



# GRAVELLY

Condensed  
Service  
Data

---

TRACTOR DIVISION  
**Studebaker**  
CORPORATION

JANUARY 1966

PRINTED IN U.S.A.

## CONDENSED SERVICE DATA

### GRAVELY MODEL L TRACTOR ENGINE

The purpose of this booklet is to furnish the mechanic with the necessary information he needs to properly fit and service the Engine and Crankcase assembly of the Gravelly Model L Tractor. Detailed assembly and disassembly methods will not be discussed since the illustrations should give sufficient guidance to proper methods.

#### ENGINE AND MODEL DATA

<u>Model</u>	<u>Cylinders</u>	<u>Bore</u>	<u>Stroke</u>	<u>Displacement</u>
L	1	3-1/4"	3-1/2"	29.0 Cubic Inches

#### Key to Model Designations and Suffixes

LS--"Slow Speed" (4 Thread Worm)  
LI--"Intermediate Speed" (6 Thread Worm)  
L--Standard "High Speed" (8 Thread Worm)

On the name plate serial number, M prefix means 100,000. For example, Tractor serial number "100105" would be shown as "M105".

## MAINTENANCE

### Spark Plug

Recommended: Auto-Lite TT-10  
Or Champion W - 89-D  
Electrode Gap .033

### Carburetor

See separate instructions.

### Magneto

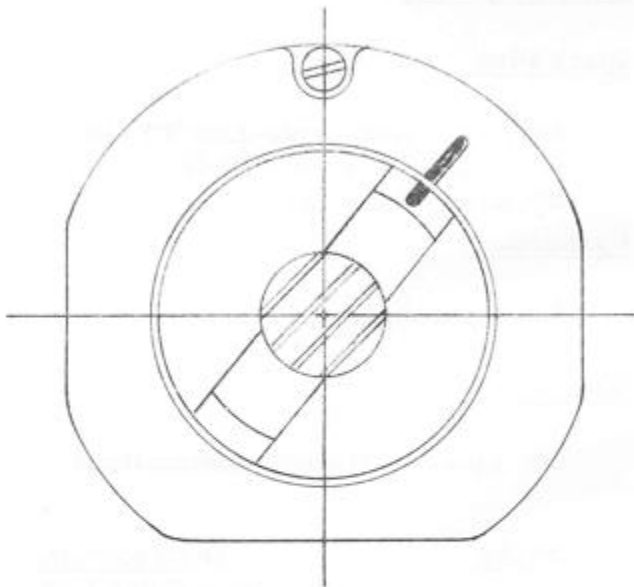
See separate Magneto instructions.

### Timing Magneto to Engine

Before timing spark to engine, inspect face of Magneto and locate timing marks. If the timing marks are two lines, one on the Magneto face and one on the Coupling, proceed by Method 1. If the timing marks are a line and a dot on the Magneto face, and a line on the Coupling, proceed by Method 2.

#### TABLE OF ENGINE SPEEDS AND GROUND SPEEDS

<u>Slow Speed Tractor</u>	<u>Medium Speed Tractor</u>	<u>Regular Speed Tractor</u>	<u>Engine RPM</u>	<u>PTO RPM</u>
High Gear:				
1mph	1-1/2 mph	2 mph	1364	682
1-1/2 mph	2-1/4 mph	3 mph	2046	1023
2 mph	3 mph	4 mph	2728	1364
Low Gear:				
1/2 mph	3/4 mph	1 mph	946	341
1 mph	1-1/2 mph	2 mph	1892	682
1-1/2 mph	2-1/4 mph	3 mph	2838	1023



MAGNETO FACE PLATE

To accomplish by Method 1. (Two Lines)

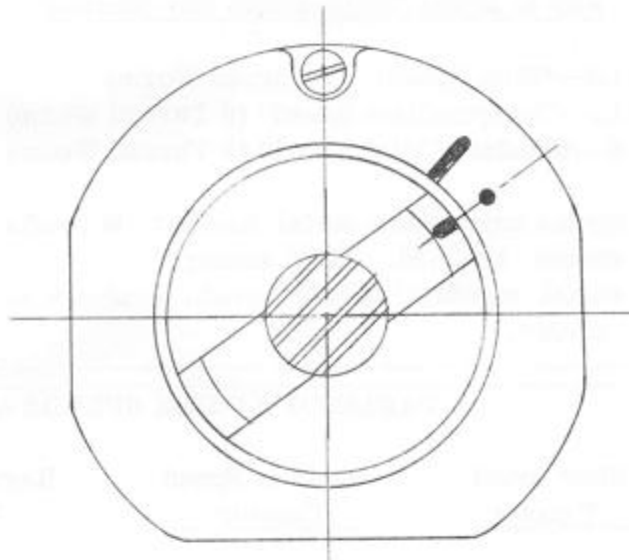
1. Remove Air Cleaner, Air Cleaner Bracket.
2. Loosen Magneto Coupling Nut until it slips on the Camshaft. It may be necessary to tap coupling gently.
3. Remove Cylinder Head.
4. Bring Piston to Top Dead Center on the compression stroke (both valves closed). Measure, accurately, the distance from top of Piston to top of Cylinder Wall. Record this measurement, then add 5/16 of an inch.
5. Turn the Starter Pulley counter clock wise until the Piston goes down the cylinder approximately an inch. Then bring Piston back up Cylinder slowly until it is the distance calculated in step four. (5/16" plus distance from top of Cylinder Wall to Piston at Top Dead Center). This procedure takes up any back-lash in the gears.
6. Hold the Magneto Shaft Extension with Vise-Grip Pliers so it will not move. Rotate the Magneto Impulse (inoperative) until the timing marks line up.

7. Be sure that there is at least 1/64" end play in the Magneto coupling so it will not cramp the impulse. Use a 1/64" (.015) Feeler Gauge between the Fiber Block and the Coupling Flange before tightening nut. Tighten nut while holding timing marks together.

8. Check your settings by backing the Piston not more than two inches down the cylinder barrel (to avoid picking up Magneto impulse) and review the procedure.

9. When timing is correct, lock Magneto Coupling Nut.

10. NOTE: Timing Marks will not line up when piston is at Top Dead Center.



MAGNETO FACE PLATE

To accomplish by Method 2. (Lines and dot)

1. Remove Air Cleaner, Air Cleaner Bracket.
2. Loosen Magneto Coupling Nut until it moves on the Camshaft. It may be necessary to tap the coupling gently.
3. Crank Starter Pulley until you feel the beginning of the Compression Stroke. Remove Spark Plug, observe by eye or, more accurately, measure to piston surface until

Piston is exactly at Top Dead Center.

4. Hold the Magneto Shaft Extension with Vise-Grip Pliers so it will not move. Rotate the Magneto Impulse (inoperative) until timing marks (line on Coupling and dot on Magneto) line up.

5. Reassemble Magneto Coupling, use 1/64th (.015) Feeler, between Fiber Block and The Coupling Flange before tightening Nut, so you will not cramp the impulse. Be sure timing marks are together while tightening nut.

6. Lock Magneto Coupling Nut. Replace Air Cleaner and Bracket.

7. NOTE: Timing line on Coupling and dot on Magneto line up at Top Dead Center.

### LUBRICATION

Capacity is 5 PINTS. Engine and Chassis are lubricated by the same oil. Use only Motor Oils, do NOT use transmission oils or greases.

For Summer:

Mobiloil AF (SAE 30)

For Winter:

Temperature range from 32° to 10° F. Use Mobiloil Arctic (SAE 20-20W) 10° and below, Mobiloil Special (SAE -10W-30)

Oil is checked by having tractor level. Remove Try-Cock Wing Nut on Chassis. If oil runs out, you have enough. When filling, be sure to fill only until oil runs out.

### REPAIRS

#### Crankpin

Crankpin diameter is 1.497/1.498, and the Connecting Rod big end Bushing must be reamed to 1.500. The Crankpin diameter has been changed. We suggest you accurately "mike" the Crankpin. If less than 1.497, ream the Bushing to give .002/.003 clearance.

Connecting Rod has bronze Bushing, pressed into Rod. Crankpin into Flywheel is a .001 to .003 interference fit. An interference fit means that the Crankpin is actually .001 to .003 larger than the hole in the Flywheel. The Crankpin must be a very tight fit to keep it from turning. Therefore the Crankpin is pressed into the Flywheel. (Note that Flywheel must be pressed tightly to shoulder on Crankpin.)

### Piston, Pin, Rings

Piston is equipped with three rings.

1 Chrome Compression Ring  
(Ring Gap: .012 to .020)

1 Steel Compression Ring:  
(Ring Gap: .008 to .016)

1 Oil Scraper Ring:  
Old Style Iron Ring, (Gap:  
.008 to .016) or New Style  
Three Piece Chrome Oil  
Ring: Ring (Gap .015 to .055)

We have recently put into production a new, chrome-plated steel, three piece oil ring, part number LH-546. Both our laboratory tests and field tests show this ring much superior to the old style cast iron ring. Therefore, even though it is more expensive, we are using it now in all production, and the rings are available on repair orders.

The rings will be furnished in standard, .010, .020. and .030 oversizes.

The standard size can be used up to .009 oversize, the .020 up to .029 oversize, and the .030 up to .039 oversize.

We recommend the use of the ring especially when "smoking" occurs in the equipment, and yet the compression rings are still in good shape. Quite often, the simple expedient of changing the old cast iron ring to the new style will stop the "smoking" completely.

Of course, it is better to refinish the cylinder bore, and use the proper size of oversize pistons and rings. The LH-546 new three-piece oil ring should have from .015 to .055 end gap for the two flat segments. In contrast, the old style cast iron oil ring should have .008 to .016 end gap. The LH-548 top chrome compression ring should have .012 to .020 end gap. Measure the end gap with a feeler gauge, with the ring removed from the piston and held in the cylinder bore.

Installation of the new ring, though not difficult, must be carried out with care, following the instructions given below carefully and accurately.

#### INSTRUCTIONS FOR INSTALLING THREE-PIECE OIL RING

1. Place stainless steel expander spacer in groove with ends butted.

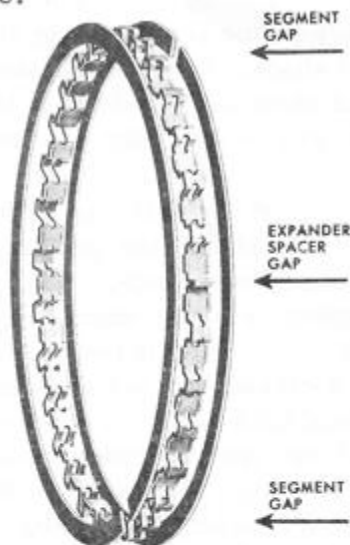
2. Install steel segment on top side of expander spacer with gap of segment approximately  $90^{\circ}$  beyond gap of stainless steel expander spacer, making certain that the expander spacer is still in a butted position.

3. Install second segment on bottom side of the expander spacer with segment gap approximately  $90^{\circ}$  from the expander spacer gap in opposite direction from which the top segment has been installed.

4. Recheck assembly - rings should be free to move in the groove, however, a slight drag will be evident because of the side sealing action of the ring assembly. **BE SURE EXPANDER SPACER REMAINS IN BUTTED POSITION.**

5. When pistons are ready for installation in the cylinders, compress rings carefully, and slip the cylinder down over piston and rings. Since the Cylinder is chamfered, a slight twisting motion will allow this process to be carried out easily, without forcing.

If any difficulty is encountered, the rings should be checked for correct installation in the groove.



Piston Pin (Wrist Pin) is .859 diameter. Small end of Connecting Rod holds Bronze Bushing which should be reamed to .860/- .861.

Piston Pin (Wrist Pin) is a solid fit in the Piston. It is a light push fit in a hot Piston.

Piston skirt clearance is .003/.005, measured with a Feeler Gauge at right angles to the Piston Pin.

To determine if cylinder needs reboring:

1. Use any Piston Ring, inserting it in the cylinder 1/2 inch from the bottom of the bore, using the piston to square it with the sides. Measure the Gap with Feeler Gauge.
2. Use the same ring, 1/2 inch from the top of the Cylinder, seated true with piston, measure the gap.
3. Subtract smaller reading from larger reading, then divide by 3.
4. If result is more than .006, we recommend the cylinder be rebored to the next .010 over size. Pistons and Rings are furnished in oversizes: .005, .010, .015 .020, .025 .030. Diameter of Standard Cylinder is 3.2545/3.2535.

#### Crankshaft

Drive Pinion Shaft Bushing should be reamed to 1.0005/0.9995. The Drive Pinion Shaft is factory toleranced to .9975/- .9965, which gives an overall clearance of .002/.004. (Drive Pinion Shaft Bushing is furnished in .005, .025 O. D. Oversize).

(Drive Pinion Shaft Bushing is fitted into hot crankcase.)

The Timing Pinion Shaft is fitted into the Ball Bearing at manufactured tolerance.

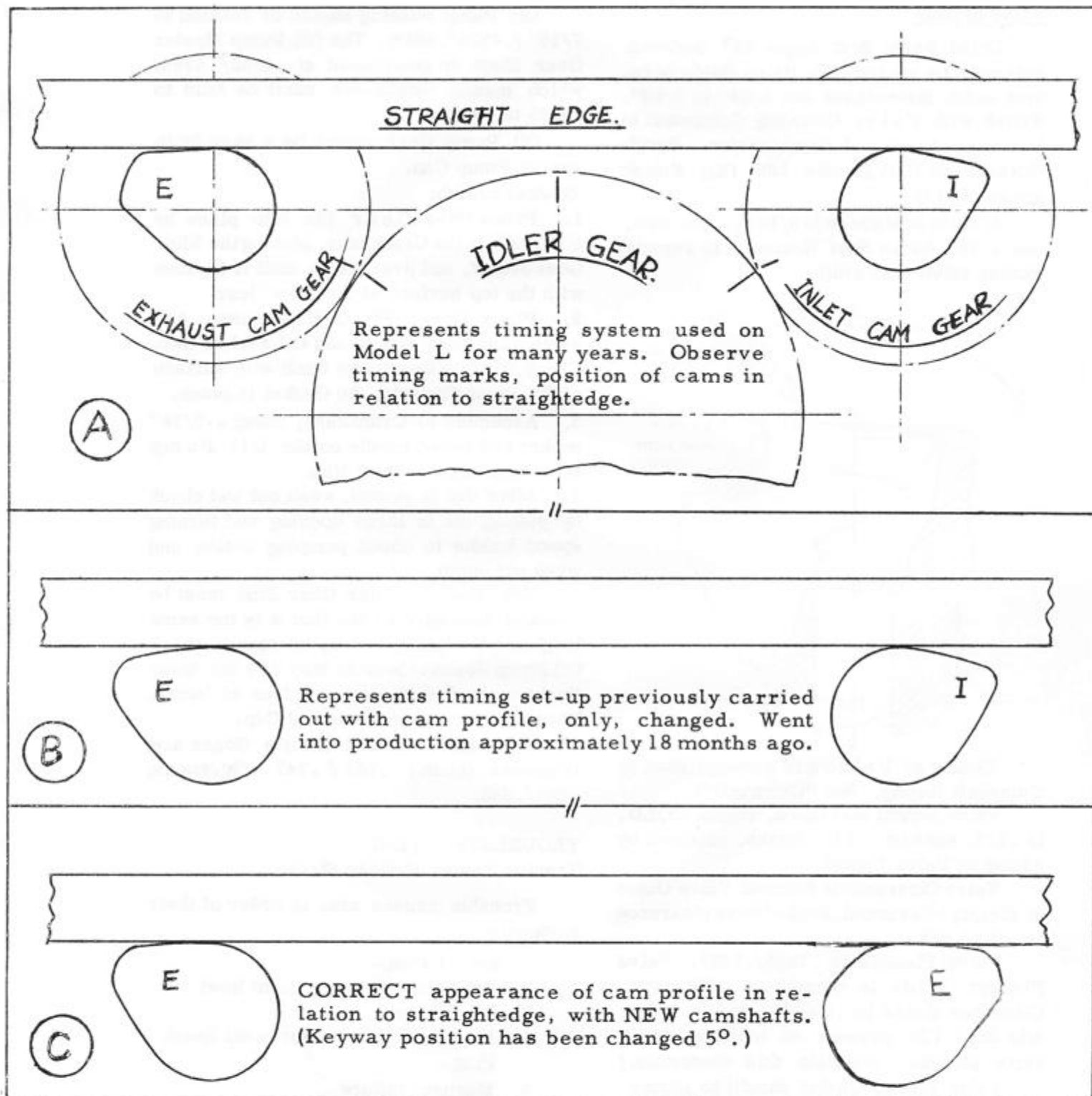
#### Camshafts

Camshafts must be timed very accurately to engine for best results. See timing diagram.

