Oliver

Service Manual

70 Row Crop, Standard & Orchard

Service® Manual

INTRODUCTION

This manual is written to furnish a ready reference and complete instructions covering the proper procedures for accomplishing the overhaul and making the adjustments of all component parts on the Oliver "70" tractors.

It is intended primarily for use by the Shop Mechanic engaged in overhauling and servicing the tractors and furnishes information sufficient to return them to new condition. In addition, it incorporates information necessary to keeping the tractors in good condition while being operated in the field.

In the discussion of each component part, it is assumed that a complete overhaul is being performed, consequently complete disassembly and reassembly of each unit is given. In cases where complete overhaul is not required, the Mechanic is relied upon to decide how far the disassembly should be carried, and the proper procedure to follow in removing parts which interfere with the work being done.

Where reference data, covering specific clearances or dimensions, are required in the overhaul of a unit, such information is included in tabular form at the beginning of the discussion to provide a quick sight reference. The purpose of this is to enable an experienced Mechanic to find the data without reading through the entire discussion.

Shop equipment suitable for conducting an overhaul is an absolute necessity as most operations cannot be successfully performed in the field. For this reason, this manual is not intended for distribution to tractor owners.

Careful workmanship is extremely important to assure the successful operation of the tractor after completion of the overhaul and it is advisable to become thoroughly familiar with each operation and to be certain that each is performed correctly.

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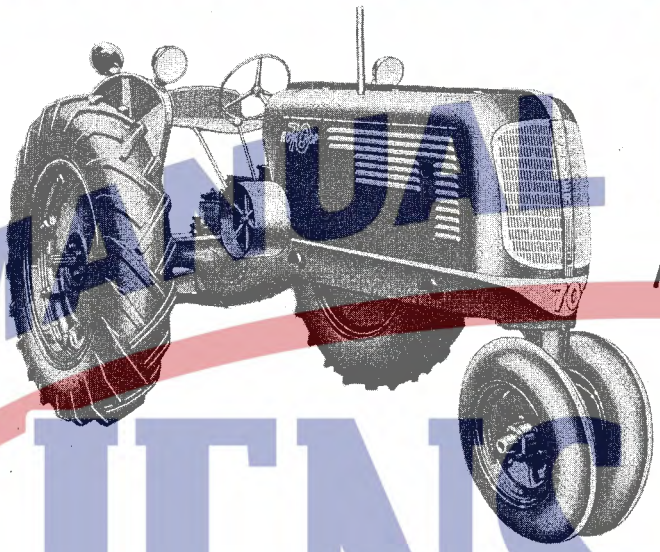
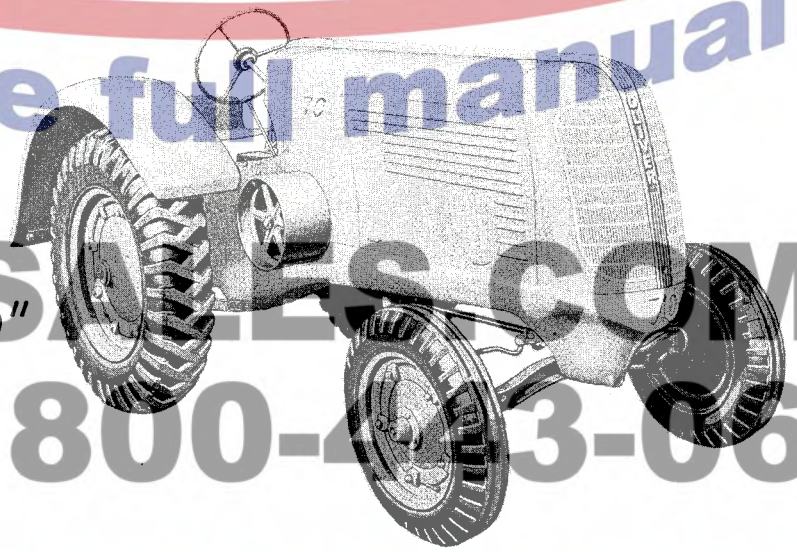


ROW CROP "70"



STANDARD "70"

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SECTION 1

TRACTOR-GENERAL

ROW CROP "70"

DESCRIPTION

The Row Crop "70" tractor is provided with tricycle wheel arrangement which adapts it to the working of row crops. A series of rear axles having different lengths are available to permit spacing the rear wheels to fit the particular needs of the operator. The front axle can be equipped with dual or single wheel arrangements or a special high clearance front axle with adjustable wheel spacing if such is desired.

