INTERNATIONAL HARVESTER

OPERATOR'S MANUAL

INTERNATIONAL®

856

Tractor

OPERATION
MAINTENANCE
LUBRICATION

To The Owner

Assembled in this manual are operation, lubrication, and maintenance instructions for the Farmall and International 856 Gasoline, LP Gas, and Diesel Tractors, including the Hi-Clear and All-Wheel Drive models. This material has been prepared in detail in the hope that it will help you to better understand the correct care and efficient operation of your tractor.

Your new International Harvester tractor is designed to meet today's exacting operating requirements. The ease and comfort of operation, the ability to match ground speeds to engine power and work requirement, and the effortless versatility of the hydraulic system are intended to lighten your work and shorten your hours on the job.

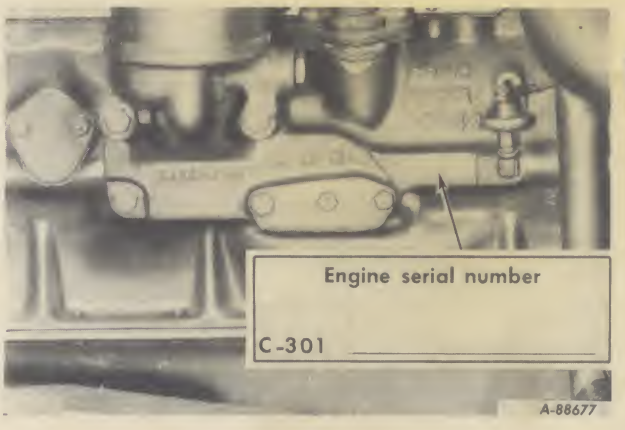
Your local International Harvester dealer is interested in the performance you receive from this tractor. He has factory-trained servicemen, informed in the latest method of servicing tractors, and modern tools, and original-equipment IH service parts which assure proper fit and good performance.

To obtain top performance and assure economical operation, the tractor should be inspected, depending on its use, periodically, or at least once a year, by your International Harvester dealer.

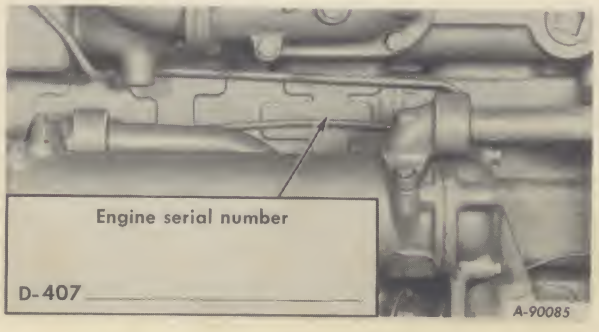
Before you operate the tractor, study this manual carefully. It has been prepared to help you operate and maintain your tractor with utmost efficiency. New copies may be ordered from your dealer at a nominal price.

When in need of parts, always specify the tractor and engine serial numbers, including prefix and suffix letters. Write these serial numbers in the spaces provided below.

Location of the tractor serial number.

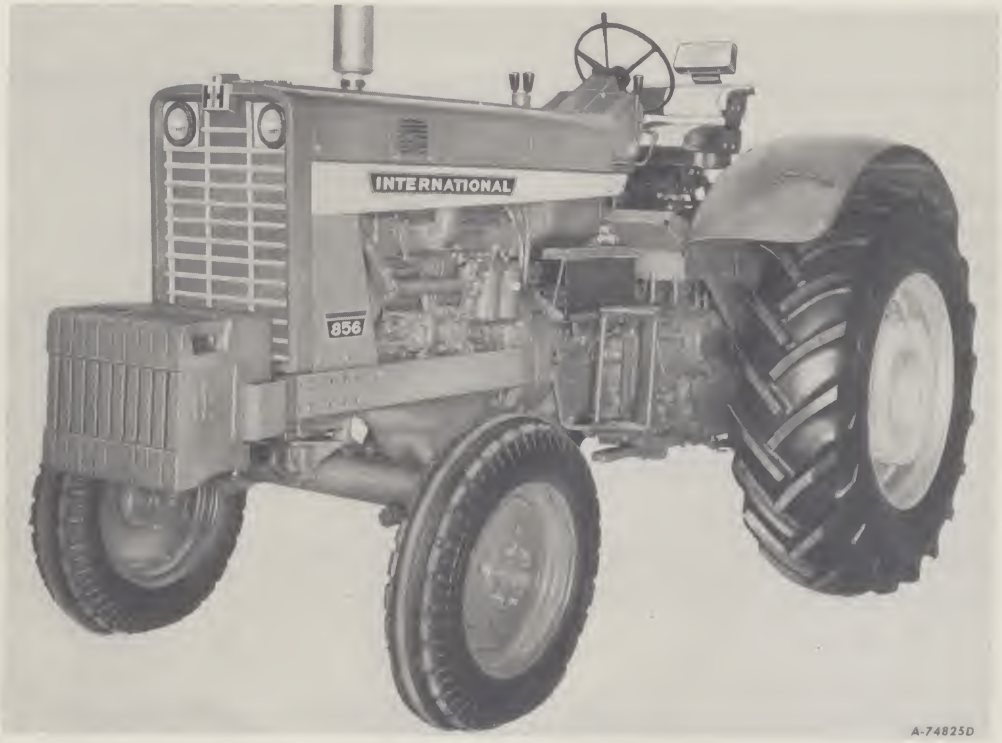


Location of gasoline or LP Gas engine serial number.

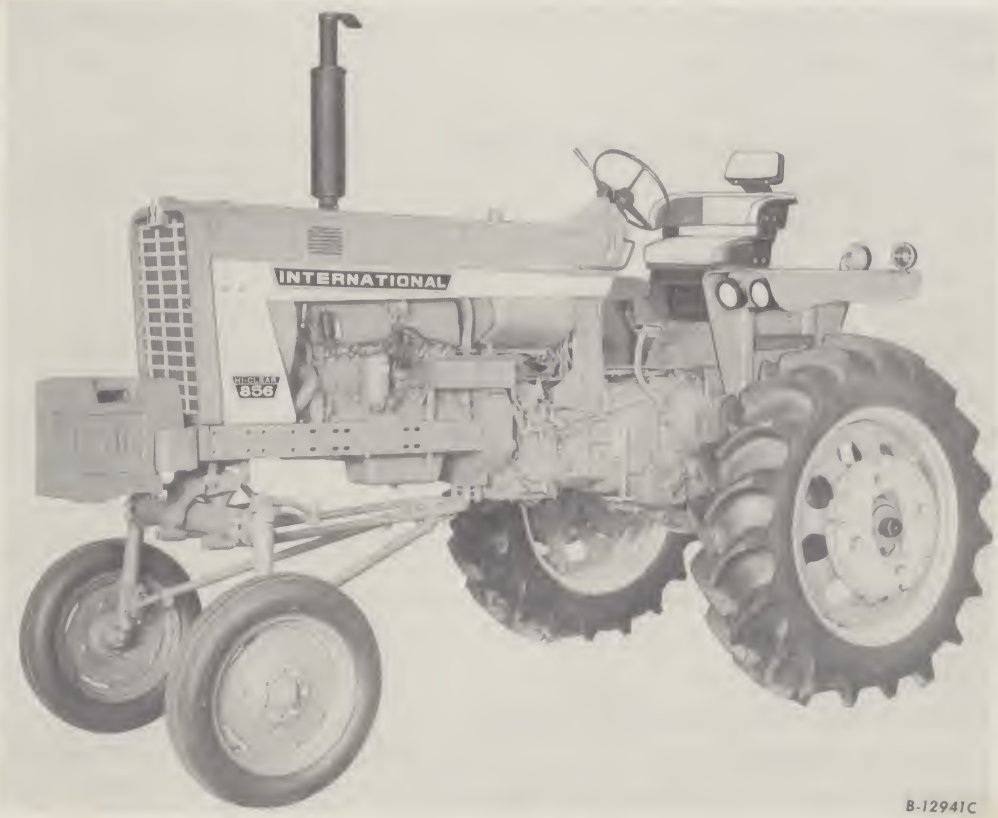


Location of diesel engine serial number.

INTRODUCTION



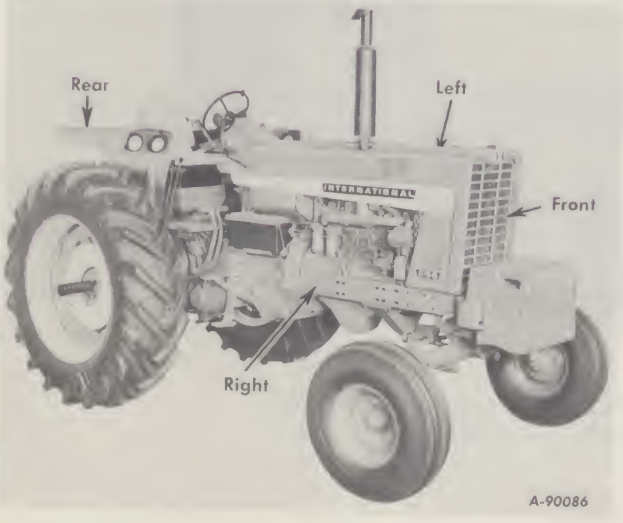
International 856 Diesel Tractor



Farmall 856 Hi-Clear Tractor

CONTENTS

Illust. 3
International 856 All-Wheel Drive Tractor



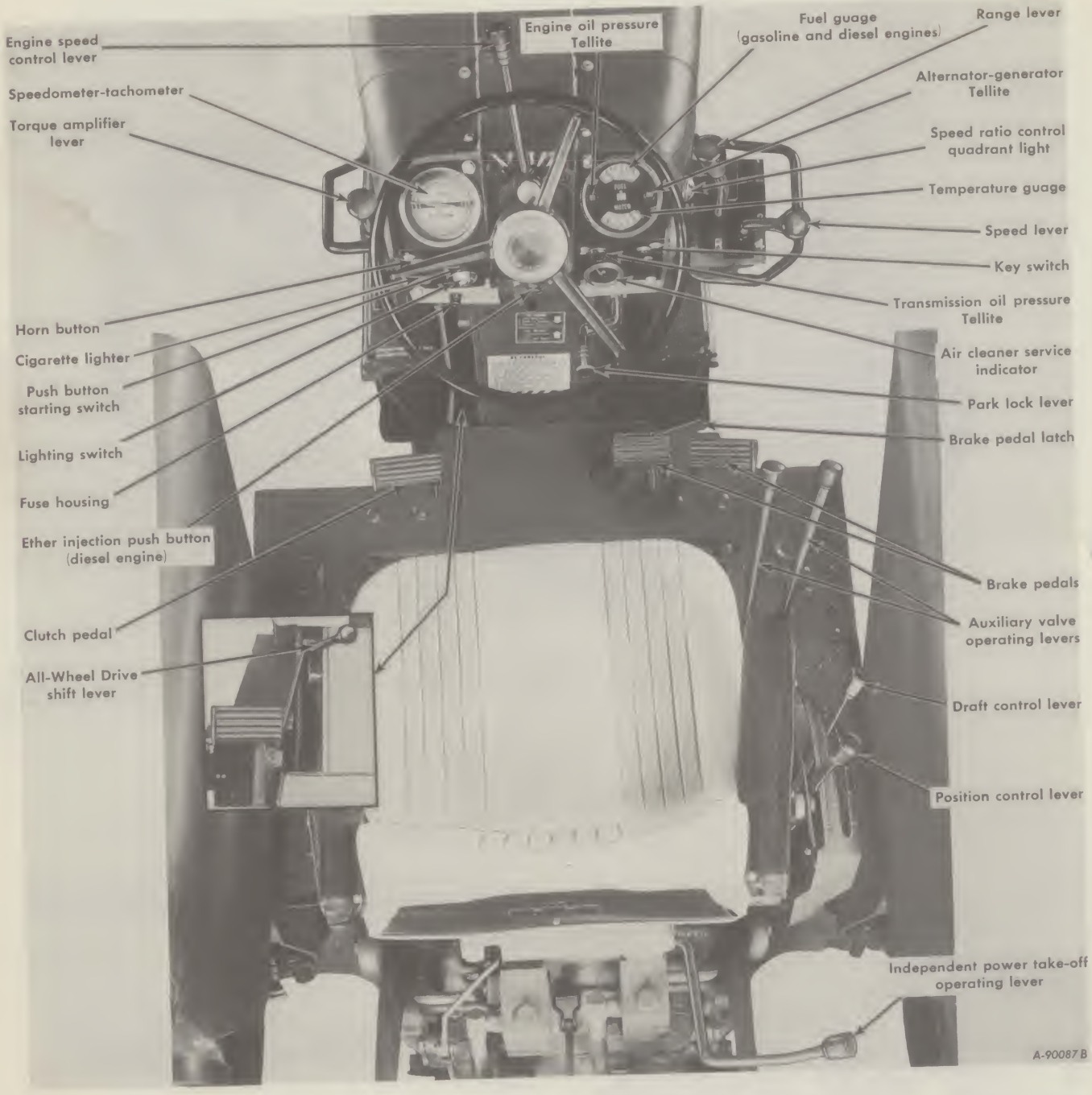
Illust. 3A
Terms of location

LEFT and RIGHT indicate the left and right sides of the tractor when facing forward in the driver's seat. **See Illust. 3A.**

The illustrations in this manual are numbered to correspond with the pages on which they appear; for example, **Illusts. 3 and 3A are on page 3.**

A variety of extra equipment and accessories is available. Refer **to page 133.** Operating and maintenance instruction on these items is included in the instructions for operating or maintaining the tractor. Disregard instructions for equipment not on your tractor.

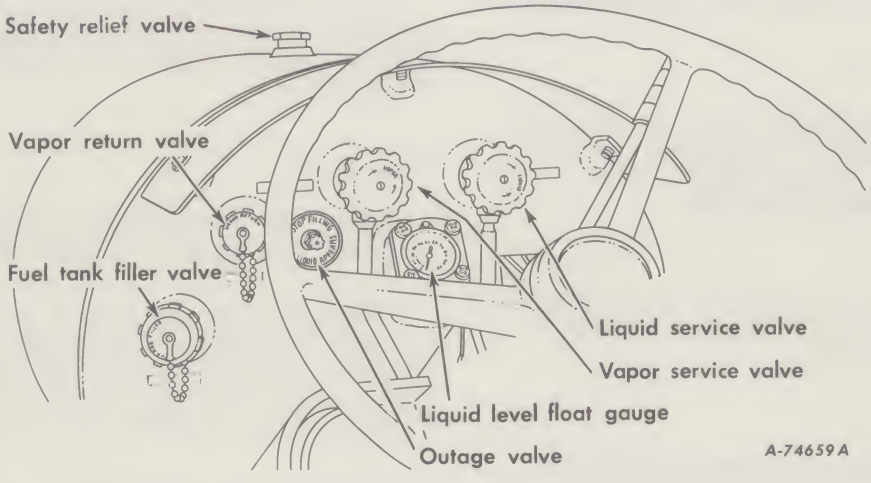
INSTRUMENTS AND CONTROLS



Illust. 4
Location of instruments and controls on the gasoline and diesel engine tractors.
(For additional instruments and controls for LP Gas tractors, see Illust. 5).

Page references for items shown in Illust. 4.

LP Gas Engine Tractors



Illust. 5
Instruments and controls on LP Gas tanks.

The items shown in Illust. 5 are described on page 15.

BEFORE OPERATING YOUR NEW TRACTOR

TRACTOR BREAK-IN PROCEDURE

Never operate an engine immediately under full load. Break it in carefully as shown in the table. Do not overload the engine at any time.

Period	Engine r. p. m.	Load	Remarks
1st hour	3/4 of rated	None	Operate tractor in the higher gears.
2nd and 3rd hours	3/4 of rated	Light	Operate tractor two full gear speeds below normal for load connected to drawbar.
4th through 25th hours	Full	Medium	Operate tractor one full gear speed below normal for load connected to drawbar.

GOVERNOR (Gasoline and LP Gas Engines)

The governor is set at the factory and should require no adjustment. Consult your International Harvester dealer if the governor does not function properly. If the linkage needs adjustment for any reason, see the instructions on pages 79 and 80.

Never operate the engine at more than the regular governed speed. Excessive speeds are harmful. Refer to "Engine Speeds" in the "Specifications" on pages 129 and 130.

All parts of your new tractor are of matched design for maximum performance as shown under "Specifications".

Any attempt to increase the engine horsepower by increasing engine r.p.m. above its rated maximum, or by other means, not only affects traveling speeds but affects the life of matching parts and voids the company responsibility as outlined in the warranty.

LUBRICATION

Lubricate the entire tractor, using the "Lubrication Guide" and the "Lubrication Table" for reference. Check the oil levels. See pages 120 to 126.

PNEUMATIC TIRES

Check the air pressures. See the tables on pages 97 and 98.

ENGINE COOLING SYSTEM

Never start or operate the engine without first checking to see if the radiator is filled to the proper level, for the prevailing temperature, with soft or rain water or antifreeze. See pages 53 and 54. Tractors shipped in the United States and Canada have the cooling system filled with antifreeze.

FUEL SYSTEM

Gasoline Engine

Use clean fuel having a minimum octane rating of 93 (Research Method).

LP Gas Engine

It is recommended that LP Gas fuel meeting the Natural Gas Processor's Association (NGPA) specification for Propane HD5 be used if available.

Diesel Engine

Check the diesel fuel specification requirement table on page 19. Carefully strain the fuel.

Use clean fuel and keep it clean. Store fuel in tanks equipped with hose and nozzle to prevent contamination of the fuel. The use of funnels, cans, and drums is not recommended because they are difficult to keep clean.

INSTRUMENTS AND CONTROLS

Thoroughly acquaint yourself with all instruments and controls.

DRIVING THE TRACTOR

PREPARING THE TRACTOR FOR EACH DAY'S WORK

Fill the fuel tank at the end of each days run, see page 13 for gasoline engine, page 17 for LP Gas engine, or page 20 for diesel engine.

Caution! Never remove the fuel tank cap or fill the fuel tank when the engine is running or is hot, or when near an open flame. Do not smoke or use an oil lantern when working around inflammable fuels. When pouring fuel, keep the hose and nozzle or the funnel and container in contact with the metal of the fuel tank to avoid the possibility of an electric spark igniting the fuel. Do not light matches near inflammable fuels, as the air around the tractor is mixed with a highly explosive vapor.

Before starting the diesel engine for each days work, open the diesel fuel tank water drain cock at the right side of the engine **(Illust. 20)** to drain off water and sediment. Close the drain as soon as clean fuel appears.

Check the level of the coolant in the radiator. **See page 53.**

Check the oil level in the engine crankcase. Also lubricate the chassis points recommended for daily service. See the "Lubrication Guide" and "Lubrication Table".

Inspect the tires for general condition. **See pages 97 and 98.**

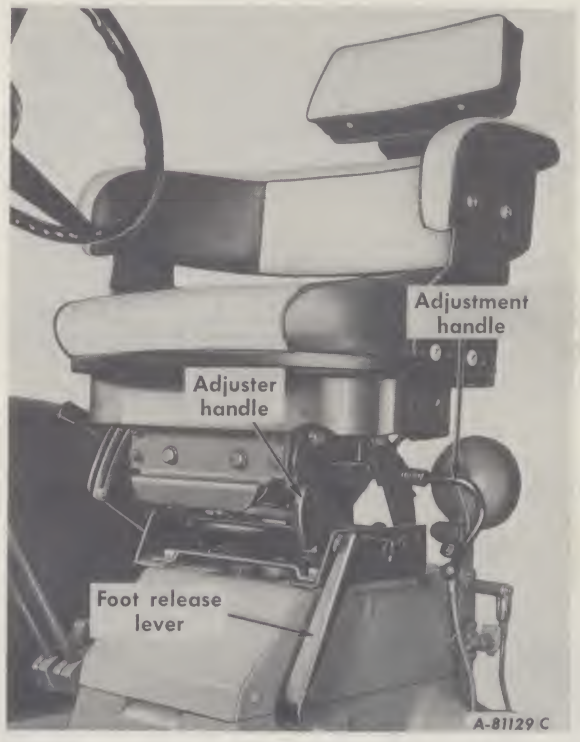
ADJUSTING THE SEAT

The seat is mounted on an adjustable base, that provides simultaneous height and longitudinal position adjustment.

Before starting the tractor, adjust the seat to one of the five positions available to provide the most comfortable position for the operator.

The seat is quickly and easily adjusted by means of the seat adjusting handles.

Lift up on the handle and move the seat forward or backward to the most comfortable operating position.



Illust. 7
Seat adjustment controls.

The back cushion of the seat can be adjusted to three different positions to the front or rear and three different heights by means of the mounting holes in the back cushion support. The back rest extension, is also adjustable to three different heights.

Foot Release Lever

The foot release lever provides means of moving the seat from a preset position, rearward out of the operator's way, to place the seat in the furthest rear position when the operator is driving the tractor from a standing position.

This allows easy access to the platform area, when getting on or off of the tractor. When the operator applies his weight to the seat and moves it forward the linkage returns to the preset position.

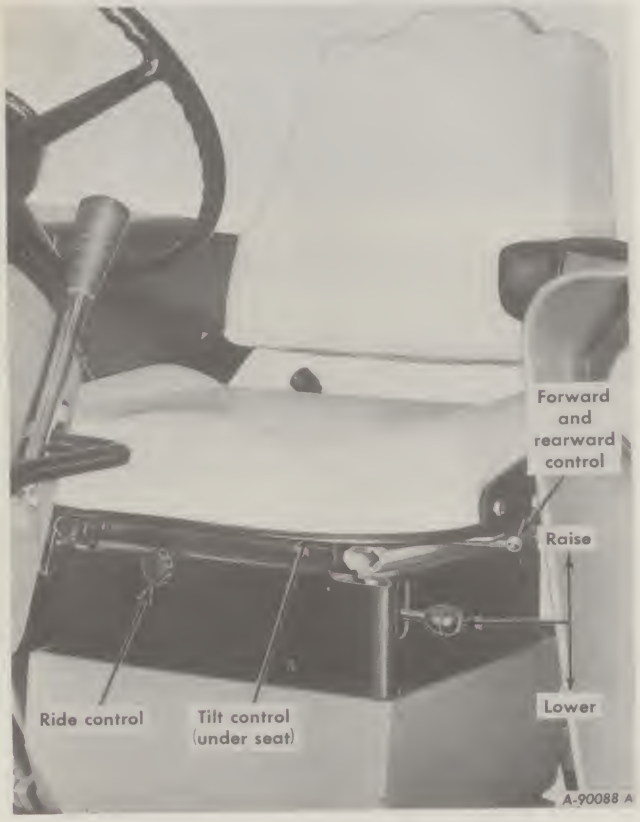
ADJUSTING THE SEAT - Continued

Adjusting the Seat to Suit the Operator's Weight

The seat suspension is adjustable to suit the weight of any operator from 100 to 250 pounds. To adjust the suspension, the operator turns an adjuster handle to slide a pointer along a scale until the proper mark is reached.

Turn the adjuster handle (Illust. 7) so the pointer at the rear of the seat is set at the number nearest the operator's weight. Place the handle in a near horizontal position after the proper adjustment is made.

ADJUSTING THE HYDRAULIC SEAT



Illust. 8
Hydraulic seat adjustment controls.

The hydraulic seat is provided with controls to regulate the height, forward or rearward position, tilt, and ride. See Illust. 8.

To raise the seat, move the control lever up; to lower the seat, move the lever down.

Note: The engine must be operating to provide hydraulic power to raise the seat or adjust the ride control.

To move the seat forward or rearward; move the handle to the release position, move the seat into position, and then release the handle.

The seat can be tilted slightly by releasing the tilt control located under the seat. See Illust. 8.

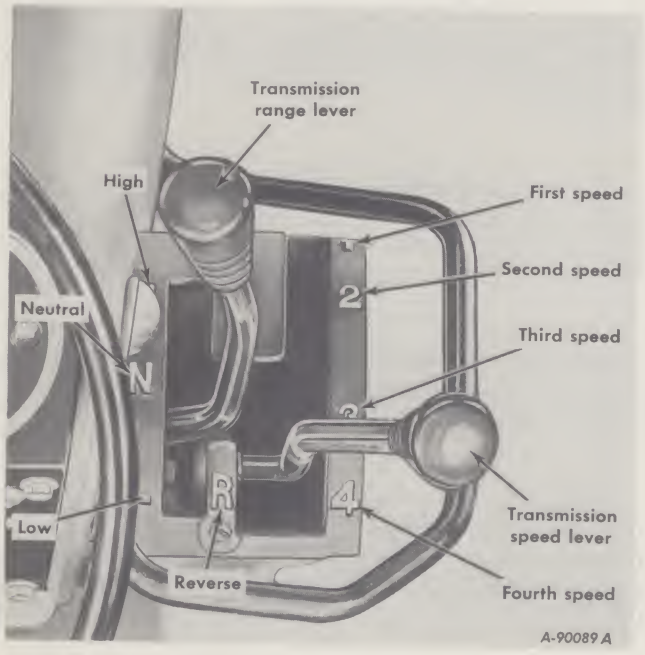
The ride control can be adjusted for a soft or firm ride. Turn the knob clockwise for a firmer ride or counterclockwise for a softer ride.

Note: If the ride becomes too soft, and adjustment fails to correct the problem, see your International Harvester dealer. DO NOT ATTEMPT TO CHARGE THE ACCUMULATOR WITH AIR, OXYGEN, OR OTHER GASES!

TRANSMISSION RANGE AND SPEED LEVERS

These levers (Illust. 9) are used to select any one of the eight forward speeds and four reverse speeds. Four forward speeds are available in the High (H) range and four in the Low (L) range. See "Ground Speeds" tables on pages 129 and 130. The range lever also has a neutral position.

TRANSMISSION RANGE AND SPEED LEVERS - Continued



Illust. 9
Transmission range and speed levers.

ACCELERATOR PEDAL (Tractors so equipped)

The accelerator pedal is used when making frequent changes of tractor speed. Pressing down with the foot increases the speed of the engine. The engine speed control lever should be retarded when the accelerator pedal is to be used.

STARTING THE ENGINE

Start the engine as instructed on the following pages: gasoline engine, **page 13**, LP Gas engine, **page 17**, or diesel engine, **page 21**.

STARTING THE TRACTOR

1. After starting the engine, advance the engine speed control lever slightly.

2. Disengage the park lock. Hold the tractor with the brakes if necessary. Disengage the clutch.

3. With the clutch in the disengaged position, move the transmission range lever to the desired range, "H" (high), "L" (low), or "R" (reverse). Then move the speed lever to the desired speed. **See Illust. 9.**

4. Start the tractor in motion by slowly engaging the clutch and advancing the engine speed control lever to a position where the engine operates best for the load to be handled.

Note: Do not shift gears while the engine clutch is engaged or while the tractor is in motion.

5. Do not "ride" the clutch or brake pedals by resting the feet on the pedals while driving the tractor because this will result in excessive wear on the linings.

Always latch the brake pedals together before driving the tractor in high range (third or fourth speeds). To latch the pedals together, engage the latch in the back of the left pedal into the slot in the back of the right pedal. **See Illust. 11.** When the brake pedals are not latched together, the latch should rest in the slot in the back of the left brake pedal.

ALL-WHEEL DRIVE SHIFT LEVER

This lever (All-Wheel Drive tractors only) is used to engage and disengage the All-Wheel Drive, to provide driving power from both the front and rear wheels or from the rear wheels only.

OPERATING THE ALL-WHEEL DRIVE

To operate the All-Wheel Drive tractor in All-Wheel Drive, follow the first three steps under "Starting the Tractor". Then with the clutch still in the disengaged position, move the All-Wheel Drive shift lever **(Illust. 4)** all the way up and follow steps 4 and 5 under "Starting the Tractor".

To operate with rear wheel drive only, disengage the clutch and move the All-Wheel Drive shift lever all the way down.

Note: Always disengage the All-Wheel Drive when operating the tractor in 3rd or 4th high range speed.

DRIVING THE TRACTOR

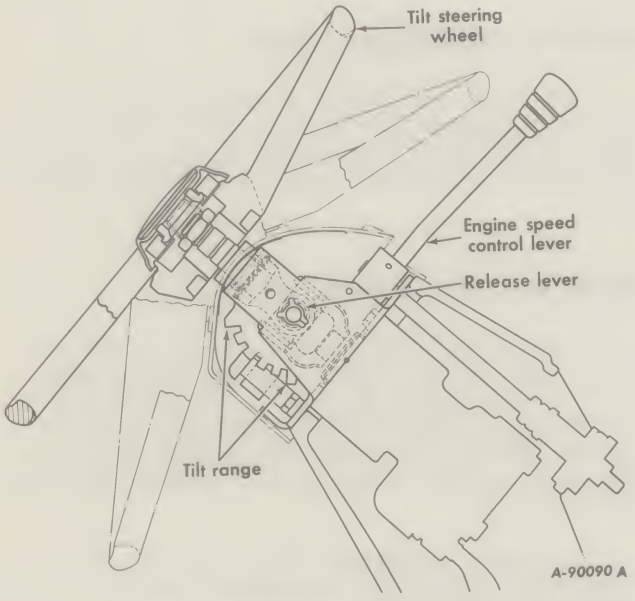
OPERATING THE ALL-WHEEL DRIVE - Continued

If difficulty is experienced engaging the All-Wheel Drive shifter lever, shift the transmission range lever into the low forward position and slowly engage the engine clutch to move the tractor forward slightly while lifting up on the shift lever until fully engaged. If difficulty is experienced disengaging the All-Wheel Drive shift lever, move the tractor forward or backward a few feet by shifting the transmission range lever into the low forward or into the reverse position and slowly engaging the engine clutch, while exerting a downward pressure on the shift lever until fully disengaged.

STEERING THE TRACTOR

The tractor is steered in the conventional manner by means of the steering wheel actuating the power steering system; however, to make a sharp or pivot turn, press the right or left brake pedal, depending on the direction in which the turn is to be made. The brake pedals must be unlatched so they can be operated individually.

TILT STEERING WHEEL



Illust. 10
Tilt steering wheel.

The tilt steering wheel can be moved to five positions. To move the steering wheel to the position most suited to the operator, pull the lever to release the spring lock, and while holding the lever, move the wheel into position. Release the lever to lock the steering wheel in place.

TOWING THE TRACTOR

When towing is necessary, use a tow rope, chain, or cable and have an operator steer the tractor and operate the brakes.

To tow a Farmall 856 Tractor, attach a tow rope, chain, or cable to the tractor front frame channel or to the lower portion of the upper bolster of the tractor which is "stuck" or which is to be towed.

To tow an International 856 Tractor, attach a tow rope, chain, or cable to a bolt or rod through the two holes in the front bolster of the tractor which is "stuck" or which is to be towed.

When a tractor is "stuck", the power of both tractors should be used, and a steady, even pull maintained by the towing tractor.

When towing a tractor to transport it from one place to another, the transmission range lever must be in the neutral position and the ground speed should not exceed twenty miles per hour.

Note: If the tractor is to be towed for any reason, the engine must be running to provide for transmission lubrication. If the engine cannot be run, four gallons of IH Hy-Tran® fluid must be added into the transmission case.

After towing the tractor, drain sufficient fluid (approximately four gallons) so the fluid level in the transmission case is at the "FULL" mark on the transmission oil level gauge. **See Illust. 115.**

Note: Tractors equipped with torque amplifier cannot be started by towing.

STOPPING THE TRACTOR

Disengage the clutch and move the transmission range lever to the neutral position. Use brakes if necessary.

Caution! Always lock the transmission when the tractor is parked. To lock the transmission move the park lock lever (**Illust. 4**) all the way down. Do not engage the park lock while the tractor is in motion.

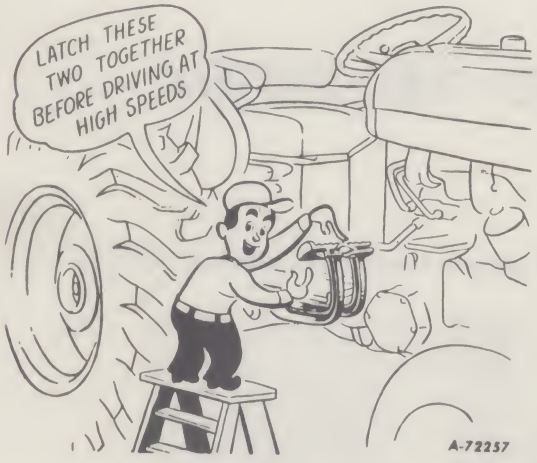
PARK LOCK LEVER

The park lock lever is used to lock the transmission, **after the tractor is stopped.** This prevents the tractor from moving.

The park lock is engaged when the park lock lever is moved all the way down. Always engage the park lock when leaving the tractor.

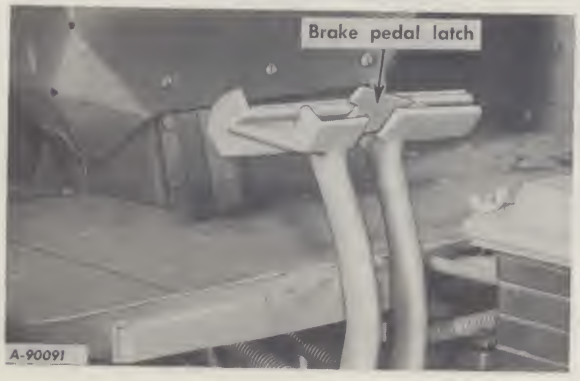
Note: The transmission range lever must be in the neutral position before the park lock can be engaged. The park lock must be released by moving the lever up before the transmission range lever can be shifted from the neutral position.

LOCKING THE BRAKES



These pedals are used to stop the tractor or to assist in making sharp turns as outlined below.

The brake pedal latch **(Illusts. 4 and 11)** is used to latch both brake pedals together, causing the brakes to operate simultaneously.



Illust. 11
Brake pedals in the locked position.

To stop the tractor, depress both pedals at the same time.

To assist in making a sharp turn, operate the pedals individually, depressing the pedal on the side toward which the turn is to be made.

TORQUE AMPLIFIER

The torque amplifier is a hydraulically actuated, supplemental, transmission unit. It is manually controlled to provide an optional lower gear speed in each respective transmission gear speed without interruption of engine power. Thus it provides two ranges of traveling speeds. Free-wheeling is prevented when going down hill in torque amplifier drive by a lock-up-clutch across the one-way sprag-type clutch. For ground speeds with or without torque amplifier, see "Specifications."

The torque amplifier can save much time and effort when the tractor is operated with either mounted or trailing-type equipment. For example, if extra-hard ground is encountered when plowing, the speed of the tractor can be reduced to provide more drawbar pull without disengaging the engine clutch, shifting gears, or stopping the tractor.

The speed of the tractor can again be increased after the hard stretch of ground is passed by simply moving the torque amplifier operating lever to the forward position.

The tractor can also be started in motion with the torque amplifier engaged, when pulling a heavy load. The tractor speed can be increased when under way by disengaging the torque amplifier.

ENGAGING OR DISENGAGING THE TORQUE AMPLIFIER

The torque amplifier clutch operating lever, located at the left of the instrument panel, allows the operator to regulate the speed of clutch engagement so that a smooth engagement may be obtained under all conditions.

To obtain a smooth shift to direct drive under light loads, the operating lever should be moved forward, hesitating at an intermediate position, then moved fully forward.

To shift to torque amplifier drive, move the operating lever fully to the rear in a rapid manner.

Do not allow the clutch to slip needlessly as any clutch can be damaged by excessive slippage.

FUEL GAUGE (Gasoline and Diesel)

When the ignition switch is turned on, the fuel gauge indicates the level of the fuel in the fuel tank.

Note: On a tractor equipped with a diesel engine, the key must be left in the "ON" position while the engine is running so the fuel gauge will function.

SPEEDOMETER-TACHOMETER

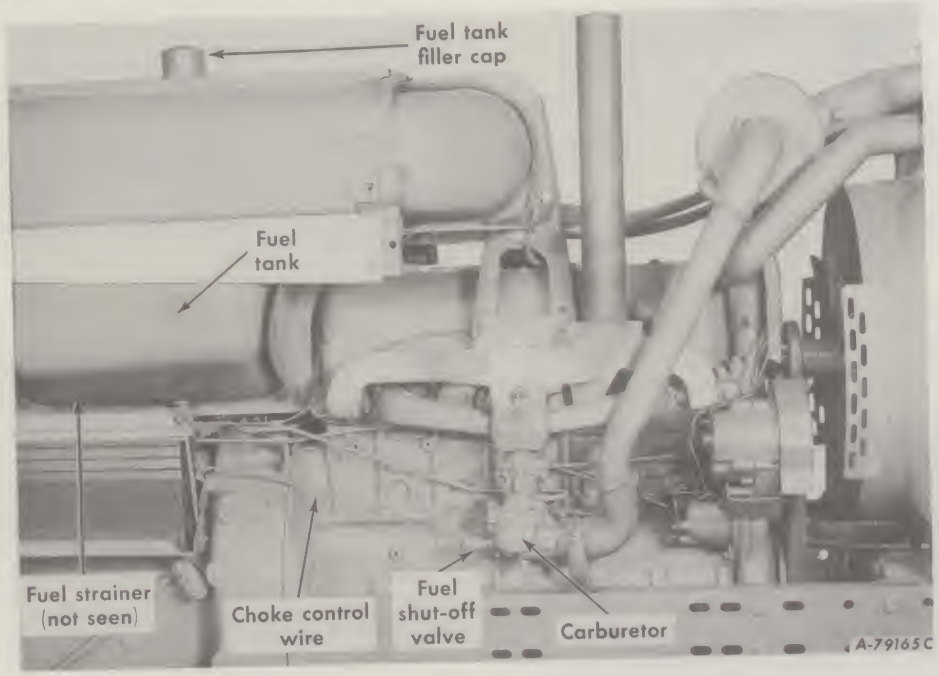
This instrument shows normal tractor speeds in miles per hour in all forward gears, and indicates the engine r.p.m. which provides a means of setting the engine speed for power take-off operations. It also records engine hours of operation at 2,400 r.p.m.

For standard power take-off shaft speed, the engine speed should be set at 2,100 r.p.m.

Refer to the tables **on pages 129 and 130** for normal ground speeds according to tires sizes. Refer to "Power Take-Off Specifications" **on page 130** for power take-off shaft speeds.

GASOLINE ENGINE AND FUEL SYSTEM

This engine is designed to operate on gasoline with a 93 minimum octane rating (Research Method).



Illust. 12
Gasoline fuel system.

FUEL SYSTEM

Fill the fuel tank, preferably at the end of each day's work. This will force out any moisture-laden air and prevent condensation.

Note: Do not fill the tank to its full capacity as space is required for vapor expansion in the event of a temperature change. A tank filled to capacity may overflow if exposed to a rise in temperature or direct sunlight.

The filler cap on the fuel tank has an air vent. This vent should be kept open at all times to assure proper flow of the fuel.

Be sure the shut-off valve on the fuel strainer under the gasoline tank is open.

To prevent leakage or seepage when the valve is in its full open position, screw the needle stem (shut-off valve) out until the seat on the stem is tight against the stop.

STARTING THE ENGINE

1. Put the transmission range lever in the neutral position. **See Illust. 4.**

2. Pull the choke control button all the way out.

When using the choke, avoid overchoking, as excessive use of the choke will flood the engine, making it hard to start. The use of the choke for starting will vary, depending on temperature and altitude.

3. Advance the engine speed control lever one-half. **See Illust. 4.**

4. Disengage the engine clutch which also closes the safety starting switch.

5. Turn the ignition key clockwise to a horizontal position. Press the push button starting switch **(Illust. 4)** and release it as soon as the engine starts; however, do not operate the cranking motor for more than 30 seconds at any one time. If the engine does not start within this time, release the push button starting switch and wait a minute or two; then try again.

Note: Never operate the cranking motor while the engine is operating.

6. Slowly release the clutch after the engine starts.

AFTER THE ENGINE STARTS

As soon as the engine starts, adjust the choke to a point where the engine operates without missing and, as the engine warms up, open the choke all the way by gradually pushing the choke control button all the way in. Do not use the choke to enrich the fuel mixture except when starting the engine.

Check the oil pressure Tellites and the alternator-generator Tellite.

STOPPING THE ENGINE

To prevent excessive loss of water in the cooling system due to expansion after heavy-load operation at high ambient temperatures, the engine should be operated at high idle or at approximately 1500 r.p.m. until the temperature gauge reaches its lower normal position before stopping. To stop the engine, retard the engine speed by moving the control lever all the way up to the low idle position. Then turn the ignition key counterclockwise to the "OFF" position. It is advisable to close the gasoline shut-off valve if the engine is to be stopped for any length of time.

CLEANING THE FUEL STRAINER AND SEDIMENT BOWL

Clean the fuel strainer and sediment bowl after every 250 hours of operation **See Illust. 13.**

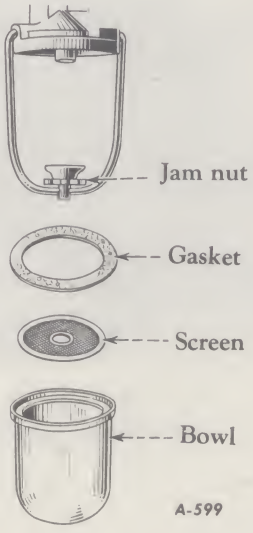
To do this, proceed as follows:

1. Close the fuel shut-off valve.

2. Take the strainer apart by loosening the nut holding the sediment bowl.

3. Clean the sediment bowl and clean the screen if necessary.

4. When reassembling, be sure the gasket between the bowl and the main body is in good condition and does not leak. Use a new gasket if necessary.



Illust. 13
Fuel strainer showing the glass bowl removed for cleaning.