On Tractors manufactured before September 1955, the appearance of the Cam profiles in relation to a straightedge will vary as shown in the same Timing Diagram. On all models, when checking Timing, carefully observe the Cam profile and position. If not as shown in sketch C, replace Camshafts.

Camshaft Bushings are reamed with a .750 reamer. Camshaft diameters are precision ground to .7480/.7490. Clearance should be .001 to .003.

NOTE: Bushings should be line reamed, in place in bolted-together Crankcases. Crankcases must be replaced, when necessary, in Pairs.

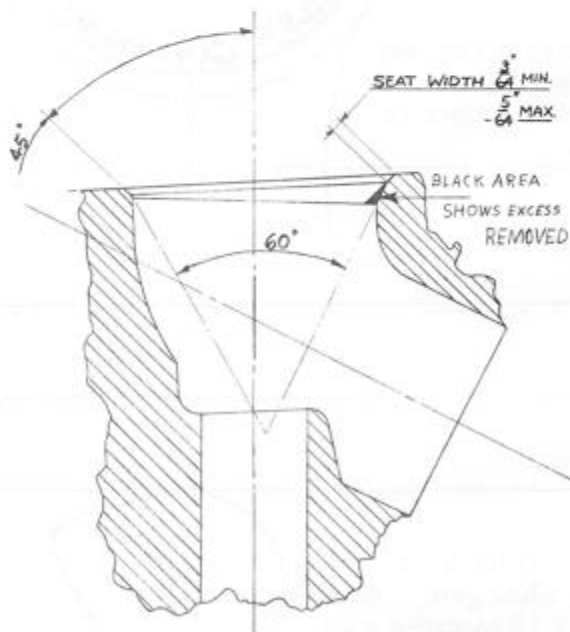


When repairing older tractors, use new Camshafts, which will give the appearance shown in (C). To check if Valve Timing is correct, (Engine cold) set Valve Tappet at .0015 (Cigarette paper). Cylinder head off. Intake valve should just start to open at the Top Dead Center of Exhaust stroke. After piston passes Top Dead Center going down on the Intake stroke the exhaust valve should just close at 5/32" from Top Dead Center. After checking, re-adjust tappets to proper clearance before running engine.

## Valve System

Grind Valve Seat Angle  $45^{\circ}$  degrees. Seat must be square with Valve Guide bore. Seat width dimensions are  $3/64''$  to  $5/64''$ . Finish with Valve Grinding Compound to insure good seat and compression. Rough: Government Grit grade 120 (E); Finish: grade 280 (A).

If Valve Seat exceeds  $5/64''$  on one side, use a  $60^{\circ}$  Valve Seat Reamer, to remove excess valve seat width.



Timing of Valves is accomplished by Camshaft timing. See "Camshaft".

Valve Tappet clearance, engine COLD, is .012, exhaust, .012 intake, obtained by adjusting Valve Tappet.

Valve Clearance in Exhaust Valve Guide is factory toleranced. Intake Valve clearance is .002/.004.

Valve Plunger is .7485/.7495. Valve Plunger Guide is reamed to .750/.751. Clearance should be .0005 to .0025. (Tight slip fit.) (To prevent oil leakage around valve plunger, maintain this clearance.)

Valve Sleeve Gasket should be permatexed or shellacked.

Replace Valve Springs if you can squeeze together with one hand.

## Oil Pump

Oil Pump is a precision gear pump. Fits and tolerances must be held closely to insure good oil supply at essential lubrication points.

Oil Pump Bushing should be reamed to  $7/16''$  (.4373/.4388). The Oil Pump Master Gear Shaft is toleranced at .4363/.4368, which means clearances must be held to .0005 to .0025.

Oil Pump Gears must be a snug fit in the Oil Pump Cap.

To Accomplish:

1. Press Idler Gear Pin into place by starting it in the Crankcase, placing the Idler Gear over it, and pressing it until it is flush with the top surface of the Idler Gear.
2. Place Dowel Pin in Crankcase. Assemble Oil Pump Gears and Oil Seal in Cap. Check that the Gears are flush with surface of Oil Pump Cap with the Gasket in place.
3. Assemble to Crankcase, using a  $9/16''$  socket and speed handle on the Oil Pump Idler Gear Pinion Shaft Nut.
4. After cap is seated, wash out and check by putting oil in large opening and turning speed handle to check pumping action and wash out pump.

Note that the Idler Gear Stud must be checked carefully to see that it is the same height as the gears. Also, be sure to check Oil Pump Gears to be sure they are the same thickness and that they are free of burrs. Never put new gears in an old Cap.

Tolerances of Oil Pump Gears are: Diameter (O.D.) .746 / .747 Thickness, .384/.385.

## TROUBLESHOOTING

### Tractor Engine Fails to Start

Probable causes are, in order of their frequency:

1. Out of Fuel
2. Fuel shut off at sediment bowl
3. Stuck valve
4. Fouled or out of adjustment Spark Plug.
5. Magneto failure
6. Timing failure

Tools needed for this service work: Feeler Gauge, Screwdriver, light Ball Peen Hammer,  $1/2''$  6 pt Socket and Wrench,  $15/16''$  Spark Plug Wrench, can of penetrating oil (may substitute  $1/2$  and  $1/2$  No. 10 Oil and Kerosene).

TO CORRECT:

1. Check Gas Tank, fill if empty.
  2. Check Shut Off Valve at Sediment Bowl, to make sure it is open wide.
  3. Turn engine over slowly by HAND, to see if engine has compression. If engine HAS COMPRESSION,
  4. Remove Spark Plug, check for fouling, burning, wetness, Remove carbon, dry if necessary, reset at .033. If Spark Plug appears to need replacement, replace with Autolite TT-10.
  5. If you DO NOT have COMPRESSION, you usually will have a valve stuck open. The primary symptom is a sudden (usually overnight) loss of compression. Lack of compression due to Ring Trouble is a gradual loss, getting progressively worse, and characterized by oily smoke from the exhaust for some period before actual complete compression loss.
  6. Remove cylinder head. (Observe Gasket. Replace if necessary).
  7. Check to see if there is any bit of carbon on the Valve seat which might be preventing the Valve from completely closing. If so, remove and grind Valve to a good seat if necessary.
  8. If no carbon bits are present, flood the Valve and stem with penetrating oil. Let "soak" a few minutes, flood again. Using a screwdriver in the slot on top of the Valve, begin working the Valve by attempting to rotate the valve. If this is unsuccessful, flood again with penetrating oil, (IMPORTANT: Turn engine over until impulse clicks—to be sure you don't break Cams.) Then tap the Valve lightly with the hammer. Again use the Screwdriver. The Valve will usually break loose in a very short time. Continue to work until it is perfectly free, and rises and falls with the turning over of the engine.
- Chronic cases of Valve sticking can be eliminated by one of the Bronze Valve Guides.
9. Observe the seating and the action of the Valves. If a Valve Grinding Job is indicated, recommend it to the customer at that time. If Valves need replacement, recommend it.
  10. Occasionally a Valve is stuck closed. This is rare, however. The symptoms will show up immediately when you attempt to turn the engine over by HAND. The Engine will "stop dead" at a certain point. Reversing the direction of turn, the

Engine will stop again at the same point in the firing cycle. The procedure is exactly the same as for releasing a Valve that is stuck open. **WARNING:** Never attempt to test for a stuck valve by turning the engine over in any manner except by HAND. Turning an Engine over with a strap, or by forcing, when a Valve is stuck closed will result in fracture of the Crankcase, necessitating replacement.

11. If the Engine has compression, the Spark Plug is in good order, etc., test the spark.

12. The Spark should jump at least 3/16" when tested by putting the end of the Magneto Cable connection this distance from a metal object. (Usually the Cylinder Head).

13. If the Spark is weak, it is usually caused by condensation within the Magneto. Remove the Cap, dry out the Magneto. (You can observe the wetness when the Cap is removed.)

14. Normally, if the Magneto is not firing correctly, routinely replace Coil, Condenser, and points.

15. If it is impractical, or undesirable, to replace all of these parts, observe the Points first, to make sure they are breaking, and are not burned or dirty.

16. If the Points are dirty or wet, clean by using a piece of hard paper. (A piece of paper from a "slick" magazine works well.) Spread the Points by hand, release on the paper, and pull the paper through.

17. Adjust the Points. On Wico Magnetos, the setting is .015: on Bendix-Scintilla, .018.

18. To adjust, release the adjusting screw by turning the locking screw slightly. Make the adjustment by turning the adjusting screw, then lock in place with the lock screw. See separate Magneto instructions. If you replace, remember to lubricate the felt washer on the Wico Magneto. **BE SURE TIMING MARKS ARE LINED UP** when you make this adjustment!

19. If the Spark you get is very red, instead of blue or yellow-white, it is probably the condenser. A bad condenser will usually allow the Engine to start, but the Engine will backfire and spit, and quit. If



there is no spark at all, it is usually the Coil.

20. To replace the Coil, Condenser, or do any other work on the Magneto, it is best to remove the Magneto from the Tractor.

21. To remove, turn the Engine over by hand until the Timing Marks are lined up. DO NOT MOVE THE ENGINE UNTIL YOU HAVE REPLACED THE MAGNETO. When You are ready to replace the Magneto, line the Timing Marks on the Magneto and replace it. The engine will be Timed the same as it was when you removed the magneto.

22. Loosen the Bolts from the bottom mounting, and remove the magneto, pulling straight back (away from engine) so as to not disturb the Timing.

23. If the Magneto is furnishing a strong Spark, and all other factors mentioned are correct, then the difficulty is probably in the timing. See "Timing Model L Engine".

#### UNUSUAL FAILURES

24. Clogged Gas Line: You can usually spot this by observing the carburetor.

25. Air pocket in the Gas line: Occasionally, when a User runs completely out of gas and refills the tank, a "pocket" of air is trapped in the system. If the Engine is not getting gas, observe the Sediment Bowl. If it is full, there is no air pocket. If the Sediment Bowl gas level is down slightly, the air pocket is present. To correct, unscrew the nut that holds the glass bowl enough to break the vacuum in the system. The Bowl will fill, and you have corrected the condition.

26. A build-up of mud or dirt on the Magneto Stop Button, or a bending of the Button which keeps it in contact with the Magneto. This, of course, shorts out the Magneto and allows no sparks to reach the Engine.

27. Very rarely a User forgets to replace the cap on the Magneto connection to the

Spark Plug, and coincidentally the hood will be bent down. This will short the Magneto out also.

28. Carburetor adjustment may cause hard starting, but rarely causes a tractor not to start at all. Usually the tractor will run, even if adjustment is off. See "Carburetor Instructions".

#### ALIGNING FLYWHEELS:

##### Method 1

Dealers who desire to check Fly Wheel Balance should acquire the following items:

- 1 Anderson Balancing Way Size 1-A  
Manufactured by Anderson Brothers  
Mfg., Co., Rockford, Illinois.
- 1 Piece Cold Rolled Steel 3/4" Dia.  
about 3" long weighing eight ounces.

##### To Check Fly Wheel Balance:

1. Remove piston from connecting rod.
2. Put the Fly Wheel Assembly on balancing ways with the connecting rod hanging down.
3. Insert eight ounce weight in wrist pin bearing. This will give the equipoise necessary for good engine operation.

The Crank Bearing produces a light dampening action on the operation and due to this fact good balance depends somewhat on the judgment of the operator.

Give the assembly a slight rolling start in different directions and position. If in your judgment there is a heavy spot, correct this by removing some metal, (preferably by drilling,) from the side of the fly wheel rim.

Not knowing whether this error is in one or both wheels it would be better to divide the metal removed and take some from both.

##### Method 2

If you do not have or do not wish to obtain the Balancing Ways, a field method that is

satisfactory is as follows:

1. Aligning Flywheels by eye as closely as possible, and press in place.
2. Using a machinest Depth Gauge and Square, place it on the flywheels so that the "square" part of the depth gauge is on the machined flat face of the flywheel, and the Gauge part is lying along the outside diameter of the Flywheels, parallel to the centerline of the bore in the flywheel.
3. By inspection, determine if the flywheels are aligned. If not, move by some convenient method the flywheels until this measurement shows that the flywheels are aligned. This method is close enough for all practical purposes.

### Method 3

If you have a Reel Mower Grinder, most models have centering spindles.

Place the Drive Pinion Shaft and the Timing Pinion Shaft in the centering spindles.

Clamp or otherwise attach a piece of flat steel to the Grinder frame, in such a manner as to allow you to place an "Indicator Dial" on the steel. An Indicator Dial is one that will show out-of-roundness in thousandths.

