VERSATILE

FORD
NEW HOLLAND

Service Manual

4 Wheel Drive Tractor
700, 900

1972 – 1975

40070020

Reprinted

700 AND 900 TRACTOR SPECIFICATIONS

OVERALL DIMENSIONS
SPECIFICATIONS
700 TRACTOR SPECIFICATIONS

- GENERAL
- TIRE SIZE
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900 TRACTOR SPECIFICATIONS

(SIMILAR TOPICS TO ABOVE)

OVERALL DIMENSIONS

WIDTH 7 ft. 10 inches - 24.5x32 tires.
9 ft. 2 inches - 30.5x32
11 ft. 7 inches - 18.4x38 duals.

OVERALL LENGTH 21 ft. 1 inch.

WHEELBASE 10 Ft. 10 inches.

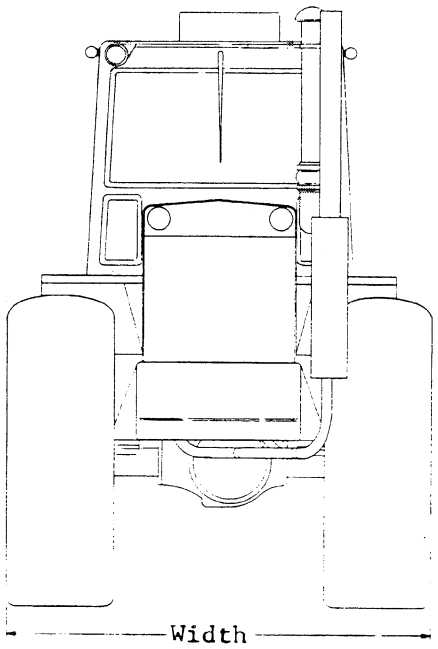
DRAWBAR HEIGHT 1 ft. 4 inches.

OVERALL HEIGHT

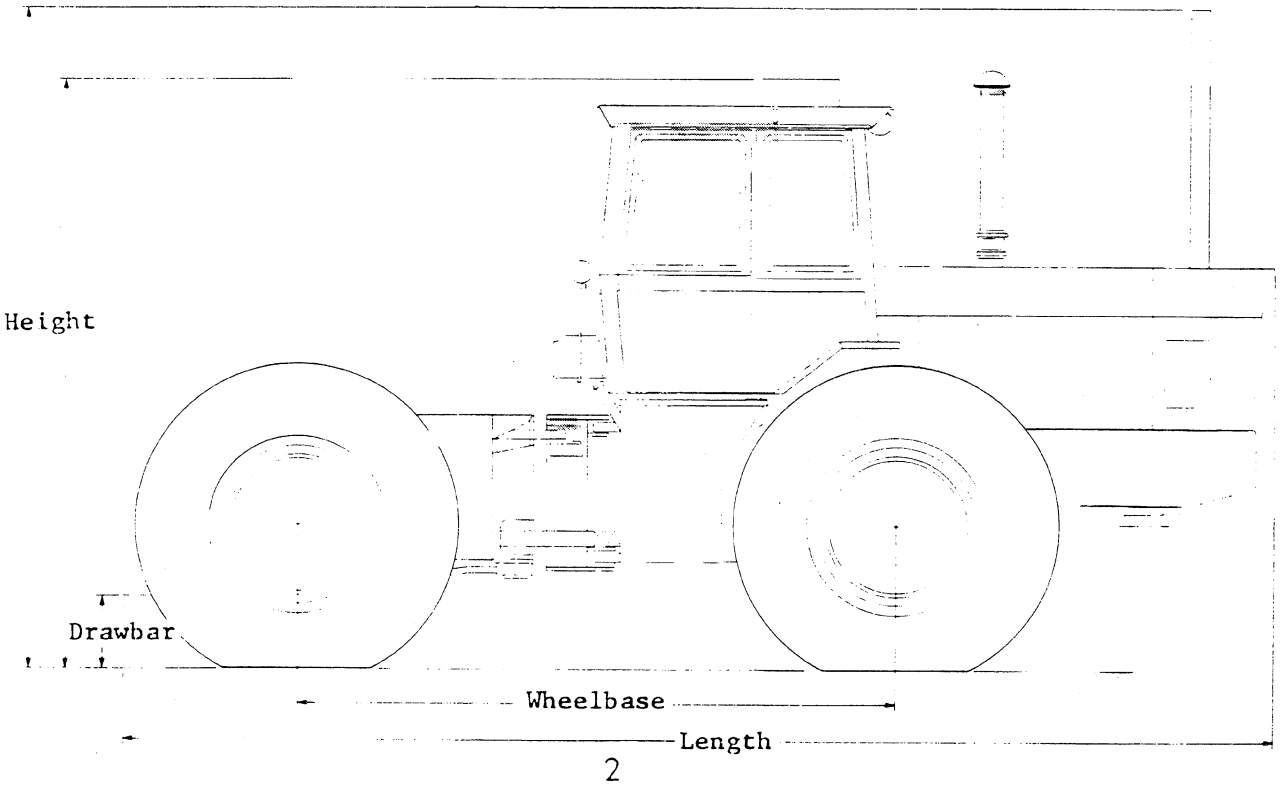
Ground to Air Pressurizer - 11 Feet

Ground to exhaust stack - 12 Feet

2 inches.



Different tire sizes affect tractor height negligibly.



700 TRACTOR SPECIFICATIONS

GENERAL

ENGINE HP - 220 @2850 rpm
WHEELBASE - 130 inches
MAXIMUM OPERATING WEIGHT - 28,000 lbs.
RECOMMENDED RANGE OF OPERATING WEIGHT - 22,500 to 25,000 lbs.
FUEL TANK CAPACITY - 145 U. S. Gallons
LENGTH OVERALL - 253 in.
HEIGHT OVERALL - 130 inches.

TIRE SIZE	THREAD	WIDTH	SHIPPING WEIGHT
18.4x38 Duals	72"	90 1/2	18,100 Total 11,580 Front
24.5x32	70 3/4	95 1/2	16,740 Total 10,960 Front
30.5x32	77 1/4	107 3/4	18,400 Total 12,060 Front

ENGINE SPECIFICATIONS

RATINGS, S. A. E. (500 FT. 85° F.):

HORSEPOWER/GOVERNED RPM .....230 @ 3300
200 @ 2800

NUMBER OF CYLINDERS 8

BORE and STROKE - in. .....4 5/8 x 4 1/8

PISTON DISPLACEMENT - cu. in. 555

COMPRESSION RATIO 17.0

OPERATING CYCLES 4

ENGINE OIL CAPACITY - gals. 7.9

OIL PAN CAPACITY - gals. 5

COOLANT CAPACITY - gals. 4

NET WEIGHT .....1710 app.

LBS. PER HORSEPOWER 7.43

BEARINGS: Precision type, steel backed inserts.

CAMSHAFT: Single camshaft controls all valve and injector movement. Induction hardened alloy steel with gear drive.

CAMSHAFT FOLLOWERS: Roller type for long cam and follower life.

CONNECTING RODS: Drop forged, 6.72" center to center length. Taper piston pin end reduces unit pressures.

COOLER, LUBRICATING OIL: Tubular type, jacket water cooled.

CRANKSHAFT: High tensile strength steel forging. Bearing journals are induction hardened.

CYLINDER BLOCK: Alloy cast iron with removable, wet liners. Cross bolt support to main bearing cap.

CYLINDER HEADS: Two, one each bank. All fuel lines are drilled passages. Individual intake and exhaust porting for each cylinder. Corrosion resistant inserts on intake and exhaust valve seats.

DAMPER, VIBRATION: Compressed rubber type.

FUEL SYSTEM: Cummins PT self adjusting system with integral flyball type governor. Camshaft actuated injectors.

GEAR TRAIN: Heavy duty, located rear of cylinder block. PTO with 0.785 to 1 ratio available at rear of fuel pump.

LUBRICATION: Force feed to all bearings. Gear type pump.

PISTONS: Aluminum, cam ground, with two compression and one oil ring.

PISTON PINS: 1 1/2 " diameter, full floating.

THERMOSTAT: Single unit, modulating by-pass type.

VALVES: Dual intake and exhaust each cylinder. Each valve 1 5/8" diameter.

CLEANER AIR: 12 dia., two stage dry type

CORROSION RESISTOR: Mounted. Checks rust and corrosion, controls acidity, and removes impurities from coolant.

ELECTRICAL EQUIPMENT: 12 volt positive engagement starting motor; 12 volt, 55 ampere negative ground alternator; voltage regulator; magnetic switch.

FAN: 24 inch, 6 Blade, High Mount, Ratio 1 to 1

FILTERS: Cummins. Lubricating oil, full flow paper element type, mounted and by-pass type, mounted.

GOVERNOR: Mechanical flyball, limiting speed type.

MANIFOLD, AIR INTAKE: Two, with crossover and common inlet.

MANIFOLD, EXHAUST: With front outlet directed downwards.

PAN OIL: Cast aluminum, rear sump type, 5 U. S. gallon capacity.

SUPPORT, ENGINE: Fully Rubber mounted.

COOLING SYSTEM

Capacity - 48 U. S. quarts
Radiator - 750 sq. in. 4 row core
Independent surge tank
Quick removeable perforated metal grill screen

ELECTRICAL

12 Volt - 58 Amp Delco Alternator
2-204 amp hour batteries.
Negative ground system
000 starting cables.

AIR CLEANER

United - Model 112D14 Triphase
Dual element - Dry type with safety element
Centrifuge action with automatic dust unloader
5 1/2 in. inlet tubing system

CLUTCH

Dana-Spicer - 14" Two plate dry type.
Model AS - 1402 angle spring, pull type.
1 3/4 x 10 spline spring loaded cushion hub discs.
Organic linings, or Ceramic Button linings.
Greaseable shaft and release bearings.
Foot operated, mechanically actuated.
Integral disk type transmission brake with spring loaded backing plate.

BRAKES

UP TO SERIAL NUMBER 070426

Bendix - 14 x 2 1/4 expansion shoe type Driveline type, transmission mounted. Hydraulic actuated by a single foot pedal. Overcenter hand operated parking brake.

FROM SERIAL NUMBER 070427 AND UP

15" Disc and Caliper Driveline mounted Hydraulic actuated by one foot pedal. Caliper parking brake mechanically actuated by overcenter lever.