The serial numbers used for "70" Row Crop tractors are in the 200000 block and the special features of the engine and tractor are indicated by the suffix letter behind the serial number. The code for the suffix letters is as follows:

Suffix Letter	Indication
None	High Compression
A	High Altitude Kerosene or Distillate
B	Four Wheel High Clearance
C	High Altitude High Compression
*C-71	Four Speed Gear Combination
**C-72	Six Speed Gear Combination
C-73	Three Reverse Speed Gear Combination
C-74	Low Six Speed Gear Combination
E	Single Front Wheel
KD	Kerosene or Distillate

*Four speed comb. was standard equip. on Serials 200001 to 245040.

**Six speed comb. is standard on Serials 245041 and up.

The following table shows the years during which succeeding serial spans were produced:

1935 — 200001 - 200685
1936 — 200686 - 208728
1937 — 208729 - 219644
220426 - 220694
1938 — 219645 - 220425
220695 - 223254
1939 — 223255 - 231115
1940 — 231116 - 236355
1941 — 236356 - 241390
1942 — 241391 - 243639
1943 — 243640 - 244710
1944 — 244711 - 250179
1945 — 250180 - 252779

Overall dimensions and other general dimensions for the "70" Row Crop tractor are as follows:

Length	136" (11' 4")
Height—top of radiator	60" (5' 0")
—top of steering wheel	68" (5' 8")
—top of exhaust pipe	84" (7' 0")
Maximum	
Width—60" to 72" axle (standard)	85" (7' 1")
—47½" to 72" axle (optional)	85" (7' 1")
—60" to 80" axle (optional)	95" (7' 11")
—72" to 90" axle (optional)	105" (8' 9")
—72" to 100" axle (optional)	113" (9' 5")
Belt pulley—ground to center of shaft	37" (3' 1")
Height of implement pipe holes from ground to center of pipe	29¾"
Distance between implement pipe holes, center to center	36½"

(Based on the condition that the rear axles are 27½" above the ground and the front wheels equipped with 5.50 x 16 tires.)

The following table gives travel speeds for the different gear shift lever positions with the C-71 and C-72 gear combinations. These speeds are based upon an engine speed of 1500 rpm as controlled by the governor.

Gear Shift position	Miles per hour	Rear Wheel Speed in rpm
1st	2½	15
2nd	3⅓	20
3rd	4⅓	26
4th	6	36
5th	7½	44
6th	13¼	78
Reverse	2½	15

SECTION II
ENGINE

DESCRIPTION

DIFFERENCE BETWEEN HC AND KD ENGINES

Two types of engines are furnished for all Model "70" tractors: The high compression (HC) engine is designed for use with gasoline, and the low compression (KD) engine is designed to burn lower grades of fuel such as kerosene or distillate. The chief difference between the two types of engines is in the cylinder head and valve assembly, the pistons, the crankshaft, the magneto drive gear, the intake and exhaust manifolds, the magneto, and the carburetor.

The cylinder head is different in that for the KD engines it has deeper combustion chambers to provide for lower compression, and, consequently, the valves are shorter. The pistons for the KD engine are concave rather than flat, also to provide lower compression. The crankshaft for the KD engine is hardened by a special process to give it additional strength. However, there is no distinction made in crankshafts which are sent out for repair purposes as all are of the hardened type. The magneto drive gear, which times the magneto, is changed to provide a more advanced spark for the KD engine. This is accomplished by shifting the keyway in the gear clockwise a small amount as viewed from the front of the engine. The intake and exhaust manifolds incorporate manifold heating on both engines, but since the lower grade fuels used in the KD engine require higher temperatures, the manifold assembly for this engine is larger and is provided with two heat control valves instead of one as provided for the HC engine. The heat control valves are dampers within the manifold which control the amount of exhaust heat that passes around the intake manifold to heat the fuel-air mixture. These valves can be adjusted for summer or winter operation and for different fuels.

The carburetor for the KD engine is different from that for the HC engine in that it is designed to handle the heavier fuel.