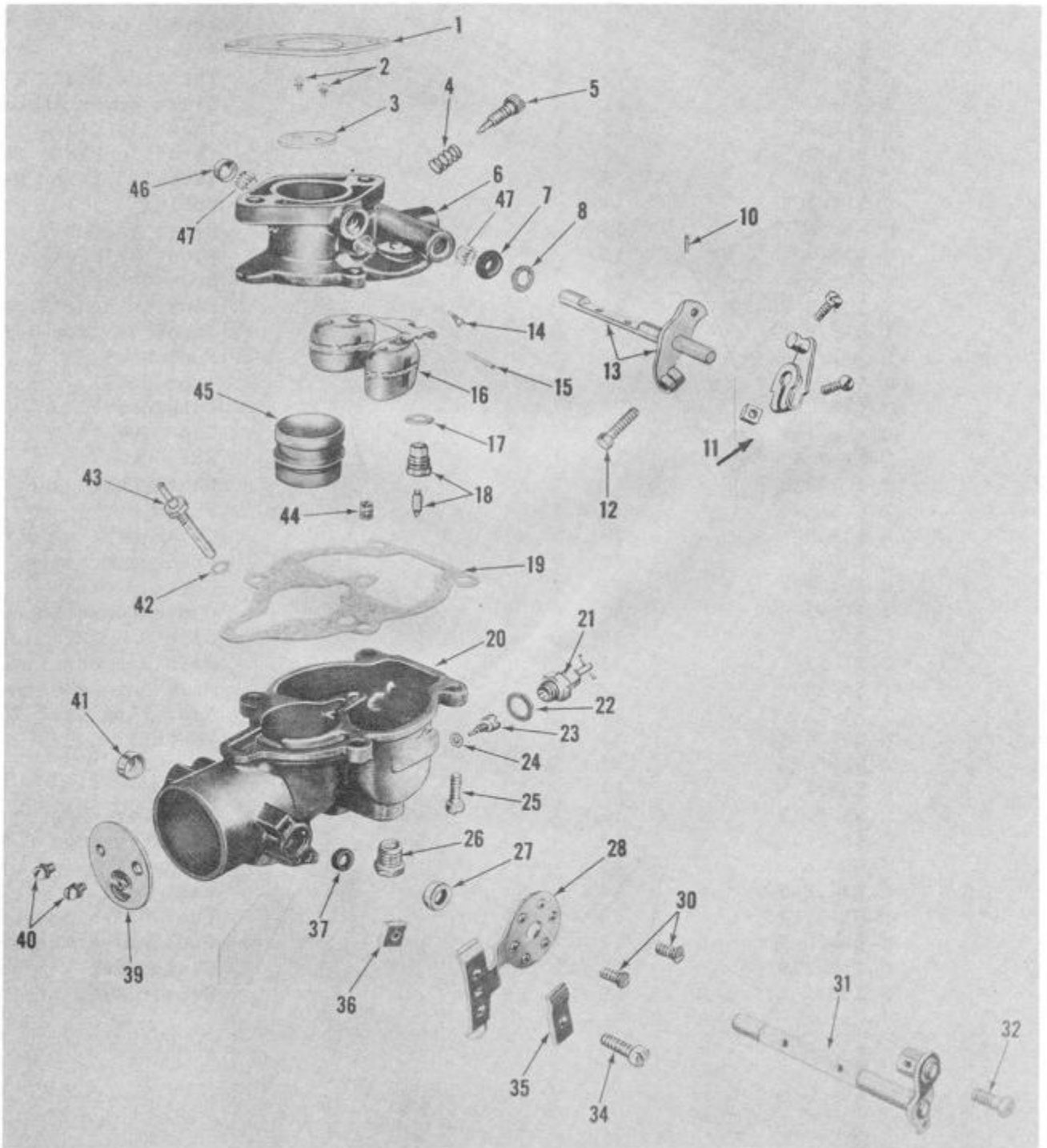
Then, by putting the pointer of the Indicator in contact with the OD of the Flywheel, and rotating the flywheel assembly slowly in the Centers, you can determine quickly if the flywheels are out of alignment or out of balance.

# GRAVELY-ZENITH 68-7

## CARBURETOR NO.13246 (GRAVELY NO.10878 A1)

### SERVICE PARTS LIST

Effective: April 1967



GRAVELY ZENITH 68-7  
No. 13246 No. 10 878A1

PARTS LIST

<u>Quan.</u>	<u>Part No.</u>	<u>Photo No.</u>	<u>Name</u>
1	L-301-B	1	Gasket
1	B 12-13246	6	Throttle Body Assembly
2	C-9-75	47	Throttle Shaft Bushing
1	T-48 -9	7	Rubber Seal
1	T-52-57	8	Washer
1	C-131-38	46	Plug, Shaft Hole
1	T-21-S-10	48	Nut
1	T-8-S-10-11	49	Screw
1	T-8-S-8-7	51	Screw
1	C 29-1603	13	(106-13 A F) Throttle Shaft & Lever Assy.
1	C-24-7 H x 2	11	Clamp Lever Assembly
1	C-21-176	3	Throttle Plate
2	T-314-B-5-4	2	Throttle Plate Screw
1	C-46-6	5	Idle Adjusting Needle
1	C-111-205	4	Spring
1	C-85-28	16	Float Assembly
1	C-120-4	15	Float Axle
1	C-142-68	19	Body Gasket
4	T-301-S-10-10	25	Bowl to Body Screw
1	T-8-S-8-12	12	Throttle Stop Screw
1	B-3-121-A-1	20	Fuel Bowl
1	T-57-4	37	Feet Seal
1	C-131-4x2	27	Retainer
1	CR-37-1x1	41	Cup Plug
1	T-21-S-8	36	Nut
1	C-108-238-8	31	Choke Shaft & Lever Assy.
1	T-8-S-8-6	32 & 34	Screw
1	C-109-60	28	Choke Bracket & Clip Assy.
2	C-140-58	30	Bracket Mounting Screw
1	C-101-79	39	Choke Plate
2	T-315-B-5-4	40	Choke Plate Screws
1	C-110-7	35	Clip
1	C-71-21	21	Main Jet Adjustment
1	T-56-23	22	Main Jet Adjustment Washer
1	T-91-23	26	1/8" Plug (use 701-P)
1	B 38-74-18	45	Venturi
1	C-52-7-25	23	Main Jet
1	T-56-24	24	Washer
1	C-55-6-12	14	Idle Jet
1	C-66-114-40	43	Discharge Jet
1	T-56-48	42	Washer
1	C-77-18-20	44	Wall Vent
1	C-81-17-35	18	Fuel Valve Assy.
1	T-56-20	17	Fuel Valve Washer
	C-181-329	NS	Gasket Set
	K 2033	NS	Repair Kit

# GRAVELLY Zenith 68 Series Carburetor

## ZENITH 68 SERIES CARBURETOR FOR GRAVELLY TRACTORS

The Zenith 68 Series carburetors are of updraft single venturi design. These carburetors are "balanced" and "sealed", and the semi-concentric fuel bowl allows operation to quite extreme angles without flooding or starving.

### FUEL SUPPLY SYSTEM (See Fig. 1)

The fuel supply system is made up of the threaded fuel inlet, the fuel valve seat, fuel valve needle, float and fuel bowl.

The fuel supply line is connected to the threaded inlet. The fuel travels through the fuel valve seat and passes around the fuel valve and into the fuel bowl. The level of the fuel in the fuel chamber is regulated by the float through its control of the fuel valve. The fuel valve does not open and close alternately but assumes an opening, regulated by the float, sufficient to maintain a proper level in the fuel chamber equal to the demand of the engine according to its speed and load.

The inside bowl vent as illustrated by the passage originating in the air intake and continuing through to the fuel bowl, is a method of venting the fuel bowl to maintain proper air fuel mixtures even though the air cleaner may become restricted. This balancing is frequently referred to as an "inside bowl vent".

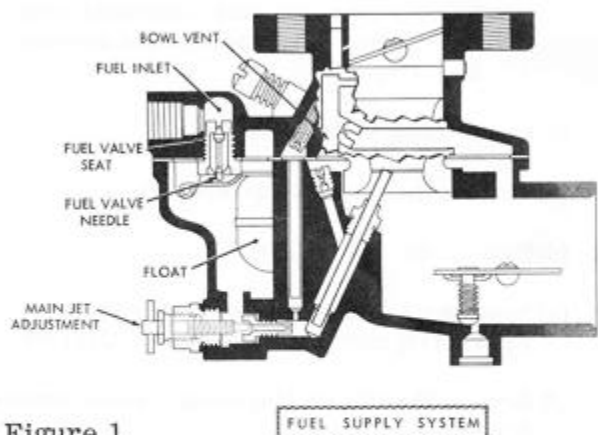


Figure 1

### IDLE SYSTEM (See Fig. 2)

The idle system consists of two idle discharge holes, idle air passage, idle adjusting needle, idle jet, and fuel pick-up passage.

The fuel for idle is supplied through the main jet to a well

directly below the main discharge jet. The pick-up passage is connected to this well by a restricted drilling at the bottom of this passage. The fuel travels through this channel to the idle jet calibration. The air for the idle mixture originates back of (or from behind) the main venturi. The position of the idle adjusting needle (normally one turn from its seat) in this passage controls the suction on the idle jet and thereby the idle mixture. Turning the needle in closer to its seat results in a greater suction with a smaller amount of air and therefore a richer mixture. Turning the needle out away from its seat increases the amount of air and reduces the suction, and a leaner mixture is delivered. The fuel is atomized and mixed with the air in the passage leading to the discharge holes and enters the air stream at this point.

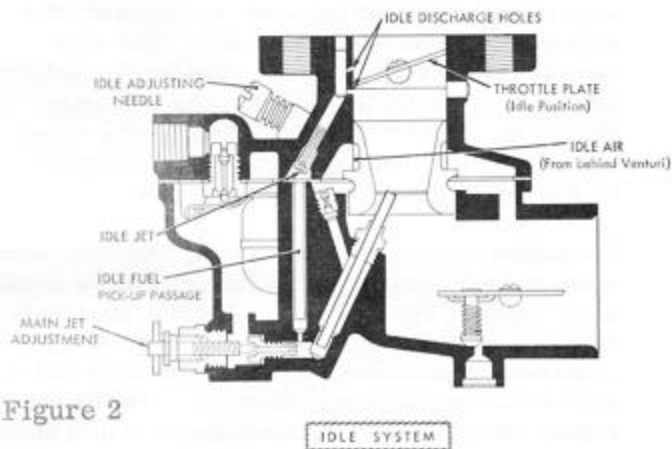


Figure 2

### HIGH SPEED SYSTEM (See Fig. 3)

The high speed system controls the fuel mixture at part throttle speeds and at wide open throttle. This system consists of a venturi, controlling the maximum volume of air admitted into the engine; the main jet, which regulates the flow of fuel from the float chamber to the main discharge jet; the well vent, which maintains uniform mixture ratio under changing suction and engine speeds; and a main discharge jet, which delivers the fuel into the air stream.

The main jet controls the fuel delivery during the part throttle range from about one-quarter to full throttle opening. A main jet adjustment permits a limited control of the main jet fuel. Ordinarily an adjustment of 2-1/4 turns from its seat will give proper mixture. To maintain a proper mixture ration a small amount of air is admitted through the well vent into the discharge jet through the air bleed holes in the discharge jet at a point below the level of fuel in the metering well.

At high speeds the fuel flows from the fuel chamber

through the main jet and into the main discharge jet where it is mixed with air admitted by the well vent, and the air-fuel mixture is then discharged into the air stream of the carburetor.

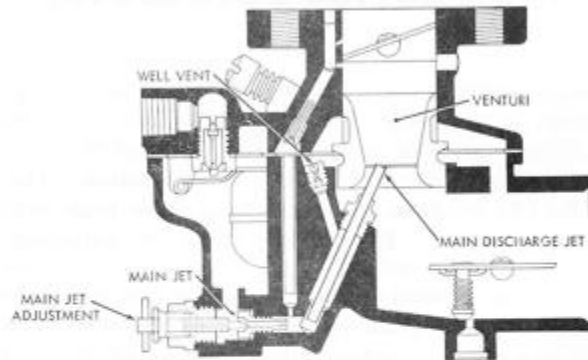


Figure 3

HIGH SPEED SYSTEM  
CHOKE SYSTEM  
(See Fig. 4)

The choke system consists of a valve mounted on a shaft located in the air entrance and operated externally by a lever mounted on the shaft. The choke valve is used to restrict the air entering the carburetor. This increases the suction on the jets when starting the engine. The choke valve is of a "semi-Automatic" type, having a poppet valve incorporated in its design, which is controlled by a spring.

The poppet valve opens automatically when the engine starts and admits air to avoid over-choking or flooding of the engine. The mixture required for starting is considerably richer than that needed to develop power at normal temperatures. As the engine fires and speed and suction are increased, the mixture ratio must be rapidly reduced. This change is accomplished through adjustment of the choke valve and the automatic opening of the poppet valve to admit more air when the engine fires.

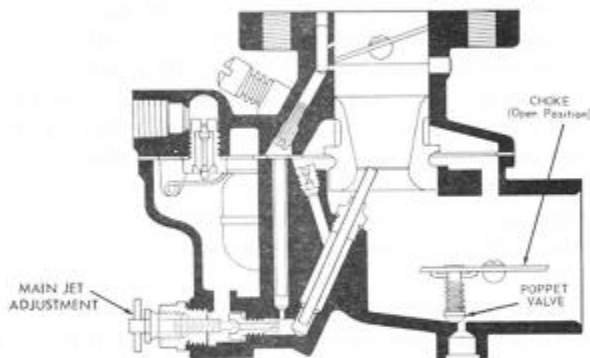


Figure 4

CHOKE SYSTEM  
SERVICE AND REPAIR PROCEDURE

#### A. DISASSEMBLED VIEW

- (a) The disassembled view will identify the various component parts and show their relation to

assembly. Use the disassembled view with the identifying part numbers to identify and locate parts when performing the disassembly and reassembly operations.

#### B. SELECTION OF TOOLS AND REPAIR PARTS KIT

- (a) The use of the proper Zenith tools and the proper repair kit is essential if the best service and repair procedure is to be performed on the carburetor.

##### (b) Zenith Special Tools

C-161-83	Main Jet Wrench
C-161-10	Plug Wrench
C-161-9	Main Discharge Wrench
C-161-82	Fuel Valve Seat Wrench
C-161-25	Shaft Nut Tool
C-161-72-1	Bushing Driver

- (c) Repair Kit, part number K12108 is required to repair carburetor assembly 12108.

#### C. SEPARATE CARBURETOR BODIES

- (a) Remove the four assembly screws (25) using a screwdriver.
- (b) Separate the throttle body (6) from the fuel bowl assembly (20).

#### D. DISASSEMBLE THROTTLE BODY

- (a) Remove float axle as follows:

- (1) Press screwdriver against float axle (15) at slotted side of float hinge bracket and force through hinge bracket.
- (2) Remove float axle (15) completely with fingers from opposite side and remove float (16).

- (b) Remove fuel valve needle (18).

- (c) Remove the assembly gasket (19).

- (d) Remove the venturi (45).

- (e) Remove the fuel valve seat (18) and fibre washer (17) using Zenith Tool No. C161-82.

- (f) Remove the idle jet (14) using a small screwdriver.

- (g) Remove the idle adjusting needle (5) and friction spring (4).

- (h) Remove the throttle plate (3), screws (2), shaft and stop lever assembly (13), as follows:

- (1) Unscrew throttle stop screw (12) until

threaded end is flush with lever (11)

- (2) Make match marks with file on throttle body (6) and all levers to act as a guide to assemble these parts in the same position as removed.
- (3) File off the riveted or peened end of the throttle plate screws (2).

NOTE: When such screws are riveted or peened the threaded end of the two screws must be filed flat before removal to avoid breakage or stripping of threads in the shaft. In some cases it may be necessary to use a small (1/4") round file and cut slightly below the surface of the shaft because of a slight counter bore around the screw hole.

BE SURE TO AVOID STRIKING AND CUTTING THE SIDE OF THE THROTTLE BODY BORE OR THE THROTTLE PLATE WHEN FILING THE SCREWS.

- (4) Remove the screws (2) and pull out the throttle plate (3).
  - (5) Remove the throttle shaft and stop lever assembly (3).
- (I) Remove the throttle shaft packing (8) and packing retainer (9) from the throttle body shaft as follows:
- (1) Screw a 5/16" fine thread taper tap into packing retainer (9) until it is firmly seated.
  - (2) Insert long punch or rod through opposite shaft hole and drive punch against the end of the tap until retainer (9) is free of the body. (Repeat operation for other packing and retainer.)