TRANSMISSION

12 speed fully constant mesh with shift - collar shifting.
Versatile 4 shaft, vertically arranged design.
Timken tapered roller bearings.
Independant lubrication system with pump, filter, cooler, steel lines and wire braid hose, dash mounted oil pressure indicator light.
One dash mounted, in-line shift, range lever.
One floor mounted gear shift lever.
Helical input gears with straight cut low speed gears.
3 inch diameter shafts drilled for lubrication.
Speeds at 2850 engine rpm and 24.5 x32 tires (31.5 in. loaded radius tires)

Low gear	2.6	3.2	3.6	4.2
Second gear	4.7	5.6	6.3	7.5
High gear	9.9	11.7	13.2	15.6
Reverse	3.3	4.0	4.5	5.3

Oil Capacity - 19.0 qts.

FRAME

Articulated frame 4 wheel drive. Front and rear frames are bolted rigidly to their respective axles and joined at the center to a subframe. Steering is accomplished by pivoting on two, 2 in. ball-bushings between the front and subframe.

Oscillation to 15° in both directions is accomplished between the subframe and the rear frame which are joined by a 2 1/4 ball-bushing and two 1 3/4 x 5 drag links mounted in 1 3/4 ball-bushings. The rear frame oscillates about the ball joint and is held in alighment with the subframe by the two drag links.

The front frame consists of 3/8 in. formed side plates with a 1/2 in. rear end plate.
The rear frame consists of formed 1/2 in. plates.

CAB

Module type with protective structure.
Fully isolated on rubber mounts.
Pressurizer with filters and vents.
Accoustical foam noise insulation
12 gauge wall panels with 7 ga. firewall.
Two speed windshield wiper
Tinted glass, rear view mirror
Standard height - 63" in. outside
Optional extension height - 72" in. outside
Width - 56 in. outside.
Bostrom Seat with arm rests.

COLD START AID

Make - Turner Quickstart
Type - Ether, operated from Instrument panel.

INSTRUMENT PANEL

1. Tachometer with hour meter.
2. Ammeter
3. Oil pressure gauge with cutout at less than 20 psi.
4. Engine temperature gauge with cutout at 205° F.
5. Transmission Oil pressure indicator light.
6. Fuel gauge on fuel tanks.
7. Key ignition.
8. Starter button with cutout overide switch [key dependant]
9. Push button turn signals and flashers.
10. Light Switch.
11. Ether Cold start aid control.

BALLAST RECOMMENDATIONS

	BALLAST PER TIRE LBS.	
Tire Size	Front	Rear
18.4 x 38 Duals	1100	1100
24.5 x 32	1500	1500
30.5 x 32	1500	1500

In the case of duals fluid should be added to the INNER tires. More weight may be added if necessary for particular applications but a weight distribution of 62% on the front axle should be maintained and the maximum weight of 28,000 lbs. should not be exceeded.

AXLE

Make - Verstile
Type - Sprial bevel differential with planetary final drives in hubs.
Ratio 21.3
Differential - Eaton - Series 17103
Differential Housing - Cast Iron
Axle Tubes - Ductile Iron
Oil Capacity - 23 Imp. Qts.
Differential Ratio - 4.88 (5.57 after Serial Number 070427)
Planetary ratio - 4.36
Lubrication - SAE 90 MIL 2105 - B gear Oil
No. of wheel mounting bolts - 12
Axle seals - Double lip neoprene, greaseable laybrinth type guard.

DRIVELINES

Engine to Trans. - Spicer 1550 series
Trans. to axles - Spicer 1600 series
Lubrication - SAE 90 gear oil

HYDRAULICS

Pump - Cessna gear type tandem pump.
Engine mounted gear driven

Flow - 24 gpm for steering.
- 24 gpm for implements.

Operating pressures - 2000 psi for implements.
- 1800 psi for steering.

Reservoir - 95 U. S. qts.

Filters - two reusable 100 mesh screen on suction
- one 10 Micron spin - on type on steering return.

Cooler - Connected into power steering return lines and mounted in front of radiator.

Control Valve - Gresen Model CP three spool with two self cancelling spools and one spring loaded, or one float control.
Two self cancelling spools connected are standard equipment.
An optional kit consisting of hoses, fittings couplers and lever connects third spool.

Couplers - Pioneer 8200 series.
- Push to connect type under pressure
- Two sets connected are standard.

STEERING

Articulated frame, 42° in each direction
Fully hydrostatic actuation.
2-3x16 1/2 in. cylinders mounted on ball bushings.
Control Valve - 45 cu. in. Ross HGB - 24
Pump - 24 Gear Type

DRAWBAR

Swinging clevis type of 1 3/4 x 5 steel with wear block.
1 1/2 in. hardened steel pin.
Replaceable hardened bushings.
Height - 18 in.

900 TRACTOR SPECIFICATIONS

GENERAL

ENGINE HP - 300 @ 2400 rpm @ 500 ft. & 85° F.

WHEELBASE - 130 inches.

MAXIMUM OPERATING WEIGHT - 28,000 lbs.

RECOMMENDED RANGE OF OPERATING WEIGHT - 26,000 to 27,000 lbs.

FUEL TANK CAPACITY - 145 U. S. Gallons.

HEIGHT OVERALL - 130 inches.

LENGTH OVERALL - 253 inches.

TIRE SIZE	THREAD	WIDTH	SHIPPING WEIGHT
18.4x38 Duals	72"	90 1/2	18,590 Total
			12,960 Front
24.5x32	70 3/4	95 1/2	17,250 Total
			12,340 Front
30.5x32	77 1/4	107 3/4	18,350 Total
			12,840 Front

ENGINE SPECIFICATIONS

HORSEPOWER 320

GOVERNED RPM 2600

NUMBER OF CYLINDERS 8

BORE & STROKE-- in. .....5 1/2 x 4 1/4

PISTON DISPLACEMENT -- cu. in. 903

OPERATING CYCLES 4

ENGINE OIL CAPACITY -- gals. 6 1/2

ENGINE COOLANT CAPACITY -- gals. 7

NET WEIGHT with STANDARD ACCESSORIES [lbs.] 2200

BEARINGS: Precision type, steel backed inserts. 5 main bearings, 3/4" diameter. Connecting Rod -- 3 1/8" diameter.

CAMSHAFT: Single camshaft controls all valve and injector movement. Induction hardened alloy steel with gear drive.

CAMSHAFT FOLLOWERS: Roller type for long cam and follower life.

CONNECTING RODS: Drop forged, 8.193" center to center length. Rifle drilled for pressure lubrication of piston pin. Taper piston pin end reduces unit pressures.

COOLER, LUBRICATING OIL: Tubular type, jacket water cooled.

CRANKSHAFT: High tensile strength steel forging. Bearing journals are induction hardened. Fully counterweighted.

CYLINDER BLOCK: Alloy cast iron with removable, wet liners. Cross bolt support to main bearing cap.

CYLINDER HEADS: Two, one each bank. All fuel lines are drilled passages. Individual intake and exhaust porting for each cylinder. Corrosion resistant inserts on intake and exhaust valve seats.

DAMPER, VIBRATION: Compressed rubber type.

FUEL SYSTEM: Cummins PT wear-compensating system with integral flyball type governor. Camshaft actuated injectors.

GEAR TRAIN: Heavy duty, located rear of cylinder block.

LUBRICATION: Force feed to all bearings. Gear type pump.

PISTONS: Aluminum, cam ground, with two compression and one oil ring.

PISTON PINS: 1 3/4" diameter, full floating.

THERMOSTATS: Dual, modulating by-pass type.

VALVES: Dual intake and exhaust each cylinder. Each valve 1 7/8 diameter. Heat and corrosion resistant face on intake and exhaust valves.

BREATHERS, CRANKCASE: Two, dry element

AIR CLEANER: 14" diameter, two stage dry type.

CORROSION RESISTOR: Fleetguard, mounted. Checks rust and corrosion, controls acidity, and removes impurities from coolant.

ELECTRICAL EQUIPMENT: 12 volt negative ground system. 12 volt positive engagement starting motor; 12 volt 55 ampere alternator; voltage regulator; magnetic switch and key type starting switch.

FANS: 6 Blade High Mount Ratio 1 to 1 (14.75 to centres).

FILTERS: Fleetguard, Lubricating oil, full flow paper element type, mounted, and by-pass type, not mounted. Fuel, heavy duty replacable paper element type, mounted.

GOVERNOR: Mechanical flyball, limiting speed type.

HOUSING, FLYWHEEL: S.A.E. NO. 2

MANIFOLD, AIR INTAKE: Two with crossover and common inlet.

MANIFOLD, EXHAUST: Dual, with horizontal outlets to front

PAN OIL: Aluminum, rear sump type, 4 1/2 U.S. gallon capacity. Angularity capability -- front up 45°; front down 45°; side to side 30°.

PUMP COOLANT: Belt driven, centrifugal type, 127 gpm @2600 rpm.

SUPPORT, ENGINE: Fully Rubber Mounted.

COOLING SYSTEM

Capacity - 53 U. S. quarts
Radiator - 930 sq. in. 4 row core
Independent surge tank

ELECTRICAL

12 Volt - 58 Amp Delco Alternator
2-204 Amp hour batteries.
Negative ground system
000 starting cables.

AIR CLEANER

United - Model 114D9 Triphase
Dual element - Dry type with safety element
Centrifuge action with automatic dust unloader
5 1/2 in. inlet tubing system

CLUTCH

Dana - Spicer - 14" Two plate dry type.
Model AS-1402 angle spring, pull type.
1 3/4 x 10 spline spring loaded cushion hub discs.
Ceramic Buttom Linings.
Greaseable shaft and release bearings.
Foot Operated, Mechanically Actuated
Integral disk type transmission brake with spring loaded backing plate.

BRAKES

15" Disc. and Caliper Driveline Mounted - Hydraulically actuated by one foot pedal.
Caliper parking brake - mechanically actuated by overcenter lever.

TRANSMISSION

12 speed fully constant mesh with shift - collar shifting.
Versatile 4 shaft, vertically arranged design.
Timken tapered roller bearings.
Independant lubrication system with pump, filter, cooler, steel lines and wire braid hose, dash mounted oil pressure indicator light.
One dash mounted, in-line shift, range lever.
One floor mounted gear shift lever.
All helical forward gears with straight cut reverse gears.
3 inch diameter shafts drilled for lubrication

Speeds at 2400 engine rpm and 24.5x32 tires (31.5 in. loaded radius tires)

Low gear	2.6	3.1	3.4	4.1
Second gear	4.6	5.5	6.1	7.4
High gear	8.9	10.7	11.9	14.3
Reverse	3.3	3.9	4.4	5.2

Oil Capacity - 23.0 qts.

