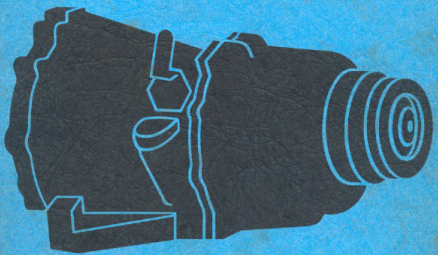
BORG WARNER

Velvet Drive Marine Transmission Service Manual Model: 73C Direct Drive and 1.5:1, 2.0:1, 3.0:1 Reduction Ratios



Warner Gear
Division of Borg-Warner Corporation

SERVICE MANUAL
PRICE $2.50

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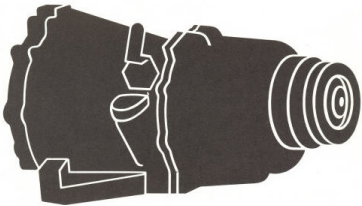

Warner Gear

BORG WARNER

Division of Borg-Warner Corporation
P.O. Box 2688, Muncie, Indiana 47302

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IDENTIFICATION OF VELVET DRIVE® IN-LINE MODEL 73C

TRANS. ASSEMBLY NUMBER (NEW)	TRANS. ASSEMBLY NUMBER (OLD)	INPUT TO OUTPUT SPEED RATIO		ROTATION (1)			PUMP SETTING (2)	PROPELLER REQUIRED (3)	OIL CAPACITY (4)				APPROX. TRANS. WEIGHT	
				INPUT SHAFT	OUTPUT SHAFT				15° INCLINED		LEVEL			
		FORWARD	REVERSE		FORWARD	REVERSE			U.S. QTS.	LITERS	U.S. QTS.	LITERS	POUNDS	KGS.
10-06-000-004	A51-73C	1:1	.88:1	CW	CW	CCW	LH	RH	1.5	1.42	1.6	1.51	135	61.2
10-06-000-005	A51-73CR	1:1	.88:1	CCW	CCW	CW	RH	LH	1.5	1.42	1.6	1.51	135	61.2
10-06-000-006	A52-73C	1.5:1	1.32:1	CW	CW	CCW	LH	RH	2.2	2.08	2.0	1.89	185	83.9
10-06-000-007	A52-73CR	1.5:1	1.32:1	CCW	CCW	CW	RH	LH	2.2	2.08	2.0	1.89	185	83.9
10-06-000-008	A55-73C	3:1	2.64:1	CW	CW	CCW	LH	RH	2.2	2.08	2.0	1.89	185	83.9
10-06-000-009	A55-73CR	3:1	2.64:1	CCW	CCW	CW	RH	LH	2.2	2.08	2.0	1.89	185	83.9
10-06-000-010	A57-73C (5)	2:1	1.76:1	CW	CCW	CW	LH	LH	2.2	2.08	2.0	1.89	185	83.9
10-06-000-011	A57-73CR (5)	2:1	1.76:1	CCW	CW	CCW	RH	RH	2.2	2.08	2.0	1.89	185	83.9

(1) Input and output shaft rotation is described as clockwise (CW) or counter clockwise (CCW) when the observer is standing behind transmission coupling facing towards front or input shaft end of transmission.

(2) Pump rotation is described when the observer is standing in front of transmission facing the pump. The arrow located nearest the top of pump face must point in the direction pump will be driven by the input shaft. IT SHOULD BE REALIZED THAT INDEXING THE PUMP FOR OPPOSITE ROTATION DOES NOT CAUSE OUTPUT SHAFT ROTATION TO BE REVERSED, but does permit the transmission to be used behind an opposite rotating engine.

CAUTION: The pump indexing on all assemblies except 2.10:1 reduction units is the only difference between C and CR units. The planetary gears and cage assembly used in C units is different than the one used in CR units in the 2.10:1 reduction units; therefore, indexing the pump for opposite rotation is not permitted on these assemblies. No warranty claims will be allowed for failures caused by improper pump indexing on 2.10:1 reduction units.

(3) The propeller is described when the observer is standing behind the boat looking forward. A right hand (RH) prop will move the boat forward when rotated clockwise.

(4) Transmission oil capacity only is given. Additional oil will be required for filling oil cooler and cooler lines.

(5) All A57 and A517 reduction units are counter-rotating, i.e. the output shaft turns opposite to input shaft when the transmission is operated in forward.

DESCRIPTION

The model 73C transmission described in this manual consists of a forward and reverse gear box, which may or may not have any one of three reduction ratios, contained in a separate housing and attached to the rear face of the transmission. Input and output shafts are all coaxial and splined at their outer ends.

The forward and reverse transmission consists of a planetary gearset, a forward clutch, a reverse clutch, an oil pump, and a pressure regulator and rotary control valve, all contained in a cast iron housing. The forward clutch locks the input to the output shaft for direct drive (1.00 to 1.00 ratio), when the selector valve is in the forward position. Reverse is obtained by placing selector valve in reverse position. The selector valve directs the hydraulic oil to the reverse clutch which causes a reverse ratio of .88 to 1.00 in a reverse rotation from input shaft.

A crescent type gear pump supplies oil from the sump to the pressure regulator valve which regulates the oil for clutch operation and the excess oil is dumped to supply oil for cooler and lubrication needs. Two ball check valves and springs maintain cooler and lube pressure and the excess oil is returned to pump suction.

Three reduction ratios (3.00 to 1.00, 2.00 to 1.00 and 1.50 to 1.00) may be used in conjunction with the forward and reverse transmission. Reduction units are always engaged and have the same reduction in forward and reverse; however, the over all reverse ratio is different from forward ratio due to the ratio difference of the forward and reverse transmission.

LOCATION OF SEVERAL TRANSMISSION DETAILS ARE SHOWN IN FIGURES 1 AND 2 AS FOLLOWS:

A. Shift Lever
B. To Cooler Outlet
C. Cooler Return Outlet
D. Reverse Clutch Pressure Tap
E. Mounting Bolt Holes
F. Drain Plug
G. Filler Plug & Dipstick Assembly
H. Forward Clutch Pressure Tap
I. Breather
J. Input Shaft
K. Pump
L. Coupling
M. Reduction Housing
N. Adapter
O. Lube Pressure Tap
P. Line Pressure Tap

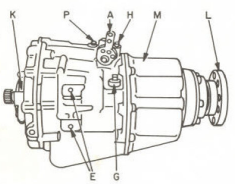


FIG. 1 LEFT SIDE VIEW OF TRANSMISSION.

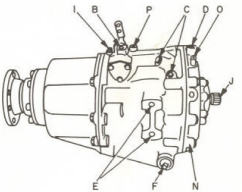


FIG. 2 RIGHT SIDE VIEW OF TRANSMISSION.

OPERATION

STARTING ENGINE

Place transmission selector in neutral before starting engine. Shifts from any selector position to any other selector position may be made at any time and in any order if the engine speed is below 1000 RPM; it is recommended that all shifts be made at the lowest feasible engine speed.

NEUTRAL

Move the shift lever to the center position where the spring loaded ball enters the chamfered hole in the side of the shift lever and properly locates lever in neutral position, Fig. 4. With shift lever so positioned, flow of oil to clutches is blocked at the control valve. The clutches are exhausted by a portion of the valve and complete interruption of power transmission is insured.

FORWARD

Move the shift lever to the extreme forward position where the spring loaded ball enters the chamfered hole in the side of the shift lever and properly locates lever in forward position, Fig. 4. The input and output shafts are locked together by the forward clutch and 1.00 to 1.00 ratio is obtained for forward operation.

REVERSE

Move transmission shift lever to the extreme rearward position where the spring loaded ball enters the chamfered hole in the side of the shift lever and properly locates it in the reverse position, Fig. 4. Fluid directed by the shift valve applies the reverse clutch and causes the clutch plates to hold the ring gear. The planet carrier and input shaft, turning at engine speed, drives the pinion shafts and cause the pinions to rotate about the shafts inside the ring gear. As the pinions rotate they force the sun gear and output shaft to rotate in reverse rotation and at an input to output shaft ratio of .88 to 1.00.

HYDRAULIC CIRCUITS

The transmission case is used as a sump for transmisson fluid. Fluid leaving sump passes through an oil strainer and into case passages, which direct fluid to inlet side of pump. Fluid leaving pump under pressure goes directly to the rotary shift valve and regulator valve. The regulator valve, set to open at 120 PSI (827 k Pa) dumps excess fluid to maintain correct line pressure.