NOTE: Do not disassemble the throttle plate, (3), throttle shaft and stop lever assembly (13), throttle packing (8), and packing retainer (9) from the throttle body (6) unless the throttle shaft is bent or otherwise damaged or unless there is damage to any of the other component parts of the throttle assembly.

#### E. DISASSEMBLE FUEL BOWL BODY

- (a) Remove the main jet adjusting needle assembly (21) and fibre washer (22) using a 1/2" wrench.
- (b) Remove the drain plug (hex) (26) from bottom of fuel bowl (20), using Zenith Tool No. C-161-10.
- (c) Remove main jet (23) and fibre washer (24) with Zenith Tool No. C161-83.
- (d) Remove main discharge jet (43) and fibre washer (42) from center of large opening in ma-

chined surface of the fuel bowl (20) with Zenith Tool No. C161-9.

- (e) Remove well vent jet (44) from center of large opening in machined surface of the fuel bowl (20) with a small screwdriver.

#### (f) Disassemble choke as follows:

- (1) Make match marks with a file on air intake body (20) and lever (31) to act as a guide to reassemble these parts in same position as removed.
- (2) Remove the choke shaft thrust washer (49) and taper pin (41).
- (3) Remove the choke plate screws (40) and remove the choke shaft (31) and choke plate (39).

NOTE: This carburetor employs choke shaft packing washers (37) and packing washer retainers (27) in the choke shaft holes around the choke shaft. The disassembly of these packing washers and retainers should be performed in the same manner as the disassembly of the throttle shaft packing washers and retainers which is described in detail in the disassembly of the throttle body.

NOTE: DO NOT DISASSEMBLE THE CHOKE LEVER AND SHAFT (31) AND PLATE (39) UNLESS THERE IS DAMAGE TO ANY ONE OF THE ABOVE MENTIONED PARTS OR DAMAGE TO ANY OF THE OTHER COMPONENT PARTS OF THE CHOKE ASSEMBLY.

#### Cleaning and Inspection of Parts

##### A. CLEANING PARTS

- (a) Clean all metal parts thoroughly with cleaning solution and rinse in solvent.
- (b) Blow out all passages in the air intake and fuel bowl casting (20) and throttle body (6).

NOTE: Be sure all carbon deposits have been removed from throttle bore and idle discharge holes. It is advisable to reverse flow of compressed air in all passages to insure that all dirt has been removed. Never use a wire or drill to clean out jets.

##### B. INSPECTION OF PARTS

- (a) Float Assembly. Replace float assembly (16) if loaded with gasoline, damaged, or if float axle bearing is worn excessively. Inspect top side of float lever for wear where it contacts fuel valve needle.

NOTE: Such wear can affect the float level.

- (b) Float Axle. Replace if any wear can be visually detected on the bearing surface.
- (c) Fuel Valve Seat and Needle Assembly. Always replace fuel valve seat and needle (18) because both parts wear and may cause improper float level.
- (d) Idling Adjustment Needle and Spring. Inspect point of needle (5). This must be smooth and free of ridges.
- (e) Throttle Plate. Inspect plate (3) for burrs or damaged edges. Never clean a throttle plate with a buffing wheel or sharp instrument.
- (f) Choke Plate (39). Inspect for bends, burrs or damaged edges.
- (g) Choke Shaft. Check bearing surfaces for wear; see that shaft (31) is straight.
- (h) Gaskets: Replace all gaskets and fibre washers every time the carburetor is disassembled.
- (i) Throttle Shaft. Replace if throttle shaft (48) shows evidence of wear on the bearing surfaces.

#### REASSEMBLY

##### A. FUEL BOWL BODY

###### (a) Choke Assembly

- (1) Install the choke shaft packing (37) and retainers (27) in fuel bowl body (20) as follows. Use bushing driver tool Zenith C161-72-1.
- (2) Assemble packing (37) and retainer (27) and place completed assembly on bushing driver tool with packing facing small end of tool.
- (3) Insert small end of tool into choke shaft hole, start retainer (27) into counter bore in body (20) and lightly drive retainer (27) into body (20) until it is flush with machined surface.
- (4) Insert choke shaft and lever (31) into air intake (20).
- (5) Insert choke plate (39) into air intake (20).

NOTE: Be sure the choke plate (39) is located in the same position in the air intake (20) as regards the poppet valve as when it was disassembled.

- (6) Install choke plate screws (40) using a

small screwdriver.

- (7) Install the choke shaft thrust washer (49) and taper pin (41).

NOTE: Use the "Match Marks" put on the choke lever (31) and air intake body (20) during disassembly to properly align the choke assembly during reassembly.

- (b) Install main discharge jet (43) and fibre washer (42) in fuel bowl (20) and tighten firmly with Zenith Tool No. C161-9.
- (c) Install well vent jet (44) in fuel bowl (20) and tighten with a small screwdriver.
- (d) Install main jet (23) and fibre washer (24) using Zenith Tool No. C161-83.
- (e) Install the drain plug (hex) in threaded passage bottom of fuel bowl using Zenith Tool C161-10 Wrench.
- (f) Install main jet adjustment (21) seat lightly and back out 2-1/4 turns.

##### B. THROTTLE BODY

- (a) Install the two new throttle shaft packings (8) and retainers (9) in throttle body (6) as follows. Use bushing driver tool Zenith C161-72-1.
  - (1) Assemble packing (8) and retainer (9) and place completed assembly on bushing driver tool with packing facing small end of tool.
  - (2) Insert small end of tool into throttle shaft hole, start retainer (9) into counter-bore in body (6) and lightly drive retainer (9) into body (6) until it is flush with machined surface.

NOTE: The packing retainer (9) must be flush with machined surface or slightly below to avoid striking throttle lever (11).

- (b) Install the throttle shaft and stop lever assembly (13), throttle plate (3), screws (2) as follows:
  - (1) Insert the throttle shaft and stop lever assembly (13) in throttle body (6).
  - (2) Rotate throttle shaft (48) to wide open position, insert throttle plate (3) and rotate to closed position holding the plate in position with fingers.
  - (3) Start throttle plate screws (2) and tighten with small screwdriver, being sure that the throttle plate (3) is properly centered in the throttle body bore.



NOTE: The screw holes in the throttle plate are off center. Start the side of the throttle plate with the shortest distance between the screw holes and beveled edge into the shaft first. The throttle plates are made with two opposite edges beveled to fit the throttle body bore when the plate is closed. The throttle plate will not close tightly if installed upside down. To properly center the plate in the throttle body bore, the screws should be started in the shaft and then with the plate closed, it should be tapped on the mounting flange side. Pressure on the plate must be maintained with the finger until the screws are tightened. When properly installed, the side of the throttle plate farthest away from the mounting flange will be aligned with the idle discharge holes when the plate is closed.

- (c) Install idle adjusting needle (5) and friction spring (4) in threaded passage on side of throttle body. Seat lightly with screwdriver and back out one full turn.
- (d) Install idle jet (4).
- (e) Install fuel valve seat (18) and fibre washer (17) using Zenith Tool No. C161-82.
- (f) Place new throttle body to fuel bowl gasket (19) on machined surface of fuel bowl cover (6), making sure venturi flange is set in throttle body recess below gasket.
- (g) Install fuel valve needle (18) in seat (18) followed by float (16) and float axle (15).

SEE FIG. 5 The "A" dimension should be  $1 \frac{5}{32}$ " plus or minus  $\frac{3}{64}$ ".

- (h) Float Level. Check position of float assembly for correct measurement to obtain proper float level using depth gauge.

NOTE: Do not bend, twist or apply pressure on the float bodies.

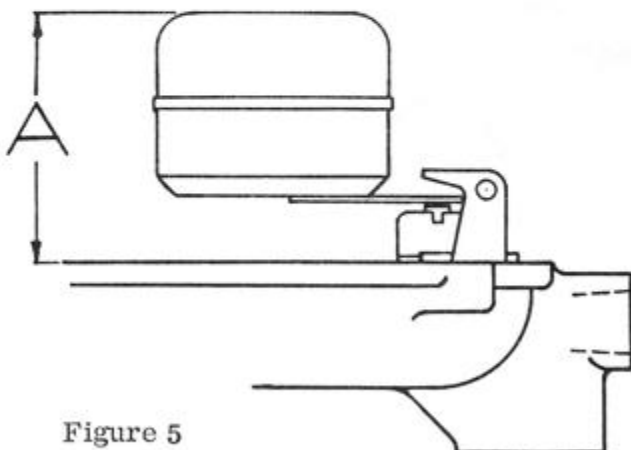


Figure 5

- (1) With bowl cover assembly (6) in an inverted position, viewed from free end of float (16) the float bodies must be centered and at right angles to the machined surfaces. The float setting is measured from the machined surface (no gasket) of cover to top side of float bodies at highest point.
- (2) Bending Float Lever. To increase or decrease distance between float body and machined surface use long nosed pliers and bend lever close to float body.

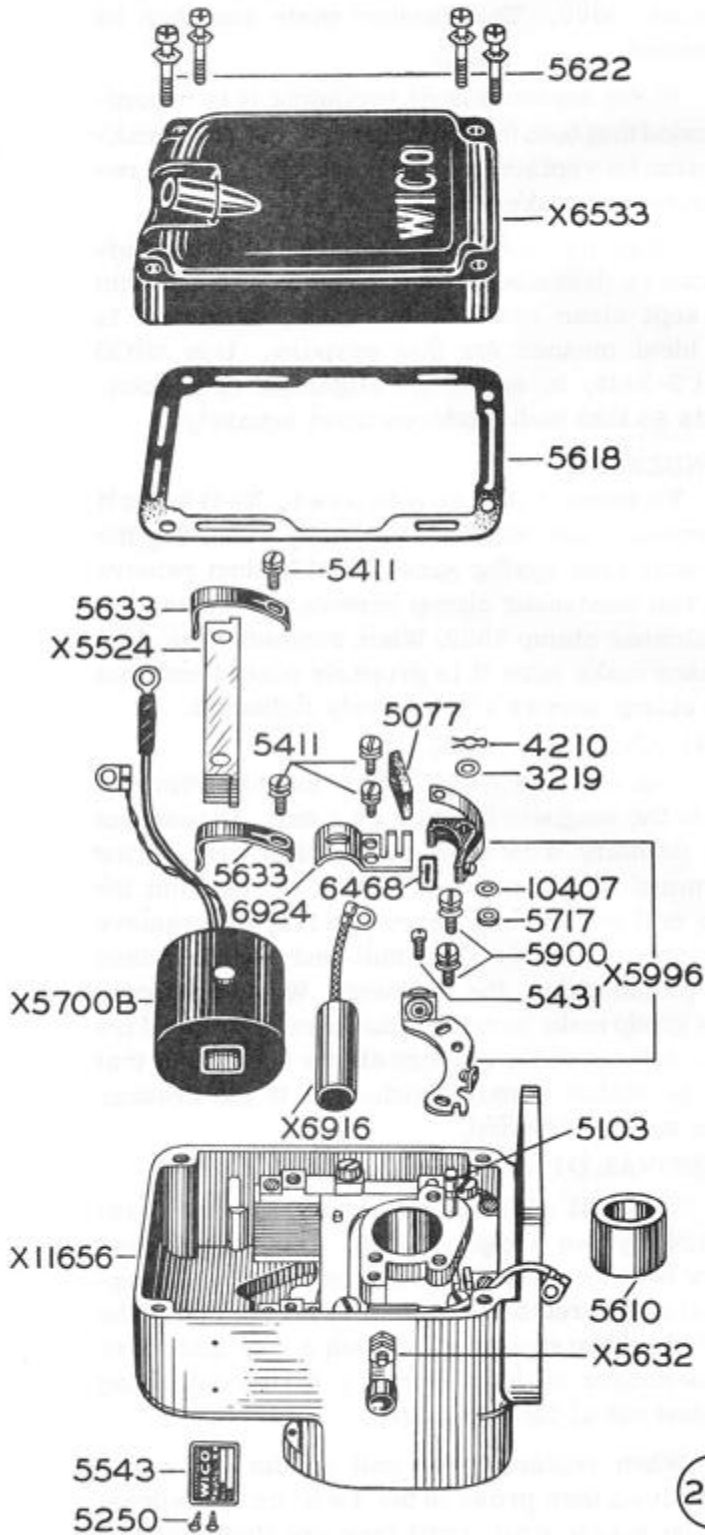
NOTE: Replace with new float if position is off more than  $\frac{1}{16}$ ".

- (i) Insert venturi (45) in throttle body bore, large opening first. Making sure venturi flange is set in throttle body recess below assembly gasket.

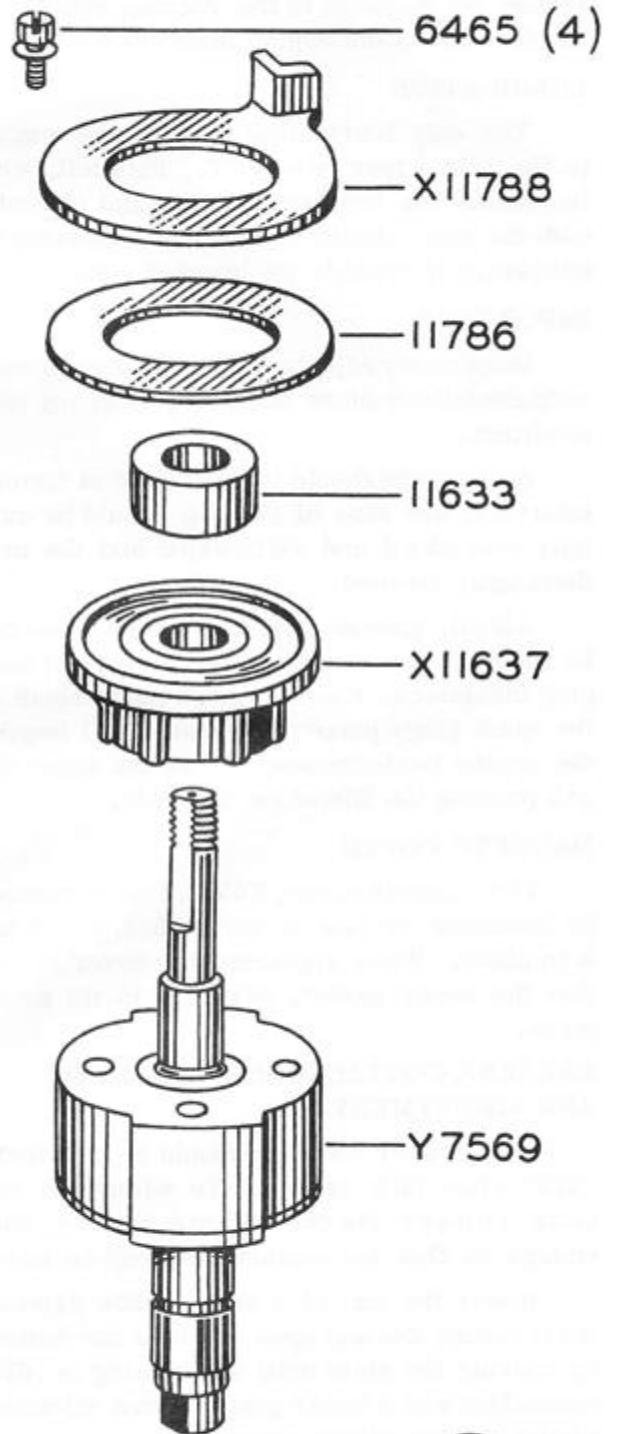
#### C. ASSEMBLE CARBURETOR BODIES

- (a) Assemble the two completed bodies (6 and 20) and four screws (25) and tighten screws evenly and firmly.
- (b) Hold the throttle lever (11) in a closed position and turn the throttle stop screw (12) in until it just contacts the stop on body (6), then turn screw (12) in  $1\frac{1}{2}$  additional turns.