AXLE

Make - Versatile
Type - Sprial bevel and planetary differential with planetary final drives.
Ratio - 27.1 total
Differential - Eaton - Series 17303 Double Reduction
Differential Housing - Cast Iron
Axle Tubes - Ductile Iron
Oil Capacity - 23 Imp. Qts.
Differential Ratio - 6.21
Planetary ratio - 4.36
Lubrication - SAE 90 MIL 2105 - B gear oil
No. of wheel mounting bolts - 12
Axle seals - Double lip neoprene, greaseable laybrinth type guard.

DRIVELINES

Engine to Trans. - Spicer 1550 Series
Trans. to axles - Spicer 1600 series
Lubrication - SAE 90 gear oil.

HYDRAULICS

Pump - Cessna gear type tandem pump.
Engine mounted gear driven

Flow - 26 gpm for steering.
26 gpm for implements.
Operating pressures - 2000 psi for implements.
- 1800 psi for steering.

Reservoir - 95 U. S. qts.

Filters - two reusable 100 mesh screen on suction.
- one 10 Micron spin - on type on steering return.

Cooler - Connected into power steering return lines and mounted in front of radiator.

Control Valve - Gresen Model CP three spool with two self cancelling spools and one Float Spool.
Two self cancelling spools connected are standard equipment.
An optional kit consisting of hoses, fittings couplers and lever connects the third spool.

Couplers - Pioneer 8200 series.
- Push to connect type under pressure
- two sets connected are standard.

STEERING

Articulated frame, 42° in each direction.
Fully hydrostatic actuation.
Two - 3 x 16 1/2 in. cylinders mounted on ball bushings
Control Valve - 45 cu. in. Ross HGB - 24
Pump - 26 gpm Gear Type

DRAWBAR

Swinging clevis type of 1 3/4 x 5 steel with wear block.
1 1/2 in. hardened steel pin.
Replaceable hardened bushings.
Height - 18 in.

FRAME

Articulated frame 4 wheel drive. Front and rear frames are bolted rigidly to their respective axles and joined at the center to a subframe. Steering is accomplished by pivoting on two 2 in. ball-bushings between the front and sub-frame.

Oscillation to 15° in both directions is accomplished between the subframe and the rear frame which are joined by a 2 1/4 ball-bushing and two 1 3/4 x 5 drag links mounted in 1 3/4 ball-bushings. The rear frame oscillates about the ball joint and is held in alighment with the subframe by the two drag links.

The front frame consists of 3/8 in. formed side plates with a 1/2 in. rear end plate.

The rear frame consists of formed 1/2 in. plates.

CAB

Module type with protective structure.
Fully isolated on rubber mounts.
Pressurizer with filters and vents.
Accoustical foam noise insulation
12 gauge wall panels with 7 ga. firewall.
Two speed windshield wiper
Tinted glass, rear view mirror
Standard height - 63" in. outside
Optional extension height - 72" in. outside
Width - 56 in. outside.
Bostrom seat with arm rests.

COLD START AID

Make - Turner Quickstart
Type - Ether, operated from Instrument panel.

INSTRUMENT PANEL

1. Tachometer with hour meter.
2. Ammeter
3. Oil pressure gauge with cutout at less than 20 psi.
4. Engine temperature gauge with cutout at 205 ° F.
5. Transmission oil pressure indicator light.
6. Fuel gauge on fuel tanks.
7. Key Ignition.
8. Starter button with cutout overide switch (key dependant).
9. Push Button Turn Signals and Flashers
10. Light switch.
11. Ether Cold start aid control.

BALLAST RECOMMENDATIONS

Tire Size	BALLAST PER TIRE LBS. Front	Rear
18.4x38 Duals	1000	1000
24.5x32	1800	1800
30.5x32	2200	2200

In the case of duals fluid should be added to ALL tires. More weight may be added if necessary for particular applications but a weight distribution of 62% on the front axle should be maintained and the maximum weight of 28,000 lbs. should not be exceeded.

OPTIONS

1. Third Spool hydraulic valve kit. Consists of 2 hoses, levers, couplers and fittings.
2. Air conditioning.
3. Cab Heater.
4. Cab Extension

CLUTCH SERVICE

INTRODUCTION TO CLUTCH SERVICE AND REPAIRS

CLUTCH DISASSEMBLY

CLUTCH ADJUSTMENT PROCEDURE

SPICER SERVICE MANUAL

INTRODUCTION TO CLUTCH SERVICING AND REPAIRS

Listed are several of the characteristics of the clutch assembly used on the Versatile 4 wheel drive tractors.

TYPE: Dana Spicer - 14" Two plate dry type.

MODEL: AS 1402 Angle Spring - Pull-Type.

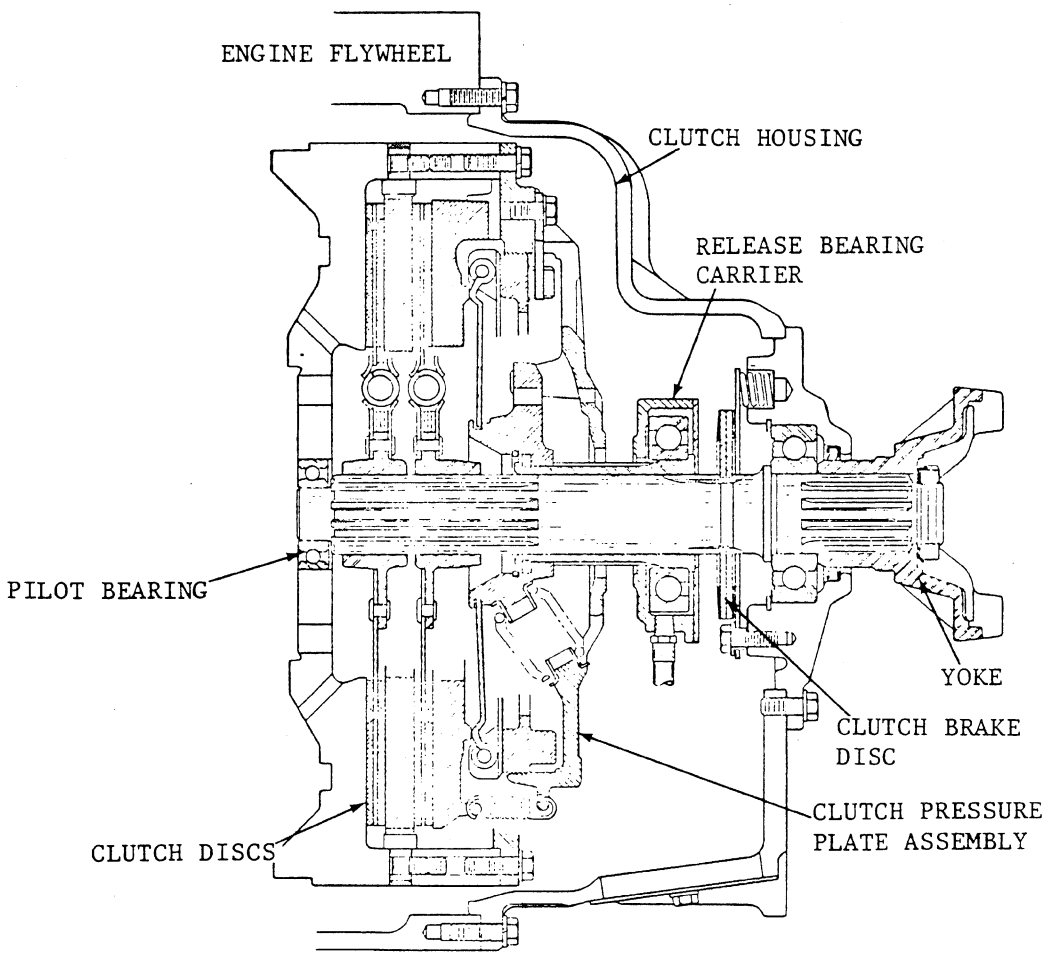
1 3/4 x 10 Spline Spring loaded cushion hub discs.

Metal Pad Linings

Shaft and release bearing are both greaseable.

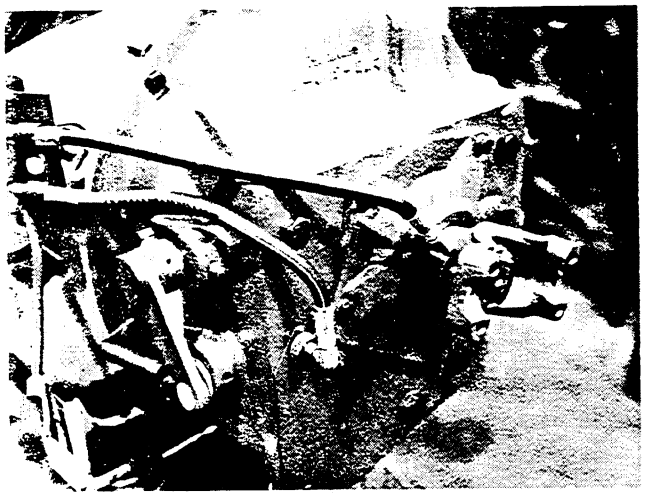
Foot operated with mechanical linkeage.

Integral disc type transmission brake with spring loaded backing plate.



CLUTCH DISASSEMBLY

1. Remove the bolt holding the clutch arm tension spring to the clutch housing.
2. Disconnect clutch pedal rod at the clutch release arm next to clutch housing. The rod yoke is held to the arm by a 1/2" Diameter pin. After removal of the pin, do not allow yoke to be turned because of clutch adjustment later.
3. Loosen clutch bearings grease hoses clip on left hand side of engine.
4. Disconnect main power shaft universal joint just behind clutch housing.
5. Remove the 5 capscrews holding the powershaft bearing cap to the clutch housing. This cap holds the shaft in place.
6. Remove the shaft. (A slight tap on the yoke may be required to start the shaft backward)
7. Remove the release bearing hose from the clutch housing.
8. Remove the cap screws holding the clutch housing to the engine. The housing is ready to be removed.
9. To remove the clutch housing, lift up unit slightly so that the clutch shift fork will clear the release bearing carrier, then pull back on the housing. The clutch housing should be taken over the back of the front axle and moved out of the way.
   Turn to the Spicer Service Manual in this section and on page 9 of the Spicer Manual, continue at "CLUTCH REMOVAL" for a complete clutch overhaul.
10. Inspect for wear the two transmission brake plates on the clutch shaft. Replace if worn down to the metal surface or if keys on inside hole of plates are sheared off. These keep the plates from rotating while in operation.
11. After inspection of entire clutch, install overhauled or new clutch in reverse order, and adjust clutch.