Fluid dumped by regulator valve, passes through case passages, flows from transmission through an externally mounted oil cooler and suitable connecting lines and is returned to transmission lube circuit. A ball check valve, ahead of cooler and set to open at 65 PSI (448 k Pa), opens if pressure to cooler becomes excessive, and dumps excess fluid to the lube circuit without going through the cooler. The AS7-73C reduction carrier has cooler pressure feed to its lube circuit.

A ball check valve, set to open at 10 PSI (70 k Pa), maintains correct lube presssure to all transmission components, and returns excess fluid to suction side of pump. **This check valve has been removed.**

Positioning the rotary shift valve in forward (F) position directs fluid from pump, through the valve and case passages through output shaft passage and into forward clutch cylinder behind clutch piston to apply against clutch plates.

Positioning the shift valve in reverse (R) position directs fluid from pump through the valve and case passages and into adapter passage into the clutch cylinder behind reverse clutch piston, forcing piston to apply against reverse clutch plates.

Hydraulic circuits of the AS7-73C transmission shows cooler oil directed to lube the reduction carrier assembly. Hydraulic circuits of the AS2-73C transmission are similar to circuits of the AS5-73C transmissions.

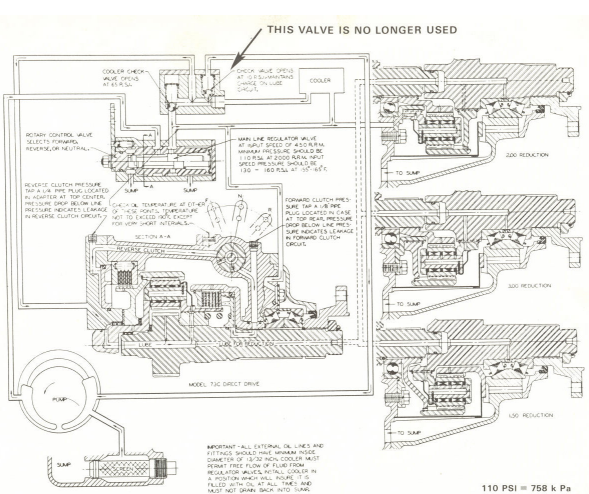


FIG. 3 HYDRAULIC CIRCUIT SCHEMATIC DRAWING.

INSTALLATION RECOMMENDATIONS

TRANMISSION TO ENGINE ADAPTER ALIGNMENT

The adapter bore and face alignment with respect to the crankshaft preferably should be held within a total indicator reading of .005 inch (.13 mm). More than .10 inch (.25 mm) misalignment should not be accepted.

COUPLING ALIGNMENT

Propeller shaft coupling to transmission coupling alignment should be checked on all new installations after the boat has been placed in the water. Alignment should be checked after storage or trailering to insure against misalignment caused by engine shifting.

Remove coupling bolts to check alignment. Hand hold couplings to engage snap fit and make face contact at one point, then check to determine the maximum clearance between couplings at other points. Check for bent shafts or couplings by rotating each coupling and checking clearance in several different positions. The coupling faces should be within .003 inch (.07 mm) of parallel in all positions.

CONTROL LEVER

Controls for shifting the transmission should be designed to position the transmission shift lever so that the poppet ball is fully engaged in the hole in the side of the shift lever in each selector position. The selector should always be located in the forward position when the boat moves forward. Transmissions which drive the boat forward when reverse is selected are apt to fail at an early date and for this reason, no warranty claims will be allowed for failures caused by this condition.

The warranty is cancelled if the shift lever poppet spring and/or ball is permanently removed, or if linkage between remote control and transmission shift lever does not have sufficient travel in both directions.

OIL COOLER

WARNING: Do not operate the engine unless a suitable oil cooler is properly connected to the transmission. Cooler should maintain the desired 140° to 190°F. (60-88c) transmission operating temperature. Oil from cooler out (see Fig. 2) should be connected to either of the two cooler return locations. **NOTE:** All transmissions are currently shipped with plastic plugs installed in transmission cooler outlet and inlet locations to identify these openings.

Maximum heat transfer will occur when water and oil flow in opposite directions through cooler.

HYDRAULIC FLUID RECOMMENDATIONS

Dexron® II, Type F, and other hydraulic transmission fluids which meet the Detroit Diesel Allison Type C3 specifications are recommended for use in all Velvet Drive® marine transmissions.

Lubricating oils which are recommended for use in diesel engines and also meet the Detroit Allison Type C3 specifications may be used if the engine speed does not exceed 3000 RPM. SAE #30 is preferred. SAE #40 is acceptable if high operating temperatures are to be encountered. Multiviscosity oils such as 10W-40 are not acceptable. The first choice is an oil which falls in the SAE-API service Class "CD." The second choice would be an oil which falls in the SAE-API Class "CC."

The equivalent DOD mil specs are:

"CD" Mil-L-2104B
"CC" Mil-L-45199

The new C3 specifications were developed by Detroit Diesel Division of General Motors to outline the requirements of an oil suitable for use in their heavy duty hydraulic automatic and powershift transmissions. The oil companies should be able to provide information as to the suitability of their product for use in a given application.

PUMP ROTATION

Determine engine rotation and purchase a transmission having pump indexed to match engine rotation; however, always check to make certain that pump is correctly indexed before installing the transmission. All Model 73C transmissions may have pump indexed for opposite rotation by removing the four pump to adapter bolts and without removing the pump, tap pump with a plastic hammer and rotate until the letters and arrow respresenting opposite rotation is nearest the top of pump with the four bolt holes aligned with holes in the adapter. Replace and torque the four pump bolts.

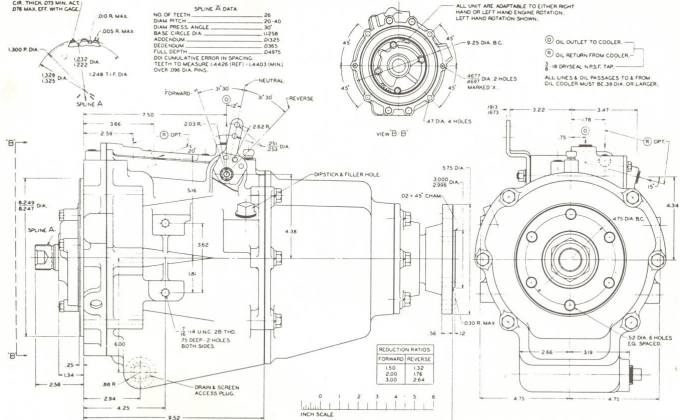


FIG. 4 INSTALLATION DIMENSIONS FOR MODEL 73C REDUCTIONS.

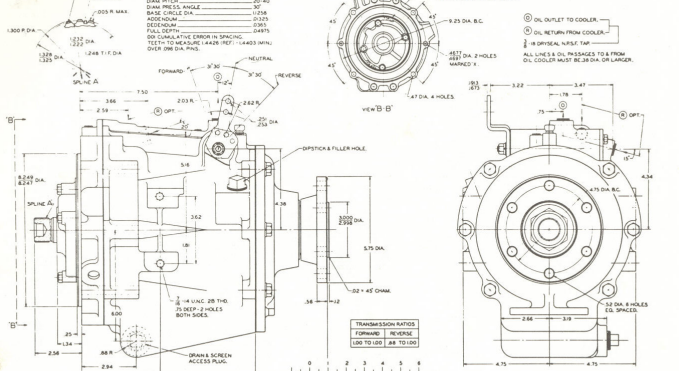
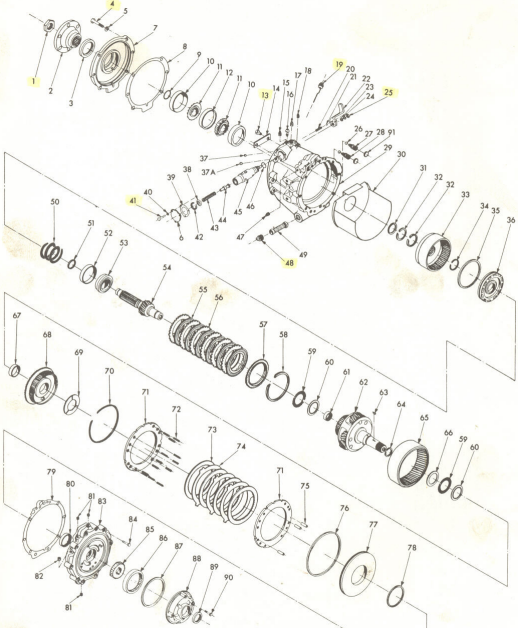


FIG. 5 INSTALLATION DIMENSIONS FOR MODEL 73C DIRECT DRIVES.



