SERVICE MANUAL

Launderall*

*TRADE MARK

F. L. JACOBS CO.
DETROIT 1, MICH.

INSTALLATION and SERVICE INSTRUCTION MANUAL

for Models LS-2A and LS-1

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AUTOMATIC HOME LAUNDRY

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INTRODUCTION

This Handbook of Instruction was written expressly for the use of Authorized LAUNDERALL Distributors, their Dealers, and their Service Men, to serve as a complete guide for installing and servicing LAUNDERALL Automatic Home Laundries.

The first step in understanding the operation of the machine as a whole is to understand the operation and functioning of its components. Because of the unique design and mechanisms employed, a detailed description of the complete automatic washing cycle together with appropriate power flow diagrams appears in section I, entitled "Theory of Operation." Included in this section is a list of general specifications and capacities, detailed information covering the functions of the power transmission, and a thorough description of all devices operated by the transmission. The final portion of this section includes several concise paragraphs devoted to the chemistry of laundering, which will aid materially in qualifying men as LAUNDERALL Service Specialists.

A complete trouble-shooting chart is included in section V, and all services are grouped according to major assemblies. Where practical, each sub-assembly is classified into headings as follows: removal and installation, disassembly and reassembly, and maintenance and adjustment.

All service methods contained herein represent the combined efforts of the Factory Service Department together with the suggestions forwarded to us by the Field. Service operations have been classified into two groups: those which may be performed in the home and those better completed in shops. We have grouped these services into their respective classifications in sections V and VI, and recommend that these be observed to obtain maximum customer satisfaction.

G. E. Schwartz

Service Manager,
Appliance Division

SECTION I
THEORY OF OPERATION

1. GENERAL SPECIFICATIONS AND CAPACITIES.

Dimensions	24½" x 24½" x 36"
Weight	223 lbs
Weight (crated)	243 lbs
Washing Cylinder Speed:	
Wash and Rinse	49 to 51 rpm (approx.)
Spin	360 to 380 rpm
Water Consumption:	
Washing Cycle	9 gal.
First Rinse	8 gal.
Second Rinse	8 gal.
Total consumption per washing	25 gal. (15 gal. hot; 10 cold—approx.)
Water Temperature:	
First Fill	
Temp. Control Lever at "Warm"	100° F (approx.)
Temp. Control Lever at "Hot":	
Serial Nos. 70,000 and up	Tank Temperature, minus drop in pipes.
Serial Nos. up to 70,000	140° F (approx.)
Second and Third Fills	100° F (approx.)
Normal Filling Rate (gals. per min.)	3.8 to 4.2
Input Belt Tension	⅜" depression at center between pulleys with a hand pressure of three pounds (approx.)
Output Belt Tension	Automatically controlled by hold-down spring
Bearings	Bronze Sleeve Throughout, except Discharge Pump which has Deep-Groove Ball Type
Oil Seals	Heavy-Duty Rawhide
Cylinder:	
Material	.051 thick Aluminum, 3-SO
Construction	Elect. Spot-Weld
Shaft Bearings	Sleeve, Marine-Type, Water-Lubricated
Shafts	Steel, Case-Hardened
Diameter x Length	21" x 16"
Capacity	10 lbs. assorted dry clothes (approx.)
Tub:	
Material	16 ga Steel
Finish	Baked Porcelain Enamel
Construction	Welded
"A" Frames:	
Material	13 ga Steel
Finish	Baked Porcelain
Cabinet Panels:	
Material	20 ga Steel
Finish	Baked Enamel
Normal Water Pressure:	
Flowing Pressure, Minimum	20 lbs
Static Pressure, Maximum	100 lbs
Motor:	
Type	Capacitor Start
Speed	1725 rpm
Horsepower	½
Frequency	60 cycles
Voltage	115
Current Rating	5.5
Cooling	Externally and internally by fans
Bearings	Sleeve type, fitted with oil cups
Transmission:	
Type	Fully enclosed, two-speed
Gears:	
Type	Helical Cut throughout, except on camshaft drive
Material	SAE 1112 Steel, carburized
Gear Train	In constant mesh
Cycle Timing	By Gear-Driven Cams—located in transmission housing
Lubricant	LAUNDERALL Transmission Oil
Lubricant Capacity	17 gal. (1⅓ pint, approx.)
Input Shaft Drive	"V" Belt—31¾"
Output Shaft Drive	"V" Belt—72"

Note

All exposed metal surfaces are rust-resistant.