The magneto is the same for both engines, but on the later engines it was moved to the right side of the engine directly forward of the carburetor. For this reason, it was found that there was interference between the magneto and the larger carburetor used on the KD engines. To avoid the interference, a different cap was provided on magnetos to be used on the KD engines. The magneto for these engines has its outlets arranged vertically so that the lead wires come straight up from the cap. (See figure 2-1).

DIFFERENCE BETWEEN 3-GEAR AND 5-GEAR ENGINES

At tractor serials, Row Crop "70" 223151 and Standard and Orchard "70" 303507, a comprehensive change was made to the design of the engines. Basically, the change involved the timing gears, but other changes were made at the same time. On the earlier engine, there are five gears in the timing gear case: the crankshaft gear drives the camshaft gear and an accessory idler gear, the governor drive gear is driven by the camshaft gear, and the magneto gear is driven by the accessory idler gear. On the later engines, the magneto and governor are driven by the same gear which receives its power from the camshaft gear. This arrangement eliminates two of the gears previously used, and involves shifting the magneto from the left to the right side of the engine.

For the purpose of identification, the earlier engines are referred to as the "5-gear" engines, and the later ones as the "3-gear" engines.

Other changes incorporated in the 3-gear engine involved the cylinder head, the crankcase and oil pan, improved tappets and push rods, the governor, the air cleaner, and the magneto. Some parts are interchangeable between 3-gear and 5-gear engines, but for all practical purposes they can be considered as two separate units when proceeding with the overhaul. Serialization of all parts is noted in the Parts List. Figures 2-2 and 2-3 show the differences in configuration between the 3-gear and 5-gear engines to aid in recognizing them. Figure 2-4 shows the 3-gear KD engine.

Figure 2-1—3-gear KD Engine Magneto

Figure 2-2—"70" HC 3-gear Engine

SECTION III
FUEL SYSTEM

GENERAL

Oliver "70" Tractors can be equipped to burn either gasoline or lower grade fuels such as kerosene or distillate. The major differences are in the engines. The HC or high compression engine is designed for 70 to 72 octane gasoline and the KD or low compression engine is designed to burn kerosene or distillate with a minimum octane rating of 30. The carburetor for the KD engine is somewhat larger and is modified to handle the heavier fuels. Tractors having the KD engine installed are equipped with an auxiliary fuel tank of one gallon capacity so that gasoline may be used for starting the engine. A three-way valve provides a means of changing over from the gasoline to the heavy fuel after the engine has started and warmed sufficiently. Other differences between the HC and KD engines are outlined in Section II.

Updraft carburetors are used on all "70" tractors. Various models have been used during manufacture of the tractors. A list of the models used and the serial spans on which they were installed is included in the Carburetor discussion.

A flyball type governor is used on all "70" tractors to control the engine speed at full load and at no load. On earlier 5-gear engines, the governor was driven by a separate gear in the timing gear case. On 3-gear engines, the governor is driven by the same gear as the magneto through the magneto-governor drive coupling. This arrangement makes it necessary to time the drive gear to the engine when the governor is installed.

Clean air is supplied to the carburetor by an oil bath type air cleaner. The air is received through a screened inlet under the radiator hood at the forward end of the tractor and is carried through metal ducting to the air cleaner and to the carburetor. All connections are provided with clamps or cap screws and are air tight so that no foreign matter will be permitted to enter the air ducts after the air cleaner. It is important that air entering the carburetor and the engine be clean and absolutely free from grit or other foreign matter due to the obvious damage caused to the engine otherwise.

The fuel tank on all "70" tractors has a capacity of 15 gallons. It is elevated above the float level of the carburetor to provide a gravity feed and the fuel is directed through a fuel strainer with a detachable sediment bowl before it is carried to the carburetor.

The purpose of the fuel strainer is to remove dirt and grit from the fuel before it enters the carburetor. The sediment bowl which collects the foreign deposits can be removed by loosening the thumb screw which holds it in place. This should be done at least every 240 hours of tractor operation and more frequently if operating conditions require it. It is advisable to watch the sediment bowl continually for collections of water and foreign matter.

A hot spot type manifold is used both on HC and KD engines. This unit combines the intake and exhaust manifolds such that hot exhaust gasses are carried through a closed compartment around the fuel mixture chamber of the intake manifold. The principal of this type manifold is to create a heated area through which the fuel air mixture is directed before it enters the engine cylinders. By heating the mixture, more complete vaporization is accomplished and consequently the fuel is more completely burned in the cylinder, thereby raising the efficiency of the engine. Both the HC and KD engines incorporate this feature, but since the lower grade fuels require more heat to vaporize them, the manifold on KD engines is larger and has more heated area. Due to varying operating conditions, various amounts of heat are required to vaporize the fuel. For this reason, heat control dampers are provided as a means of adjusting the flow of exhaust gasses around the intake manifold. To obtain maximum efficiency from the engine, these dampers should be adjusted correctly to suit the weather conditions.