# GRAVELY-WICO MAGNETO SPECIFICATION XH-2533 Service Parts List



262



263

# SERVICE INSTRUCTIONS For Wico Magneto Specification XH-2533

## TIMING

The magneto is properly timed to the engine at the factory. If it becomes necessary to retune the magneto to the engine, refer to the instructions in the engine instruction book.

## LUBRICATION

The only lubricating point in the magneto is the cam wiper felt, 5077. This felt, which lubricates the breaker arm at point of contact with the cam, should be replaced whenever it is necessary to replace the breaker contacts.

## IMPORTANT

Incorrectly adjusted spark plug gaps cause magneto failure more frequently than any other condition.

Spark plugs should be inspected at frequent intervals, the size of the gap should be carefully checked and adjusted and the plugs thoroughly cleaned.

All oil, grease, and dirt should frequently be wiped off the magneto, lead wires, and spark plug insulators. Keeping these parts clean and the spark plugs properly adjusted will improve the engine performance and at the same time will prolong the life of the magneto.

## MAGNETO COVER

The magneto cover, X6533, can be removed by loosening the four screws, 5622, which hold it in place. When replacing the cover be sure that the cover gasket, 5618, is in its proper place.

## BREAKER CONTACTS-REPLACEMENT AND ADJUSTMENT

The breaker contacts should be adjusted to .015" when fully opened. To adjust the contacts, loosen the two clamp screws, 5900, enough so that the contact plate can be moved.

Insert the end of a small screw driver in the adjusting slot and open or close the contacts by moving the plate until the opening is .015", measuring with a feeler gauge of that thickness, tighten the two clamp screws.

To replace the contacts remove the breaker, the spring clamp screw, 6017, the breaker arm lock and washer, 3219, and 4210, then lift the

breaker arm from its pivot. Remove the spacing washer, 5717, and the two breaker plate clamp screws, 5900. The breaker plate can then be removed.

If the contacts need replacing it is recommended that both the fixed contact and the breaker arm be replaced at the same time, using replacement breaker set X5996.

After assembly the contacts should be adjusted as described above. The contacts should be kept clean at all times. Lacquer thinner is an ideal cleaner for this purpose. Use WICO tool S-5449, to adjust the alignment of the contacts so that both surfaces meet squarely.

## CONDENSER

To remove the condenser, X5614, first disconnect the condenser lead by removing the breaker arm spring screw, 6017, then remove the two condenser clamp screws, 5411, and the condenser clamp 5532. When replacing the condenser make sure it is properly placed and that the clamp screws are securely tightened.

## COIL AND COIL CORE

The coil and coil core must be removed from the magneto housing as a unit. Disconnect the primary wire from the breaker arm spring terminal by removing screw, 6017, take out the two coil core clamp screws, 5411, and remove the clamps, 5633. The coil and core can then be pulled from the housing. When replacing this group make sure that the bare primary wire is connected under the core clamp screw and that the insulated wire is connected to the breaker arm spring terminal.

## REMOVAL OF COIL FROM CORE

The coil X5700, is held tight on the core, X5524, by two wedges, 10383. It will be necessary to press against the coil core with considerable force to remove it from the coil. The coil should be supported in such a way that there is no danger of the primary of the coil being pushed out of the secondary.

When replacing the coil on the coil core, slide it on then press in the two coil wedges, one on each end, until they are flush with the primary of the coil.

<u>Part No.</u>	<u>No. Req'd.</u>	<u>Part Name</u>
M-42XA	1	Drive Flange Spacing Washer .....
M-55XA	2	Ground Stud Lockwasher .....
A-179X	1	Trip Arm .. .....
15-186	1	Drive Spring .....
A-243X	1	Snap Ring .....
IXA-256	1	Ground Stud Washer (steel) .....
16-583	1	Drive cup Spacing Washer .....
2122	1	Driven Flange Spacer .....
IVA-583	1	Drive Cup Spacing Washer .....
X2286	1	Driven Flange Group .....
2288	1	Drive Spring Retainer .....
3219	1	Breaker Arm Pivot Washer.....
3230	2	Ground Stud Nut .....
3945	1	Ground Stud .....
4210	1	Breaker Arm Lock .....
5077	1	Cam Wiper Felt .....
5250	2	Name Plate Screw .....
5411	2	Condenser Clamp Screw (Sems) .....
5411	2	Coil Core Clamp Screw (Sems).....
5411	1	Impulse Dust Cover Screw (Sems) .....
5431	1	Breaker Spring Clamp Screw.....
X5524	1	Coil Core Group .....
5543	1	Name Plate .....
5603	1	Breaker Arm Pivot .....
5610	1	Breaker Plate Bushing .....
5618	1	Cover Gasket (Inc. in X6533).....
5622	4	Cover Screw (Sems).....
X5632	1	Stop Button Group .....
5633	2	Coil Core Clamp .....
X5700B	1	Coil Group .....
5717	1	Breaker Point Aligning Washer.....
X5750	1	Ground Connection Unit.....
X5757	1	Ground Lead Group .....
5900	2	Fixed Contact Clamp Screw (Sems).....
X5996	1	Breaker Contact Set.....
6230	1	Impulse Lock Nut .....
6465	4	Impulse Stop Clamp Screw (Sems).....
X6533	1	Cover Unit .....
6693	1	Impulse Dust Cover Gasket .....
6694	1	Impulse Dust Cover Ring .....
6732	1	Coil Contact Spring .....
X6916	1	Condenser.....
6924	1	Condenser Clamp .....
X7444	1	Dust Cover Unit .....
7446	1	Drive Cup .....

<u>Part No.</u>	<u>No. Req'd.</u>	<u>Part Name</u>
7447	1	Impulse Dust Cover .....
Y7569	1	Rotor .....
9820	1	Ground Stud Insulating Lock.....
10407	1	Breaker Point Aligning Washer (thin).....
11633	1	Impulse Spacer .....
X11637	1	Bearings Cage Group .....
X11650	1	Impulse Coupling Unit .....
X11656	1	Housing Group .....
11689	1	Rotor Bearing (Inc. in X11637).....
11786	1	Impulse Stop Gasket (Inc. in X11788).....
X11788	1	Impulse Stop Group .....
11874	1	Ground Stud Insulator .....



# LT TRACTOR

## ILLUSTRATED PARTS LIST



To continue its program of quality and design improvement, the manufacturer reserves the right to change specifications, designs or prices without notice and without incurring obligation.

TRACTORS WITH MANUFACTURING NUMBERS  
(See Name Plate) A-1 through 2M 51800

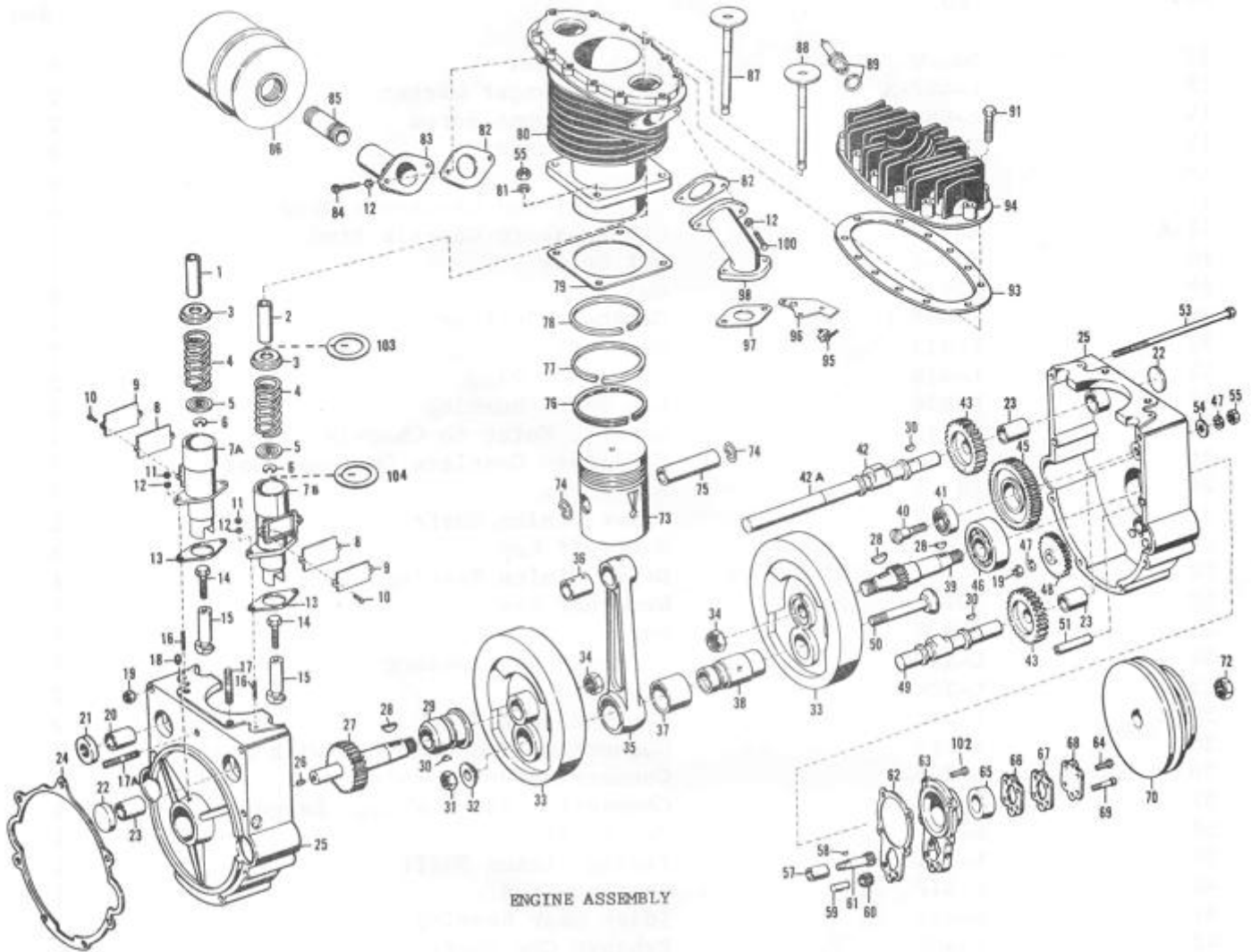


1 GRAVELLY LANE      DUNBAR      WEST VIRGINIA 25064  
*A Division of Studebaker Corporation*

## MAJOR BEARING CHANGES IN TRACTOR CHASSIS

Beginning with tractor Mfg. No. I-11553, the rear bearing on L-521 worm shaft and axle bearings will have a smaller diameter Timken Roller Bearing. The following parts will be affected:

<u>OLD PART NO.</u>	<u>DESCRIPTION</u>	<u>NEW PART NO.</u>
L-201	Chassis Casting	10-388 PI
L-522-C	Rear Worm Shaft Bearing Cone Only	10-389 AI
L-522-R	Rear Worm Shaft Bearing Race Only	10-390 PI
L-611-B	Axle	10-377 PI
L-203-E	Axle Housing	10-380 PI
6728	Axle Housing, Two Speed	10-381 PI
RB-110-R	Axle Bearing Race	9245 PI
RB-110-C	Axle Bearing Cone	9246 AI
7106	Shim .020"	10-382 PI
7107	Shim .005"	10-383 PI
7103	Bearing Cap Gasket	10-384 PI
L-204-E	Bearing Cap	10-379 PI



Item No.	Part No.	Description	Quan. Req'd.
1	L-881-X	Valve Guide Bronze	1
2	L-881-N	Valve Guide, Cast Iron	1
3	L-882	Valve Spring Locator Sleeve	2
4	L-312	Valve Spring	2
5	5741	Valve Spring Cap	2
6	5742	Valve Spring Cap Key	2
7-A	L-403-A	Valve Spring Plunger Guide & Cover Ex.Side	1
7-B	L-403-B	Valve Spring Plunger Guide & Cover w/keyway	1
8	L-879	Valve Cover Gasket	2
9	L-878	Valve Cover Cap	2
10	101-S	Screw	4
11	202-N	Nut	4

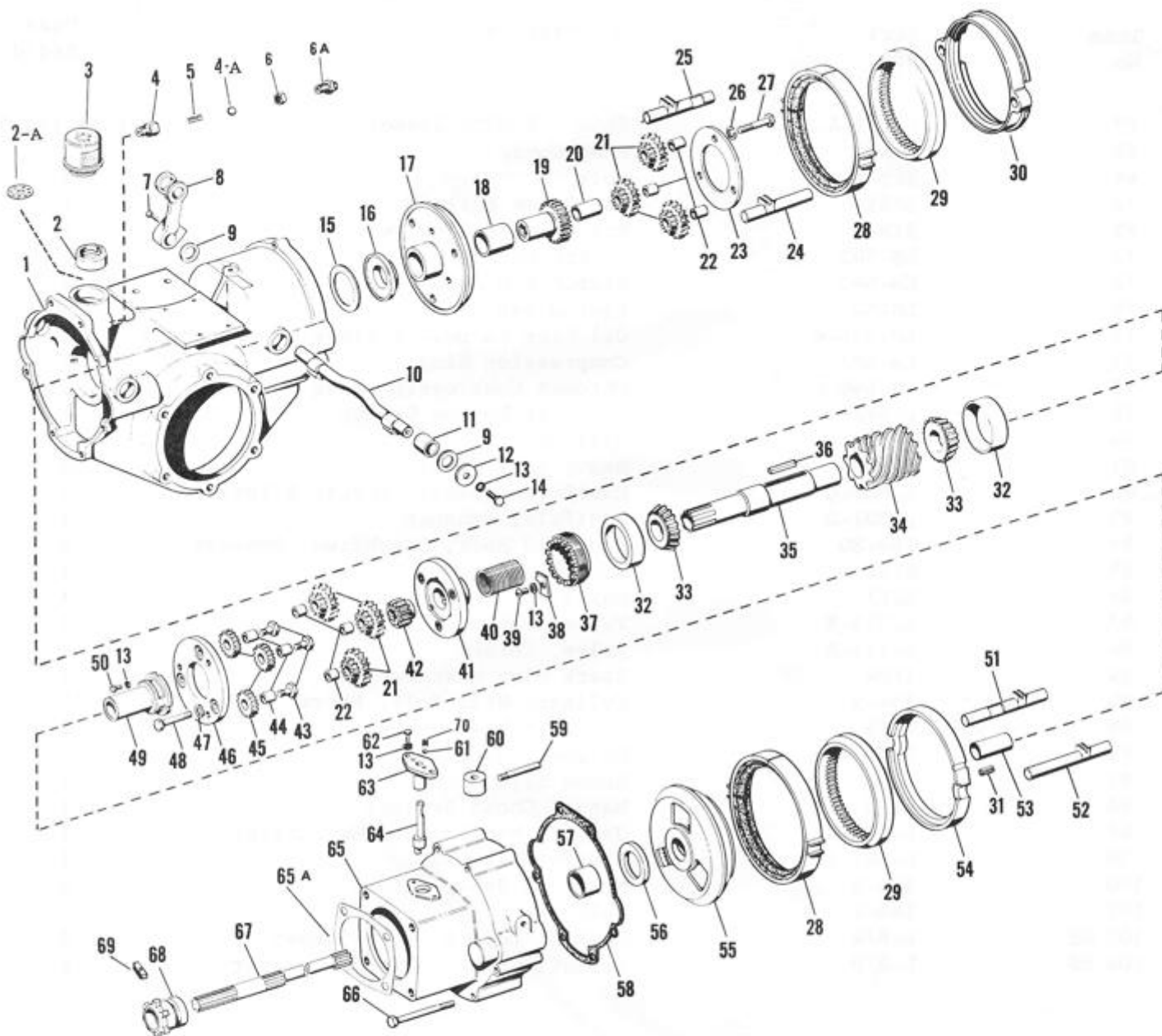


ENGINE ASSEMBLY Con't.