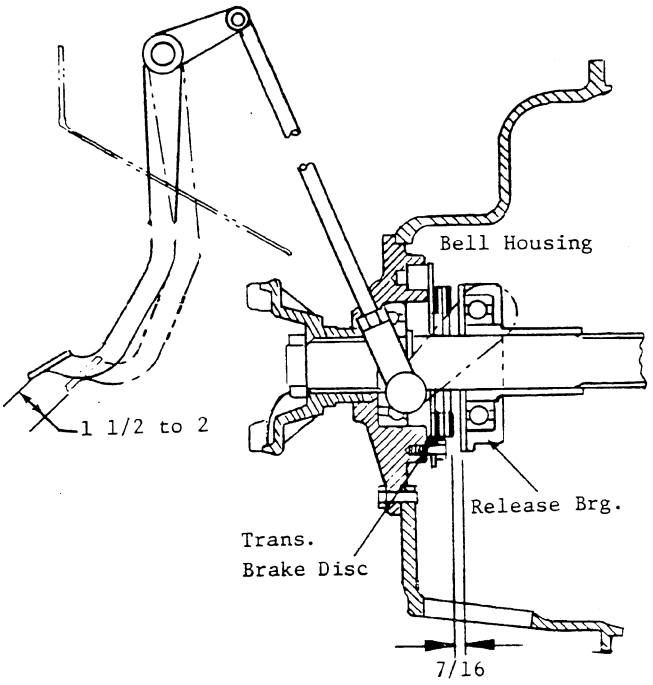
CLUTCH HOUSING

CLUTCH ADJUSTMENT PROCEDURE

ENGINE CLUTCH

An important fact to know about the clutch used on the Versatile Tractor is that you "ADJUST THE CLUTCH AND NOT THE LINKAGE."

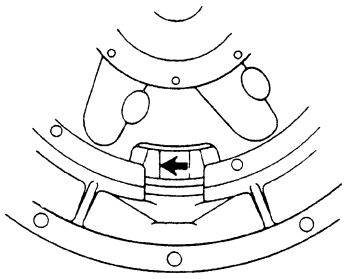
Proper "free pedal" is very important. It is used as a guage to determine the internal condition of the clutch. The yoke should not contact the pad on the release bearing until the pedal has travelled 1 1/2 to 2 inches as illustrated



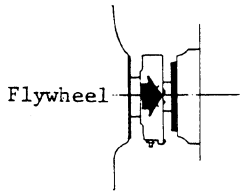
NOTE: Free pedal becomes less as clutch wears, also decreasing pressure applied to clutch brake making it rougher shifting. Make internal clutch adjustment before free pedal is reduced to 3/4 inch.

Measurements are made with the clutch engaged (pedal up). Adjustments are made with the clutch released. (pedal down)

1) Remove lower clutch housing cover plate.
2) Remove the adjusting ring lock and rotate adjusting ring clockwise, with a large screwdriver. Movement of three knotches means approx. 1/16 inch release bearing movement.



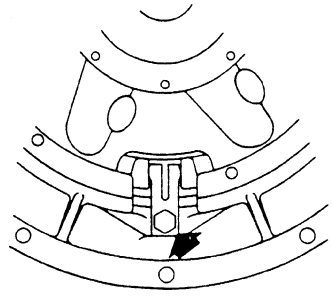
THIS ROTATION IS USED MAINLY TO COMPENSATE FOR FACING WEAR.



CLOCKWISE ROTATION OF THE ADJUSTING RING MOVES THE RELEASE BEARING AWAY FROM THE FLYWHEEL AS INDICATED BY ARROWS.

Release clutch: Due to play on release bearing carrier, press down until free travel on the clutch pedal is taken up before checking for 7/16" gap between release bearing and clutch discs. Use a piece of 7/16 keystock material as a guage.

BE SURE TO REPLACE ADJUSTING RING LOCK BEFORE RUNNING ENGINE AND REPLACE LOWER CLUTCH COVER.

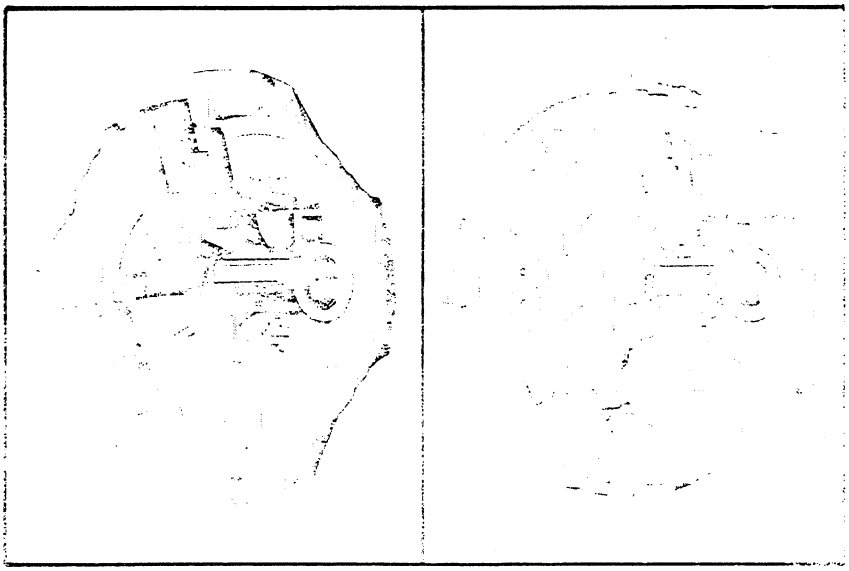


BE SURE TO REINSTALL THE ADJUSTING RING LOCK.

CLUTCH SHOULD BE ADJUSTED FOR NORMAL WEAR AFTER THE FIRST 60 HRS. OF OPERATION

SERVICE MANUAL

SPICER®
ANGLE-SPRING CLUTCHES



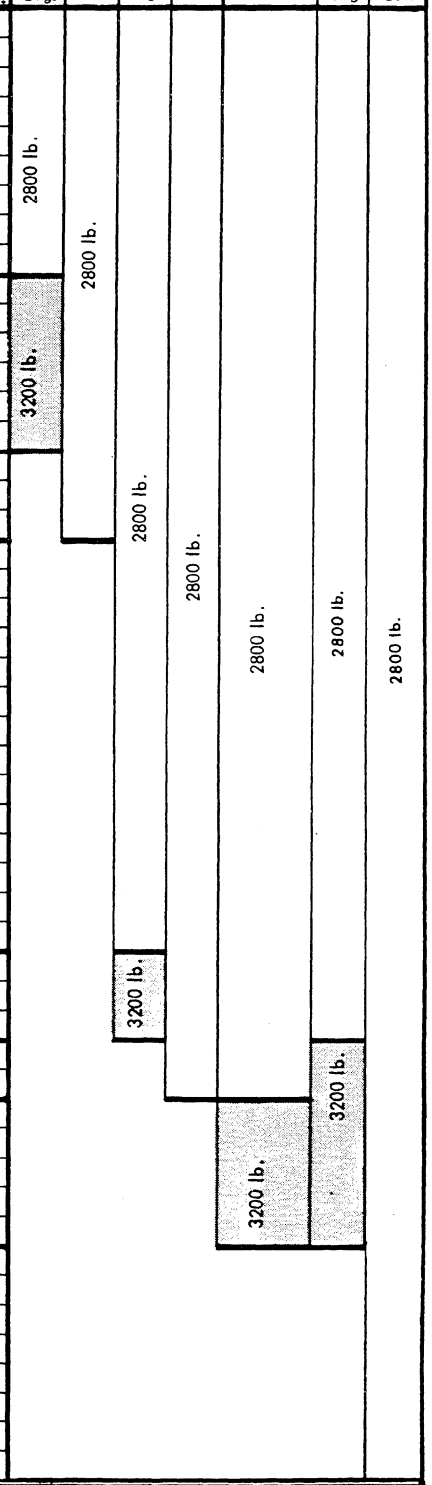
AS-1400 SERIES

AS-1550 SERIES

Spicer | DANA

SPICER CLUTCH TO ENGINE SELECTION CHART

ENGINE MAKE	ENGINE MODEL	H.P.	GOV. RPM	MAX. TORQ.	ENGINE MAKE	ENGINE MODEL	H.P.	GOV. RPM	MAX. TORQ.
Cum	V6-140	140	3300	248	IHC	D-354	131	2800	282
D.D.	4-53N	140	2800	295	Cat.	1140	150	3200	310
Cum	V8E-170	170	3300	310	GMC	DH-478	165	2800	337
Cum	V8-185	185	3300	329	Cum	CF-160	160	2800	345
IHC	DV-462	185	3200	337					
Mack	END-475	140	2400	350	A.C.	10000	140	2200	372
Cat	1145	175	3200	360	Cat	1670	145	2200	378
Cum	C-160	160	2500	376	Cum	V8-210	210	3300	404
Per	V8-510	185	2800	380	D.D.	6V-53NE	170	2600	404
GMC	DH-637	210	2800	424	Cum	C180	180	2500	425
A.C.	3500	175	2400	428	Cum	V-555	225	3300	425
Cat	1150	200	3000	435					
Cum	C190	190	2500	447	D.D.	6V-53N	195	2600	447
Mack	ENDT-475	190	2400	450	Cum	V6E-195	195	2500	450
Cum	V6-200	200	2600	452					
					Cat	1160	225	2800	510
Mack	END-673	200	2100	540	IHC	DVT-573	240	2600	552
Mack	END-707	200	2100	557					
Cum	V8E-235	235	2400	568	D.D.	6-71NE	195	1950	570
D.D.	6V-71NE	195	1950	570	D.D.	8V-53N	247	2500	575
IHC	DVT-573	260	2600	578	Cum	NHE-195	195	1950	580
A.C.	11000	220	2200	585	Cum	HRF-6	190	2000	590
Cum	V8-265	265	2600	600	D.D.	6-71N(N-60)	218	2100	604
Mack	END-711	211	2100	602	D.D.	6-71N(N-65)	238	2100	650
D.D.	6V-71N	218	2100	650	Mack	ENDT-673	225	2100	653
Cum	NHE-225	225	1950	670	Chrys.	IN-675	237	2200	654
Cum	NH-250	250	2100	685	Mack	END-864	255	2300	673
Mack	ENDT-673	250	2100	700	Cat	1673CT	245	2200	690
Cum	N-927	260	2100	720	Cum	NHCT-270	270	2100	740
Cum	V-903	320	2600	737	Mack	ENDT-864	300	2300	792
D.D.	8V-71NE(N-55)	260	1950	761	Cat	1674TA	270	2200	805
D.D.	8V-71N(N-60)	290	2100	805	Cum	V8-350	350	2500	805
Cum	NHRS-320	320	2100	865	D.D.	8V-71N(N-65)	318	2100	866
Mack	ENDT-675	237	2100	906	Cum	NHCT-CT	240	2100	900
					Cum	NTC-335	335	2100	930
Cum	NT-380	380	2300	955	Cat	1693T	325	2100	1000
Mack	ENDDT 865	285	2400	965	Cum	VT8-430	430	2500	1005
Cum	NTA-370	370	2100	1050	A.C.	21000	375	2100	1015
Mack	ENDT-865	325	2400	1100	Cum	NTA-400	400	2100	1100
Cat	1693TA	375	2000	1145	D.D.	12V-71	390	2100	1140
D.D.	12V-71	434	2100	1205					
D.D.	12V-71	475	2100	1270	A.C.	25000	450	2100	1248