CARBURETOR

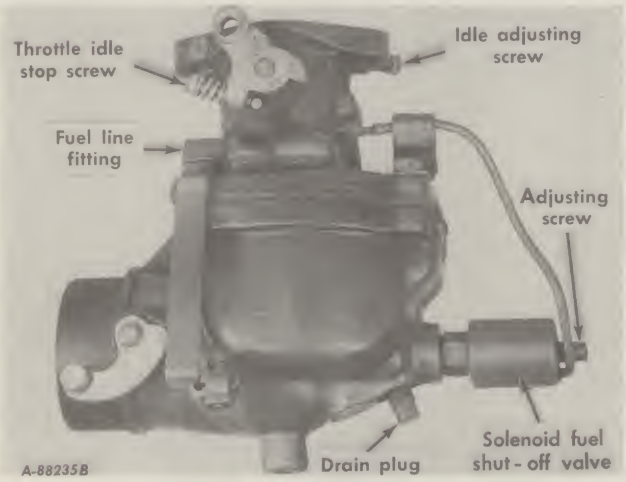
Use clean fuel; the presence of dirt and water will disturb the functioning of the carburetor. Clean the fuel screen periodically.

The fuel screen can be removed for cleaning by unscrewing the fuel line fitting and removing the elbow; clean the screen and replace it.

The flange nuts which hold the carburetor to the manifold should be checked periodically for tightness.

Occasionally check cover screws which fasten the fuel bowl to the fuel bowl cover. See Illust. 14. They should be kept tight to avoid any air leakage past the fuel bowl cover gasket.

The engine and carburetor are correctly set when shipped from the factory. If this setting has been disturbed for any reason, proceed as follows.



Illust. 14
Carburetor adjustment.

Adjusting the Idle Adjusting Screw

Close the idle adjusting screw to its seat by turning it clockwise (or in); then open it one turn. Start the engine and operate it at fast idle speed (without any load) until thoroughly warm. Cover the radiator if necessary.

While the engine is running at fast idle speed, screw in the throttle stop screw a few turns to keep the engine from stopping when the throttle is closed. Now close the throttle. The engine will now idle at a fairly high speed and the throttle stop screw can be backed out a little at a time until the desired idle speed is obtained.

If the engine misses or rolls while backing out the throttle stop screw, the idle adjusting screw may be adjusted either in or out until the engine operates smoothly. Speed up the engine for a few seconds; then recheck the idle adjustment. A slight adjustment in or out will give the smoothest idle.

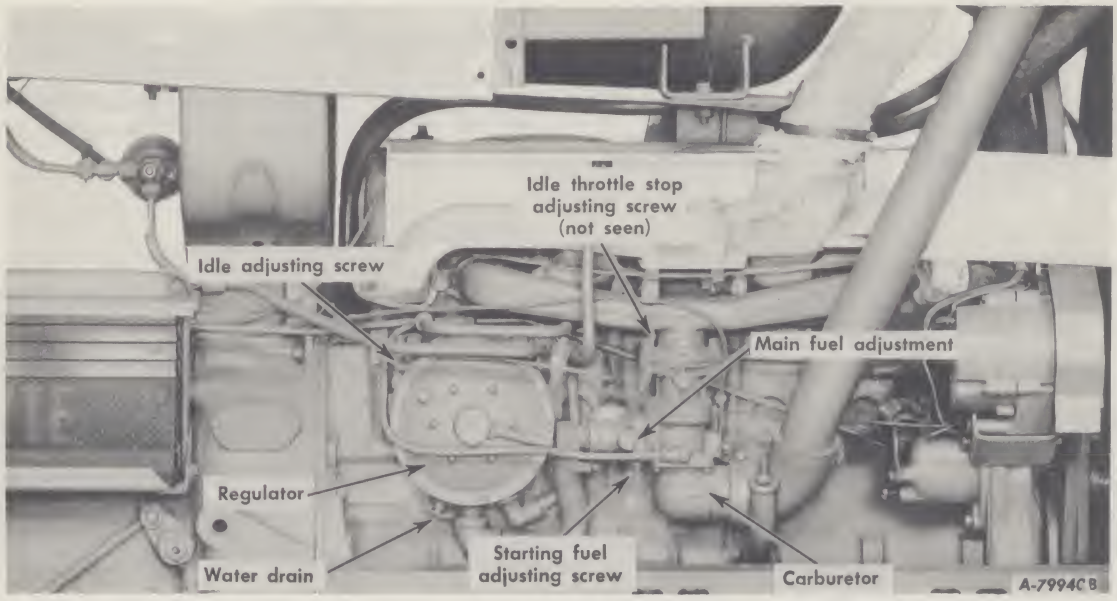
SOLENOID FUEL SHUT-OFF VALVE

To prevent engine "run-on" after the ignition is switched to "Off", the carburetor is equipped with a solenoid fuel shut-off valve (Illust. 14) which is used to stop fuel flow through the main fuel jet.

Note: The adjusting screw on the solenoid fuel shut-of valve has been set at the factory after assembly to the carburetor and need not be changed. If this setting has been disturbed, the valve may limit the main jet fuel flow and thus reduce engine power.

To reset the adjusting screw, turn the adjusting screw in a clockwise direction until the adjusting screw contacts the plunger. Do not force! Then turn the adjusting screw in a counterclockwise direction four and one-half (4-1/2) complete turns.

LP GAS ENGINE AND FUEL SYSTEM



Illust. 15
LP Gas fuel system.

PRINCIPAL ELEMENTS

Principal elements of this LP Gas fuel system include the fuel tank assembly with valves and gauges, fuel lines, pipes and connections, carburetor, fuel regulator vaporizer unit, fuel filter, and a cold manifold. These elements are specifically designed and installed to assure efficient, economical operation on LP Gas fuel as described below.

1. The fuel tank is of heavy gauge welded steel construction complete with valves and gauges designed to withstand a pressure of 1250 pounds per square inch. It is hydrostatically tested at a pressure to 500 pounds per square inch and has a working pressure of 312 pounds per square inch. A strong tank is necessary because the LP Gas fuel is stored in a liquid state under pressure, which varies with the temperature.

2. The regulator-vaporizer unit is supplied to change the liquid fuel at tank pressure to a dry gas at slightly below atmospheric pressure.

3. The carburetor is especially designed for LP Gas fuel and has an economizer for improved fuel economy under light loads.

GENERAL INFORMATION

Note: It is recommended that LP Gas fuel meeting the Natural Gas Processor's Association (NGPA) specifications for Propane HD5 be used if available.

In the normal temperature range, the fuel in the tank will be under pressures of from a few pounds up to 300 pounds per square inch. The pressure in the LP Gas tank is determined by the temperature and the type of fuel in it - - propane, butane, or a mixture of the two. As an example, normal liquid butane boils at +31° F. and liquid propane boils at -44° F. A mixture of the two liquid fuels have boiling points between these two temperatures. As the temperature of the tank and the contents rises, the pressure in the tank also increases. Both propane and butane vapors are heavier than air and will tend to settle in a low quiet spot if they should leak out of the tanks. Care should be taken to see that these spots are ventilated thoroughly before any spark or flame is produced, if the unit is used near such a location.

GENERAL INFORMATION - Continued

The safety relief valve protects the tank and starts to discharge at 312 pounds per square inch pressure and allows excess vapor to escape. If this occurs frequently in hot weather, consult your fuel dealer for a different blend of fuel having a lower vapor pressure.

If a tank is subjected to fire and the tank pressure rises above 312 pounds per square inch, the relief valve will open allowing the high pressure fuel to escape and burn. The fuel burns very fiercely, as a torch, but since no air can enter the tank there is no explosion. Nevertheless, you should not smoke or light a match around an L.P. Gas tank that is being filled, any more than you would do so while filling a gasoline tank. Safety precautions in the handling of any volatile fuel cannot be overemphasized. Complete instructions for handling this type of fuel should be obtained from the dealer distributing the fuel in you community.

The liquid and vapor service valves on this tank are fitted with automatic excess flow check valves which close instantly whenever the flow exceeds the normal amount used to operate the tractor. If a fuel line accidentally should be broken or a valve torn off of the tank, the check valves which are located ahead of the pipe thread on the valve, will close and stop the flow of gas, except for a small amount which is bypassed for valve relief purposes.

Note: Never remove a valve assembly or gauge assembly from the fuel tank without first emptying the tank and making sure there is no pressure in the tank.

In addition to the regular gasoline tractor controls (except fuel gauge) the LP Gas tractor has the following:

FUEL TANK FILLER VALVE

The filler valve serves as a connection for the transfer of liquid fuel from the storage tank. This valve contains double check valves which are spring-loaded and automatically close when the pump pressure is released. The valve has a screw cap (with attached chain) to exclude dirt.

LIQUID LEVEL GAUGE

These gauges are fairly accurate, the wear of certain parts and manufacturing variations effects the accuracy, therefore, the outage valve should be used when filling the tank.

OUTAGE VALVE

The outage valve is used to determine when the fuel tank is filled to the maximum permitted level. It is also a positive check on the accuracy of the float-type gauge. The outage valve is opened by turning the thumb screw counterclockwise, venting vapor from the tank through a small opening. The moment liquid is ejected from the valve, the maximum permitted filling level has been reached. The filling operation should be stopped and the outage valve closed.

SAFETY RELIEF VALVE

The safety relief valve is a safety device to protect the tank from excessive vapor pressure due to excessive heat. It allows vapor in the tank to escape should the pressure in the tank rise above 312 pounds per square inch. It will reseat itself automatically, when the tank pressure returns to normal.

VAPOR RETURN VALVE

The vapor return valve is used to connect the vapor space in the tractor tank with the vapor space in the storage tank. This equalizes the pressure in the two tanks, permitting transfer of fuel by gravity or reducing the pump pressure required to transfer fuel. A built-in excess flow valve closes if the flow through the valve becomes excessive. A screw cap (with attached chain) is also provided to exclude dirt

VAPOR AND LIQUID SERVICE VALVES

Internal tank piping delivers vapor from the top of the tank to the vapor service valve. Liquid from the bottom of the tank is delivered to the liquid service valve. External fuel lines connect both valves to the inlet port of the fuel filter. Both service valves have excess flow valves which close if the flow through them becomes excessive.

FUEL SYSTEM

Fill the fuel tank at a thoroughly ventilated location. Never fill the fuel tank when the tractor is inside a building.

Fuel transfer equipment and complete instructions for handling this fuel should be obtained from the dealer distributing the fuel in your community.

The recommended method for filling the fuel tank, is to use a fuel transfer pump connected from the main storage tank to the tractor tank filler valve. A vapor hose is recommended for use between the two tanks to equalize the pressure and reduce the pump pressure required to transfer fuel. The filler valve contains double check-valves which are spring loaded and automatically close when the pump pressure is released. The vapor return hose connection has a check valve which is pushed off its seat when the hose is connected, and closes automatically when it is disconnected.

The tank can also be filled without a fuel transfer pump if the pressure in the tractor tank is considerably less than the pressure in the storage tank. When this method is used, filling can be expedited by running the engine on vapor only (under light loads on fast idle) before refueling. This reduces the vapor pressure in the tractor tank by cooling the remaining fuel. This increases the pressure differential between the two tanks and provides quicker filling. Both vapor service and liquid service valves must be closed before filling the tank.

The fuel tank is equipped with an outage valve. This valve is so located that when the tractor is level and the fuel tank is 80 percent full, liquid fuel will be ejected from the outage valve when the fuel reaches this level and the valve is open. Use the liquid level float gauge to fill the tank to approximately 75 percent full, then open the outage valve momentarily at frequent intervals until liquid spray is ejected. As soon as liquid is ejected from the outage valve, the maximum permitted filling level has been reached; the filling operation should be stopped and the outage valve closed. The outage valve should also be used to periodically check the liquid level float gauge, which should read approximately 80 percent at this point. This will differ somewhat due to manufacturing variations.

Note: Do not overfill the tank as vapor space is required for expansion.

The tank is constructed to meet the regulations of the states having laws covering the design of tanks, their mounting, fittings, etc. In states not having safety codes, the National Board of Fire Underwriters' Regulations apply.

Caution! Due to various state laws and regulations your dealer should be consulted whenever any service on the fuel system is required.

STARTING THE ENGINE

1. Put the transmission range lever in the neutral position.

2. Advance the engine speed control lever one-half.

3. Pull the choke control button **(Illust. 4)** all the way out. Never set the choke in an intermediate position. The choke must close completely, because the carburetor has a separate set of gas and air orifices for starting.

4. Slowly open the vapor valve **(Illust. 5).** It is important that the vapor valve or liquid valve be opened slowly, otherwise the excess flow valve may be "slugged" or automatically closed, requiring up to about 50 seconds for the excess flow valve to relieve itself.

5. Disengage the engine clutch, which also closes the safety starting switch. Turn the ignition switch key clockwise to the horizontal position, press the push button starting switch and release it as soon as the engine starts. However, do not operate the cranking motor for more than thirty seconds at any one time. If the engine does not start within a reasonable time, check the plugs for icing (in cold weather), gap setting, and correctness of carburetor starting adjustment. Then try starting again. Slowly release the clutch pedal after the engine starts.

AFTER THE ENGINE STARTS

Check the oil pressure Tellites and the alternator-generator Tellite. Refer **to pages 64 and 65.** Also push the choke control button all the way in.

After the engine is running and warmed up, slowly open the liquid service valve **(Illust. 5),** and close the vapor service valve.

Note: When temperatures drop below minus (-) 15 degrees F., operate the engine on vapor at idle speeds below 1500 r.p.m. for at least three minutes before opening the liquid valve.

LP GAS ENGINE AND FUEL SYSTEM

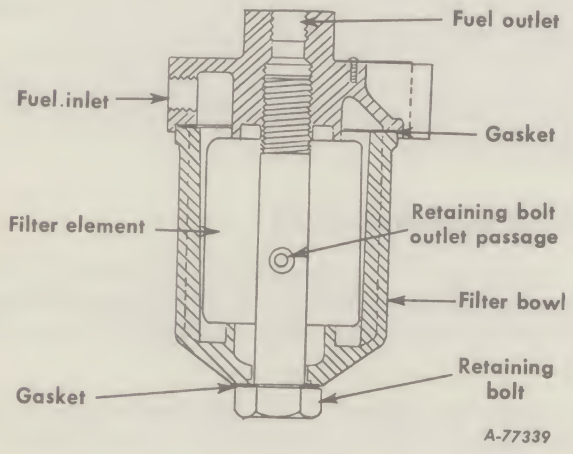
STOPPING THE ENGINE

To prevent excessive loss of water in the cooling system due to expansion after heavy-load operation at high ambient temperatures, the engine should be run at high idle or at approximately 1500 r.p.m. until the temperature gauge reaches its lower normal position before stopping. To stop the engine, close the liquid service valve (and vapor service valve, if open) **(Illust. 5)** and allow the engine to consume the fuel in the lines. Then turn the ignition switch key counterclockwise to the "OFF" position. Never allow the liquid service valve or vapor service valve to remain open after the engine is stopped.

FUEL FILTER

The fuel filter is provided to stop the passage of scale, rust, or other foreign matter that may be carried by the liquid fuel as it flows from the tank. The filter bowl and top are of cast bronze and designed for a working pressure of 375 pounds per square inch. Liquid fuel from the tank enters the filter and flows down through the filter element to the outlet passage. By removing the retaining bolt and filter bowl, the filter element may be removed for replacement. **See Illust. 18.**

This filter operates until it becomes clogged sufficiently to restrict the flow of fuel.



Illust. 18
Cutaway view of liquefied petroleum fuel filter showing the fuel passages inside and outside of the filter cartridge.

A clogged element causes a pressure drop within the filter. This results in vaporization of the fuel which may cause freezing at the filter and engine starvation for fuel due to liquid passages being required to pass gaseous fuel.

The filter element should be replaced when it is clogged sufficiently to restrict the flow of fuel. The filter element should be handled carefully so as not to crush the sides of the element. When reassembling the filter, make certain the contact surfaces of the upper and lower bowl gaskets are clean. Replace the bowl gaskets with new ones, if necessary.

CARBURETOR

The carburetor, especially designed for LP Gas, mixes the correct proportions of LP Gas vapor with air and automatically provides this mixture in the right quantity to meet every engine demand. The carburetor also includes an economizer, a choke, and a metering system for starting purposes.

Adjusting the Carburetor and Regulator

There are three fuel adjustments. These adjustments are correctly set and sealed at the factory and should require no alteration. If these adjustments have been disturbed in some manner, however, they can be correctly reset by your International Harvester dealer.

Starting adjustment and main fuel adjustment on the carburetor: Screw in (clockwise) for leaner mixture and out (counterclockwise) for richer mixture. **See Illust. 15.**

Idle adjustment on the regulator: Screw out (counterclockwise) for leaner mixture and in (clockwise) for richer mixture.

To reset the fuel adjustments:

1. Loosen the lock nuts on the starting fuel adjustment and main fuel adjustment on the carburetor. Turn these adjusting screws, also the idle adjusting screw (on the regulator) all the way in.

2. Set the starting adjustment 3/4 turn open, the main fuel adjustment 3-7/8 turns open, and the idle adjustment (on the regulator) 3 turns open.

CARBURETOR - Continued

3. Start the engine and allow it to warm up. As soon as it is warm, retard the engine speed control lever until the control is taken by the throttle stop adjusting screw (on the carburetor) (Illust. 15). Check the idle fuel adjustment (on the regulator) and turn it to a point where the engine speed is highest and operation smoothest.

To adjust the main fuel adjustment, move the engine speed control lever to the fully advanced position. Turn the main fuel adjustment either counterclockwise or clockwise to secure the smoothest operation. When the tractor is put under load, it may be necessary to vary this adjustment slightly to obtain the best engine performance.

The starting adjustment may be varied to obtain easiest starting if, "cold starts" with the suggested adjustment is not satisfactory.

DIESEL ENGINE AND FUEL SYSTEM

DIESEL FUEL SPECIFICATION REQUIREMENTS

The following table shows the limiting requirements for diesel fuels recommended for use in International diesel engines:

Requirements	Grade 2-D* (Preferred)	Grade 1-D*
Flash Point, degree F, minimum	125 or legal	100 or legal
Pour Point, degree F, maximum	10 below ambient †	10 below ambient †
Cloud Point, degree F, maximum	ambient †	ambient †
Water and Sediment, percent by vol. maximum	0.10	Trace
Carbon Residue on 10 percent Residuum, percent max.	0.35	0.15
Ash, percent by weight, maximum	0.02	0.01
Distillation Temperatures, degree F:		
50 percent Point, minimum	475	----
90 percent Point, minimum	540	----
90 percent Point, maximum	675	550
End Point, maximum	725	----
Sulphur, percent by weight, maximum	0.5	0.5
Cetane Number, minimum	40	40
Copper Strip Corrosion, maximum	No. 3	No. 3
Viscosity, Kinematic at 100F, centistokes, minimum	2.0	1.4
Viscosity, Kinematic at 100F, centistokes, maximum	5.8	2.5

Notes:

* Grade 2-D is preferred but 1-D should be used at temperatures below 10 degrees F or for operations entailing considerable idling.

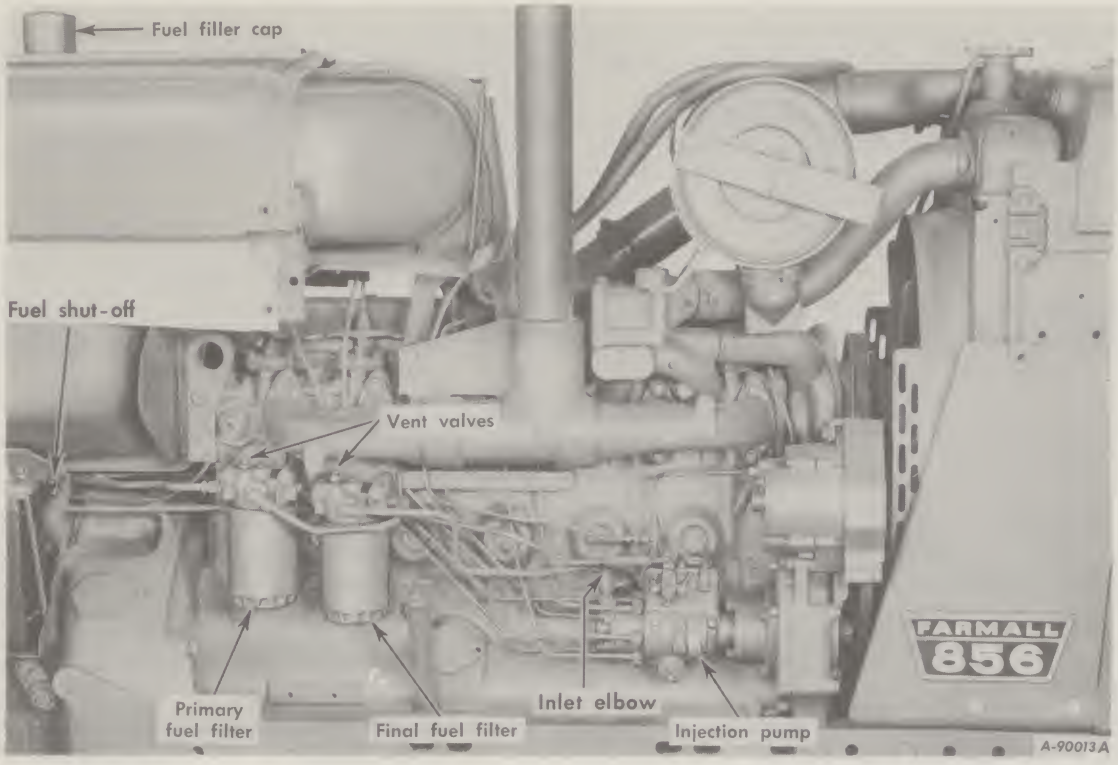
† Ambient refers to lowest temperature at which the engine is to be operated.

The diesel fuel system consists of a fuel tank with a water drain valve, a primary fuel filter, a final fuel filter, an injection pump assembly complete with charging pump and governor, a nozzle holder and nozzle assembly for each cylinder and high-pressure tubings connecting the pump discharge outlets to the nozzles.

The fuel injection pump draws the fuel from the supply tank through the filters, places it under the high pressure required for mechanical atomization, meters it with great accuracy, distributes it in proper sequence to the various cylinders, makes the individual injections with fine precision in timing, and produces uniformly through the nozzles the correct pattern of spray for the combustion chambers.

Careless or too frequent removal of elements of the fuel injection system for "inspection" or "cleaning" is generally far more harmful than beneficial, because of the danger that dirt will enter the exposed connections and because of the possibility of mishandling the equipment through lack of knowledge of its design and construction. Various components are made with the utmost precision and are easily damaged when removed.

The injection pump is correctly set at the factory and should require no adjustment. Whenever adjustments or repairs become necessary, consult your local International Harvester dealer. Do not tamper with any of the pump units.



Illust. 20
Fuel system on the right side of the diesel engine.

FUEL SYSTEM

When filling the fuel tank, carefully strain the diesel fuel to be sure it is free from foreign substances. Do not use dirty fuel. Consult your International Harvester dealer or fuel supplier for the diesel fuels which will give the most satisfactory performance in your International diesel engine. See the table on "Diesel Fuel Specification Requirements" on page 19.

Note: Do not fill the tank to its full capacity as space is required for vapor expansion in the event of a temperature change. A tank filled to capacity may overflow if exposed to a raise in temperature or direct sunlight.

Be sure the shut-off valve under the right side of the fuel tank is open. To prevent leakage or seepage when the valve is in its full open position, be sure to screw the needle stem (shut-off valve) out until the seat on the stem is tight against the stop.

All air must be eliminated from the fuel lines before the engine will start and operate properly. All plugs and fuel line connections must be thoroughly tight to prevent leakage and to prevent air from entering the fuel system.

VENTING THE FUEL SYSTEM

To assure proper operation of the engine, the fuel system must be free from air. Vent the system under the following conditions:

1. Before starting an engine that has not been operated for an extended period of time.

2. When an engine, in operation, runs out of fuel.

3. When the fuel filters have been serviced or replaced.

4. When any connections between the injection pump and fuel tank have been loosened or broken for any reason.

To Vent the Fuel System

1. Loosen the bleeder stem on the vent valve at the top of the primary fuel filter and allow the fuel to run out until it flows free from air bubbles. Then tighten the bleeder stem to close the vent valve.

2. Loosen the bleeder stem on the vent valve at the top of the final fuel filter and allow the fuel to run out until it flows free from air bubbles. Then tighten the bleeder stem to close the vent valve.

3. Loosen the hose connection on the injection pump inlet elbow **(Illust. 20)** and allow the fuel to run out until it flows free from air bubbles.

VENTING THE FUEL SYSTEM - Continued

Tighten the hose connection at the inlet elbow.

4. Start the engine.

STARTING THE ENGINE

When Temperatures Are Above Freezing

1. Be sure the shut-off valve under the fuel tank is open.

2. Put the transmission range lever in the neutral position.

3. Move the engine speed control lever to the fully advanced position (wide open throttle).

When the lever is set at the stop pin the engine speed is fully retarded. When the lever is at the extreme right indicator point, the engine speed is fully advanced.

4. Disengage the clutch which also closes the safety starting switch.

5. Turn the key switch to the "starting" position.

6. Press the push-button starting switch until the engine starts.

Note: Do not operate the cranking motor for more than 30 seconds at any one time. If the engine does not start within this time, wait one minute and then crank again.

7. As soon as the engine starts, set the engine speed control lever to obtain approximately 1000 engine r. p. m. Slowly engage the clutch after the engine starts. If the engine fails to start after following the above procedure, see your International Harvester dealer.

When Temperatures Are Below Freezing

Note: At these temperatures, it is necessary that ether be used as a starting aid. Remove the protective plug (if so equipped) or the empty container from the bottom of the ether injection assembly and install an approved can of ether in place. See instructions on "CHANGING STARTING FLUID CONTAINER" and follow steps 3, 4, and 5. Starting can then be accomplished as follows:

Follow steps 1 through 5 as in Temperatures Above-Freezing Procedure then continue as follows:

6. Simultaneously, press the push-button starting switch and press the ether injection push button until the engine starts. If the engine does not begin firing within 30 seconds, stop cranking and make certain that ether is available under pressure. To do so, remove the ether can and check if a good spray is obtained. If not, replace with a new can and repeat starting attempt. If a good spray was obtained, reinstall the can and test the ether attachment as follows:

a. Remove the spray nozzle from the manifold inlet elbow. **See Illust. 114B.**
b. Reconnect nozzle to ether line.
c. Press the ether injection push button and observe spray (should be cone-shaped).
d. Dribbling or no spray indicates a blocked spray nozzle or lack of ether pressure.

Clean the blocked nozzle or install a new can of ether as needed. Repeat step 6.

Note: Do not operate the cranking motor for more than 30 seconds at any one time.

7. As soon as the engine starts, set the engine speed control lever to obtain approximately 1000 engine r. p. m. Slowly release the clutch after the engine starts.

8. If the engine is not firing on all cylinders, apply ether intermittently until the engine is running smoothly.

Note: The ether container must be in place at all times. Failure to do so will permit dust to be drawn into the engine.

CAUTION: OBSERVE THE PRECAUTIONS PRINTED ON THE CONTAINER WHEN USING OR STORING THIS FLUID AND WHEN DISCARDING THE EMPTY CONTAINERS.

Note: Improper starting fluids can cause valve seizure and severe damage to the engine. Consult your authorized International Harvester dealer for the recommended starting fluid to be used.

If the engine fails to start after following the above procedure, see your International Harvester dealer.

AFTER THE ENGINE STARTS

Check the oil pressure Tellites and the alternator-generator Tellite. **See pages 64 and 65.**

Inspect the engine to see that it is running evenly and note whether the exhaust smoke shows evidence of poor combustion. Refer to "EXHAUST SMOKE TABLE", **on page 22.**

EXHAUST SMOKE TABLE

	Smoke Number	Color	Explanation
Acceptable Range	0	Clear	No smoke visible, only heat distortion of objects seen through exhaust gas vapor.
	1 2	Trace Gray	Very faint smoke. Definite smoke visible, can be seen from some distance.
	3	Black haze	May be encountered at full power.
	4*	Black	Not desirable for continuous operation.
	5*	Heavy black	Soot color - possible flame or glow present, depending on the length of the exhaust line.

*If this smoke is encountered, stop the engine and investigate the cause. Most probable causes are either clogged air cleaner or plugged fuel filter.

STOPPING THE ENGINE

To prevent excessive loss of water in the cooling system due to expansion after heavy-load operation at high ambient temperatures, the engine should be run at high idle or at approximately 1500 r.p.m. until the temperature gauge reaches its lower normal position before stopping. To stop the engine, retard the engine speed by pushing the control lever all the way up to the stop pin. Then lift the control lever up and over the stop pin and move it all the way to the left stop on the quadrant. Turn the key switch counterclockwise to the "OFF" position.

CHANGING THE ETHER FLUID CONTAINER

1. Turn the knurled adjusting screw clockwise until the starting fluid container can be removed from the injector body.

2. Discard the container.

3. Install the new container between the bail.

Illust. 22
Removal of ether can.

4. Tighten the knurled adjusting screw (turning counter-clockwise) and at the same time, guide the container head into the injector body.

5. Tighten the knurled adjusting screw enough to hold the container in position. Turn the can back and forth to be sure it is seated properly in the injector body. Tighten the adjusting screw.

FUEL STORAGE

A storage tank is the best method of storing diesel fuel on the job. By the use of a storage tank, the sediment and water can be easily drained off through a trap provided for that purpose, and the fuel can be pumped into the tractor with a minimum of handling.

When conditions require the use of drums for fuel storage, use a pump to draw the fuel from the drums, rather than from a faucet, as water and foreign material settle to the bottom of the drum. The suction pipe of the pump should be at least three inches from the bottom of the storage tank or drum.

If drums are used for storage of diesel fuel, place them under cover, or in a horizontal (laid-down) position if left exposed to rain. Do not disturb the drums after the fuel settles.

Do not use the last three inches of fuel in the supply tank or drum; collect it in a container and allow it to settle. In this manner the sediment and foreign material can be separated from the fuel and disposed of with no loss of fuel.

DRAINING WATER FROM THE TRACTOR FUEL TANK

The fuel tank drain valve is located just below the fuel tank on the left side of the tractor.

After allowing time for the water and sediment to settle to the bottom of the tank, open the valve and drain the tank until uncontaminated fuel appears. Then close the valve.

FUEL FILTERS

Fine particles of dirt in the fuel are extremely destructive to high pressure pumps of any description. To insure clean fuel entering the fuel injection pump, the diesel fuel passes through two stages of filtration.

The fuel, after leaving the fuel tank, passes through the shut-off valve and into the primary filter and final filter. Then the fuel from the final filter is delivered to the injection pump to be metered.

Only filters recommended by your International Harvester dealer should be used, to be sure that they are both effective and capable of withstanding the required suction without damage to the filter element.

The life of the filters depends upon the amount of dirt, water, and sediment that they must remove. It is important that precautions be taken to keep the fuel clean and free from water during storage and in handling. This will lengthen the life of the filters.

The fuel filters are the spin-on-type which cannot be cleaned and should not be disturbed except when it is necessary to replace them.

The final filter element will last longer if proper service is given to the primary filter.

When to Replace Filters

When the engine is misfiring or a loss of power is evident, the fuel system is probably clogged. If the symptoms persist, replace the primary filter. Then if the symptons still persist, replace the final fuel filter. It is necessary to vent the system after each operation. Refer to page 20.

Precautions When Replacing Fuel Filters

Cleanliness cannot be overemphasized. Be careful not to allow dirt, water, and other foreign materials to get in the filter. Keep new filters in the original package until ready for installation.

Replacing the Primary or Final Fuel Filter

Close the fuel shut-off valve at the fuel tank.

Unscrew the filter from the filter base.

Discard the old filter.

Install the new filter and tighten until "hand" tight. Do not overtighten.

Open the fuel shut-off valve at the fuel filter and then vent the system as described on page 21.

FUEL INJECTION PUMP AND NOZZLES

These are highly precision units and must be serviced only by your International Harvester dealer's serviceman.

INJECTION PUMP GOVERNOR

The governor is an integral part of the fuel injection pump and is fully enclosed and sealed at the factory. It maintains the engine speed selected by the operator and automatically proportions the fuel to the load.

Do not attempt to adjust the pump or the governor. In case of serious trouble, see your International Harvester dealer.

TORQUE AMPLIFIER

TORQUE AMPLIFIER VALVE OPERATING LINKAGE ADJUSTMENT

If it is necessary to adjust the torque amplifier valve operating linkage for any reason, remove the sheet metal steering and gear selector support housing and proceed as follows:

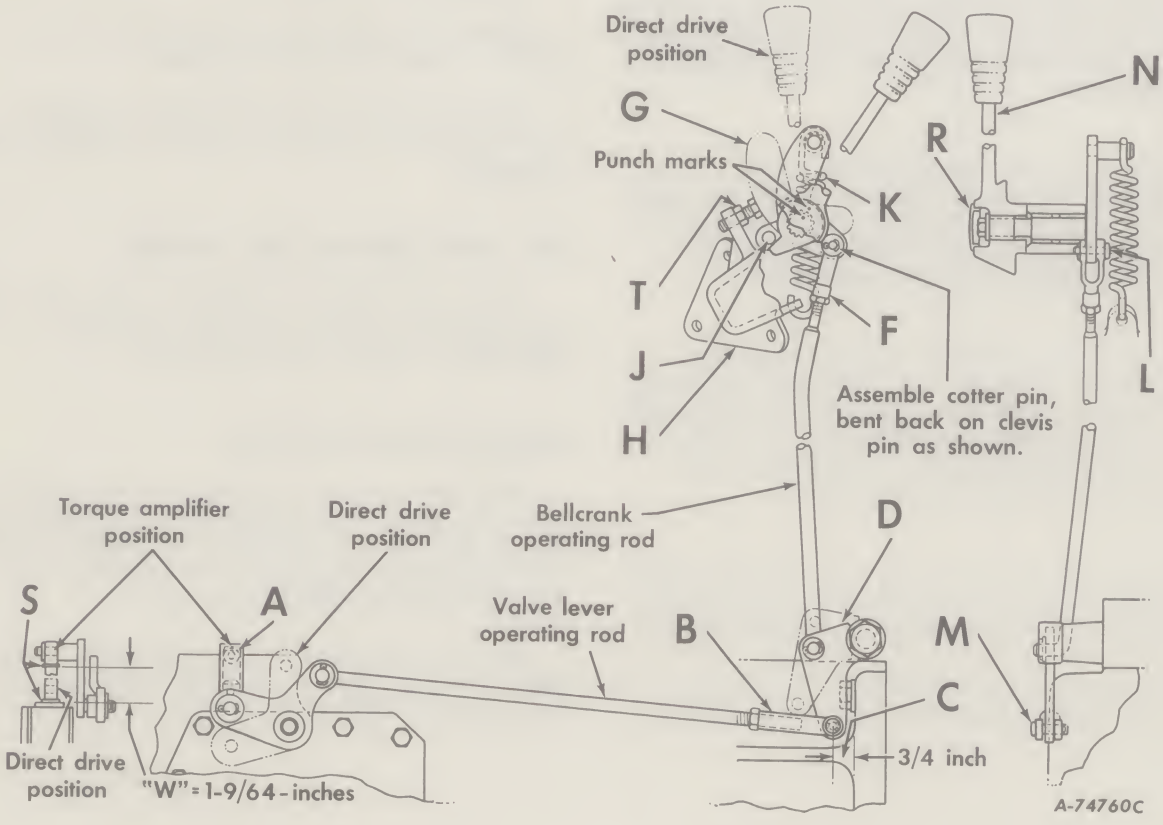
Rotate the torque amplifier lever pivot shaft arm "G" clockwise until the stop on the arm rests against the stop pin "J" on the support bracket "H" (spring "K" will hold the pivot shaft assembly "G" in this position.) Remove the clevis pins "L" and "M". Position the torque amplifier bellcrank "D" to obtain dimension "C" between the mounting hole on the torque amplifier bellcrank "D" and the flange of the clutch housing. Then adjust clevis "F" until the clevis pin "L" can be freely assembled. Insert the cotter pin and tighten the jam nut.

With the torque amplifier bellcrank "D" retained in position "C", position the selector valve stem "A" in the extreme uppermost position (dimension "W") and adjust the clevis "B" until the pin "M" can be freely assembled. Insert the cotter pin and tighten jam nut.

Move the torque amplifier bellcrank pivot shaft assembly "G" forward to the direct drive position. (The torque amplifier valve stem snap ring "S" should be contacting the valve body.) Loosen the jam nut "T" and adjust the stop screw to provide a gap from .002 to .010-inch (measured with a feeler gauge) between the head of the screw and the torque amplifier lever pivot arm; tighten jam nut "T".

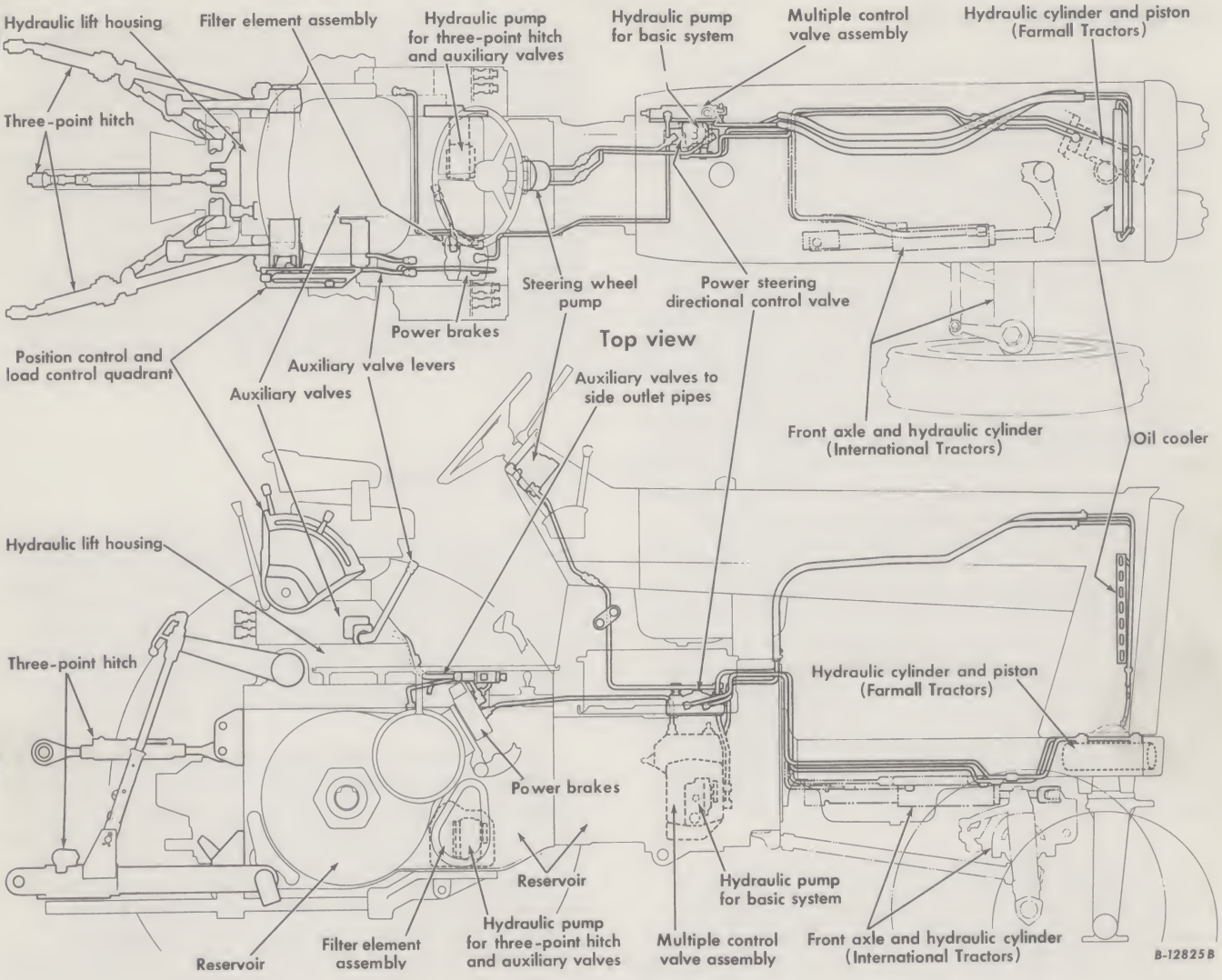
Install the steering and gear selector support housing to the tractor. Assemble the torque amplifier lever "N" to the shaft assembly "G" with the cap screw and washer, keeping the punch mark on the lever aligned with the punch mark on the tooth of the shaft.

Press the button plug "R" into the lever cavity.



Illust. 24.
Torque amplifier valve operating linkage adjustment.

BASIC HYDRAULIC SYSTEM WITH POWER STEERING



Illust. 25
Hydraulic systems diagram.

The basic hydraulic system provides "live" hydraulic power to the power steering, power brakes, and power-shift torque amplifier systems at all operating speeds, and guarantees lubrication of all transmission components that are above the oil level. The transmission and rear frame compartments serve as the hydraulic reservoir.

Hydraulic flow for the basic system is provided by a 9-gallon per minute gear-type pump. This pump is in the front transmission compartment mounted on the multiple control valve assembly, on the left side of the tractor, and is driven continuously from the power take-off shaft drive gear. The pump draws its supply of fluid from the rear frame compartment through a replaceable filter element, which protects the hydraulic system from foreign matter. A large by-pass valve at the outside end of the filter element admits fluid through a screen directly to the pump, should filter resistance become excessive through clogging or because of cold oil. The filter and by-pass valve screen are serviced by removing a cover plate on the right side of the rear frame. See "Lubrication" and the "Lubrication Guide" for additional information.

POWER STEERING

The power steering system is of the hydrostatic type, linked by fluid, there being no mechanical connection between the steering wheel and the front bolster or axle. Fluid passes from the pump outlet into a priority-type flow divider valve in the rear of the multiple control valve body. A controlled flow of approximately 3-gallons per minute is admitted to the power steering system through an orifice in the passageway, irrespective of the pressure requirements.