73C DIRECT DRIVE TRANSMISSION

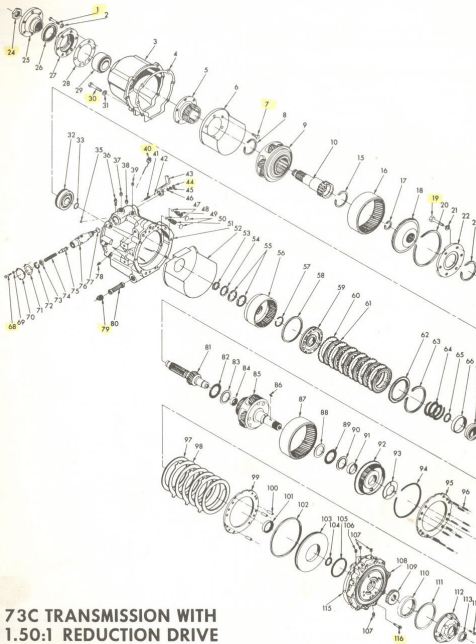
DIRECT DRIVE PARTS LIST FOR MODELS:
10-06-000-004 OR AS1-73C AND 10-06-000-005 OR AS1-73CR

INDEX NO.	W.G. PART NO.	DESCRIPTION	NO. REQ'D
1	4775T	Main shaft nut	1
2	4914A	Coupling	1
3	10-00-044-017 (1)	Oil seal	1
4	0000179860	7/16-14 x 1-1/4 Hex head bolt	6
5	0000103322	7/16 Lockwasher	6
6	71-4	Valve cover	1
7	73C-7	Bearing Retainer	1
8	73C-146	Case rear gasket	1
9	3-34	"O" ring	1
10	4923G	Bearing Cup	2
11	4922G	Bearing cone	2
12	73C-75	Bearing spacer	1
13	4776BB	7/16-14 x 7/8 Hex head bolt	2
14	73C-51	Lube line cover	1
15	0000444854	1/8 Pipe plug	1
16	4740A	Breather assembly-early type	1
	4740G	Breather assembly-pressure type	1
17	0000444864	3/8 Pipe plug	1
18	0000444864	3/8 Pipe plug	1
19	71-2A195	Dipstick assembly–screw-in type	1
N.I.	10-06-559-001	Dipstick assembly–latest type	1
N.I.	10-04-034-002	Dipstick tube	1
20	71-42	Poppet spring	1
21	0000453632	5/16 Steel ball	1
22	68C-79	Forward & reverse shift lever	1
23	0000103340	Control lever washer	1
24	0000108579	5/16 Lockwasher	1
25	0000115729	5/16-24 Hex nut	1
26	0000453595	7/16 Steel ball	2
27	72M-273	Cooler check valve spring	1
28	68C-269	Check valve spring	1
29	10-06-565-001 (2)	Forward & reverse trans. case & plug assembly	1
30	73C-140	Oil baffle	1
31	4652KK	bearing spacer	1
32	4806R	Sealing ring	2
33	73C-50A (4)	Direct clutch cylinder	1
34	4559A	Snap ring	1
35	3-46	Sealing ring	1
36	6-A45 (5)	Clutch piston & ball assembly	1
37	10-00-113-007	Plug	1
37A	4572N	Plug	1
38	71-246	Valve spring retainer	1
39	71-14	Valve cover gasket	1
40	0000103319	1/4 Lockwasher	3
41	0000179793	1/4-20 x 5/8 Hex head bolt	3
	0000179791	1/4-20 x 1-1/2 Hex head bolt	1
42	4821	Snap ring	1
43	5G-246	Valve spring	1
44	73C-243	Pressure regulator valve	1
45	73C-244	Forward & reverse gear trans. valve	1
N.I.	73C-A244 (8)	Valve assembly (items 42,43,44,45)	1
46	4804H	"O" Ring	1
47	0000444864	3/8 Pipe plug	2
48	0000444592	3/4 Pipe plug	1
49	71C-A98A	Oil strainer assembly	1
50	3-47A	Clutch spring	1
51	3-44	Sealing ring	1
52	Not serviced	Bearing sleeve bushing (order assy.)	1

INDEX NO.	W.G. PART NO.	DESCRIPTION	NO. REQ'D
53	73C-A12A	Bearing sleeve & bushing assembly (includes item 52)	1
54	73C-1A2F (9)	Output shaft & sleeve assembly (includes item 53)	1
55	12-A66 (6)	Clutch inner plate assembly	6
56	3-65 (7)	Clutch plate	6
57	5L-67	Clutch pressure plate	1
58	4751	Snap ring	1
59	4830D (10)	Needle bearing	2
60	4832B (11)	Thrust bearing race	2
61	4840R	Needle bearing	1
62	73C-1A16E (12)	Input shaft & planet carrier assembly	1
63	4897A (13)	Pump drive key	1
64	4806A	Sealing ring	1
65	73C-6	Ring gear	1
66	4832A	Needle bearing thrust race	1
67	Not serviced	Ring gear hub bushing (order assy.)	1
68	73C-A106A (14)	Ring gear hub & assembly (includes item 67)	1
69	73C-15	Ring gear hub thrust washer	1
70	4822A	Ring gear snap ring	1
71	73C-71	Reverse clutch pressure plate	2
72	71-97	Pressure plate spring	12
73	10-17-666-001	Reverse clutch plate, inner	4
74	72-176	Reverse clutch plate, outer	3
75	4622F	Dowel pin	3
76	4805A	Sealing ring	1
77	71-35	Reverse clutch piston	1
78	4804G	Sealing ring	1
79	73C-144	Case & adapter gasket	1
80	4840T	Needle bearing	1
81	0000444854	1/8 Pipe plug	3
82	0000444858	1/4 Pipe plug	1
83	73C-A8	Trans. adapter & brg. assembly	1
84	4911	3/8-16 x 1-1/4 Capscrew	4
N.I.	71C-A60	Pump ass'y. (items 85,86,88 & 89)	1
85	Not serviced	Pump drive gear (order assembly)	1
86	Not serviced	Pump driven gear (order assembly)	1
87	3-61	Pump gasket	1
88	Not serviced	Pump housing (order assembly)	1
89	10-00-044-014 (15)	Oil seal assembly	1
90	0000179822	5/16-18 x 1-1/2 Hex head bolt	4
N.I.	10-00-183-021 (16)	5/16-18 x 1-3/8 Hex head bolt	4
91	68C-268	Check valve spring retainer	2
N.I.	4636KR	Service name plate	1
N.I.	000145366	Drive screw	2
N.I.	10-16-039-001	Valve cover	1
N.I.	10-00-640-004	Switch & "O" ring assembly	1
N.I.	10-00-141-006	"O" Ring	1
N.I.	10-16-099-001	Switch cam	1
N.I.	0000179796	Hex HD bolt	3

NOTES 1-15: SEE PAGE 18

N.I. – NOT ILLUSTRATED



73C TRANSMISSION WITH 1.50:1 REDUCTION DRIVE

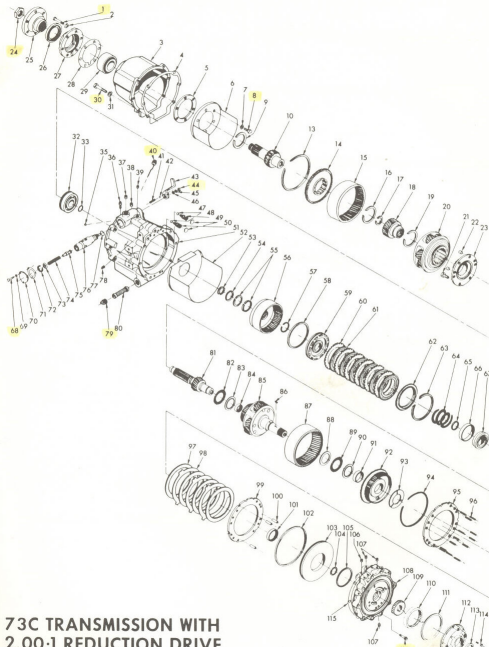
1.50:1 REDUCTION UNIT PARTS LIST FOR MODELS: 10-06-000-006 OR AS2-73C AND 10-06-000-007 OR AS2-73CR

