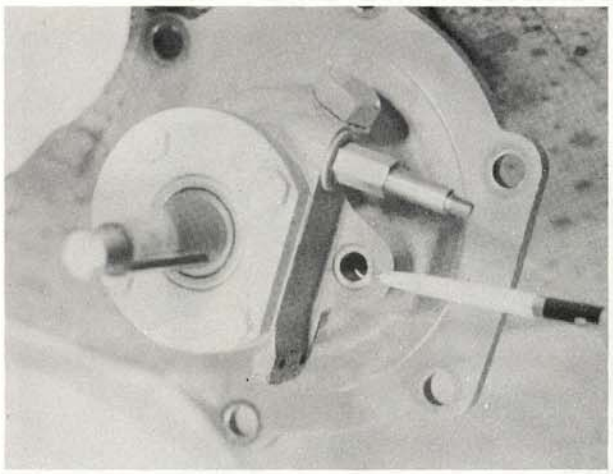

Figure 16

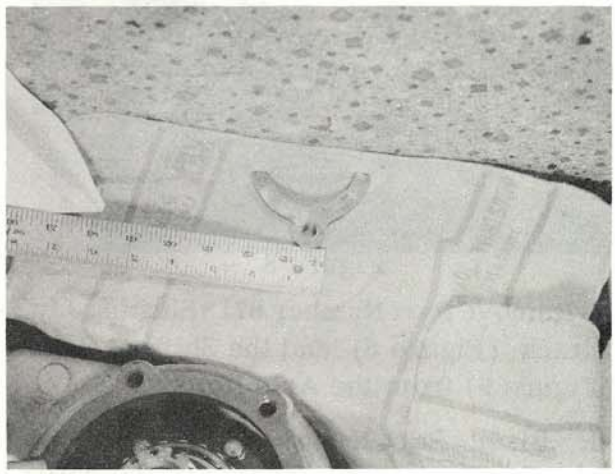

Figure 17

e. Check to see if the Jaw Teeth on Part Number 6718 will engage in all positions with the Jaw Teeth on Part Number 6717 Clutch Housing (which remains attached to the differential), by advancing one tooth at a time until all teeth have been checked. If the teeth do not mesh, replace the parts necessary to give a proper mesh. Also check the mesh of the Jaw Teeth on Part Number 6718 Shifting Jaw Clutch and 6720 Stationary Clutch which remains attached to the axle housing... see Figure 15, again advancing mesh one tooth at a time. It is not necessary to remove Part Number 6720, Stationary Clutch, from the Axle Housing when doing this.

NOTE: When reassembling, be sure the assembly mark on the Shifting Jaw Clutch, Part Number 6718, is to the outside, as in Figure 13.

f. Make sure the teeth of the shifting Jaw Clutch will fully engage with either 6717 Clutch on the differential, or with 6720 Stationary Clutch in the axle housing, as in Figure 14. When shifting from high to low or low to high, the Shifting Clutch Jaws must completely clear teeth on one side before starting engagement on the other side. The teeth should bottom within 1/32" on either Jaw Clutch after full engagement. If they do not, and related parts are properly in place, the counterbore in the axle housing (Figure 15) is not sufficient to clear the shoulder on the shifting jaw clutch. Correct by removing excess metal from the axle housing at point of interference, or replace Part Number 6728 Axle Housing.

5. Binding of the Clutch Sliding Pin:

a. Check to see if the Clutch Sliding Pin Part Number 6721 will slide in and out of the Axle Housing (Part Number 6728) with parts removed... see Figures 7 and 8. If the pin tends to bind it may be because the pin is crooked, or due to insufficient clearance in the "O" Ring Retainers (Part Number 6713). If the pin is crooked, replace it. If the "O" Ring Retainers are too tight to permit the pin to slide freely, remove the "O" Ring and hand ream the "O" Ring Retainer until the pin slides freely. Replace the "O" Ring and check the fit. "O" Ring Retainer is shown in Figure 16.

6. Binding of the Shifter Yoke:

a. Check to see if the Shifting Yoke (Part Number 6719), pictured in Figures 8 and 9, is binding in the slot in the Shifting Clutch--Part Number 6718. This may be caused by an inadequate radius to clear the bottom of the collar on the Jaw Clutch. A minimum radius of 1/32 is necessary.

b. See if the drilled and tapped hole in Shifting Yoke is in the center of the boss, as in Figure 17. (1/16th off center will cause the yoke to bind in the axle housing). To correct this problem, grind the yoke to remove excess material so that part clears the Axle Housing.

With the parts dis-assembled, check to see if the Clutch Sliding Pin--Part Number 6721--is perpendicular to the ground finished face of the Shifter Yoke by threading the Shifter Pin into the Shifting Yoke, and placing a square along the surface of the 6719 Shifter Yoke and along the surface of 6721 Clutch Sliding Pin to see if all surfaces are flush with each other. Refer to Figure 18. Replace part or parts

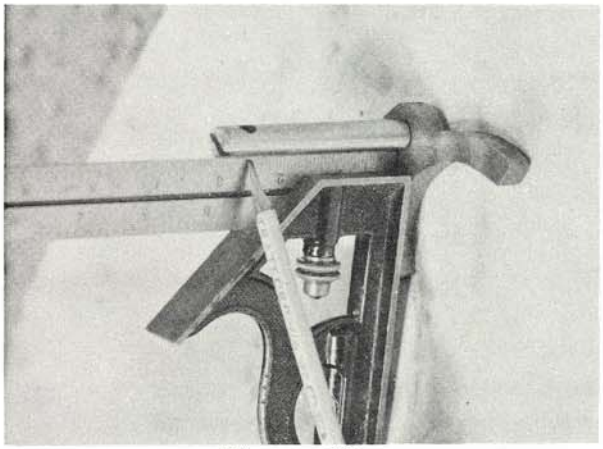

Figure 18

causing the trouble. If they are all flush, square and reassemble the unit.

7. If transmission will not shift into low and there seems to be no binding, or the transmission will shift into low and not move the tractor, check Part Number 6734--the Stationary Clutch Bolt pictured in Figure 19 in the Axle Housing. If this lock bolt becomes disengaged from the Stationary Jaw Clutch (Part Number 6720), the Jaw Clutch may turn in the housing. This part must be locked to the axle housing to operate the tractor in low axle range.

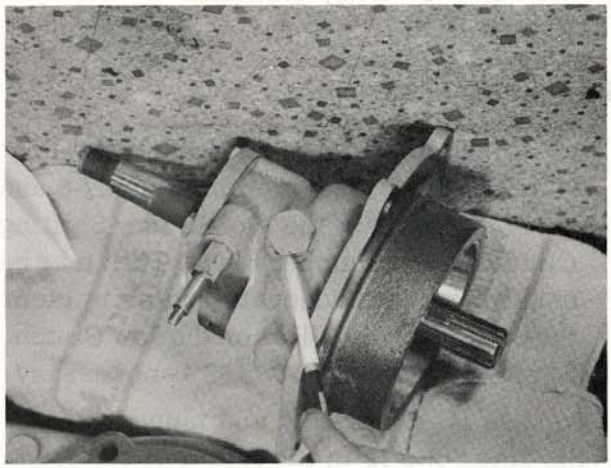

Figure 19

Assembly Procedure -- 2 Speed Differential

Introduction

Frequent reference is made to individual parts by number.