BASIC HYDRAULIC SYSTEM WITH POWER STEERING

POWER STEERING - Continued

The power steering system is composed of a safety relief valve exposed to the power steering flow, located at the bottom of the multiple control valve body, a spool-type directional control valve mounted on top of the clutch and transmission housing on the left side, a gerotor-type internal gear pump on the steering wheel shaft, and an actuating means at the front bolster or axle. Farmall 856 Tractors have a hydraulic cylinder built into the upper bolster, which has a piston with rack teeth on one side that engage with the pinion teeth on the upper bolster pivot shaft. International 856 Tractors have a two-way balanced hydraulic cylinder on the right side of the tractor, with one end attached to the frame channel and the other end actuating the center linkage bellcrank.

Turning the steering wheel delivers fluid to move the spool valve against its centering spring. This then directs the delivery of fluid from the flow divider to the inlet side of the steering wheel pump, passing through the pump and the spool valve to the front bolster or axle cylinder. This in turn supplies the required steering effort according to the rate of steering wheel turn. The only manual effort required is that necessary to overcome the spool valve centering spring. The effort is more or less according to the suddenness of the turn desired. The stiffness of the spring has been selected to give the desired "feel".

Manual steering is accomplished in the same manner when the engine is not running, except that there is no power assist. By rotating the steering wheel pump, fluid is delivered through the spool valve to the front bolster or axle cylinder. Check valves provide for the return of fluid from the cylinder to the steering wheel pump, instead of to the reservoir, to complete the circuit. A check valve in the front transmission compartment, at the bottom rear corner of the multiple control valve body, allows the steering wheel pump to draw up fluid under manual steering, should any air gaps exist in the circuit.

POWER BRAKES

The power brakes are of the double-disk type and are actuated by hydraulic pressure being exerted upon disk-size pistons. The control valves provide independent operation of each brake for steering purposes, or hydraulic equalization of both brakes when both pedals are depressed.

The return line from the power steering system is maintained at approximately 200 pounds per square inch pressure by a regulating valve, at the rear of the multiple control valve body near the top, for actuating the power brakes and the torque amplifier clutches. An orifice at the entry to the brake valve body permits a continuous flow of approximately one gallon per minute through the two valves to the reservoir for smoother brake action. A check valve in the supply line at the top of the multiple control valve body, prevents drain back and enables pedal actuating of the brakes without power assist when the engine is not running.

TORQUE AMPLIFIER

The torque amplifier unit provides a direct-drive of the transmission through a multiple disk clutch, and a reduced speed drive through a one-way sprag-type clutch when the direct-drive clutch is disengaged. A lock-up clutch across the sprag clutch prevents free-wheeling when in torque amplifier drive. Both clutches are hydraulically actuated by a control lever.

On tractors, with the torque amplifier, a drive selector valve, with its direct-drive and torque amplifier positions, is located at the top near the front of the multiple control valve body. A clutch dump valve, at the rear of the multiple control valve body and actuated by the engine clutch release rod, disengages the direct-drive clutch or the torque amplifier lock-up clutch, to facilitate gear-shifting, when the engine clutch is in the disengaged position.

LUBRICATION

The full pump delivery, except that directed to the power steering system by the flow divider valve, passes through an oil cooler mounted in front of the radiator, and then through passageways in the transmission case, rear frame, and rear frame cover to lubricate the bearings and gears of the drive bevel gear and differential assembly. A by-pass relief valve in the multiple control valve body, at the outlet leading to the cooler, allows the return flow for lubrication to by-pass the cooler when the oil is cold. If resistance to the flow of cold oil through the passageways to the rear frame becomes excessive, further provision is made to by-pass the flow directly to the reservoir.

LUBRICATION - Continued

The return flow from the power steering system, not used by the power brakes or torque amplifier clutches, is further reduced to approximately 20 pounds per square inch pressure by a regulating valve at the rear of the multiple control valve body. An oil pressure Tellite indicator switch is attached thereto. Oil at this pressure is directed to the rear frame, where it passes through the reverse and main shafts of the range transmission and the main shaft of the speed transmission to provide bearing lubrication. Another passage directs oil to the torque amplifier unit, when so equipped, to lubricate the direct-drive clutch and bearings of the upper shaft assembly.

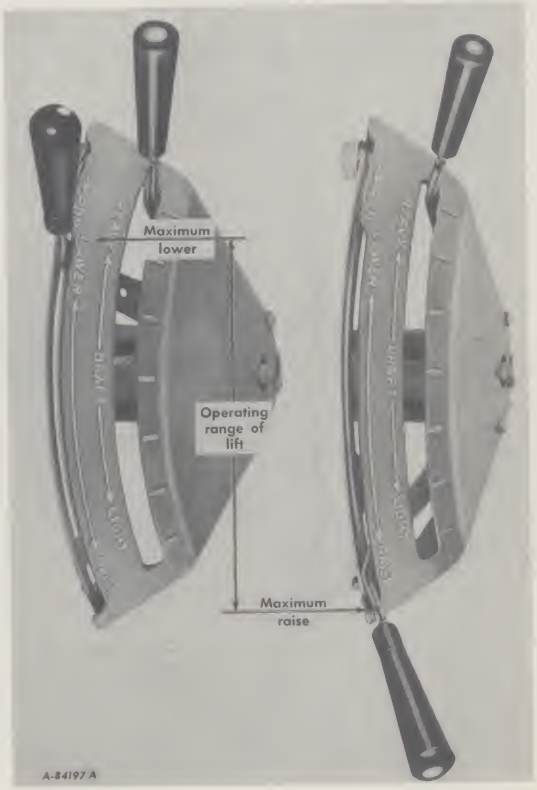
HYDRAULIC CONTROLS FOR THREE-POINT OR TWO-POINT FAST HITCH

The three-point or two-point hitch is activated by a hydraulic control unit assembly mounted on top of the rear frame. This assembly incorporates a rockshaft, lift cylinder, main control valve with linkage, unloading valve and relief valve for its separate pump circuit, and an action control valve to select the response desired. Control levers and a quadrant are mounted to the right of the seat. **See Illust. 28.** Draft control is obtained through the lower links of the hitch, to a torsion bar type spring extending through the bottom of the rear frame.

A separate 12 gallons per minute pump, provides the hydraulic flow for the three-point or two-point hitch and for auxiliary valve circuits or remote cylinders. This pump is mounted on a cover plate on the lower left side of the rear frame and is driven continuously from a gear on the power take-off shaft. The pump draws fluid from the rear frame through the filter assembly of the basic hydraulic system.

The illustrations accompanying the following explanations are only examples. Working conditions and operator perference in each case must govern the exact positions of the levers.

INSIDE CONTROL LEVER



Illust. 27
Inside control lever showing maximum raise and lower positions (draft control in extreme forward position).

HYDRAULIC CONTROLS FOR THREE-POINT OR TWO-POINT FAST HITCH

INSIDE CONTROL LEVER - Continued

The inside control lever is used to raise, lower, or control all equipment which operates above the ground, or ground-working equipment when draft sensing is not desired. The draft control lever is placed in the extreme forward position when draft sensing is not used.

The inside control lever is also used to raise and lower equipment which operates below the ground, such as plows, subsoilers, and cultivators.

The location of the inside control lever in the quadrant indicates the relative position of the equipment. When the lever is placed at the offset near the forward end of the quadrant, the hitch is as low as it will go. When the lever is placed at the rear position, the hitch is as high as it will go. **See Illust. 27.**

Caution! Never park the equipment in the raised position. Moving the control lever will lower the equipment even though the engine is not running.

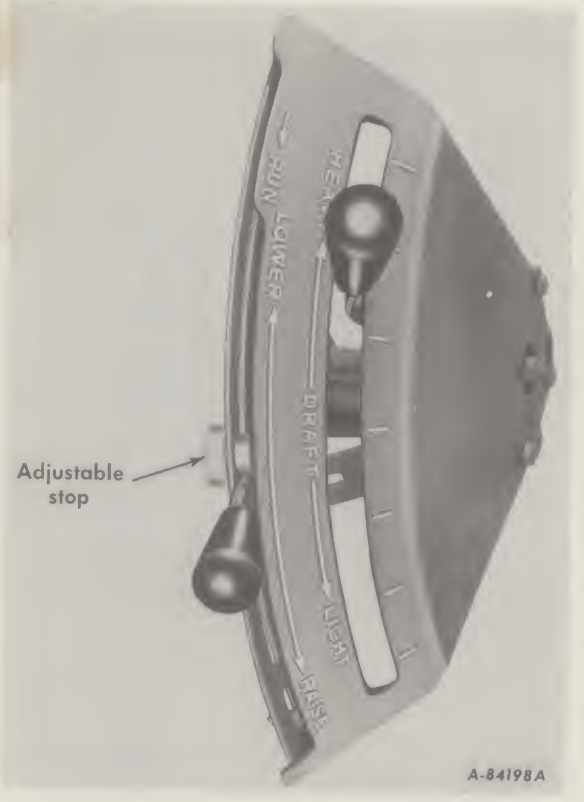
Adjustable Stop

An adjustable stop is provided for use whenever it is desirable to return the inside control lever to the same operating position. **See Illust. 28.** If the operator wishes to go deeper temporarily, the lever can be deflected past the stop, or the stop can be moved all the way forward, beyond the operating range.

DRAFT CONTROL (Outside Lever)

Draft control is the ability of the hitch to quickly respond to variations in load (or draft) so as to maintain a virtually constant load on the tractor. As the load on the hitch increases, due to pulling equipment such as a plow, the hitch responds to shallow the equipment. During the shallowing process, weight is transferred to the rear wheels of the tractor, thus increasing traction.

The draft control lever establishes the operating depth of below-ground-working tools.



Adjustable stop

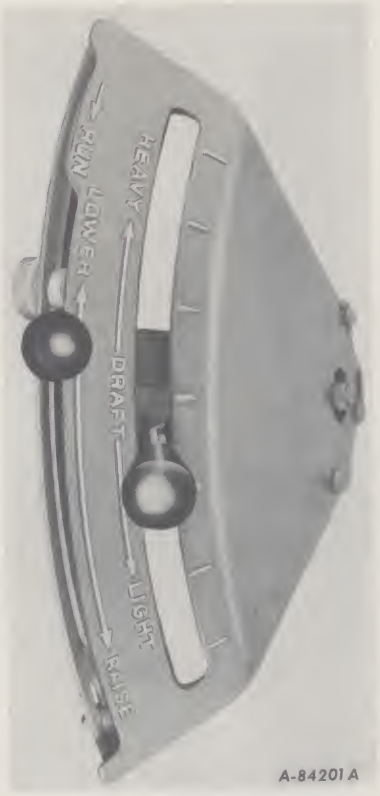
Illust. 28
Adjustable stop being used to return inside control lever to same operating position.

Illust. 28A
Starting below-ground-working equipment in the ground. Draft control lever position governs depth of operation.

DRAFT CONTROL (Outside Lever) - Continued

Illust. 29
Inside control lever used to raise the equipment without moving the draft control lever.

For example, when starting a plow or other below-ground-working equipment, the inside control lever is placed at the offset near the forward end of the quadrant. This results in fast response draft sensing. The draft control lever is placed near the center of the quadrant and the plow enters the ground. **See Illust. 29.** If the plow goes too deep, move the draft control lever rearward. If it is too shallow, move the lever forward. After the desired depth has been established, it will not be necessary to change this setting, except when encountering extreme soil or terrain conditions. Then it may be necessary momentarily to move the draft control lever a slight amount, either forward or rearward, for maintaining even furrow depth.



Illust. 29A
Levers set to control depth of below ground working tools in conditions of extreme soil variations.

The hitch is now operating under draft control and will automatically raise or lower to maintain a constant draft load when changes in soil texture or uneven terrain are encountered. The equipment is raised at the end of the field and lowered again by operating the inside control lever without moving the draft control lever. **See Illust. 29A.**

When operating in a field with extreme variations in soil, such as sand at one end and heavy clay at the other, a bottom limit (or depth limit) can be established by placing the inside control lever above the offset so the plow will not go below this pre-determined depth when going through the sand. The placing of the draft control lever then establishes the desired load and operating depth for operating in the heavy clay. **See Illust. 29A.**

HYDRAULIC CONTROLS FOR THREE-POINT OR TWO-POINT FAST HITCH

RUN RANGE (Inside Lever)

Illust. 30
Inside control lever set for fast draft sensing response.

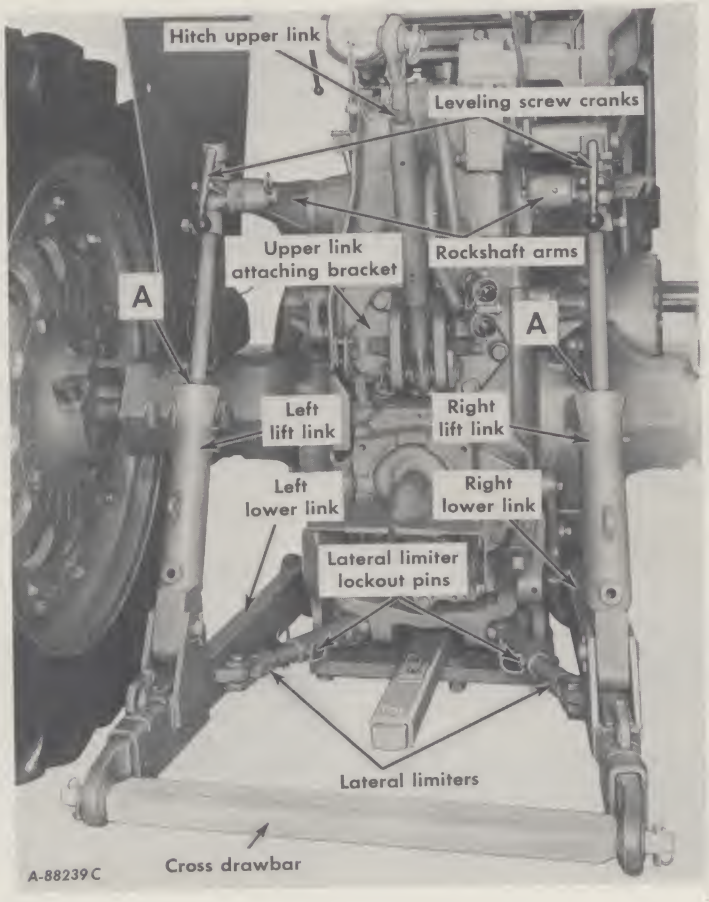
Illust. 30A
Inside control lever set for slow draft sensing response.

The speed of hitch response can be adjusted for fast or slow by moving the inside control lever past the offset into the "RUN" section of the quadrant. When the lever is placed in the fast position, draft sensing is fast. When the lever is in the slow (forward) position, response is slow. **See Illusts. 30 and 30A.**

The fast position is recommended when operating in third gear or above; the slow position for slower speeds, when cultivating, transplanting, etc.

The operator can determine in a short time, the best rate of response for the soil conditions encountered. When this is determined, set the adjustable stop forward of the lever so the lever can be returned readily to this setting after raising the equipment.

THREE-POINT HITCH



Illust. 31
Principal parts of three-point hitch.
(Swinging drawbar in storage position)

The three-point hitch, with control levers and a quadrant, provides a fast and convenient means of attaching rear mounted equipment conforming to A.S.A.E. and S.A.E. specifications. You can mount Category II or adapt the hitch to Category I International Harvester Company three-point equipment or most three-point equipment of other manufacturers.

The three-point hitch consists of two hitch lower links and a hitch upper link to connect the equipment to the tractor. The left and right hitch lower links are connected to the torsion bar crank arms, pivoting from the rear frame, and are suspended by lift links from a rockshaft which is part of the draft control unit.

Note: When operating the three-point hitch, the swinging drawbar must be set in the storage position and locked in the center of the drawbar support plate with two 3/4 x 2-inch cap screws, lock washers, and nuts, to prevent damage and assure proper operation of the hitch. The swinging drawbar may be removed from the tractor, if preferred.

THREE-POINT HITCH

LIFT LINKS AND LEVELING CRANKS

The lift links are adjusted by leveling screw cranks to obtain the desired position of the hitch points relative to one another. The desired working range or lift range can be obtained by adjusting both leveling screws. **Note:** Flat surfaces are provided on the upper collars so that the leveling screws can be turned with a wrench to assist in turning the leveling screw cranks, whenever it is difficult to turn the leveling cranks by hand. Leveling screw crank locks prevent the screws from working down. **See Illust. 31.**

Note: When the groove "A" on each lift link is aligned with the top edge of the lift link housing **(Illust. 31)**, the lower link swivel sockets will be level and at their normal height.

The lift links are made "rigid" or "free to float" by the position of the set collars at the top of the leveling screws.

When the lift links are "free to float", they allow oscillation of the hitch as required by disc harrows or equipment having widely spaced gauge wheels. The lift links are used "rigid" for equipment such as plows.

Note: Be sure to place the leveling screw cranks in their locked positions after adjustment so they will not strike the cab (when so equipped), or the control quadrant, when the hitch is raised.

HITCH LOWER LINKS

The hitch lower links connect the equipment to the crank arms of the torsion bar pivoting from the rear frame of the tractor.

The rear section of the lower links can be extended by lifting the latches, providing easier hitching. When necessary, one of the lower links can be raised individually by loosening the set screw on the lift link collar.

Note: When operating equipment under heavy trash conditions use the shields (located in the tool box) ahead of the linch pins to prevent the linch pins from being dislodged from the hitching pins.

HITCH UPPER LINK

The hitch upper link is attached to the tractor rear frame by a two hole bracket. The length of the upper link can be adjusted from 23 to 30-1/2 inches with the adjusting handle. Raise the handle to a vertical position then turn the handle clockwise to shorten the link or counterclockwise to lengthen the link.

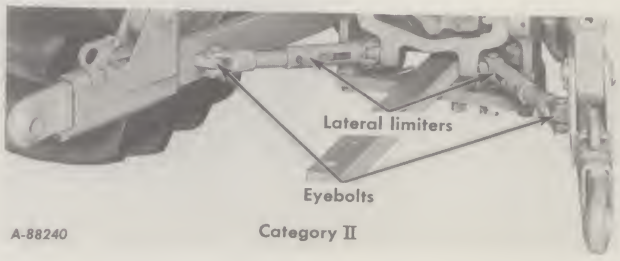
After adjusting, place the upper link adjusting handle in the clip on the turnbuckle housing.

Note: The lug on the handle must engage the slot in the threaded rod. When it is desirable to have the upper link raised out of the way, put the end of the adjusting handle in the clip on the rear edge of the load control housing.

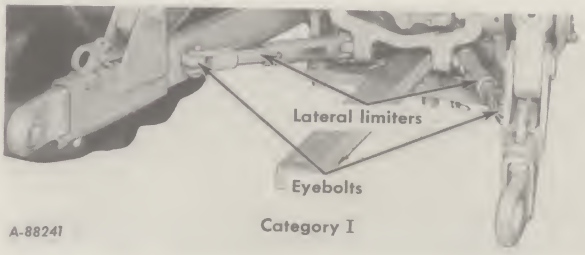
Note: The upper link must be pinned in the upper hole of the bracket only when using 1000 r.p.m. power take-off operated equipment.

For all other operation when using 540 r.p.m. power take-off operated equipment or Category I and II equipment hitched to tractors without power take-off, the upper link must be pinned in the lower hole in the bracket.

LATERAL LIMITER



Illust. 32
Lateral limiter connections for Category II equipment.



Illust. 32A
Lateral limiter connections for Category I equipment.

The lateral swing of the hitch is controlled by heavy-duty spring pins, moving within the confines of slots in the lateral limiter housings. The lateral limiter can be made rigid by inserting lockout pins in the holes in the lateral limiter housings. **See Illust. 33.**

LATERAL LIMITER - Continued

The control arm is pulled against the support bracket bolts when the equipment is in the raised position, which eliminates side sway in transport even if the lockout pins are not being used.

When operating Category II equipment, the rear clevises on the lateral limiters must be pinned to the eyebolts at the inner side of the lower links, with the offset holes in the eyebolts turned toward the rear of the tractor. **See Illust. 32.**

When operating Category I equipment, the offset holes in the eyebolts must be turned away from the rear of the tractor. **See Illust. 32A.**

"RIGID" HITCH POSITION

Put the set collars on the left and right leveling crank screws in the upper position as shown **in Illust. 33.** Be sure the point of each set screw is in the spot hole.

Remove the lateral swing lockout pins from the lift links and insert them in the holes in the lateral limiter housings. **See Illust. 33.**

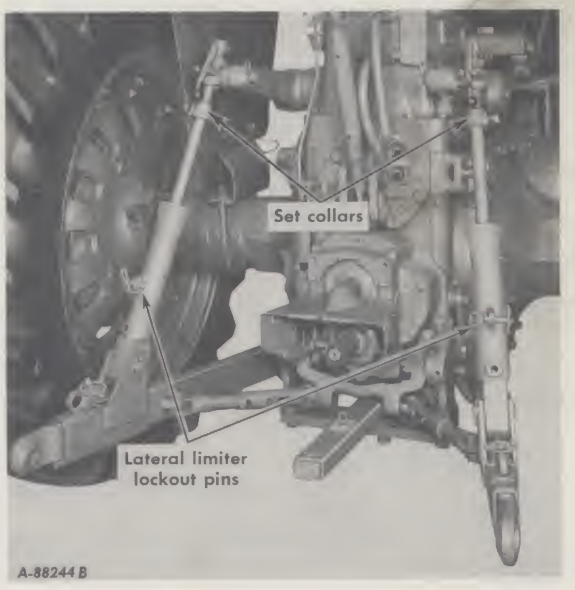
"FREE TO FLOAT" POSITION

Put the set collars on the left and right leveling crank screws in the lower position as shown **in Illust. 33A.** Be sure the point of each set screw is in the spot hole.

Remove the lateral swing lockout pins from the holes in the lateral limiter housings and store them in the lift links. **See Illust. 33A.**

Note: When operating the Three-Point Hitch, the belt pulley unit (if so equipped) must be removed. See "REMOVING THE BELT PULLEY UNIT" **on page 52.**

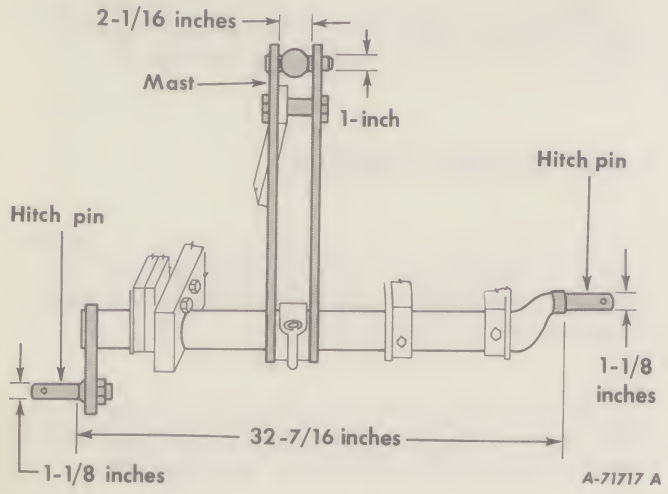
Illust. 33
Three-point hitch in "rigid" setting.



Illust. 33A
Three-point hitch in "free to float" setting.

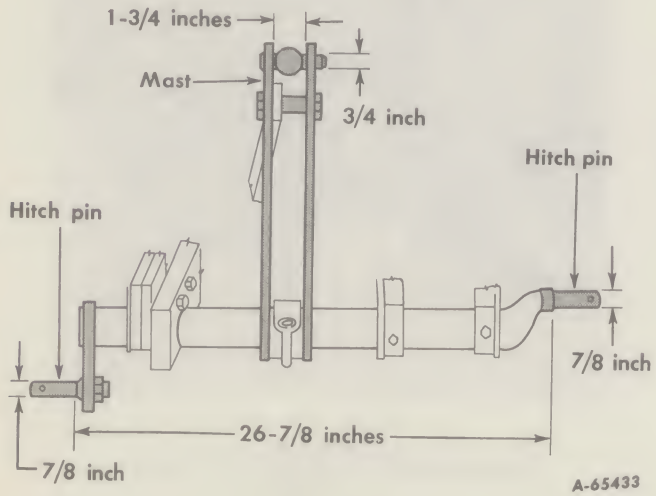
THREE-POINT HITCH

COUPLING THE EQUIPMENT

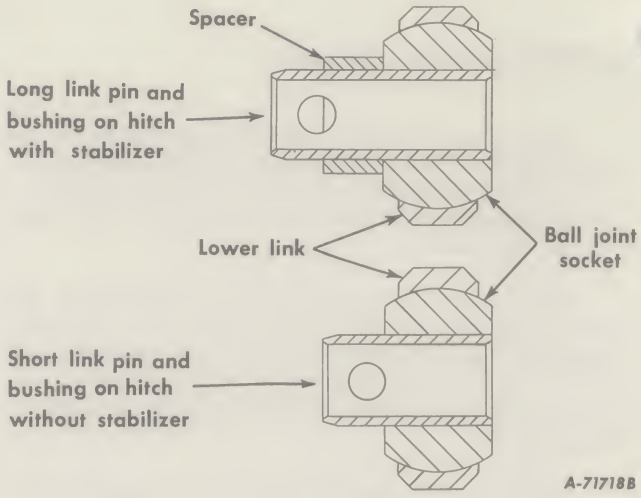


Illust. 34
Dimensions for Category II equipment.

The Category II designation means that the hitch lower links are spaced to fit equipment hitching pins spaced 32-7/16-inches between the shoulders, the swivel sockets in the ends of the lower hitch links are the correct size to fit the 1-1/8-inch diameter equipment hitching pins, and the swivel socket on the hitch upper link is the correct size to fit the 1-inch hitching pin on the equipment mast. The space at the top of the mast is 2-1/16-inches. **See Illust. 34.**



Illust. 34A
Dimensions for Category I equipment.



Illust. 34B
Lower link bushings in package to adapt Category I equipment to the Category II Hitch (with or without stabilizers).

The Category I designation means that the hitch lower links are spaced to fit equipment hitching pins spaced 26-7/8-inches between the shoulders, the swivel sockets in the ends of the lower hitch links are the correct size to fit the 7/8-inch diameter equipment hitching pins, and the swivel socket on the hitch upper link is the correct size to fit the 3/4-inch hitching pin on the equipment mast. The space at the top of the mast is 1-3/4-inches. **See Illust. 34A.**

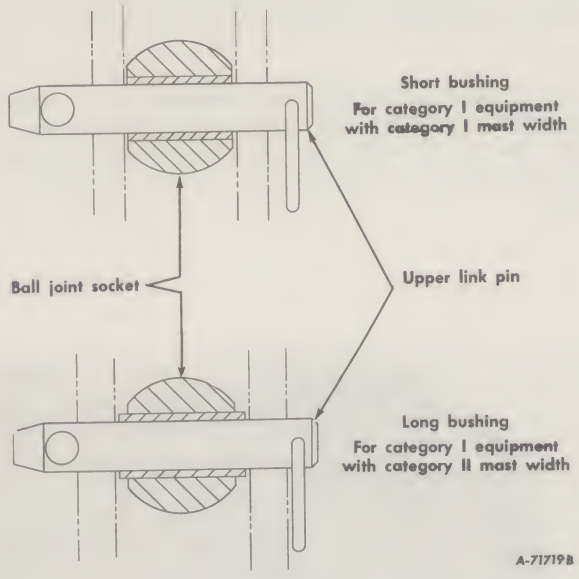
The three-point hitch on your tractor is a Category II hitch. No special bushings or pins are necessary when using Category II equipment.

An adapting package is available from your International Harvester dealer to adapt Category I equipment to the Category II hitch on your tractor. This package contains bushings for the upper and lower link ball joint sockets to adapt the smaller hitch pins on Category I equipment to the larger hole in the Category II hitch. The package contains spacers to reduce lateral movement of equipment that requires stabilization but has long lower link hitch pins.

Pins are also in the package to fit the larger Category II mast width. **See Illusts. 34B and 35.**

Coupling equipment to tractors with the three-point hitch is relatively simple, but it requires a little thought and practice to do the job quickly and without lost motion. New hitches and equipment often need to be "broken in" to work best.

COUPLING THE EQUIPMENT - Continued



Illust. 35
Upper link bushings and pin in package to adapt Category I equipment to the Category II hitch.

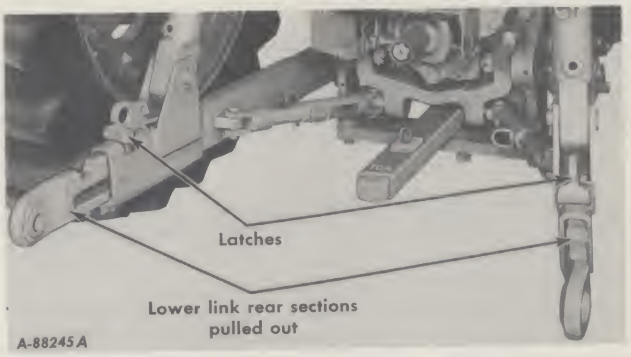
Be sure the uses of the position control and draft control levers are fully understood. Spend a little time observing the action of the hitch when it is moved by these levers.

Set the inside control lever **(Illust. 27)** as required to locate the hitch lower links at the same height as the equipment hitching pins.

Hitching is easier if the equipment and the tractor are on reasonably level ground.

Back the tractor straight in until the swivel sockets at the ends of the lower link rear sections are in line with the equipment hitching pins. Lift the latches at the rear ends of the lower links and pull out the lower link rear sections. **See Illust. 35A.**

Put the swivel socket on to the left equipment pin and insert the linch pin from the latch storage hole. Similarly assemble the right swivel socket and the linch pin, adjusting the leveling cranks if necessary.



Illust. 35A
Lower link rear sections pulled out for easier coupling.

Remove the hitching pin from the upper link. Adjust the hitch upper link so the swivel socket lines up between the hitching pin holes in the mast. Put the hitching pin through the mast holes and the swivel socket in the hitch upper link. Insert the linch pin. Shorten the upper link to its normal operating length, which will tend to return the lower link extensions to their latched positions. Raise the equipment. If the lower link extensions have not returned to their latched positions, back the tractor until this takes place before transporting.

EXAMPLE OF OPERATING THE THREE-POINT HITCH WITH DRAFT CONTROL

To provide a specific example showing the use of the three-point hitch with position control and draft control, we have selected the moldboard and disk plows.

1. Put the collars on the left and right leveling crank screws in the upper position as shown **in Illust. 33.** Be sure the point of the set screw is in the spot hole. The lift links are thereby made rigid, but vertical float, to follow ground contour, is provided by the rockshaft. Set the upper link at the 26-1/2-inch length, pin to pin.

2. Place the draft control lever **(Illust. 28A)** at the center of the quadrant.

3. Starting at the end of the field, move the inside control lever **(Illust. 28A)** forward to the "LOWER" position, and drive ahead several feet.

4. Stop the tractor and adjust the upper link **(Illust. 31)** either shorter or longer, to level the plow in the fore and aft.

5. Adjust the lift links with the leveling cranks **(Illust. 31)** to level the plow horizontally.

THREE-POINT HITCH

EXAMPLE OF OPERATING THE THREE-POINT HITCH WITH DRAFT CONTROL - Continued

6. After the plow has been leveled, adjust the draft control lever either forward (to go deeper) or rearward (for shallower depth) until the desired depth is reached.

7. If the action of the plow is too fast, move the inside control lever forward in the "RUN" range slowly until the plow reacts at the desired rate of speed.

8. When the control levers are set for the field conditions, set the stop on the quadrant so the inside control lever can be returned to this position each time the plow is lowered into the ground.

9. When reaching the end of the field, move the inside control lever rearward, raising the plow to transport.

10. Re-enter the field and lower the plow by moving the inside control lever forward to the fast rate of the "RUN" range. After the plow has reached its depth, move the inside control lever to the stop. The plow will maintain the desired depth as previously set by the draft control lever.

UNCOUPLING THE EQUIPMENT

Lower the equipment to the ground. Remove the linch pins from the three hitching points of the equipment. If the pins are difficult to remove, slightly raise or lower the hitch with the inside control lever until the pins are free.

REMOVING THE THREE-POINT HITCH

If for any reason the three-point hitch is to be removed, proceed as follows:

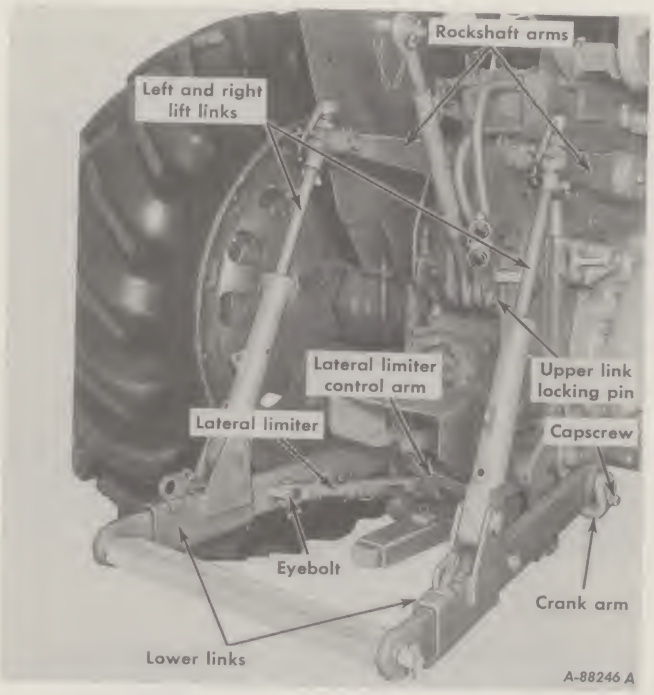
Remove the lateral limiters by removing the cotter pins and headed pins from the eyebolts in the lower links and from the lateral limiter control arm. **See Illust. 36.**

Disconnect the lift links from the rockshaft arms by removing the quick-attachable cotter pins and washers. **See Illust. 36.**

Remove the cap screws that hold the lower link pins in the crank arms and remove the pins. **See Illust. 36.** This will release the lower links from the tractor.

If it is necessary to remove the upper link, remove the quick-attachable cotter pin and the locking pin from the upper link bracket.

If for any reason it is necessary to remove the rockshaft arms, remove the cap screws from the rockshaft arm retainers and remove the retainers. Then remove the rockshaft. arms.



Illust. 36
Points of the hitch linkage removal.

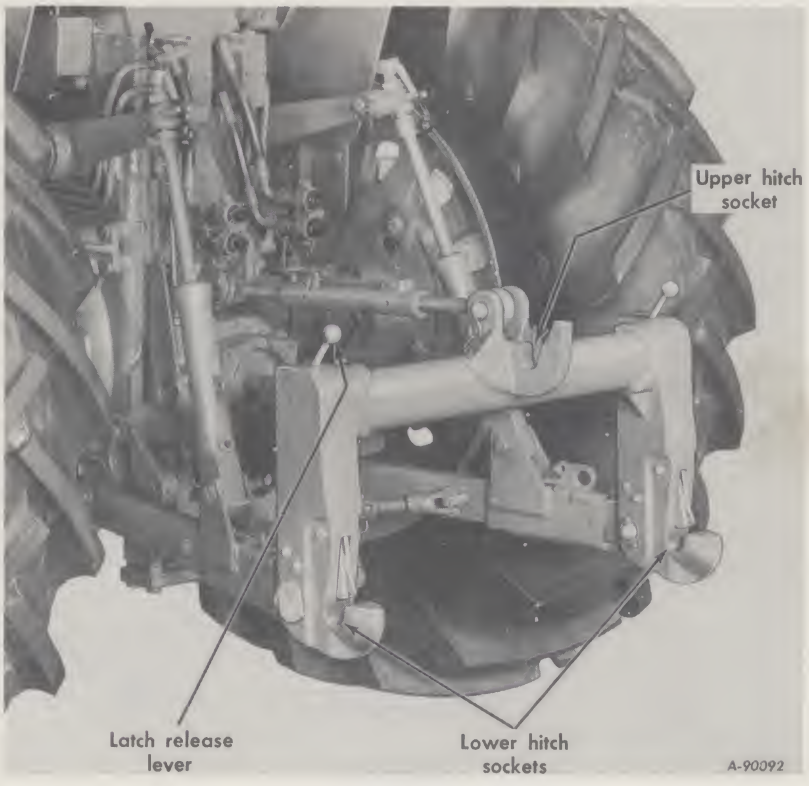
INSTALLING THE THREE-POINT HITCH

Reassemble the hitch parts in the reverse order of removal.

Tighten the cap screws holding the lower link pins in the crank arms securely.

Reassemble the rockshaft arms to the splines on the rockshaft with the arrow on the inner and outer surface of the rockshaft arm hub to be in line with the arrow marked "3" on the draft control rockshaft. Replace the rockshaft arm retainers with the cap screws.

QUICK-COUPLER FOR THREE-POINT HITCH

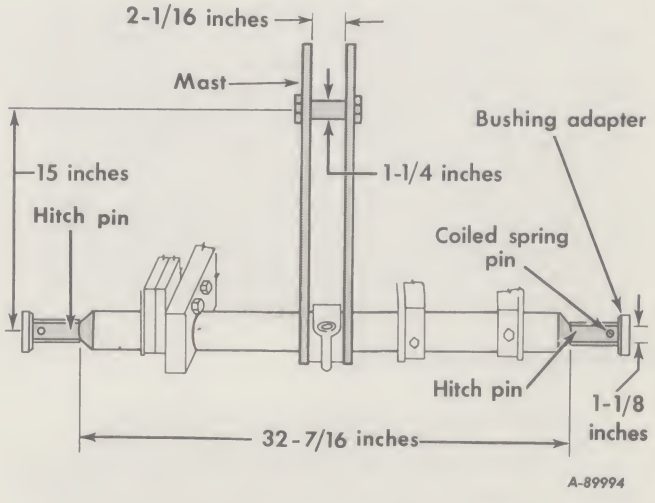


Illust. 37
Three-Point Hitch with Category II (standard) quick-coupler.

The three-point hitch quick-coupler (standard or heavy-duty) provides a fast easy means of attaching Category II equipment to the tractor. Refer to Illust. 37A for dimensions of Category II equipment.

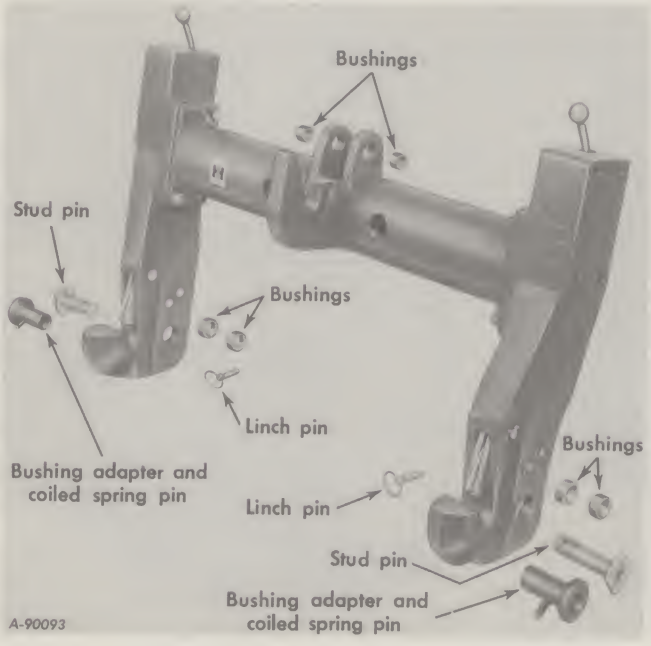
Note: The hitch lateral limiter eyebolts must be positioned as shown in Illust. 32 to provide the proper Category II dimension between the lower links.

The standard (Category II only) coupler is constructed to attach directly to the Category II hitch. Attach the hitch upper link to the quick-coupler as shown in Illust. 37. Attach the hitch lower links to the coupler, using the two stud pins and linch pins, then hitch the tractor to the equipment.



Illust. 37A
Dimensions for Category II equipment.

QUICK-COUPLER FOR THREE-POINT HITCH - Continued



Illust. 38
Heavy-duty Category II quick-coupler.

The heavy-duty (combination Category II and III) quick-coupler must be assembled as shown **in Illust. 38** to provide the Category II dimension between the side members of the quick-coupler. Bushings must be used when attaching the coupler to the hitch upper and lower links. Use two bushings on the upper link pin and two on each lower link pin. **See Illust. 38.** Install the two bushing adapters with coiled spring pins on the equipment hitch pins as shown **in Illust. 37A.** The equipment can now be attached to the quick-coupler.