2. DIFFERENCES IN MODELS.

All machines bearing serial numbers up to 200,000 are identified as Model LS-1; all subsequent serial numbers are identified as Model LS-2A. The major differences between models are enumerated below:

LS-1	LS-2A
Mechanically operated metering and mixing type valve *(See figure 1.)* on transmission, on serial numbers up to 70,000; thereafter, electrically operated metering and mixing valve on rear cross-member. *(See figure 2.)* Electrically operated proportioning valve on serial numbers 30,000 to 40,000 located on rear cross-member.	Electrically operated metering and mixing valve on front cross-member. *(See figure 2.)*
Water trap and vent constructed of metal tubing, with hose entry below rear panel. *(See figure 4.)*	Ventless, inlet water trap, with entry through hole in "A" frame. Vent holes in top door. *(See figure 3.)*
Steel, cadmium-plated drain strainer.	Aluminum drain strainer. *(See figure 5.)*
Lever-operated door switch.	Plunger-operated door switch.
Unperforated rear panel.	Rear panel provided with holes to admit water supply hoses. *(See figure 3.)*

Figure 1—Mechanically Operated Water Inlet Valve

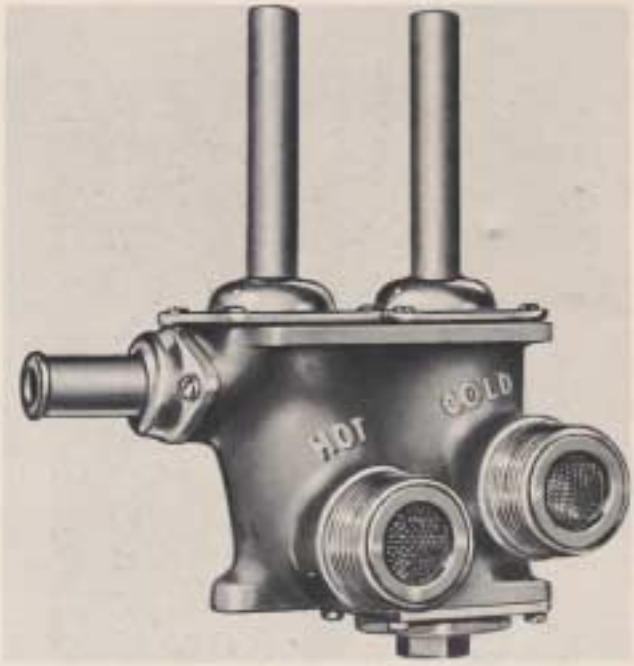


Figure 2—Electrically Operated Water Inlet Valve

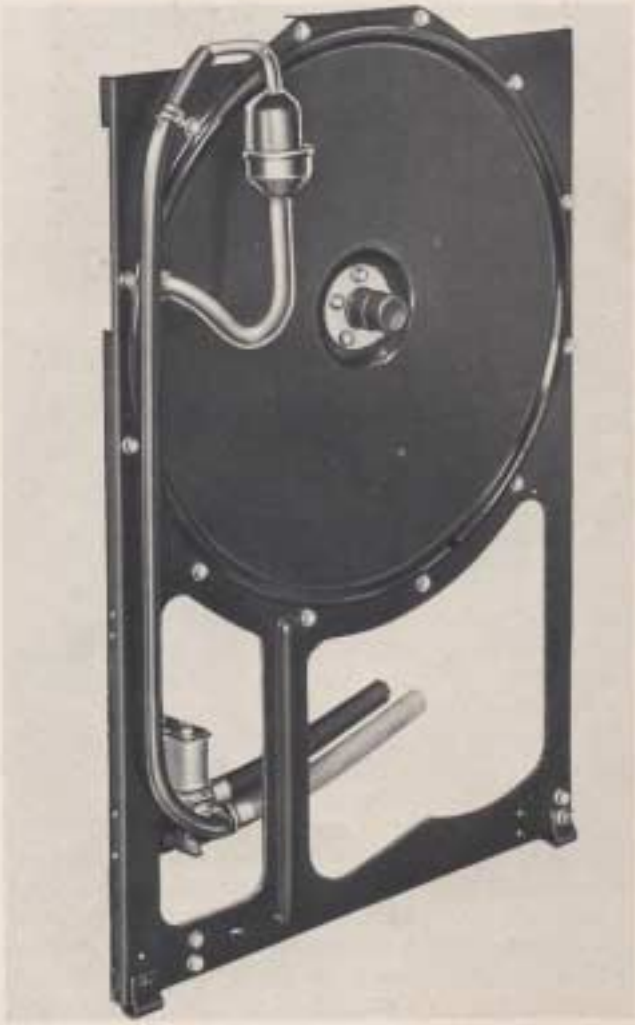


Figure 3—Water Trap—LS-2A

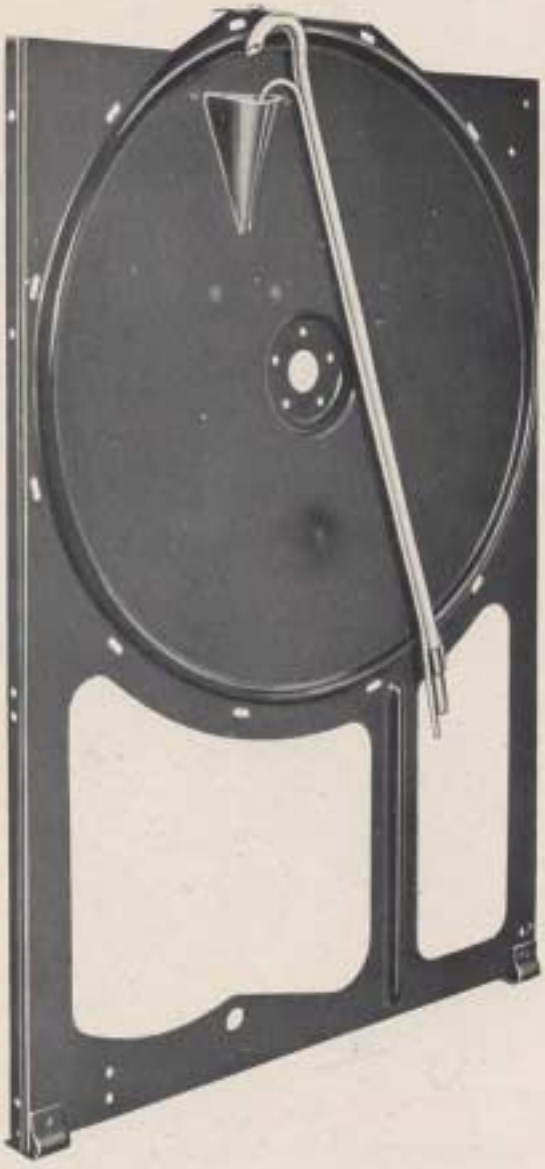


Figure 4—Water Trap and Vent—LS-1

1. Front Panel Door
2. Drain Strainer
3. Starting Lever
4. Temperature Control Lever
5. Top Door Latch Handle
6. Cylinder Door Latch
7. Top Door

Figure 5—Operating Controls and Doors