All AS-1400 series are available with 1½"-10, 1¾"-10, and 2"-10 splines.
The AS1552 clutches are available with 1¾"-10 and 2"-10 splines.
Dampened driven discs are recommended with all engines to reduce drive gear spline wear, increase the life of the transmission and driveline, and to reduce driveline vibrations.
The above clutch selections are normal on-highway service with minimum startability of 10%.
For off-highway, multiple trailers, or other types of severe service, please contact Dana Clutch Engineering.

Maximum Engine Speed:
AS-1400-3600 RPM
AS1552-2600 RPM

TABLE OF CONTENTS

OPERATION AND MAINTENANCE

The major cause of clutch failures could be summarized with two words: **"EXCESSIVE HEAT"**. Excessive heat is not the amount of heat a clutch can normally absorb and dissipate but the amount of heat a clutch is **"FORCED"** to absorb and attempt to dissipate.

Most clutches are designed to absorb and throw off more heat than encountered in normal clutch operation without damage or breakdown of the friction surfaces. Clutch installations are engineered to last many thousands of miles under normal operating temperatures and if properly used and maintained they will give satisfactory service.

However, if a clutch is "slipped" excessively or asked to do the job of a fluid coupling, **high heat** quickly develops to destroy the clutch. Temperatures generated between the flywheel, driven discs and pressure plates can be high enough to cause the metal to flow and the friction facing material to char and burn.

Heat or wear is practically non-existent when a clutch is **fully engaged** but during the moment of engagement, when the clutch is picking up the load, it generates considerable heat. An improperly adjusted or slipping clutch will rapidly generate sufficient heat to destroy itself.

FLEET OWNERS CAN EXTEND CLUTCH LIFE AND REDUCE MAINTENANCE COSTS THROUGH DRIVER/MECHANIC TRAINING PROGRAMS

Proper training of drivers as well as mechanics is essential for long and satisfactory clutch life. Yard jockeys, as well as over-the-road drivers, should be taught how to operate the truck properly — not left to experiment for themselves. Starting in the right gear, clutch malfunctions, and "when to write up a clutch for readjustment" are the more critical points to cover in driver training programs.

The maintenance personnel should not be left out of the picture. Mechanics attending driver training programs have a chance to see what driver errors can do to clutch life and be in a better position to spot and analyze failures during their clutch maintenance and rebuild programs.

Some of the more important items to be covered in the training programs are:

1. STARTING THE VEHICLE IN THE PROPER GEAR:

Naturally, an empty truck can be started satisfactorily in a higher transmission gear ratio than when partially or fully loaded. If auxiliary transmissions or multi-speed axles are used, they must be in the lower ratios for satisfactory starts. Drivers should be shown or taught what ratios can be used for safe starts when the truck is empty or loaded. Don't let the driver find out for himself; he can burn up the clutch by this experimentation. A good rule of thumb for the driver to follow is: **Empty or loaded, select the gear combination that lets you take up the slack and start moving out with an idling engine or, if necessary, just enough throttle to prevent stalling the engine.** After the clutch is fully engaged, the engine should be accelerated to near governed speed for the upshift into the next higher gear.

2. GEAR SHIFTING TECHNIQUES:

Many drivers upshift into the next gear — or even skip-shift into a higher gear — before the vehicle has reached the proper speed. This type of shifting is almost as bad as starting off in a gear that is too high, since the engine speed and vehicle speeds are too far apart, requiring the clutch to absorb the speed difference as heat.

3. EXCESSIVE VEHICLE OVERLOAD OR OVERLOADING THE CLUTCH:

Clutches are designed and recommended for specific vehicle applications and loads. These limitations should not be exceeded. Excessive or extreme overloading is not only injurious to the clutch but to the entire vehicle power train as well. If the total gear reduction in the power train is not sufficient to handle excessive overloads, the clutch will suffer, since it is forced to pick up the load at a high speed differential as outlined in paragraphs 1 and 2, above.

4. RIDING THE CLUTCH PEDAL:

This practice is very destructive to the clutch since a partial clutch engagement permits slippage and excessive heat.

Riding the clutch pedal will also put a constant thrust load on the release bearing, which can thin out the lubricant.

Release bearing failures can be attributed to this type of operation.

5. HOLDING THE VEHICLE ON AN INCLINE WITH A SLIPPING CLUTCH:

This procedure is asking the clutch to do the job normally expected of a fluid coupling. A slipping clutch accumulates heat faster than it can be dissipated, resulting in early failures.

6. COASTING WITH THE CLUTCH RELEASED AND TRANSMISSION IN GEAR:

This procedure can cause high driven disc R.P.M. through multiplication of ratios from the final drive and transmission. It can result in "throwing" the facing off the clutch discs. Driven

disc speeds of over 10,000 R.P.M. have been encountered in such a simple procedure as coasting tractors down an unloading ramp. While ample safety factor is provided for normal operation, the burst strength of the facing is limited.

7. ENGAGING CLUTCH WHILE COASTING:

This procedure can result in tremendous shock loads and possible damage to the clutch, as well as to the entire drive train.

8. REPORTING ERRATIC CLUTCH OPERATION PROMPTLY:

Drivers reporting erratic clutch operations as soon as possible, will give the maintenance personnel a chance to make the necessary inspection, internal clutch adjustment, linkage adjustments, lubrication, etc., thereby avoiding possible clutch failures and breakdowns while on the road. **The importance of free-pedal travel (sometimes referred to as pedal lash) should be brought to the driver's attention as well as the mechanic. This item should be included and commented on daily in the driver's report, since clutch free-pedal is the maintenance personnel's guide to the condition of the clutch and the release mechanism.**

9. CLUTCH ADJUSTMENTS:

Drivers and mechanics should be made aware of the fact that Spicer® Angle-Spring Clutches have provisions for an internal clutch adjustment. This permits the clutch "itself" to be readjusted while it is in the vehicle. Details of the clutch adjustment feature are covered on pages 24 thru 27. Drivers and mechanics should be advised that, unlike competitive clutches, **YOU DO NOT ADJUST THE EXTERNAL LINKAGE ON A SPICER ANGLE-SPRING CLUTCH TO COMPENSATE FOR WEAR. LINKAGE SHOULD ONLY BE RESET TO PROVIDE PROPER FREE PEDAL AFTER THE INTERNAL CLUTCH ADJUSTMENT HAS BEEN MADE.**

OPERATION AND MAINTENANCE

DESCRIPTION: (See Figs. 1 & 2)

Spicer® Angle-Spring Clutches are of the dry disc, adjustable, pull-type design for heavy duty service, utilizing centrally located pressure springs (F-3) entirely isolated from the heat of the pressure plate (B-1).

Driven discs (A-1 & A-3) with solid centers and riveted organic facings are considered standard. Damper-style hubs and/or metallic, cerametallic or bonded organic facings are available when recommended by Dana clutch engineers.

In the 14-in. two-plate models, the intermediate plate — separating the driven discs — is mounted inside a "cup-type" flywheel and carried on drive pins mounted in the flywheel itself.

In all models, the pressure plate is driven by four drive lugs which mate with four drive slots in the flywheel ring itself. The pressure plate also carries four return springs to retract the pressure plate when the clutch is disengaged.

The clutch release bearing (G-3) rotates continuously since the inner race of the bearing is pressed on the release sleeve (H-1). However, the clutch release bearing only carries a thrust load when the clutch is released.

All Spicer clutches are ventilated to circulate cooling air through the clutch whenever the engine is running.

Spicer clutch design is such that maintenance is readily accomplished without special tools other than a hand arbor press, which should be available for easier clutch disassembly and assembly.

DESIGN FEATURES:

TORQUE CAPACITY — Spring loads for various plate loads are available to tailor the clutch to a specific size engine.

INTERNAL CLUTCH ADJUSTMENT is simple and quickly maintained by turning the threaded adjusting ring (D-1) which is accessible through the inspection plates located on the clutch housing.

CLUTCH BRAKES are readily adaptable to the Spicer heavy-duty pull-type clutch as an aid to gear shifting when the vehicle is stationary. The clutch brake is located between the release bearing housing and transmission bearing cap. Steel washer has tangs on the I.D. to engage the transmission main drive gear. When the clutch pedal is fully depressed, the discs are squeezed between the release bearing housing assembly and transmission bearing cap to stop the rotation of the main drive gear and clutch discs.

SMOOTH ENGAGEMENTS are assured since the flexing of the levers (D-4) gives a cushioning effect that is easy on clutch facings, transmission and drive line components.

CONSTANT CLUTCH CAPACITY is maintained regardless of facing wear. There is no direct contact between pressure springs (F-3) and pressure plate (B-1); therefore, springs will not take a set and lose pressure due to heat. The threaded internal adjusting ring permits a quick internal adjustment to restore the springs to their original height and pressure.