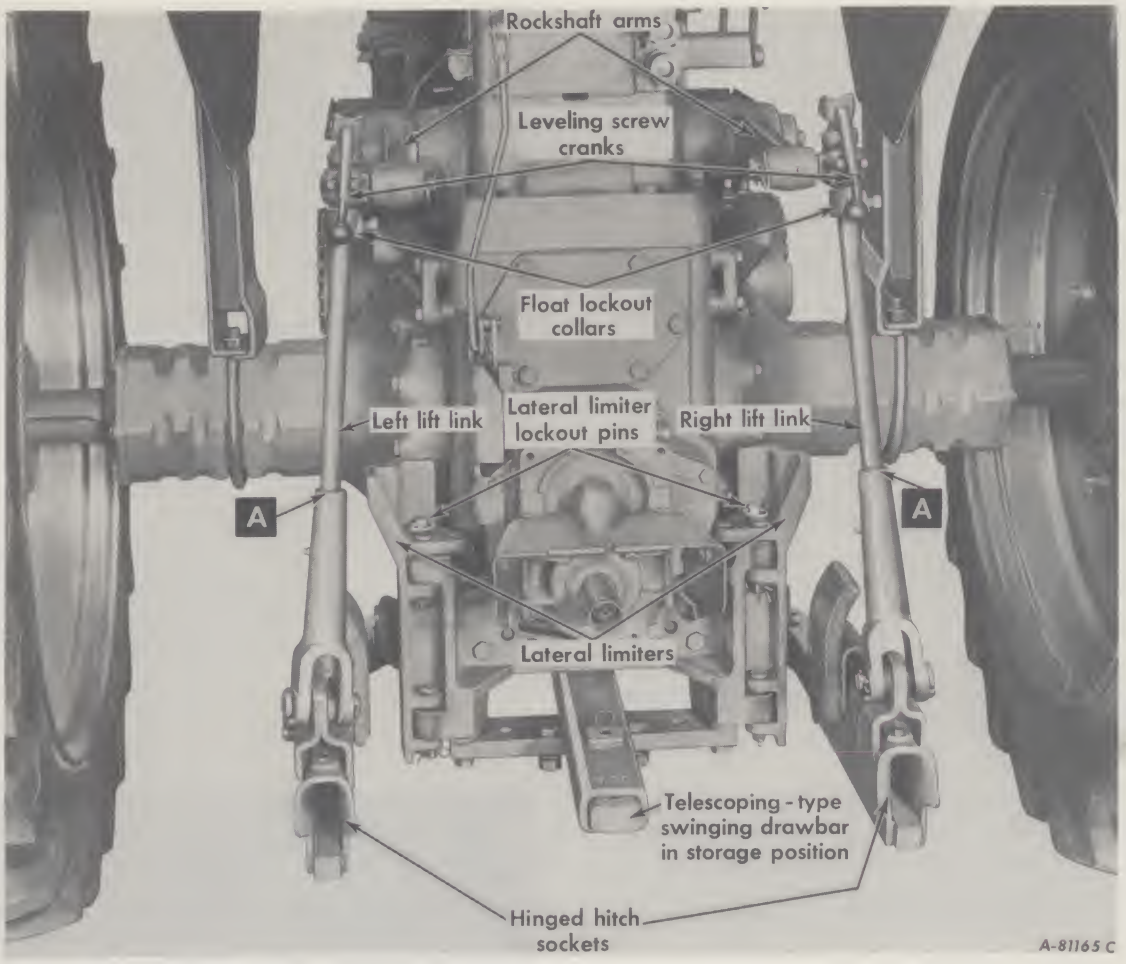
HITCHING AND UNHITCHING

With the quick-coupler in position as shown **in Illust. 37,** hitching equipment to the coupler requires a minimum of effort. Simply back the tractor up to the equipment with the quick-coupler positioned below and in line with the equipment hitching pins. Raise the hitch so the coupler upper hook engages the upper hitching pin and while continuing to raise the hitch, the lower sockets engage the lower hitching pins. As the equipment weight forces the lower hitch pins into place, the spring-loaded latches lock the pins in place.

The spring-loaded latches must be released to unhitch the equipment. Raise the equipment to the transport position. Then, while seated on the tractor, move the latch control levers to the release position by pulling the levers past the detent position.

With the latches in the released position, lower the equipment to the ground. Further lowering of the hitch disengages the three coupler hooks from the hitching pins on the equipment. The tractor is now free to be driven away.

TWO-POINT FAST-HITCH



Illust. 39
Principal parts of the two-point fast-hitch.

The two-point fast-hitch, with control levers and a quadrant, provides a fast and convenient means of attaching rear-mounted equipment. Coupling and uncoupling of equipment can be done from the tractor seat.

The operator remains on the tractor seat and backs in with the socket latches of the hitch either open or closed. Coupling is automatically completed on contact, hydraulic power raises the equipment from the ground, and the operator drives off to the work area.

The two-point fast-hitch consists of a simple bail with a hinged socket at each end, which may be pinned rigidly to the bail or allowed to pivot vertically. The front end of the bail is suspended under the rear frame by a ball joint supported from two pivot straps, and the rear end by lift links connecting to the rockshaft arms on the draft control unit. The ball joint is connected by a link assembly to the torsion bar crank arms which pivot from the rear frame. Load applied through the hitch sockets is transferred through the bail to the ball joint and back through the link assembly to the crank arms, which act upon the torsion bar to provide draft control.

The bell-mouthed sockets receive a pair of coupling beams on the equipment. The beams on all fast-hitch equipment have the same shape and spacing. The bail therefore provides a common hitch frame for all equipment. Raising and lowering is accomplished by a lift cylinder in the load control housing. Leveling of the hitch is done manually with the left and right crank-type adjusting screws.

An independent telescoping-type swinging drawbar is furnished as regular equipment with the two-point fast-hitch for pulling trailing-type equipment. The slideable bar must be in the telescoped position whenever the two-point fast-hitch is used, so it will not interfere with equipment being operated. **See Illust. 39.**

TWO-POINT FAST-HITCH

A slip-in type cross drawbar, with prongs that engage the hitch sockets, is also available for pulling trailing-type equipment. Whenever the cross drawbar is used, the lift links must be attached to the lockout brackets. **See Illust. 49.**

LIFT LINKS AND LEVELING CRANKS

The lift links are adjusted by leveling screw cranks, to obtain the desired position of the hitch sockets relative to one another. The desired working range or lift range can be obtained by adjusting both leveling screws. Leveling screw crank locks prevent the leveling screws from working down. **See Illust. 39.**

Note: When the groove "A" on each lift link is aligned with the top edge of the lift link housing **(Illust. 39),** the hitch sockets will be level and at their normal height.

The lift links are made "rigid" or "free ot float" by the position of the set collars at the top of the leveling screws.

When the lift links are "free to float", they allow oscillation of the hitch, as required by disk harrows and equipment having widely spaced gauge wheels. The lift links are used "rigid" for equipment such as plows.

Note: Be sure to place the leveling screw cranks in their locked positions after adjustment so they will not strike the cab (when so equipped), or the control quadrant, when the hitch is raised.

HITCH SOCKETS

The equipment attaching sockets are flexibly mounted on the hitch bail so they can either pivot vertically or be pinned rigidly as desired, as shown **in Illusts. 40 and 41.**

When the hitch sockets are allowed to pivot vertically, they provide flexibility that will permit moldboard plows, disk plows, and other tools to enter the ground more quickly and to maintain a more uniform working depth in fields of uneven contour. Leaf springs hold the hinged sockets so they line up with the equipment prongs when attaching. The hitch sockets are pinned rigidly when semi-mounted, steerable, moldboard plows are used.

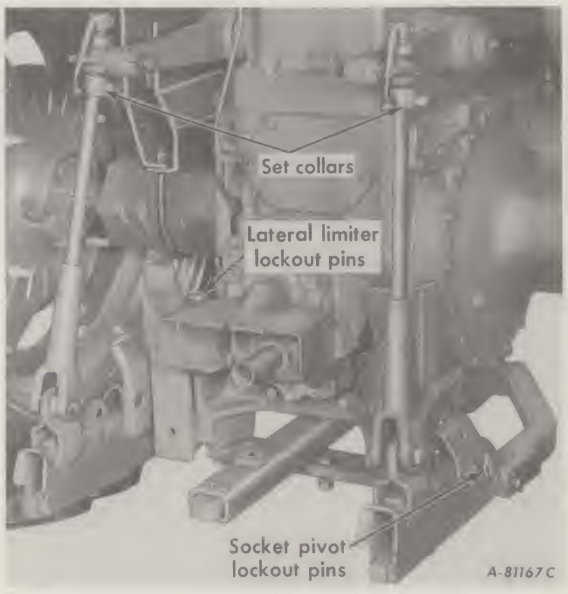
LATERAL LIMITER

The lateral swing of the hitch is controlled by rub shoes attached to the hitch sockets and lateral limiter blocks which pivot on a bracket attached to the rear frame. The blocks can be turned and pinned in either of two positions, to provide a "rigid" hitch or to allow side swing. **See Illusts. 40 and 41.**

With the limiter blocks set in "free to swing" position, side sway is eliminated in transport since the rub shoes encounter raised surfaces in the blocks when the hitch is raised.

"RIGID" HITCH POSITION

Put the set collars on the left and right leveling crank screws in the upper position as shown **in Illust. 40.** Be sure the point of each set screw is in the spot hole in the lift links.



Illust. 40
Two-point fast-hitch in "rigid" position.

Pivot the lateral limiter blocks so they meet the rub shoes and pin in this position. **See Illust. 40.**

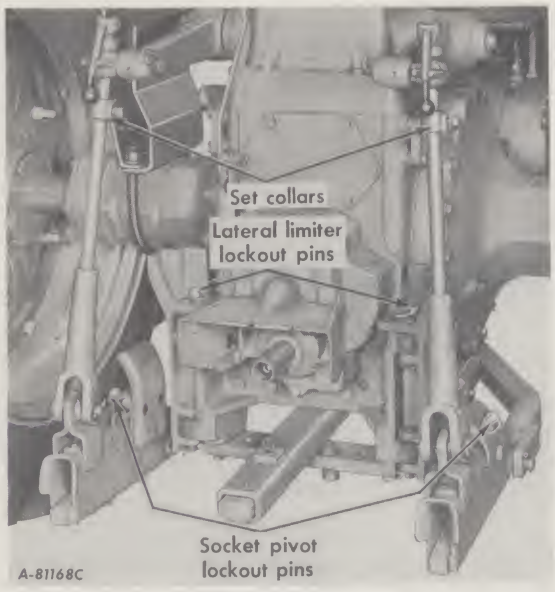
Remove the socket pivot lockout pins from the storage holes in the brackets above the sockets and place them in the holes at the front of the sockets. **See Illust. 40.**

"FREE TO FLOAT" POSITION

Put the set collars on the left and right leveling crank screws in the lower position as shown **in Illust. 41.** Be sure the point of each set screw is in the spot hole in the left links.

Pivot the lateral limiter blocks so they allow side swing of the hitch and pin the supports in this position. **See Illust. 41.**

Remove the socket pivot lockout pins from the holes at the front of the sockets and place them in the storage holes in the brackets above the sockets. **See Illust. 41.**



Illust. 41
Two-point fast-hitch in "free to float" position.

COUPLING THE EQUIPMENT

Coupling equipment to tractors with the two-point fast-hitch is relatively simple but it requires a little thought and practice to do the job quickly without loss of motion. New hitches and equipment often need to be "broken in" to work best.

Make certain the use of the control levers is understood. Spend a little time observing the action of the hitch when it is moved by these levers.

Hitching will be easier if the socket pivot lockout pins are in the storage holes in the brackets on top of the sockets when coupling equipment. The equipment and tractor should rest on reasonably level ground.

Set the inside control lever **(Illust. 27)** as required to locate the hitch sockets at the same height as the equipment prongs.

Back the tractor until the prongs begin to enter the sockets, and lower the hitch until the weight of the hitch is resting on the prongs. Then with the tractor engine running at approximately one-third throttle, back the tractor with a sudden motion so the prongs are forced into the sockets and the latches fall in place.

When the prongs enter the sockets and difficulty with latching is experienced, the equipment can be picked up by the hitch and then set back on the ground. When this is done the equipment will usually align itself and allow the prongs to latch.

UNCOUPLING THE EQUIPMENT

To uncouple the equipment, lift the hitch latches at the top of the sockets. If the latches are difficult to disengage, back the tractor slightly against the equipment to relieve the strain on the latches. The latches will remain open until the equipment prongs are withdrawn.

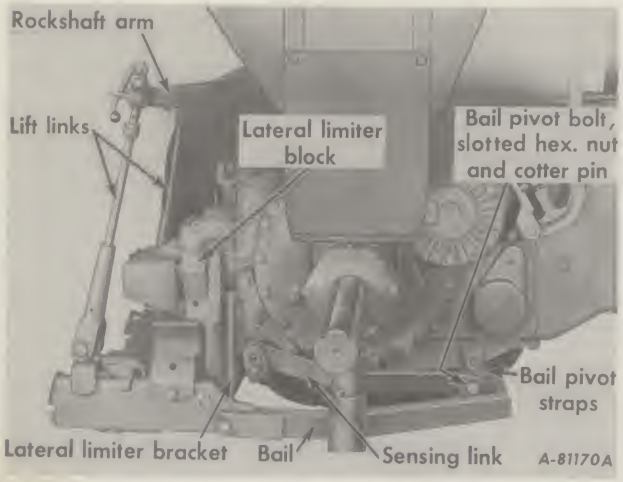
REMOVING THE TWO-POINT HITCH

If for any reason the two-point fast-hitch is to be removed, proceed as follows:

Disconnect the front end of the bail from the bail pivot straps at the underside of the tractor by removing the cotter pin, slotted hex. nut and bail pivot bolt. **See Illust. 42.** Removing the bolt will also release the sensing links. Replace the sensing links on the bail pivot straps with the previously removed bail pivot bolt, slotted hex. nut, and cotter pin.

Disconnect the lift links from the rockshaft arms by removing the quick-attachable cotter pins and washers. **See Illust. 42.** If it is necessary to remove the left and right lateral limiter blocks, remove the cotter pins and headed pins from the lateral limiter bracket. **See Illust. 39.** The lateral limiter bracket can also be removed by removing the six cap screws from the bracket attached to the rear frame.

If for any reason it is necessary to remove the rockshaft arms, remove the cap screws from the rockshaft arm retainers and remove the retainers. Then remove the rockshaft arms.



Illust. 42
Points of the hitch linkage removal.

INSTALLING THE TWO-POINT FAST-HITCH

Reassemble the hitch parts in the reverse order of removal.

Reassemble the rockshaft arms to the splines on the rockshaft with the arrow on the inner and outer surface of the rockshaft arm hub in line with the arrow marked "2" on the draft control rockshaft. Replace the rockshaft arm retainers with the cap screws.

AUXILIARY VALVES AND REMOTE CYLINDERS

One or two auxiliary valves may be added to the top of the draft control housing (under the seat) to provide hydraulic control of various mounted and trailing-type equipment. Control levers are located on the right side of the seat, ahead of and below the control levers for the three-point or two-point hitch.

Hydraulic flow for the auxiliary valves is provided by the 12-gallon per minute pump located in the rear frame, which also supplies the three-point or two-point hitch, when so equipped. A 17-gallon per minute pump is available, in place of the 12-gallon per minute pump, on International 856 Tractors for industrial purposes, such as with a front end loader, when not equipped with the three-point or two-point hitch.

Each valve provides independent lifting and lowering and may be set for float operation when equipment is to follow the ground contour. However, when the levers are operated at the same time or with the three-point or two-point hitch, the cylinder with the lightest load will move before the more heavily loaded one moves.

The inner or single control lever operates the left side and rear hydraulic outlets simultaneously, or the rear outlets when not equipped with the side outlets. The outer control lever operates either the right side outlets or a second set of rear outlets.

A double-acting check valve, available with either set of rear outlets, will check the flow of fluid in both directions, thereby preventing the possibility of the equipment dropping during transport or while parked.

Rear remote control extension mounting is available for the rear self-sealing couplings operated by the inner or single control lever, to provide a breakaway feature for trailing-type equipment. An extension mounting is also available for the rear self-sealing couplings operated by the outer control lever, to provide a second set of breakaway couplings.

Proper connection of the hoses is important, otherwise the rear remote control system will not function properly. One hose must be connected from the upper port of the hydraulic lift housing or the rear junction block (or check valve) to the upper port of its breakaway coupling and the other hose must be connected from the lower port of the hydraulic lift housing or the rear junction block (or check valve) to the lower port of its breakaway coupling.

The use of these levers will depend on the type of equipment used with the tractor. Complete instructions for operating the control levers and use of the cylinders are included in the operator's manual furnished with the equipment. General instructions for operating the levers are given here.

It is recommended that the gold colored male coupling, identified with a 1/16-inch wide groove on the hex part of the body; and the gold colored female coupling, identified with a 1/16-inch groove next to the collar; be used as a pair, to insure maximum performance.

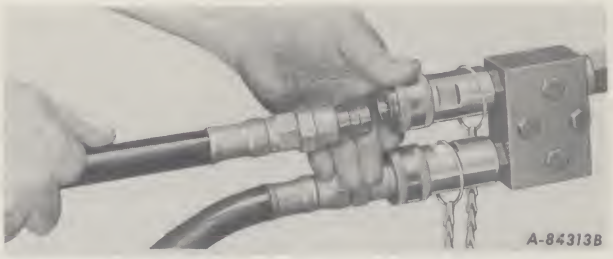
CONNECTING HOSES TO JUNCTION PORTS

The proper junction port should be connected to the cylinder port to assure that the cylinder piston rod will extend when the auxiliary valve levers are moved rearward and retract when they are moved forward. Reverse the hoses if the piston rod works the opposite way.

When connecting the coupling halves, take care to keep the couplings free from dirt and grit. Use the dust plugs furnished to help protect the female coupling from dirt and grit when the coupling is disconnected.

Illust. 43
Rear junction ports operated by the inner or single control lever.

If it is difficult to connect one of the couplings (one or the other couplings will always connect easily) because of the pressure in one of the tractor lines, proceed as follows: With the tractor engine running, momentarily actuate the control valve to pressurize the coupling that is already connected. This relieves the pressure in the other coupling and makes it easy to connect. To disconnect the coupling, push the collar and pull the hose.



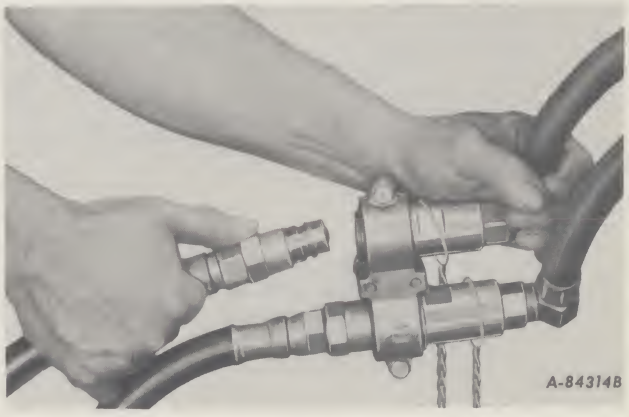
Illust. 43A
Connecting the self-sealing couplings.

CONNECTING HOSES TO REMOTE CONTROL BREAK-AWAY COUPLINGS

When self-sealing couplings are rear mounted to provide the break-away feature, the collar or lock ball retainer on the female coupling is rigidly held so that the coupling body must be pulled rearward to insert the hose end.

To connect the self-sealing couplings in a breakaway bracket, pull the female coupling rearward and insert the male coupling all the way **(Illust. 43B);** then, ease back the female coupling to lock the two halves together. After both couplings are connected, actuate the control valve momentarily in both directions to open the coupling poppets.

If it is difficult to connect one of the couplings (one or the other coupling will always connect easily) because of the pressure in one of the tractor lines, proceed as follows: With the tractor engine running, momentarily actuate the control valve to pressurize the coupling that is already connected. This relieves the pressure in the other coupling and makes it easy to connect. To disconnect the coupling, pull the hose.



Illust. 43B
Connecting the self-sealing breakaway couplings.

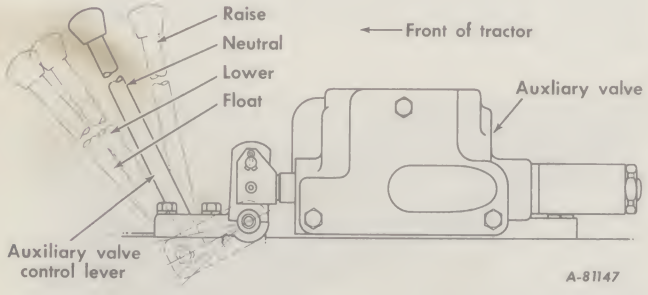
AUXILIARY VALVES AND REMOTE CYLINDERS

THERMAL EXPANSION PRESSURES
(Double and Single-Acting Cylinders)

On remote occasions, thermal expansion pressures in the cylinder lines, while disconnected from the tractor, can build in excess of the maximum pressures of the tractor system. This would make it impossible for the tractor pressure to open the male poppet after connecting to the female coupling. Should this happen, partially unscrew the hose from the one male half to bleed a few drops of oil. This will reduce the pressure sufficiently to connect the hoses to the rear couplings.

OPERATING DOUBLE-ACTION CYLINDERS

To raise the equipment all the way up, move the control lever all the way back. **See Illust. 44.** To partially raise the equipment, when it is desirable to ease the load as when hitching equipment, move the auxiliary valve control lever backward slowly just enough to secure the proper lift. To lower equipment move the control lever forward to the lower position **(Illust. 44).** Push forward to lower, pull back to raise. Push the lever all the way forward to provide float required by some equipment to follow ground contour.



Illust. 44
Setting the auxiliary valve in position with the control lever.

If the lever has been moved to detent positions during raising or lowering, it will automatically return to neutral when the piston stroke has been completed or an adjustable piston stop contacted. When the lever has been moved fully forward to provide the equipment with float, it will remain in the float position until manually returned to another position.

Note: The setting of the inside control lever in the "RUN" range of the quadrant also determines the rate of lift of remote cylinders operated by the auxiliary valves, and the rate of lowering of double-acting cylinders. This feature permits the operator to select the desired rate of action on any remote controlled implement. However, when the inside control lever is fully forward, there may not be enough pressure available to the auxiliary valves to actuate the automatic detent release. The inside control lever should be placed rearward from the "RUN" range for fast cylinder operation and normal automatic detent release of the auxiliary valves.

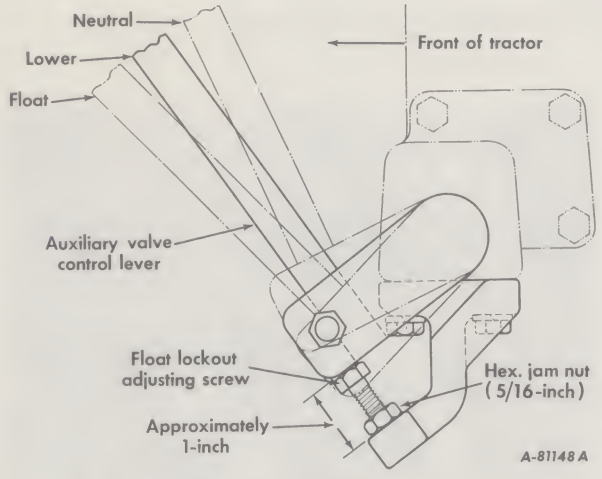
The length of the implement cylinder piston stroke gauges the working position of the equipment. Adjust the collar on the piston rod to provide working depth. The equipment will automatically stop at this depth.

OPERATING SINGLE-ACTION CYLINDERS

Follow the preceding instructions when raising equipment.

When lowering, the lever must be manually held in the lowering position. It will automatically return to neutral when released. If the lever has been moved fully forward to provide float operation, it must be manually returned to neutral.

FLOAT LOCKOUT



Illust. 45
Float position of control levers locked out with lockout screw.

The auxiliary valve levers can be locked out of the "float" position, so the levers cannot be accidently moved into the "float" position. When using equipment for work where "free to float" is not wanted, loosen the hex. jam nut and turn the lockout screw out, so the control lever cannot be moved past the "lower position" **(Illust. 45).** Then tighten the hex. jam nut.

When "free to float" is desired, loosen the hex. jam nut and turn the lockout screw in enough so the control lever can be moved into the "float" position **(Illust. 45).** Then tighten the hex. jam nut.

ADDING FLUID AFTER CONNECTING CYLINDERS AND HOSES

Start the engine and operate it at a moderate idle speed. Set the stroke limit collar at the yoke end of the piston; then operate the piston to its maximum stroke in both directions, about ten times, by moving the proper control lever back and forth. This will fill the cylinder and hoses with fluid and remove the air from the system. Retract the piston completely. Pull the transmission oil level gauge and check the oil level. Add sufficient clean IH Hy-Tran Fluid to bring it up to the proper level. Refer to the "Lubrication Guide".

Note: When using a cylinder which can be used for single-action, do not add fluid to the reservoir when the piston rod is extended.

AIR IN THE HYDRAULIC SYSTEM

Make certain that all connections and openings are well sealed. The entire system must be kept tightly sealed at all times, not only to prevent loss of fluid, but also to avoid entrance of air in the inlet end of the system. Air entering the system interferes with proper lubrication of the moving parts. It causes an increased amount of vibration and an unsteady pressure. The presence of air in the system will be noticed by a noise in the pump or by the pump laboring under high pressure. Proper filling of the reservoir and working the system during the filling process will work the air out of the system. Refer to "Freeing the System of Trapped Air".

Freeing the System of Trapped Air

Start the tractor engine and operate it at a moderate idle speed. Slowly move the control levers back and forth ten or twelve times through their full range of travel. Move the steering wheel, first to one extreme, then to the other, and then back to center. This frees the system of trapped air.

Then with the levers in the neutral position, stop the engine. If necessary, add fluid to the proper level in the transmission case, as instructed in the "Lubrication Guide".

HITCHING TRAILING EQUIPMENT TO THE TRACTOR

Do not attempt to pull when the drawbar is removed.
Drawbar bolts must be kept tight.
All hitches for trailing-type equipment must be attached to the drawbar.

Caution! All hitches for trailing-type equipment must be attached to a vertically adjustable drawbar or a swinging drawbar as outlined in the following instructions. Do not attach to any other location on the rear of the tractor.

The swinging drawbars are free to swing the entire width of the support bar or, when desired, can be locked in a stationary position.

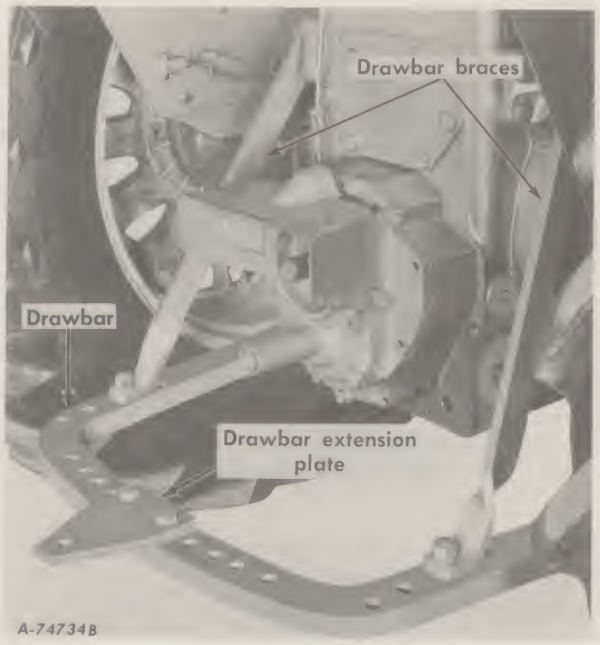
When using a swinging drawbar to pull trailing-type equipment which does not require close positioning, the drawbar tongue may be left free to swing, making steering under load easier both on the straight-away and when turning and permitting shorter turns in working small or irregular fields.

The swinging drawbar must be locked in the center position for power take-off operation of trailing-type equipment.

When using a long chain or cable to hitch the tractor to the load, drive the tractor forward slowly until all slack is taken out.

VERTICALLY ADJUSTABLE DRAWBAR

To raise or lower the drawbar **(Illust. 46)** remove the drawbar brace bolts from the drawbar and reposition the braces at the holes in the drawbar most suitable to the height desired for hitching the equipment. Replace the bolts and tighten them securely.



Illust. 46
Vertically adjustable drawbar.

The belt pulley drive unit (if so equipped) can be left on the tractor when doing drawbar work in all drawbar positions, except the highest. When operating the tractor with the drawbar in the highest position, the entire belt pulley drive unit must be removed.

On tractors with the fixed-type drawbar, the standard 14-inch or 16-inch hitch distance may be obtained by using the available extension plate.

SWINGING DRAWBAR

The swinging drawbar is free to swing the entire width of the support bar or, when desired, can be locked in a stationary position.

When using a swinging drawbar to pull trailing-type equipment which does not require close positioning, the drawbar may be left free to swing, making steering under load easier both on the straight-away and when turning and permitting shorter turns in working small or irregular fields.

SWINGING DRAWBAR - Continued

When using the telescoping-type swinging drawbar on tractors having a hitch, pull the inside control lever (on the quadrant) all the way back so the lower links are up as far as they can go. In this position the hitch will not interfere with the side movement of the swinging drawbar.

Caution! When towing loaded wagons or heavy equipment downhill or on the highway with a swinging drawbar, lock the swinging drawbar in the center position.

When using power take-off driven equipment with a swinging drawbar, lock the swinging drawbar at the center two holes in the swinging drawbar support, using two 3/4 x 2-inch cap screws, lock washers, and nuts with the three-point hitch, two 3/4 x 2-1/4-inch cap screws, lock washers, and nuts with the two-point hitch, or the two 3/4 x 2-3/4-inch headed pins and quick-attachable cotter pins with the vertically adjustable drawbar.

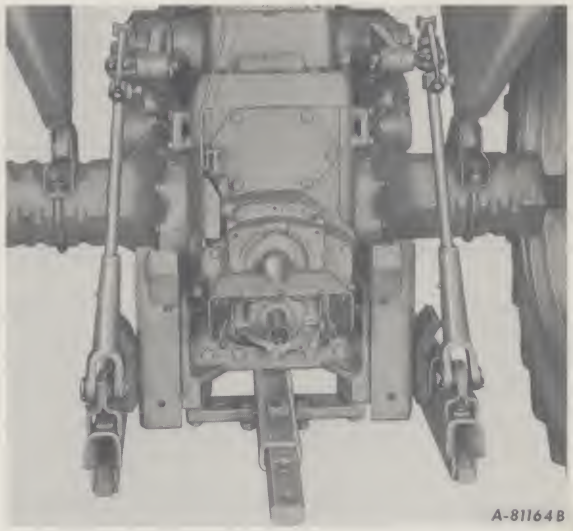
The horizontal distance between the hitch point on the telescoping-type swinging drawbar when extended, and the ends of the splined shaft of the power take-off is 14-inches for 540 r.p.m. power take-off driven equipment and 16-inches for 1000 r.p.m. power take-off driven equipment. **See Illust. 47.**

Telescoping-Type Swinging Drawbar for Three-Point Hitch or Two-Point Fast Hitch

The telescoping-type swinging drawbar is held in the storage position by a clinch-type pin.

To extend the drawbar, remove the clinch pin, pull out the drawbar, and lock in this position, using the headed pin and quick-attachable cotter.

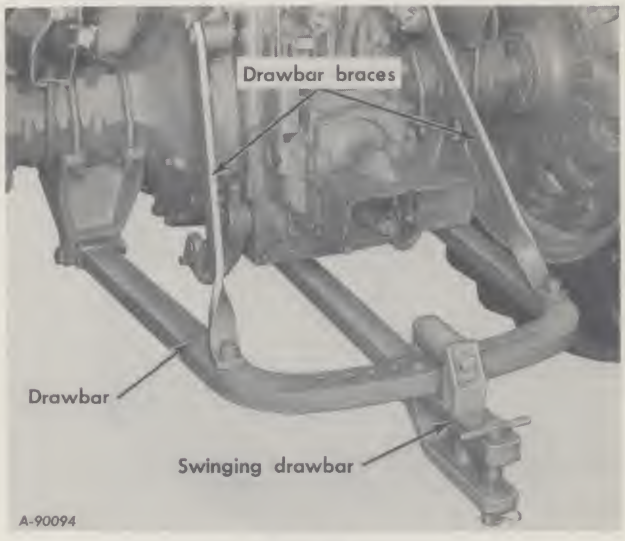
To telescope the drawbar for storage, reverse the procedure for extending the drawbar.



Illust. 47
Two-point fast-hitch with telescoping-type swinging drawbar in extended position.

Heavy-Duty Swinging Drawbar

Your tractor may be equipped with a heavy-duty swinging drawbar consisting of the swinging drawbar, vertical drawbar (not adjustable), braces, and axle clamps. It can be used for heavy duty equipment such as large plows, etc.



Illust. 47A
Heavy-duty swinging drawbar.

HITCHING TRAILING EQUIPMENT TO THE TRACTOR

CROSS DRAWBAR

When attaching to the cross drawbar of either the three-point or the two-point hitch, or to the swinging drawbar of a two-point hitch that is supported by the cross drawbar, the lift links must be attached to the lock-out brackets **(as shown in Illusts. 48 and 48A),** and the set collar must be in the upper position on the leveling screws. Be sure that the point of each set screw is in the spot hole.

Three-Point Hitch

When using the cross drawbar for the first time, assemble the left and right lockout brackets for the lift links to the tapped holes in the tractor rear frame, using the three 5/8NC x 2-1/2-inch cap screws and lock washers, and tighten them securely.

Disconnect the left and right lift links from the rockshaft arms by removing the quick-attachable cotter pins. Adjust the lift links to obtain the desired drawbar height, keeping their lengths equal. By aligning the groove "A" on the lift links with the top edge of the lift link housings **(Illust. 31),** a normal drawbar height will result. Connect the lift links to the left and right lower link lockout brackets, which are furnished with the cross drawbar. Assemble with the washer at the outside surface of the lockout bracket.

Assemble the lift link upper ends with the washer at the outside surface of the lockout bracket.

Insert the ends of the cross drawbar into the hitch lower link swivel sockets. Remove the drawbar pins from the storage holes in the lower link latches and insert them through the holes in the ends of the drawbar.

Caution! When the cross drawbar is used for trailing-type equipment or when operating the belt pulley, the lift links must be connected to the lockout brackets, as shown **in Illust. 49** and the set collars must be in the upper positions on the leveling screws. Be sure that the point of each set screw is in the spot hole in the lift links. When side movement of the hitch is undesirable or hazardous, the lateral swing lock-out pins must be inserted in the holes in the lateral limiter housings.

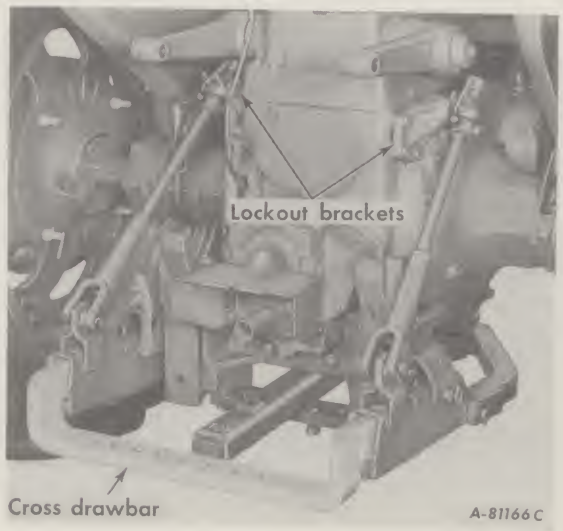
Note: The cross drawbar is not to be used with power take-off equipment.

Two-Point Fast-Hitch

When using the cross drawbar for the first time, assemble the left and right lockout brackets for the lift links to the tapped holes in the tractor rear frame, using the three 5/8NC x 2-1/2-inch cap screws and lock washers, and tighten them securely.

Disconnect the left and right lift links from the rockshaft arms by removing the quick-attachable cotter pins. Adjust the lift links to obtain the desired drawbar height, keeping their lengths equal. By aligning the groove "A" on the lift links with the top edge of the lift link housings **(Illust. 39),** a normal drawbar height will result. Connect the lift links to the left and right lower link lockout brackets, which are furnished with the cross drawbar. Assemble with the washer at the outside surface of the lockout bracket.

Illust. 48
Connecting the lift links to the lockout brackets.



Illust. 48A
Connecting the lift links to the lockout brackets.

CROSS DRAWBAR - Continued

Two-Point Fast-Hitch - Continued

Insert the prong ends of the slip-in type cross drawbar into the lower link sockets of the two-point fast-hitch.

Caution! When the slip-in type cross drawbar is used for trailing-type equipment, the lift links must be connected to the lockout brackets, as shown **in Illust. 48A,** and the set collars must be in the upper positions on the leveling screws. Be sure that the point of each set screw is in the spot hole in the lift links. The socket pivot lockout pins must be in the holes at the front of the sockets to hold them rigid with the bail. When side movement of the hitch is undesirable or hazardous, the lateral limiter blocks must be pinned in the "rigid" hitch position.

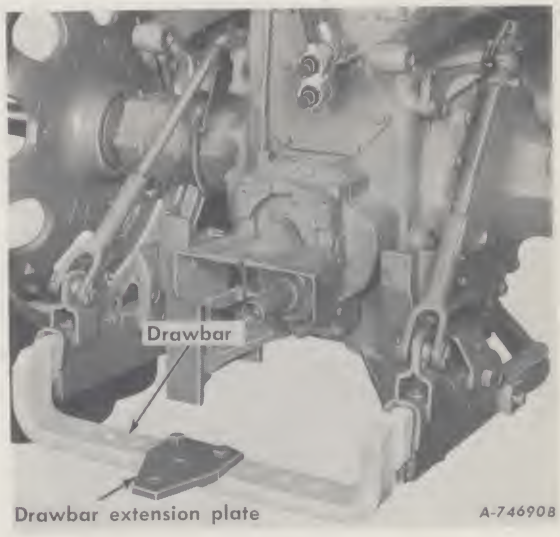
POWER TAKE-OFF

The independent power take-off is powered directly from the engine flywheel. It provides a control of the power take-off drive independent of the engine clutch. It is engaged or disengaged hydraulically by a lever at the rear of the seat on the right side.

When using direct connected power take-off driven equipment, the left and right lift links must be set as specified in the equipment manual. The lateral limiter blocks must be pinned in the "rigid" hitch position to limit the lateral movement of the equipment.

Note: On tractors with three-point hitch, the upper link must be pinned in the upper hole of the upper link bracket only when using 1000 r.p.m. power take-off operated equipment. **See Illust. 31.** For all other operations, when using 540 r.p.m. power take-off operated equipment, the upper link must be pinned in the lower hole in the bracket.

On tractors with a hitch, the telescoping-type swinging drawbar provides the standard hitch distance of the power take-off shaft to the center line of the rear hole for power take-off operation of trailing-type equipment, when the slideable bar is in the extended position. Lock the swinging drawbar in the center position, using the two 3/4NC x 2-inch cap screws. **See Illust. 47.**



Illust. 49
Extension plate on cross drawbar.

POWER TAKE-OFF

On tractors with a two-point fast-hitch without the telescoping-type swinging drawbar, a drawbar extension plate is available which, when attached to the top and center of the slip-in type cross drawbar, will provide a standard hitch distance of the power take-off shaft to the center line of the rear hole for power take-off operation of trailing-type equipment. **See Illust. 49.** When the swinging drawbar is used with the cross drawbar, it also provides the standard power take-off to hitch distance for power take-off operation of trailing-type equipment. Lock the swinging drawbar in the center position, using the two 3/4NC x 2-1/4-inch cap screws. **See Illust. 47.**

Note: When operating the two-point fast-hitch, the belt pulley unit (if so equipped) must be removed. See "REMOVING THE BELT PULLEY UNIT" **on page 52.**

OPERATING THE INDEPENDENT POWER TAKE-OFF

Advance the engine speed control lever to the position where the indicator needle on the tachometer is in line with the mark on the lower half of the dial, showing the proper speed for power take-off operation.

Note: Do not exceed the recommended power take-off speed for the driven machine.

The tractor motion can be started or stopped in any of the forward or reverse speeds without affecting the speed of the power take-off shaft. Also, the power take-off shaft can be started or stopped without affecting the speed of the tractor.

Stop the power take-off before dismounting from the tractor.

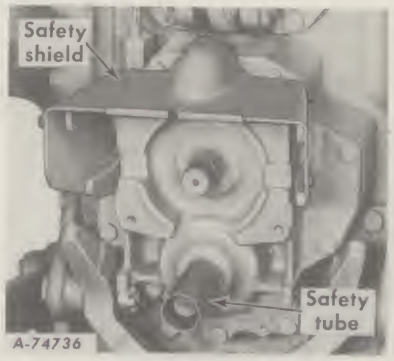
Illust. 50
Safety shield in place for 540 r.p.m. Power take-off.

Caution! When operating the power take-off, be sure that the master shield is always in place covering the power take-off exposed shaft or shafts, and also that the safety tube is in place covering the lower shaft of the dual speed unit when the upper shaft is being used.

On the dual speed unit, both the 540 and 1000 r.p.m. shafts revolve at the same time.

Caution! It is very important that the safety shield be lowered when using the 540 r.p.m. shaft. **See Illust. 50.**

Caution! Always keep the 540 r.p.m. shaft covered with the safety tube when the 1000 r.p.m. shaft is used. **See Illust. 50A.**



Illust. 50A
Safety shield in place for 1000 r.p.m. Power take-off.

Engaging or Disengaging the Power Take-Off

The independent power take-off clutch operating lever allows the operator to regulate the speed of clutch engagement so that a smooth engagement may be obtained under all conditions.

Smooth engagements may easily be obtained under most conditions by moving the operating lever forward to the position where an increase in lever effort is apparent, holding the lever at this position until the driven machine is up to speed, then moving the operating lever fully forward, To obtain a smooth engagement under extremely light or heavy loads, the operating lever may be held at intermediate positions as required.

When attempting to free plugged equipment, do not continuously slip the clutch as any clutch can be damaged by excessive slippage.

Do not allow the clutch to slip longer than three seconds at any time.

BELT PULLEY

The belt pulley assembly is mounted on the power take-off housing cover at the rear of the tractor, with the pulley on the right side, and is driven from the 1000 r.p.m. power take-off shaft. The unit is engaged and disengaged through the hydraulically-actuated independent power take-off clutch by a lever on the right side of the seat, which is also accessible from the rear of the tractor.

A constant flow of lubricant is maintained through the belt pulley housing for lubrication and cooling. For normal power requirements, a hose is provided to connect the outlet on the left side of the power take-off housing (through the hole in the linkage support bracket) to the top of the belt pulley housing. This permits a part of the delivery from the gear pump on the independent power take-off drive shaft, which supplies fluid under pressure to engage the power take-off clutch, to pass to the belt pulley housing. The hose connecting the left side of the belt pulley housing to the power take-off cover returns the flow to the rear frame reservoir and maintains the proper level for the bevel gears and bearings.

For heavy-duty power requirements, where more than approximately 50 horsepower is to be transmitted through the belt, connection is made to the basic hydraulic system of the tractor to provide a greater flow of cool oil. A long hose connecting the top of the belt pulley housing with the return line from the oil cooler, at the rear of the engine on the left side of the tractor, bypasses, to the belt pulley housing, a portion of the return flow to the rear frame. The hose connecting the left side of the belt pulley housing to the power take-off cover, returns the flow to the rear frame reservoir, as above. When the belt pulley unit is removed, the bypass hose from the oil cooler return line is connected to the power take-off cover to return this flow directly to the rear frame reservoir.