This may, at first, appear confusing, but will be of great help when you refer to the parts and price list by part number, to see what a particular part looks like.

General Instructions:

Loosen cap screws 1/2" (but it is not necessary to remove) the side of housing (L-203-D) to allow 'drop' of the Differential (see Figure 20) out of mesh with Worm Gear (6705).

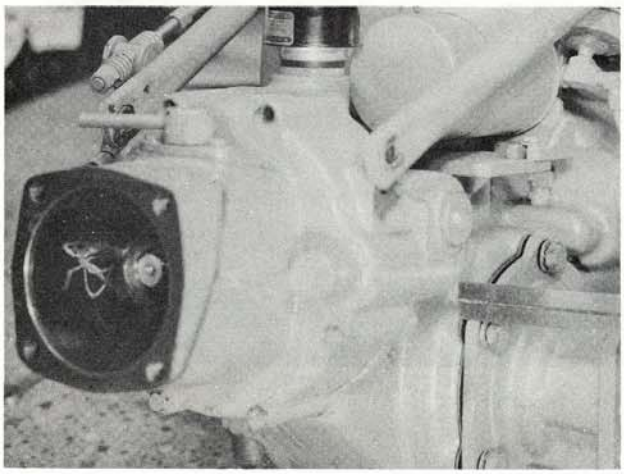

Figure 20

Remove axle housing bolts that retain Axle Housing (6728).

Lift out Differential, as seen in Figure 21 and proceed to disassemble, changing worn parts where needed.

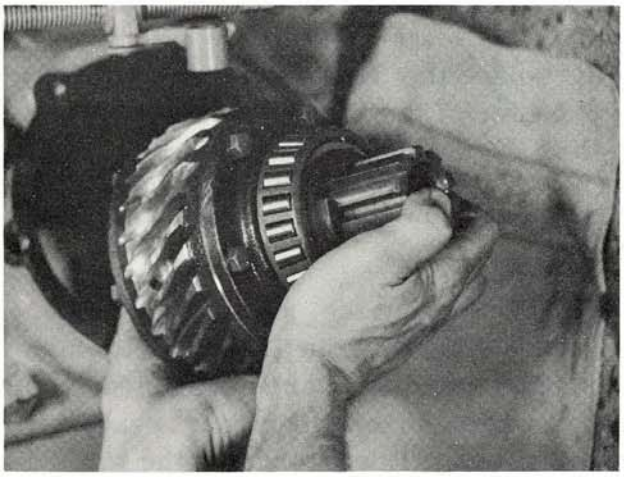

Figure 21

Assembly Procedure

1. To assemble: Press the Differential Bearing Cone (RB-111-C) on the Pinned Housing (6716) and the Bearing Cone (RB-123) on the Clutch Housing (6717) in proper orientation. See Figure 21.

2. Bolt the Worm Gear being assembled to the Pinned Housing, using six Shakeproof Lockwashers and six Hex Head Cap Screws.

3. Now place three Dowell Pins (6714) in the pin holes in the Pinned Housing as shown in Figure 22.

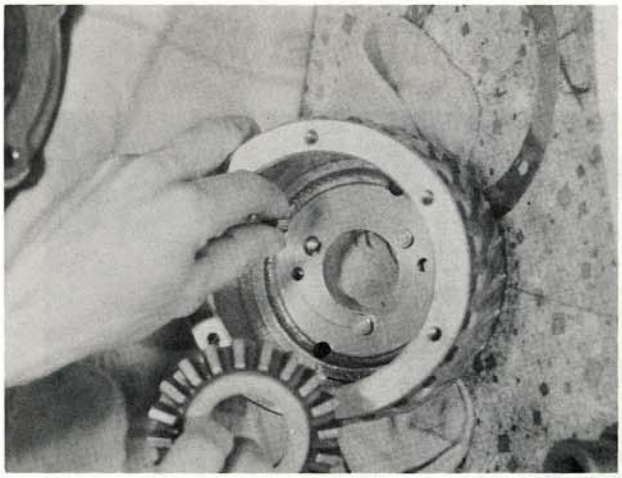

Figure 22

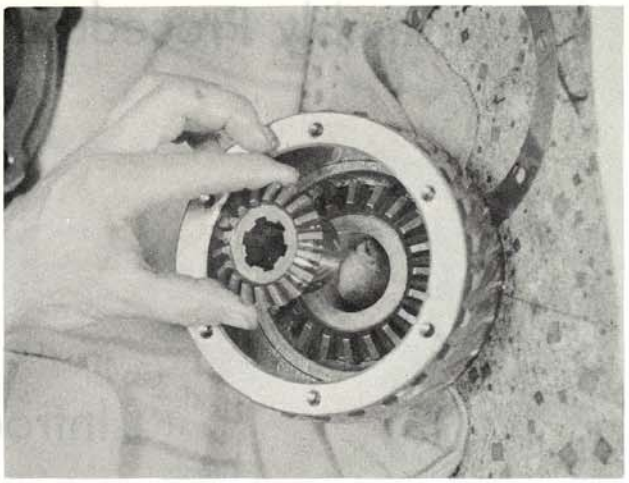

Figure 23

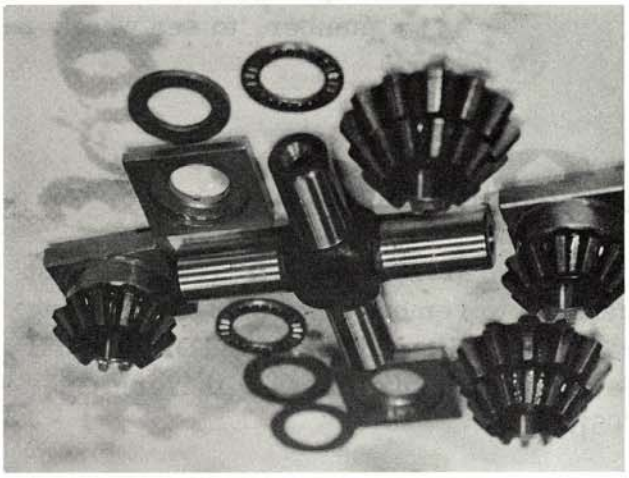

Figure 24

4. Place the Pinned Gear in position on the pins.

5. Now place the Differential Gear (6709) in the center of the Pinned Gear (6703) as shown in Figure 23.

Figure 24 shows the disassembled Differential.

6. Next, assemble the four spider gears, with close reference to Figure 25, which shows three spider gears assembled, and parts for the fourth spider gear ready for assembly, and in line in order to the way the parts will be assembled.