INDEX NO	W.G. PART NO.	DESCRIPTION	NO REQ'D
1	0000179860	7/16-14 x 1-1/4 Hex head bolt	6
2	0000103322	7/16 Lockwasher	6
3	L14-1	Reduction unit housing	1
4	73C-146	Case rear gasket	1
5	L14-4	Reduction sun gear	1
6	L14-140	Reduction oil baffle	1
7	47766B	7/16-14 x 7/8 Hex lock bolt	5
8	4765B	Snap ring	1
9	L14-A150	Pinion cage assembly	1
10	L14-2	Reduction output shaft	1
15	4765B	Snap ring	1
16	73C-6	Reduction ring gear	1
17	4746	Snap ring	1
18	L14-16	Reduction ring gear hub	1
19	0000179857	7/16-14 x 2-1/2 Hex head bolt	6
20	4822A	Ring gear snap ring	1
21	0000115550	7/16 Lockwasher	6
22	L14-8	Bearing retainer	1
23	4745E	Bearing snap ring	1
24	4775T	Main shaft nut	1
25	4714	Coupling	1
26	10-00-044-017 (1)	Oil seal	1
27	L14-7	Bearing retainer	1
28	73C-147	Bearing retainer gasket	1
29	4920B	Bearing	1
30	0000179861	7/16-14 x 1-3/8 Hex head bolt	6
31	0000103322	7/16 Lockwasher	6
32	B308AG	Bearing	1
33	4804G	"O" Ring	1
35	10-00-113-007	Plug	1
36	4740A	Breather assembly-early type	1
	4740G	Breather assembly-pressure type	1
38	0000444854	1/8 Pipe plug	1
39	0000444864	3/8 Pipe plug	1
40	71-2A195	Dipstick assembly–screw-in type	1
N.I.	10-06-559-001	Dipstick assembly–new type	1
N.I.	10-04-034-002	Dipstick tube	1
41	71-42	Poppet spring	1
42	0000453632	5/16 Steel ball	1
43	68C-79	Forward & reverse shift lever	1
44	0000115729	5/16-24 Hex nut	1
45	0000108579	5/16 Lockwasher	1
46	0000103340	Control lever washer	1
47	0000453595 (17)	7/16 Steel ball	1
48	72M-273 (17)	Cooler check valve spring	1
49	68C-268 (17)	Check valve spring retainer	1
50	68C-269	Check valve spring	1
51	10-06-565-001 (2)	Forward & reverse transmisson case	1
52	73C-140	Oil baffle	1
53	73C-52A (3)	"O" Ring backing plate	2
54	3-34	"O" Ring	1
55	4806R	Sealing ring	2
56	73C-50A (4)	Direct clutch cylinder	1
57	4559A	Snap ring	1
58	3-46	Sealing ring	1
59	6-A45 (5)	Clutch piston & ball assembly	1
60	3-65 (6)	Clutch plate (steel)	6
61	12-A66 (7)	Clutch inner plate assembly	6
62	5L-67	Clutch pressure plate	1
63	4751	Snap ring	1
64	3-47A	Clutch spring	1
65	3-44	Sealing ring	1
66	Not serviced	Bearing sleeve bushing (order ass'y.)	1
67	73C-A12A	Bearing sleeve & bushing assembly	1
68	0000179793	1/4-20 x 5/8 Hex head bolt	3
-	0000179791	1/4-20 x 1/2 Hex head bolt	3

INDEX NO	W.G. PART NO.	DESCRIPTION	NO REQ'D
69	0000103319	1/4 Lockwasher	3
70	71-4	Valve cover	1
71	71-14	Valve cover gasket	1
N.I.	73C-A244 (8)	Valve & spring ass'y. (Items 72, 73, 74, 75 & 76)	1
72	4821	Snap ring	1
73	71-246	Valve spring retainer	1
74	5G-246	Valve spring	1
75	73C-243	Pressure regulator valve	1
76	73C-244	Forward & reverse gear trans. valve	1
77	4804H	"O" Ring	1
78	0000444864	3/8 Pipe plug	1
79	0000444592	3/4 Pipe plug	1
80	71C-A98A	Oil strainer assembly	1
81	73C-1A2E (9)	Output shaft & sleeve assembly	1
82	4830D (10)	Needle bearing	1
83	4832B (11)	Thrust bearing race	1
84	4840R	Needle bearing	1
85	73C-1A16E (12)	Input shaft & planet carrier ass'y.	1
86	4897A (13)	Pump drive key	1
87	73C-6	Ring gear	1
88	4832A	Needle thrust bearing race	1
89	4830D	Needle bearing	1
90	4832B	Thrust bearing race	1
91	Not serviced	Ring gear hub bushing	1
92	73C-A106A (14)	Ring gear hub & bushing assembly	1
93	71C-15	Ring gear hub thrust washer	1
94	4822A	Ring gear snap ring	1
95	72C-71	Reverse clutch pressure plate	1
96	71-97	Pressure plate spring	2
97	10-17-666-001	Reverse clutch plate, inner	4
98	72-176	Reverse clutch plate, outer	3
99	73C-71	Reverse clutch pressure plate	1
100	4822F	Dowel pin	3
101	4840T	Needle bearing	1
102	4805A	Sealing ring	1
103	71-35	Reverse clutch piston	1
104	4806A	Sealing ring	1
105	4804G	Sealing ring	1
106	0000444858	1/4 Pipe plug	1
107	0000444854	1/8 Pipe plug	1
108	73C-A8	Trans. adapter & bearing assembly	1
N.I.	71C-A60	Pump assembly (Items 109, 110, 112 & 113)	1
109	Not serviced	Pump drive gear (order assembly)	1
110	Not serviced	Pump driven gear (order ass'y.)	1
111	3-61	Pump gasket	1
112	Not serviced	Pump housing (order assembly)	1
113	10-00-044-014 (15)	Oil seal assembly	1
114	0000179822	5/16-18 x 1-1/2 hex head bolt	4
N.I.	10-00-183-021 (16)	5/16-18 x 1-3/8 Hex head bolt	4
115	73C-144	Case & adapter gasket	1
N.I.	4636KR	Name plate, for service	1
N.I.	0000145366	Drive screw	2
116	4911	3/8)16 x 1-1/4	4

NOTES 1-15: SEE PAGE 18

N.I. – NOT ILLUSTRATED



73C TRANSMISSION WITH 2.00:1 REDUCTION DRIVE

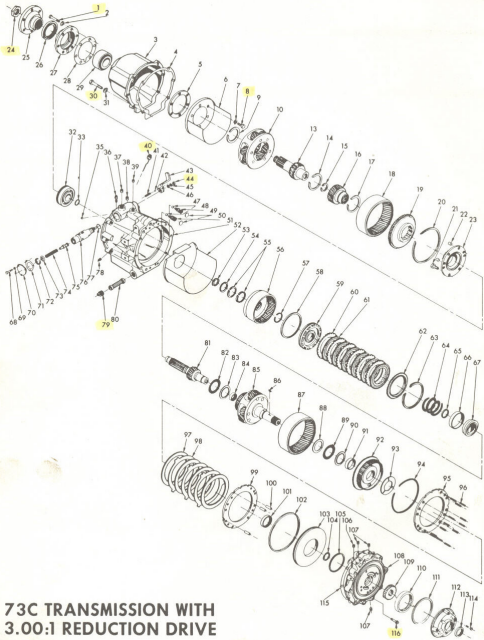
2.00:1 REDUCTION UNIT PARTS LIST FOR MODELS: 10-06-000-010 OR AS7-73C AND 10-06-000-011 OR AS7-73CR

