

GRAVELY

Condensed
Service
Data



TRACTOR DIVISION
Studebaker
CORPORATION

CONDENSED SERVICE DATA

MAINTENANCE

GRAVELY MODEL L TRACTOR
ENGINE

Spark Plug

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.

Recommended: Auto-Lite TT-10
Or Champion W - 89-D

Electrode Gap .033

Carburetor

See separate instructions.

Magneto

See separate Magneto instructions.

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)

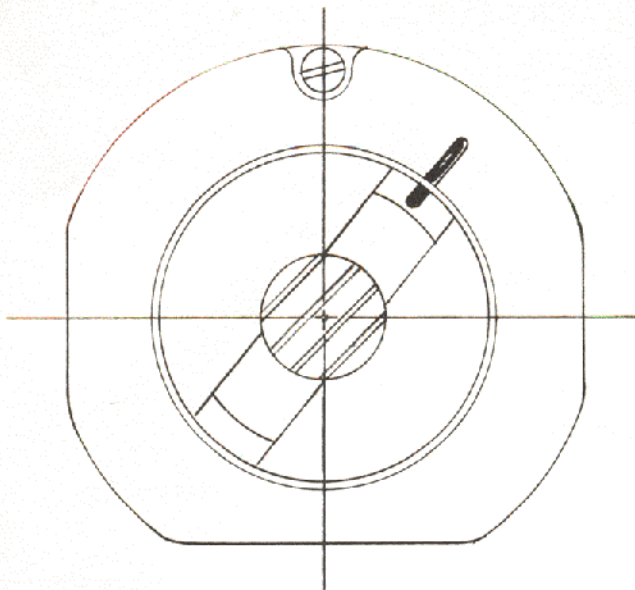
On the name plate serial number, M prefix means 100,000. For example, Tractor serial number "100105" would be shown as "M105".

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>
Model LS	Model LI	Model L		
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)

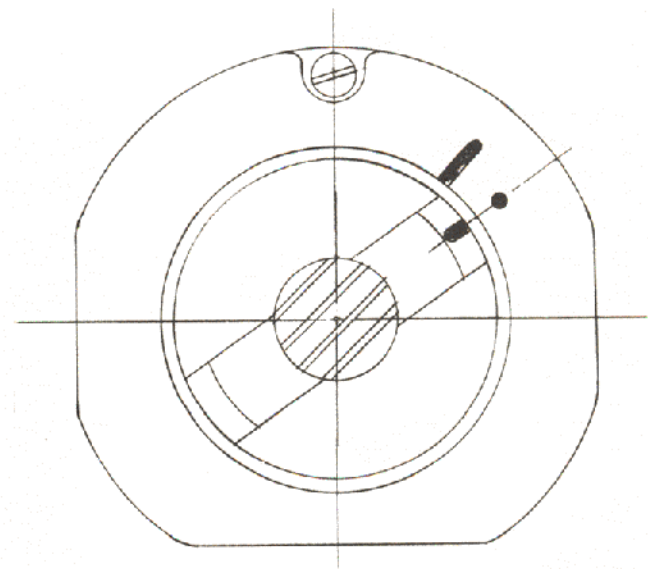
1. Remove Air Cleaner, Air Cleaner Bracket.
2. Loosen Magneto Coupling Nut until it slips on the Camshaft. It may be necessary to tap coupling gently.
3. Remove Cylinder Head.
4. Bring Piston to Top Dead Center on the compression stroke (both valves closed). Measure, accurately, the distance from top 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.

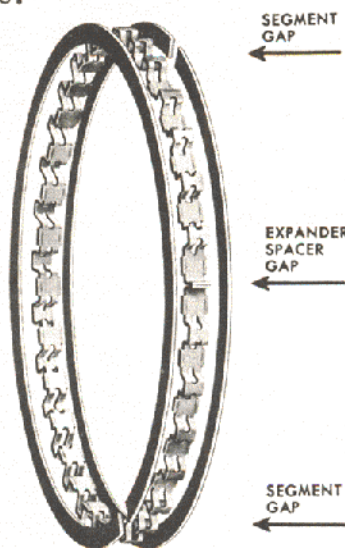
2. Install steel segment on top side of expander spacer with gap of segment approximately 90° beyond gap of stainless steel expander spacer, making certain that the expander spacer is still in a butted position.

3. Install second segment on bottom side of the expander spacer with segment gap approximately 90° 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.

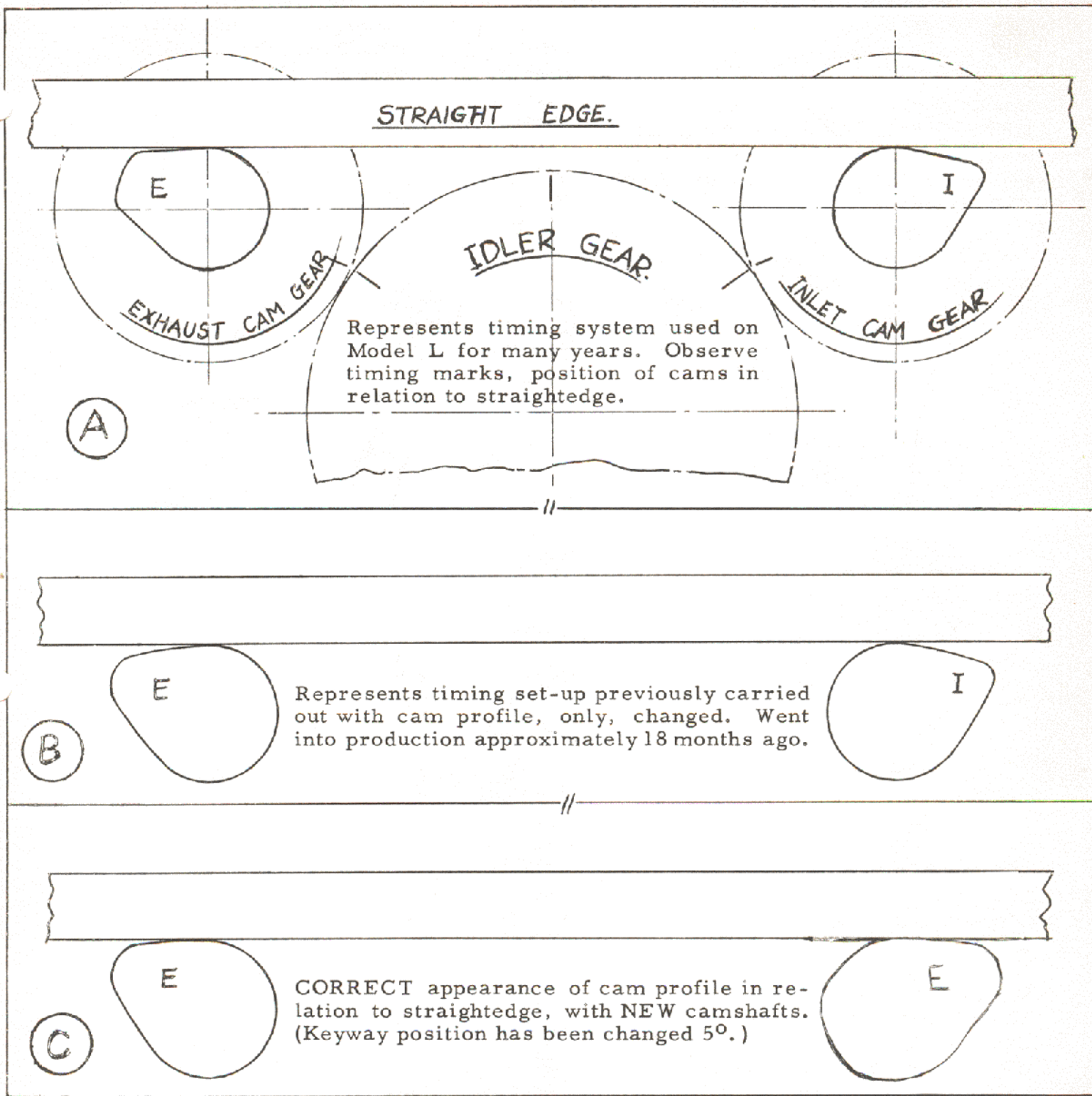
Camshafts

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.

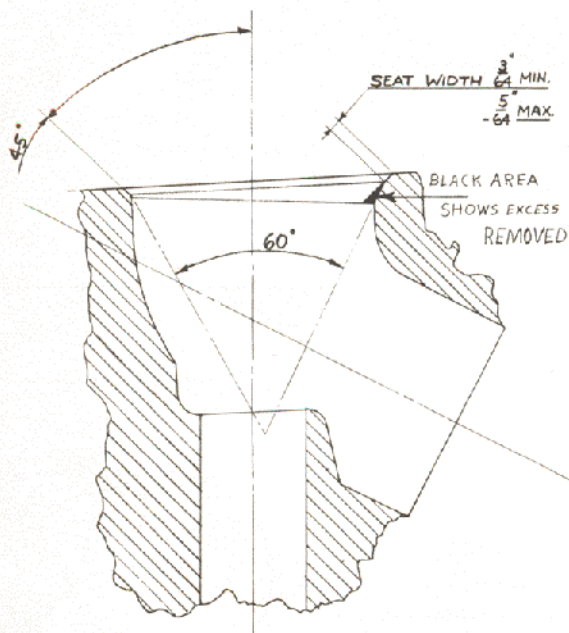


When repairing older tractors, use new Camshafts, which will give the appearance shown in (C). To check if Valve Timing is correct, (Engine cold) set Valve Tappet at .0015 (Cigarettepaper). Cylinder head off. Intake valve should just start to open at the Top Dead Center of Exhaust stroke. After piston 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° 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° 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.