Item No.	Part No.	Description	Quan. Req'd.
12	303-W	Lock Washer	8
13	L-407-A	Valve Plunger Gasket	2
14	L-880	Valve Tappet Screw	2
15	L-404	Valve Plunger	2
16	L-405	Plunger Guide Stud	4
17	L-304	Cylinder and Crankcase Stud	4
17-A	L-303	Crankcase to Chassis Stud	1
18	803-A	Set Screw	1
19	220-N	Nut	3
20	L-406-I	Camshaft Bushing	1
21	L-412	Camshaft Oil Seal	1
22	L-414	Expansion Plug	3
23	L-426	Cam Shaft Bushing	3
24	L-210	Gasket, Motor to Chassis	1
25	L-101-2	Crankcase Complete (Matched Set)	1
26	801-A	Set Screw	1
27	L-109	Drive Pinion Shaft	1
28	514-K	Woodruff Key	3
29	L-117	Drive Pinion Bearing	1
30	503-K	Woodruff Key	3
31	210-N	Nut	1
32	L-107	Spreader Bolt Washer	1
33	L-104	Flywheel	2
34	L-112	Flywheel Nut	2
35	L-863	Connecting Rod Complete with Bushing	1
36	L-306-A	Connecting Rod Bushing	1
37	L-306-B	Connecting Rod Bushing, Large	1
38	L-105	Crank Pin	1
39	L-110	Timing Pinion Shaft	1
40	L-417	Bearing Stud	1
41	L-416	Idler Gear Bearing	1
42	L-402	Exhaust Cam Shaft	1
42-A	L-810-A	Camshaft Extension	1
43	L-413	Camshaft Gear	2
45	L-415	Idler Gear	1
46	L-115	Timing Pinion Bearing	1
47	305-W	Lock Washer	2
48	L-419-A	Oil Pump Drive Gear	1
49	L-424	Intake Cam Shaft	1
50	L-106	Spreader Bolt	1
51	L-120	Crankcase Dowel	2
53	L-116	Crankcase Bolt	8
54	403-W	Flat Washer	1
55	206-N	Nut	5
57	L-420-B	Oil Pump Bushing	1
58	507-K	Woodruff Key	1
59	L-855	Idler Gear Pin	1
60	L-854	Idler Gear	1
61	L-853	Master Gear	1
62	L-125	Bearing Cap Gasket	1
63	L-850	Bearing and Pump Cap	1
64	165-S	Bolt	3
65	L-126-A	Oil Seal	1
66	L-852	Gasket	1

## ENGINE ASSEMBLY Con't.

Item No.	Part No.	Description	Quan. Req'd.
67	L-852-A	Shim (.005) Gasket	( as req.)
68	L-851	Pump Cover	1
69	185-S	Bolt	3
70	5745	Fan Drive Pulley	1
72	218-N	Fan Drive Pulley Nut	1
73	LH-543	Piston with Pin	1
74	LH-545	Piston Pin Lock	2
75	LH-544	Piston Pin	1
76	LH-546-C	Oil Ring (3 pc.- 2 rings, 1 expander)	1
77	LH-547	Compression Ring	1
78	LH-548	Chromed Compression Ring	1
79	L-317	Cylinder Bottom Gasket	1
80	5733	Cylinder	1
81	306-W	Heavy Lock Washer	4
82	L-407-C	Manifold Gasket, Exhaust & Intake	2
83	L-301-D	Manifold, Exhaust	1
84	164-SG	Manifold Bolt, Graphited, Exhaust	2
85	8255	Nipple	1
86	8227	Muffler	1
87	L-311-X	Valve, Exhaust	1
88	L-311-N	Valve, Intake	1
89	1709	Spark Plug & Washer	1
91	154-S	Cylinder Head Bolt, Short	10
93	5735	Cylinder Head Gasket	1
94	5734	Cylinder Head	1
95	7331	Speed Clip	1
96	7176	Manual Choke Bracket	1
97	L-301-B	Gasket, Manifold to Carburetor	1
98	L-301-A	Manifold Intake	1
100	183-S	Manifold Bolt, Intake	2
102	183-S	Bolt	4
103 NS	L-874	Gasket, Locator to Cylinder	2
104 NS	L-876	Gasket, Valve Cover to Locator	2



MODEL LT CHASSIS

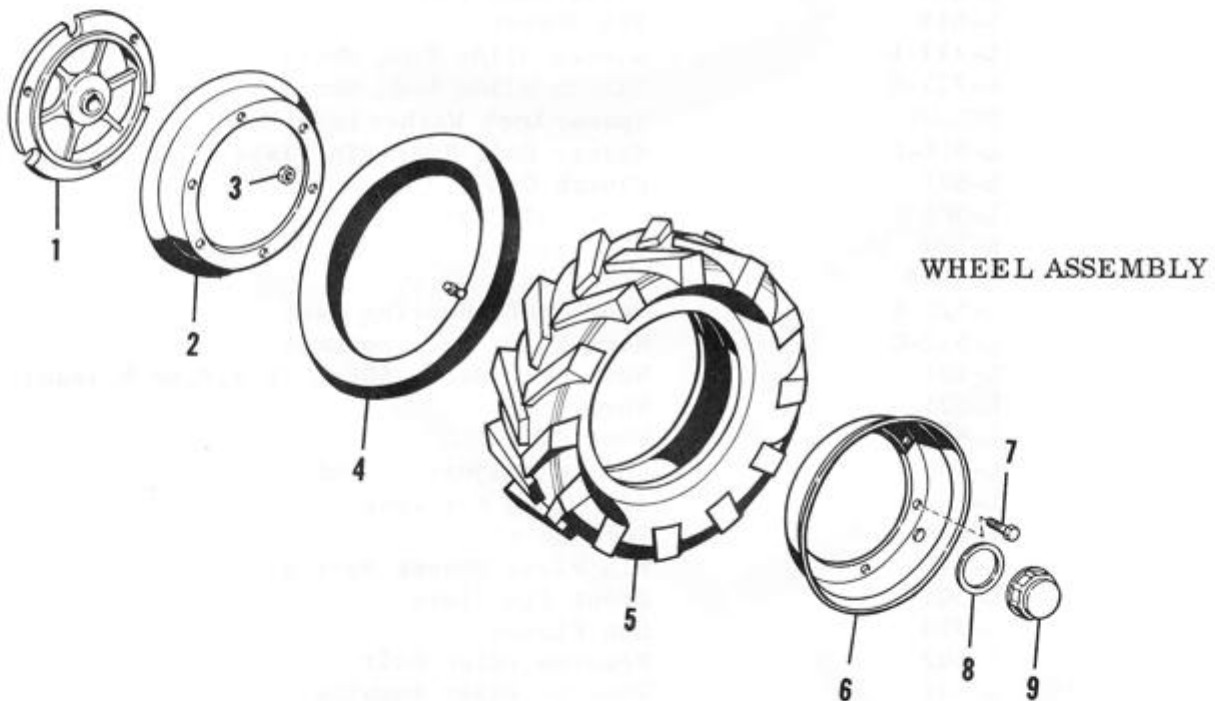
Item No.	Part No.	Description	Quan. Req'd.
1	L-201	Chassis Casting	1
2	L-211	Chassis Oil Filler Neck	1
2-A	L-864	Filler Neck Baffle	1
3	L-212	Chassis Oil Filler Cap Breather	1
4	8231	Relief Valve Body	1
4-A	L-865	Relief Valve Check Ball	1
5	L-815-D	Spring .025"	2

## CHASSIS Con't.

Item No.	Part No.	Description	Quan. Req'd.
6	NJ-7-F	Nut Adjustable	
6-A	8230	Relief Valve	
7	154-S	Actuating Lever Clamp Bolt	2
8	L-715	Actuating Shaft Lever	2
9	L-735	Oil Seal Washer	1
10	L-712	Clutch Actuating Shaft	2
11	L-713	Actuating Shaft Bushing	4
12	L-736	Thrust Washer	2
13	303-W	Securing Bolt Washer	8
14	165-S	Bolt	2
15	2211	Rear Thrust Plate Shim (.020)	1
16	L-519	Rear Thrust Plate	1
17	L-506	Rear Pin Plate	1
18	L-535	Rear Pin Plate Bushing	1
19	L-511	Sun Gear	1
20	L-534	Sun Gear Bushing	1
21	L-513	Orbit Gear	6
22	L-514	Orbit Gear Pin	6
23	L-515	Pin Spacer	1
24	L-711-L	Clutch Slide Rod, Short	1
25	L-711-R	Clutch Slide Rod, Short	1
26	305-WL	Spacer Lock Washer Left Hand	3
27	L-516-L	Spacer Bolt Rear Pin Plate (L.H. Thread)	3
28	L-517	Clutch Cup	2
29	L-501	Internal Gear	2
30	L-524	Rear Spacer	1
31	HE-106	Roll Pin	1
32	L-522-R	Worm Shaft Bearing Race	2
33	L-522-C	Worm Shaft Bearing Cone	2
34	L-601	Worm, Standard, (Specify 4,6,or 8 lead)	1
35	L-521	Worm Shaft	1
36	L-608	Worm Key	1
37	L-507	Bearing Adjusting Nut	1
38	L-523	Adjusting Nut Lock	1
39	164-S	Lock Screw	1
40	L-547	Pin Plate Spacer Spring	1
41	L-505	Front Pin Plate	1
42	L-510	Sun Pinion	1
43	L-542	Reverse Idler Bolt	3
44	L-541	Reverse Idler Bushing	3
45	L-540	Reverse Idler	3
46	L-539	Front Pin Spacer	1
47	305-W	Spacer Lock Washer	3
48	L-516-R	Spacer Bolt Front Pin Plate	3
49	L-536	Pin Plate Quill	1
50	191-S	Quill Securing Bolt	3
51	L-710-R	Clutch Slide Rod, Long	1
52	L-710-L	Clutch Slide Rod, Long	1
53	L-546	Pinion Shaft Bearing	1
54	L-508	Gear Cup	1
55	L-538	Reverse Cone	1
56	L-520	Front Thrust Plate	1
57	L-532	Quill Bearing	1

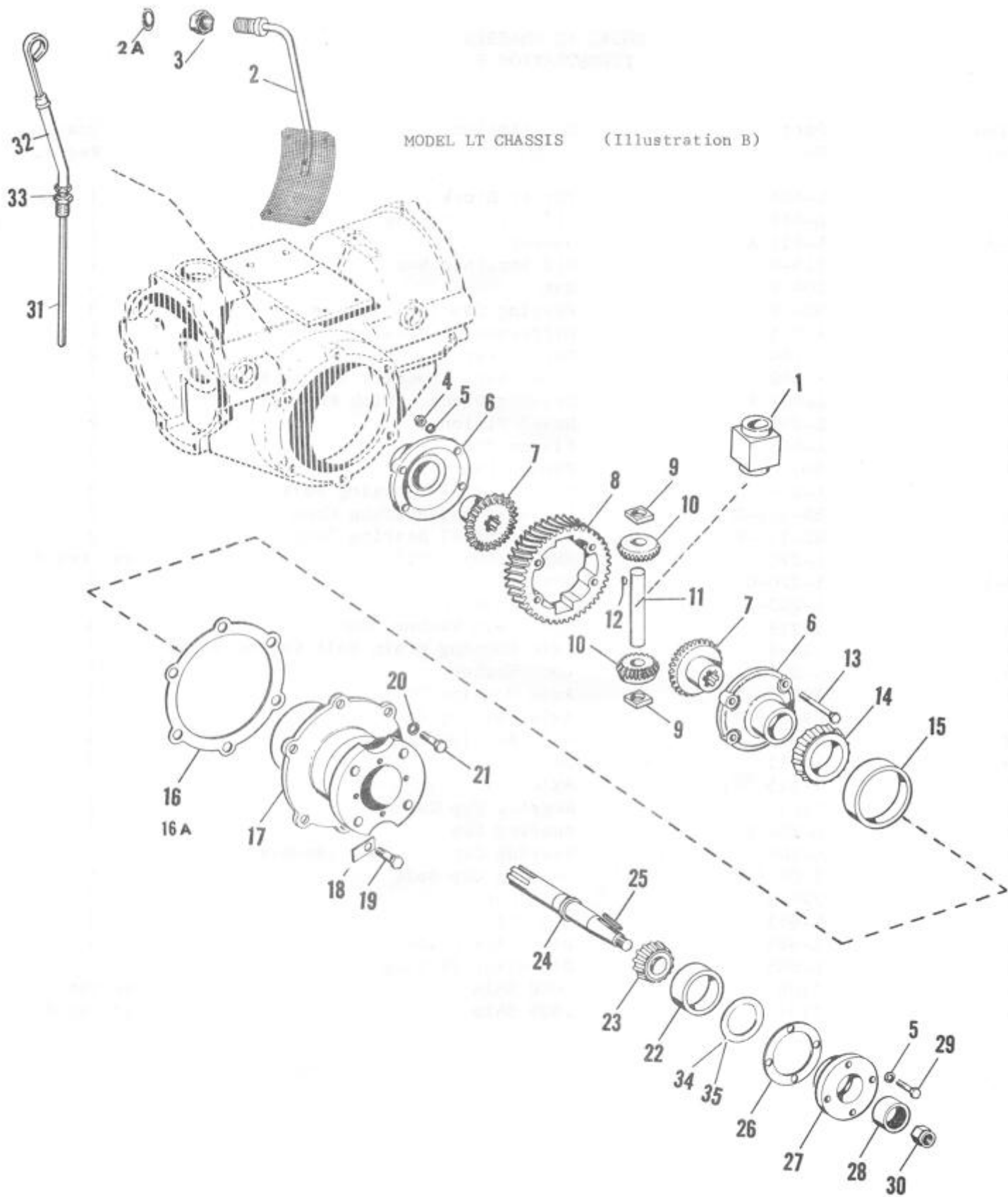
CHASSIS Con't.