OPERATING THE BELT PULLEY

Note: Before operating the belt pulley, for the first time only, add two quarts of IH Hy-Tran fluid to the belt pulley housing. See "Lubrication" on page 120.

On tractors equipped with two-point or three-point hitch, the right lift link must be removed by removing the upper pin from the rockshaft arm and the lower pin from the right lower link.

Note: Secure the lower link so it will not dig into the ground when lining up the belt.

When operating the two-point or three-point hitch, the belt pulley unit must be removed.

On tractors equipped with a fixed-type drawbar, the belt pulley drive unit may be left on the tractor when doing drawbar work in all except the highest drawbar position. When operating the tractor with the drawbar in the highest position, the entire belt pulley drive unit must be removed.

Observe the following instructions when operating the belt pulley unit:

1. Securely anchor the machine which is to be driven by the belt, in the desired location.

2. Align the tractor belt pulley with the equipment pulley. Keep the tractor level, if possible.

3. Observe the direction of belt travel, indicated on the belt, and install the belt accordingly to prevent damage to it.

4. Tighten the belt enough to keep it from rubbing against itself during operation. Do this by driving the tractor into the belt, locking the transmission with the park lock, and blocking the tractor rear wheels. When using a very long belt or a crossed belt, it will not be possible to eliminate all rubbing.

Note: Static electricity generated by belt work, can be discharged harmlessly from tractors with pneumatic tires, by attaching a chain to the tractor and letting it touch the ground.

STARTING AND STOPPING THE BELT PULLEY

Because the belt pulley is driven by the power take-off shaft, it is started and stopped by the power take-off operating lever.

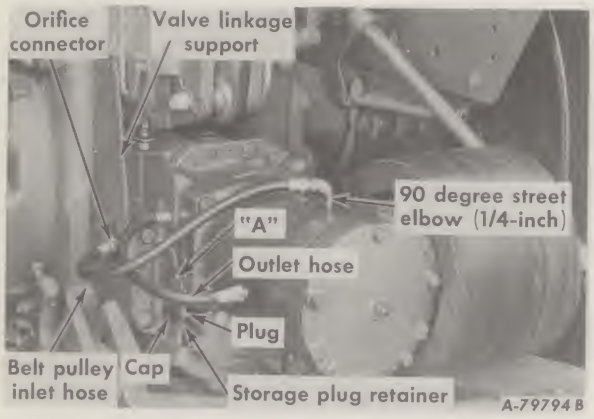
The independent power take-off operating lever allows the operator to regulate the speed of clutch engagement so that a smooth engagement can be obtained under most conditions by moving the operating lever forward to the position where an increase in lever effort is apparent, holding the lever at this position until the driven machine is up to speed, then moving the operating lever fully forward. To obtain a smooth engagement under extremely light or heavy loads, the operating lever can be held at intermediate positions as required.

STARTING AND STOPPING THE BELT PULLEY - Continued

When attempting to free plugged equipment, do not continuously slip the clutch as any clutch can be damaged by excessive slippage.

Do not allow the clutch to slip longer than three seconds at any time.

For belt and pulley speeds refer to the "Specifications" on page 131.



Illust. 52
Hoses installed for belt pulley operation.

REMOVING THE BELT PULLEY UNIT

When operating the two-point or three-point hitch the belt-pulley unit must be removed.

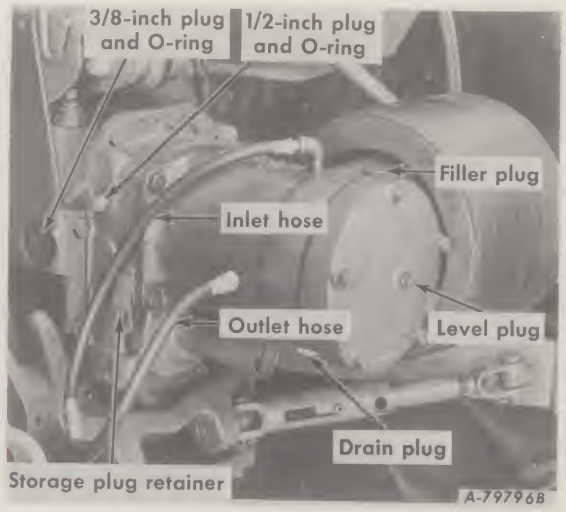
Changing Hose Connections For Removal

In order to remove the belt-pulley unit, the hoses must be disconnected from the independent power take-off housing and connected together to free the unit from the independent power take-off housing and to keep the hoses and belt pulley unit free from dirt and grit.

Disconnect the "belt pulley inlet hose" from the orifice connector at the hole in the "valve linkage support" and remove the orifice connector.

Plug the orifice connector hole with a 3/8-inch plug and O-ring. See Illust. 52A.

Disconnect the "belt pulley outlet hose" from the upper left side of the independent power take-off housing. Then remove the 1/2-inch plug and O-ring from the "storage plug retainer" and use to plug the hole. See Illust. 52A.



Illust. 52A
Hoses in position for removing belt pulley unit.

Removing the Belt Pulley Unit From the Tractor

Remove two 1/2NC x 1-3/8-inch cap screws and lock washers from two diagonally opposite holes.

Replace these cap screws with two round guide rods, 1/2 x 4-inches long, having 1-inch of 1/2NC thread at one end.

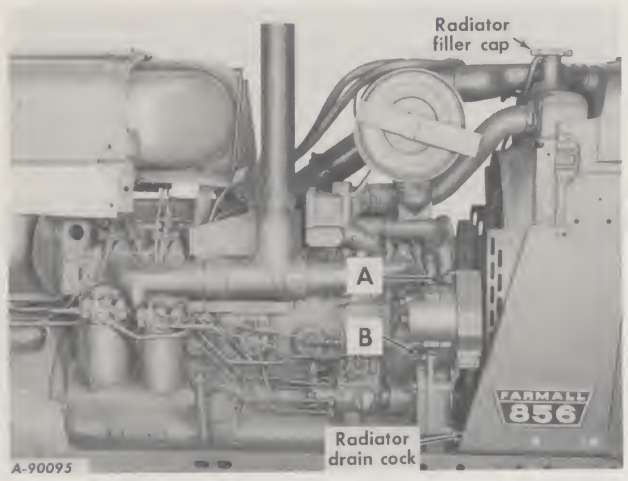
Now remove the other two diagonally opposite cap screws and lock washers.

Use a chain hoist or block and tackle to remove the belt pulley unit from the tractor.

Slide the belt pulley unit back slowly so the splines release from the gears inside the belt pulley unit.

When reinstalling the belt pulley unit and hoses, connect them in the reverse order of removal.

COOLING SYSTEM



Illust. 53
Cooling system - Diesel engine.
(Gasoline and LP Gas engines are similar)

The cooling system operates under pressure which is controlled by means of a regulating valve built into the radiator cap.

A belt-driven water pump is used to circulate the water through the engine block, cylinder head, and radiator. Circulation is controlled by a thermostat which prevents the water from flowing through the radiator until the engine has reached operating temperature. With the thermostat closed, water circulates only through the engine block.

TEMPERATURE GAUGE

This instrument (in the lower half of the gauge cluster (Illust. 4) shows the temperature of the coolant circulating through the engine.

The needle position varies depending on load and ambient temperature. In cold weather under light load, the needle may stay near "C". In hot weather under heavy load, the needle may approach "H".

FILLING THE COOLING SYSTEM

Be sure the radiator drain cock and the crankcase water drain cock are closed, also the regulator drain cock on LP Gas engines. The crankcase drain cock is located at the bottom of the oil cooler on diesel engines.

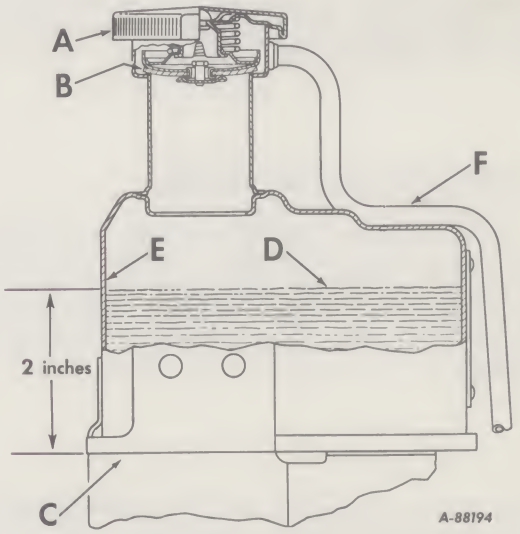
When cold, fill the radiator to a level 2-inches above the radiator core. Filling the radiator to this level will allow for expansion of the coolant under normal operating conditions.

Fill the radiator slowly. This permits air to escape from the cylinder head, allowing the cooling system to be filled to its maximum capacity. Always use clean water (soft or rain water if possible).

If the engine is to be operated in freezing temperatures, refer to "Cold Weather Precautions" on page 106. For cooling system capacities, refer to page 130.

Before replacing the filler cap, be sure to remove any chaff or dirt particles which may be on the gasket surface or cap, and tighten the cap clockwise to the stop.

Note: A pressure-cooled system will not operate properly unless the cooling system is tight.



"A" Radiator cap.
"B" Filler cap gasket.
"C" Top of radiator core.
"D" Water level.
"E" Upper water tank.
"F" Overflow pipe.

Illust. 53A
Water level in pressure-cooled radiator.

If the radiator cap regulating valve is faulty, replace the radiator cap with a new one of the same type.

COOLING SYSTEM

ADDING WATER TO THE COOLING SYSTEM

Caution! If the water in the cooling system is hot and water is to be added, observe the following:

Turn the radiator cap "A" **(Illust. 53A)** slowly counterclockwise to the safety stop to allow the pressure or any steam to escape; then press down on the cap and continue to turn until the cap is free to be removed.

Allow the engine to cool and fill the radiator slowly to a level 2-inches above the radiator core. **See Illust. 53A.** Due to expansion, when the system becomes hot, any excess water will be discharged through the overflow pipe "F".

Note: Do not pour cold water into the radiator if the engine is very hot unless conditions make it absolutely necessary. In this case start the engine and let it idle; then slowly pour the water into the radiator.

CLEANING THE COOLING SYSTEM

Twice a year (spring and fall) or more often, depending upon the mineral content of the water used, the cooling system should be drained and thoroughly flushed. This is particularly important before using an antifreeze solution.

Drain the cooling system by opening the crankcase drain cock on the right side of the gasoline and LP gas engines **(Illust. 53)** or on the left side of the diesel engine, and open the radiator drain cock. **See Illust. 53.** Allow the system to drain; then close the two drain cocks.

When draining the cooling system on LP Gas engines, drain the water from the regulator **(Illust. 15)** by opening the drain cock at the bottom of the regulator.

RUST PREVENTION

One of the most common causes of engine overheating is a rust-clogged cooling system. Rust interferes with circulation and cooling, which causes overheating.

The practice of flushing the system by forcing water from a hose in the radiator filler neck, without the use of cleaning solutions, may be only a waste of time. Iron corrosion is greater than that of any other cooling system metal, which accounts for the large quantities of rust found in neglected water jackets. Heavy rust deposits in the water jacket hold in heat and create local hot spots, especially around the exhaust valve seats. Under these conditions, the metal may get so hot that the valves will stick or burn, or the cylinder block or head may be damaged by heat cracking.

Unless the cooling water is treated with a corrosion preventive, rust and scale will eventually clog the passages in the radiator and water jacket. This condition is aggravated in some localities by the formation of insoluble salts from the water used.

IH Cooling System Cleaner, dissolves rust, scale, and sludge and retards future corrosion when used according to the directions on the container.

Note: Do not use chemical mixtures to stop radiator leaks except as a temporary measure in an emergency. Instead, have the radiator repaired.

If the radiator is clogged with insoluble salt formations, take it to a reputable concern specializing in the removal of such formations. Reliable radiator service stations are familiar with local conditions and are equipped to apply the proper treatment.

In localities where alkaline, acid, or saline waters are the only kind available, the addition of IH Radiator Rust Preventive will tend to minimize the corrosive action of such water.

RUST PREVENTION - Continued

For rust prevention during winter use of the engine, a fresh filling of IH permanent-type antifreeze containing an effective corrosion preventive should be used. In the spring, drain and discard the old antifreeze solution, as the rust preventive or "inhibitor" may be exhausted from contamination and continued use.

After draining the antifreeze, IH Rust Preventive should be added to the cooling water to protect the cooling system during warm weather operation. This inhibitor solution should be drained and discarded in the fall when danger of freezing again makes necessary the use of an antifreeze.

RADIATOR CORE AND TRANSMISSION OIL COOLER

Overheating is often caused by bent or clogged radiator fins. If the spaces between the radiator fins become clogged, clean them with forced air or water. When straightening bent fins, be careful not to injure the tubes or break the bond between the fins and tubes.

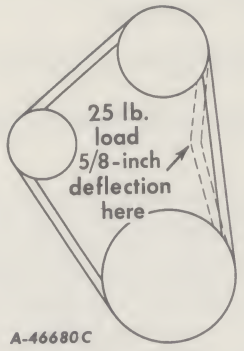
The oil cooler can be swung out for easier cleaning of the radiator fins and the oil cooler by loosening the two wing nuts and sliding them up or down in their respective slots. After cleaning, swing the oil cooler back in place and secure with the wing nuts.

WATER PUMP, ALTERNATOR-GENERATOR, AND FAN BELT TENSION (Gasoline and LP Gas Engines)

Belts on new tractors (also new replacement belts) lose their tension as they "seat" themselves in the pulleys. New belts should be checked every 10 hours of use, until the belt tension is substantially stabilized. Check the belt every 50 hours of engine operation thereafter to assure maintenance of the correct tension. The tension is correct when the belt can be deflected 5/8-inch on the water pump and generator belt, and 7/8-inch on the fan belt with 25 pound load, measured midway between the pulleys **(Illusts. 55 and 56).** If the deflection is more than specified, adjust the belt as follows:

Adjusting the Water Pump and Alternator-Generator Belt Tension

Loosen brace bolt "A" and mounting bolt "B" **(Illust. 53).**



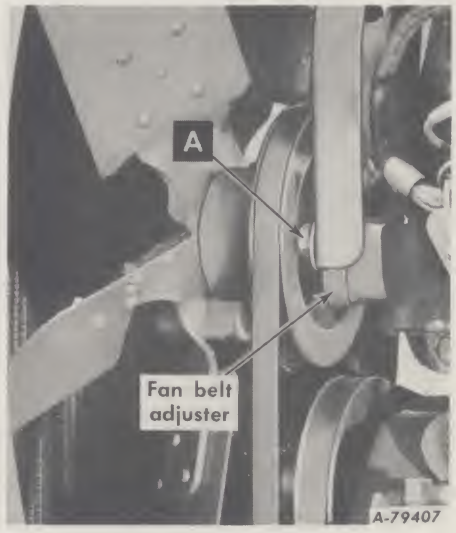
Illust. 55
Water pump and alternator-generator belt (gasoline and LP Gas engines).

Move the alternator-generator away from the engine until the deflection on the belt is 5/8-inch measured between the water pump and crankshaft pulleys. **See Illust. 55.**

Tighten the brace bolt "A" and the mounting bolt or bolts "B".

Adjusting the Fan Belt Tension

The tension of the fan belt is adjusted by changing the position of the fan belt adjuster. To adjust, loosen cap screw "A" **(Illust. 55A)** and push the adjuster up to tighten the belt or down to loosen it until the deflection on the belt is 7/8-inch measured mid-way between the fan and crankshaft pulleys. Retighten cap screw "A" after the correct tension is obtained.



Illust. 55A
Fan belt adjuster (gasoline and LP Gas engines).

COOLING SYSTEM

WATER PUMP, ALTERNATOR-GENERATOR, AND FAN BELT TENSION - Continued

Gasoline and LP Gas Engines - Continued

Removing and Replacing the Water Pump and Alternator-Generator Belt

Replace the water pump and alternator-generator belt when it becomes soaked with grease, or when it is so badly worn that it does not drive the alternator-generator at the proper speed. To remove the old belt, remove the fan belt from the crankshaft pulley by loosening cap screw "A" **(Illust. 55A)** and pushing the adjuster down. Loosen alternator-generator brace bolt "A" and mounting bolt "B". **See Illust. 53.** Remove the shield from the alternator-generator. Move the alternator-generator in toward the engine and slip the old belt off the alternator-generator, water pump, and crankshaft pulleys.

When reinstalling the belt, reverse the removal procedure. Adjust the belt as described under "Adjusting the Water Pump and Alternator-Generator Belt Tension".

Replace the fan belt and adjust as described under "Adjusting the Fan Belt Tension".

Removing and Replacing the Fan Belt

Replace the fan belt when it becomes soaked with grease or when it is so badly worn that it does not drive the fan at the proper speed.

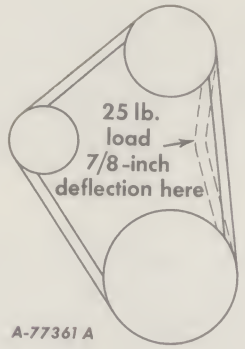
To remove the fan belt loosen cap screw "A" **(Illust. 55A)** and push the adjuster down. Start the belt over the outer flange of the crankshaft pulley and remove the belt. The belt can now be worked over the top of the fan blades.

When reinstalling the belt, reverse the removal procedure. Adjust the belt as described under "Adjusting the Fan Belt Tension".

WATER PUMP, ALTERNATOR-GENERATOR, AND FAN BELT TENSION

Diesel Engines

The belt on a new tractor (also a new replacement belt) loses its tension as it "seats" itself in the pulleys. A new belt should be checked every 10 hours of use, until the tension is substantially stabilized. Check the belt every 50 hours of engine operation thereafter to assure maintenance of the correct tension. The tension is correct when the belt can be deflected 7/8-inch with 25 pound load, measured midway between the fan and crankshaft pulleys. **See page 56.** If the deflection is more than specified, adjust the belt as follows:



Illust. 56
Water pump, alternator-generator, and fan belt (diesel engine).

Adjusting the Belt Tension

Loosen brace bolt "A" and mounting bolt "B" **(Illust. 55).**

Move the alternator-generator away from the engine until the deflection on the belt is 7/8-inch measured between the fan and crankshaft pulleys.

Tighten the brace bolt "A" and the mounting bolt "B".

Removing and Replacing the Belt

Replace the belt when it becomes soaked with grease, or when it is so badly worn that it does not drive the fan and alternator-generator at the proper speed.

To remove the old belt, loosen the brace bolt "A" and mounting bolt "B" **(Illust. 53).** Remove the shield from the alternator-generator. Move the alternator-generator in toward the engine and slip the old belt off the alternator-generator and crankshaft pulleys. Work the belt over the fan blades to remove it.

To install a new fan belt, work the belt over the fan blades and over the top of the fan pulley. Slide the belt over the crankshaft pulley. Hold the alternator-generator in toward the engine if necessary and slide the belt over the alternator-generator pulley. Replace the alternator-generator shield. Adjust the belt as shown under "Adjusting the Belt Tension".

WATER PUMP

No lubrication of the pump is required on gasoline and LP Gas engines as the bearings are of the permanently sealed type and are packed with special lubricant for the life of the bearing. The pump on diesel engines is to be lubricated through the plug in the bearing housing only when overhauled.

AIR CLEANING SYSTEM

DRY-TYPE AIR CLEANER

Your tractor is equipped with a dry-type air-cleaner with two elements. The smaller element in the center of the large one is a safety element. An electric air cleaner filter service indicator (Illust. 4) signals when element service is required.

Air Cleaner and Automatic Dust Unloader

Air entering the air cleaner body is swirled causing the large heavy particles to pass to the outer surface and be deposited in the automatic dust unloader. The air then goes through the filter elements which remove the remaining particles. The clean air then enters the intake manifold.

General Precautions

Frequently inspect all hose connections. If hoses show any signs of deterioration, replace them.

To eliminate strain on the rubber hose connections, be sure the pipes line up.

All the joints between the air cleaner and the engine must be tight. All the gaskets must be in good condition and the bolts must be drawn up tight.

Never operate the engine unless both elements are in place. The automatic dust unloader should also be in place as operation without it will lower dust capacity of the air cleaner.

Note: Never attempt to remove the elements from the air cleaner while the engine is running.

Air Cleaner Service Indicator

The filter element must be serviced when indicated by the air cleaner filter service indicator (Illust. 4).

When the key switch is turned on, and electrical circuit is completed which moves the indicator needle to a position over the green dot. When the indicator needle remains over the green dot with the engine running, the filter elements are in a satisfactory condition. The key switch must be on while the engine is running so the air cleaner service indicator will function.

Air Cleaner Service Indicator - Continued

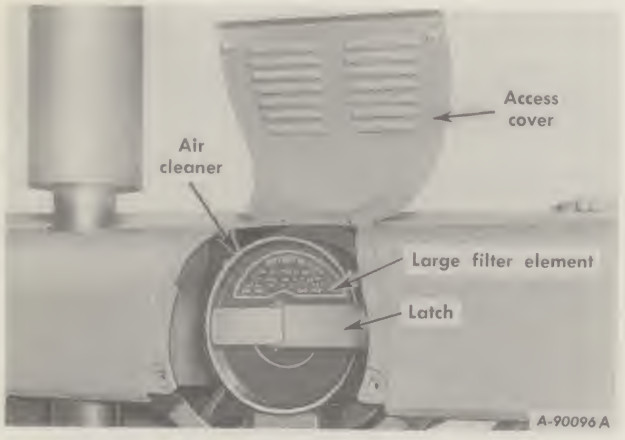
Included in the circuit is a vacuum switch which is sensitive to vacuum in the air cleaner outlet pipe. As dirt accumulates on the filter element, the vacuum increases. When the vacuum in the pipe, during engine operation, reaches a certain value the circuit is broken by the vacuum switch. This causes the indicator needle to move to the red dot, indicating that the filter element needs to be serviced.

Note: When the engine is not running, the indicator needle will be positioned over the red dot. THIS MUST NOT BE MISTAKEN AS A SIGNAL TO SERVICE THE ELEMENT.

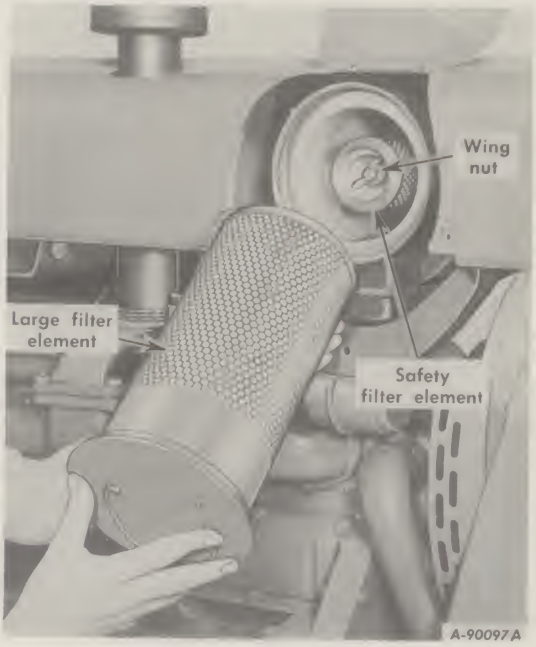
REMOVING THE FILTER ELEMENT

1. Stop the engine. The engine should never be run, under any conditions, without the elements in place in the air cleaner.

2. Loosen the knurled thumb screws and raise the hood access cover.



Illust. 58
Removal of the filter elements.



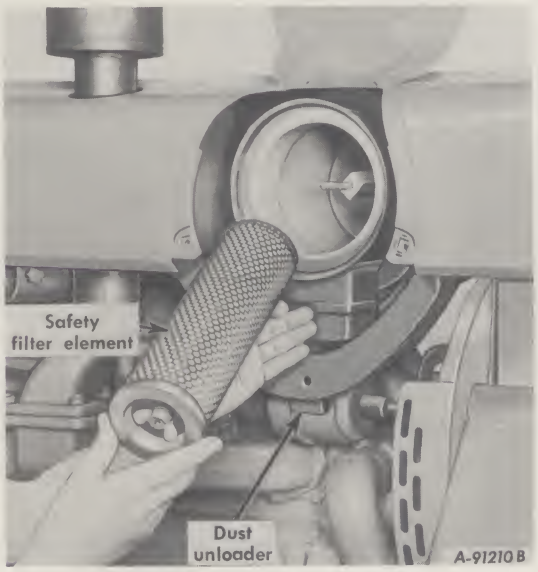
Illust. 58A
Removal of the large filter element.

3. Remove the lower hood panel (for diesel only) by loosening the knurled thumb screws.

4. Pull the handle of the element latch towards you and remove the latch from the slots.

5. Remove the filter element by pulling it straight out very slowly.

REMOVING THE FILTER ELEMENT - Continued



Illust. 59
Removal of the safety filter element.

Cleaning the Filter Element

Note: The paper element must be handled with care. It will not stand the abuse of rapping on a tire or hard surface.

Direct clean, dry compressed air up and down the pleats on the "CLEAN SIDE" (inside) of the element. Continue this until the element is clean.

An element cleaning tool (No. 407 073 R1) for use with compressed air, available from your International Harvester dealer, will do a faster and more efficient job of removing dust than a regular air gun or nozzle.

Note: Air pressure at the nozzle must not exceed 100 pounds per square inch.

Replace the filter element after ten cleanings or annually, whichever comes first, with a new element recommended by your International Harvester dealer.

Inspection

1. Inspect the contact surfaces of the element and the air cleaner body. If faulty or damaged gaskets or surfaces are noted, correct these conditions immediately.

2. Remove any dirt, found inside the air cleaner body, with a damp cloth before reinstalling the elements.

3. Before resuming operation, inspect and tighten all air cleaner and air induction system connections.

Safety Element

The safety element is a back-up filter which provides maximum engine protection in the event the filter element is damaged or installed improperly. To obtain maximum engine protection the safety element must be replaced annually.

If, after the large filter element has been properly cleaned, the air cleaner service indicator needle is on the red dot, remove the safety element and check operation with the large filter element only. If the air cleaner service indicator needle moved to the green dot, replace both the safety element and the large filter element. DO NOT CLEAN THE SAFETY ELEMENT. If the air cleaner service indicator needle remained on the red dot, reinstall safety element and tighten retaining nut to 20 inch pounds torque, then check the air cleaner service indicator components.

If the air cleaner service indicator is defective, it must be replaced.

AIR CLEANING SYSTEM

Automatic Dust Unloader

The unloader automatically allows the accumulated dirt in the air cleaner body to drop out when the weight of the dust overcomes the vacuum that keeps the unloader lips closed.

After every 100 hours of operation, and with the engine stopped, squeeze the dust unloader to be sure the rubber lip seal is not blocked.

Note: When replacing the dust unloader on the air cleaner, be sure the flat side of the hose is in line and not broadside to the fan blast so the normal functioning of the dust unloader is not affected. **See Illust. 59.**

CRANKCASE BREATHER

Gasoline and LP Gas Engines

The crankcase breather pipe is on the left side of the engine. The two breather filtering elements are inside the push rod cover in the breather baffle at the breather pipe opening. Replace the elements with new ones at the time of a major overhaul. **See Illust. 61C.**

Diesel Engine

The crankcase breather compartment is located in the front left corner of the cylinder head. It consists of internal passages to the crankcase, a filtering element, a drain back area and a discharge tube to allow escape of fumes. Replace the filtering element with a new one at the time of a major overhaul.

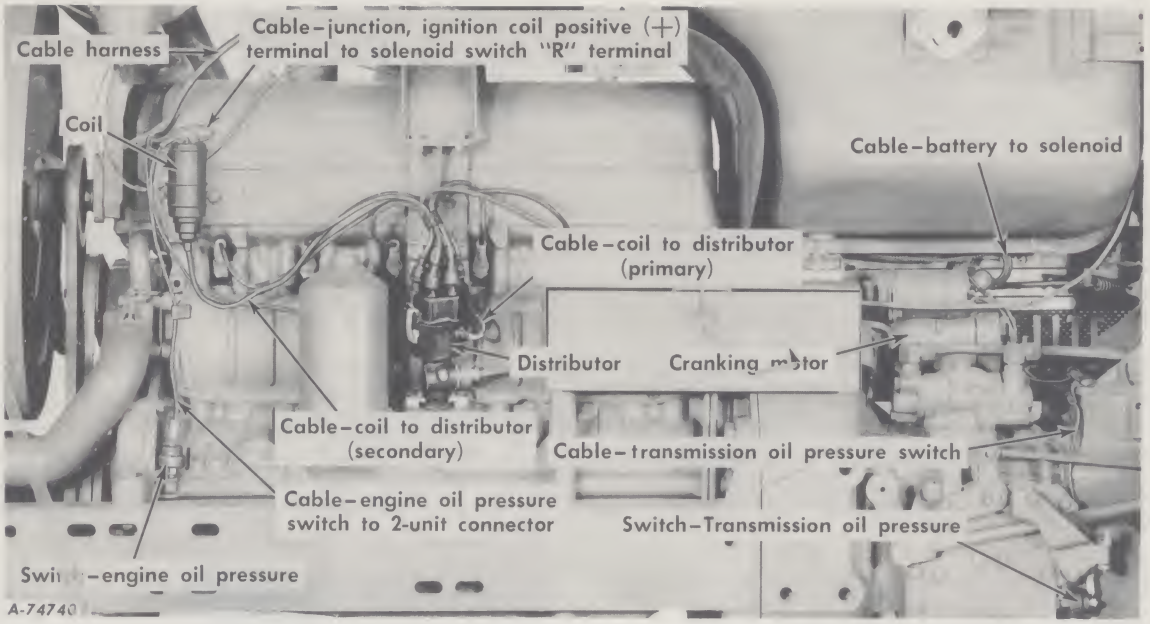
ELECTRICAL SYSTEM

Gasoline and LP Gas Engine Tractors

The electrical system is a twelve-volt system and consists of an alternator-generator, voltage regulator, cranking motor, lights, lighting switch, twelve volt battery, a distributor and coil unit, and electrical instruments.

Use the illustrations and wiring diagrams on the following pages as a guide for identifying the various electrical units and for tracing the electrical cables and connections. Be sure all terminals are clean and securely fastened.

Caution! Before working on any part of the electrical system, disconnect the battery ground strap from the battery terminal. Do not reconnect it until all electrical work has been completed. This will prevent shorting and causing damage to any of the electrical units.



Illust. 61 Distributor, coil, and cable harness on the left side of the gasoline engine.

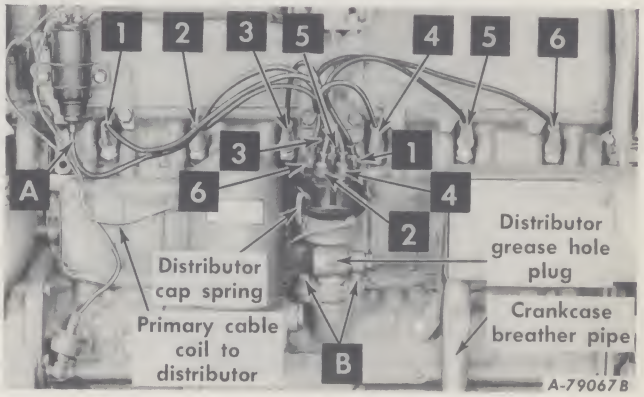
SPARK PLUGS AND CABLES

Illust. 61A
Checking the spark plug gap.

Note: Remove all dirt from the base of the spark plug before removing the spark plug.

Remove the spark plugs after every 250 hours of operation for cleaning and checking the gaps between electrodes. A gap of .023-inch should be maintained for gasoline engines or .015-inch for LP Gas engines. When making this adjustment, always bend the outer electrode. Never bend the center electrode, as it may damage the insulator. If the gap between the electrodes is too great, due to improper setting or burning off of the ends, the engine will misfire and be hard to start.

Cleaning Spark Plugs



Illust. 61B
Spark plug wiring. Engine firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUGS AND CABLES - Continued

Cleaning the Spark Plugs - Continued

Sandblasting is the recommended method of cleaning spark plugs. Never scrape or clean the insulator with anything which will scratch the porcelain. Scratched porcelain allows carbon and dirt to accumulate much faster.

Always use a spark plug wrench when removing or replacing plugs. This helps to prevent cracking the porcelain.

Screw the spark plugs into the cylinder head using a new copper gasket with each one. Do not tighten more than enough to compress the gasket to seal the plug and assure a good heat transfer between the plug and the cylinder head. Tighten the spark plugs to 34 foot pounds torque. If a torque wrench is not available, tighten the plug 1/2 to 3/4 turns past finger tight.

Replace defective plugs with new plugs.

See your International Harvester dealer for various makes of replacement plugs for normal or special service. These plugs have been tested and recommended as best suited for this engine.

If the spark plug cables are removed for any reason, note the position of each cable on the distributor cap as shown **in Illust. 61B.**

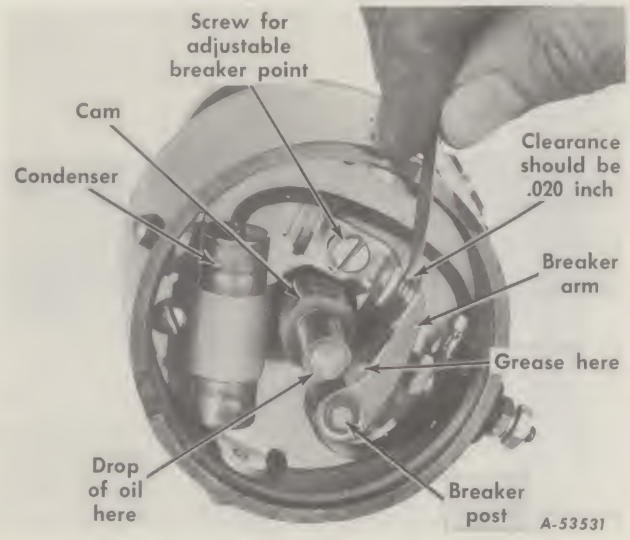
DISTRIBUTOR

Greasing the Breaker Mechanism and Checking the Points

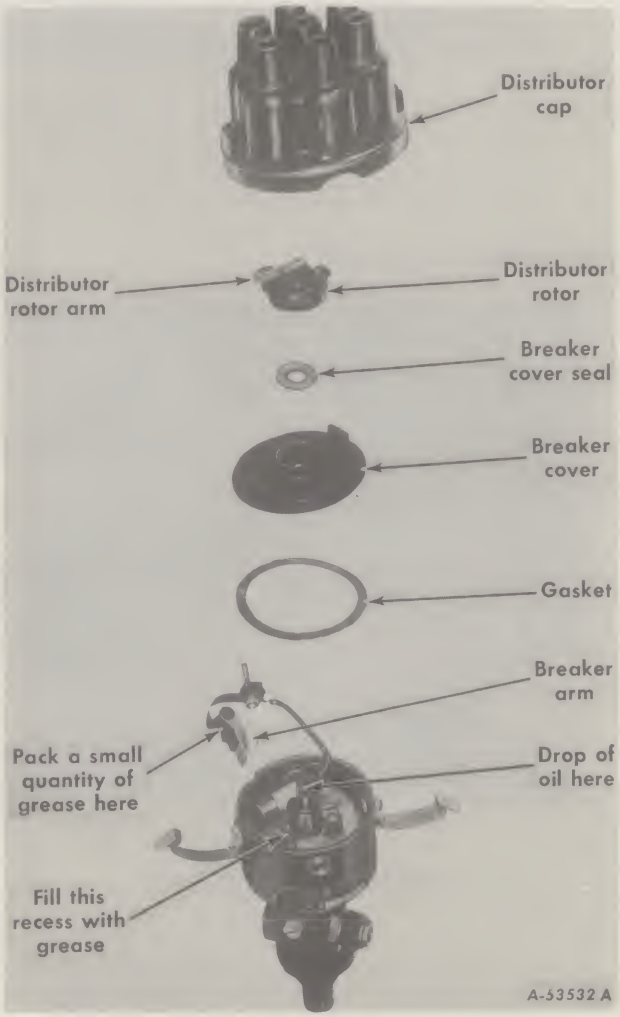
It is important that the breaker chamber be kept clean because oil on the breaker points will cause rapid burning. Remove the distributor cap, distributor rotor, and the breaker cover for breaker chamber inspection. **See Illust. 62.** Care should be taken, when removing the breaker cover, to prevent dirt from entering the breaker chamber. Be sure the chamber is clean and that the breaker points are in good condition and have the proper opening.

Never use emery cloth or sandpaper to clean the points. To dress the points, use a sharp fine file. If the points are worn excessively, replace both points.

Fill the recess in the breaker post with IH High Temperature Grease (21372-D) and pack a small quantity of the same grease in back of the breaker arm rubbing block and apply a light coating of the same grease on the lobes and flats of the breaker cam. **See Illusts. 62 and 62A.** See your International Harvester dealer.



Illust. 62
Adjusting the breaker points.



Illust. 62A
Distributor partially disassembled for servicing.

DISTRIBUTOR - Continued

Greasing the Breaker Mechanism and Checking the Points - Continued

Check the condition of the breaker points for build-up or lip formation. If present, the points must be dressed before the point opening can be checked or set. Check the opening between the breaker points with a feeler gauge as shown **(Illust. 62).** The point opening should be .020-inch when the rubbing block is on the high part of the cam. If the opening is not correct, adjust it by loosening the screw holding the adjustable point. Then move the point toward or away from the point on the breaker arm until the gauge slips snugly into the opening. After the adjustment has been made, tighten the screw.

Distributor Cap

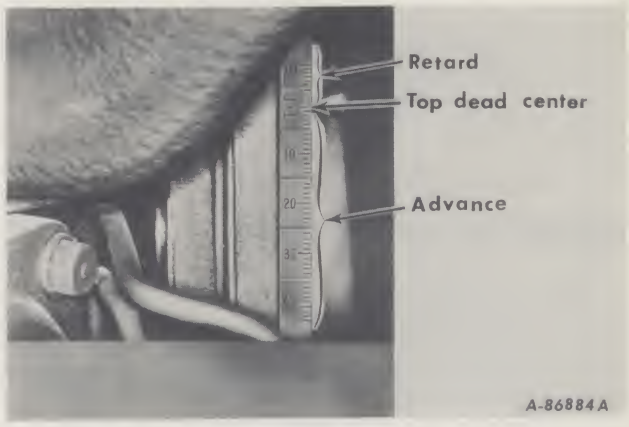
After every 500 hours of engine operation, remove the distributor cap and examine the inside. If any dust, moisture, or oil deposits are present, thoroughly clean and wipe dry. To assure long life of the distributor, care must be taken to keep the ventilator flats at the inside edge of the distributor cap open at all times. Also see that the distributor rotor is kept clean.

If the terminal nipples are removed, be sure the distributor cap terminals and coil terminal are clean and dry. The distributor is equipped with these nipples to prevent any external electrical leakage when the tractor is operating under adverse conditions.

If the spark plugs have been removed for any reason, attach the cables to the spark plugs and to the terminal sockets of the distributor cap in the following order: The No. 1 cylinder spark plug cable to the socket marked "1" **(Illust. 61B).** Then, going around the distributor cap in the counterclockwise direction, attach the cable from the No. 5 spark plug to the next or second socket, the cable from the No. 3 spark plug to the next or third socket, and the cable from the No. 6 spark plug to the next or fourth socket, the cable from the No. 2 spark plug to the next on fifth socket, and the cable from the No. 4 spark plug to the sixth or last socket. Assemble the secondary cable in the distributor cap. **See Illust. 61B.**

POWER TIMING LIGHT

A final check and adjustment of ignition timing must be made with a neon-type flashing timing light connected to the ignition system and directed at the timing mark on the rear flange of the crankcase fan drive pulley. **See Illust. 63, and "SPECIFICATIONS" on page 159.** Similar timing mark on the flywheel may also be used. This check is to be made with the engine operating at high idle. See your International Harvester dealer for this service.



Illust. 63
Timing pointer and timing marks on the fan drive pulley (gasoline and LP Gas engines).

IGNITION COIL

The ignition coil does not require special service other than to keep all terminals and connections clean and tight.

Diesel Engine Tractors

The 12-volt eletrical system of the tractor consists of an alternator-generator, voltage regulator, cranking motor, lights, lighting switch, electrical instruments, and two six-volt batteries.

Use the illustrations and the wiring diagrams on the following pages as a guide for identifying the various electrical units and for tracing the electrical cables and connections. Be sure all of the terminals are clean and securely fastened.

Caution! Before working on any part of the electrical system, disconnect the battery ground strap from the battery terminal. Do not reconnect it until all electrical work has been completed. This will prevent shorting and causing damage to any of the electrical units.

ELECTRICAL SYSTEM

Gasoline, LP Gas and Diesel Engine Tractors

KEY SWITCH

A key-type switch is located on the right side of the instrument panel. Turn the key clockwise to a horizontal position to complete the circuit between the push button switch and battery. The key cannot be removed when in this position.

If the key switch is removed or replaced, be sure to install it with the key slot turned up as shown (Illust. 64). If not so installed, moisture may get into the lock and freeze during cold weather.

Key switch must be assembled to instrument panel so that notches of key are facing up.

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Illust. 64

PUSH BUTTON STARTING SWITCH

Pushing the button in and disengaging the clutch completes the electrical circuit between the battery and the cranking motor solenoid and causes the cranking motor pinion to engage the flywheel ring gear, thereby cranking the engine. Refer to page 13 for starting the gasoline engine; page 17 for the LP Gas engine.

SAFETY STARTING SWITCH

The safety starting switch serves to prevent accidentally moving the tractor with the cranking motor or starting the engine when the tractor is in gear.

The switch moves to the closed contact position when the clutch pedal is depressed all the way to disengage the engine from the transmission. This permits completion of the circuit to the cranking motor for starting the engine.

ALTERNATOR-GENERATOR AND REGULATOR

The alternator-generator charging system supplies current for the electrical equipment and keeps the battery in a charged condition. It is hinge-mounted on the right side of the engine.

The alternator-generator is cooled by a ventilating fan located on the drive end.

The voltage regulator is temperature compensated and consists of a voltage regulator unit and a field relay. The voltage regulator unit controls the alternator-generator voltage to its preset value. The field relay connects the alternator-generator field to the battery when the key switch is closed. The unit is shock mounted. If the alternator-generator system fails to function properly, see your International Harvester dealer.