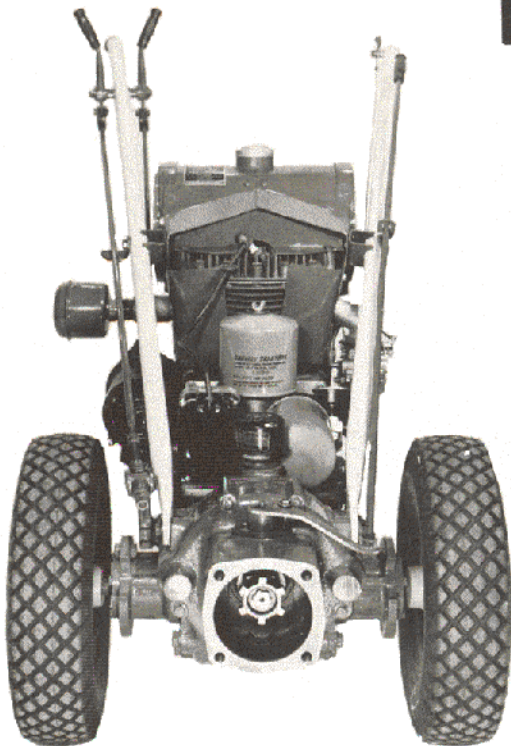
Place the Drive Pinion Shaft and the Timing Pinion Shaft in the centering spindles.

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

TRACTOR



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.

ILLUSTRATED PARTS & PRICE LIST

Effective Date

APRIL 1, 1963

TRACTORS WITH MFG. NOS. (SEE NAMEPLATE)

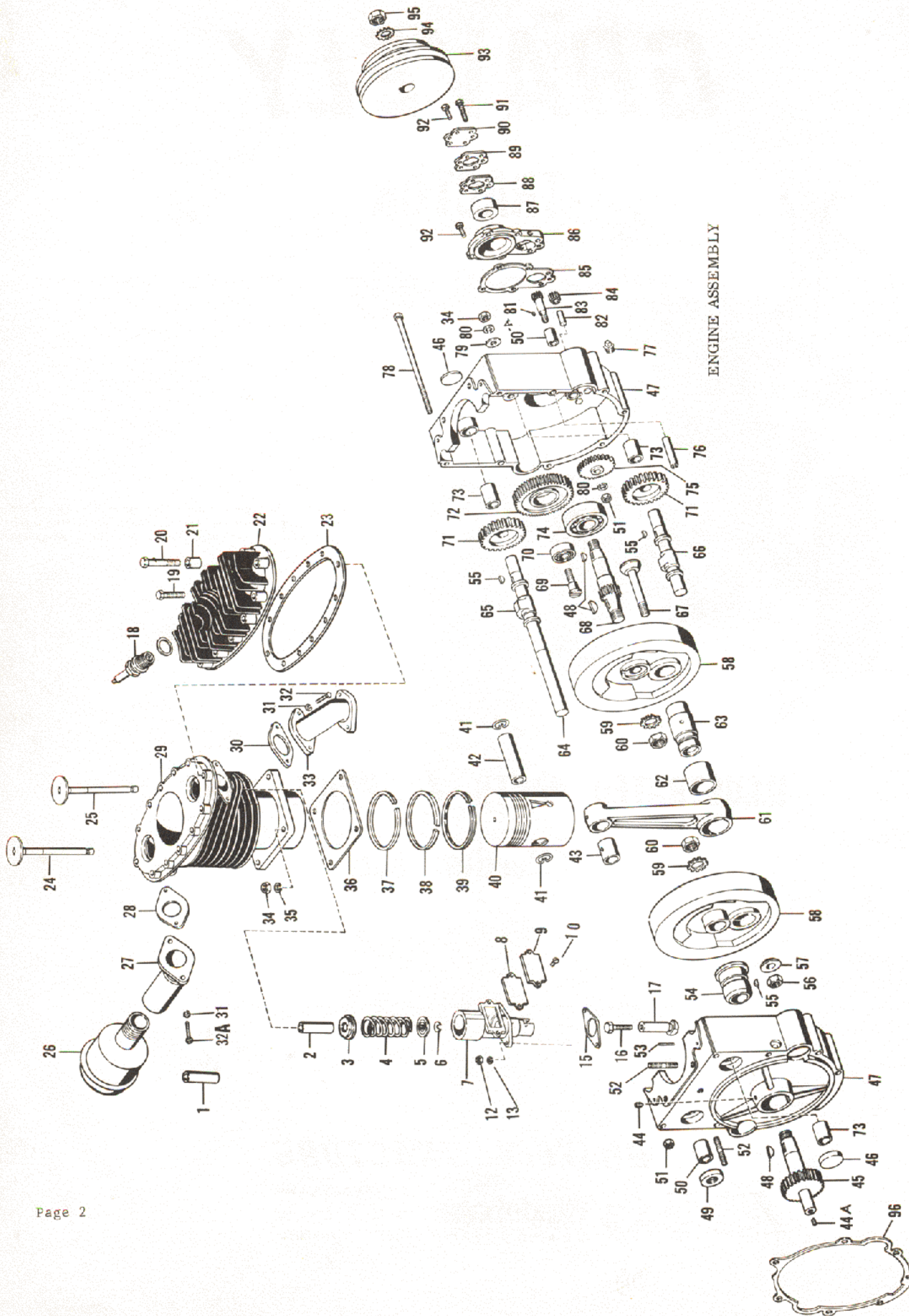
BEGINNING A-1, B-1, C-1, D-1, E-1, F-1, G-1,

GRAVELY TRACTORS



TRACTOR DIVISION
Studebaker
CORPORATION

1 GRAVELY LANE
DUNBAR
WEST VIRGINIA



ENGINE ASSEMBLY

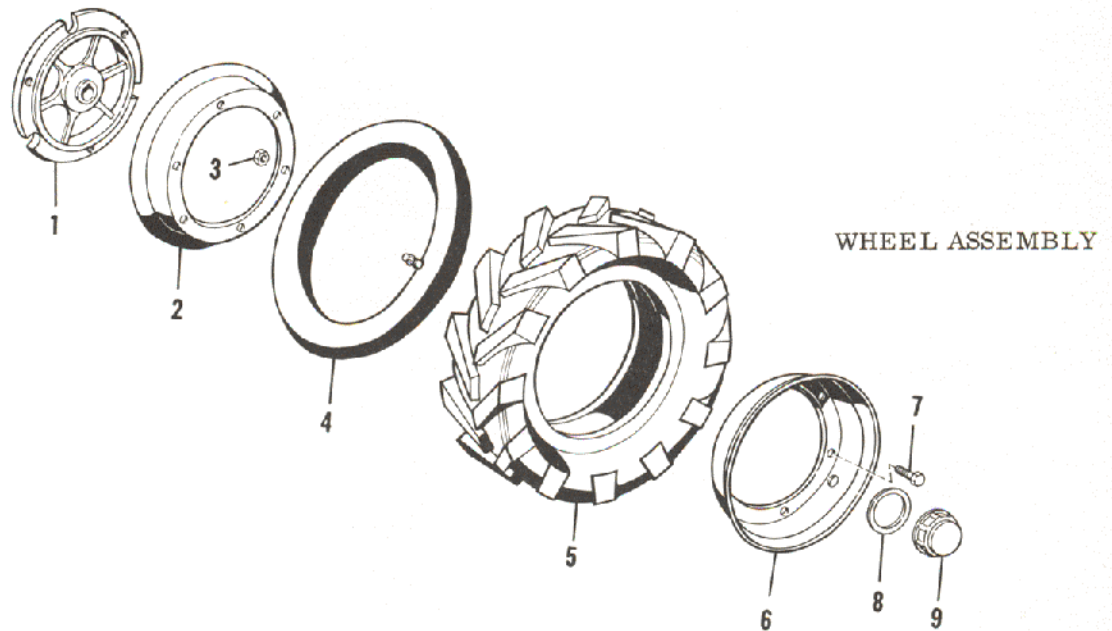
Item No.	Part No.	Description	Quan. Req'd.	Price
1	L-881-X	Valve Guide, bronze	1	\$1.00
2	L-881-N	Valve Guide, cast iron	1	.60
3	L-882	Valve Spring Locator Sleeve	2	.10
4	L-312	Valve Spring	2	.24
5	5741	Valve Spring Cap	2	.14
6	5742	Valve Spring Cap Key	2	.08
7	L-403-A	Valve Plunger Guide & Cover	1	1.74
8	L-879	Valve Cover Gasket	2	.05
9	L-878	Valve Cover Cap	2	.10
10	101-S	Valve Cover Cap Bolt	4	.02
12	202-N	Nut	4	.02
13	303-W	Lock Washer	4	.01
15	L-407-A	Valve Plunger Gasket	2	.06
16	L-880	Valve Tappet Screw	2	.20
17	L-404	Valve Plunger	2	1.21
18	1709	Spark Plug and Washer	1	.84
19	154-S	Cylinder Head Bolt, short	10	.06
20	155-S	Cylinder Head Bolt, long	2	.06
21	L-840	Cylinder Head Bolt Sleeve	2	.09
22	5734	Cylinder Head	1	5.78
23	5735	Cylinder Head Gasket	1	.67
24	L-311-X	Valve, exhaust	1	1.08
25	L-311-N	Valve, intake	1	.94
26	L-816	Muffler	1	2.07
27	L-301-D	Manifold, exhaust	1	1.66
28	L-407-C	Manifold to Cylinder Gasket, exhaust	1	.06
29	5733	Cylinder	1	21.56
30	L-407-C	Manifold to Cylinder Gasket, intake	1	.06
31	303-W	Manifold Bolt Lock Washer	4	.01
32	164-S	Manifold Bolt, intake	2	.02
32-A	164-SG	Manifold Bolt, Graphited, exhaust	2	.04
33	L-301-A	Manifold, intake	1	1.66
33-A	L-301-B	Carburetor Gasket	1	.06
34	206-N	Cylinder Stud Bolt Nut and Idle Gear Stud Nut	5	.02
35	306-W	Heavy Lock Washer for Cylinder Stud	4	.01
36	L-317	Cylinder Bottom Gasket	1	.09
37	LH-548	Chromed Compression Ring	1	.88
38	LH-547	Compression Ring	1	.41
39	LH-546-C	Oil Ring	1	.88
40	LH-543	Piston with Pin	1	6.26
41	LH-545	Piston Pin Lock	2	.01
42	LH-544	Piston Pin	1	1.16
43	L-306-A	Connecting Rod Bushing	1	.45
44	803-A	Crankcase Bushing Set Screw	1	.13
45	L-109	Drive Pinion Shaft	1	5.39
46	L-414	Expansion Plug	3	.10
44-A	801-A	Pinion Shaft Set Screw	1	.18