INDEX NO.	W.G. PART NO.	DESCRIPTION	NO. REQ'D
1	0000179860	7/16-14 x 1-1/4 Hex head bolt	6
2	0000103322	7/16 Lockwasher	6
3	L14-1	Reduction unit housing	1
4	73C-146	Case rear gasket	1
5	L17-141	Oil baffle spacer (no longer used)	1
6	10-06-036-001	Reduction oil baffle	1
7	0000115550	7/16 Lockwasher	5
8	0000179857	7/16-14 x 7/8 Hex head bolt	5
9	4765B	Snap ring	1
10	L17-2	Reduction output shaft	1
11	4822A	Ring gear snap ring	1
14	L17-16	Reduction ring gear hub	1
15	73C-6	Reduction ring gear	1
16	4765B	Snap ring	1
17	4746	Snap ring	1
18	L17-4	Reduction sun gear	1
19	4765B	Snap ring	1
20	L14-A150	Pinion cage assembly	1
21	4776BB	7/16-14 x 7/8 Hex head bolt	6
22	0000141283	Dowel pin	2
23	L17-8A	Bearing retainer	1
24	4775T	Main shaft nut	1
25	4914	Coupling	1
26	10-00-044-017 (1)	Oil seal	1
27	L14-7	Bearing retainer	1
28	73C-147	Bearing retainer gasket	1
29	4920B	Bearing	1
30	0000179861	7/16-14 x 1-3/8 Hex head bolt	6
31	0000103322	7/16 Lockwasher	6
32	B308A	Bearing	1
33	4804R	"O" Ring	1
35	10-00-113-007	Plug	1
36	4740	Breather assembly–early type	1
	4740G	Breather assembly–pressure type	1
37	10-00-191-002	3/8 Plastic plug	1
38	0000044854	1/8 Pipe plug	1
39	0000044864	3/8 Pipe plug	1
40	71-2A195	Dipstick assembly–screw-in type	1
N.I.	10-06-559-001	Dipstick assembly–new type	1
N.I.	10-04-034-002	Dipstick tube	1
41	71-42	Poppet spring	1
42	0000045632	5/16 Steel ball	1
43	68C-79	Forward & reverse shift lever	1
44	0000115729	5/16-24 Hex nut	1
45	0000108579	5/16 Lockwasher	1
46	0000103340	Control lever washer	1
47	0000453595 (17)	7/16 Steel ball	1
48	72M-273 (17)	Cooler check valve spring	1
49	68C-268 (17)	Check valve spring retainer	1
50	68C-269	Check valve spring	1
51	10-06-565-001 (2)	Forward & reverse transmission case	1
52	73C-140	Oill baffle	1
53	73C-52A (3)	"O" ring backing plate	2
54	3-34	"O" Ring	1
55	4806R	Sealing ring	2
56	73X-50A (4)	Direct clutch cylinder	1
57	4559A	Snap ring	1
58	3-46	Sealing ring	1
59	6-A45 (5)	Clutch piston & ball assembly	1
60	3-65 (6)	Clutch plate (steel)	6
61	12-A66 (7)	Clutch inner plate assembly	6
62	5L-67	Clutch pressure plate	1
63	4751	Snap ring	1
64	3-47A	Clutch spring	1
65	3-44	Sealing ring	1
66	Not serviced	Bearing sleeve bushing (order ass'y.)	1

INDEX NO.	W.G. WART NO.	DESCRIPTION	NO. REQ'D
67	72C-A12A	Bearing sleeve & bushing assembly	1
68	0000179793	1/4-20 x 5/8 Hex head bolt	3
	0000179791	1/4-20 x 1/2 Hex head bolt	3
69	0001033319	1/4 Lockwasher	3
70	71-4	Valve cover	1
71	71-14	Valve cover gasket	1
N.I.	73C-A244 (8)	Valve & spring ass'y. (Items 72, 73, 74, 75 & 76)	1
72	4821	Snap ring	1
73	71-246	Valve spring retainer	1
74	5G-246	Valve spring	1
75	73C-243	Pressure regulator valve	1
76	73C-244	Forward & reverse gear trans. valve	1
77	4804H	"O" Ring	1
78	0000444864	3/8 Pipe plug	1
79	0000444592	3/4 Pipe plug	1
80	71C-A86A	Oil strainer assembly	1
81	73C-1A2E (9)	Output shaft & sleeeve assembly	1
82	4830D (10)	Needle bearing	1
83	4832B (11)	Thrust bearing race	1
84	4840R	Needle bearing	1
85	73C-1A16E (12)	Input shaft & planet carrier assembly	1
86	4897A (13)	Pump drive key	1
87	73C-6	Ring gear	1
88	4832A	Needle thrust bearing race	1
89	4830D	Needle bearing	1
90	4832B	Thrust bearing race	1
91	Not serviced	Ring gear hub	1
92	73C-A106A (14)	Ring gear & hub assembly	1
93	71C-15	Ring gear hub thrust washer	1
94	4822A	Ring gear snap ring	1
95	73C-71	Reverse clutch pressure plate	1
96	71)97	Pressure plate spring	12
97	10-17-666-001	Reverse clutch plate, inner	4
98	72-176	Reverse clutch plate, outer	3
99	73C71	Reverse clutch pressure plate	1
100	4622F	Dowel pin	3
101	4840T	Needle bearing	1
102	4805A	Sealing ring	1
103	71-35	Reverse clutch piston	1
104	4806A	Sealing ring	1
105	4804G	Sealing ring	1
106	0000444858	1/4 Pipe plug	1
107	0000444854	1/8 Pipe plug	1
108	73C-A8	Trans. adapter & bearing assembly	1
N.I.	71C-A60	Pump assembly (Items 109, 110, 112 & 113)	1
109	Not serviced	Pump drive gear (order assembly)	1
110	Not serviced	Pump driven gear (order assembly)	1
111	3-61	Front pump gasket	1
112	Not serviced	Front pump housing (order assembly)	1
113	10-00-044-014 (15)	Oil seal assem assembly	1
114	0000179822	5/16-18 x 1-1/2 Hex head bolt	4
N.I.	10-00-183-021 (16)	5/16-18 x 1-3/8 Hex head bolt	4
115	73C-144	Case & adapter gasket	1
N.I.	4636KR	Service name plate	1
N.I.	0001145366	Drive screw	1
116	4911	3/8-16 x 1-1/4 Capscrew	4

NOTES 1-15: SEE PAGE 18

N.I. – NOT ILLUSTRATED



73C TRANSMISSION WITH 3.00:1 REDUCTION DRIVE

PARTS INTERCHANGEABILITY

1) Oil seal 10-00-044-017 replaces seal L14-110A.

2) 10-06-565-001 forward and reverse transmission case replaces the 73C-1 and 73C-1A cases.

3) 73C-52A "O" ring backing plate replaces 73C-52 plate which was thinner. These plates are not used when 73C-50 direct clutch cylinder is used.

4) 73C-50A direct clutch cylinder replaces 73C-50 clutch cylinder. 73C-50A cylinder is undercut to accomodate the 3-34 "O" ring under rear portion of clutch hub. 73C-50A cylinder may be used with "O" ring positioned behind bearing when sun gear and output shaft have the "O" ring groove in this location.

5) 6-A45 clutch piston and ball replaces 5M-45A clutch piston, which had no ball.

6) 3-65 coned steel clutch plate replaced 3-176A flat steel clutch plate. Six of the 3-65 plates replace seven of the 3-176A plates. Change No. 7 was made in conjunction with this change.

7) 5C-A66A clutch inner plate assembly replaces 5C-A66 clutch plate. Six 5C-A66A plates used with six 3-65 plates replace seven 5C-A66 plates used with seven 3-176A plates. 12A-66 plates are now used.

8) 73C-A244 valve and spring assembly replaces 68C-A244 valve and spring assembly. These two assemblies are interchangeable; however, individual parts should not be interchanged.

Items 9, 10, 11 and 12 are used together and should not be interchanged with earlier parts used in these locations.

9) 73C-1A2F or 73C-1A2E output shaft and sleeve assembly.

10) 4830D needle bearing.

11) 4832B thrust bearing race.

12) 73C-1A16E input shaft and planet carrier assembly.

Transmissions having serial numbers prior to 423 for AS1-73C and CR units, 335 for AS2-73C and CR units, 1138 for AS5-73C and CR units, or 534 for AS7-73C and CR units will have the following parts which should be used together: 73C-A2 output shaft and sleeve assembly, 73C-1A16 input shaft and planet carrier assembly, 4830C needle bearing, and 4832 thrust bearing race. These early parts have a smaller thrust bearing and thrust faces are too small to be used with later parts.

13) 4897A pump drive key is the current key which replaced 4873 pump drive key. These two keys are not interchangeable. Units with serial numbers prior to those listed below will use the 4873 key:

AS1-73C and CR	203
AS2-73C and CR	149
AS5-73C and CR	220
AS7-73C and CR	210

14) 73C-A106A ring gear hub and bushing assembly replaces and is interchangeable with 73C-A106 ring gear hub without a bushing.

15) 71C-62A oil seal assembly replaces and is interchangeable with 71C-62 oil seal assembly. 71C-62A has a double lip and 71C-62 has a single lip.

16) A shorter pump housing is now being supplied. The new pump requires the 5/16-18 x 1-3/8 hex head bolt and the earlier pump requires 5/16-18 x 1-1/2 hex head bolt. Be sure to use the correct bolts.