3. THE LAUNDERALL WASHING CYCLE.

The washing cycle is started by depressing the "START" lever. The tub then automatically fills with the correct amount of water at the temperature selected by use of the temperature control lever *(See figure 5.)*, and the washing cylinder proceeds through a thorough washing action which consists of a gentle tumbling interrupted by positive and frequent reversals of rotation, and two consecutive rinse operations. *(See figure 6.)* This tumbling action, utilized for washing and rinsing only, is the result of horizontal cylinder rotation (10 to 12 turns in each direction) at approximately 48 revolutions per minute. This "Double Tumble" principle has been used for years in commercial laundries and has repeatedly proved itself far superior to any other method yet devised. *(See figure 15.)*

Before each rinse takes place, the dirty wash water is automatically drained from the machine and the correct amount of fresh rinse water is admitted at the proper temperature. At the completion of the wash and first rinse when the water has been drained out, the wet clothes are automatically subjected to a high-speed centrifugal spin for about two minutes to extract the surplus water and improve the efficiency of each rinse. At the end of the second rinse, the cylinder containing the thoroughly washed clothes is given a final spin at approximately 370 rpm for approximately seven minutes. At the conclusion of the cycle the machine automatically shuts off, permitting the operator to unload the unit while the clothes are in a damp-dry condition.