Item No	Part No	Description	Quan. Req'd.	Price
47	L-101-2	Crankcase (Matched set, inner & outer)	1	30.32
48	504-K	Drive Pinion Shaft Key	2	.02
49	L-412	Cam Shaft Oil Seal	1	.59
50	L-406-I	Crankcase Bushing (use with Oil Seal)	1	.31
50-A	L-420-B	Oil Pump Bushing	1	.35
51	220-N	Oil Pump Master Gear Nut	1	.02
52	L-303	Cylinder Stud Bolt and Crankcase Stud Bolt	5	.13
53	L-405	Plunger Guide Stud	4	.13
54	L-117	Drive Pinion Bearing	1	2.09
55	503-K	Cam Shaft Gear Key and also for L-117	3	.02
56	210-N	Spreader Bolt Nut	1	.06
57	L-107	Spreader Bolt Washer	1	.40
58	L-104	Flywheel	2	5.39
59	L-113	Flywheel Nut Lock Washer	2	.06
60	L-112	Flywheel Nut	2	.14
61	L-863	Connecting Rod complete with Bushings	1	4.43
62	L-306-B	Connecting Rod Bushing, large	1	.91
63	L-105	Crank pin	1	2.81
64	L-810-A	Magneto Shaft Extension	1	.68
65	L-402	Exhaust Cam Shaft	1	3.03
66	L-424	Intake Cam Shaft	1	3.03
67	L-106	Spreader Bolt	1	.44
68	L-110	Timing Pinion Shaft	1	5.39
69	L-417	Bearing Stud	1	.36
70	L-416	Idler Gear Bearing	1	1.88
71	L-413	Cam Shaft Gear	2	2.09
72	L-415	Idler Gear	1	2.76
73	L-426	Cam Shaft Bushing, use with Expansion Plug	3	.31
74	L-115	Timing Pinion Bearing	1	3.91
75	L-419-A	Oil Pump Drive Gear	1	1.53
76	L-120	Crankcase Dowel	2	.19
78	L-116	Crankcase Bolt	8	.18
79	403-W	Idler Gear Stud Flat Washer	1	.01
80	305-W	Lockwasher	5	.01
81	507-K	Oil Pump Master Gear Key	1	.02
82	L-855	Idler Gear Stud	1	.13
83	L-853	Oil Pump Master Gear	1	2.45
84	L-854	Oil Pump Idler Gear	1	.98
85	L-125	Bearing Cap Gasket	1	.05
86	L-850	Bearing and Pump Cap	1	3.48
87	L-126-A	Bearing Cap Double Seal	1	1.16
88	L-852	Gasket, 1/64" thick, (Pump Cover)	1	.04
89	L-852-A	Pump Cover Shims, .005 thick	opt.	.03
90	L-851	Pump Cover	1	.40
91	185-S	Bearing Cap Bolt, long	3	.07
92	165-S	Bolts	3	.02
93	5745	Fan Drive Pulley	1	5.23
94	309-W	Fan Drive Pulley Nut, Lock Washer	1	.02
95	218-N	Fan Drive Pulley Nut	1	.10
96	L-210	Gasket	1	.01

LUBRICATION CHANGEOVER: During 1958 a change in lubrication was made, which will influence the ordering of several parts for repairs. This change is best recognized by the style of Oil Filter on your Tractor. If the Filter is a screw-on can and it may be removed without disconnecting the fittings, the repair parts apply as shown in the previous parts listings and illustrations. However, if you have the older style system (best recognized by oil lines and fittings mounted directly into the Oil Filter) the following instructions apply for repair parts:

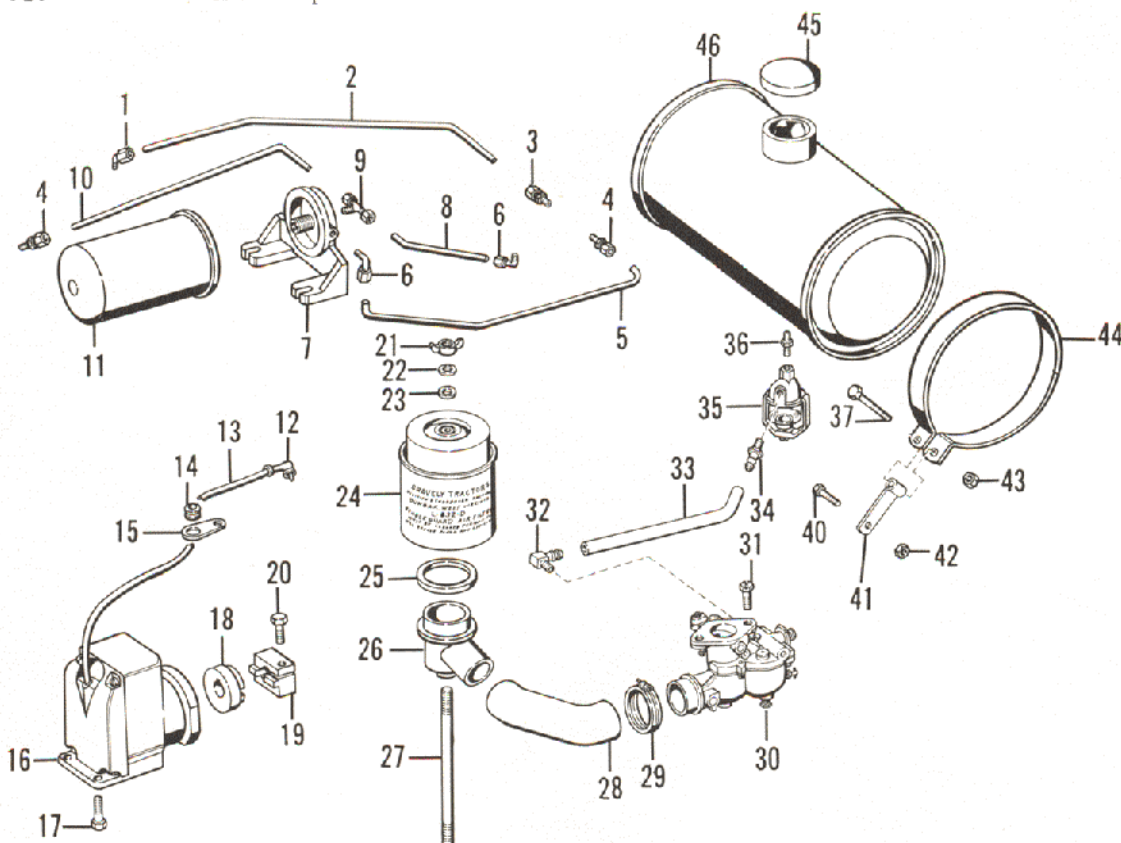
<u>Part No.</u>	<u>Description</u>	<u>Price</u>
L-306	Connecting Rod, (instead of L-863)	4.43
L-421	Oil Pump Master Gear, (instead of L-853)	2.45
L-422	Oil Pump Idler Gear, (instead of L-854)	.98
L-423	Idler Gear Stud, (instead of L-855)	.13
L-103	Bearing & Pump Cap, (instead of L-850)	3.48
L-815-A	Relief Valve, (instead of L-856)	.67
L-815-B	Relief Valve Plunger, (instead of L-865)	.51
L-813-E	Oil Line, (instead of L-859)	.22
L-813-C	Oil Line, (instead of L-861)	.22
L-813-F	Oil Line, (instead of L-860)	.22
5737-B	Valve Guide, (instead of L-881-N)	1.75
5737-B	Valve Guide, (instead of L-881-X)	1.75
L-875	Cover, (instead of L-315, L-316 & L-318)	1.00

Note: Write for Changeover Bulletin giving procedure to changeover any Tractor to the heavy duty Oil Pump and Full-Flow Oil Filter.



<u>Item No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Quan. Req'd.</u>	<u>Price</u>
1	L-614-B	Wheel Hub	2	\$3.41
2	L-616-IR	Inner Rim	2	1.38
3	3509	Rim Bolt Nuts	6	.03

Item No.	Part No.	Description	Quan. Req'd.	Price
4	L-616-TU	Tractor Tire Tube	2	\$ 2.78
5	L-616-TI	Tractor Tire, sure grip or studded	2	11.22
6	L-616-OR	Outer Rim, (with valve hole)	2	1.38
7	179-S	Rim Bolts	6	.08
8	L-613	Hub Cap Washer	2	.04
9	L-619	Hub Cap	2	.06



Item No.	Part No.	Description	Quan. Req'd.	Price
1	L-814-F	Elbow, Oil Strainer Body to Oil Line	1	\$.31
2	L-813-A	Oil Intake Line, Strainer to Pump	1	.22
3	L-814-A	Pump Inlet Connector	1	.22
4	L-707	Relief Valve and Pump Line Connector	2	.19
5	L-859	Oil Line, Pump to Filter	1	.22
6	L-814-DL	Engine Elbow, long style	1	.22
7	L-858	Oil Filter Bracket	1	1.75
8	L-860	Oil Line, Filter to Engine	1	.22
9	L-814-C	Discharge Line Tee	1	.39
10	L-861	Oil Line, Filter to Relief	1	.22
11	L-857	Oil Filter	1	2.60
12	1726	Spark Plug Rubber Cover	1	.28
13	1731	Magneto Cable	1	.42
14	L-827	Rubber Grommet	1	.06
15	L-826	Cable Bracket	1	.14
16	L-808	Magneto	1	35.60

When ordering parts for Carburetor or Magneto repair, be sure to specify the make and model number of the Carburetor or Magneto. Secure this information directly from the small name plate attached to the Carburetor and Magneto.