SECTION IV

IGNITION SYSTEM

GENERAL

All Oliver "70" tractors are equipped with high tension induction magneto type ignition. The induction type magneto has a rotary magnet and stationary coils and is driven by the magneto drive gear in the timing gear case. Since the spark occurs 6° earlier on KD engines than on HC engines, the keyway in the magneto drive gear for KD engines is advanced more than for HC engines. For this reason, the magneto drive gears are not interchangeable between KD and HC engines, and it is important that the correct gear is used when making replacements.

On 5-gear engines, the magneto drive gear is located on the left-hand side of the timing gear case and is driven by the accessory drive idler gear. Timing marks are provided for timing the magneto drive gear to the idler gear. A pulley on the forward end of the magneto drive shaft serves to drive the generator belt.

On 3-gear engines, the magneto-governor drive gear is located on the right-hand side of the timing gear case and is driven by the camshaft gear. The magneto-governor drive gear is assembled with the governor shaft and weight carrier assembly. The entire assembly including the gear is furnished for replacement and it is advisable to replace the entire assembly rather than to replace the gear separately. However, the gear is furnished separately if desired. The magneto is driven by the magneto drive coupling which is attached to the rear end of the governor drive shaft. When the magneto-governor drive shaft assembly is installed it is necessary to time the magneto-governor drive gear to the camshaft gear using the timing marks provided.

The magnetos used on all 3-gear engines are interchangeable with the exception of the magneto used on 3-gear KD engines. Due to the lack of clearance between the carburetor and the magneto on these engines, a special cap having vertical outlets is used. However, the magneto is the same as the others, and can be used on the HC engine. All 5-gear engine magnetos are interchangeable.

IGNITION TROUBLE SHOOTING

Poor starting and faulty operation of the engine are very often attributable to malfunctioning of the ignition system. Dirty, or improperly gapped spark plugs will cause poor starting and rough operations, especially if the spark plug gaps are too wide. Consistent misfiring on one cylinder is usually due to a faulty plug or a short circuit in the ignition cable leading from the magneto. Chafed or burned insulation on the ignition cables will also cause irregular firing.

If the cables and plugs are in good condition and yet the ignition is irregular, it is probably due to faulty magneto operation. The interrupter assembly should be examined carefully. Be sure the points are in good condition and not burned. Be sure the interrupter lever moves freely without sticking or binding and that the gap between the points is set at .014" to .018" when the cam follower is at the top of the cam lobe. Be sure the points are free of oil or grease. A sanded appearance of the points should not be mistaken for pitting. After the interrupter points have been properly worn in they will have a rough sanded appearance, but they should not be blackened to indicate burning. If the points are burned, it indicates a faulty condenser. When making replacements, replace the entire interrupter assembly including the condenser.

Be sure the magneto is properly timed. Improper timing will cause a loss of power or severe back firing.

SECTION V

COOLING SYSTEM

GENERAL

The cooling system holds 4½ U. S. gallons. Its function is to maintain correct operating temperatures throughout the engine and to carry off and dissipate surplus heat developed in the combustion of the fuel. The coolant level must be kept above the upper radiator inlet or the circulation will be impaired. It is as important that the working parts of the engine be kept at the proper working temperatures as it is that they be kept from overheating. Over-cooling is as harmful as overheating and for this reason it is necessary that the temperature be kept within the "WORK RANGE" as indicated on the temperature gauge.

The correct operating temperature for the "70" HC engines is 160°F. to 185°F. and for KD engines 180°F. to 200°F. If the engine is operated above the temperatures specified, there is considerable loss of power due to detonation and pre-ignition. There is the constant danger of burning the valves and of causing severe damage to the moving parts of the engine due to improper lubrication. If the engine is allowed to run too cold, improper fuel vaporization will result causing crankcase dilution which will eventually impair the lubricative quality of the engine oil. Overcooling will also create the possibility of water condensate forming in the crank case since the products of combustion contain a large quantity of water.