CAUTIONS

The alternator-generator and voltage regulator are designed for use on a twelve volt negative ground electrical system.

Note: Failure to observe the following precautions will result in serious damage to the electrical equipment.

Do not attempt to polarize the alternator-generator.

Do not short across or ground any of the terminals on the alternator-generator or voltage regulator.

Do not operate the alternator-generator on open circuit.

When a booster battery or a battery charger is connected to the tractor battery, be sure to connect the **negative** lead to the **negative** terminal and the **positive** lead to the **positive** terminal.

If the voltage regulator is to be removed for any reason, care must be taken to prevent any sharp blows from striking it, which can upset the factory adjustment.

ALTERNATOR-GENERATOR BELT TENSION

The tractor has a combination water pump and alternator-generator belt (gasoline and LP Gas engines) or a combination fan and alternator-generator belt (diesel engine). To check, adjust, or replace the belt, **see pages 55 to 56.**

ALTERNATOR-GENERATOR TELLITE

This light is located on the right side of the right gauge cluster (Illust. 4) and is connected in a circuit with the battery and alternator-generator. The letters "AMP" are indicated on the light lens. A flashing type bulb is used in this light.

Turn the key switch on. The light should come on. The bulb will burn steadily or flash off and on intermittently. Each time the engine is to be started, check whether the light is functioning properly.

ALTERNATOR-GENERATOR TELLITE - Continued

If the light does not come on, check the following:

1. Check bulb - replace bulb if burned out.

2. Make sure all connections are complete and tight in the light circuit.

After the engine is started, the light should go out in a few seconds. If the light stays on, increase the engine speed slightly and check to see if the light goes out.

If the light remains on when the engine speed is 600 r.p.m. or higher, check the alternator-generator and regulator.

Note: On a tractor with a diesel engine the key switch must be left in the "ON" position while the engine is running so the alternator-generator Tellite will function.

OIL PRESSURE TELLITES

Engine

The engine oil pressure Tellite is located on the left side of the gauge cluster in the right instrument panel **(Illust. 4)** and is connected in a circuit with the key switch and the crankcase oil pressure switch (see wiring diagram). The letters "OIL" are indicated on the light lens. A flashing type bulb is used in this light.

Transmission

The transmission oil pressure Tellite is located below the gauge cluster to the left of the key switch **(Illust. 4)** and is connected in a circuit with the key switch and the transmission oil pressure switch (see wiring diagram). A flashing-type bulb is used.

Engine or Transmission

Turn the key switch on. The lights should come on. The bulbs will burn steadily or flash off and on intermittently. Each time the engine is to be started, check whether the lights are functioning properly.

1. Check bulb. Replace the bulb if burned out. Refer to "SPECIFICATIONS".

2. Make sure all connections are complete and tight in the light circuit.

3. Defective switches - remove the connection from either one of the switches and ground the terminal on the crankcase or clutch housing in an area that is clean and free of paint. If the light comes on, the switch is defective. Replace the defective switch with a new one.

After the engine is started, the lights should go out in a few seconds. On tractors equipped with the torque amplifier, the engine clutch must be in the engaged position before the lights will go out. If either light stays on, or comes on during engine operation, make the following checks:

1. If the engine is running at low idle speed, increase the engine speed slightly and check to see if the light goes out. If the light goes out, leave the engine running at increased speed.

2. Shorted switch - test each switch and replace the defective switch with a new one.

3. Stop the engine and check the oil level in the crankcase or transmission. Add oil if necessary to bring to the proper level. Start the engine. If the oil pressure is still low, remove the switch and check pressure with a reliable pressure gauge.

Note: On a tractor with a diesel engine, the key switch must be left in the "ON" position while the engine is running so the engine oil and transmission oil pressure Tellites will function.

LIGHTING SWITCH POSITIONS

Tractors With Hood or Grille Mounted Headlights

"OFF" - All lights turned off.
"D" - Headlights on dim; bright instrument lights; a red taillight; and a warning light.
"B" - Headlights on bright; bright instrument lights; a red taillight; and a warning light.
"R" - Headlights on bright; bright instrument lights and a white rear light.

Tractors With Fender Mounted Headlights and Floodlights

"OFF" - All lights turned off.
"D" - Outside headlights on dim; inside floodlights off; bright instrument lights; a red taillight; and a warning light.
"B" - Outside headlights on bright; inside floodlights off; bright instrument lights; a red taillight; and a warning light.
"R" - Outside headlights and inside floodlights on bright; bright instrument lights and a white rear light.

Note: The red taillight should always be used when traveling on the highway at night or during times of poor visibility. The white rear light is for field use only and should not be used on the highway.

ELECTRICAL SYSTEM

Gasoline, LP Gas and Diesel Engine Tractors

LIGHTS

The headlights are sealed-beam lights especially developed for tractor operations. The parts are so constructed that the filament, reflector, and lens are all assembled in a shockproof unit permanently sealed against dirt, moisture, and corrosion. If a filament burns out or a lens breaks, the complete unit must be replaced. See your International Harvester dealer. Refer to "SPECIFICATIONS".

The headlight beam on the Farmall Tractors can be adjusted up or down by loosening the headlight mounting nut, under the headlight mounting bracket.

The headlights on International tractors and those on the deluxe fenders on Farmall Tractors are mounted in cup shaped housings and can be adjusted to various positions by loosening the mounting nuts at the rear of the headlight housings. Tighten the nuts securely when the desired position is obtained.

The combination rear light and taillight is turned on by the lighting switch on the instrument panel. Should a lens break or a filament burn out the complete sealed beam unit must be replaced. See your International Harvester dealer. To replace the taillight lamp, remove the sealed beam unit and replace the taillight lamp with a new one. Refer to "SPECIFICATIONS".

Four 2-candlepower lamps, two in the speedometer tachometer and two in the gauge cluster, are provided for illuminating the instruments at night and are lighted whenever the headlights are on. Refer to "SPECIFICATIONS".

A light is located above the speed-ratio control quadrant at the right of the instrument panel for illuminating the positions at night and is lighted whenever the headlights are on.

A breakaway connector socket is located on the underside of the platform on the left side of Farmall Tractors; or on the left fender support on Farmall Tractors equipped with deluxe fenders; or the left fender on International Tractors; serves as a plug-in connection for lights on trailing equipment. This socket can also be used to plug in a trouble light.

WARNING LIGHT

A flashing warning light is located at the left rear side of the tractor. The light will automatically flash whenever the red taillight is "ON".

This light is for use on public highways to warn operators of other vehicles that they are approaching a slow moving vehicle.

If local laws do not approve its use disconnect the short body connector from one terminal of the flasher and connect to the male blade of the other connector body on the flasher. This will provide a steady light.

FUSE

A cartridge-type SFE-20 ampere fuse is located in the fuse housing. If a short circuit occurs in the lighting circuit, the fuse will burn out and break the circuit, preventing damage to the electrical system.

It is important to use the same capacity fuse for replacement. If the lights fail, check the fuse. If the fuse continually burns out, check the electrical wiring for short circuits.

To install a new fuse, unscrew the fuse holder on the instrument panel, pull out the old fuse and replace it with a new one.

STORAGE BATTERY

Cleaning and Servicing the Battery

To service the battery, loosen the nuts on the battery hold-down bolts, and let the cover hang forward on the battery support.

Occasionally remove the battery cable and ground strap, brighten the terminal contact surface with wire wool, and reassemble. Then apply a light coat of vaseline or chassis lubricant. Be sure the terminals are clamped tightly and that the battery is fastened securely to the battery support. Replace damaged cables. Keep the vent holes in the battery filler caps open.

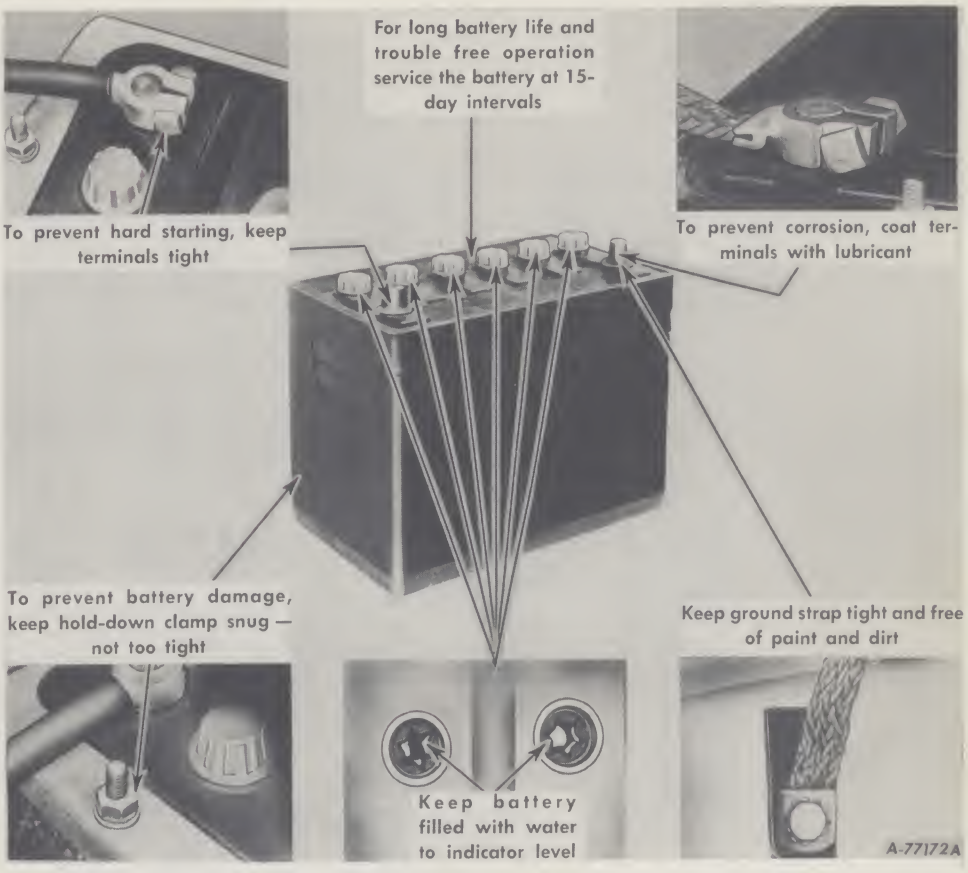
STORAGE BATTERY - Continued

Liquid Level

Check the battery at least once a month for water level. If the battery is in need of charging, it should be given immediate attention. Keeping the battery fully charged not only adds to its life but makes it available for instant use when needed.

The electrolyte (acid and water) in each cell should be at the proper level at all times to prevent battery failure. When the electrolyte is below this level, pure, distilled water should be added.

Acid or electrolyte should never be added except by a skilled battery man. Under no circumstances add any special battery "dopes", solutions, or powders.



Illust. 67
Major items of battery care.

Caution! Electric storage batteries give off highly inflammable hydrogen gas when charging and continue to do so for some time after receiving a steady charge.

Do not under any circumstances allow an electric spark or an open flame near the battery. Do not lay tools across battery terminals as this may result in a spark or short circuit which may cause an explosion. Be careful to avoid spilling any electrolyte on hands or clothing.

For dependable battery service see your International Harvester dealer.

Cold Weather Operation

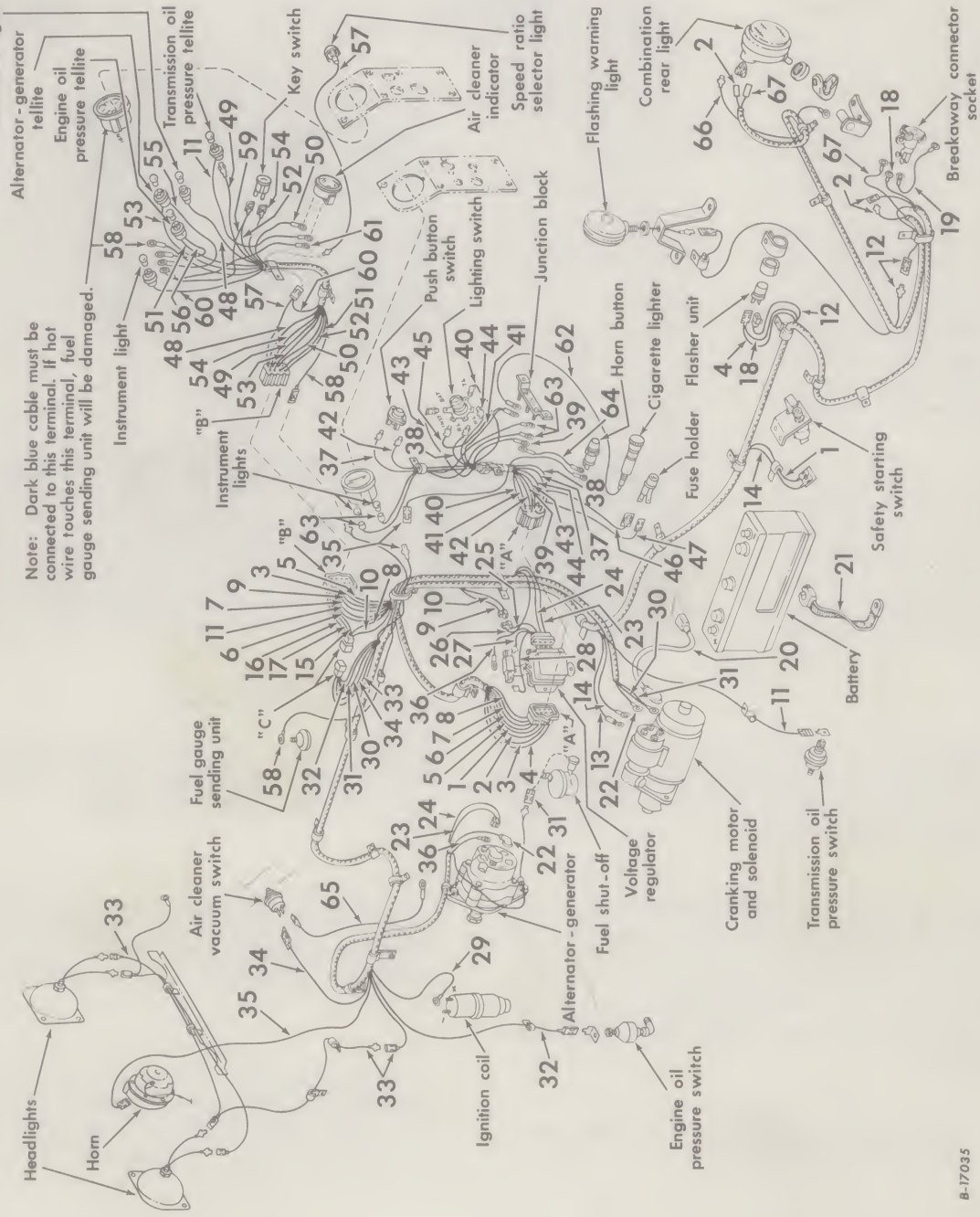
It is especially important to keep the battery close to full charge for cold weather operation. Add water to the battery in freezing temperatures only when the tractor is to operate for several hours, to thoroughly mix the water and electrolyte, or damage to the battery will result from the water freezing.

A battery three-fourths charged is in no danger of damage from freezing. Therefore keep the battery better than three-fourths charged, especially during winter weather.

If your tractor is not to be operated for some time during the winter months, it is advisable to remove the battery and store it in a cool, dry place above freezing (+32°F.). Place the battery on a rack or bench.

Ground Strap

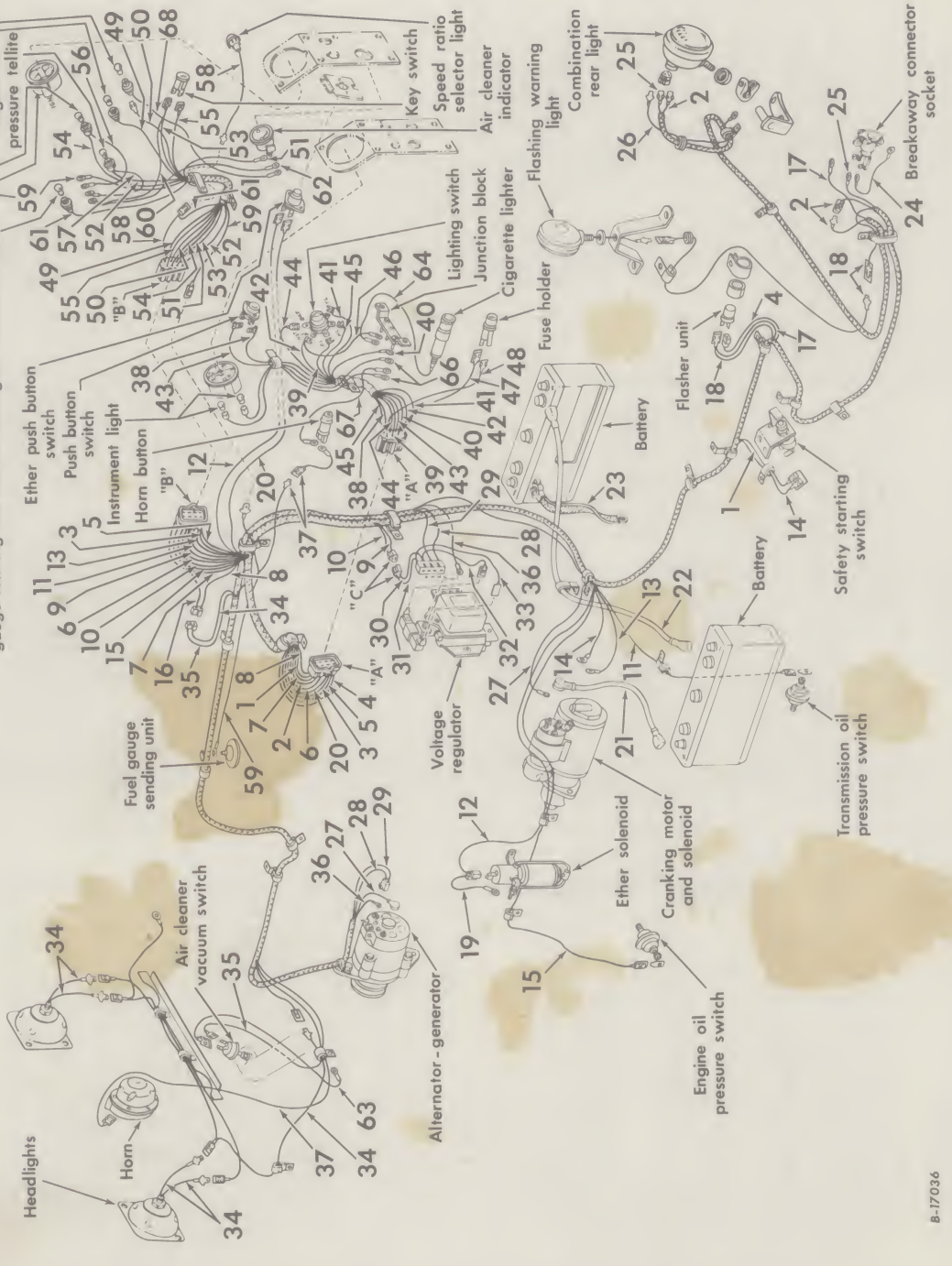
When replacing a battery, make certain that the ground strap is connected to the negative (-) terminal on the battery.



Illust. 68
Wiring diagram for International Tractors (gasoline and LP Gas engines).

Index to reference numbers in Illust. 68.

Ref. No.	Description
1	Cable - multiple connector "A" to safety starting switch - orange.
2	Cable - multiple connector "A" to combination rear light - white.
3	Cable - multiple connector "A" to multiple connector "B" - red with white tracer.
4	Cable - multiple connector "A" to flasher unit - dark blue.
5	Cable - multiple connector "A" to multiple connector "B" - brown with white tracer.
6	Cable - multiple connector "A" to multiple connector "B" - pink.
7	Cable - multiple connector "A" to multiple connector "B" - light green.
8	Cable - multiple connector "A" to connector "C" - violet.
9	Cable - multiple connector "B" to connector "D" - light blue.
10	Cable - connector "C" to connector "D" - pink with black tracer.
11	Cable - multiple connector "B" to transmission oil pressure switch - yellow.
12	Cable - flasher unit to single connector to warning light - brown.
13	Cable - multiple connector "B" to solenoid switch "BAT" terminal - red.
14	Cable - solenoid switch "S" terminal to safety starting switch - orange with black tracer.
15	Cable - multiple connector "B" to connector "C" - gray.
16	Cable - multiple connector "B" to connector "C" - black.
17	Cable - multiple connector "B" to connector "C" - pink.
18	Cable - flasher unit to breakaway connector socket - black.
19	Cable - breakaway connector socket to ground.
20	Battery cable.
21	Battery ground strap.
22	Cable - solenoid switch "BAT" terminal to alternator-generator "BAT" terminal - black.
23	Cable - voltage regulator to alternator - generator "F" terminal - yellow.
24	Cable - voltage regulator to alternator-generator "R" terminal - brown.
25	Cable - connector "D" to voltage regulator #3 terminal - pink with black tracer.
26	Cable - connector "D" to voltage regulator #4 terminal - light blue.
27	Cable - voltage regulator #3 terminal to resistor - pink with black tracer.
28	Cable - voltage regulator #4 terminal to resistor - light blue.
29	Cable - solenoid switch "R" terminal to ignition coil positive (+) terminal - white.
30	Cable - multiple connector "C" to solenoid switch "R" terminal - white with orange and black tracers.
31	Cable - multiple connector "C" to single connector to fuel shut-off - light green with black tracer.
32	Cable - multiple connector "C" to engine oil pressure switch - gray.
33	Cable - multiple connector "C" to single connector to headlights - violet.
34	Cable - air cleaner switch to connector "C" - black with white tracer.
35	Cable - horn to single connector to horn button - dark green.
36	Cable - alternator - generator "GRD" terminal to voltage regulator ground connection.
37	Cable - multiple connector "A" to push button switch - orange.
38	Cable - multiple connector "A" to lighting switch "RL" terminal - white.
39	Cable - multiple connector "A" to junction block - red.
40	Cable - multiple connector "A" to lighting switch "TL" terminal - black.
41	Cable - multiple connector "A" to junction block - tan.
42	Cable - multiple connector "A" to push button switch - pink.
43	Cable - multiple connector "A" to lighting switch "BAT" terminal - light green.
44	Cable - multiple connector "A" to lighting switch "HL" terminal - violet.
45	Cable - junction block to lighting switch "INST" terminal - tan.
46	Cable - multiple connector "A" to fuse housing - red.
47	Cable - multiple connector "A" to fuse housing - light green.
48	Cable - multiple connector "B" to connector - tan.
49	Cable - multiple connector "B" to transmission oil pressure Tellite - yellow.
50	Cable - multiple connector "B" to air cleaner indicator - black.
51	Multiple connector "B" to engine oil pressure Tellite - gray.
52	Cable - multiple connector "B" to key switch - pink.
53	Cable - multiple connector "B" to alternator-generator Tellite - light blue.
54	Cable - multiple connector "B" to key switch - red.
55	Cable - alternator-generator Tellite to fuel gauge receiving unit "IGN" terminal - black.
56	Cable - engine oil pressure Tellite to fuel gauge receiving unit "IGN" terminal - black.
57	Cable - connector to speed-ratio selector light - tan.
58	Cable - fuel gauge sending unit to single connector to fuel gauge receiving unit (gasoline engine only) - dark blue.
59	Cable - key switch to fuel gauge receiving unit "IGN" terminal (gasoline engine only) - pink.
60	Cable - connector to instrument light - tan.
61	Cable - air cleaner indicator "IGN" terminal to fuel gauge "IGN" terminal - pink.
62	Cable - cigarette lighter to lower terminal on junction block - red.
63	Cable - junction block to instrument light.
64	Cable - junction block to horn button - pink.
65	Cable - air cleaner switch to ground - pink.
66	Cable - combination rear light to ground - pink.
67	Cable - combination rear light to breakaway connector socket - black.



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Illust. 70
Wiring diagram for International Tractors (diesel engine).

Index to reference numbers in Illust. 70.

Ref. No.	Description
1	Cable - multiple connector "A" to safety starting switch - orange.
2	Cable - multiple connector "A" to single connector to combination rear light - white.
3	Cable - multiple connector "A" to multiple connector "B" - red with white tracer.
4	Cable - multiple connector "A" to flasher unit - dark blue.
5	Cable - multiple connector "A" to multiple connector "B" - brown with white tracer.
6	Cable - multiple connector "A" to multiple connector "B" - pink.
7	Cable - multiple connector "A" to multiple connector "B" - (tractors with cab) - light green.
8	Cable - multiple connector "A" to two unit connector - violet.
9	Cable - multiple connector "B" to connector "C" - light blue.
10	Cable - multiple connector "B" to connector "C" - pink with black tracer.
11	Cable - multiple connector "B" to transmission oil pressure switch - yellow.
12	Cable - ether solenoid to single connector - black with white tracer.
13	Cable - multiple connector "B" to solenoid switch - "BAT" terminal - red.
14	Cable - solenoid switch "S" terminal to safety starting switch - orange with black tracer.
15	Cable - multiple connector "B" to engine oil pressure switch - gray.
16	Cable - multiple connector "B" to two unit connector - black.
17	Cable - flasher unit to breakaway connector socket - black.
18	Cable - flasher unit to warning light - brown.
19	Cable - ether solenoid to ground on container housing - pink.
20	Cable - ether push button switch to multiple connector "A" - tan.
21	Cable - solenoid switch "BAT" terminal to battery positive (+) terminal.
22	Cable - battery to battery.
23	Battery ground strap.
24	Cable - breakaway connector socket to ground.
25	Cable - breakaway connector socket to combination rear lamp - black.
26	Cable - combination rear light to ground on bracket.
27	Cable - solenoid switch "BAT" terminal to alternator-generator "BAT" terminal - black.
28	Cable - voltage regulator "F" terminal to alternator-generator "F" terminal - yellow.
29	Cable - voltage regulator #2 terminal to alternator-generator "R" terminal - brown.
30	Cable - voltage regulator #3 terminal to connector "C" - pink with black tracer.
31	Cable - voltage regulator #4 terminal to connector "C" - light blue.
32	Cable - voltage regulator #3 terminal to resistor - pink with black tracer.
33	Cable - voltage regulator #4 terminal to resistor - light blue.
34	Cable - headlights to two unit connector - violet.
35	Cable - air cleaner switch to two unit connector - black with white tracer.
36	Cable - alternator-generator ground terminal to voltage regulator ground terminal - pink.
37	Cable - horn to horn button.
38	Cable - multiple connector "A" to push button switch - orange.
39	Cable - multiple connector "A" to lighting switch "RL" terminal - white.
40	Cable - multiple connector "A" to junction block - red.
41	Cable - multiple connector "A" to lighting switch "TL" terminal - black.
42	Cable - multiple connector "A" to junction block - tan.
43	Cable - multiple connector "A" to push button switch - pink.
44	Cable - multiple connector "A" to lighting switch "BAT" terminal - light green.
45	Cable - multiple connector "A" to lighting switch "HL" terminal - violet.
46	Cable - junction block to lighting switch "INST" terminal - tan.
47	Cable - multiple connector "A" to fuse holder - red.
48	Cable - multiple connector "A" to fuse holder - light green.
49	Cable - multiple connector "B" to instrument light - tan.
50	Cable - multiple connector "B" to transmission oil pressure Tellite - yellow.
51	Cable - multiple connector "B" to air cleaner indicator - black.
52	Cable - multiple connector "B" to engine oil pressure switch - gray.
53	Cable - multiple connector "B" to key switch - pink.
54	Cable - multiple connector "B" to alternator-generator Tellite - light blue.
55	Cable - multiple connector "B" to key switch - red.
56	Cable - alternator-generator Tellite to fuel gauge "IGN" terminal - black.
57	Cable - engine oil pressure Tellite to fuel gauge "IGN" terminal - black.
58	Cable - connector to speed-ratio selector light - tan.
59	Cable - fuel gauge sending unit to single connector to fuel gauge.receiving unit - dark blue.
60	Cable - key switch to fuel gauge "IGN" terminal - pink.
61	Cable - instrument light to connector to multiple connector "B" - tan.
62	Cable - air cleaner indicator light to fuel gauge "IGN" terminal - pink.
63	Cable - air cleaner switch to ground - pink.
64	Cable - cigarette lighter to lower terminal on junction block - red.
65	Cable - headlights to ground - pink.
66	Cable - junction block to instrument lights - tan.
67	Cable - horn button to junction block - pink.
68	Cable - air cleaner indicator to transmission oil pressure Tellite - black.

Illust. 72
Wiring diagram for Farmall Tractors (gasoline and LP Gas engines).

Index to reference numbers in Illust. 72.

Ref. No.	Description
1	Cable - multiple connector "A" to safety starting switch - orange.
2	Cable - multiple connector "A" to connector "E" - white.
3	Cable - multiple connector "A" to multiple connector "B" - red with white tracer.
4	Cable - multiple connector "A" to connector "E" - black.
5	Cable - multiple connector "A" to multiple connector "B" - brown with white tracer.
6	Cable - multiple connector "A" to multiple connector "B" - pink.
7	Cable - multiple connector "A" to dome light (tractors with cab) - light green.
8	Cable - multiple connector "A" to right headlight - violet.
9	Cable - multiple connector "B" to transmission oil pressure switch - yellow.
10	Cable - multiple connector "B" to connector "C" - pink.
11	Cable - multiple connector "B" to solenoid switch "BAT" terminal - red.
12	Cable - solenoid switch "S" terminal to safety starting switch - orange with black tracer.
13	Cable - multiple connector "B" to connector "C" - gray.
14	Cable - multiple connector "B" to voltage regulator connector "D" - light blue.
15	Cable - connector "C" to voltage regulator connector "D" - pink with black tracer.
16	Cable - multiple connector "B" to connector "C" - black.
17	Cable - multiple connector "A" to left headlight - violet.
18	Cable - combination rear light to ground - pink.
19	Cable - breakaway connector socket to ground - pink.
20	Cable - breakaway connector socket to combination rear light - black with blue tracer.
21	Cable - flasher unit to warning light - brown.
22	Cable - connector "E" to flasher unit - black.
23	Cable - connector "E" to combination rear light - black.
24	Cable - connector "E" to combination rear light - white.
25	Cable - solenoid switch "BAT" terminal to alternator-generator "BAT" terminal - black.
26	Cable - voltage regulator "F" terminal to alternator-generator "F" terminal - yellow.
27	Cable - voltage regulator #2 terminal to alternator-generator "R" terminal - brown.
28	Cable - voltage regulator #3 terminal to connector "D" - pink with black tracer.
29	Cable - voltage regulator #4 terminal to connector "D" - light blue.
30	Cable - voltage regulator #3 terminal to resistor - pink with black tracer.
31	Cable - voltage regulator #4 terminal to resistor - light blue.
32	Cable - solenoid switch "R" terminal to ignition coil positive (+) terminal - white.
33	Cable - multiple connector "C" to solenoid switch "R" terminal - white with orange and black tracer.
34	Cable - multiple connector "C" to fuel shut-off solenoid - light green with black tracer.
35	Cable - multiple connector "C" to engine oil pressure switch - gray.
36	Cable - multiple connector "C" to air cleaner vacuum switch - black with white tracer.
37	Cable - horn to horn button - dark green.
38	Cable - alternator-generator "GRD" terminal to voltage regulator base ground - pink.
39	Cable - vacuum switch ground terminal to ground on alternator-generator.
40	Cable - multiple connector "A" to push button switch - orange.
41	Cable - multiple connector "A" to lighting switch "RL" terminal - white.
42	Cable - multiple connector "A" to junction block - red.
43	Cable - multiple connector "A" to lighting switch "TL" terminal - black.
44	Cable - multiple connector "A" to junction block - tan.
45	Cable - multiple connector "A" to push button switch - pink.
46	Cable - multiple connector "A" to lighting switch "BAT" terminal - light green.
47	Cable - multiple connector "A" to lighting switch "HL" terminal - violet.
48	Cable - junction block to lighting switch "INST" terminal - tan.
49	Cable - multiple connector "A" to fuse housing - red.
50	Cable - multiple connector "A" to fuse housing - light green.
51	Cable - multiple connector "B" to instrument light - tan.
52	Cable - multiple connector "B" to transmission oil pressure Tellite - yellow.
53	Cable - multiple connector "B" to air cleaner indicator - black.
54	Cable - multiple connector "B" to engine oil pressure Tellite - gray.
55	Cable - multiple connector "B" to key switch - pink.
56	Cable - multiple connector "B" to alternator-generator Tellite - light blue.
57	Cable - multiple connector "B" to key switch - red.
58	Cable - alternator-generator Tellite to fuel gauge receiving unit - "IGN" terminal - black.
59	Cable - engine oil pressure Tellite to fuel gauge receiving unit "IGN" terminal - black.
60	Cable - multiple connector "B" to instrument light - tan.
61	Cable - fuel gauge sending unit to fuel gauge receiving unit - dark blue.
62	Cable - key switch to fuel gauge receiving unit "IGN" terminal - pink.
63	Cable - speed-ratio selector light to instrument light connector - tan.
64	Cable - air cleaner indicator "IGN" terminal to fuel gauge receiving unit "IGN" terminal - pink.
65	Cable - battery to solenoid "BAT" terminal.
66	Battery ground strap.
67	Cable - headlights to ground.
68	Cable - cigarette lighter to lower terminal on junction block - red.
69	Cable - air cleaner indicator to transmission oil pressure Tellite - black.
70	Cable - horn button to junction block - pink.
71	Cable - junction block to instrument lights -

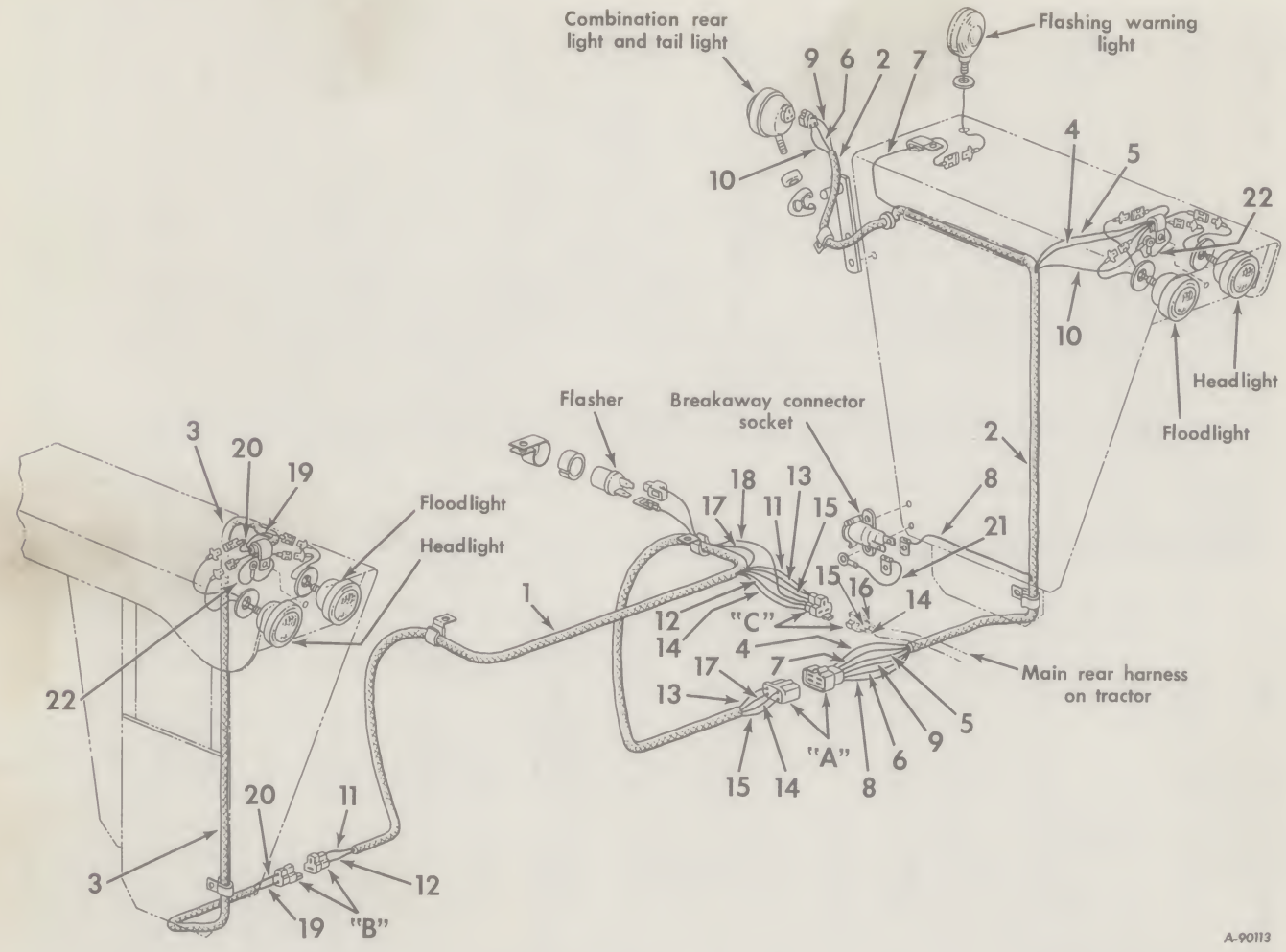
Illust. 74
Wiring diagram for Farmall Tractors (diesel engine).

Index to reference numbers in Illust. 74.

Ref. No.	Description
1	Cable - multiple connector "A" to safety starting switch - orange.
2	Cable - multiple connector "A" to connector "D" - white.
3	Cable - multiple connector "A" to multiple connector "B" - red with white tracer.
4	Cable - multiple connector "A" to connector "D" - black.
5	Cable - multiple connector "A" to multiple connector "B" - brown with white tracer.
6	Cable - multiple connector "A" to multiple connector "B" - pink.
7	Cable - multiple connector "A" to connector "B" to dome light - (tractors with cab) - light green.
8	Cable - multiple connector "A" to single connector to right headlight - violet.
9	Cable - multiple connector "B" to transmission oil pressure switch - yellow.
10	Cable - multiple connector "A" to ether starting push button switch - tan.
11	Cable - multiple connector "B" to solenoid switch "BAT" terminal - red.
12	Cable - solenoid switch "S" terminal to safety starting switch - orange with black tracer.
13	Cable - multiple connector "B" to engine oil pressure switch - gray.
14	Cable - multiple connector "B" to voltage regulator connector "C" - light blue.
15	Cable - multiple connector "B" to voltage regulator connector "C" - pink with black tracer.
16	Cable - multiple connector "B" to single connector - black.
17	Cable - ether solenoid switch to ground on ether mounting bracket - pink.
18	Cable - ether push button switch to ether solenoid - black with white tracer.
19	Cable - multiple connector "A" to single connector to left headlight - violet.
20	Cable - ground connection to combination rear light - pink.
21	Cable - ground connection to breakaway connector - pink.
22	Cable - breakaway connector to combination rear light - black with blue tracer.
23	Cable - flasher unit to warning light - brown.
24	Cable - connector "D" to flasher unit - black.
25	Cable - connector "D" to combination rear light - white.
26	Cable - connector "D" to combination rear light - black.
27	Cable - solenoid switch "BAT" terminal to alternator-generator "BAT" terminal - black.
28	Cable - voltage regulator connector "F" terminal to alternator-generator "F" terminal - yellow.
29	Cable - voltage regulator #2 terminal to alternator-generator "R" terminal - brown.
30	Cable - connector "C" to voltage regulator #3 terminal - pink with black tracer.
31	Cable - connector "C" to voltage regulator #4 terminal - light blue.
32	Cable - voltage regulator #3 terminal to resistor - pink with black tracer.
33	Cable - voltage regulator #4 terminal to resistor - light blue.
34	Cable - single connector to air cleaner vacuum switch - black with white tracer.
35	Cable - horn to horn button - dark green.
36	Cable - alternator-generator "GRD" terminal to ground on voltage regulator - pink.
37	Cable - multiple connector "A" to push button switch - orange.
38	Cable - multiple connector "A" to lighting switch "RL" terminal - white.
39	Cable - multiple connector "A" to junction block - red.
40	Cable - multiple connector "A" to lighting switch "TL" terminal - black.
41	Cable - multiple connector "A" to junction block - tan.
42	Cable - multiple connector "A" to push button switch - pink.
43	Cable - multiple connector "A" to lighting switch "BAT" terminal - light green.
44	Cable - multiple connector "A" to lighting switch "HL" terminal - violet.
45	Cable - junction block to lighting switch "INST" terminal - tan.
46	Cable - multiple connector "A" to fuse housing - red.
47	Cable - multiple connector "A" to fuse housing - light green.
48	Cable - multiple connector "B" to instrument light - tan.
49	Cable - multiple connector "B" to transmission oil pressure Tellite - yellow.
50	Cable - multiple connector "B" to air cleaner indicator - black.
51	Cable - multiple connector "B" to engine oil pressure Tellite - gray.
52	Cable - multiple connector "B" to key switch - pink.
53	Cable - multiple connector "B" to alternator-generator Tellite - light blue.
54	Cable - multiple connector "B" to key switch - red.
55	Cable - alternator-generator Tellite to fuel gauge receiving unit "IGN" terminal - black.
56	Cable - engine oil pressure Tellite to fuel gauge receiving unit "IGN" terminal - black.
57	Cable - multiple connector "B" to instrument light - tan.
58	Cable - fuel gauge sending unit to fuel gauge receiving unit - dark blue.
59	Cable - key switch to fuel gauge receiving unit "IGN" terminal - pink.
60	Cable - speed-ratio selector light to instrument light connector - tan.
61	Cable - air cleaner indicator "IGN" terminal to fuel gauge receiving unit "IGN" terminal - pink.
62	Cable - battery positive (+) terminal to to solenoid switch "BAT" terminal.
63	Cable - battery to battery.
64	Battery ground strap.
65	Cable - headlights to ground.
66	Cable - cigarette lighter to lower terminal on junction block.
67	Cable - transmission oil pressure Tellite to air cleaner indicator - black.
68	Cable - air cleaner switch to ground - pink.
69	Cable - horn button to junction block - pink.
70	Cable - instrument light to junction block - tan.