17	179-S	Magneto to Chassis Bolt	2	.08
18	L-809-F	Magneto Fibre Float Member	1	1.21
19	L-811	Magneto Coupling Steel	1	1.40
20	154-S	Magneto Coupling Bolt	1	.06
21	EWN-4C	Wing Nut	1	.20
22	401-W	Washer	1	.01
23	L-837	Washer, Rubber	1	.03
24	L-832-D	Double Air Guard	1	3.75
NS	L-832-E	Dacron Felt Element for L-832-D	1	2.50
25	L-834	Gasket	1	.11
26	L-833	Air Filter Bracket	1	.99
27	L-819-E	Air Filter Bolt	1	.13
28	L-841	Air Filter Hose	1	1.54
29	L-836	Air Filter Hose Clamp	2	.11
30	L-806-Z	Carburetor-Zenith	1	15.54
31	126-S	Carburetor Bolt	2	.06
32	L-843	Elbow, Carburetor to Gas Line	1	.22
33	L-844	Gas Line	1	.22
34	L-842	Gas Line to Gas Strainer Connector	1	.15
35	L-705	Gas Strainer Complete	1	1.75
Gas Strainers (name of strainer cast into strainer body)				
NS	L-832-E	Element(for L-832-D)	1	2.50
NS	L-832-R	Rubber Sealing Ring (for L-832-E)	2	.15
NS	L-832-W	Oil Wick	1	.15
NS	L-832-H	Base Grommet	1	.15
NS	L-832-G	Grommet	1	.15

Tillotson		Crippen		Description
Part No.	Price	Part No.	Price	
L-705-A	\$.65	L-705-H	\$.42	Gas Shutoff Valve
L-705-B	.22	L-705-I	.22	Glass Bowl
L-705-C	.20	L-705-M	.25	Bowl Nut
L-705-D	.20	L-705-K	.14	Wire Screen
L-705-E	.75	L-705-L	.34	Cast Body
L-705-F	.45	L-705-J	.28	Bale Assembly
L-705-G	.08	L-705-N	.03	Gasket

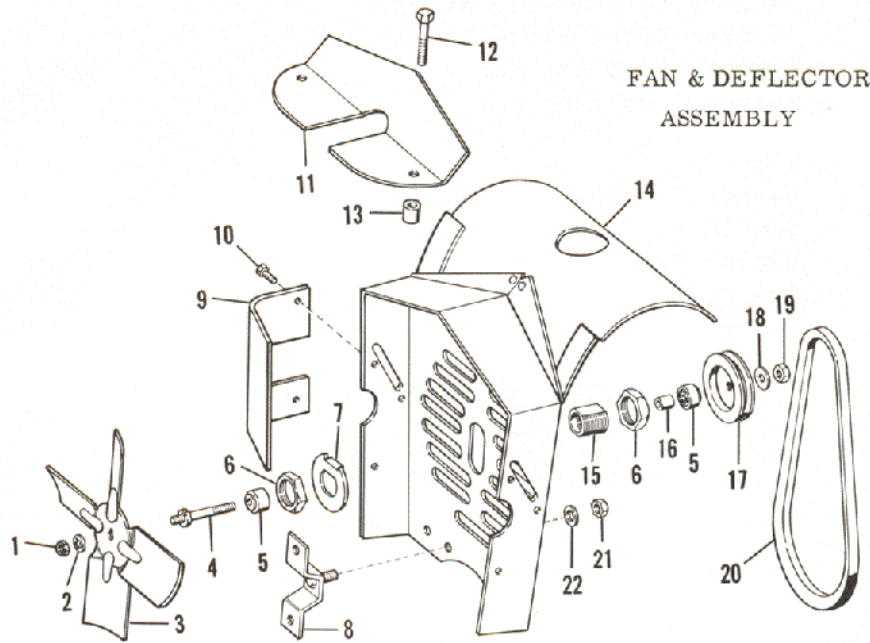
36	L-814-E	Gas Filter Nipple	1	.13
37	149-S	Tank Band Bolt-Long	2	.08
40	114-S	Tank Band to Fan Housing Bolt	2	.09
41	5164-B	Anchor Bracket	2	.19
42	233-N	Elastic Stop Nut	4	.08
43	233-N	Elastic Stop Nut	4	.08
44	5164-A	Tank Band Right & Left	2	.50 ea.
45	2505	Gas Tank Cap	1	.44
46	L-701	Gas Tank	1	6.38
NS	2506	Gas Tank Cap Gasket	1	.08

Oil Pressure Gauge (optional equipment)

- A. New style Lubrication System on Tractors starting in 1958 (Manufacturing Number B-7620) or on all Tractors converted to heavy duty Oil Pump and Full-Flow Oil Filter.

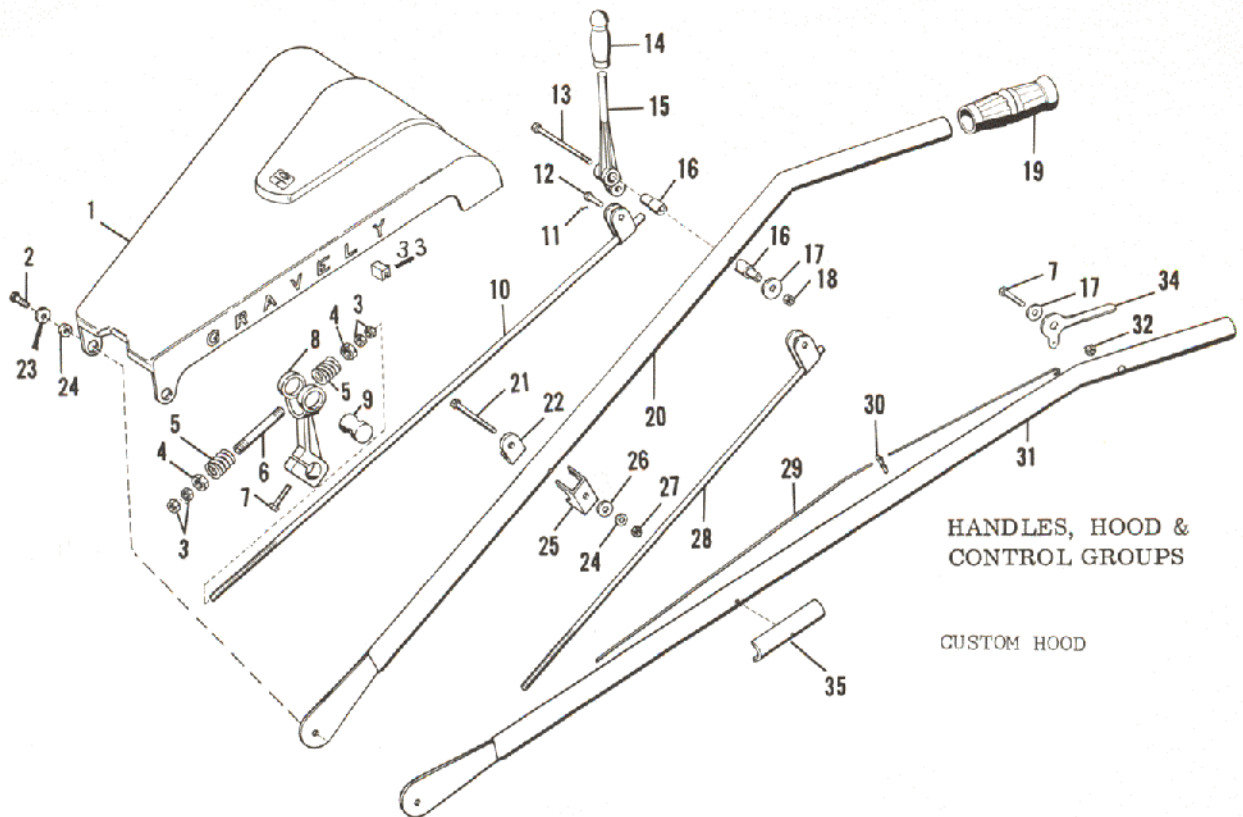
Part No.	Description	Price
L-866	Oil Gauge only	\$2.75
L-867	Oil Gauge Adapter	.50

- B. Older style Tractors before 1958 (Manufacturing Number B-7620) Tractors with older style Oil Pump and partial Flow Oil Filter, specify Oil Pressure Gauge--old style.



Item No.	Part No.	Description	Quan. Req'd.	Price
1	206-N	Fan Securing Nut	1	\$.02
2	305-W	Fan Nut Lock Washer	1	.01
3	L-805	Fan Blade	1	1.27
4	5137	Fan Shaft	1	.56
5	5139	Fan Ball Bearing	2	2.09
6	5134	Fan Bearing Lock Nut	2	.32
7	L-830	Fan Retainer Adjusting Washer	1	.22
8	L-224	Fan Housing Bracket	2	.64
9	L-838-A-RH	Air Deflector, Right Hand	1	.50
	L-838-B-LH	Air Deflector, Left Hand	1	.50
10	156-S	Screws for L-838-A and B	4	.02
11	L-839	Cylinder Head Air Deflector	1	.66
12	155-S	Long Cylinder Head Screw	2	.06
13	L-840	Deflector Spacer	2	.09
14	L-222	Fan Housing	1	4.41
15	5133	Fan Bearing Race Retainer	1	1.33
16	5165	Fan Bearing Spacer	1	.08
17	L-802	Fan Pulley	1	.88
18	401-W	Fan Pulley Jam Nut Washer	1	.01
19	204-N	Fan Pulley Jam Nut	1	.02
20	5163	Fan Belt *	1	1.18
21	205-N	Nut for L-224 Bracket	2	.03
22	403-W	Flat Washer for L-224 Bracket	2	.01