Item No.	Part No.	Description	Quan. Req'd.
58	L-209	Chassis Front Gasket	1
59	L-732	Shipper Shaft Lever	1
60	L-733	Locator Body	1
61	1809	Locator Ball	1
62	164-S	Shipper Shaft Guide Bolt	2
63	L-734	Shipper Shaft Guide	1
64	L-545	Shipper Shaft	1
65	L-202	Advance Casting	1
65-A	5056	Attachment Gasket	4
66	L-207	Advance Casting Bolt	6
67	L-543	Pinion Shaft	1
68	L-544	Clutch Dog	1
69	L-226	Dog Plate	1
70	L-132	Spring	1
NS	152-S	Attachment Bolt	4



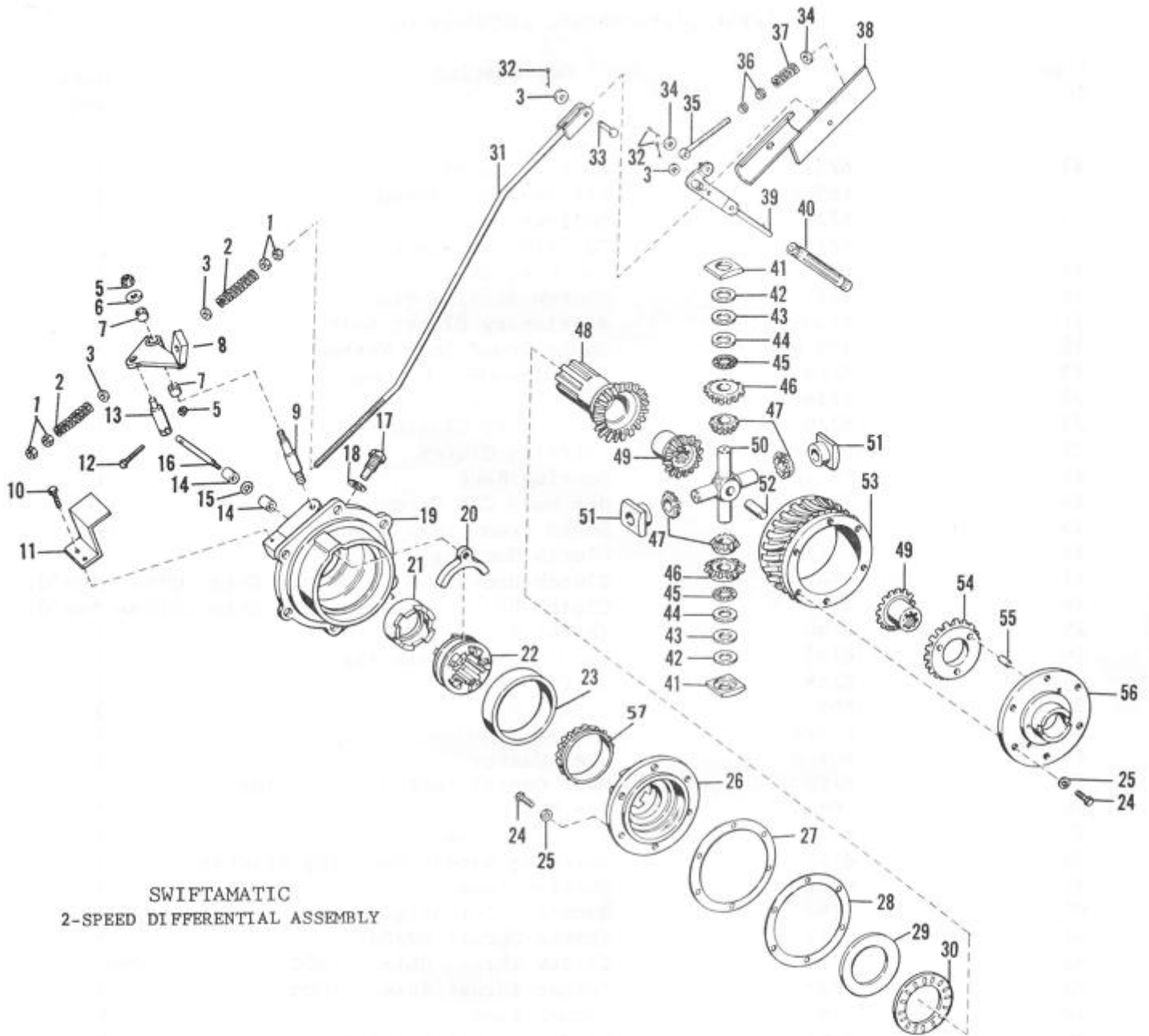
Item No.	Part No.	Description	Quan. Req'd.
1	L-614-B	Wheel Hub	2
2	L-616-IR	Inner Rim	2
3	3509	Rim Bolt Nuts	6
4	L-616-TU	Tractor Tire Tube	2
5	L-616-TI	Tractor Tire, sure grip or studded	2
6	L-616-OR	Outer Rim, (with valve hole)	2
7	179-S	Rim Bolts	6
8	L-613	Hub Cap Washer	2
9	L-619	Hub Cap	2

MODEL LT CHASSIS (Illustration B)



MODEL LT CHASSIS  
ILLUSTRATION B

Item No.	Part No.	Description	Quan. Req'd.
1	L-606	Thrust Block	1
2	L-868	Oil Strainer Body	1
2-A	L-823-A	Gasket	1
3	218-N	Oil Strainer Nut	1
4	204-N	Nut	4
5	304-W	Bearing Cap Lock Washer	4
6	L-205	Differential Housing	2
7	L-604	Bevel Gear	2
8	L-602	Worm Gear, (Specify 4,6,or 8 Lead)	1
9	L-607-K	Driving Block, (with Keyway)	2
10	L-603	Bevel Pinion	2
11	L-605	Pinion Pin	1
12	501-K	Pinion Pin Key	1
13	L-206	Differential Housing Bolt	4
14	RB-111-C	Differential Bearing Cone	2
15	RB-111-R	Differential Bearing Race	2
16	L-220	Shim (.005 .020)	as req'd.
16-A	L-220-G	Gasket	2
17	L-203-E	Axle Housing	2
18	L-215	Oil Drain Washer Tab	1
19	123-S	Axle Housing Drain Bolt (nylon plug)	1
20	W-S-18	Lock Washer	11
21	122-S	Axle Housing Bolt	11
22	RB-110-R	Axle Bearing Race	1
23	RB-110-C	Axle Bearing (cone)	1
24	L-611	Axle	2
25	L-615	Axle Key	2
26	7103	Bearing Cap Gasket	2
27	L-204-E	Bearing Cap	2
28	L-208	Bearing Cap Oil Seal (double)	2
29	5 CH-6-C	Bearing Cap Bolt	8
30	227-N	Axle Nut	2
31	L-883	Dip Stick	1
32	L-884	Dip Stick Guide	1
33	L-885	Dip Stick Fitting	1
34	7106	.020 Shim	as req'd.
35	7107	.005 Shim	as req'd.



SWIFTAMATIC  
2-SPEED DIFFERENTIAL ASSEMBLY

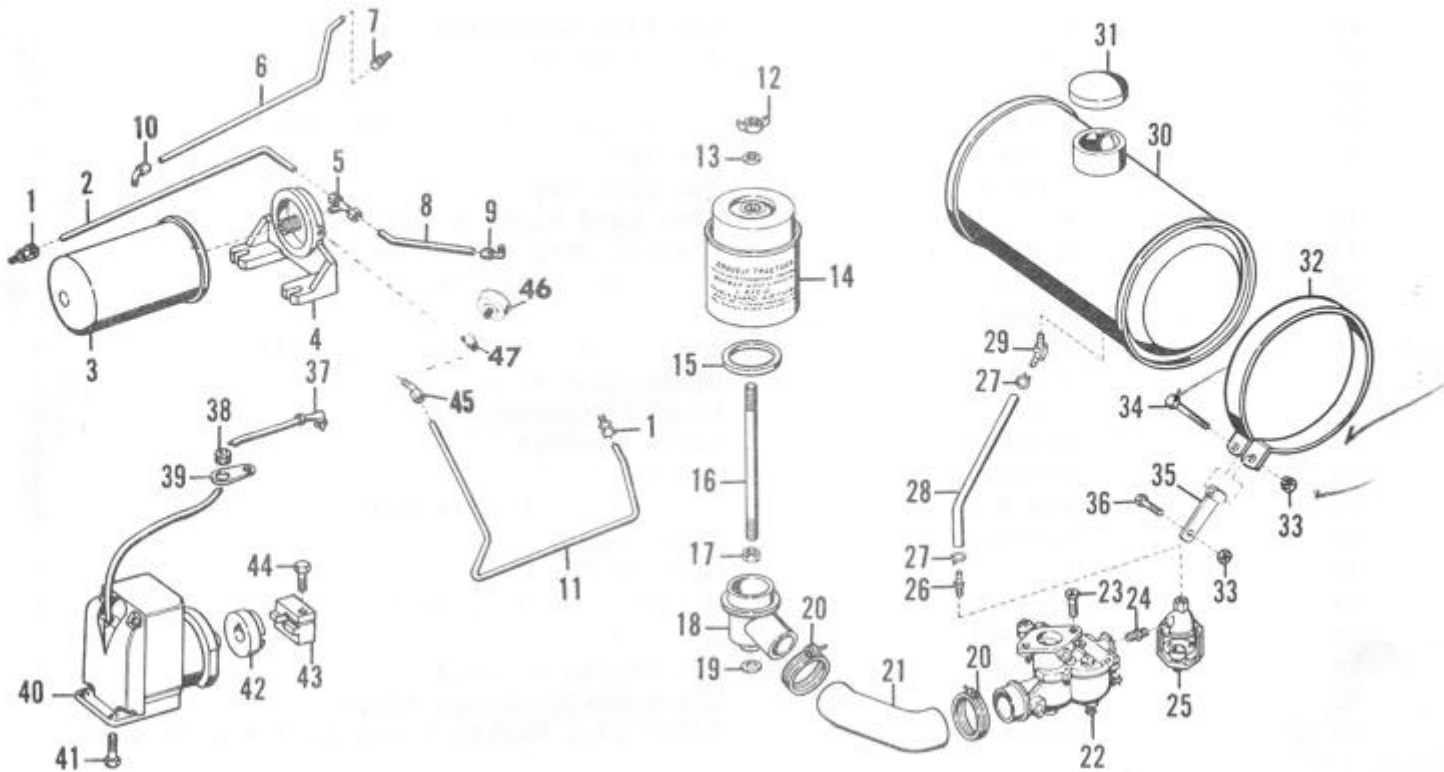
Item No.	Part No.	Description	Quan. Req'd.
1	205-N	Hex Nut	4
2	6750	Clutch Spring	2
3	403-W	Clutch Spring Washer, heavy	4
5	NTE-05C	Elastic Stop Nut	2
6	402-W	Flat Washer	1
7	6724	Pivot Bushing	2
8	6723	Shifter Arm	1
9	6725	Stationary Pivot Pin	1
10	191-S	Hex Head Cap Screw	2



## 2-SPEED DIFFERENTIAL ASSEMBLY Con't.

Item No.	Part No.	Description	Quan. Req'd.
11	6731	Shifter Guard	1
12	185-S	Hex Head Cap Screw	1
13	6726	Shifter Pin	1
14	6713	"O" Ring Retainer	2
15	6732	"O" Ring Seal	1
16	6721	Clutch Sliding Pin	1
17	6734	Stationary Clutch Bolt	1
18	309-W	Shake Proof Lock Washer	1
19	6728	Axle Housing 2-Speed	1
20	6719	Shifting Yoke	1
21	6720	Stationary Clutch	1
22	6718	Shifting Clutch	1
23	RB-123-R	Bearing Race	1
24	5CH-6C	Hex Head Cap Screw	12
25	304-W	Shake Proof Lock Washer	12
26	6717	Clutch Housing	1
27	6739	Clutch Housing & Worm Gear Shim .005 as req'd.	
28	6740	Clutch Housing & Worm Gear Shim .020 as req'd.	
29	6744	Thrust Race	1
30	6743	Needle Thrust Bearing	1
31	6758	Shifter Rod	1
32	602-C	Cotter Pin	3
33	L-722	Clevis Pin	1
34	401-W	Flat Washer	2
35	6757	Over Center Lock Spring Guide	1
36	201-N	Hex Nut	2
37	6755	Toggle Spring	1
38	6759	Shifting Handle Mounting Bracket	1
39	6756	Shifter Lever	1
40	5167	Handle Lever Grip	1
41	6715	Spider Thrust Washer	2
42	6738	Spider Thrust Shim .020	Opt.
43	6737	Spider Thrust Shim .005	2
44	6742	Thrust Race	2
45	6741	Needle Thrust Bearing	2
46	6702	Shifting Train Pinion	2
47	6708	Spider Gear	4
48	6704	Shifting Gear	1
49	6709	Differential Gear	2
50	6710	Spider Pin	1
51	6752	Differential Thrust Spacer	2
52	6711	Thrust Pin	1
53	6705	8 Start Worm Gear	1
54	6703	Pinned Gear	1
55	6714	Dowell Pin	3
56	6716	Pinned Housing	1
57	RB-123-C	Bearing Cone	1
	NN	Shifter Rod Assembly, Complete	1