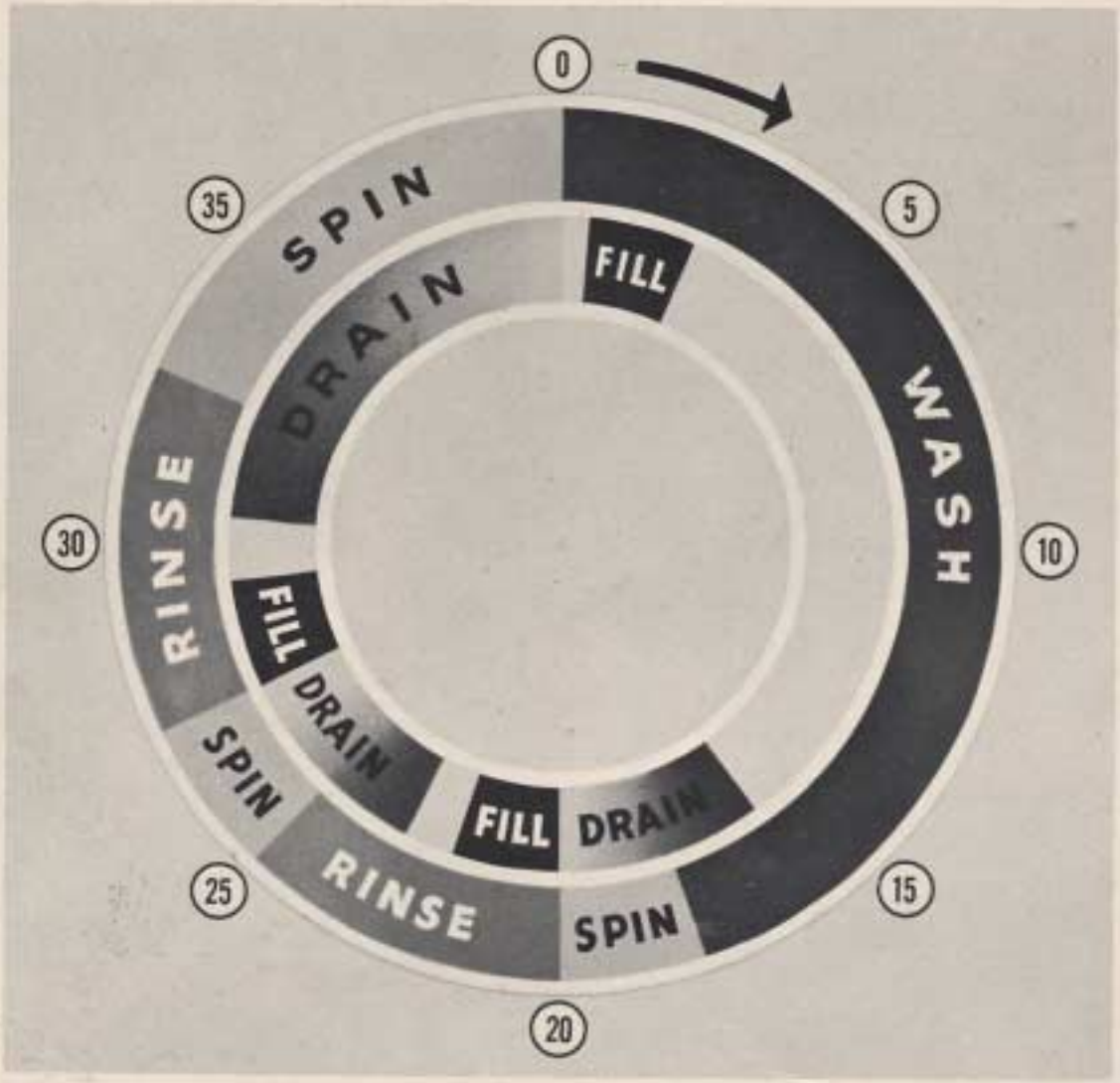


Figure 6—Wash Cycle Chart

The approximate amount of time allotted to each portion of the complete wash cycle is shown below:

IMPORTANT

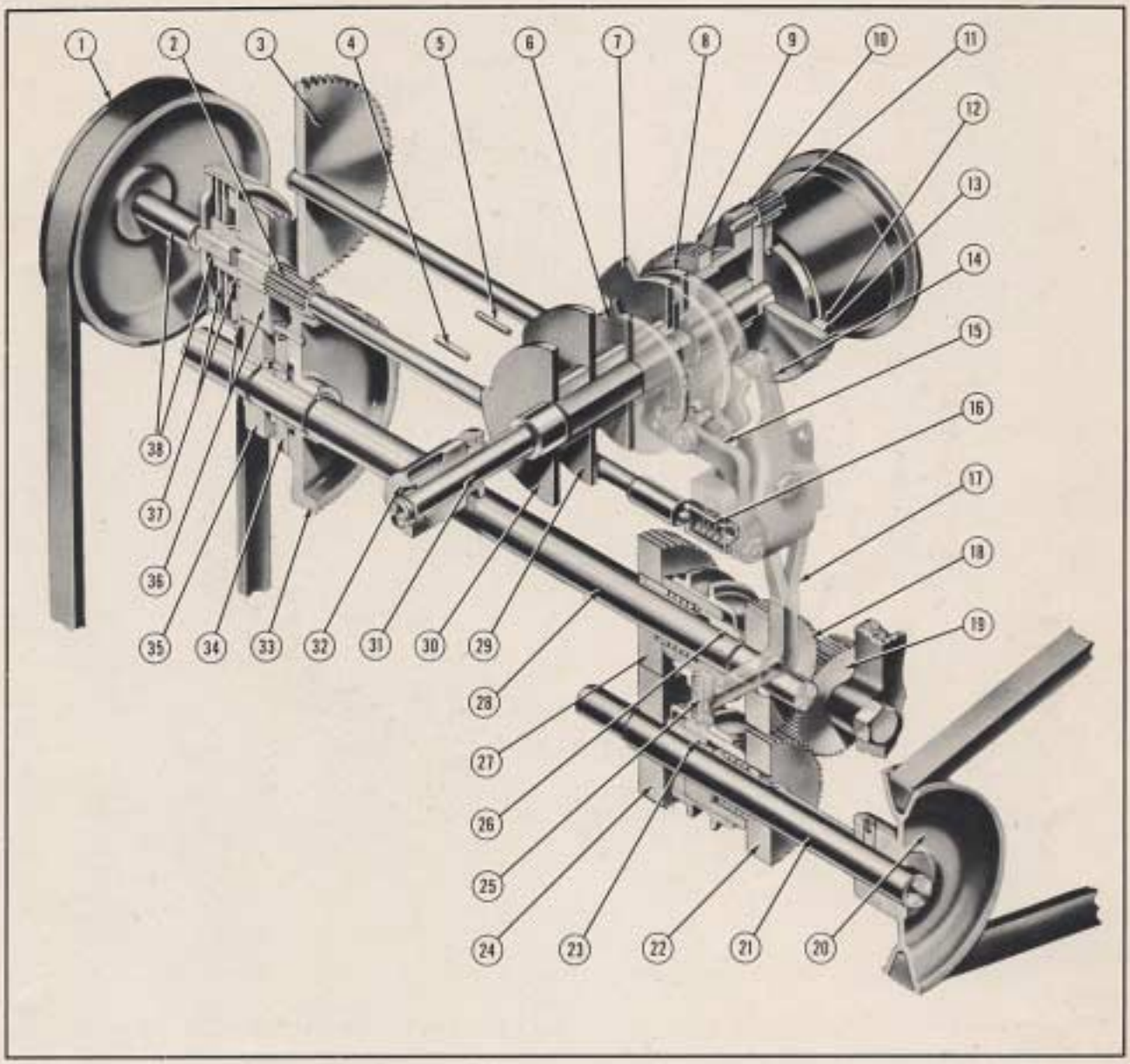
Minor deviations from time allotments do not necessarily indicate faulty or abnormal operation.