* A-section (1/2" wide) 31" belt, or GATES 2310

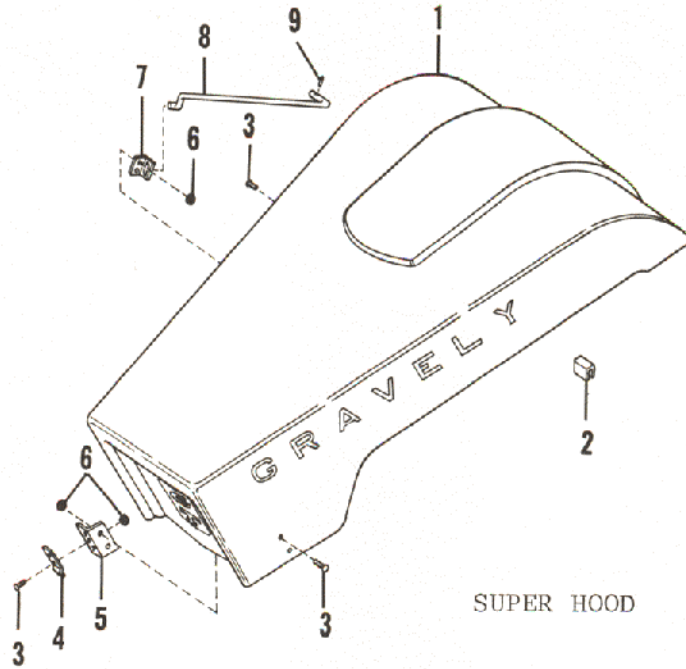


HANDLES, HOOD &
CONTROL GROUPS

CUSTOM HOOD

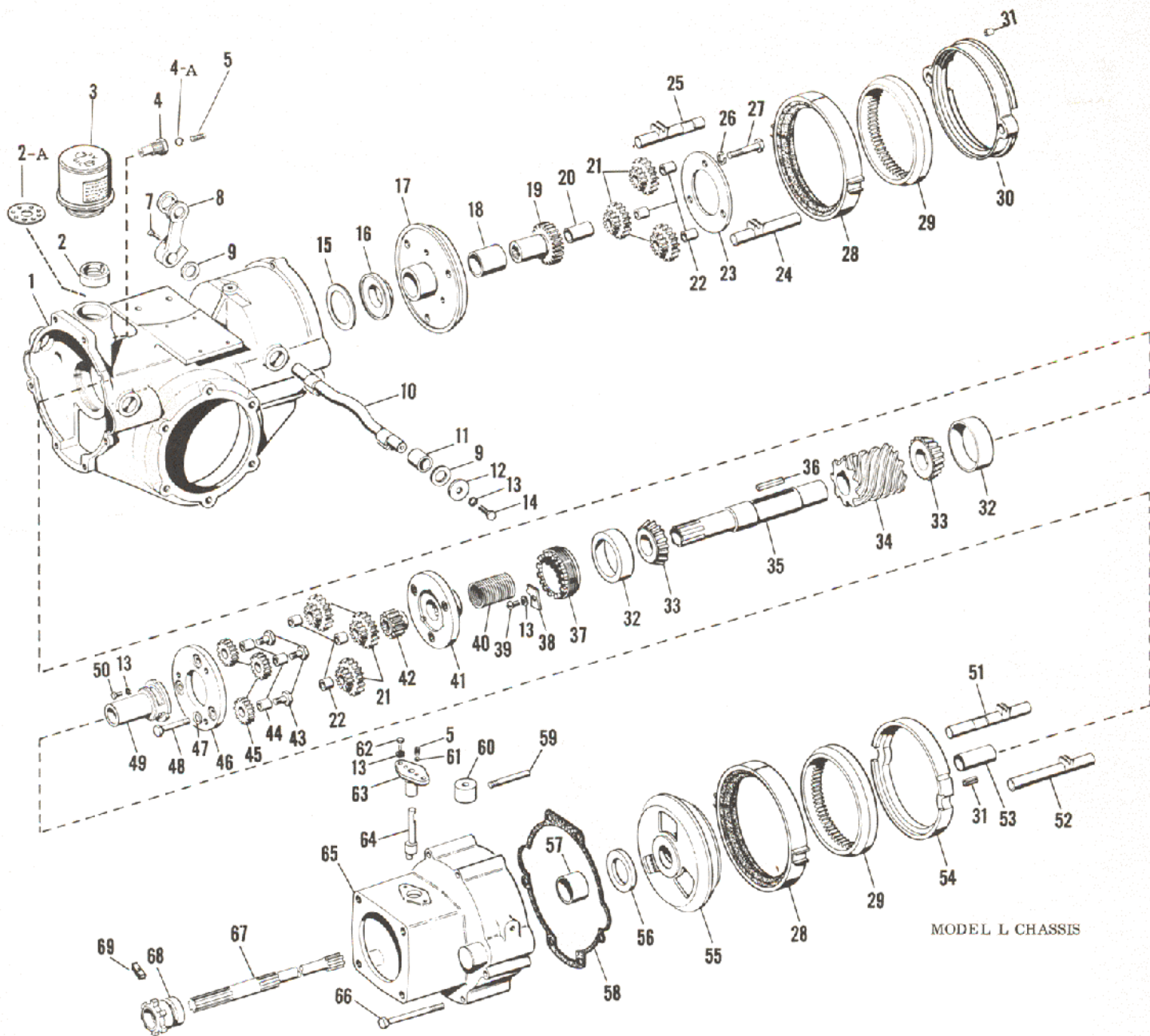
Item No.	Part No	Description	Quan. Req'd.	Price
1	L-820-A	Hood-Custom	1	\$6.00
2	112-S	Bolt	2	.07
3	206-N	Clutch Adjusting Nut	4	.02
4	210-N	Clutch Sleeve Nut (repairs only)	2	.04
5	L-729	Spring	4	.14
6	L-730	Clutch Rod (threader repairs)	2	.31
7	154-S	Throttle lever pivot & actuating lever bolt	3	.06
8	L-715	Clutch Actuating Lever	2	1.29
9	L-723	Clutch Rod Pivot	2	.39
10	L-720-L	Clutch Rod-Long	1	1.09
11	602-C	Cotter Pin for L-722 Pin	2	.01
12	L-722	Clutch Rod Clevis Pin	2	.11
13	L-718	Hand Lever Pivot bolt	1	.17
14	5167	Hand Lever Grip	2	.25
15	L-716	Clutch Hand Lever Drive Speed Selector Lever	2	.79
17	L-744	Throttle Lever Nylon Washer	2	.10
18	233-N	Hand Lever Pivot Bolt Nut	1	.13
16	L-717	Hand Lever Pivot	2	.28
19	L-725	Driving Handle Grip	2	.46
20	L-724-R	Driving Handle-Right	1	3.19
21	131-S	Driving Handle Bolt	2	.11
22	L-742	Clutch Rod Brace	1	.11
23	L-821	Washer	2	.06
24	305-W	Washer	2	.01
25	L-728	Driving Handle Bracket	2	.44
26	403-W	Driving Handle Bolt Flat Washer	2	.01
27	205-N	Driving Handle Bracket Nut	2	.03
28	L-720-S	Clutch Rod Short	1	1.05

29	L-737	Throttle Wire	1	.10
30	L-743	Throttle Stud	1	.10
31	L-724-L	Driving Handle-Left	1	3.19
32	214-N	Pivot Bolt Nut	1	.02
33	L-846	Rubber Channel	1	.05
34	L-740-A	Throttle Lever	1	.24
35	L-726	Handle Clamp	2	.15



SUPER HOOD & PARTS NECESSARY FOR INSTALLING

1	ST-127	Hood-Super	1	6.00
2	L-846	Rubber Channel	2	.05
3	NT-10-ST-5	Truss Head Machine Screw	10	.02
4	ST-128	Starter Hood Clip Spring	2	.10
5	ST-130	Starter Hood Pivot Plate	2	.35
6	207-N	Hex Nut	10	.02
7	ST-131	Starter Hood Catch	1	.35
8	ST-129	Starter Hood Support Rod	1	.40
9	2-RP-4	Roll Pin	1	.05



MODEL L CHASSIS

Photo No.	Part No.	Description	No. Req'd.	Price
1	L-201	Chassis Casting	1	\$37.60
2	L-211	Chassis Oil Filler Neck	1	.19
2-A	L-864	Filler Neck Baffle	1	.10
3	L-212	Chassis Oil Filler Cap Breather	1	.78
4	L-856	Relief Valve Body	1	.67
4-A	L-865	Relief Valve Check Ball	1	.03
5	L-815-D	Spring .025"	2	.14
7	154-S	Actuating Lever Clamp Bolt	2	.06
8	L-715	Actuating Shaft Lever	2	1.29
9	L-735	Thrust Washer	1	.03
10	L-712	Clutch Actuating Shaft	2	2.87
11	L-713	Actuating Shaft Bushing	4	.24
12	L-736	Oil Seal Washer	2	.03
13	303-W	Quill Securing Bolt Washer	8	.01

14	165-S	Bolt	2	.02
15	2211	Rear Thrust Plate Shim (.020)	1	.07
16	L-519	Rear Thrust Plate	1	1.21
17	L-506	Rear Pin Plate	1	4.59
18	L-535	Rear Pin Plate Bushing	1	.56
19	L-511	Sun Gear	1	4.29
20	L-534	Sun Gear Bushing	1	.36
21	L-513	Orbit Gear	6	2.31
22	L-514	Orbit Gear Pin	6	.24
23	L-515	Pin Spacer	1	.42
24	L-711-R	Clutch Slide Rod, short	1	1.84
25	L-711-L	Clutch Slide Rod, short	1	1.84

Clutch Slide Rods: When ordering Clutch Cup (Part L-517) for Tractors manufactured earlier than 1956, it is necessary to also order the Clutch Slide Rods, Part L-710 (long) right and left for the front Clutch, or Part L-711 (short) right and left for the rear Clutch.