UNIFORM CONTACT PRESSURES due to built-in parallelism. Contact circles of the adjusting ring (D-1) and release sleeve retainer (F-2) are permanently and accurately parallel. This means uniform pressure around the entire circumference of pressure plate (B-1) regardless of wear or adjustments, and eliminates the possibility of cocking.

CLUTCH BALANCE MAINTAINED even though parts are interchanged or replaced in the field. All major parts are balanced individually at the factory.

AS-1400 PARTS IDENTIFICATION

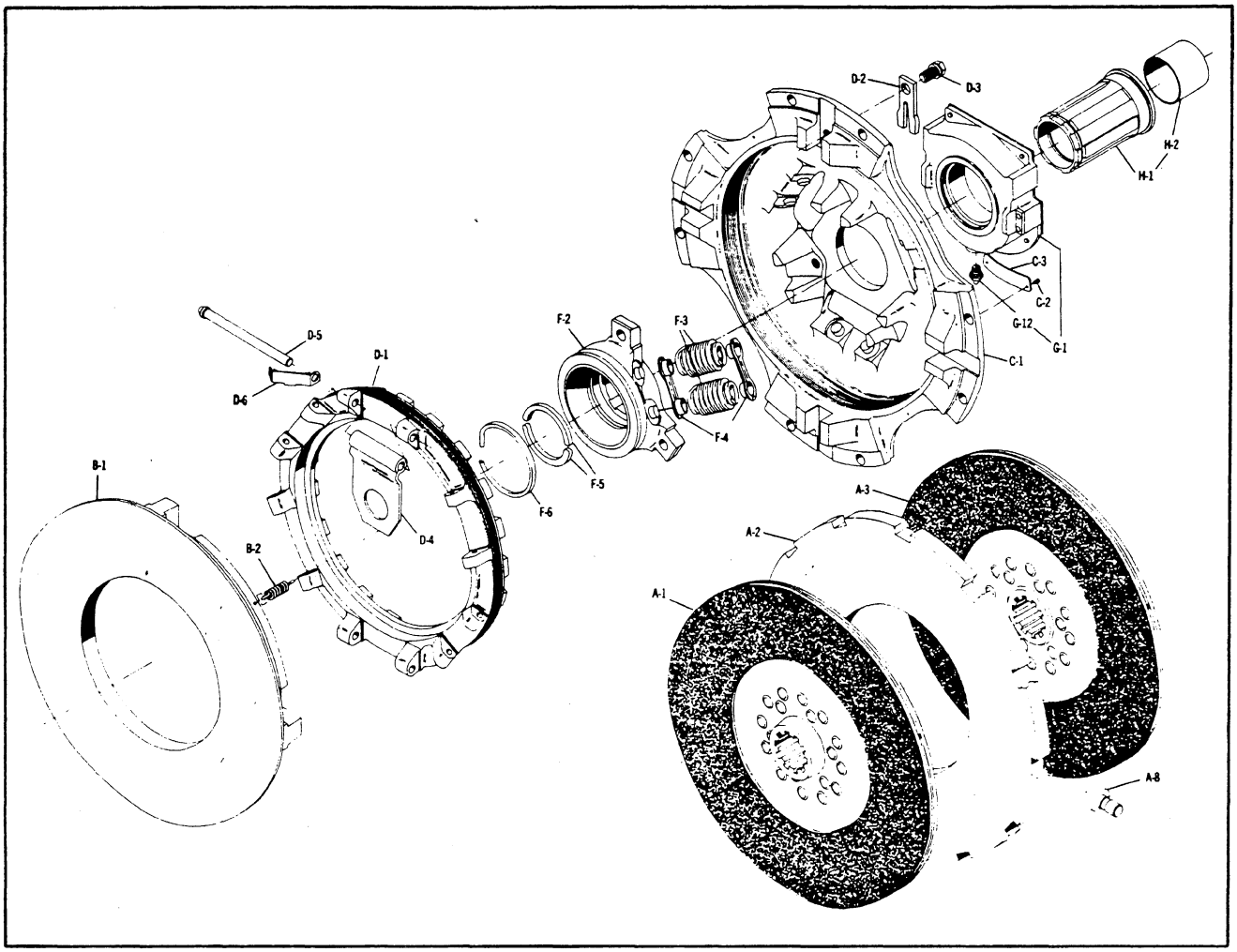


FIG. 1

A-1	DISC, driven front
A-2	PLATE, intermediate
A-3	DISC, driven rear
A-8	DRIVE PIN
B-1	PLATE, pressure
B-2	SPRING, return
C-1	RING, flywheel
C-2	PIN, name plate
C-3	PLATE, name
D-1	RING, adjusting
D-2	LOCK, adjusting ring
D-3	BOLT & lock washer assembly
D-4	LEVER
D-5	PIN, pivot
D-6	CLIP, Spring
F-2	RETAINER, release sleeve
F-3	SPRING, pressure
F-4	PIVOT, spring
F-5	RING, release sleeve
F-6	RING, snap
G-1	BEARING & COVER, sub-assembly
G-12	NIPPLE, zerk (1/8"-27)
H-1	RELEASE SLEEVE sub-assembly
H-2	BUSHING, Release sleeve

AS-1550 PARTS IDENTIFICATION

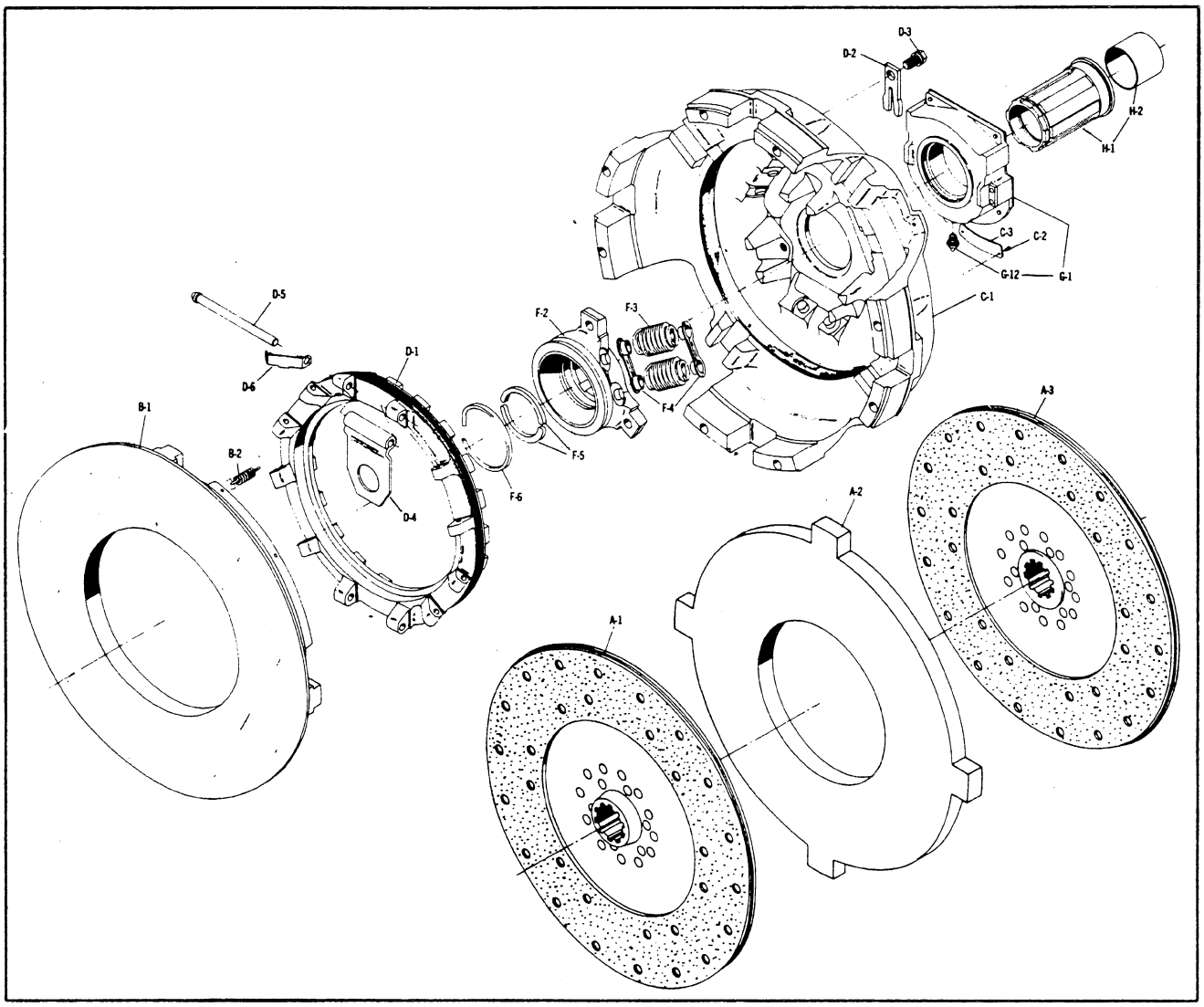
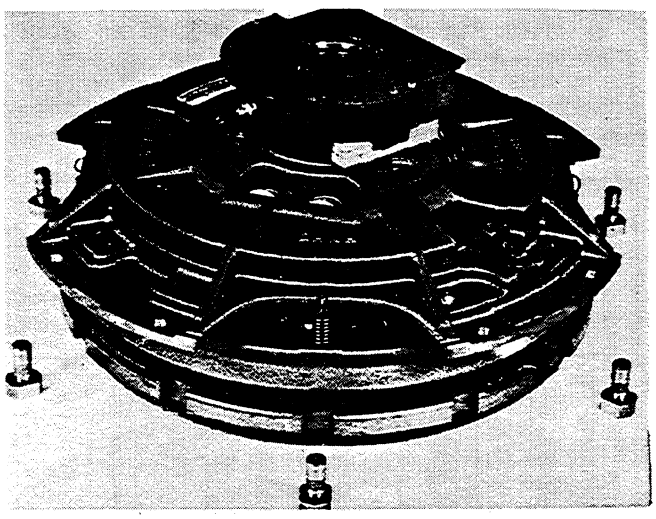