Operation	*Minutes*
Fill with hot (or mixed) water, slow speed	2
Wash, slow speed	15
Drain, slow speed	2
Spin and drain, high speed	2
Fill with rinse water, slow speed	2
Rinse, slow speed	1
Drain, slow speed	2
Spin and drain, high speed	2
Fill with rinse water, slow speed	2
Rinse, slow speed	1
Drain, slow speed	2
Spin and drain, high speed	7
Total Time per Complete Cycle	Approx. 40 Min.

4. TRANSMISSION MECHANISM.

a. GENERAL. *(See figures 7 and 10.)* — The transmission has an input shaft, an intermediate shaft and an output shaft, which carries the output pulley. For low-speed drive in either direction as well as for high-speed drive, the power must flow through all three shafts. Drive from the motor to the input pulley, and from the output pulley to the washer cylinder pulley is by V-belt. Timing of the reversals of drum rotation during washing and rinsing cycles, high-speed spinning for drying, and actuation of the water inlet valves is all done through a mechanical camshaft, driven by the transmission and located in the transmission housing.

b. LOW-SPEED DRIVE. *(See figures 7, 8, 9 and 10.)*—In low speed, power from the input shaft flows through a small pinion into a large gear freely mounted on the intermediate shaft. This driven gear engages its shaft through a two-toothed Eclipse clutch only when in low speed. The drive



1. Input Pulley
2. Low-Speed Driver Pinion (11 Teeth)
3. Worm Gear (76 Teeth) and Single-Thread Worm Assembly
4. Drain-Cam Pin
5. Switch-Cam Pin
6. High-Speed Cam
7. Synchronizing Cam
8. Reversing Cam
9. Worm Gear (125 Teeth)
10. Worm Gear Adapter
11. Planetary Pinion (11 Teeth)
12. Planetary Gear—Stationary (79 Teeth)
13. Planetary Gear—Driven (80 Teeth)
14. Reversing Lever
15. High-Speed Lever
16. High-Speed Clutch Tappet
17. Shifter Yoke
18. Keyed Helix Gear (46 Teeth)
19. Reverse Idler Gear (40 Teeth)
20. Output Pulley
21. Output Shaft and Clutch Pocket Assembly
22. Helix Gear (46 Teeth) and Spring Assembly
23. Reversing Shifter Key
24. Keyed Helix Gear (51 Teeth)
25. Shifter Yoke Rollers (Part of Item 17)
26. Reversing Shifter Key
27. Helix Gear (51 Teeth) and Spring Assembly
28. Intermediate Shaft and Clutch Pocket Assembly
29. Switch Cam
30. Drain Cam
31. Cam Shaft
32. Water Cam
33. Low-Speed Driven Gear (76 Teeth)
34. Low-Speed Clutch Mechanism
35. High-Speed Driven Gear (41 Teeth)
36. High-Speed Driving Gear (47 Teeth) and Clutch Housing Assembly
37. High-Speed Clutch Mechanism
38. Input Shaft