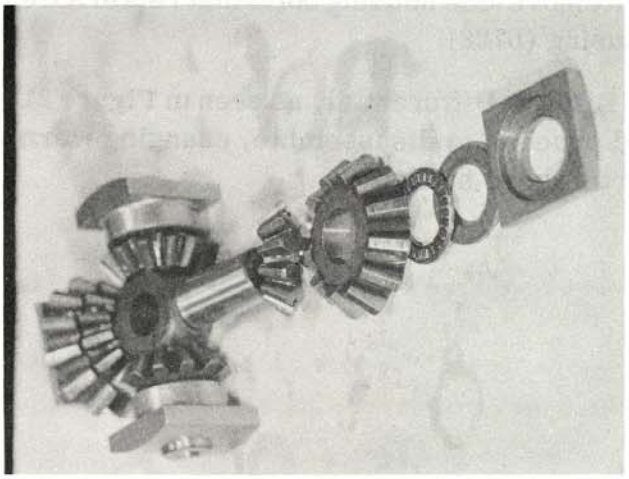

Figure 25

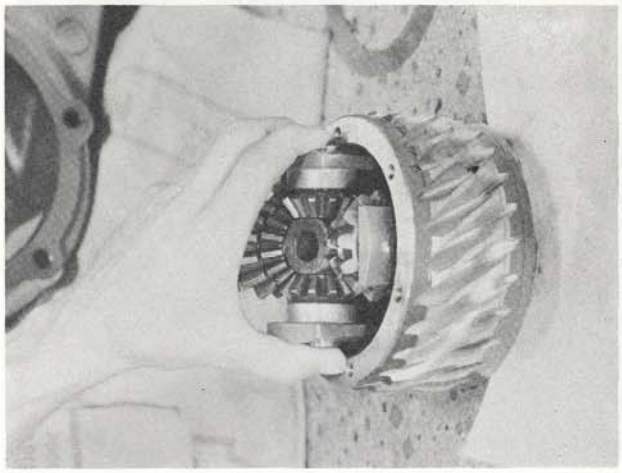

Figure 26

Figure 26 shows proper placement of the Differential in the Bronze Gear. Figure 27 shows the Differential Gear.

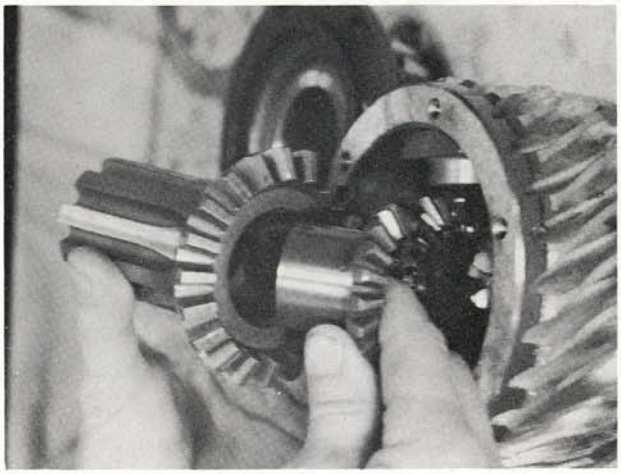

Figure 27

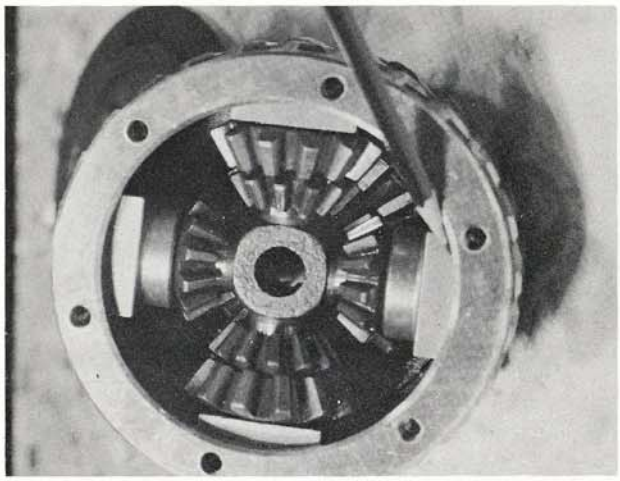

Figure 28

7. Check orientation of powdered metal thrust blocks--see Figure 28. Check for proper gear shimming as in Figure 29. The back cone of Shifting Gear (6704) and Shifting Train Pinion (6702) must be flush within .010.

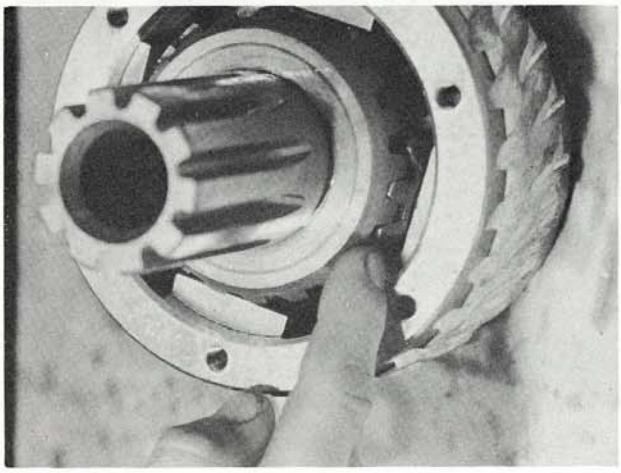

Figure 29

Caution

Add the same number of shims under each Bearing Race so that the gear mesh is balanced. If the mesh is not balanced, it is necessary to re-shim to obtain the proper mesh.

8. Place the Needle Thrust Bearing and Thrust Race on the Gear Hub, as in Figure 30.

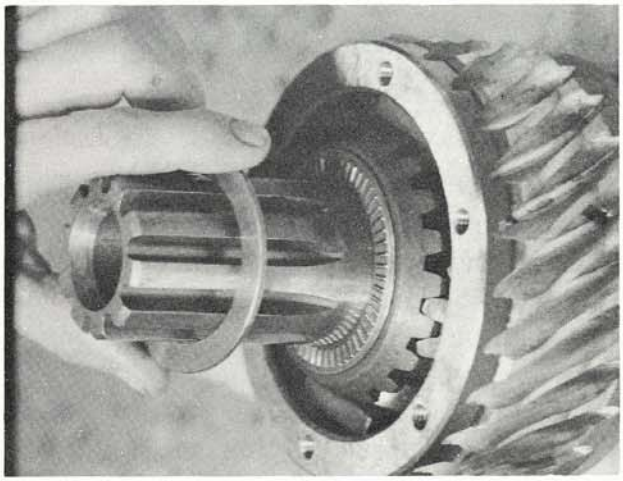

Figure 30

9. Now put the Clutch Housing (6717) on the hub of the Shifting Gear (6704) as shown in Figure 31. Note that the Clutch Housing and Worm Wheel do not meet flush because shims

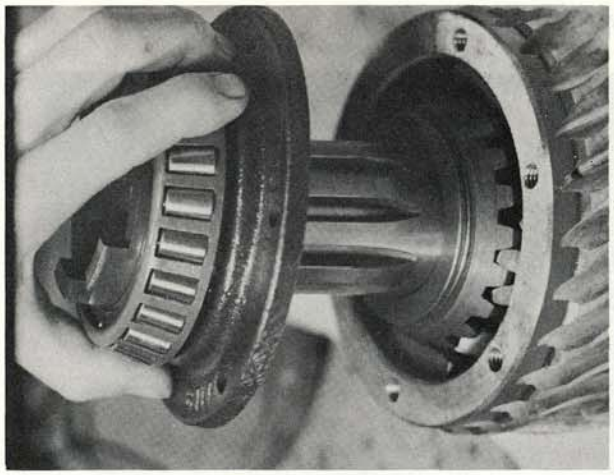

Figure 31

must be added. Use a feeler gage, or slip the corners of shims in the gap to determine how many shims will be needed. Refer to Figure 32.