26	305-WL	Spacer Lockwasher Left Hand	3	.02
27	L-516-L	Spacer Bolt Rear Pin Plate	3	.19
28	L-517	Clutch Cup	2	4.62
29	L-501	Internal Gear	2	3.93
30	L-524	Rear Spacer	1	5.39
31	HE-106	Roll Pin-	2	.09
32	L-522-R	Worm Shaft Bearing Race	2	1.93
33	L-522-C	Worm Shaft Bearing Cone	2	3.03
34	L-601	Worm, Standard, (Specify 4, 6, or 8 lead)	1	9.08
35	L-521	Worm Shaft	1	4.53
36	L-608	Worm Key	1	.06
37	L-507	Bearing Adjusting Nut	1	1.53
38	L-523	Adjusting Nut Lock	1	.06
39	164-S	Lock Screw	1	.02
40	L-547	Pin Plate Spacer	1	.39
41	L-505	Front Pin Plate	1	3.70
42	L-510	Sun Pinion	1	1.32
43	L-542	Reverse Idler Bolt	3	.14
44	L-541	Reverse Idler Bushing	3	.15
45	L-540	Reverse Idler	3	1.49
46	L-539	Front Pin Spacer	1	3.04
47	305-W	Spacer Lockwasher	3	.01
48	L-516-R	Spacer Bolt Front Pin Plate	3	.19
49	L-536	Pin Plate Quill	1	4.29
50	191-S	Quill Securing Bolt	3	.03
51	L-710-R	Clutch Slide Rod, long	1	1.96
52	L-710-L	Clutch Slide Rod, long	1	1.96
53	L-546	Pinion Shaft Bearing	1	.44
54	L-508	Gear Cup	1	4.13
55	L-538	Reverse Cone	1	8.82
56	L-520	Front Thrust Plate	1	.88
57	L-532	Quill Bearing	1	.50
58	L-209	Chassis Front Gasket	1	.10
59	L-732	Shipper Shaft Lever	1	.13
60	L-733	Locator Body	1	.88
61	1809	Locator Ball	1	.02
62	164-S	Shipper Shaft Guide Bolt	2	.02
63	L-734	Shipper Shaft Guide	1	1.10
64	L-545	Shipper Shaft	1	1.32
65	L-202	Advance Casting	1	15.84

65-A	152-S	Attachment Bolt	4	.11
66	L-207	Advance Casting Bolt	6	.15
67	L-543	Pinion Shaft	1	4.95
68	L-544	Clutch Dog	1	2.70
69	L-226	Dog Block	1	.35


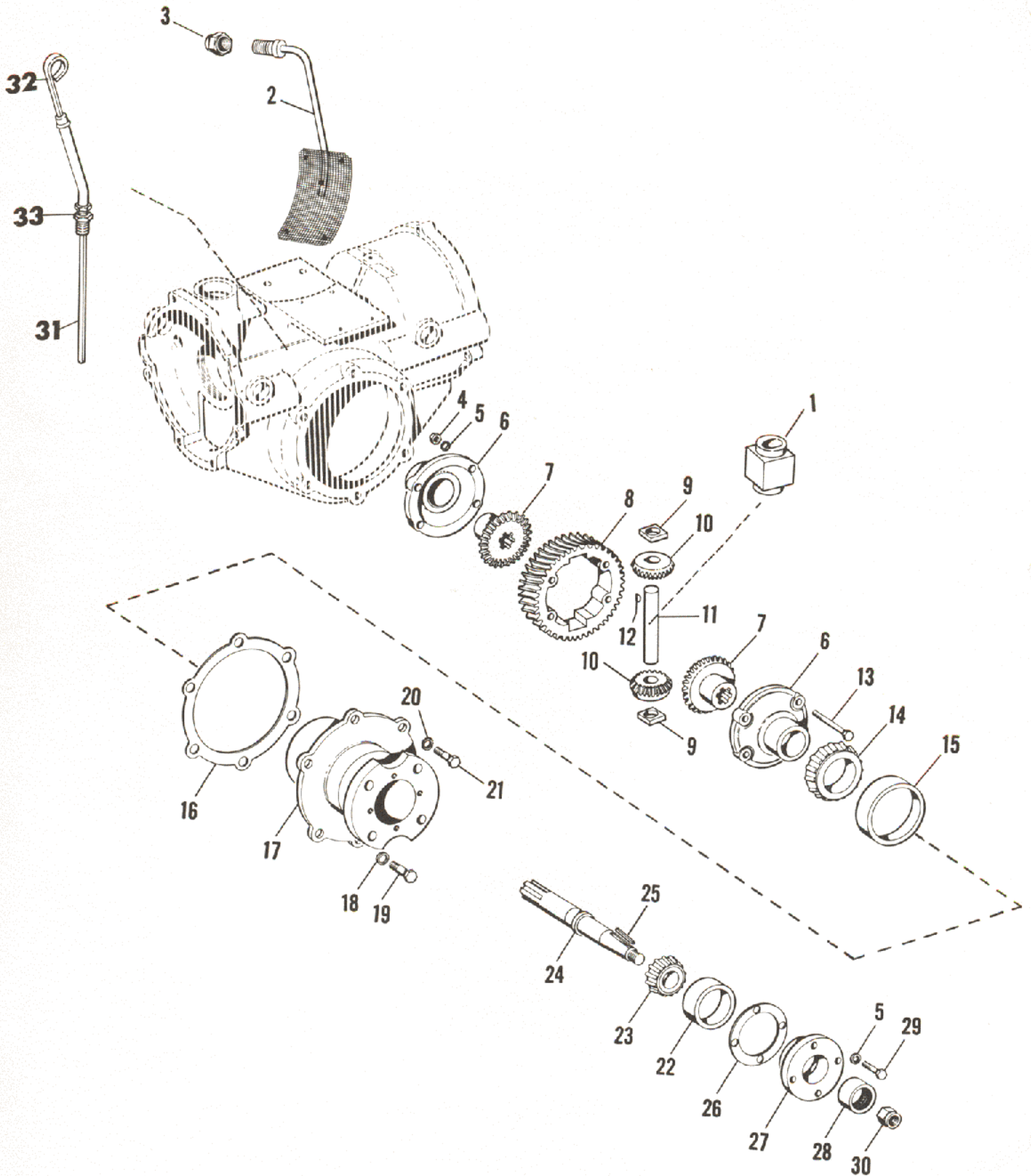
MODEL "L" CHASSIS
ILLUSTRATION B 

Photo No.	Part No.	Description	Quan. Req'd.	Price
1	L-606	Thrust Block	1	\$.90
2	L-868	Oil Strainer Body	1	1.75
2-A	L-823-A	Gasket	1	.04
3	218-N	Oil Strainer Nut	1	.10
4	204-N	Nut	4	.02
5	304-W	Bearing Cap Lockwasher	4	.01
6	L-205	Differential Housing	2	2.45
7	L-604	Bevel Gear	2	5.68
8	L-602	Worm Gear, (Specify 4, 6, or 8 lead)	1	18.98
9	L-607-K	Driving Block, (with keyway)	2	.50
10	L-603	Bevel Pinion	2	3.36
11	L-605	Pinion Pin	1	.98
12	501-K	Pinion Pin Key	1	.02
13	L-206	Differential Housing Bolt	4	.15
14	RB-111-C	Differential Bearing Cone	2	3.69
15	RB-111-R	Differential Bearing Race	2	2.26
16	L-220	Shim (.005 22¢ .020 28¢)		
16-A	L-220-G	Gasket	2	.10
17	L-203-D	Axle Housing	2	7.98
18	L-213	Washer	1	.07
19	123-S	Axle Housing Drain Bolt (nylon plug)	1	.16
20	308-W	Lock Washer	11	.01
21	122-S	Axle Housing Bolt	11	.10
22	RB-110-R	Axle Bearing Race	1	1.38
23	RB-110-C	Axle Bearing (cone)	1	2.26
24	L-611-HT	Axle	2	3.80
25	L-615	Axle Key	2	.06
26	L-219-D	Shim (As required .005 .11ea. .020 .15ea.)		
27	L-204-D	Bearing Cap	2	1.49
28	L-221-A	Bearing Cap Oil Seal (double)	2	1.16
29	126-S	Bearing Cap Bolt	8	.06
30	227-N	Axle Nut	2	.23
31	L-883	Dip Stick	1	
32	L-884	Dip Stick Guide	1	
33	L-885	Dip Stick Fitting	1	