The cooling system consists of the radiator, the water pump, the fan and fan belt, the temperature gauge and the connections necessary to circulate the cooling liquid through the engine block and cylinder head. The radiator is composed of a metal core through which the coolant is circulated. Due to the large surface of the core, heat is dissipated rapidly. The cooling liquid is circulated through the entire system by the water pump which is driven by the fan belt. The fan serves to draw air through the radiator core to assist in the dissipation of the heat.

Under some circumstances it is possible to obtain excessive cooling of the cooling liquids as for instance, while operating in cold weather or against the wind. To avoid overcooling under such conditions, a curtain or shutter is provided to cover part of the radiator core thereby reducing the heat transfer. Careful observation of the temperature gauge is important and adjustment of the radiator curtain should be made whenever the temperature of the cooling system falls below the green "WORK RANGE" area on the temperature gauge.

If the temperature of the cooling system is consistently high it may be due to a stoppage in the passages or an excessive deposit of lime in the engine block. It may also be possible that water level is low due to a leak in the radiator core or in the connections. Temperatures will run higher in warm weather but if the cooling system is functioning properly, they should never run above the upper limit of the work range. If the cooling system seems to be in good order and the engine continues to overheat, it may be due to an over lean fuel mixture. It is well to check the load needle adjustment of the carburetor and be sure it is not set too lean. If the overheating is accompanied by detonation heard as a "pinging" sound in the engine, either the fuel mixture is too lean or the proper fuel is not being used. In either case, corrective measures should be taken immediately as detonation is very detrimental to an engine. Improper timing of the magneto and improperly set valve clearances will also cause overheating.

COOLING SYSTEM SERVICING

Soft water, such as rain water or distilled water, should be used in the cooling system if possible. This will avoid much of the difficulty resulting from the action of minerals contained in ordinary water.