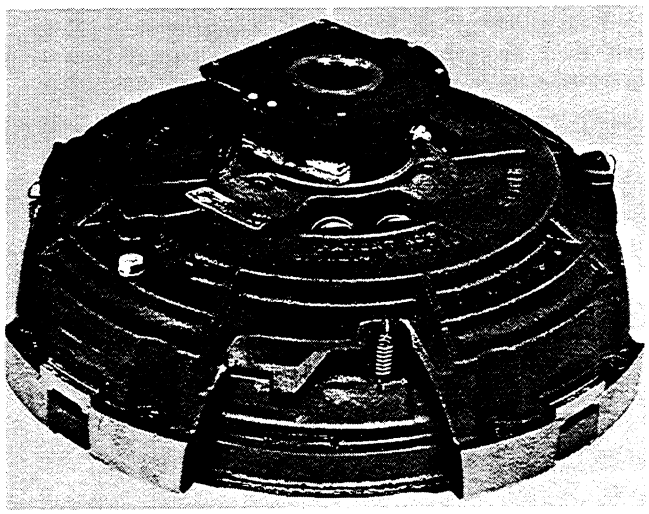
FIG. 2

A-1	DISC, driven front
A-2	PLATE, intermediate
A-3	DISC, driven rear
B-1	PLATE, pressure
B-2	SPRING, return
C-1	RING, flywheel
C-2	PIN, name plate
C-3	PLATE, name
D-1	RING, adjusting
D-2	LOCK, adjusting ring
D-3	BOLT & lock washer assembly
D-4	LEVER
D-5	PIN, pivot
D-6	CLIP, Spring
F-2	RETAINER, release sleeve
F-3	SPRING, pressure
F-4	PIVOT, spring
F-5	RING, release sleeve
F-6	RING, snap
G-1	BEARING & COVER, sub-assembly
G-12	NIPPLE, zerk (1/8''-27)
H-1	RELEASE SLEEVE sub-assembly
H-2	BUSHING, release sleeve

REMOVAL AND DISASSEMBLY



3068-41 AS-1400



3068-40 AS-1550

FIG. 3

TRANSMISSION REMOVAL:

A suitable "sling" or transmission jack should be used to properly support and maintain the engine/transmission alignment when removing or installing a transmission on an engine. DO NOT let the rear end of the transmission drop down and hang unsupported in the splined hubs of the clutch discs to avoid bending or distorting the friction discs. Disconnect the external linkage from the clutch release arm to permit the release yoke to turn up and pull free of the release bearing thrust pads.

CLUTCH REMOVAL:

1. Prior to actual clutch removal, assemble a clutch disc aligning tool to the driven disc and release bearing assembly.

SPACER BLOCKS: (See Fig. 3)

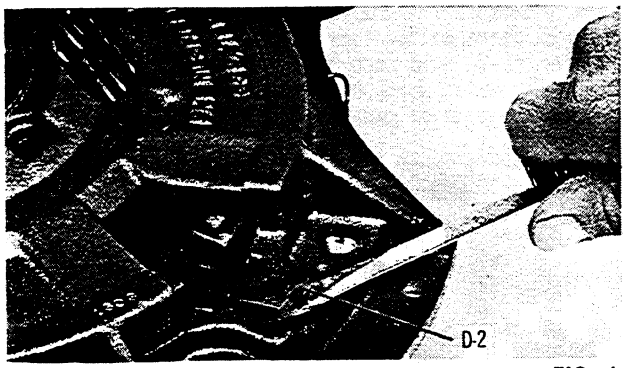
It is important that two ¾" blocks of wood be inserted between the clutch release bearing housing and clutch flywheel ring as the clutch mounting bolts are loosened around the flywheel. These blocks will relieve the heavy internal spring load, preventing cocking and bending within the clutch and insure easy removal of remaining mounting bolts.

2. When all bolts have been removed, slide clutch assembly back and off using caution to keep aligning tool in place to retain discs and intermediate plate.

3. Carefully remove aligning tool, rear disc, intermediate plate and front disc.

4. See Inspection Section for checks of flywheel

5. **Note Fig. 4.** Remove bolt and lockwasher (D-3) assembly and adjusting ring lock (D-2). Use screwdriver or similar wedge to remove adjusting ring lock.

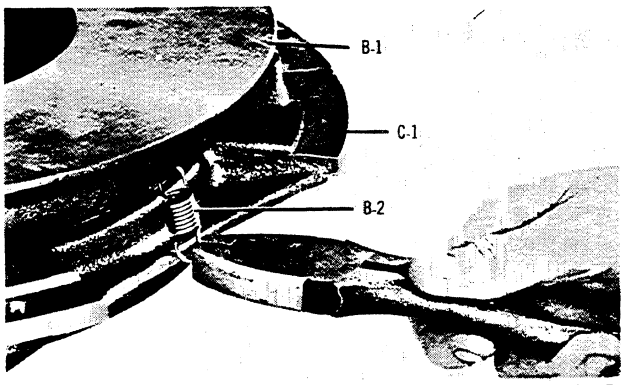


3063-30 FIG. 4

6. **Note Fig. 5.** Set clutch assembly (without driven discs and intermediate plate) upside down on a flat table or workbench. Unhook four return springs (B-2) from flywheel ring (C-1) and lift pressure plate (B-1) off.

NOTE

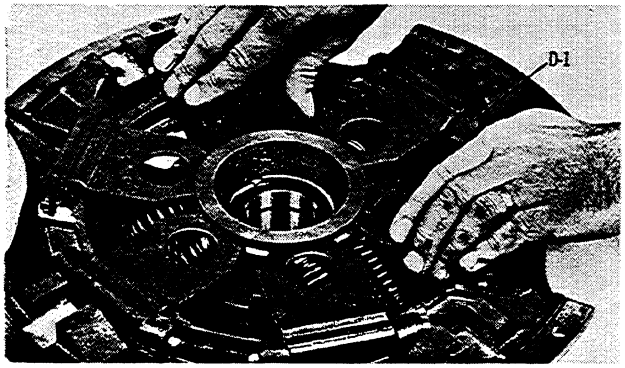
Mark pressure plate in relation to the flywheel ring for reassembly purposes.



3063-17 FIG. 5

REMOVAL AND DISASSEMBLY

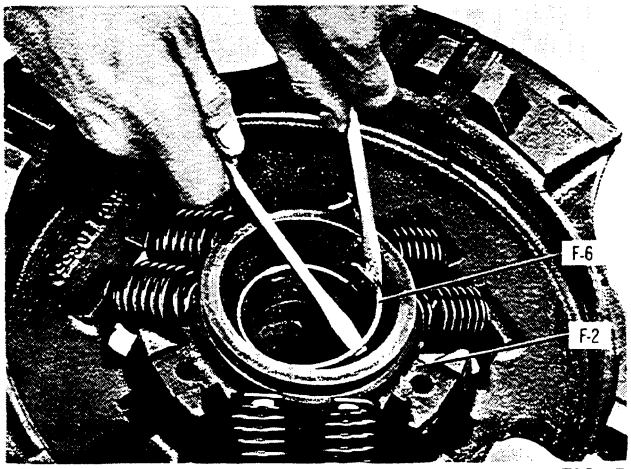
7. **Note Fig. 6.** Turn the adjusting ring (D-1) and lever assembly counter-clockwise until free of flywheel ring (C-1). Then lift and remove assembly.



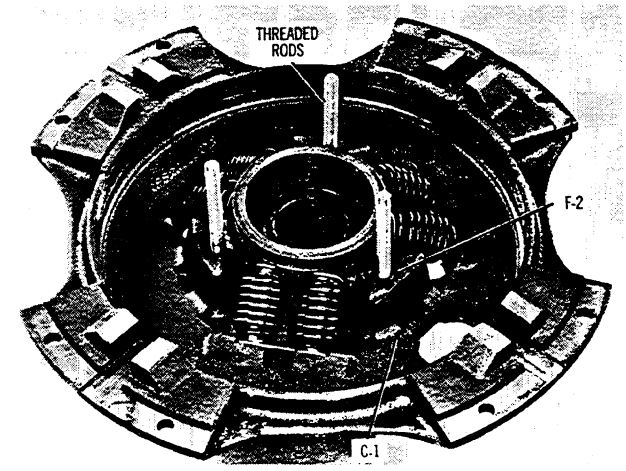
3063-34 **FIG. 6**

8. **Note Fig. 7.** Remove snap ring (F-6) from release sleeve retainer (F-2).

9. **Note Fig. 8.** Install three 5/16" x 5" threaded rods through clearance holes in release sleeve retainer (F-2) and into holes provided in flywheel ring. Threaded rod must pass through flywheel ring far enough to put hex nuts on both ends.



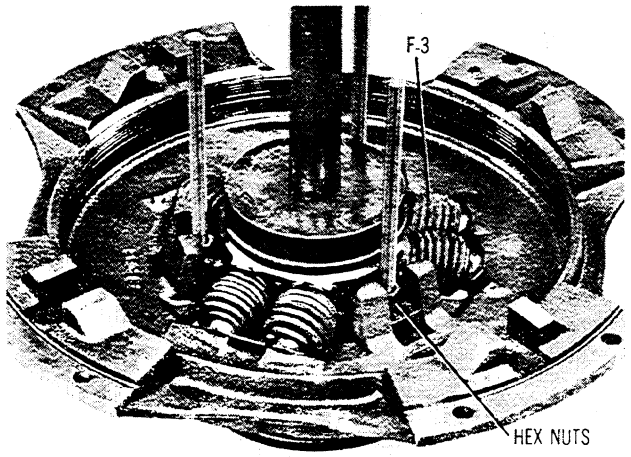
3063-2 **FIG. 7**



3063-16 **FIG. 8**

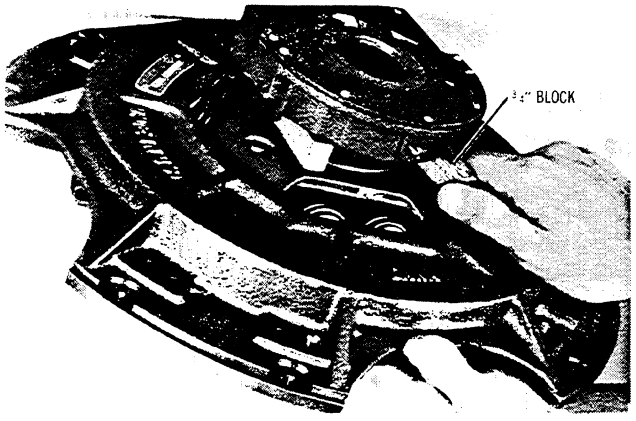
10. **Note Fig. 9.** Place assembly on an arbor press with a piece of tubing (See Note) supporting the release sleeve (H-1). Compress retainer until drive lugs bottom on flywheel ring and draw three hex nuts tightly against retainer.