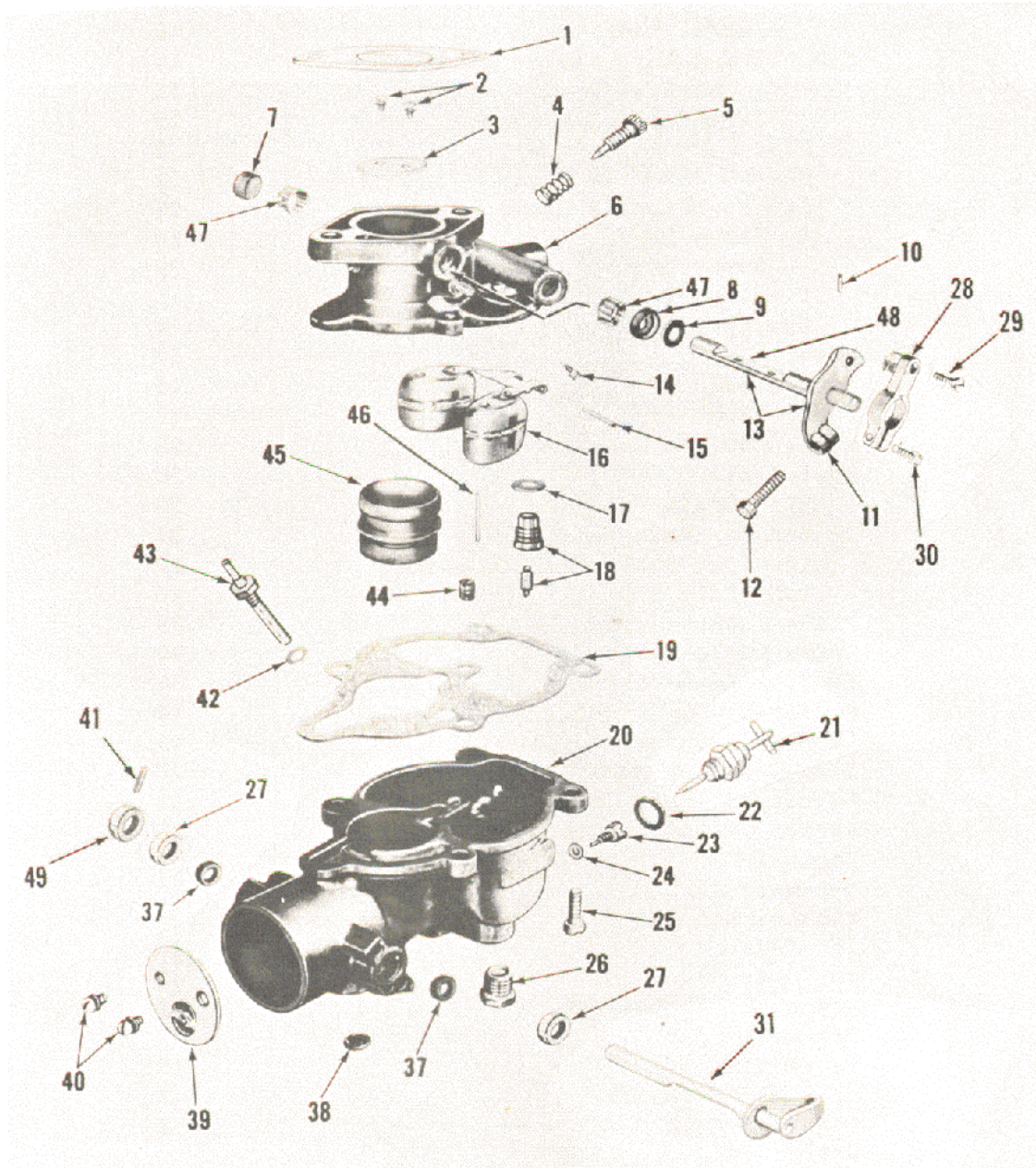
(Commences with our Mfg. No. E-9006

MODEL L CHASSIS (CONT'D)



GRAVELY-ZENITH 68-7 CARBURETOR NO. 12108-D-(GRAVELY NO. L-806) SERVICE PARTS LIST

Effective Date: October 1, 1962



GRAVELY TRACTORS
Division Studebaker Corporation
DUNBAR, WEST VIRGINIA

Part No.	No. Req'd.	Part Name	Ref. No. Photo 2539 C	List Price
* B2-209H-1	1	Body-Throttle Assembly	6	9.00
C9-75	2	Bushing Throttle Shaft	47	.20
CT48-9	1	Seal Throttle Shaft	8	.35
CT52-57	1	Retainer Shaft Seal	9	.07
C131-38	1	Plug Shaft Hole	7	.06
* C229-12108	1	Shaft & Stop Lever-Throttle	13	2.20
C23-680	1	Shaft Throttle	48	1.05
* CR28-104	1	Lever-Throttle Stop Assembly	11	1.15
T8S8-12	1	Screw Throttle Stop	12	.06
CT63-9	1	Taper Pin-Stop Lever	10	.06
C21-176	1	Plate-Throttle	3	1.30
* T315B5-4	2	Screw- Throttle Plate	2	.08
* C24-11BN-1X2	1	Lever- Throttle Clamp	28	1.90
T8S10-9	1	Screw-Lever Clamp	30	.06
T8S8-6	1	Screw-Lever Swivel	29	.06
C46-6	1	Needle-Idle Adjusting	5	.70
* C111-205	1	Spring-Idle Needle	4	.25
C85-28	1	Float	16	1.70
C120-4	1	Axle-Float	15	.20
C142-68	1	Gasket-Bowl to Body	19	.11
T301S10-10	4	Screw-Bowl To Body Assembly	25	.06
* B3-121-D-5	1	Bowl-Fuel	20	8.95
C135-29	1	Disc-Drain	38	.20
CT57-4	2	Washer-Shaft Packing	37	.06
C131-4X2	2	Retainer-Shaft Packing Washer	27	.06
C63-224	1	Tube-Idle Filler	46	
C101-79	1	Plate-Choke	39	1.50
* T315B5-4	2	Screw-Choke Plate	40	.08
* C108-257-1	1	Shaft & Lever-Choke	31	1.60
C130-4	1	Collar-Shaft Thrust	49	.06
CT63-8	1	Taper Pin-Thrust Collar	41	.06
CT91-3	1	Plug-1/8 Pipe-Bowl Drain	26	.20
C71-21	1	Adjustment-Main Jet	21	1.70
T56-23	1	Washer-Jet Adjustment	22	.06
B38-74-17	1	Venturi	45	2.25
* C52-7-25	1	Jet-Main	23	1.35
T56-24	1	Washer-Main Jet	24	.06
C55-6-12	1	Jet-Idle	14	1.00
C66-114-40	1	Jet-Discharge	43	1.20
T56-48	1	Washer-Discharge Jet	42	.06
C77-18-20	1	Jet-Well Vent	44	.55
C81-17-35	1	Valve & Seat-Fuel	18	1.65
T56-20	1	Washer-Fuel Value Seat	17	.06
L-301-B	1	Gasket-Flange	1	.06
C181-329	1	Gasket Set		.45
K12108	1	Repair Kit		4.34

NOTE: Parts indented are part of the preceding complete assembly.

* New Parts not in previous Carburetor 12108-A.

GRAVELY

Zenith 68 Series Carburetor

ZENITH 68 SERIES CARBURETOR FOR GRAVELY 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".

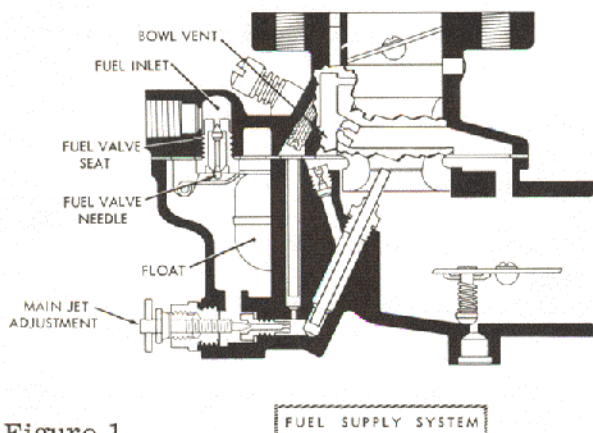


Figure 1

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.

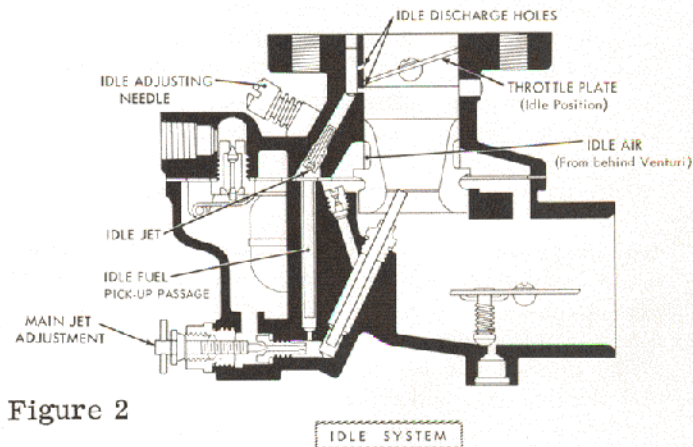


Figure 2

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.

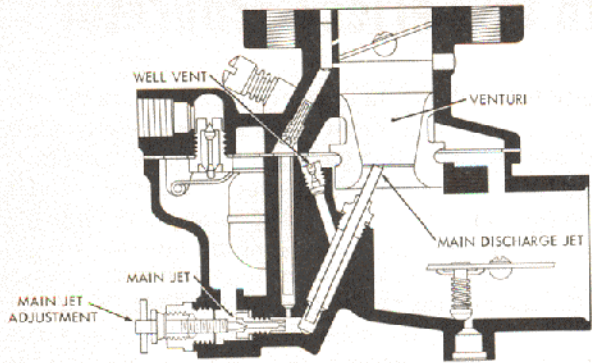


Figure 3

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.

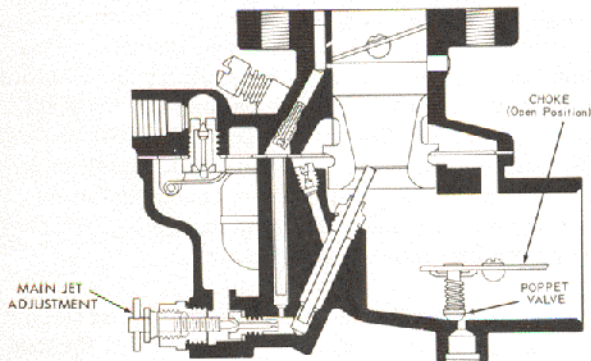


Figure 4

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.

- (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.