17) These parts were changed as follows:

1 68C-269 spring removed
1 was 2 453595 7/16 steel ball
1 was 2 68C-268 check valve spring

REQUEST FOR SERVICE INFORMATION

Service questions can not be itelligently answered without a complete knowledge of the nature of the problem, the model number of the transmission involved and all pertinent information. the following list indicates information that should be included when writing or phoning for assistance:

1) Model number and date purchased.
2) Serial number.
3) Transmission ratio
4) Engine used with transmission
5) Type of equipment in which used
6) Describe symptoms
7) Is transmission operative in forward
8) Is transmission operative in reverse
9) Does transmission slip in forward
10) Does transmission slip in reverse
11) Where from full mark was oil level
12) Was transmission noisy, (describe)
13) What was transmission line presure, (see manual and check)
14) Did transmission lock-up
15) Was excessive heat noted at or near time of failure, (Describe)
16) Was shift lever correctly positioned by poppet ball in all positions
17) Was anything peculiar noticed prior to failure, (Describe)
18) What type of oil is being used
19) Is an oil cooler properly connected to transmission

If model or serial number can not be read from name tag, look for it on sales contract or ask your dealer. The service manual will identify some models clearly; however, when all efforts fail, include all information that would help identify your transmission.

REPAIR KITS FOR MODEL 73C

SMALL PARTS REPAIR KIT — KIT NO. A4867DW

PART NO.	PART NAME	QTY.
73C-144	Gasket–case & adapter	1
73C-146	Gasket–case, rear	1
73C-147	Gasket–bearing retainer, reduction & direct drive	1
71-14	Gasket–valve cover	1
10-00-044-014	Oil seal, pump	1
10-00-044-017	Oil seal, rear	1
3-61	Gasket–front pump	1
4805A	Seal ring, reverse clutch piston	1
4804G	Seal ring, reverse clutch cylinder	1
3-46	Seal ring, forward clutch piston	1
3-44	Seal ring	1
3-34	Seal ring	1
4804R	Seal ring	1
4806A	Sealing ring	1
4806R	Sealing ring	2
4822A	Snap ring	2
4559A	Snap ring	1
4751	Snap ring	1
4746	Snap ring	1
4765B	Snap ring	2
4745E	Snap ring	1
73C-15	Ring gear hub thrust washer	1
4804H	"O" Ring, selector valve	1
453632	Poppet ball	1
71-42	Poppet spring	1
4897A	No. 9 Key, pump	1
71-97	Reverse clutch pressure plate spring	4
4622F	Dowel pin, reverse clutch	3
4775T	Main shaft nut	1
4652KK	7/16 Steel ball	1
4821	Snap ring	1
73C-52A	"O" ring backing plate	2

GASKET, OIL SEAL & SEALING RING KIT NO. A4867H

PART NO.	PART NAME	Q
73C-144	Gasket–case & adapter	
73C-146	Gasket–case rear	
73C-147	Gasket–bearing retainer, reduction	
71-14	Gasket–valve cover	
3-61	Gasket–front pump	
4805A	Seal ring–reverse clutch piston	
4804G	Seal ring–reverse clutch cylinder	
3-46	Seal ring–forward clutch piston	
3-44	Seal ring	
3-34	Seal ring	
4804R	Seal ring	
10-00-044-014	Oil seal–pump	
10-00-044-017	Oil seal–rear	

DISASSEMBLY OF TRANSMISSION

PROCEDURES FOR ALL MODELS

The number following a part name in this section refers to the part as illustrated in the "Direct Drive Exploded View"

1) Disassembly procedure should not begin until transmission exterior and work area have been thoroughly cleaned.

2) Remove all pipe plugs, all fittings, filler plug, drain plug and oil screen. Permit remaining fluid to drain from transmission.

3) Place transmission upright on a bench. Remove the four pump to adapter bolts. Use a plastic hammer to free pump as it is pulled from input shaft. Do not damage pump bolt bosses. Pump bolts seal against these faces.

4) Use a felt marking pen to mark gears so that they may be replaced in original position. Press the oil seal from pump housing and discard seal and gasket.

5) Remove the four adapter to case bolts (84) and pull adapter (83) from front of transmission. A large plastic hammer may be needed to help free adapter from snap fit of transmission case. Catch and remove clutch pressure plate as the adapter is removed.

6) Blow air into adapter clutch feed hole to force piston (77) from adapter. Remove and discard adapter gasket and clutch sealing rings.

7) Remove the three dowel pins (75) which hold clutch outer plates from turning. Remove clutch return springs.

8) Pull input shaft and planetary carrier assembly (62) forward to remove ring gear, pinion cage assembly and remaining reverse clutch plates from transmission.

9) Remove reverse clutch plates from ring gear and thrust washer (69) from ring gear hub (68). Remove ring gear and ring gear hub from pinion cage assembly. Remove thrust needles (59) and one thrust race (66) from carrier and the other thrust race (60) from ring gear hub.

10) Ring gear and ring gear hub (68) may be separated by removing the snap ring (70).

11) Remove needle thrust bearing (59) from front face of sun gear (54). A thrust plate (60) will be found inside the pinion cage assembly and it should be removed for inspection.

12) Remove nut, lockwasher and flat washer from shift lever, then remove shift lever (22).

13) Remove valve cover bolts (41), lockwashers, valve cover (6) and gasket.

14) Remove valve assembly from case. Press against spring retainer (38) to prevent parts from springing out as snap ring (42) is removed from valve. Remove spring and regulator valve from forward and reverse valve (45).

TO COMPLETE DISASSEMBLY OF FORWARD AND REVERSE TRANSMISSION

1) Use a tool similar to the one shown in Fig. 6 to press against the end of sun gear and output shaft (54), while completing steps two through five, inclusive.

2) Remove output shaft nut and coupling from output shaft.

3) Remove bearing retainer to case bolts (4) and lockwashers. Remove bearing retainer (7) and bearing spacer (12) from transmission case. It may be necessary to use a large plastic hammer to help free retainer from case.

4) Remove the "O" ring (9) from behind bearing.

5) Remove bearing components from output shaft.

6) Remove the tool and pull output shaft and forward clutch assembly forward from case.

7) Remove the snap ring (58) from clutch cylinder.

8) Invert the clutch assembly and catch clutch plates as they slide from clutch cylinder.

9) Press clutch cylinder from shaft and piston.

10) Position remaining clutch parts, with a tool similar to the one illustrated in Fig. 7 on an arbor press and compress clutch return spring, then remove snap ring (34) from behind clutch piston.

11) Remove clutch piston (36), and spring (50) from sun gear and output shaft (54). Remove sealing ring from clutch piston.

12) Remove the two cast iron sealing rings (32) from rear of clutch housing.

13) Inspect the bearing cups (10) in case and retainer. Remove only if replacement of cups is required.

14) Remove and discard oil seal from bearing retainer.

DISASSEMBLY OF REDUCTION UNITS

PROCEDURES FOR ALL MODELS

Procedure in this section applies to all reduction units and should follow steps outlined in section "Procedure for All Models". Numbers which follow a part name refer to this part on the appropriate reduction unit exploded view.

1) Remove six reduction housing to case bolts and slide reduction housing with attached parts rearward from forward and reverse transmission.

2) Use a tool similar to the one shown in Fig. 6 to press against the end of sun gear and output shaft, while removing the snap ring which retains reduction unit gears to forward and reverse transmission output shaft. Slide reduction unit parts from shaft.

3) Complete steps six through twelve inclusive of section "To Complete Disassembly of Forward and Reverse Transmission" except, following step No. 8, complete the following instruction: Place clutch cylinder and sun gear under an arbor press and compress clutch spring to permit removal of "O" ring backing plates (53) and "O" ring (54). The "O" will be positioned in the shaft groove behind the annular bearing on a few early transmissions.

4) Remove the snap ring (17) from bearing retainer (23) and remove ring gear (18) and ring gear hub (19) from 3:1 units. Remove snap ring (19) and pinion cage assembly (20) from 2:1 units.

5) Remove bearing retainer to case bolts and retainer from transmission case rear face.

6) Pull bearing (32) from case. It will be necessary to remove the snap ring (23) from bearing snap ring groove on 1.5:1 units, so that a puller may be installed in bearing groove.

7) Remove output shaft nut and coupling from output shaft, then remove output shaft with attached parts from reduction housing.

8) Remove bearing retainer to reduction housing bolts (1). Remove bearing retainer (27) and rear bearing cone.

9) Bearing outer race may be removed by pressing on front face of front bearing cone.

10) Press seal from bearing retainer.

TO COMPLETE DISASSEMBLY OF 2:1 REDUCTION UNITS

1) Remove the two snap rings (9 & 16) from output shaft and slide ring gear hub (14) from output shaft.

2) Ring gear may be separated from ring gear hub after removing the snap ring (13).

3) Remove oil baffle to reduction housing bolts (8) then remove baffle and spacer.

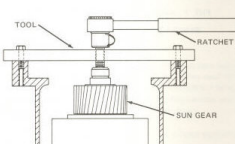


FIG. 6 PRESS AGAINST SUN GEAR SHAFT.