> **NOTE**
>
> *Use a short piece of 2½" or 2¾" O.D. tubing to support release sleeve assembly. DO NOT support on clutch release bearing cover rivet heads.*



3681-8 **FIG. 9**

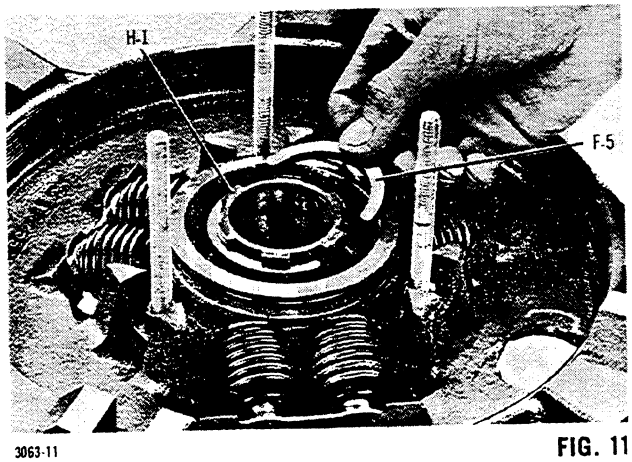
11. **Note Fig. 10.** Raise arbor. Tilt assembly and remove ¾" wooden blocks.



3063-8 **FIG. 10**

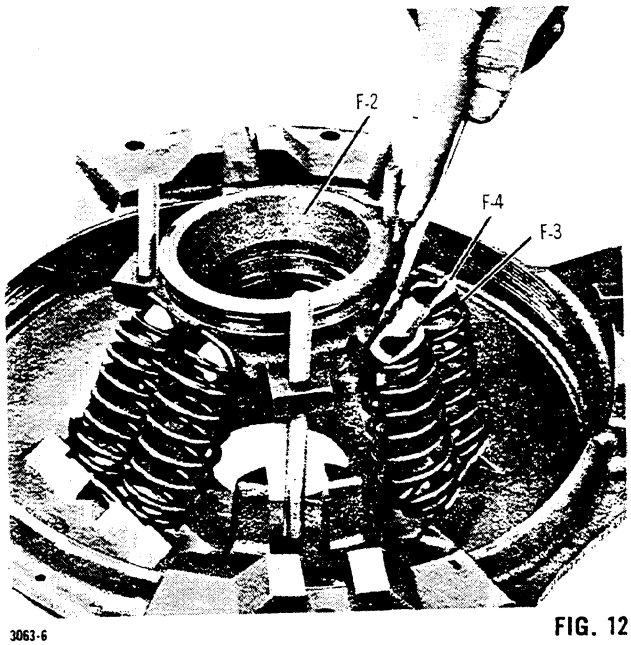
12. **Note Fig. 11.** Again support release sleeve on tubing as in Step 10. Remove half ring locks (F-5). Now release sleeve and bearing assembly are free to slide through retainer toward rear of clutch.

REMOVAL AND DISASSEMBLY



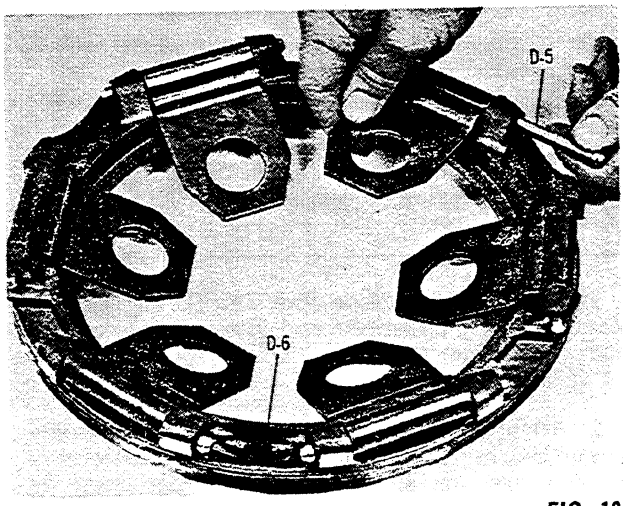
3063-11 FIG. 11

13. **Note Fig. 12.** To disassemble pressure springs (F-3) and retainer, compress retainer to relieve load on hex nuts. Back off hex nuts and remove load on pressure springs. Remove pressure springs and spring pivots (F-4).



3063-6 FIG. 12

14. **Note Fig. 13.** To complete disassembly, remove the retainer clip (D-6) from pivot pins (D-5). And remove pins and levers.



3063-37 FIG. 13

NOTE

All parts must be clean and dry for inspection.

REMOVAL AND DISASSEMBLY
RELEASE BEARING ASSEMBLIES

NOTE

The release sleeve and bearing assemblies used with the 1¾ ″-10 spline drive gear will be different than the sleeve and bearing assembly used with the 2″-10 spline drive gear. Follow correct disassembly procedure outlined below. The letter "a" is used to designate parts that are used on 2″ spline assemblies only. Examples: G-2a, F-2a, etc.

1¾″-10 spline. Note Fig. 14. To disassemble release bearing assembly and sleeve subassembly, support housing cover (G-5) and press sleeve (H-1) out of bearing.

2″-10 spline. Note Fig. 15. To disassemble release bearing assembly and sleeve subassembly (H-1a), press or slide release bearing assembly back on release sleeve (H-1a) to expose snap ring. Remove snap ring (H-3). Support back side of housing (G-2a) and press sleeve out of bearing.

IMPORTANT

Completely assembled release bearing assemblies as well as release sleeve and bushing subassemblies (H-1 & H-1a) are available as service replacement parts.

We recommend the above assemblies be replaced as a unit at the time of clutch rebuild.

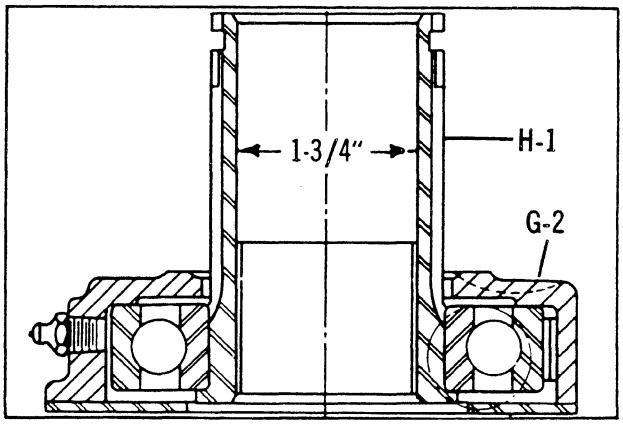


FIG. 14

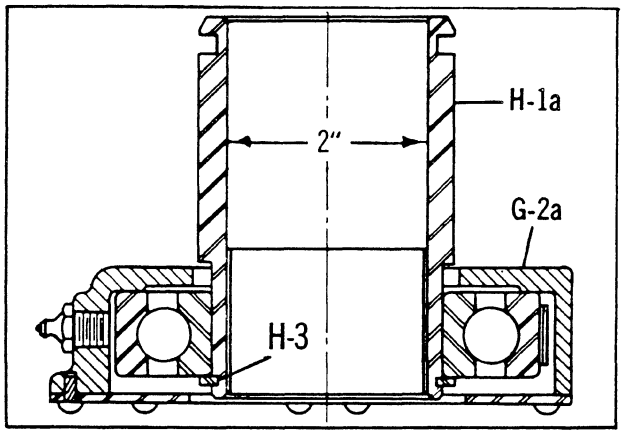
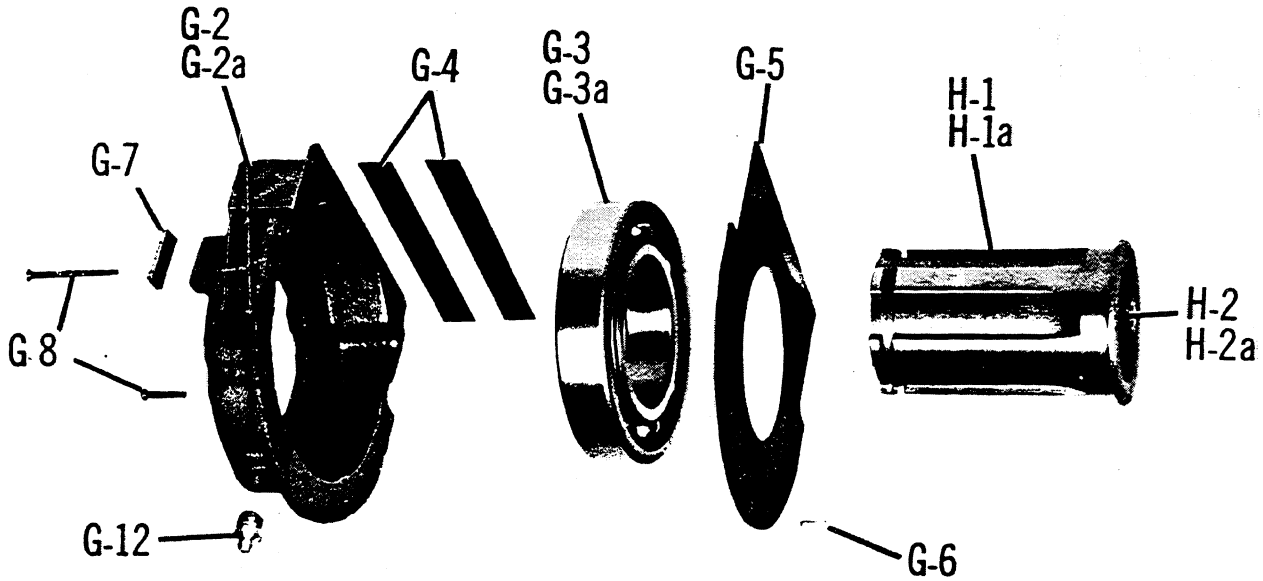


FIG. 15

1. **Note Fig. 16.** To disassemble release bearing assembly (G-2) or (G-2a), cut or grind rivet heads off and remove cover. Remove release bearing (G-3) and two flat springs (G-4). Drive rivets out of housing to remove wear pads (G-7).



2494-17

FIG. 16