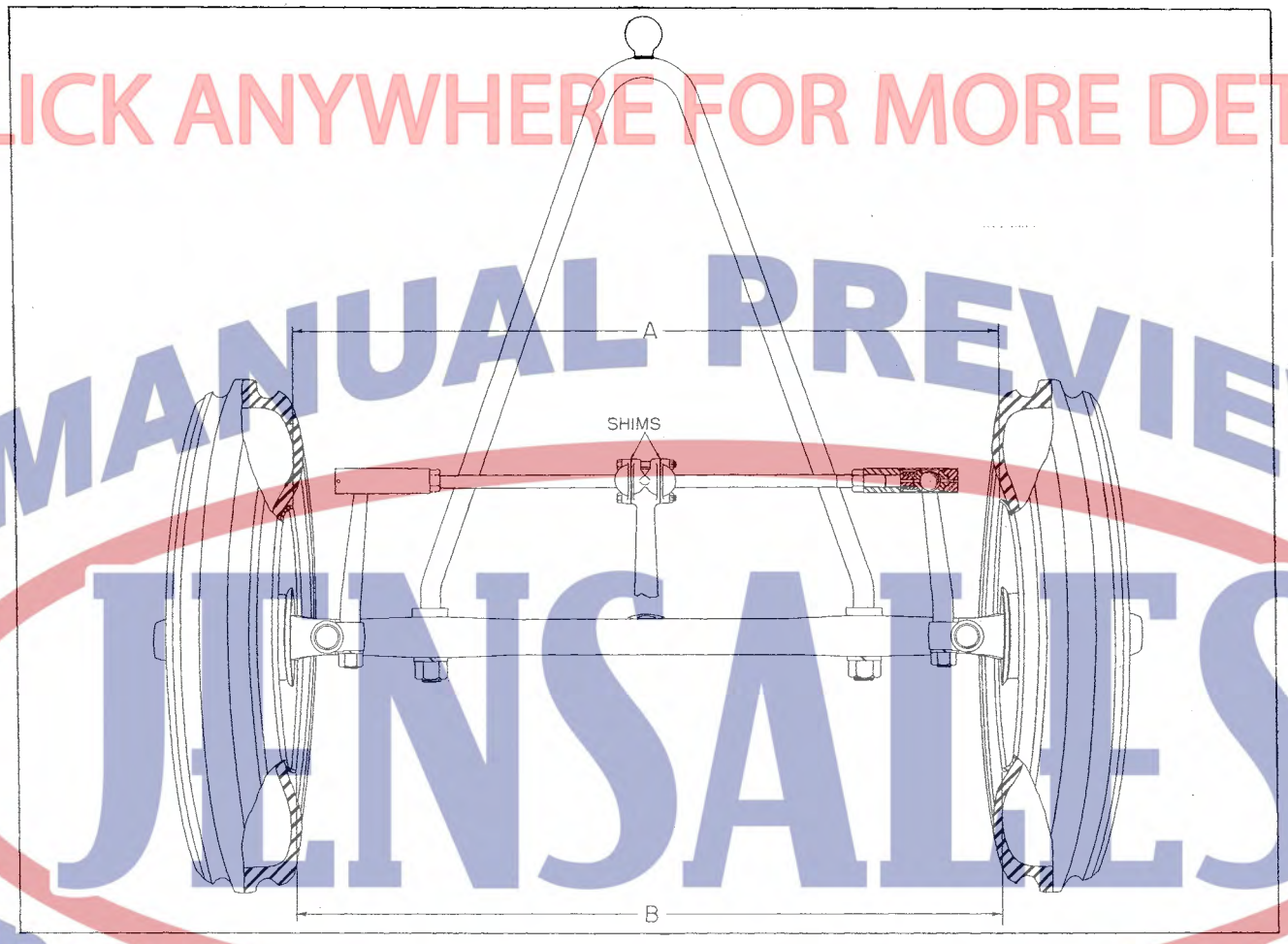

Figure 8-6—Front End, Standard "70"

STANDARD, ORCHARD, INDUSTRIAL, SINGLE WHEEL, AND HIGH CLEARANCE FRONT STEERING MECHANISM

The same rear steering mechanism is used on all Oliver "70" tractors. See the discussion in the first part of this section covering the rear steering mechanism. For additional information on all front ends, see Section IX, Front End Equipment.

The front steering mechanisms on the above tractors are of the conventional automotive type with the rear steering mechanism controlling the wheels through steering arms, knuckles and tie rods.

The correct front wheel alignment should be maintained to allow easy steering and the least possible wear on rubber tires. Wheel alignment on these tractors can be checked by measuring the distance between the wheel rims at the extreme front and rear (A and B, figure 8-6) with the wheels turned to the straight-ahead position. The distance "A" should be ¼" longer than the distance "B" to give the correct toe-in for easy steering. To adjust toe-in, loosen the center steering arm bolts and release the steering knuckle tie rods. Loosen the tie rod lock nuts and screw the tie rod into the tie rod ends to decrease toe-in or out of the tie rod ends to increase toe-in. When the proper adjustment is accomplished, tighten the tie rod lock nuts. Replace the tie rods, caps, and bolts.

On the Standard "70", shims are provided between the center steering arm and the center steering arm caps. To correct play in the joint, remove shims until each joint is tight when the bolts are tightened down; then add one .002" shim under each cap to allow free movement.

To adjust the steering gear tie rod between the front and rear steering mechanisms and the front steering gear tie rod ends, screw the adjusting plug up until the seat is tight against the ball; then back the adjusting plug off one full turn and replace the cotter key.

Standard and Four Wheel High Clearance tractors have two replaceable bushings in which the center steering shaft rotates. These are replaced most easily when the engine is removed for overhaul.

SECTION IX
FRONT END EQUIPMENT

STANDARD AND ORCHARD TYPE AXLE

Oliver Standard "70" and Orchard "70" front ends, alike in every respect, are equipped with drop forged front axles, steering arms, and knuckles. The center steering permits compact construction and offers protection to the steering mechanism. The inside clearance between front wheels is 40". See Section VIII for illustration of the Standard and Orchard type front end. See Section X for the various types of wheels available for all front ends.

FRONT WHEEL ADJUSTMENT

The slightest amount of end play of the wheel bearings can be detected by attempting to wobble the wheel. To adjust the wheel bearings (See figure 9-1), raise the tractor sufficiently for the front wheels to clear the ground. Remove the hub cap and pull out the cotter key from the spindle. Tighten the nut until considerable drag on the bearing can be felt when the wheel is rotated; this assures that the bearings and bearing races are in place. Now back off the nut until the wheel turns without drag but has no end play. DO NOT pre-load the bearings by leaving the nut excessively tight. Refill with grease when the hub cap gasket and hub cap have been reinstalled.