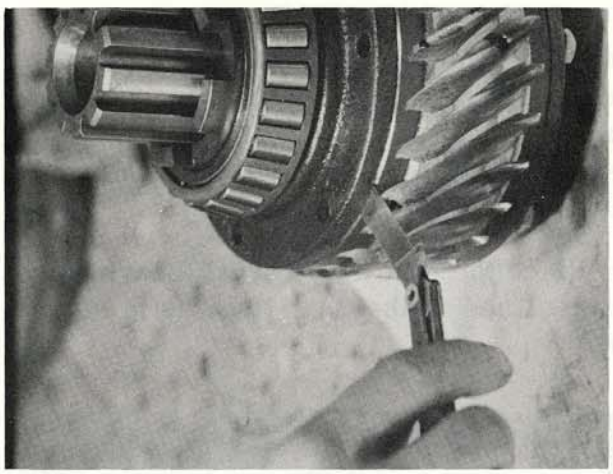

Figure 32

10. Bolt down the Clutch Housing as in Figure 33, using three Hex Head Cap Screws and three Shakeproof Lockwashers. Check to see that the gear moves freely, and has slight end play--about .010. If not, more shims are needed. If additional shims are not needed, complete bolting down, using three more Hex Head Cap Screws, and three more Shakeproof Lockwashers.

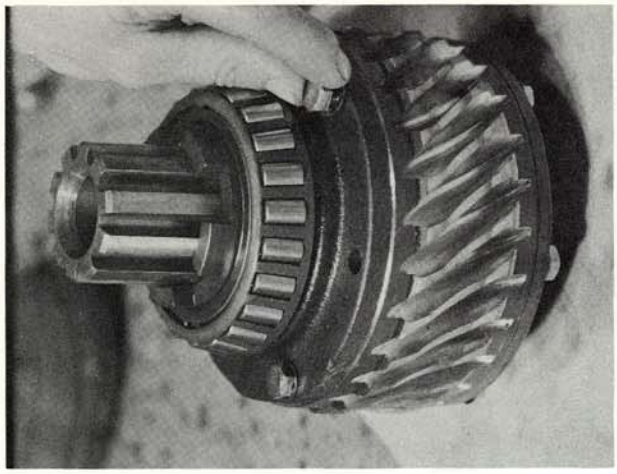

Figure 33

Figure 34 shows the 2 speed Axle Housing internal assembly, in the manner of installation by part.

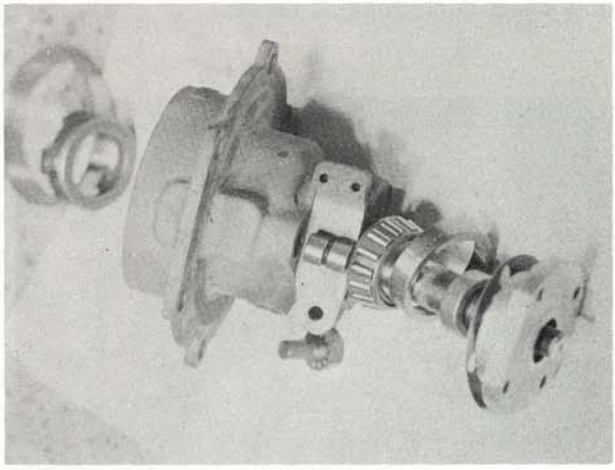

Figure 34

11. Place "O" Ring Retainers in bore as shown in Figure 35. First, place "O" Ring Retainer (6713), in bore and press in to a depth of .572 to .582 from the finished sur-

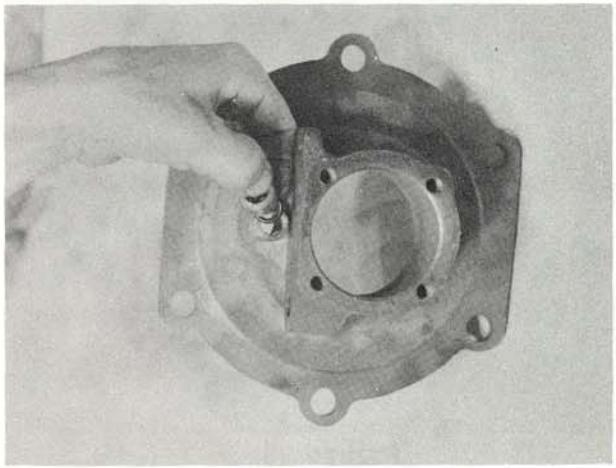

Figure 35

face. Then press the "O" Ring Seal, then "O" Ring Retainer (6713) in the bore.

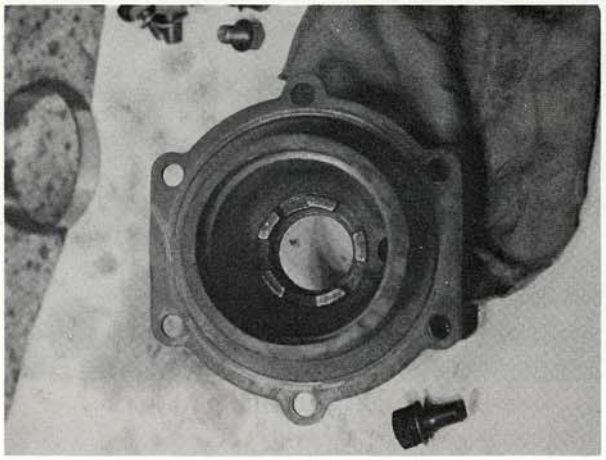

Figure 36

12. Now place the Stationary Clutch (6720) in the Axle Housing, lining up the hole in the Stationary Clutch with the drilled and tapped hole in the axle housing. Bolt the Stationary Clutch in place with the Clutch Bolt (pictured in Figure 36). Figure 37 shows where the bolt goes.

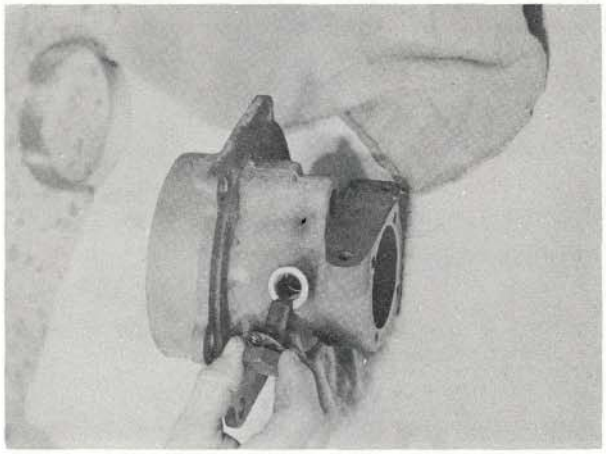

Figure 37

13. Refer to Figure 8 to see the Shifting Yoke in the pilot groove in the Shifting Clutch. Engage the Shifting Clutch with the Stationary Clutch, making sure the timing mark on the Shifting Clutch is to the outside.