TO COMPLETE DISASSEMBLY OF 3:1 REDUCTION UNITS

1) Separate ring gear (18) and hub (19) after removing snap ring (20).

2) Remove the two snap rings (9 & 14) from output shaft, then slide pinion cage (10) from shaft.

3) Remove oil baffle to reduction housing bolts (8), oil baffle (6) and spacer (5) from reduction housing.

TO COMPLETE DISASSEMBLY OF 1.5:1 REDUCTION UNITS

1) Remove the two snap rings and pinion cage from output shaft.

2) Remove sun gear to reduction housing bolts, oil baffle and sun gear from reduction housing.

3) Ring gear may be separated from ring gear hub after snap ring is removed from ring gear.

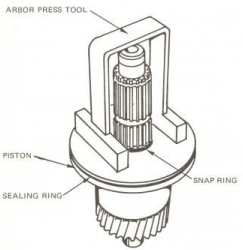


FIG. 7 ASSEMBLE PISTON & SNAP RING

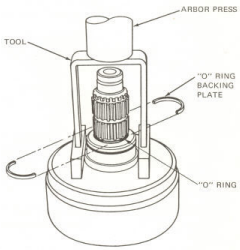


FIG. 8 ASSEMBLE "O" RING AND BACKING PLATES

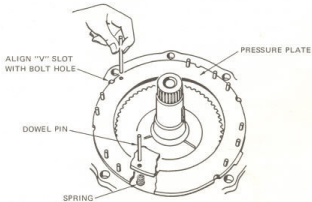


FIG. 9 DOWELS USED TO RETAIN SPRINGS

ASSEMBLY OF TRANSMISSION

ALL MODELS

The procedure described in this section is the same for all ratios. Index numbers used in this section refer to the part as shown in the "Direct Drive Transmission" exploded view Page 10.

1) An orifice plug (37) should be pressed in the drilled passage which angles down from the cast passage in case rear face connecting to bearing bore. A plug (37A) without an orifice is pressed into the upper left passage which angles up to connect with the valve bore of direct drive units only. The plugs will normally be in position; however, new cases may be received with plugs omitted.

NOTE: Early cases will not have the passage which angles down to connect with bearing bore and the orifice plug was not required in these cases. A second plug without an orifice should be pressed in the right hand passage on direct drive units only which use this early case. These cases are interchangeable.

2) Assemble regulator valve (44) and spring (43) into shift valve (45) bore. Press spring retainer (38) into place and install snap ring (42) in valve groove. The retainer should offset away from spring.

3) Assemble the "O" ring (46) in shift valve groove. Lubricate and assemble valve and spring assembly into case bore. The slot in end of valve should be aligned with the lower valve body cover bolt hole.

4) Assemble a new valve cover gasket (39), valve cover (6) and three 1/4–20 X 5/8 hex head bolts (41) with lockwashers (40).

5) Assemble shift lever (22), detent spring (20), detent ball (21), control lever washer (23), lockwasher (24) and nut (25). Spring and ball should be liberally greased to prevent rust caused by salt water entering spring bore.

6) Replace all pipe plugs, oil screen (49), drain plug (48) and dipstick (19).

7) Assemble oil baffle (30) into case (29).

8) Assemble an "O" ring (51) in shaft (54) groove nearest sun gear. Lubricate the "O" ring. Place clutch piston return spring (50) on shoulder of bearing sleeve (53).

NOTE: Bearing sleeve (53), bearing sleeve bushing (52) and output shaft (54) are an assembly and normally are not disassembled. The bushing was not used in early transmissions. The new shaft with bushings may be used to replace a shaft which has no bushing.

9) Assemble a sealing ring (35) in forward clutch piston (36) groove. Lubricate the sealing ring and position piston over sun gear shaft and rest on spring.

10) Place parts assembled in steps eight and nine in an arbor press and with a tool similar to the one shown in Fig. 7, press the piston and spring down, then assemble a snap ring (34) in shaft groove behind piston.

11) Assemble clutch cylinder (33) over output shaft and piston assembly. Check, after assembling these parts, to be sure that clutch sealing rings were not sheared or damaged.

12) Start with a steel plate (56) and alternate friction (55) and steel plates until six sets of plates, a pressure plate (57) and snap ring (58) are assembled into clutch cylinder. The steel plates are coned to give a better clutch release in neutral. The cone of all steel plates should face in the same direction, perferably concave forward.

NOTE: Seven sets of flat steel plates were used with seven friction plates in a few early units. A full set of the new clutch plates should be used to replace a set of these early plates.

13) Assemble two cast iron sealing rings (32) into clutch cylinder (33) hub grooves.

TO COMPLETE ASSEMBLY OF DIRECT DRIVE TRANSMISSION

1) Press a bearing cup (10) into transmission case bore. Press a bearing cup into bearing retainer. These cups will normally be left in position and replacement will not be required. Press a new oil seal (3) into bearing retainer until rear face of seal is flush with retainer rear face.

2) Assemble the bearing spacer (31) over output shaft and against clutch cylinder rear face.

3) Assemble clutch and output shaft assembly into transmission case, being careful to prevent damaging the two cast iron sealing rings, as they enter the transmission case bore.

4) Install the tool Fig. 6 to front of case and adjust the screw against front face of shaft to press parts rearward until they just bottom on case.

5) Assemble bearing cones (11) back to back over output shaft and against the spacer.

6) Assemble an "O" ring (9) in output shaft groove just behind the rear bearing cone.

7) Assemble the lube line cover (14) and the two retaining bolts (13). A few early cases do not require this lube line cover.

8) Assemble case rear gasket (8) to case. Assemble the bearing spacer (12) into retainer bore then assemble retainer to transmission. Replace the six 7/16–14 X 1 inch hex head bolts (4) and lockwashers (5).

9) Assemble coupling (2) and output shaft nut (1) then remove the tool from front of transmission case. Permatex or a similar sealer should be applied to ouput shaft splines and under output shaft nut to prevent leakage around shaft splines.

10) Stand the transmission on it's coupling and install the thrust needles (59) on front face of sun gear.

11) Inspect the needle bearing (61) which is located in input shaft and carrier assembly bore, and replace if necessary. Press a new bearing in until rear face is 7/8 inch below rear face of carrier assembly.

12) Assemble needle thrust bearing race (60), with flange facing forward, into bore and against face of input shaft and carrier assembly.

13) Use a twisting motion to align gear teeth and clutch plate teeth with mating parts as the input shaft and carrier assembly are lowered over sun gear and into direct clutch.

14) Place the flat needle thrust race (66) followed by the needle thrust bearing (59) on the forward thrust face of carrier assembly.

15) Assemble the cast iron sealing ring (64) in input shaft groove.

16) Assemble ring gear hub (68) into splines of ring gear (65) and install the snap ring (70) in ring gear groove. Early ring gear hubs did not have a bushing (67). The present ring gear hub with a bushing may be used to replace the earlier hub without a bushing.

17) Assemble thrust race (60) with flange toward ring gear hub.

18) Use a twisting motion to align gear teeth as the ring gear and hub are lowered over input shaft and carrier assembly.

19) Assemble the thrust washer (69) on front face of ring gear hub.

20) Assemble a reverse clutch pressure plate (71) positioned with the "V" notch aligned with the lower left bolt hole at front of case.

21) Assemble the three dowel pins (75) in the half moon cut-outs in case reverse clutch bore.

22) Assemble an inner reverse clutch plate (73) over ring gear hub splines and alternating with steel outer plates (74) aligned with dowel pins, assemble four inner and three outer plates in the reverse clutch cavity. Place the odd shaped lug of steel plates over the uppermost dowel to permit clearance with spring.

23) Install twelve clutch return springs (72) and place a dowel pin inside each spring. Make dowels 3/16 inches in diameter and approximately 2-1/4 inches long. Dowels hold springs during assembly and must fit holes in pressure plate Fig. 9.

24) Install the other clutch pressure plate (71) aligning the dowel pins with pressure plate holes and with the cast "V" in pressure plate aligned with lower left bolt hole in case face. Remove the twelve dowel pins after the upper pressure plate is firmly seated against the twelve springs.

25) Inspect needle bearing (80) which is located in adapter bore and replace if necessary.

26) Assemble reverse clutch sealing ring (76) in reverse clutch piston (77) groove and assemble "O" ring (78) in adapter (83) hub groove. Lubricate and press piston in clutch cylinder bore of adapter.

27) Assemble a gasket over snap fit on adapter face. Use petrolatum to hold the gasket in position. Carefully lower the adapter into contact with case face. Assemble the four 3/8–16 X 1–1/4 adapter bolts (84) to retain the adapter to the case.