Figure 7—Transmission Chart

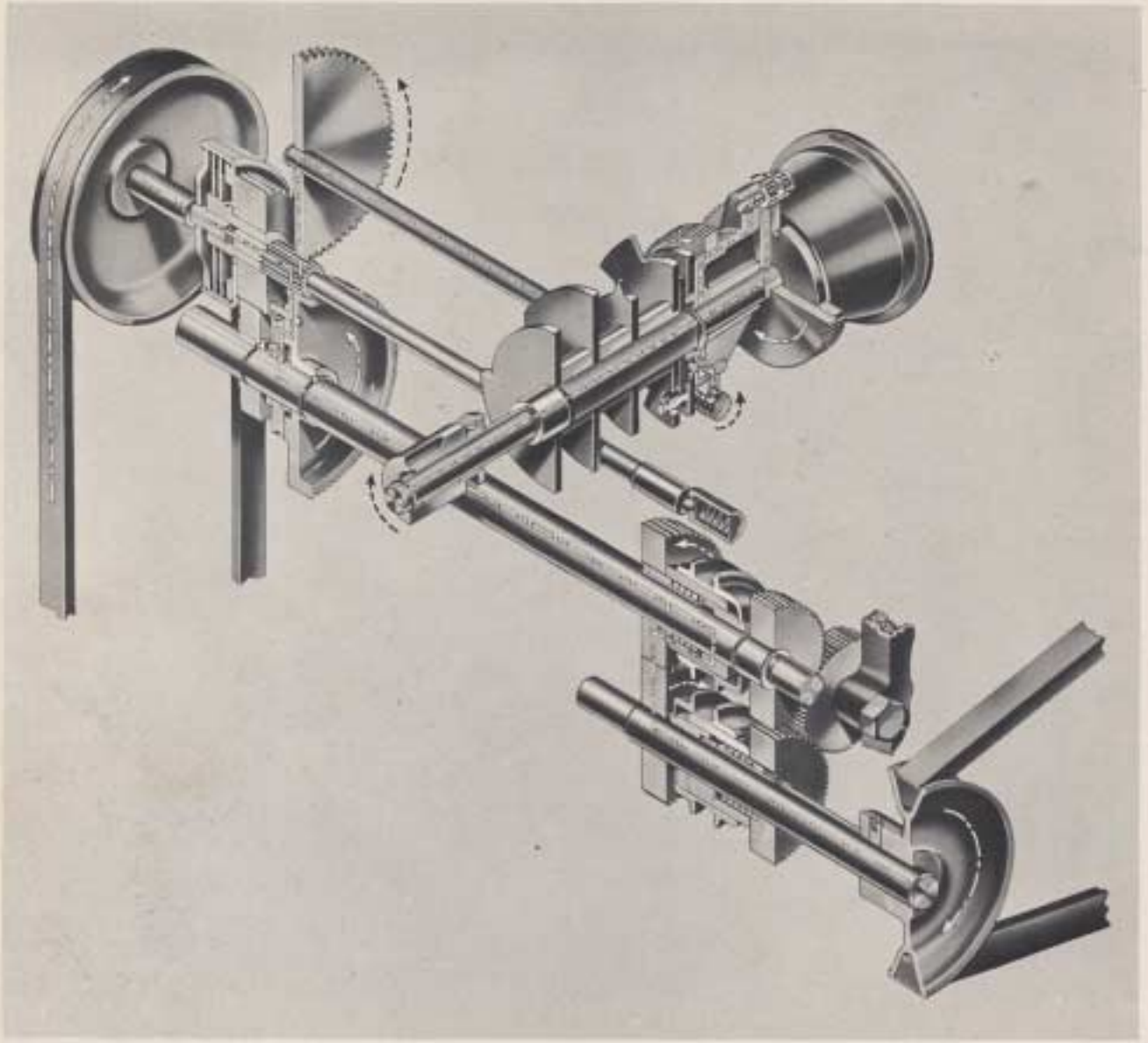


Figure 8—Transmission Gearing Power Flow—Forward

to the output shaft is either through direct gearing or through the reverse idler. Direction of output pulley is selected by a pair of simultaneously operated LGS spring clutches engaging clutch-driven gears on each shaft. These clutches face opposite directions on their respective shafts so that the shifter yoke engaging the shifter sleeves of each, causes one to release at the time the other is engaged. The actuating member of the clutch is in the form of a helical spring which tends to expand within a sleeve when the action of engagement seeks to unwind it. The gears to which the clutch gears are mated are keyed to their respective shafts, one being a driver and the other a driven member.

c. HIGH-SPEED DRIVE. *(See figures 7, 10 and 11.)*—The high-speed drive has its own driving gear and clutch *(See figure 12.)*, but uses all three shafts of the low-speed train. The high-speed driving gear on the input shaft is engaged through a multiple-disc clutch whose driving members are keyed to a short pinion shaft. This gear is in constant mesh with the high-speed driven gear which has approximately the same number of teeth and is keyed to the intermediate shaft. When the multiple-disc clutch is engaged through action of the high-speed lever operated through a bellcrank on shifter bracket, overspeeding of the intermediate shaft declutches the low speed gear which, however, remains in constant mesh with its driving pinion. This declutching is effected through screw action on a fast lead screw and is identical in principle to the action used to throw out the starting pinion on conventional automotive starters. *(See figure 13.)*

From this point on, the high-speed drive is the