If new front wheel felts are to be installed, adjust the front wheel bearings before removing the wheels. Mark the position of each front wheel bearing nut and count the number of turns required to remove it. Take the wheel, or wheel and hub off and replace the felt; on steel wheels, the hub comes off with the wheel. Before reinstalling the hub or wheel, wash and repack the bearings with wheel bearing grease. Turn the nut the correct number of turns, replace the cotter pin, gasket, and hub cap, and fill the wheel hub with grease, through the grease fitting on the cap.

REPLACING FRONT WHEEL BEARINGS

1. Raise the front end of the tractor until the wheels clear the ground. Remove the hub cap, cotter key, and bearing nut.

2. Remove the wheel assembly using a hammer and brass bar against the wheel just outside of the hub. Rotate the wheel so that the hub is evenly loosened. Do not drive directly against the cast hub. The bearings, felt washer, and retainer will come off with the wheel. Wheel pullers may be used but the above method is generally more satisfactory.

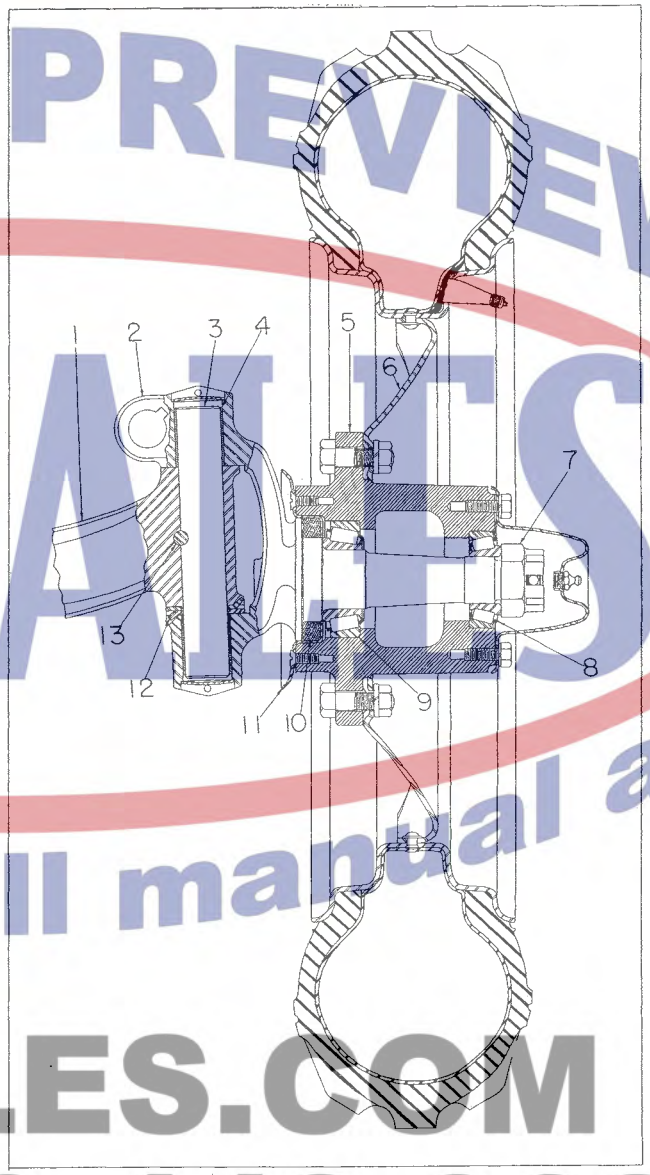

Figure 9-1—Front Wheel, Knuckle, and Bearings

1. Front Axle
2. Steering Knuckles
3. Steering Knuckle Pivot
4. Steering Knuckle Bushing
5. Front Wheel Hub
6. Front Wheel
7. Bearing Nut
8. Outer Roller Bearing
9. Inner Roller Bearing
10. Felt Washer
11. Felt Washer Retainer
12. Steering Knuckle Pivot Washer
13. Steering Knuckle Pivot Pin