OIL LINES, GASOLINE & MAGNETO ASSEMBLIES

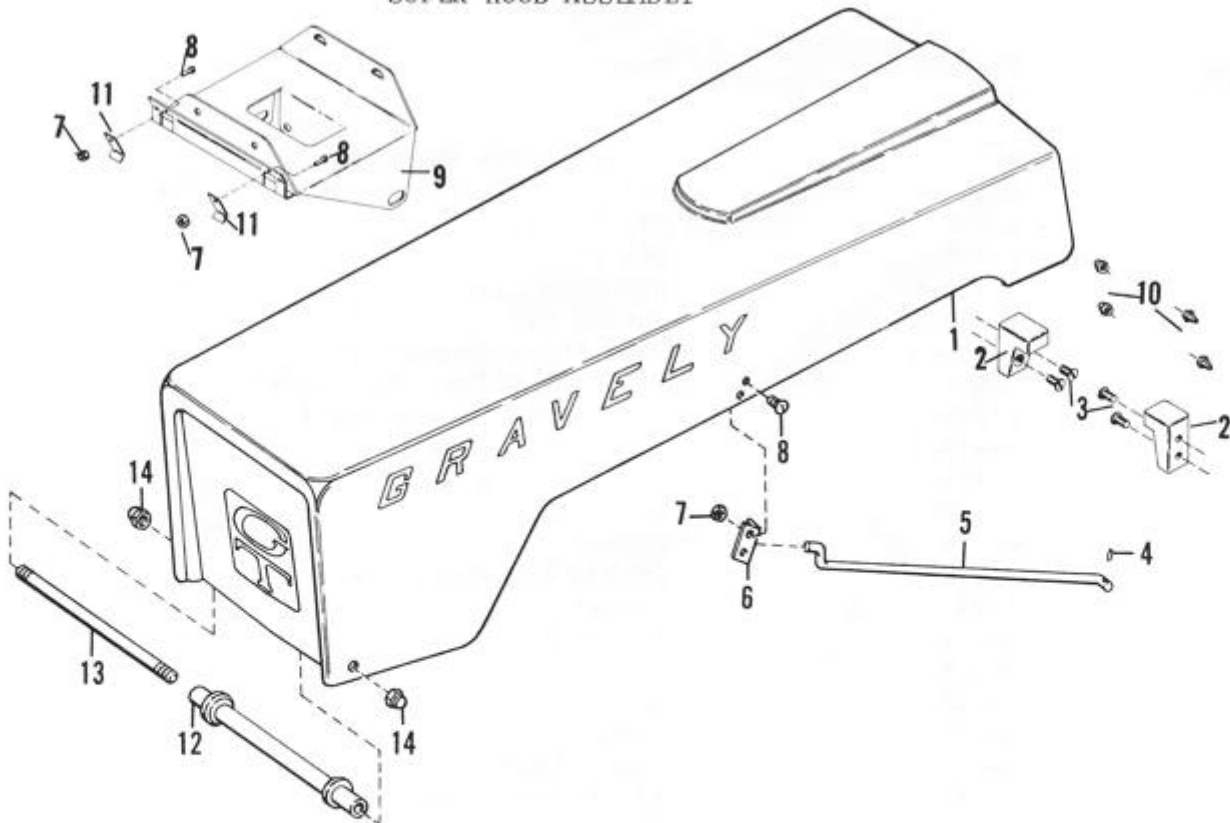


Item No.	Part No.	Description	Quan. Req'd.
1	8230	Relief Valve Connector	1
2	8259	Oil Line, Filter to Relief Valve	1
3	L-857	Oil Filter	1
4	L-858	Oil Filter Bracket	1
5	L-814-C	Discharge Line Tee	1
6	L-813-A	Intake Oil Line 5/16"	1
7	L-814-A	Pump Inlet Connector	1
8	L-860	Oil Line Filter to Engine	1
9	L-814-DL	Engine Elbow Long Style	1
10	L-814-F	Elbow, Oil Strainer	1
11	L-859	Oil Line Pump to Filter	1
12	EWN/4C	Wing Nut	1
13	401-W	Washer	1
14	L-832-D	Double Air Guard	1
15	L-832-H	Gasket	1
16	L-819-E	Air Filter Bolt	1
17	201-N	Hex Nut	1
18	L-833	Air Cleaner Bracket	1
19	L-837	Gasket	1
20	L-836	Hose Clamp	2
21	L-841	Air Filter Hose	1
22	8228	Carburetor	1
23	126-S	Carburetor Bolt	2
24	L-814-E	Gas Filter Nipple	1
25	L-705	Gas Strainer Complete	1

OIL LINES, GASOLINE & MAGNETO ASSEMBLIES Con't.

Item No.	Part No.	Description	Quan. Req'd.
26	L-842	Gas Line Connector	1
27	7216	Fuel Hose Clamp	2
28	L-844	Gas Line Hose	1
29	L-843	Elbow Carburetor to Gas Line	1
30	L-701	Gas Tank	1
31	2505-A	Gas Tank Cap	1
32	8257	Tank Band Right & Left	2
33	233-N	Elastic Stop Nut	4
34	149-S	Tank Band Bolt, Long	2
35	5164-B	Anchor Bracket	2
36	114-S	Tank Band to Fan Housing Bolt	2
37	1731	Spark Plug Wire	1
38	L-827	Rubber Grommet	1
39	L-826	Cable Bracket	1
40	L-808	Magneto	1
41	179-S	Magneto to Chassis Bolt	2
42	L-809-F	Float Member	1
43	L-811	Magneto Coupling	1
44	154-S	Magneto Coupling Bolt	1
45	L-814-D	Elbow 1/4"	1
46	L-866	Oil Pressure Gauge	1
47	L-867	Oil Pressure Gauge Adapter	1
NS	402-W	5/16" Flat Washer (used on Items 34 & 36)	4

SUPER HOOD ASSEMBLY

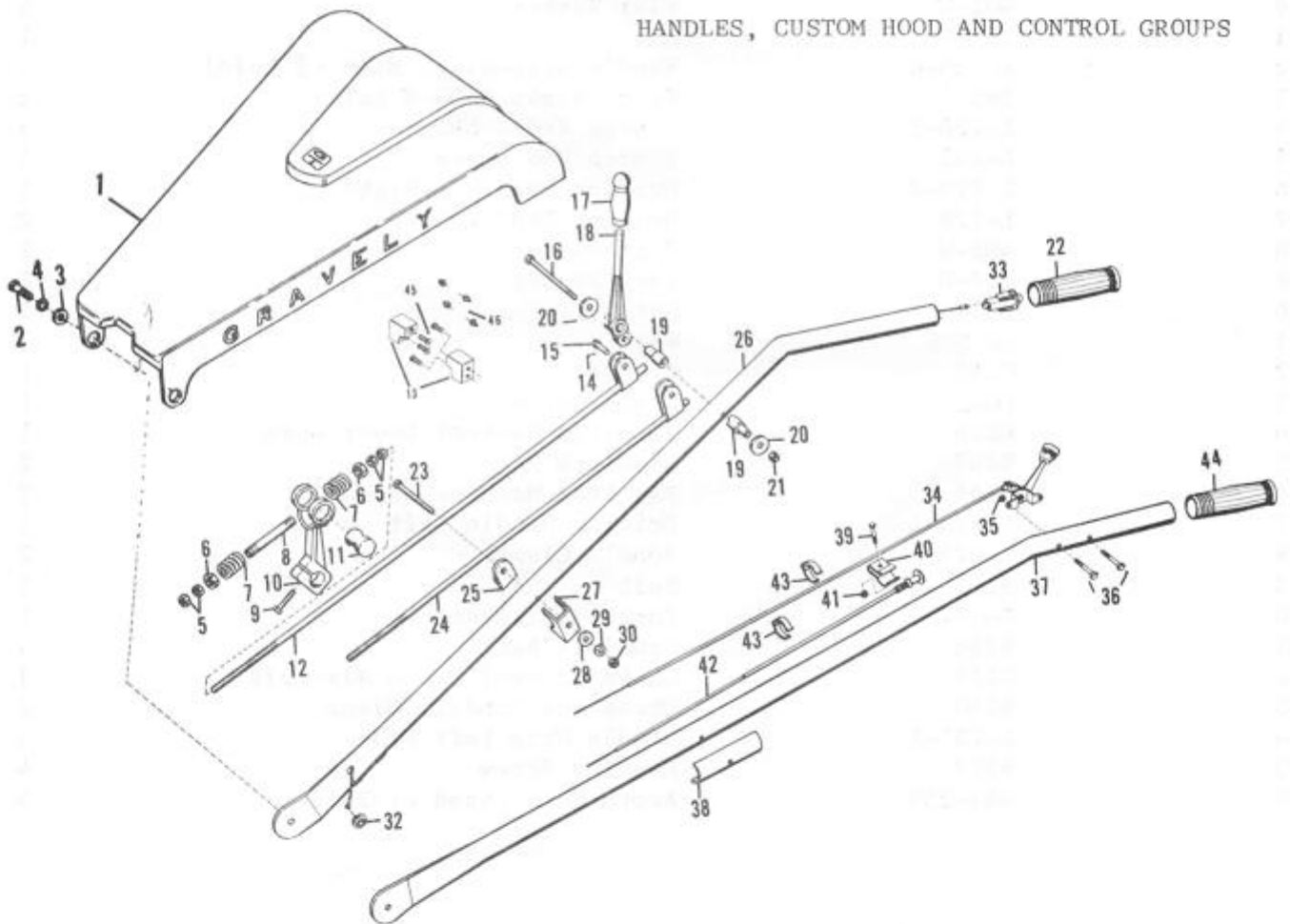


Item No.	Part No.	Description	Quan. Req'd.
1	ST-136	Super Hood	1

SUPER HOOD ASSEMBLY Con't.

Item No.	Part No.	Description	Quan. Req'd.
2	8280	Hood Bumper	2
3	436-732	Machine Screw	4
4	2 RP 4	Roll Pin	1
5	ST-129	Support Rod	1
6	ST-131	Hood Catch	1
7	207-N	Hex Nut	4
8	N-10-ST-5-C	Machine Screw	1
9	8261	Battery Bracket	1
10	441-256	Acorn Nut	4
11	8254	Spring	2
12	8251	Pivot Tube	1
13	8252	Pivot Rod	1
14	8253	Acorn Nut	2

HANDLES, CUSTOM HOOD AND CONTROL GROUPS

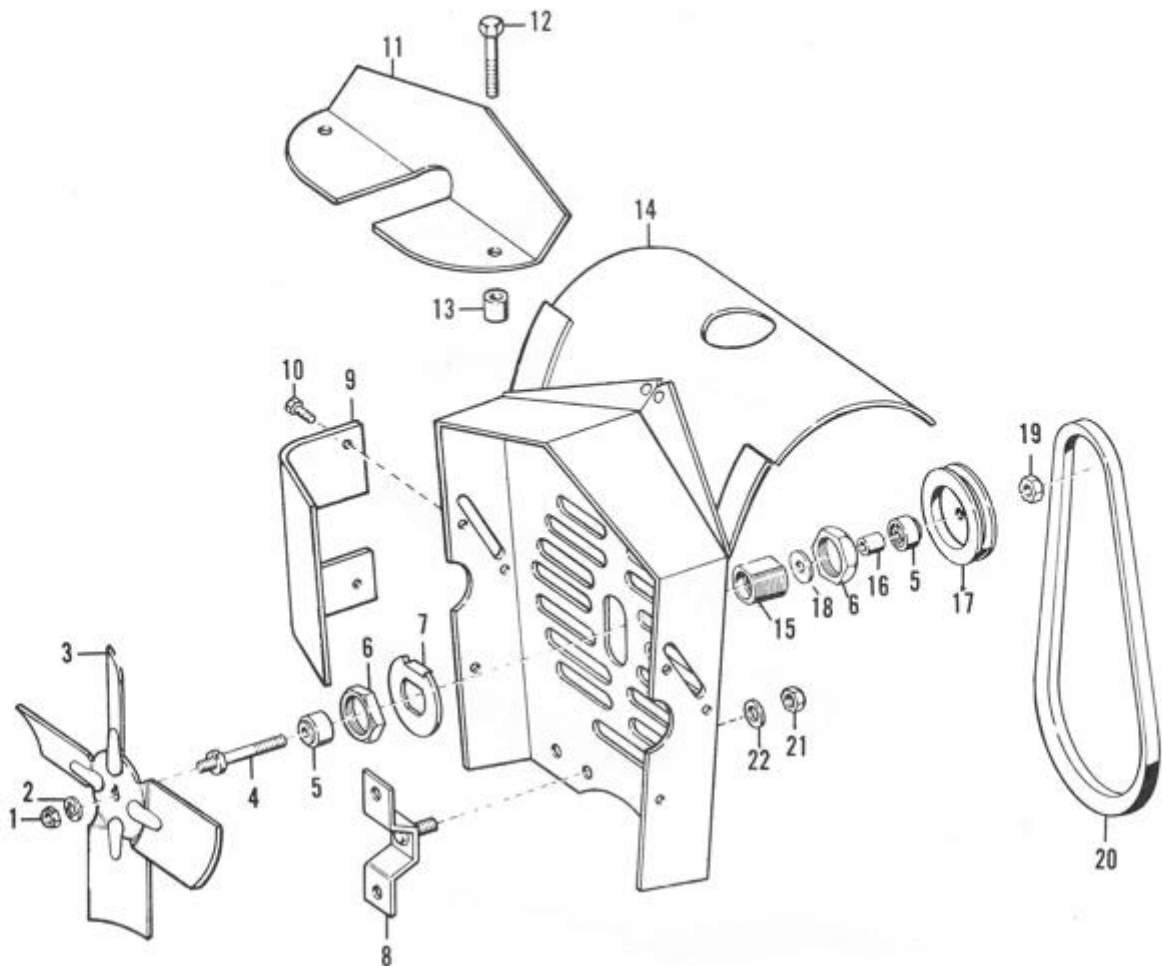


Item No.	Part No.	Description	Quan. Req'd.
1	L-820-B	Hood - Custom	1
2	112-S	Bolt	2
3	L-821	Hood Spacer	2
4	306-W	Lock Washer	2
5	206-N	Nut	8

## HANDLES, CUSTOM HOOD AND CONTROL GROUPS Con't.

Item No.	Part No.	Description	Quan. Req'd.
6	210-N	Nut (Repairs Only)	4
7	L-729	Spring	4
8	L-730	Clutch Rod (Threaded-repairs)	2
9	154-S	Bolt	2
10	L-715	Clutch Actuating Lever	2
11	L-723	Clutch Rod Pivot	2
12	L-720-L	Clutch Rod - Long	1
13	8281	Hood Bumper	2
14	602-C	Cotter Pin	2
15	L-722	Clevis Pin	2
16	L-718	Bolt	1
17	5167	Hand Lever Grip	2
18	L-716	Clutch Hand Lever	2
19	L-717	Hand Lever Pivot	2
20	402-W	Flat Washer	2
21	233-N	Nut	1
22	L-725-R	Handle Grip-Right Side ( $\frac{1}{2}$ "hole)	1
23	195-S	Bolt, Right (131-S Left)	2
24	L-720-S	Clutch Rod - Short	1
25	L-742	Clutch Rod Brace	1
26	L-724-R	Driving Handle - Right	1
27	L-728	Driving Handle Bracket	2
28	403-W	Flat Washer	2
29	306-W	Lock Washer	2
30	205-N	Nut	2
31	10-275	Wire	1
32	8265	Grommet	1
33	10-277	Stop Switch	1
34	8226	Throttle Control Lever Assy.	1
35	8267	Conelock Nut	2
36	8266	Pan Head Machine Screw	2
37	L-724-L	Driving Handle Left	1
38	L-726	Handle Clamp	2
39	8263	Bolt	1
40	G-107	Control Bracket	1
41	8264	Conelock Nut	1
42	8225	Choke Control Cable Assembly	1
43	8260	Choke and Conduit Clamp	2
44	L-725-L	Handle Grip Left Side	1
45	8276	Machine Screw	4
46	441-256	Acorn Nuts (Used W/8281)	4

FAN AND DEFLECTOR ASSEMBLY



Item No	Part No.	Description	Quan. Req'd.
1	206-N	Fan Securing Nut	1
2	306-W	Fan Nut Lock Washer	1
3	L-805	Fan	1
4	5137	Fan Shaft	1
5	5139	Fan Ball Bearing	2
6	5134	Fan Bearing Lock Nut	2
7	L-830	Fan Bearing Lock Washer	1
8	L-224	Fan Housing Bracket	2
9	L-838-A-RH	Air Deflector, Right Hand	1
	L-838-B-LH	Air Deflector, Left Hand	1
10	156-S	Sheet Metal Screw	4
11	L-839	Cylinder Head Air Deflector	1
12	155-S	Long Cylinder Head Screw	2
13	L-840	Deflector Spacer	2
14	L-222	Fan Housing	1
15	5133	Fan Bearing Race Retainer	1
16	5165	Fan Bearing Spacer	1
17	L-802	Fan Pulley	1
18	401-W	Fan Pulley Jam Nut Washer	1
19	204-N	Fan Pulley Jam Nut	1
20	5163	Fan Belt	1
21	211-N	Hex Nut	2
22	308-W	Lock Washer	2