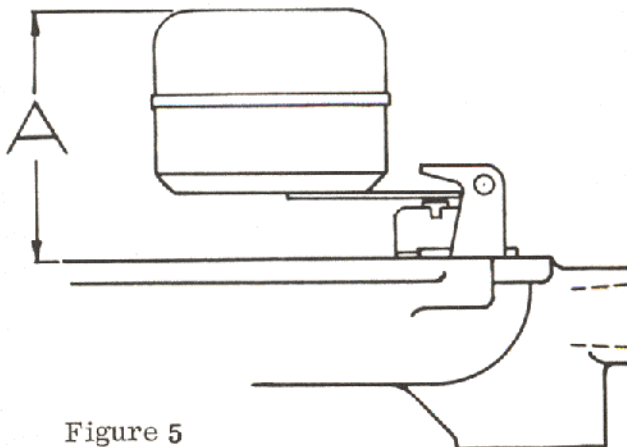
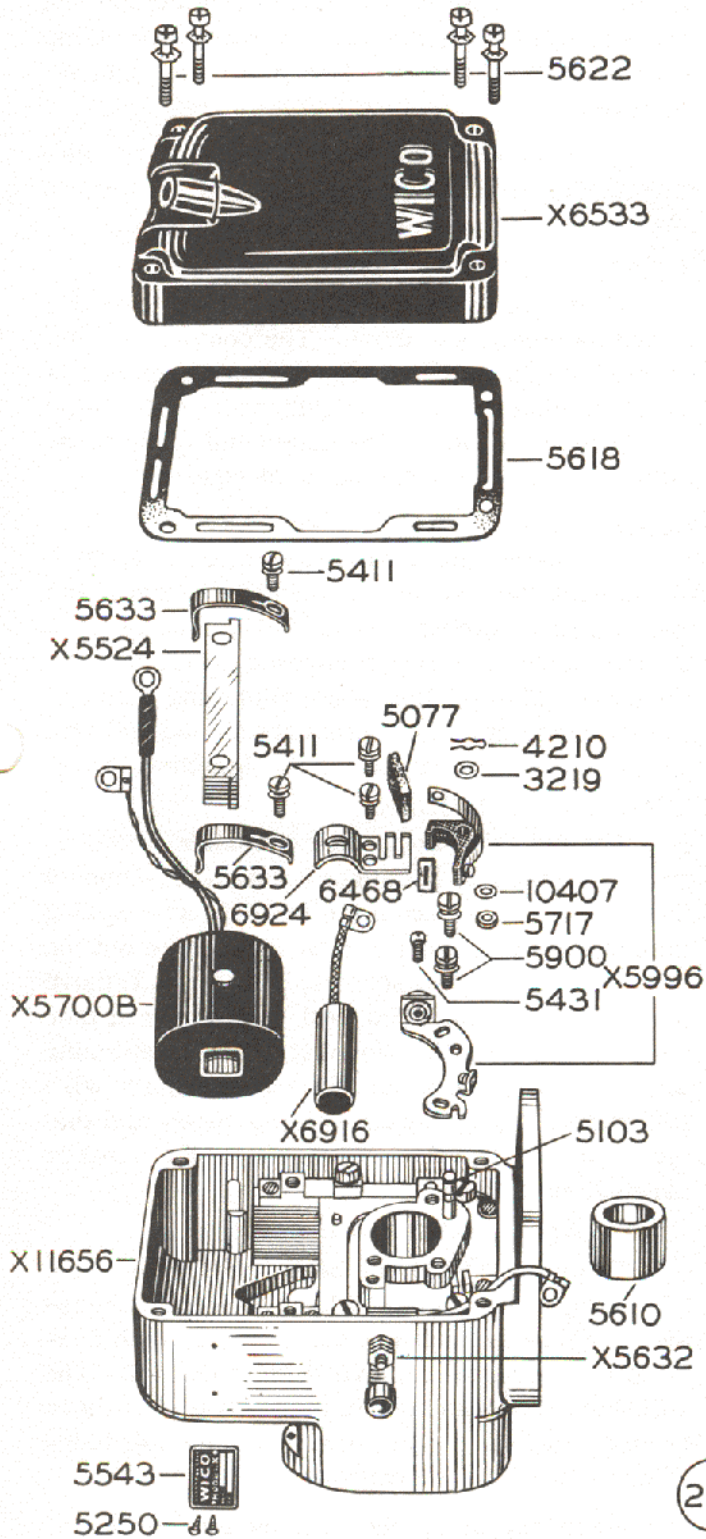


Figure 5

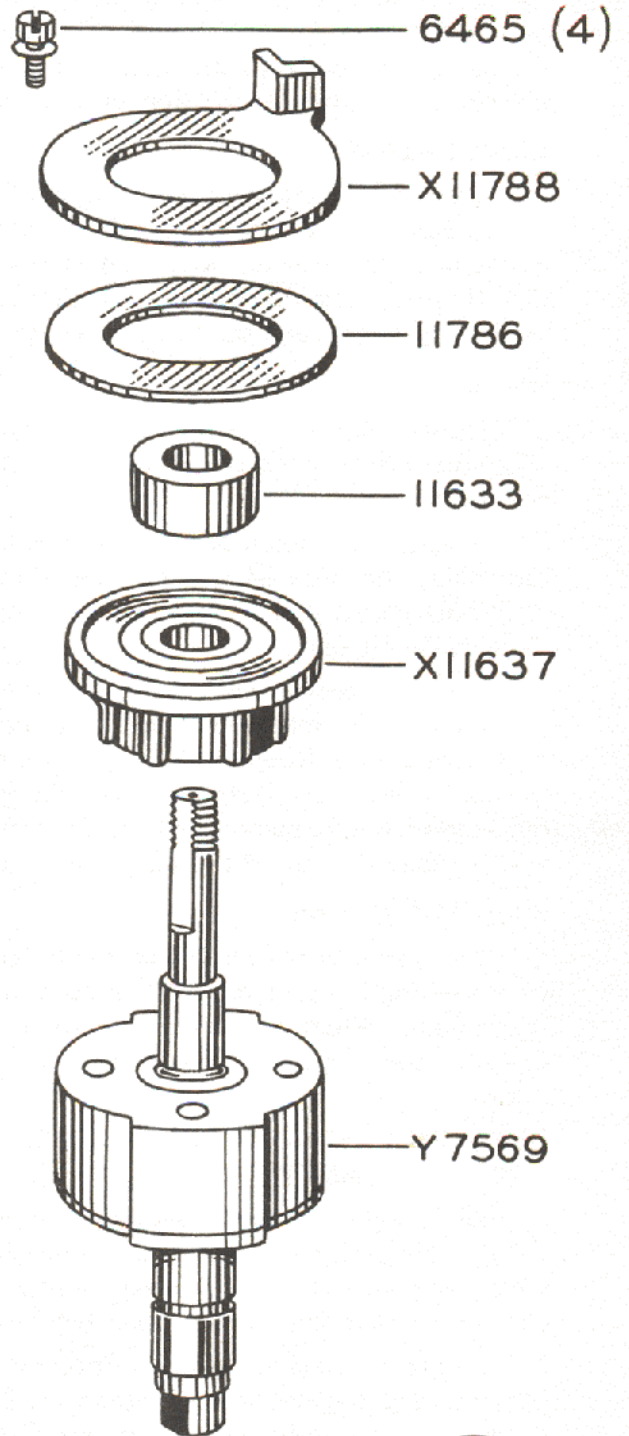
GRAVELY TRACTORS

A DIVISION OF STUDEBAKER-PACKARD CORPORATION
DUNBAR, WEST VIRGINIA

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>	<u>List Price</u>
M-42XA	1	Drive Flange Spacing Washer	\$.05
M-55XA	2	Ground Stud Lockwasher .....	.05
A-179X	1	Trip Arm ..	.35
15-186	1	Drive Spring .....	.85
A-243X	1	Snap Ring .....	.05
IXA-256	1	Ground Stud Washer (steel) .....	.05
16-583	1	Drive cup Spacing Washer .....	.15
2122	1	Driven Flange Spacer .....	.10
IVA-583	1	Drive Cup Spacing Washer .....	.10
X2286	1	Driven Flange Group .....	.95
2288	1	Drive Spring Retainer .....	.25
3219	1	Breaker Arm Pivot Washer.....	.05
3230	2	Ground Stud Nut .....	.05
3945	1	Ground Stud .....	.05
4210	1	Breaker Arm Lock .....	.05
5077	1	Cam Wiper Felt .....	.05
5250	2	Name Plate Screw .....	.05
5411	2	Condenser Clamp Screw (Sems) .....	.05
5411	2	Coil Core Clamp Screw (Sems).....	.05
5411	1	Impulse Dust Cover Screw (Sems) .....	.05
5431	1	Breaker Spring Clamp Screw.....	.05
X5524	1	Coil Core Group .....	.70
5543	1	Name Plate .....	.10
5603	1	Breaker Arm Pivot .....	.05
5610	1	Breaker Plate Bushing .....	.25
5618	1	Cover Gasket (Inc. in X6533).....	.10
5622	4	Cover Screw (Sems).....	.05
X5632	1	Stop Button Group .....	.15
5633	2	Coil Core Clamp .....	.05
X5700B	1	Coil Group	6.60
5717	1	Breaker Point Aligning Washer.....	.05
X5750	1	Ground Connection Unit.....	.55
X5757	1	Ground Lead Group .....	.25
5900	2	Fixed Contact Clamp Screw (Sems).....	.05
X5996	1	Breaker Contact Set.....	2.40
6230	1	Impulse Lock Nut .....	.85
6465	4	Impulse Stop Clamp Screw (Sems).....	.05
X6533	1	Cover Unit	2.60
6693	1	Impulse Dust Cover Gasket .....	.05
6694	1	Impulse Dust Cover Ring .....	.10
6732	1	Coil Contact Spring .....	.05
X6916	1	Condenser.....	2.15
6924	1	Condenser Clamp .....	.15
X7444	1	Dust Cover Unit.....	.45
7446	1	Drive Cup	3.25

<u>Part No.</u>	<u>No. Req'd.</u>	<u>Part Name</u>	<u>List Price</u>
7447	1	Impulse Dust Cover	\$.25
Y7569	1	Rotor	10.90
9820	1	Ground Stud Insulating Lock.....	.05
10407	1	Breaker Point Aligning Washer (thin).....	.05
11633	1	Impulse Spacer .....	.65
X11637	1	Bearings Cage Group	2.00
X11650	1	Impulse Coupling Unit	5.00
X11656	1	Housing Group	10.90
11689	1	Rotor Bearing (Inc. in X11637).....	.25
11786	1	Impulse Stop Gasket (Inc. in X11788).....	.10
X11788	1	Impulse Stop Group	1.05
11874	1	Ground Stud Insulator .....	.40