14. Insert the Clutch Sliding Pin through the "O" Ring all ready assembled in the axle housing, as seen in Figure 38 and thread tight into the Shifting Yoke. Back off at least

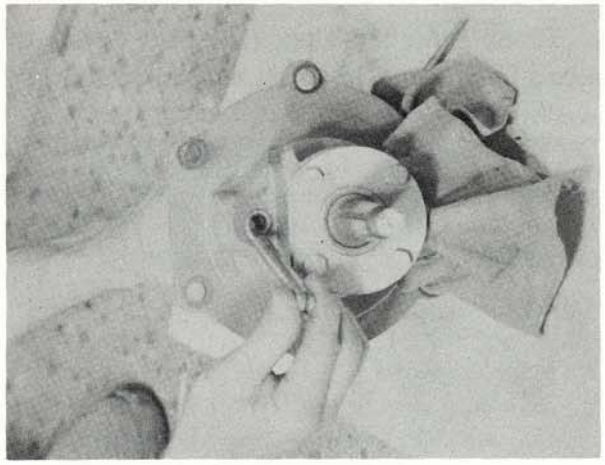

Figure 38

1/4 turn till the hole in the Clutch Sliding Pin is parallel to the milled surface. See Figure 39.

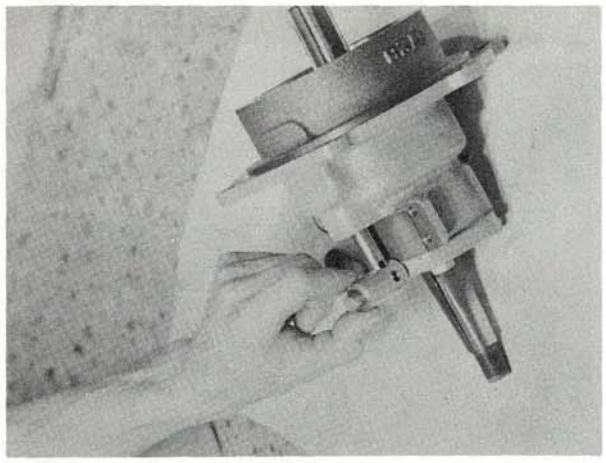

Figure 39

15. Place the Shifter Pin (6726) on the Clutch Sliding Pin as in Figure 39 and line up the holes. Place Hex Head Cap Screw Bolt in the hole from the guard side and secure with an elastic stop nut.

NOTE: Place bolt in the hole from the guard side, or guard will not fit.

16. Place Bearing Cup (RB-123-394A) in the two speed axle housing as shown in Figure 40.

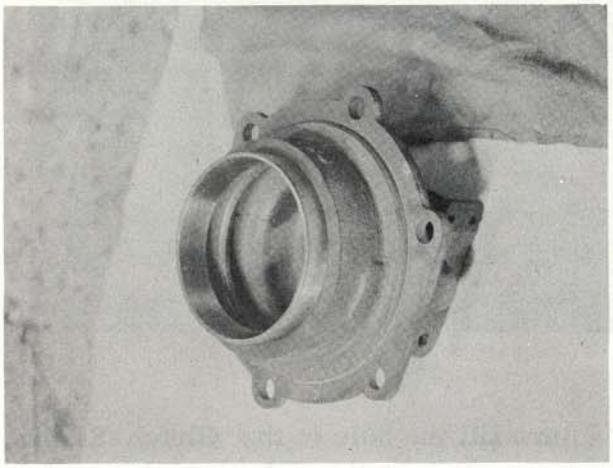

Figure 40

17. Place the Thrust Pin (6711) in the center of the spider pin, see Figure 44.

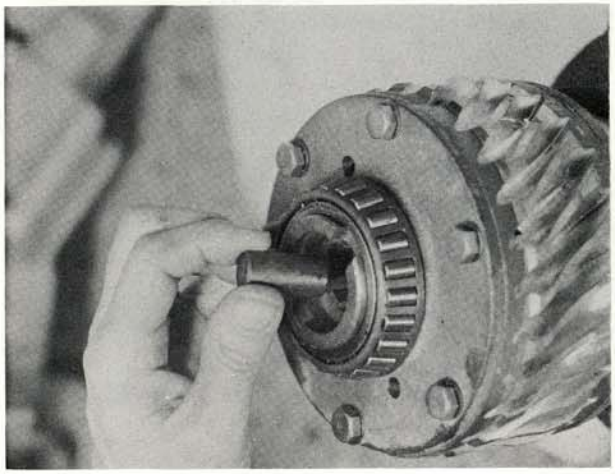

Figure 44

18. Put Differential on axle shaft that is already assembled in Axle Housing (6728). Make sure that the Shifting Clutch is engaged with the Stationary Clutch and slip the Differential and Axle Housing into position by getting the splined gear hub in the splined hole of the Shifting Clutch... see Figure 41.

19. Slip the complete unit into the chassis and guide the axle in the Axle Housing (L-203-E) into the center of the Differential, as in Figure 41.

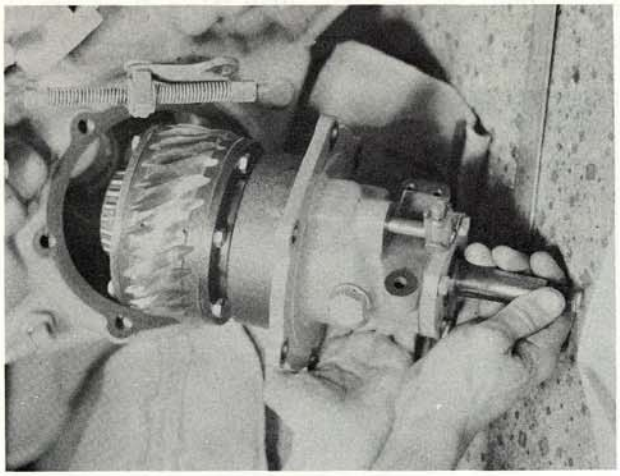

Figure 41

20. Bolt both Axle Housings to the chassis with three bolts (three bolts for each axle housing). Refer to Figure 42. Then check for bearing adjustment by shimming between Axle Housing (L-203-E) and the chassis, and Axle Housing (6728) and chassis.

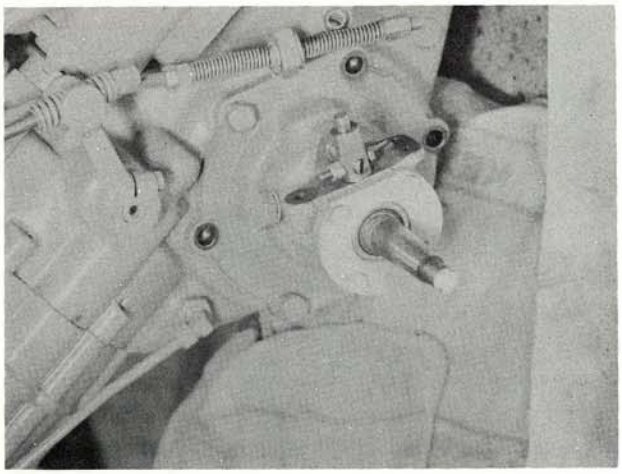

Figure 42

CAUTION: Add equal shims to each side to keep Differential centered.

21. Remove the front planetary and further check alignment of Wormshaft and Differential. If Worm Wheel is not centered on the Worm Gear, rearrange shims between the axle housings and chassis till the Differential Worm Wheel is centered on the Worm Pinion. See Figure 43.