ELECTRICAL SYSTEM

Farmall Tractors with Deluxe Fenders

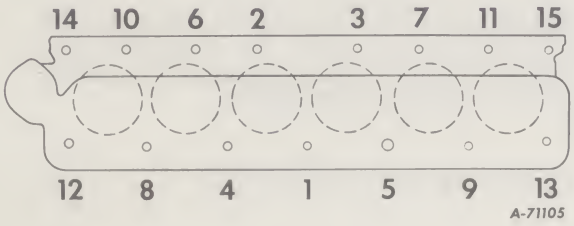


Illust. 76
Wiring diagram - tractors with deluxe fenders.

Ref. No.	Description	Ref. No.	Description
1	Cable harness - deluxe fenders.	13	Cable - lighting switch "HL" terminal to left fender headlight - violet.
2	Cable harness - left deluxe fender.	14	Cable - lighting switch "RL" terminal to left fender floodlight - white with black tracers.
3	Cable harness - right deluxe fender.	15	Cable - lighting switch "TL" terminal to left fender combination rear light - black.
4	Cable - connector "A" to headlight - violet.	16	Cable - lighting switch "TL" terminal to connector "C" - black.
5	Cable - Connector "A" to floodlight - white.	17	Cable - connector "A" to flasher unit - brown.
6	Cable - connector "A" to combination rear light - black with white tracers.	18	Cable - flasher unit to connector "C" - black.
7	Cable - connector "A" to flasher unit - brown.	19	Cable - right floodlight to connector "B" - white.
8	Cable - connector "A" to break-away connector - black.	20	Cable - right headlight to connector "B" - black.
9	Cable - connector "A" to combination rear light - white with black tracers.	21	Cable - breakaway connector socket to ground.
10	Cable - combination rear light connector to ground - ground on left headlamp panel.	22	Cable - headlight and floodlight to ground.
11	Cable - right fender headlight to lighting switch "HL" terminal - violet.		
12	Cable - right fender floodlight to lighting switch "RL" terminal - white.		

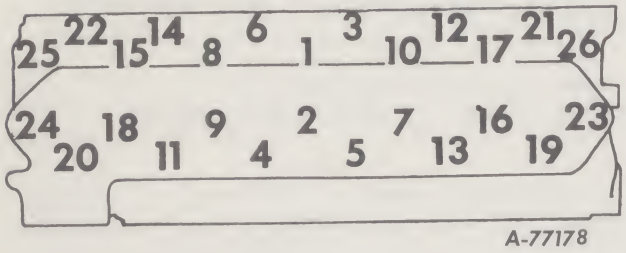
MINOR ENGINE SERVICE OPERATIONS

CYLINDER HEAD GASKET



Illust. 77
Tightening sequence for cylinder head bolts.
(Gasoline or LP Gas Engines).

On gasoline and diesel engines, check the tightness of the cylinder head bolts after the first 100 hours of engine operation for a new tractor and 100 hours after installing a new cylinder head gasket. The bolts should be tightened to, from 85 to 95 foot pounds torque (gasoline engine) or from 120 to 140 foot pounds torque (diesel engine).



Illust. 77A
Tightening sequence for cylinder head bolts.
(Diesel engine.)

On LP Gas engines check the tightness of the cylinder head bolts after the first 50 hours of engine operation for a new tractor and 50 hours after installing a new cylinder head gasket. The bolts should be tightened to, from 85 to 95 foot pounds torque.

For most satisfactory results in tightening the cylinder head, follow the sequence **in Illust. 77** for gasoline and LP Gas engines **or Illust. 77A** for diesel engines and tighten down all the cylinder head bolts fairly snug. Retighten in the same order, giving each bolt a fraction of a turn at a time. Continue this until all bolts are tight. Do not screw one bolt down perfectly tight and then go to the next as an even pressure on the gasket cannot be obtained in this manner. It is recommended that you see your International Harvester dealer for this service.

After replacing the cylinder head, it is necessary to insure against leaks by retightening the bolts after the engine has been operating and the water jacket has become thoroughly heated.

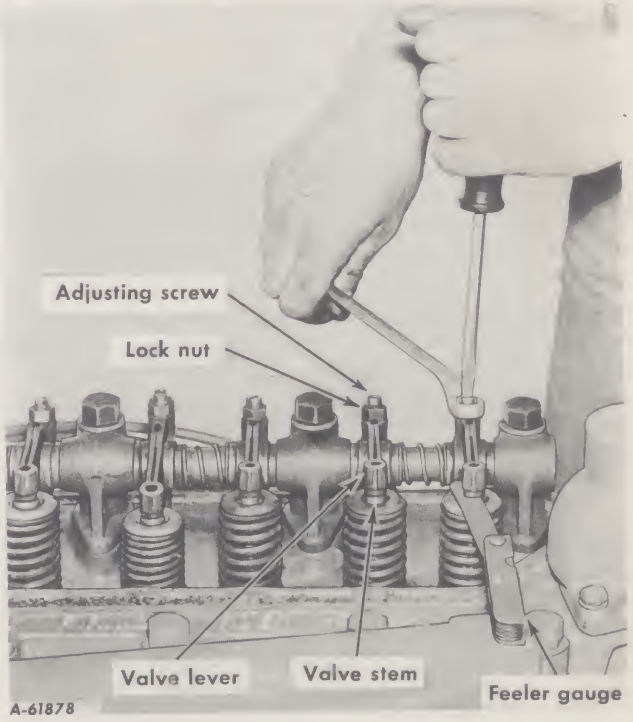
Note: Be sure to adjust the valve tappet clearance after the last tightening of the cylinder head bolts. See "Valve Clearance Adjustment.

CRANKSHAFT BEARINGS, PISTON AND RINGS

We cannot impress too strongly the necessity of having your International Harvester dealer do the work of replacing the connecting-rod bearings, crankshaft bearings, pistons and rings, and reconditioning the valves.

VALVE CLEARANCE ADJUSTMENT

A clearance of .013 inch for the intake valves and .025 inch for the exhaust valves must be maintained for the diesel engine, and a clearance of .027 inch for both the intake and the exhaust valves on the gasoline and LP gas engines (measured when the valves are closed and the engine is warm) must be maintained between the end of the valve levers and the valve stems.



Illust. 77B
Gauging the valve levers with a feeler gauge.

VALVE CLEARANCE ADJUSTMENT - Continued

Note: The valve arrangement from front to rear, is exhaust, intake, exhaust, intake, etc.

The exhaust valves are equipped with positive-action valve rotators.

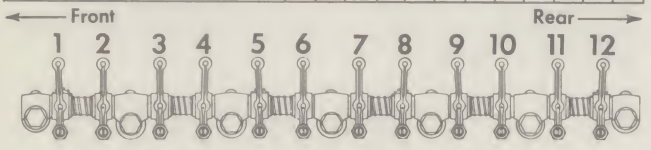
On gasoline and diesel engines, check the valve clearance after the first 100 hours of engine operation.

On LP Gas engines, check the valve clearance after the first 50 hours of engine operation.

Thereafter check the valve clearance on all engines after every 500 hours of engine operation.

Note: Do not adjust the valves with the engine running.

WITH	ADJUST VALVES (ENGINE WARM)											
No. 1 Piston at T.D.C. (Compression)	1	2	3		5		7		9			
No. 6 Piston at T.D.C. (Compression)				4		6		8		10	11	12



Numbering sequence of valves which correspond to chart
A-84583 A

Illust. 78
Gasoline or LP Gas engines.

Adjust the valves with the engine warm. Warm in this case, covers any temperature from +50 degrees F. up to a temperature of an engine which has just been stopped after operating.

Note: Gasoline Engine: The valve arrangement from front to rear is exhaust, intake; exhaust, intake; etc. **Diesel Engine:** The valve arrangement from front to rear is exhaust, intake; exhaust, intake; exhaust, intake: and exhaust, intake.

Using **Illusts. 78 or 78A** as a guide, all valves can be adjusted accurately by cranking the engine only twice. Six valves are adjusted when the No. 1 piston is at TDC (compression) and the remaining six valves are adjusted when the No. 6 piston is at TDC (compression).

Note: Be accurate. Use a feeler gauge for checking the valve clearance.

Adjusting the Clearance

Note: When checking the valve clearance on the gasoline or LP Gas engine, remove the distributor-to-coil cable "A" **(Illust. 61B)** from the socket on the coil, to safeguard against accidently starting the engine.

1. Remove the valve cover.

2. **Diesel engine:** Remove the timing plate on the right side of the clutch housing.

Crank the engine until the "T" mark on the flywheel is in line with the timing pointer on the clutch housing.

Gasoline or LP Gas engines: Crank the engine until the "TC" mark on the back flange of the fan drive pulley is in line with the timing pointer on the crankcase front cover.

All engines: Either the No. 1 or No. 6 cylinder is now at top dead center of the compression stroke.

Note: The push rods are free to rotate on the cylinder that is on TDC (compression).

3. Adjust six valves in the sequence shown **in Illust. 78 or 78A,** then crank the engine one complete revolution and adjust the remaining six valves in the sequence shown **in Illust. 78 or 78A,** as follows:

WITH	ADJUST VALVES (ENGINE WARM)											
No. 1 Piston at T. D. C. (Compression)	1	2		4	5			8	9			
No. 6 Piston at T. D. C. (Compression)			3			6	7			10	11	12

Numbering sequence of valves which correspond to chart
A-84634 A

Illust. 78A
Diesel engine.

VALVE CLEARANCE ADJUSTMENT - Continued

Adjusting the Clearance - Continued

Loosen the adjusting screw lock nut on the valve lever. **See Illust. 78.** Insert the feeler gauge between the valve lever and valve stem. Turn the adjusting screw in or out as necessary to hold the feeler gauge snugly. When the correct clearance is obtained, hold the adjusting screw in place with a screw driver, tighten the lock nut, and recheck the clearance.

4. Replace the valve cover. Check to see that the valve cover gasket makes an oil-tight seal with the cylinder head. Use a new gasket if necessary.

GOVERNOR ADJUSTMENTS (Gasoline or LP Gas Engines)

Governor action should be smooth and steady without surging and should maintain a fast idle speed, of approximately 2,650 r.p.m. on the gasoline and LP Gas engine.

The governor fast idle speed is defined as the speed at which the engine runs with the engine speed control lever moved all the way down and the engine running without load.

Governor to Carburetor Control Rod Adjustment

1. Loosen alternater-generator brace bolt "A" and mounting bolt "B", **(Illust. 53).** Then move the alternator-generator in toward the engine, remove the belt from the alternator-generator pulley, and move the alternator-generator away from the engine.

2. Pull the engine speed control lever down to create tension on the governor spring.

3. With the governor to carburetor control rod connected to the carburetor, and the governor rockshaft lever in the wide open throttle position, adjust the length of the rod so the clevis pin slides freely into the clevis and governor rockshaft lever hole.

4. Remove the clevis pin and turn the clevis one complete turn longer.

5. Reassemble the clevis pin and tighten the clevis lock nut.

6. Check to be sure there is no binding by moving the engine speed control lever up and down a few times. Bending or sticking of parts will cause surging and/or poor speed control.

7. Move the alternator-generator in toward the engine, reinstall the belt on the pulley, and tighten the mounting bolts. Then adjust the belt tension as shown **in Illust. 55.**

Governor Fast Idle Speed Adjustment

1. Make sure the governor to carburetor control rod is adjusted correctly.

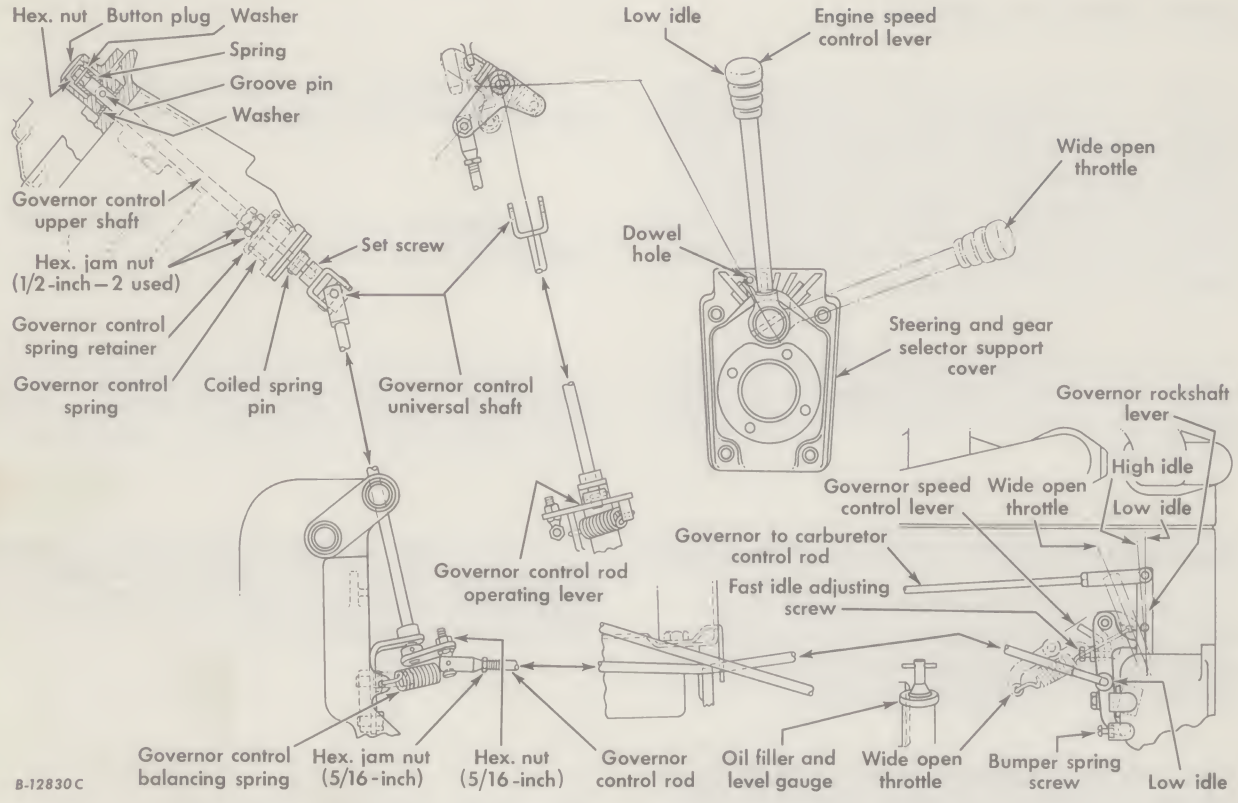
2. Loosen the jam nut and back out the bumper spring screw approximately 3/4-inch **(Illust. 80).** Then tighten the jam nut.

3. Start the engine and bring it up to operating temperature.

4. Hold the governor speed control lever against the fast idle adjusting screw, loosen the jam nut and adjust the screw to obtain a fast idle speed of 2,650 r.p.m. Turning the screw in reduces speed, out increases speed. When the proper speed is reached, lock the screw in place with the jam nut.

GOVERNOR ADJUSTMENTS (Gasoline or LP Gas Engines) - Continued

Governor Fast Idle Speed Adjustment - Continued



Illust. 80
Governor linkage adjustments (gasoline and LP Gas engines).

5. Flash engine speed, recheck engine fast idle speed and readjust if necessary.

6. While sitting in the tractor seat, quickly advance the engine speed control lever to the fully advanced position from the full retarded position. If the engine surges more than twice adjust the governor bumper spring screw as instructed in step No. 7.

7. Loosen the jam nut and screw in the bumper spring screw (Illust. 80) just enough to stop excessive surging. After the bumper spring screw has been adjusted properly, lock it in place with the jam nut.

Note: If the governor does not function properly after making the above adjustments, see your International Harvester dealer.

ENGINE SPEED CONTROL LEVER POSITION

Gasoline and LP Gas Engines

If the engine speed control linkage has been disassembled or the engine speed control lever is removed for any reason, the control lever must be reassembled in position to obtain the proper low and high idle speed.

If the control lever hits either of the stops, before low or high idle speed is obtained, remedy this condition as follows:

Set the engine to run at low idle speed (425 r.p.m.) as indicated on the tachometer.

Place the engine speed control lever pointer approximately at the mid-point between the dowel hole and the left stop.

If further adjustment is needed, loosen the ball socket jam nut, on the governor control rod, then remove the nut from the rod and ball screw. Adjust the length of the rod by screwing the end, in or out until low idle speed is obtained. Reinstall the ball screw and nut and tighten the jam nut.

ENGINE SPEED CONTROL LEVER POSITION

Diesel Engines

If the engine speed control linkage has been disassembled or the engine speed control lever is removed for any reason, the control lever must be reassembled in position to obtain the proper low and high idle speed.

ENGINE SPEED CONTROL LEVER POSITION (Diesel Engines) - Continued

If the control lever hits either of the stops before low or high idle speed is obtained, remedy this condition as follows:

1. Set the engine to run at low idle speed (600 r.p.m.) as indicated on the tachometer.

2. Place the engine speed control lever so the lever pointer contacts the dowel pin or detent (tractors with tilt steering wheel). **See Illust. 81.**

3. Loosen the jam nuts and adjust the turnbuckle on the governor control rod until the injection pump control lever is in the low idle position. (Tachometer should indicate 675 r.p.m.).

4. If complete adjustment cannot be made at the turnbuckle end, loosen the jam nut at the ball socket end of the rod, then remove the nut from the rod end ball screw. Adjust the length of the rod by turning the end, in or out, until low idle speed is obtained. Reinstall the ball screw and nut. Tighten the jam nut. The tachometer should now indicate approximately 675 r.p.m.

5. Place the engine speed control lever in the high idle position. The engine speed will then be approximately 2,640 r.p.m.

6. When moving the engine speed control lever to the shut-off position, lift the lever up and over the stop pin and move it towards the extreme left stop.

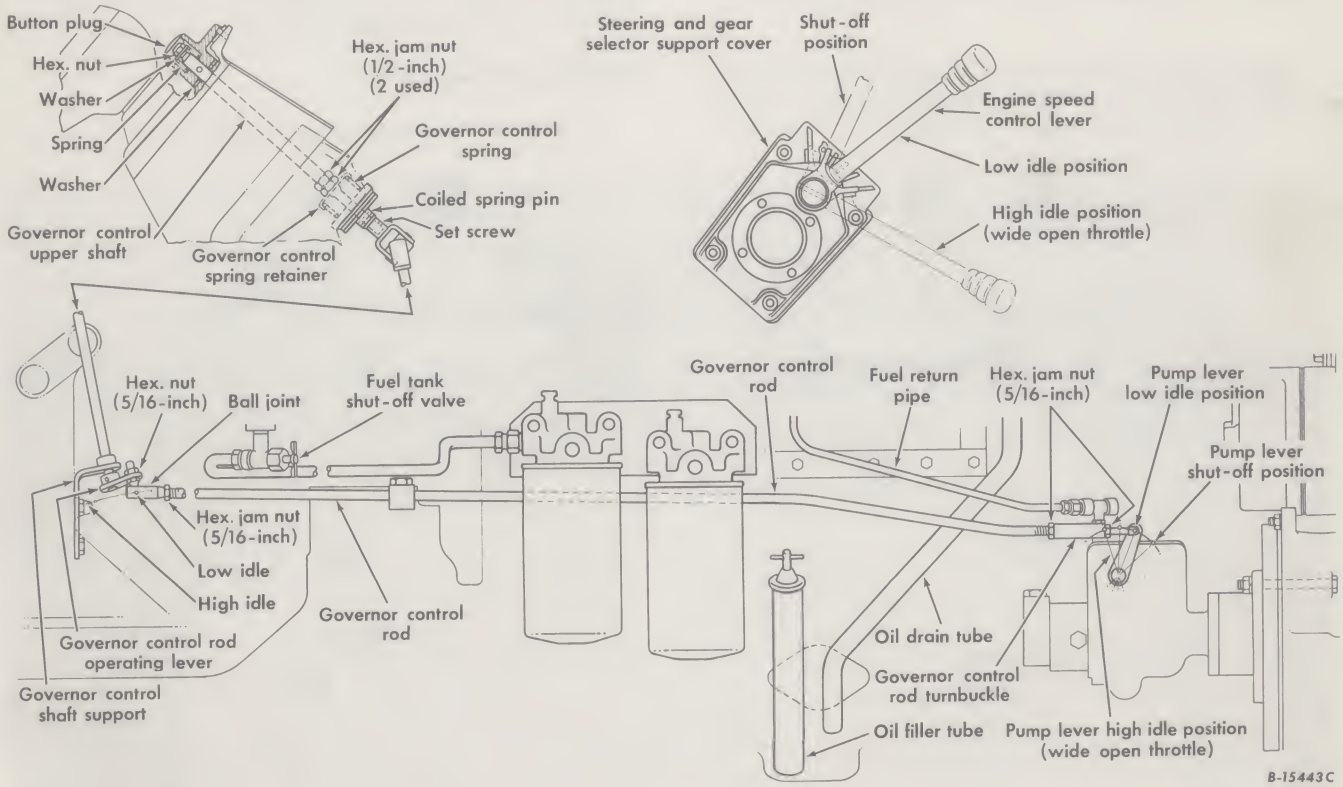
ENGINE SPEED CONTROL LEVER CREEP (All Models)

To remove engine speed control lever creep:

1. Back off the two 1/2-inch hex. jam nuts that hold the spring retainer in place on the governor control upper shaft. **See Illust. 81.**

Tighten the bottom nut against the spring retainer until the tension in the spring is felt.

3. Compress the spring by rotating the nut through five complete turns (eight turns on the tilt steering wheel) and then lock in position with the top jam nut.



Illust. 81
Governor linkage adjustments (diesel engine).

FRONT WHEELS

Farmall Tractors

The front wheels are reversible disc wheels commonly equipped with 7.50-16 tires. Other tire sizes are available.

Your tractor may be equipped with one of two basic adjustable wide-tread front axle attachments as ordered: one provides a tread range of 50 to 74-inches with the wheel concaves turned in. The other adjustable wide-tread front axle attachment provides a tread range of 58 to 82-inches with the wheel concaves turned in.

The above figure applies when using 7.50-16 tires.

A front axle for tricycle type dual front wheels also is available.

On tractors with tricycle type dual front wheels, the wheels are mounted on axles on the lower bolster which is attached to the upper bolster pivot shaft assembly with four bolts. Check the tightness of the bolts periodically.

The wheels are provided with mounting holes for the addition of cast iron weights.

The front wheel tread is approximately 10-inches with the concave sides turned in. With the concave sides out the tread is 14-inches.

ADJUSTABLE WIDE-TREAD FRONT AXLE

The adjustable wide-tread front axle adapts the tractor to work where rows are spaced too closely for tricycle type dual front wheels.

When the tractor is equipped with an adjustable wide-tread front axle, the front wheels can be set to track with the rear wheels.

An adjustable wide-tread axle is available, using extensions and extension pipes, to provide treads of 114 to 120 inch with 7.50-16 tires or 117 to 123 inch with 10.00-16 tires. These wide treads are not recommended for use with front bolster weights on front mounted equipment.

Many intermediate tread settings between the inner and outer limits can be obtained by moving the axle extensions in or out.

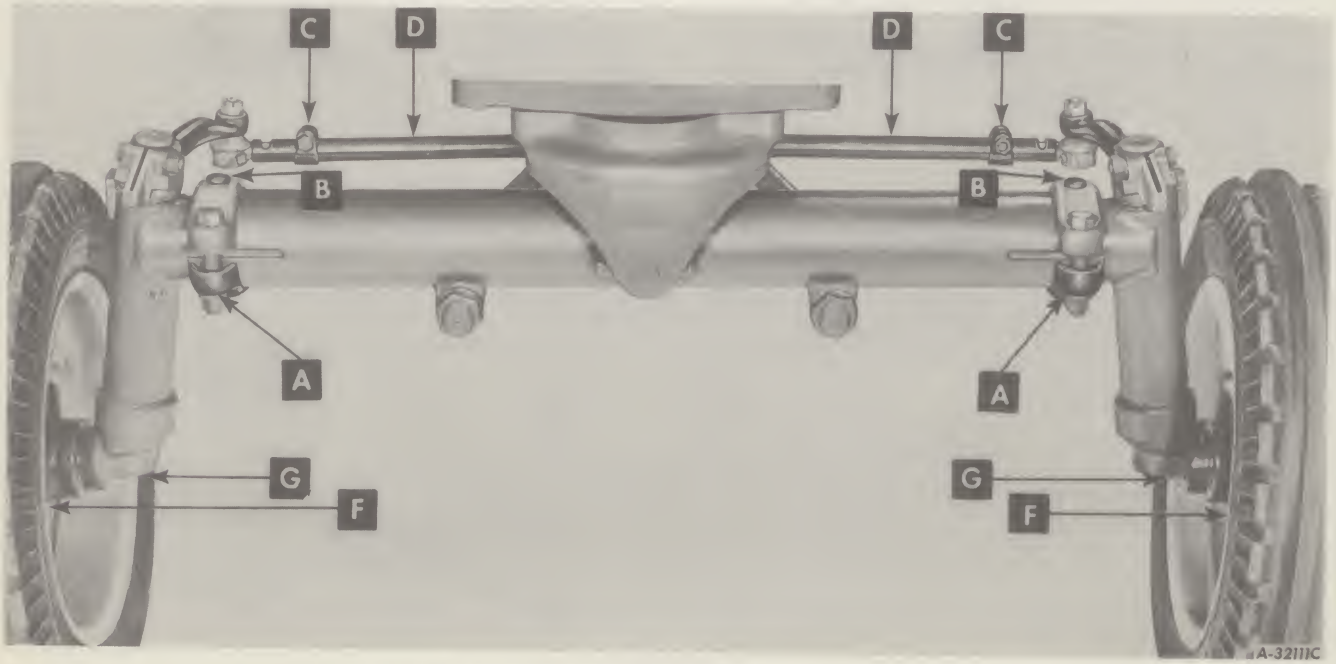
For the maximum tread width, assemble the wheels with the concave sides turned out.

Note: The front wheels must always be assembled with the concave side in when the tractor is carrying heavy front end weight.

Note: The adjustable wide-tread front axle cannot be used with M-448 or HM-639 Cultivators, or HM-1 Beet Harvester.

Adjusting the Tread Widths

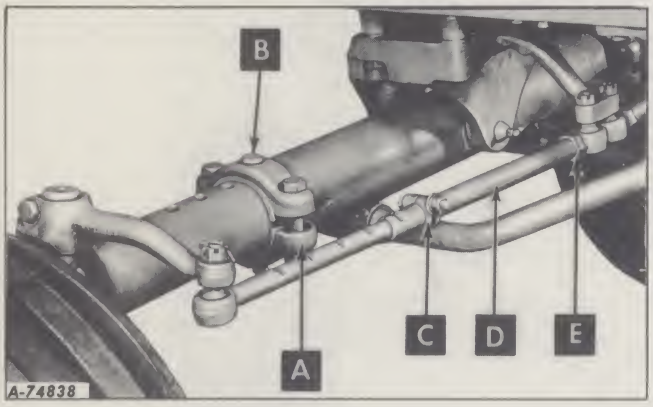
1. Raise the front end of the tractor.



Illust. 82 - Front view showing adjustable wide-tread front axle.

ADJUSTABLE WIDE-TREAD FRONT AXLE - Continued

Adjusting the Tread Width - Continued



Illust. 83
Left side view of the adjustable wide-tread front axle.

2. Loosen the bolts holding axle extension clamps "A" and remove pin "B" on each side. See Illusts. 82 and 83.

3. Remove the bolts from the tie rod clamps "C".

4. Move the axle extensions an equal distance on both sides to the desired tread position and move the tie rods to correspond.

5. Replace pin "B" on each side in the holes selected and tighten the clamps to 190 to 260 foot-pounds torque. Also replace and tighten the bolts in the tie rod clamps.

Adjusting the Toe-In

The front wheels should have 1/4-inch (±1/16-inch) toe-in, that is, 1/4-inch closer together in the front than in the rear. To check the toe-in, with the tractor on level ground and the wheels in the straight-ahead position, place chalk marks on the rims at points "F" (Illust. 82) at the same height as the hub caps and measure the distance between them. Move the tractor forward a distance equal to one-half revolution of the front wheels. The chalk marks will now be at points "G". The measurement at points "G" should be 1/4-inch (±1/16-inch) greater than at points "F".

To adjust the toe-in, remove the clamp bolts "C" from the tie rods and loosen the lock nuts "E" sufficiently to allow the tie rod tubes "D" to turn freely. See Illust. 84. Turn the tie rod tubes one turn at a time to shorten or lengthen, as required. Left and right tie rods should be adjusted by equal amounts (not more than one turn difference), so that the steering gear arm will remain centered and not limit left or right turns. Clamp bolts "C" must be installed again to check toe-in. Tighten bolts "C" and nuts "E" when specified toe-in is obtained.

Farmall Hi-Clear Tractors

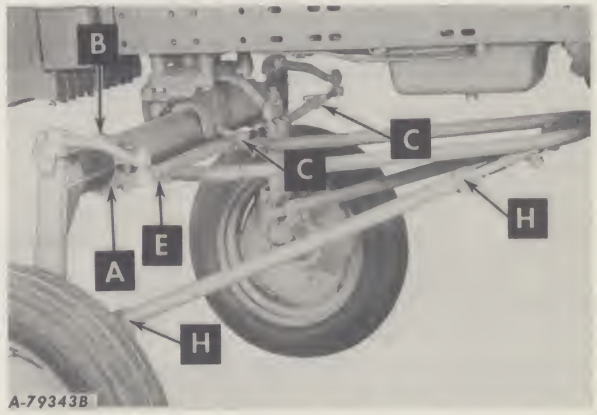
The Farmall Hi-Clear Tractors use front disc wheels for 7.50-20 6-ply tractor type tires.

The Farmall Hi-Clear Tractors are equipped with an adjustable front axle which provides a tread range of 64 to 84-inches with the wheel concaves turned in.

For the maximum tread width, assemble the wheels with the concave sides turned out.

Note: The front wheels always must be assembled with the concave side facing in when the tractor is carrying heavy front end weight.

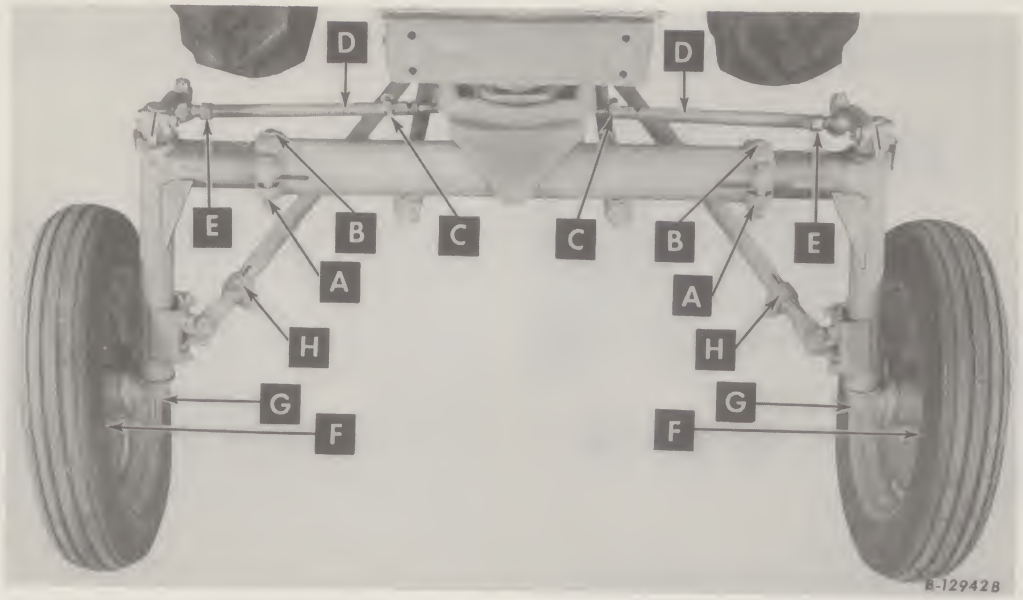
The adjustable front axle unit for the Farmall Hi-Clear Tractors has auxiliary stay rods to prevent the axle and main stay rod from bending under the severe operating conditions encountered in rice or cane field operations.



Illust. 83A
Left side view of the adjustable wide tread front axle.

FRONT WHEELS
Farmall Hi-Clear Tractors

ADJUSTING THE TREAD WIDTHS



Illust. 84
Front view showing adjustable wide-tread front axle.

1. Raise the front end of the tractor.

2. Loosen the bolts holding axle extension clamps "A" and remove pin "B" on each side. **See Illusts. 83A and 84.**

3. Remove the bolts from the tie rod clamps "C".

4. Remove the bolts from the auxiliary stay rod clamps "H" which hold the slotted rod ends.

5. Move the axle extensions an equal distance on both sides to the desired tread position and move the tie rods and auxiliary stay rods to correspond.

6. Replace pin "B" on each side in the holes selected and tighten the clamps. Also replace and tighten the bolts and nuts in the tie rod and auxiliary stay rod clamps.

Adjusting the Toe-In

The front wheels should have 1/4-inch (±1/16-inch) toe-in, that is, 1/4-inch closer together in the front than in the rear. To check the toe-in, with the tractor on level ground and the wheels in the straight-ahead position, place chalk marks on the rims at points "F" **(Illust. 82)** at the same height as the hub caps and measure the distance between them. Move the tractor forward a distance equal to one-half revolution of the front wheels. The chalk marks will now be at points "G". The measurement at points "G" should be 1/4-inch (±1/16-inch) greater than at points "F".

To adjust the toe-in, remove the clamp bolts "C" from the tie rods and loosen the lock nuts "E" sufficiently to allow the tie rod tubes "D" to turn freely. **See Illust. 84.** Turn the tie rod tubes one turn at a time to shorten or lengthen, as required. Left and right tie rods should be adjusted by equal amounts (not more than one turn difference), so that the steering gear arm will remain centered and not limit left or right turns. Clamp bolts "C" must be installed again to check toe-in. Tighten bolts "C" and nuts "E" when specified toe-in is obtained.

International Tractors

The front wheels are disc wheels commonly equipped with 11.00-16 tires. Other tire sizes are available. The fixed tread is 57-inches.

The wheels are provided with mounting holes for the addition of cast iron weights.

ADJUSTING THE TOE-IN

The front wheels should have 1/4-inch (±1/16-inch toe-in, that is, 1/4-inch closer together in the front than in the rear. To check the toe-in, with the tractor on level ground and the wheels in the straight-ahead position, place chalk marks on the rims in front at the same height as the hub caps and measure the distance between them (as between points "F", **Illust. 84).** Move the tractor forward a distance equal to one-half revolution of the front wheels. The chalk marks will now be at

the rear of the front wheels (as points "G") and should be at a 1/4-inch (±1/16-inch) greater distance than at the front position.

To adjust the toe-in loosen the lock nut at both ends of the tie rods. Screw the tie rods in or out to make any necessary adjustments. Tighten the lock nuts.

Tie rods on the left and right sides must be approximately the same length so that full wheel turn in either direction may be obtained.

ADJUSTABLE WIDE-TREAD FRONT AXLE

When the tractor has an adjustable wide-tread front axle, the front wheels can be set to track with several rear wheel tread settings. The axle is adjustable to three front wheel tread positions of 60-inches, 73-inches, and 84-inches.

Note: The adjustable tread front axle is not recommended for use with heavy front mounted equipment and should be restricted to agricultural use only.

Adjusting the Tread Widths

1. Raise the front end of the tractor.

2. Loosen the bolts holding the axle extension clamps and remove the center bolt on each side. **See Illusts. 82 and 83** for similar axle adjustment.

3. Remove the bolts from the tie rod clamps.

4. Move the axle extensions an equal distance on both sides so the holes line up when the wheels are at the desired tread position and move the tie rods to correspond.

5. Replace the locating bolt on each side in the holes selected and tighten the clamps. Also replace and tighten the bolts in the tie rod clamps.

Adjusting the Toe-In

The front wheels should have 1/4-inch (±1/16-inch) toe-in, that is, 1/4-inch closer together in the front than in the rear. To check the toe-in, with the tractor on level ground and the wheels in the straight-ahead position, place chalk marks on the rims in front at the same height as the hub caps and measure the distance between them (as between points "F", **Illust. 84).** Move the tractor forward a distance equal to one-half revolution of the front wheels. The chalk marks will now be at the rear of the front wheels (as points "G") and should be at a 1/4-inch (±1/16-inch) greater distance than at the front position.

To adjust the toe-in, remove the clamp bolts "C" from the tie rods and loosen the lock nuts "E" sufficiently to allow the tie rod tubes "D" to turn freely. **See Illust. 88.** Turn the tie rod tubes one turn at a time to shorten or lengthen, as required. Left and right tie rods should be adjusted by equal amounts (not more than one turn difference), so that left and right turns will be equal. Clamp bolts "C" must be installed again to check toe-in. Tighten bolts "C" and nuts "E" when specified toe-in is obtained.

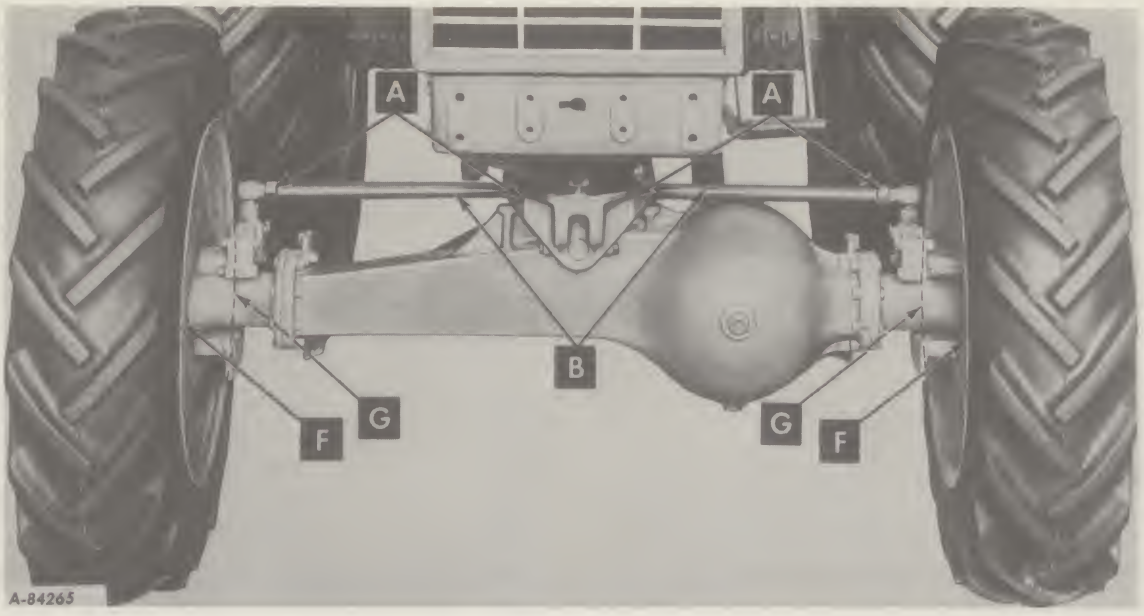
ALL-WHEEL DRIVE

Farmall and International Tractors

The All-Wheel Drive front axle assembly provides increased traction under most heavily-loaded agricultural applications. This is particularly true when operating in loose or sandy soils, or under wet field conditions where traction is difficult. Improved steering control and decreased soil compaction is also realized through the addition of the front drive, with its better weight distribution and flotation. Front wheel drive disengagement is provided for light-duty draft requirements and for transport or operation on hard, dry surfaces.

The front axle assembly consists of a one-piece cast steel center housing with flanged ends to which removable stud ends are bolted. Upper and lower tapered roller bearings at the end of each stub extension support the wheel spindles to provide for wheel turn. The wheel hubs are mounted on the spindles by large tapered roller bearings. Disc wheels with 11.2-24 R-1, R-2, or R-4 or 12.4-24, R-1 or R-2 tires provide a tread of 67-inches when the wheels are mounted in their normal position with concave sides turned in. When the wheels are reversed and interchanged, a tread of 75-inches is provided. The axle assembly is mounted under the upper bolster, with a stay rod bracket under the clutch housing. The regular power steering system actuated the center arm of the steering linkage.

ALL-WHEEL DRIVE
Farmall and International Tractors



Illust. 86
Front view of All-Wheel Drive tractor.

The power drive for the front axle is provided through a gear reduction unit mounted on the left side of the rear frame, which is driven from an idler gear of the range transmission at a fixed gear ration to the rear axle. Front and rear tire combinations are selected to provide matching ground speeds with the single gear ratio available. The side drive unit may be shifted to neutral, to disengage the front drive. This is done by moving the hand lever on the left side of the controls support base downward. Power is transmitted to the front axle through a drive shaft, with universal joints, on the left side of the tractor. The rear universal joint has a slip yoke to compensate for axle oscillation.

The front axle center housing incorporates a bevel-type hypoid gear reduction unit, with straddle-mounted pinion, and a four-pinion differential gear unit. Full-floating axle shafts extend outward from the differential to the driving yokes of the Cardan-type universal steering joints inside the wheel hubs. The driving yoke in each wheel hub is attached by two pins to a large compensating ring, which is in line with the vertical spindle bearings. The ring, in turn, drives the wheel through two pins in the hub located at 90 degrees to the hub yoke and thus permits power drive during turns.

ADJUSTING THE TOE-IN

The front wheels should have 1/4-inch (±1/16-inch) toe-in, that is, 1/4-inch closer together in the front than in the rear. To check the toe-in, with the tractor on level ground and the wheels in the straight-ahead position, place chalk marks on the rims in front at the same height as the center point of the axle extensions and measure the distance between them (as between points "F", **Illust. 86).**

Move the tractor forward a distance equal to one-half revolution of the front wheels.