SECTION X

OPTIONAL EQUIPMENT

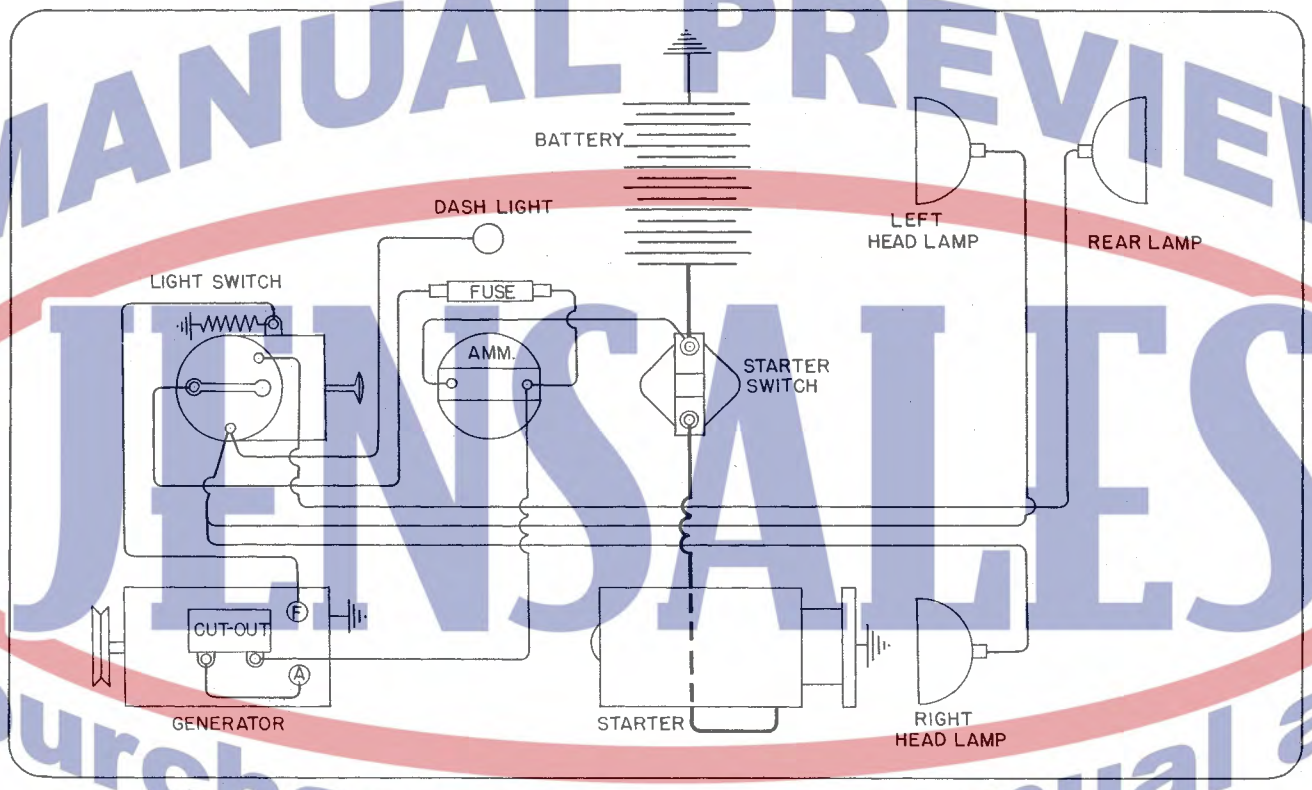

Figure 10-1—Row Crop "70" Wiring Diagram

ELECTRICAL SYSTEM

ELECTRICAL CIRCUIT

The 6 volt single wire system with grounded return through the tractor frame is made up of the battery, generator, starter and lights, with connecting leads and switches. The system is designed to operate with the positive terminal of the battery grounded. In checking this system, the mechanic must remember that ground and ground leads are as important as hot leads.

When the starter switch is closed, energy flows directly from the battery through the starter switch to the starter. (See figure 10-1.) Power for the lighting system is drawn from the battery, through the ammeter and a 20 ampere fuse for distribution to the lights at the light switch. The four position light switch serves two purposes—(1) to control generator output and (2) to control the operation of the lights. When the switch is all the way in, a lead from the generator field is grounded through a resistance at the light switch to the tractor frame; this reduces field voltage and provides low generator output. In second or "high charge" position the resistance at the light switch is by-passed and the generator field is grounded directly on the tractor frame; this increases the field current and therefore the generator output. The third position of the switch maintains the generator at high charge and turns on the front lights and dash light; the fourth position maintains the generator at high charge and turns on front, rear, and dash lights. The generator output goes to the ammeter; from the ammeter the power may go either to the battery or the electric lights or both, depending on the charge of the battery and the load on the electrical system.