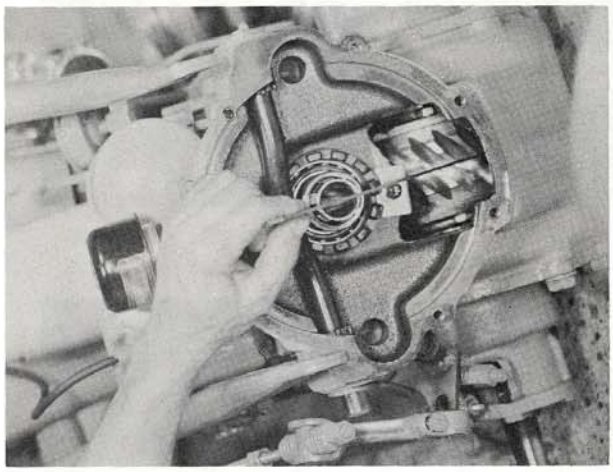

Figure 43

22. Press two Pivot Bushings (6724) into the Shifter Arm--one from each end so there is a gap between the two. Place the shaft of Clutch Rod Swivel Pin (6760) through the punched hole of the Shifter Arm and install Retaining Ring. (On some units, this is a weldment, and thus not necessary).

23. Install Stationary Pivot Pin (6725) into the Axle Housing as shown in Figure 45.

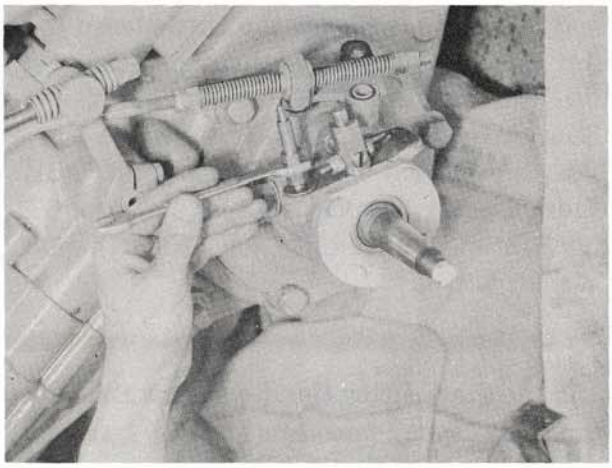

Figure 45

24. Place the Shifter Arm over the bearing shaft of the Stationary Pivot Pin as seen in Figure 46, and the slotted hole of the Shifter Arm over the Shifter Pin. Tighten with Flat Washer (401) and elastic stop nut.

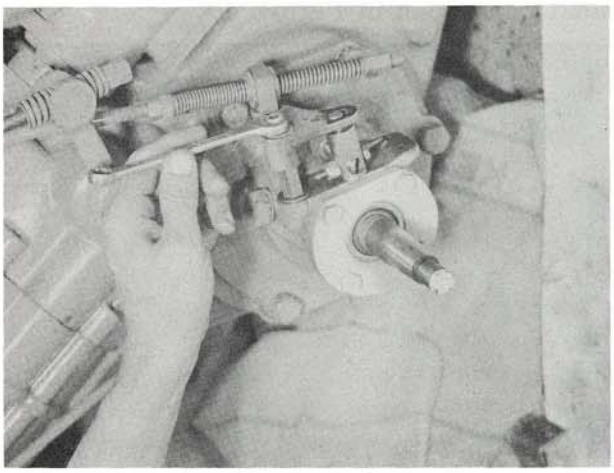

Figure 46

25. Install the Shifter Guard and tighten with two Hex Head Cap Screws (191-S) as shown in Figure 47.

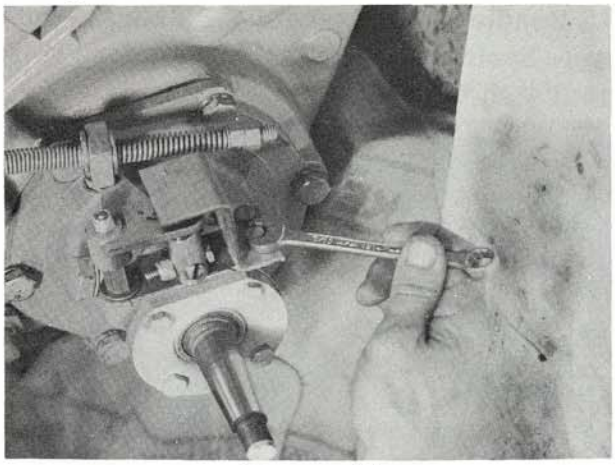

Figure 47

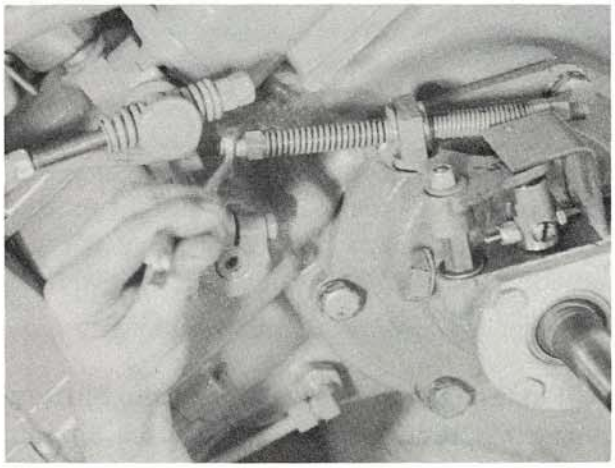

Figure 48

26. Now thread two Hex Head Nuts (201-N) to the limit of the threads on the Over Center Lock Spring Guide (6757), as in Figure 48.

27. Mount the Shifter Lever on the Shifter Bracket, as seen in Figure 49.

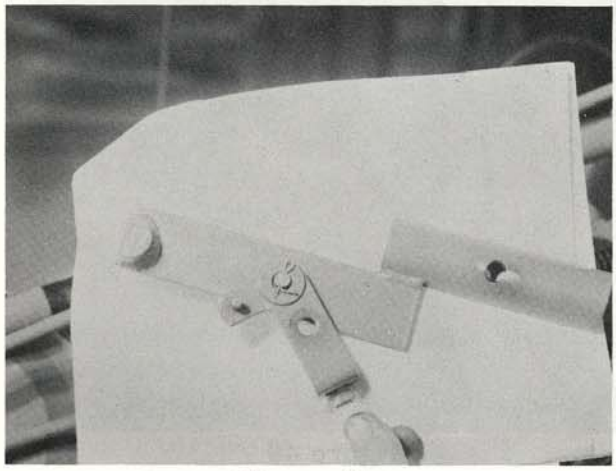

Figure 49

28. Place Toggle Spring and Flat Washer over the Lock Spring Guide and fasten to the Shift Handle as in Figure 50. Be sure to put Toggle Spring through the guide before you lock it with the cotter pin.

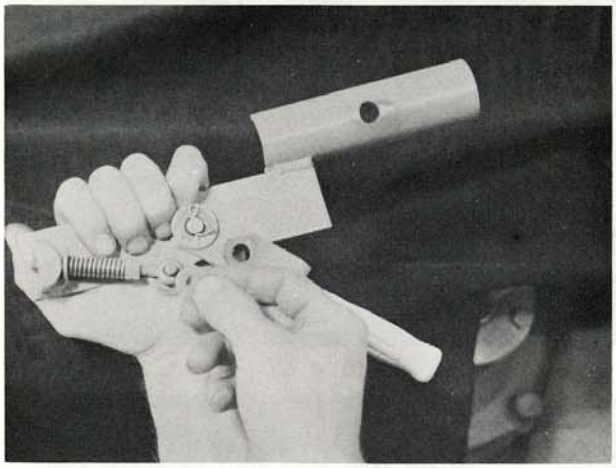

Figure 50

29. Adjust the Toggle Spring so that the spring comes almost to solid height as the Shifter Lever snaps over center--a spring height of about 29/32"--and lock the two Hex Head Nuts (201-N) shown in Figure 51.