28) Press a new seal (89) into pump housing (88) until seal is flush with front face of housing.

29) Assemble pump drive key (63) in input shaft groove then assemble the pump drive gear (85) over shaft and key.

Two different keys have been used and the shaft has two different keyways to accept one of the keys. The correct key must be selected for each shaft.

30) Assemble pump driven gear (86) into pump housing (88). Place pump gasket (87) in adapter pump counterbore then assemble pump housing with gear on adapter. Assemble four pump bolts to retain pump to adapter. A seal protector should be assembled over shaft splines to protect pump seal.

CAUTION: The pump can be assembled in either one of two positions. In each position, the pump will only pump oil when rotated in the direction that the arrow at top of the pump is pointing.

A new shorter pump housing is being placed in production. This pump is interchangeable with the earlier pump. The pump to adapter bolts used with the early pump were 5/16–18 X 1–1/2 hex head bolts and the new pump uses 1–3/8 inch long bolts. **CAUTION:** Be sure to use the correct length of bolt.

ASSEMBLY OF TRANSMISSION WITH REDUCTION UNIT

The index numbers which follow a part name in this section refers to the part in the appropriate reduction unit exploded view.

1) Complete all steps as outlined in section "All Models".

2) Press the ball bearing (32) into case bore. The bearing snap ring groove should be to rear and a snap ring (23) should be assembled in the groove of bearings used in 1.5 to 1 reduction units.

3) Assemble bearing retainer (23 or 22) and six 7/16–14 X 1 hex head bolts (21) to rear face of case. Lockwashers (21) are used on 1.5:1 units only. Dowels (22) are used to prevent bearing retainer from shifting on 2 to 1 and 3 to 1 ratio units; however, early units were not doweled. Doweled cases and retainers are both interchangeable. Doweled retainers are recommended.

4) Parts assembled in steps 8 through 13 in the section "All Models" should be placed in an arbor press and using a tool as shown in Fig. 8 , press the clutch cylinder down against the clutch spring. The sealing ring groove will now be exposed. Assemble sealing ring (54) into shaft groove and work the seal under clutch cylinder counterbore so that the two half moon backing plates (53) may be assembled behind the seal. Carefully release arbor press, making certain that the clutch cylinder bore returns back over the two half moon retainers.

NOTE: Early transmissions will not have the "O" ring located under clutch counterbore. The "O" ring will be assembled later in these units.

5) Assemble clutch pack and sun gear to transmission case and use a tool similar to the one shown in Fig. 6 to press against sun gear shaft until the snap ring is installed in shaft groove.

6) Assemble an "O" ring in the shaft groove behind the bearing on early units which do not have this "O" ring installed under the clutch cylinder hub as described in step No. 4.

7) Assemble an "O" ring (33) into the shaft groove near end of shaft.

7a) **For 1.5 to 1 Units Only:**

1) Assemble ring gear (16), ring gear hub (18) and snap ring (20), then assemble these parts over output shaft splines.

2) Assemble snap ring (17) into output shaft groove behind ring gear hub.

7b) **For 2:1 Units Only**

1) Assemble pinion carrier assembly (20) over bearing retainer splines, then assemble a snap ring (19) into retainer groove behind carrier. Splines assemble in one position only.

2) Assemble sun gear (18) over forward and reverse transmission output shaft splines. This gear is identified by a single groove around gear hub.

3) Assemble a snap ring (17) into output shaft groove to retain sun gear to shaft.

7c) **For 3:1 Units Only**

1) Assemble ring gear (18), ring gear hub (19), and snap ring (20), then assemble these parts over bearing retainer (23). The splines will assemble in one position only.

2) Assemble a snap ring (17) into bearing retainer groove behind ring gear hub.

3) Assemble sun gear (16) over splines of forward and reverse transmission output shaft and replace snap ring (15) to retain sun gear to output shaft. The 3:1 sun gear may be identified by the two grooves around gear hub.

8) Remove the tool installed in step No. 5. Stand the transmission on end on the parts assembled in steps 7a, 7b and 7c, then complete steps 10 through 30 of section "To Complete Assembly of Direct Drive Transmission".

9) Press outer race of bearing (29) into reduction housing and seat against shoulder.

10) Press a new seal (26) into reduction unit bearing retainer (27). Seal and retainer faces should be flush.

11) Place rear bearing cone into bearing race then assemble bearing retainer, gasket (28) and six 7/16–14 X 1–1/4 hex head bolts (1) and lockwashers.

NOTE: Bearing components are matched. The cup, spacer and two cones will all have the same number with the cup and one spacer having an "A" Suffix. Place the cone with the "A" Suffix in the end of the cup which has the Suffix "A". Do not interchange bearing components.

12) **For 1.5:1 Units Only**

1) Assemble bearing spacer, front cone, sun gear (5) and

12a) **For 2:1 Units Only**

1) Assemble oil baffle spacer (5), oil baffle (6) and five 7/16–14 X 7/8 hex head bolts (8) with lockwashers to reduction housing.

2) Assemble ring gear (15), ring gear hub (14), and snap ring (13).

3) Assemble snap ring (9) in rear output shaft groove, then assemble hub splines over shaft splines and install a snap ring (16) in shaft front groove. Hub and shaft splines will assemble in one position only.

4) Assemble front bearing cone and spacer over output shaft.

5) Assemble output shaft and attached parts into reduction housing, then replace coupling (25) and nut (24). Use permatex or another suitable sealer on shaft splines and under nut to insure against leakage.

12b) **For 3:1 Units Only**

1) Assemble oil baffle spacer (5), oil baffle (6) and five 7/16–14 X 7/8 hex head bolts into reduction housing.

2) Assemble a snap ring (14) in output shaft front groove, slide carrier over shaft splines and replace the snap ring (9) in shaft rear groove. Carrier and shaft splines will assemble in one position only.

3) Assemble front bearing cone and spacer over output shaft.

4) Assemble carrier and output shaft assembly with bearing components into reduction housing and replace cou-

pling and nut. Use permatex or another suitable sealer on

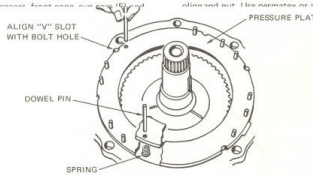


FIG. 9 DOWELS USED TO RETAIN SPRINGS

TORQUE SPECIFICATIONS

PART NO.	APPLICATION	TORQUE LBS. FT.	k Pa
179857	BEARING RETAINER & OIL BAFFLE SPACER	42-50	57-68
4776BB	LOCK BOLT	42-50	57-68
191641	REDUCTION SUN GEAR & BEARING RETAINER	42-50	57-68
179860	BEARING RETAINER, REAR	42-50	57-68
4911	ADAPTER TO CASE	27-37	37-50
179822	PUMP TO ADAPTER	17-22	23-30
179793	VALVE COVER	8-11	11-15
115729	CONTROL LEVER (NUT)	8-11	11-15
179861	REDUCTION HOUSING TO TRANSMISSION CASE	42-50	57-68
4775T	MAIN SHAFT NUT	160-220	217-253
444592	DRAIN PLUG	25-35	34-47
71-2A195	DIPSTICK ASSEMBLY	10-15	14-22
10-04-034-002	DIPSTICK TUBE	10-40	14-54

SPECIFICATIONS SUMMARY

	AS1--		AS2--		AS5--		AS7--	
	73C	73CR	73C	73CR	73C	73CR	73C	73CR
*INPUT ROTATION	CW	CCW	CW	CCW	CW	CCW	CW	CCW
*OUTPUT ROTATION–FORWARD	CW	CCW	CW	CCW	CW	CCW	CCW	CW
REDUCTION RATIO–FORWARD	1.00:1.00		1.50:1.00		3.00:1.00		2.00:1.00	
REDUCTION RATIO–REVERSE	.88:1.00		1.32:1.00		2.64:1.00		1.76:1.00	
TRANSMISSION WEIGHT–DRY	135 LBS.		185 LBS.		185 LBS.		185 LBS.	
OIL CAPACITY–LEVEL	1.6 QUARTS		2 QUARTS		2 QUARTS		2 QUARTS	
OIL CAPACITY–15° INCLINED	1.5 QUARTS		2.2 QUARTS		2.2 QUARTS		2.2 QUARTS	

*As viewed from rear of transmission looking forward.

A white name plate will be used on all Model 73C transmissions.

NOTE: Oil capacity does not include oil needed for transmission cooler and external oil lines.

TRANSMISSION FLUID & LUBRICATION REQUIREMENTS

SEE PAGE 7 FOR FLUID RECOMMENDATIONS