30. Fasten the Shifter Rod to the Shifter Lever with Clevis Pin (L-722) Clutch Spring Washers, and Cotter Pin (602) as shown in Figure 52.

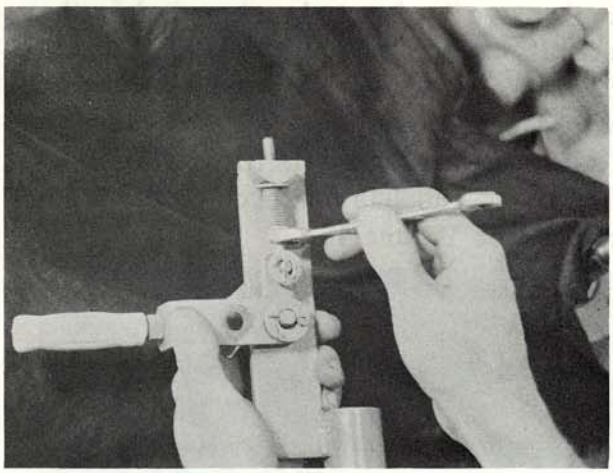

Figure 51

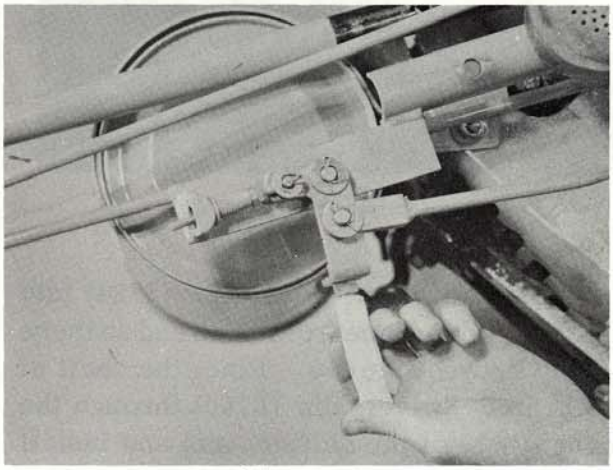

Figure 52

31. Place Handle Lever Grip (if not already on) on Shifter Lever.

32. Run two Light Finish Hex Head Nuts (205-N) to the length of the threads on the Shifter Rod. Insert the rod through the center of the Clutch Spring and Clutch Spring Washer; then through the Clutch Rod Swivel Pin, and another Clutch Spring Washer, and still another Clutch Spring, and add two more Light Finish Hex Head Nuts (204-N). Do not adjust yet.

33. Place the Shifting Handle Mount Bracket on the handle bar and tighten the bar into place, as seen in Figure 53.

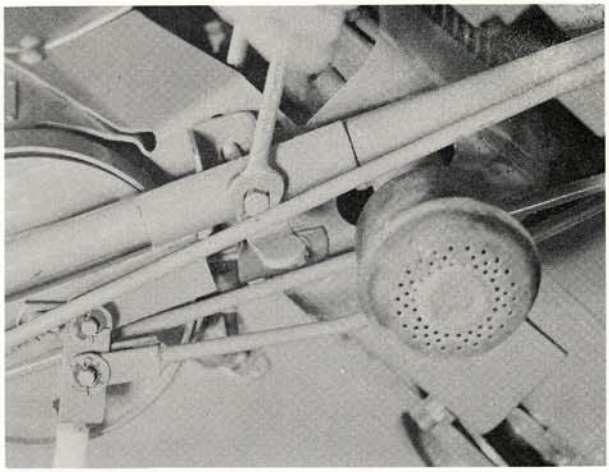

Figure 53

34. Adjust for high range as in Figure 54. With the Shifting Handle in the High range position, retain the Shifter Pin in the Low range position. Adjust the Clutch Spring near the bottom of the rod to almost solid height (with about 1/64" between coils). Lock in position with the two jam nuts for high.

To adjust for Low Range, as in Figure 55, shift Shifter Pin into the high range position and retain. Note in the photo the use of a wedge to maintain proper position. Now shift the Shifter Lever to the Low Range position by moving Shifter Lever toward the power take off. Adjust Clutch Spring to almost solid height (1/64" between coils) and lock in position with two jam nuts.

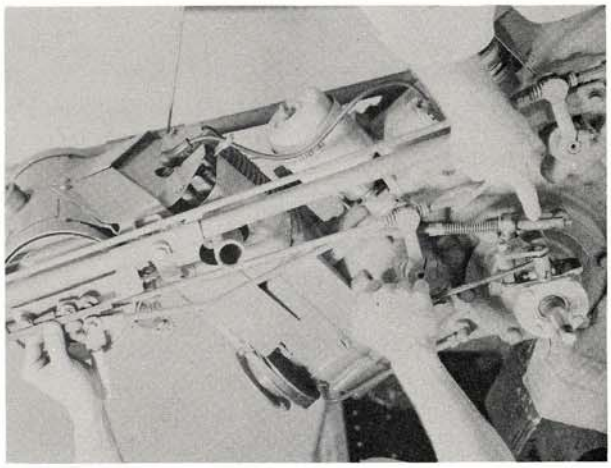

Figure 54

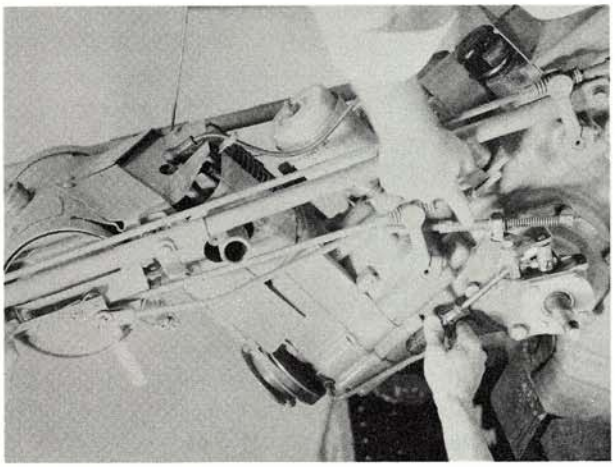

Figure 55

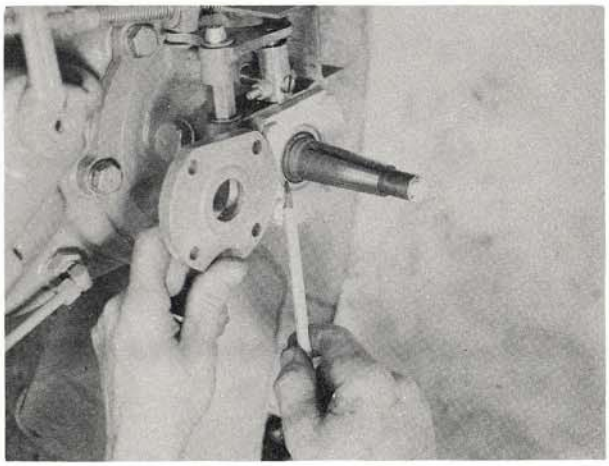

Figure 56

NOTE: Figure 56 points out the change in the old Bearing Cap (on tractor) and the new Bearing Cap. The new Bearing Cap must be used to retain bearing in Axle Housing (6728) with the flat side paralled to the finished surface on the Axle Housing (6728).

TRACTOR DIVISION
Studebaker CORPORATION
1 GRAVELY LANE, DUNBAR,
WEST VIRGINIA, U. S. A.

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Parts and Price List
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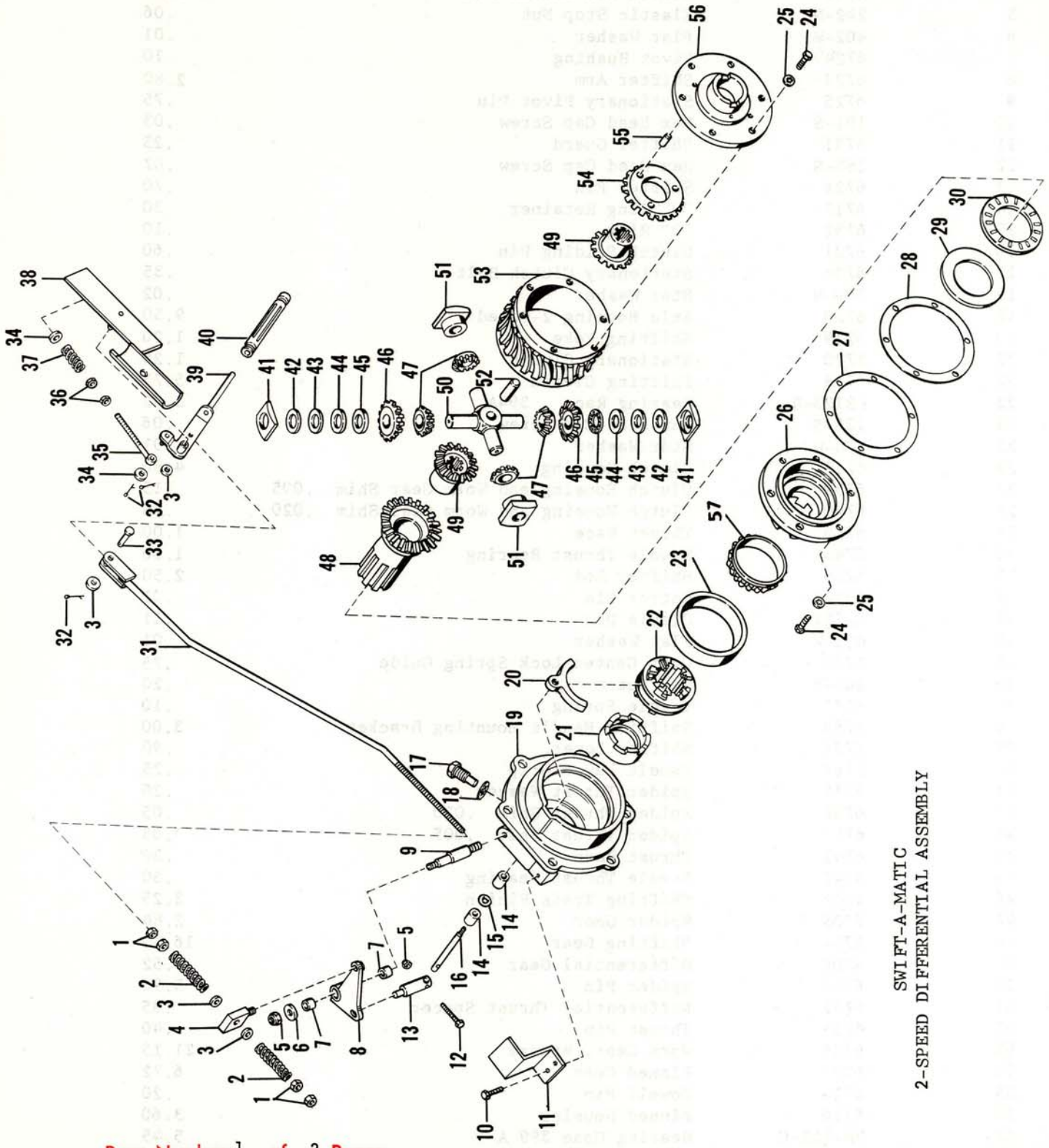
SWIFT-A-MATIC TRANSMISSION

Model Nr. _____

Effective Date: 8-1-63

Form Number: PPL-130



SWIFT-A-MATIC
2-SPEED DIFFERENTIAL ASSEMBLY

Item No.	Part No.	Description	Price
1	204-N	Hex Nut	.02
2	6750	Spring	.20
3	403-W	Clutch Spring Washer	.01
4	6760	Clutch Rod Swivel Pin	1.60
5	242-N	Elastic Stop Nut	.06
6	402-W	Flat Washer	.01
7	6724	Pivot Bushing	.10
8	6723	Shifter Arm	2.80
9	6725	Stationary Pivot Pin	.75
10	191-S	Hex Head Cap Screw	.03
11	6731	Shifter Guard	.25
12	185-S	Hex Head Cap Screw	.07
13	6726	Shifter Pin	.70
14	6713	"O" Ring Retainer	.30
15	6732	"O" Ring	.10
16	6721	Clutch Sliding Pin	.60
17	6734	Stationary Clutch Bolt	.35
18	309-W	Star Washer	.02
19	6728	Axle Housing 2-Speed	9.50
20	6719	Shifting Yoke	1.20
21	6720	Stationary Clutch	1.25
22	6718	Shifting Clutch	5.75
23	RB123-R	Bearing Race 394A	3.42
24	139-S	Hex Head Cap Screw	.06
25	304-W	Star Washer	.01
26	6717	Clutch Housing	4.80
27	6739	Clutch Housing and Worm Gear Shim .005	.15
28	6740	Clutch Housing and Worm Gear Shim .020	.25
29	6744	Thrust Race	1.00
30	6743	Needle Thrust Bearing	1.00
31	6758	Shifter Rod	2.50
32	602-C	Cotter Pin	.01
33	L-722	Clevis Pin	.11
34	401-W	Flat Washer	.01
35	6757	Over Center Lock Spring Guide	.75
36	201-N	Hex Nut	.20
37	6755	Toggle Spring	.10
38	6759	Shifting Handle Mounting Bracket	3.00
39	6756	Shifter Lever	.90
40	5167	Handle Lever Grip	.25
41	6715	Spider Thrust Washer	.20
42	6738	Spider Thrust Shim .020	.05
43	6737	Spider Thrust Shim .005	.05
44	6742	Thrust Race	.30
45	6741	Needle Thrust Bearing	.50
46	6702	Shifting Train Pinion	3.25
47	6708	Spider Gear	2.84
48	6704	Shifting Gear	16.40
49	6709	Differential Gear	5.52
50	6710	Spider Pin	5.96
51	6752	Differential Thrust Spacer	.35
52	6711	Thrust Pin	.40
53	6705	Worm Gear, Bronze	21.15
54	6703	Pinned Gear	6.72
55	6714	Dowell Pin	.20
56	6716	Pinned Housing	3.60
57	RB-123-C	Bearing Cone 399 A	5.45
	NN	Shifter Rod Assembly, Complete	11.25