The chalk marks will now be at the rear of the front wheels (at point "G") and should be at a 1/4-inch (±1/16-inch) greater distance than at the front position.

To adjust the toe-in, loosen the lock nut "A" at both ends of the tie rods.

Screw the tie rods "B" in or out to make any necessary adjustments.

Tighten the lock nuts "A". Tie rods on the left and right sides must be approximately the same length so that full wheel turn in either direction may be obtained.

REAR WHEELS

Farmall and Hi-Clear Tractors

Farmall Tractors are equipped with cast iron rear wheels with demountable double-bead type rims commonly equipped with 16.9-38 or 18.4-38 tractor-type, agricultural tread tires. Other tire sizes are available. Power adjusted wheels and rims are available for 15.5-38 tires. **See pages 93 and 94.**

Farmall Hi-Clear Tractors are equipped with cast iron rear wheels with demountable double-beaded type rims commonly equipped with 15.5-38 cane and rice field type tires. Other tire sizes are available.

International tractors are equipped with cast iron wheels with rims as follows:

Rear wheels have double-beaded rims for 16.9-38, 18.4-38, and 18.4-34 tires; and attached-clamp rims for 23.1-26, 23.1-30, or 23.1-34 tires.

All the rear wheels are provided with mounting holes for the addition of cast iron wheel weights.

Wide-tread rear axles are available on Farmall Tractors for special requirements. See the table under **Illust. 88.**

ADJUSTING THE TREAD WIDTH

Farmall and International Tractors

The desired tread widths can be obtained by moving the wheels in or out on the axles, by mounting the rims in various positions on the wheels, and by reversing the wheels on the axles.

The various tread combinations available with different rim and wheel positions are tabulated **in Illusts. 88 and 89.**

Note: The rear wheels must not be moved inward on the axles closer than 1/8-inch from the stop on the rear axle carrier caps.

Note: When adjusting the rear wheel tread on a tractor equipped with a cab, allow a minimum clearance of 4-1/2-inches between cab wall and tire.

ASSEMBLING THE REAR WHEEL DOUBLE-BEAD RIMS

Farmall and International Tractors

The rear wheel rims are held in place with two fixed clamps and ten adjustable clamps, which engage a raised bead around the inside of the rims. The clamps may be bolted to either side of the wheel and will engage either of the two beads in the rims.

When assembling the rim on the wheel, be sure the two fixed clamps are assembled at 90 degrees to each other and are engaged over two of the four drive lugs. Tighten the clamp bolts securely. Then assemble the ten adjustable clamps and be sure that two of these clamps engage with the two other drivers. Tighten all of the adjustable clamp bolts securely and equally in consecutive order to prevent possible misalignment or slippage.

REVERSING THE REAR WHEELS

Raise the rear of the tractor so that one of the rear wheels is off the ground.

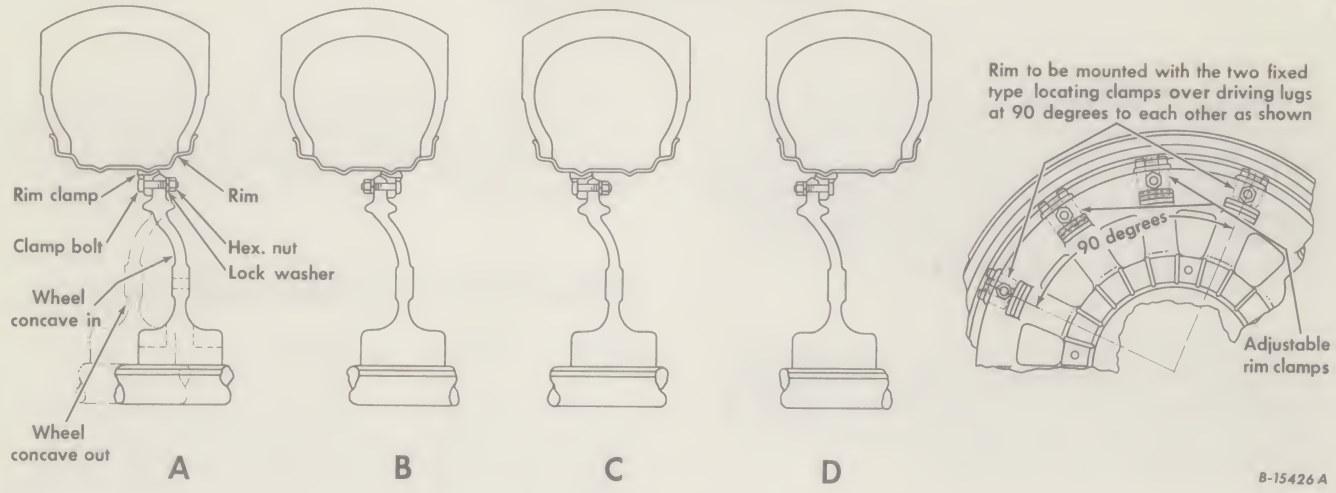
Caution! Be sure the tractor is rigidly supported. Engage the park lock and block the front wheels and the other rear wheel.

Remove and reverse the wheel and place in the desired position on the rear axle. Then lower the tractor, raise the opposite rear wheel and repeat the procedure.

When reversing the wheels on the axles, make sure that the tires rotate in the direction shown by the arrow on the side of the tires. This will mean changing the wheels from one side of the tractor to the other, unless rims and tires are removed from the wheels and reversed. Be sure all bolts are tight and the wheels secure on the axle.

REAR WHEELS

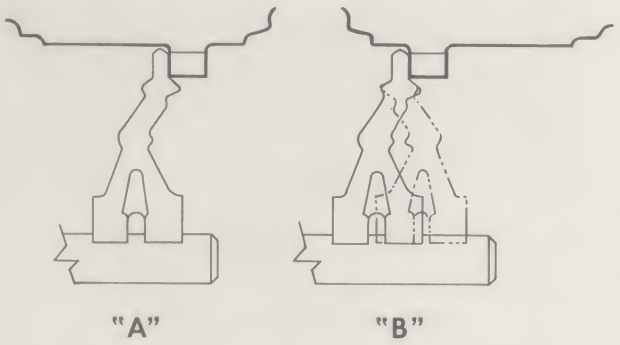
WHEELS WITH DOUBLE-BEADED RIMS



Illust. 88
Rear wheel tread and rim mounting diagram (right rear wheel shown).

Double beaded rim	Wheel Concave	Rim and Clamp Position			
		A	B	C	D
Farmall with standard axles	In	60-74** 56-74*	60-78** 58-78*	62-82	66-86
	Out	62-82	66-86	70-90	74-94
International with standard axles and 34 and 38-inch wheels	In	60-62**	60-66**	62-70	66-74
	Out	62-70	66-74	70-78	74-82
Farmall and International with 100-inch axles for dual wheels ‡	In	60-80 56-80*	60-84 58-84*	62-88	66-92
	Out	62-88	66-92	70-96	74-100
Farmall and International with wide tread axles ‡	In	60-98 56-98*	60-102 58-102*	62-106	66-110
	Out	62-106	66-110	70-114	74-118
Farmall with heavy-duty wide tread axles ‡	In	66-94	70-98	74-102	78-106
	Out	74-102	78-106	82-110	86-114
Farmall Hi-Clear, with shorter axle	In	64-75* 76-81**	73-79* 78-85**	77-83* 82-89**	81-87* 86-93**
	Out	87-93* 82-89**	91-96* 86-93**	90-96**	

* - With 15.5-38 tires. ** - With 18.4-38 or 18.4-34 tires.
‡ - **Heavy drawbar loads are not recommended with treads wider than 94-inches,** except with heavy-duty wide tread axles on Farmall 856 tractors where heavy drawbar loads may be used up to 108-inch tread. Refer to rear ballast instructions under "Weights" **on page 96.**



Illust. 89
Rear wheel tread and rim mounting diagram
(right rear wheel shown)

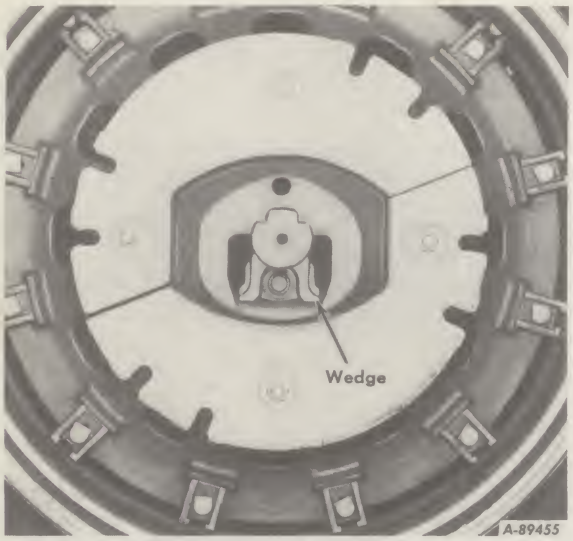
Note: When the attached-clamp rims are reversed to change the tread width, change the tire and rim assembly, assembling the right tire and rim on the left side and vice versa, in order to keep the tread of the tire pointing in the correct direction of rotation as shown by the arrow on the tire.

Fixed clamp rim	Wheel concave	Rim Position	
		"A" Rim center line in	"B" Rim center line out
International tractor with 23.1-34 tire	In	Not used	73-81
	Out	65-73	81-89
International tractor with 23.1-30 tire	In	Not used	71-79
	Out	67-75	83-91
International tractor with 23.1-26 tire and DW 16-26 rim	In	Not used	Not used
	Out	66-72	74-80
International tractor with 23.1-26 tire and DW 20-26 rim	In	Not used	Not used
	Out	70-76 (Clamp at center of rim)	
Farmall tractor with 23.1-34 tire ‡‡	In	Not used	73-93
	Out	65-85	81-101
Farmall tractor with 23.1-30 tire ‡‡	In	Not used	71-91
	Out	67-87	83-103

‡‡ – Heavy drawbar loads are not recommended with treads wider than 94-inches, except with heavy-duty wide tread axles where heavy drawbar loads may be used up to 108-inch tread. Refer to rear ballast instructions under "weights" on page 95.

REAR WHEELS

TRACTORS WITH WEDGE WHEELS



Illust. 90
Wheel wedge in place.

The wedges in the wedge lock wheel must be tightly seated or the wheel may move on the axle. **See Illust. 90.** Seating the wedges can be accomplished by utilizing the tractor power to "work" them into place. They can be "power" loosened in the same way.

Tightening Wedges

On new tractors or wheels, tighten the wedge bolt to 400 to 500 foot pounds. Then drive the tractor slowly, and without releasing the clutch, rapidly apply the brake, 3 or 4 times, on the side being tightened. Again tighten the bolt to 400 to 500 foot pounds and repeat the entire procedure.

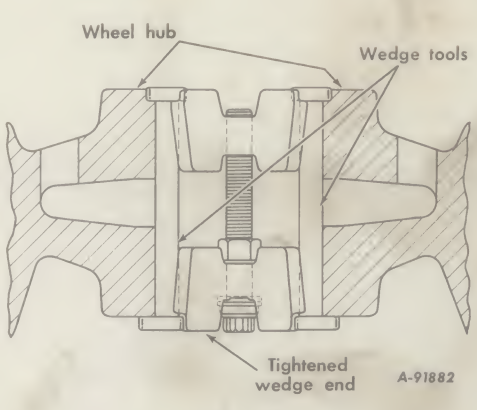
Wedges should now be seated and not require any further tightening except for checking at the 100 hour after-delivery service period. When checking the wedge bolt, torque will have dropped. If it is below 200 foot pounds it should be tightened to 300 to 400 foot pounds.

After wedges have been seated and wheel tread is being changed, the same procedure for the new wheels should be followed, except the bolt should be tightened to 300 to 400 foot pounds.

Note: 400 ft. lbs. of torque is the equivalent of 100 lbs. pull on the 4 ft. length of pipe that is shipped with each tractor.

Loosening Wedges

"Back out" the wedge bolt until one of the wedges is loose. Insert the wedge remover



Illust. 90A
Wedge remover tools in place.

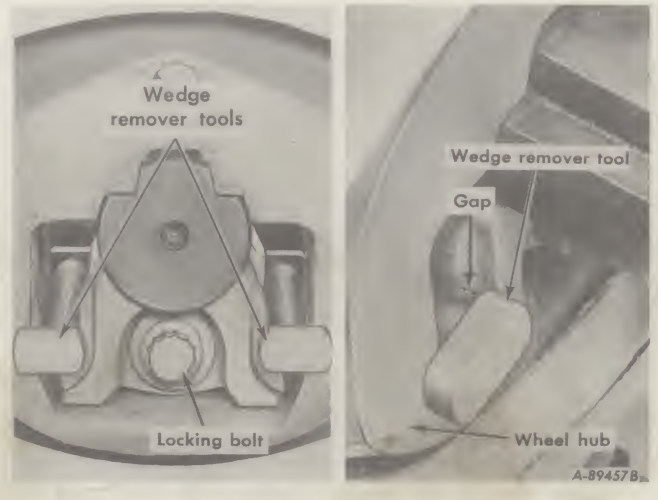
tools in the openings between the wheel hub and wedge with the offset head toward the tightened wedge end. **See Illust. 90A.** Rotate the tool until the offset extends over the wheel hub face. **See Illusts. 90A and 90B.**

Continue loosening the locking bolt. If the remaining wedge is not loose when approximately 450 foot pounds of counterlockwise torque has been applied, the wedge can be worked free, using the power of the tractor.

Drive the tractor forward slowly, and without releasing the clutch, rapidly apply the brakes 3 or 4 times on the wheel being loosened.

Wedge Lock Tools

The wedge lock tools should be positioned so that the offset end contacts the wheel hub face, then the opposite (centered) end will contact the wedge as the locking bolt is loosened. **See Illust. 90A.**



Illust. 90B
Tools in place with offset head over wheel hub face.

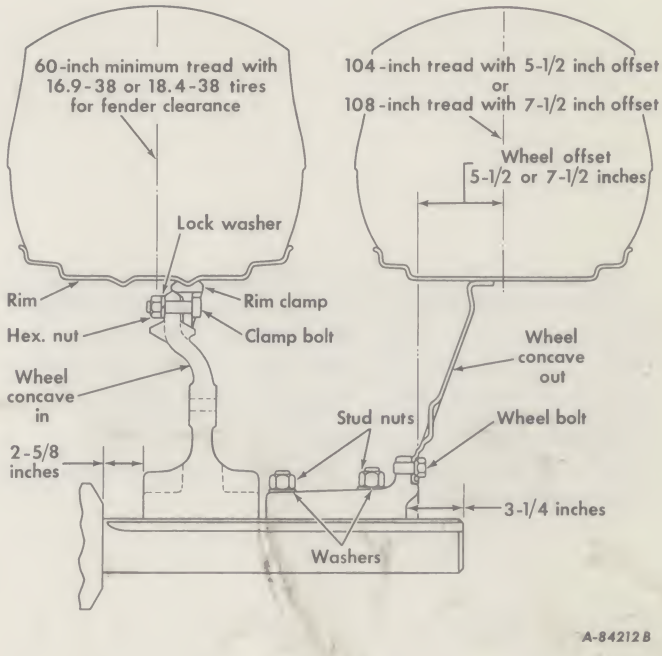
HUB CLAMP STUD ASSEMBLY (Tractors so Equipped) (Regular and Power Adjusted Wheels)

Tighten the hub clamp stud nuts alternately, a little at a time, to achieve equalized pressure across each clamp. Check the tightness of the stud nuts 10 hours after changing the wheel position, and every 50 hours of operation thereafter. Use a torque wrench or the box wrench and extension handles furnished.

Tighten the inner stud nuts to between 175 and 225 foot-pounds torque, using a torque wrench, or the box wrench and short extension handle furnished.

Tighten the outer stud nuts to between 390 and 460 foot-pounds torque, using a torque wrench, or the box wrench and long extension handle furnished. A 100-pound pull at the end of the four-foot extension handle will produce the recommended tightness.

If dual wheels are used, the outer wheel hub clamps must have all four stud nuts tightened to between 390 and 460 foot-pounds torque.



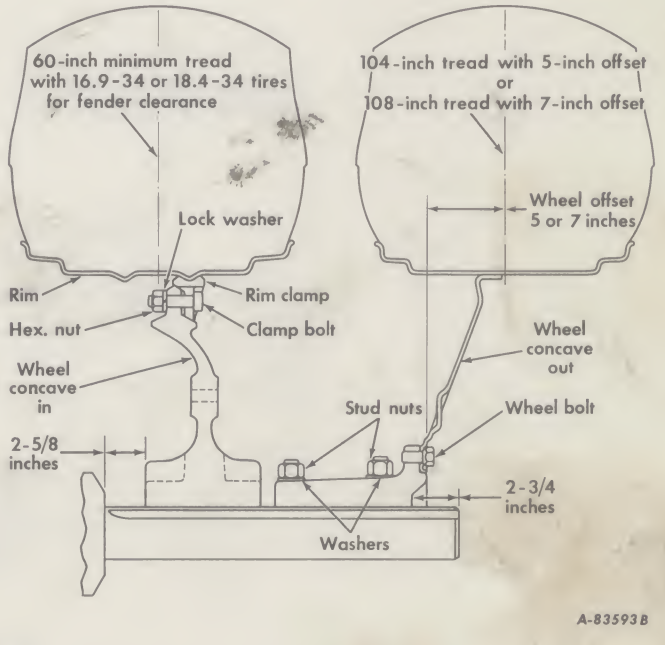
Illust. 91
Mounting diagram for removable disc-type dual wheels with 16.9-38 or 18.4-38 tires on 100-inch axles as set for minimum overall width for plowing with on-the-land type hitch.

DUAL REAR WHEELS

Farmall and International Tractors

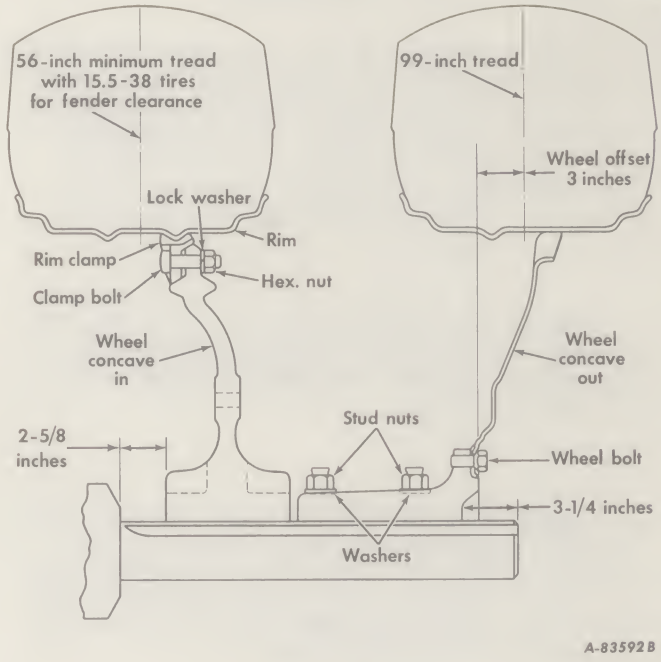
The use of dual rear tires substantially increases ground contact area, which becomes particularly important when operating in loose or sandy soils, or under wet field conditions where traction is difficult. Improved tractor performance can be realized under such conditions, with less soil compaction, because of better flotation or less soil displacement under the tires.

Disc-type wheels and longer rear axles are available on Farmall Tractors to provide dual tire equipment with various tire sizes. The disc wheel and tire assemblies are removable from the hubs, when duals are not required. The wheel and hub settings on the 100-inch rear axles for proper tire clearance and spacing are shown in **Illusts. 91 to 92.** The wheel treads available with dual wheel axles, when the outer wheels and hubs are removed, are shown in **Illust. 88.**

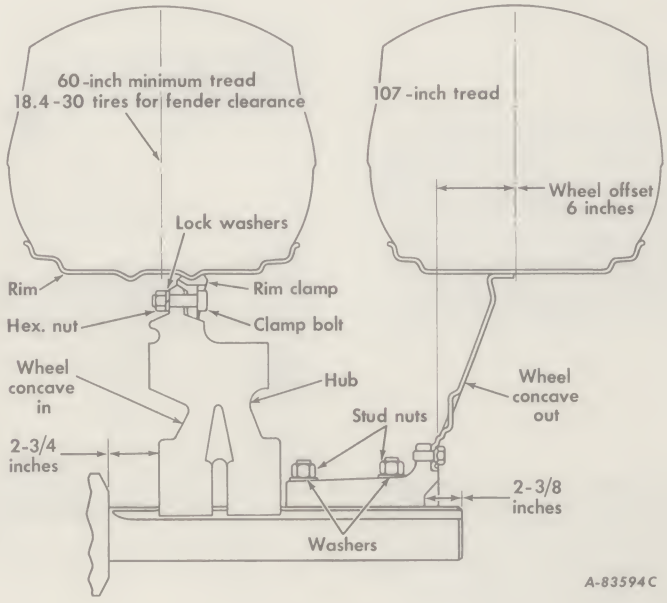


Illust. 91A
Mounting diagram for removable disc-type dual wheels with 16.9-34 or 18.4-34 tires on 100-inch axles as set for minimum overall width for plowing with on-the-land type hitch.

Note: On tractors with 100-inch axles equipped with a cab, set the outer dual wheels with the outer edges of the disc wheel hubs at the ends of the axles. Set the inner wheels to provide a minimum clearance of 4-1/2 inches between cab wall and tire. With 15.5-38 and smaller tires, mount the rims on the inner wheels in position "B" **(Illust. 88)** before setting for cab clearance.



Illust. 92
Mounting diagram for removable disc-type dual wheels, with 15.5-38 and smaller tires, on 100-inch axles as set for minimum overall width for plowing with on-the-land type hitch.



Illust. 92A
Mounting diagram for removable disc-type dual wheels with 18.4-30 tires on 100-inch axles as set for minimum overall width for plowing with on-the-land type hitch.

DUAL WHEELS - Continued

Note: When using the 118-inch axles with dual tires to obtain wider spacing between inner and outer tires, adjust the inner wheels to obtain a minimum acceptable tire clearance to fender or cab. Then adjust the outer wheels to obtain the desired tire spacing. With the inner wheels set to give 66-inch tread from center to center of tires, it is recommended that the center to center tread setting of the outer dual tires be no greater than 126 inches when operating with continuous maximum pulls in third gear, low range or fourth gear, low range with torque amplifier. For the higher speeds, the maximum of 128 or 132 inches may be used for the minimum and maximum offset wheels respectively.

POWER-ADJUSTED REAR WHEELS
Farmall Tractors

The power-adjusted rear wheels can be set at any position within the range of the holes in the rails on the rims by use of tractor power, to provide a variety of wheel tread positions. Wheel treads of 56-inches minimum to 96-inches maximum width may be obtained on tractors with standard rear axles by power-adjusting the wheels and by moving the wheels in or out on the axles.

Tread widths of 56 inches minimum to 120 inches maximum may be obtained when the tractor is equipped with wide tread rear axles, and 64 inches minimum to 116 inches maximum when equipped with heavy duty wide tread rear axles. **Heavy drawbar loads are not recommended with treads wider than 94-inches,** except with heavy duty wide tread rear axles where heavy drawbar loads may be used up to 108-inch tread.

Adjusting the Tread Width

A range of 12-inches with W14L-38 rims is available in two-inch increments at each position of the wheel on the axle by power-adjusting the wheels. **See Illust. 94B.**

Adjust the wheels one at a time as follows:

Loosen the rim from the wheel by loosening the three upper-most adjacent jack screws as shown **in Illust. 93.**

Loosen the screw in the stop at the side of the jack screw toward which the wheel is to be rotated. Move this stop to the new tread position. Then tighten the screw. **See Illusts. 94 and 94A.**

Apply the brake to the wheel which is not being adjusted. To move the right wheel inward or the left wheel outward, operate the tractor in low gear. To move the right wheel outward or the left wheel inward, operate the tractor in reverse gear. Engage the clutch until the jack screw reaches the stop, then disengage the clutch and shift to neutral.

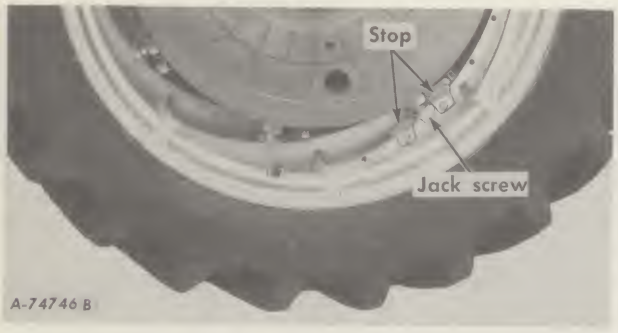
Illust. 93
Loosening rim from wheel.

REAR WHEELS

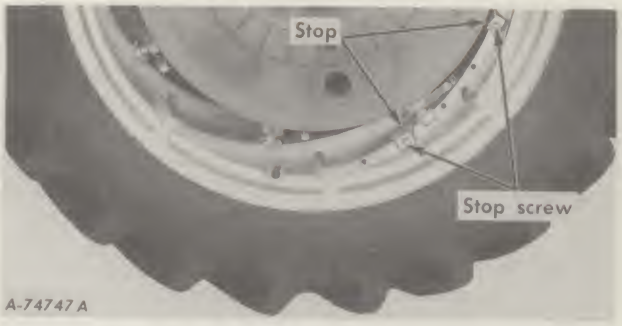
POWER-ADJUSTED REAR WHEELS - Continued

Farmall Tractors - Continued

Adjusting the Tread Widths - Continued



Illust. 94
Jack screw in locked position.



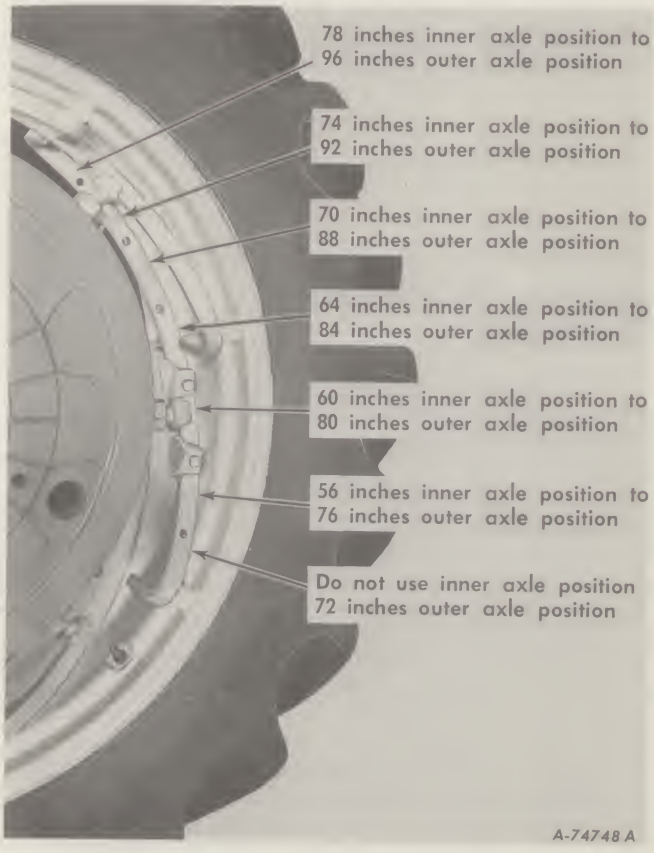
Illust. 94A
Position of stop before power-adjusting the rim.

Loosen the screw in the other stop, then slide the stop over against the newly positioned jack screw, and tighten the stop screw.

Tighten the nuts on the three previously loosened jack screws securely so the rim will be properly centered. Recheck all jack screw nuts for tightness after the tractor has been operated a short time.

Note: In order to avoid interference with the fenders do not set the wheels on the axles closer than 3-5/8-inches from the bearing caps.

Note: When adjusting the rear wheel tread on a tractor equipped with a cab, allow a minimum clearance of 4-1/2-inches between cab wall and tire.



Illust. 94B
Jack screw locations for available power-adjusted rear wheel tread positions.

WEIGHTS

Farmall and International Tractors

Front and rear weights are available to provide safe and efficient operation with various equipment under different conditions. Tillage operations are more efficient and overall cost is less when tractors are operated at a speed range of 3-1/2 to 5-1/2 miles per hour. Allowing for slippage, this means 3rd gear, low range, direct drive, or higher speeds, on your tractor.

This improved efficiency and overall reduction in cost is attained in several ways:

1. Less ground compaction.
2. More work done.
3. Less equipment cost in the form of ballast and tools.
4. Less wheel slippage.

Rear ballast should be added to the tractor, in the tires or on the wheels, to prevent excessive tire slippage and tread wear. The amount of rear weight needed will depend upon the type of soil or operating surface. However, excessive weight is not to be added to the rear wheels to obtain continuous pulls in first or second gears which are greater than the maximum pull obtained in third gear, low range.

FRONT END WEIGHTS

Front end weights are available for use with various equipment combinations. In adding front end weight, consideration must be given to both transport and field operation of the equipment, and whether the tractor is to be operated over hills and on side slopes.

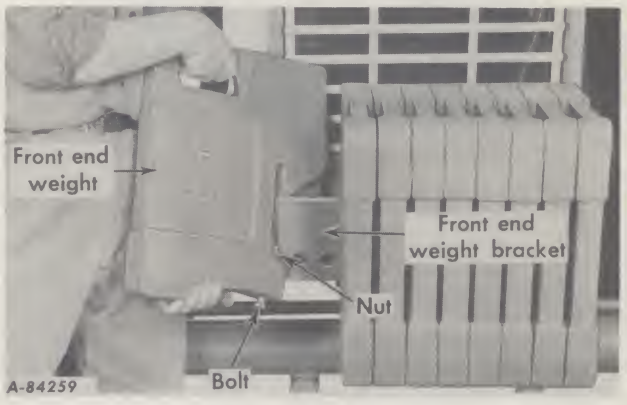
Unnecessary front end weight is a hindrance to efficient operation.

1. Add front end weight for safe transport of mounted equipment with heavy rear overhang or semi-mounted equipment that imposes heavy loads on the hitch lower links.

2. Add front end weight for safe and efficient tractor operation with soil-working equipment which, because of weight, position, method of hitching, or soil condition, causes considerable weight to be transferred from the tractor front end to the drive wheels.

Up to twelve front end weights can be furnished in either the 67 or 100 pound size, which are conveniently installed upon a front mounting bracket.

Assemble the bracket to the front bolster with the four 3/4 x 1-7/8-inch hex. head cap screws. Install the weights at each end of the bracket first; then install the center weights. After putting the weights on the bracket, secure each one with a 1/2 x 4-inch hex. head cap screw and square nut.



Illust. 95
Front end weights.

All-Wheel Drive Tractors

Note: Do not use front end weights or add ballast in the front tires of All-Wheel Drive Tractors, except when necessary for safe and efficient operation under conditions where considerable weight is transferred from the front end to the rear wheels. It is important that a balanced front and rear operating weight distribution be maintained, so that front and rear wheel slippage will be matched and held to a minimum. In most instances added front end weight will not be required, since the front drive axle assembly adds considerable weight to the tractor front end.

FRONT WHEEL WEIGHTS

Either one or two weights, weighing approximately 50 pounds each, can be attached to each front wheel on Farmall 856 Tractors with 7.50-16 or 6.50-16 tires.

The first set of front wheel weights includes a set of two weights and four 1/2NC x 2-inch bolts, nuts, lockwashers and plain washers for attaching the weights to the front wheels at "A". **See Illust. 96.**

A second set of weights can be attached to the first weights by using four 1/2NC x 4-inch bolts, nuts, lockwashers and plain washers at "B". **See Illust. 96A.**

WEIGHTS

Farmall and International Tractors

FRONT WHEEL WEIGHTS - Continued

Illust. 96
First front wheel weight assembled on the tractor.

Before attaching the second front wheel weights, it is necessary to remove two bolts from each first weight and replace them with the longer bolts provided with the second weights. When the second weights are removed, replace the two shorter bolts in each first weight.

Illust. 96A
First and second front wheel weights assembled on the tractor.

REAR WHEEL WEIGHTS (TWO-PIECE)

Two-piece weights are available for tractors with wedge-lock rear wheels having 30, 34, and 38-inch tires. This facilitates mounting weights on the inside of the wheel without having to remove the wheel. Easier mounting is possible since each half weights approximately 75 pounds.

The first set of rear wheel weights is mounted to the 34-inch or 38-inch wheels with eight 3/4NC x 6-1/2-inch bolts, lock washers, hex. nuts, and hex. jam nuts; and to the 30-inch wheel with eight 3/4NC x 9-1/2-inch bolts, lock washers, hex. nuts, and hex. jam nuts. Weights to be mounted to the power adjusted wheels, using eight 3/4NC x 4-3/4-inch bolts, lock washers, hex. nuts, and hex. jam nuts.

The second set of rear wheel weights is mounted to the first set with eight 3/4NC x 3-1/4-inch bolts, hex. nuts, hex. jam nuts, and 16 plain washers for attaching the second set of weights to the first weights.

REAR WHEEL WEIGHTS (ONE-PIECE)

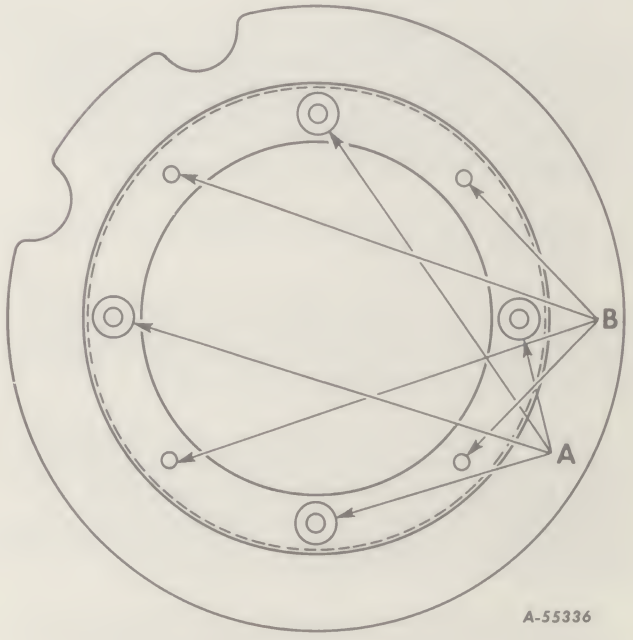
International Tractors

One-piece weights are available for International Tractors with rear wheels having 26-inch tires. These rear wheel weights weigh approximately 145 pounds each and either one or two, or more (as needed) can be attached to each rear wheel.

The first set of weights must be fastened to the rear wheels using eight 5/8NC x 2-3/4-inch square head machine bolts at "A" (Illust. 96B).

A second set of weights must be fastened to the first weights using eight 5/8NC x 2-3/4-inch hex. head cap screws at "B".

Each additional set of weights can be fastened to the previously installed weights, using eight 5/8NC x 2-3/4-inch hex. head cap screws.



Illust. 96B
Wheel weight showing mounting holes.

PNEUMATIC TIRES

Observe the following instructions and recommendations in order to secure maximum life and efficient service from the pneumatic tires.

CARE OF TIRES

Avoid stumps, stones, deep ruts, and other hazards. Cuts in tires should be repaired immediately, as neglect decreases tire life. Keep the tires free from oil and grease, as both destroy rubber. After using the tractor for spraying (insect control work), use water to remove any chemicals that may be on the tires.

INFLATION

Keep the pneumatic tires properly inflated to the pressures shown in the tables **on pages 97 and 98.** Both underinflation and overinflation are detrimental to tire life.

Always see that the tire valve caps are in place and are tightened securely to prevent the loss of air and protect the valve core and stem.

Tires can be inflated with a pressure pump, hand pump, or a spark plug pump. Spark plug pumps can be purchased from International Harvester dealers for use with any carbureted engine to inflate tires.

A-16751C

Illust. 97
Tire pump, hose, and air gauge.

FRONT TIRE INFLATION PRESSURE (Pounds Per Square Inch)

Tire Size	Ply Rating	Code Marking *	Without Ballast in Tires, Front End Weights, or Front-Mounted Equipment	With Maximum Added Front End Weight, or With Front-Mounted Equipment **	Remarks
6.50-16	6	F-2	44	44	Farmall tractors
7.50L-15	8	F-2	36	52	Farmall tractors
7.50-16	6	F-2	36	36	Single tire
7.50-16	8	F-2	36	52	Farmall tractors
7.50-16	10	I-1	56	56	Single tire
7.50-18	6	F-2	32	36	Farmall tractors
7.50-20	6	F-2, F-1	32	36	International tractors
7.50-20	6	I-1	24	32	International tractors
7.50-20	6	F-2	24	36	Farmall tractors
7.50-20	6	F-2	36	36	Single tire
7.50-20	8	F-2	32	52	International tractors
7.50-20	8	I-1	24	40 (1)	International tractors
7.50-24	6	I-1	24	32	International tractors
7.50-24	8	I-1	24	36 (2)	International tractors
9.00-10	10	F-3	52	52	Single tire
9.50-20	8	F-2	20	32 (2)	Farmall tractors ‡‡
9.50-20	8	F-2	24	36 (2)	International tractors ‡
10.00-16	6	F-2, F-1	20	28	International tractors ‡
11.00-16	8	F-2, F-3, F-1	20	24 (3)	Farmall tractors ‡‡
11.00-16	8	F-2, F-3, F-1	20	28 (3)	International tractors
11.2 -24	6	R-1, R-2	20	26	Farmall tractors
11.2 -24	6	R-1, R-2, R-4	22	26	International tractors
12.4 -16	6	R-3	18	22	Farmall tractors ‡‡
12.4 -24	6	R-1	14	22	Farmall tractors
12.4 -24	6	R-1, R-2	16	22	International tractors

* Tire code marking: F-2, regular agricultural triple-rib tread; F-1, single-rib tread; F-3, industrial multi-rib tractor tread; I-1, multi-rib, implement tread; R-1, regular agricultural drive wheel tread; R-2, cane and rice field drive wheel tread.

** Maximum recommended tire pressure: (1) 44 psi; (2) 40 psi; (3) 36 psi.

‡ Also for Farmall tractors with adjustable wide tread front axle.

‡‡ With adjustable wide tread front axle.

PNEUMATIC TIRES

REAR TIRE INFLATION PRESSURES
(Pounds Per Square Inch)

Tire Size	Ply Rating	Code Marking *	Without Ballast in Tires, Wheel Weights, or Rear-Mounted Equipment		With Maximum Recommended Rear End Weight, or With Rear-Mounted Equipment **		Remarks
			Single Tires	Dual Tires	Single Tires	Dual Tires	
13.6-38	8	R-1	None	14	None	16(1)	Farmall tractors
14.9-38	6	R-1	None	14	None	14(2)	Farmall tractors
15.5-38	6	R-1, R-2	None	14	None	14(2)	Farmall tractors
15.5-38	8	R-1, R-2	16	14	24	14	Farmall tractors
15.5-38	8	R-2	18	None	24	None	Hi-Clear tractors
15.5-38	10	R-1, R-2	16	14	30	14	Farmall tractors
16.9-34	6	R-1	None	16	None	16	
16.9-34	8	R-1	16	16	22	16	Farmall tractors
16.9-34	8	R-1	None	16	None	16(3)	International tractors
16.9-38	6	R-1	16	16	16	16	Farmall tractors
16.9-38	8	R-1	16	16	22	16	
18.4-30	6	R-1, R-2	None	16	None	16	International tractors
18.4-34	6	R-1, R-2	16	16	16	16	
18.4-34	8	R-1, R-2	16	16	20	16	
18.4-34	8	R-2	16	None	20	None	Hi-Clear tractors
18.4-38	6	R-1, R-2	16	16	16	16	Farmall tractors
18.4-38	8	R-1, R-2	16	16	20	16	
23.1-26	8	R-1, R-2	16	None	16	None	International tractors
23.1-30	8	R-1, R-4	16	None	16	None	International tractors
23.1-34	8	R-1, R-2	16	None	16	None	
23.1-34	10	R-1, R-2	16	None	16(4)	None	
23.1-36	8	R-2	16	None	16	None	

* Tire code marking: R-1, regular agricultural drive wheel tread; R-2, cane and rice field drive wheel tread; R-4 and grader, industrial lug-type tractor tread.

** Maximum recommended tire pressures: (1) 28 psi; (2) 18 psi; (3) 22 psi; (4) 20 psi.

SHIPPING TRACTORS EQUIPPED WITH PNEUMATIC TIRES

When tractors are transported on a carrier, such as a railroad car or trailer, the rear tires should be inflated up to 30 pounds to make possible rigid blocking and to prevent bouncing. Inflate the front tires to the maximum pressures shown in the table. The higher pressure must be reduced to operating pressure before the tractor is removed from the carrier.

OPERATING PRESSURE FOR LOW-PRESSURE TRACTOR TIRES

Caution! Upon receiving your tractor, immediately adjust the air pressure in the tires as indicated in the tables.

When equipment is mounted on the tractor, the rear wheel tire loads may be increased up to 20 percent with no increase in inflation (as indicated in the tables and speeds do not exceed 10 miles per hour). Tire loads should be calculated to include FULL bins or tanks.

MOUNTING TIRES ON THE RIM

After mounting a new or old tire on the rim, inflate it to thirty pounds pressure to seat the tire bead on the rim flange and to prevent the tire from creeping and shearing off the valve. Then deflate or inflate the tire to the correct operating pressure.

TRACTION AND WEIGHTS

The tractor should not be operated with the tires improperly inflated. To insure the maximum hours of service, watch the tread lugs; if they wear down too fast, immediately add more weight to cut down slippage. Check for high air pressure. Consult your International Harvester dealer for information.

WHEEL WEIGHTS

The drawbar pull of a tractor can be increased by adding cast iron weights to the driving wheels, and by the use of ballast in the tire tubes.

The amount of the increase in drawbar pull by the addition of certain definite weights varies with the type of soil. When very heavy weight is required, both tire ballast and cast iron weights can be used. For maximum recommended weight addition information refer to "Weights" section in this manual.

After adding weight to the rear wheels, it may be necessary to readjust the height of the drawbar to obtain the correct alignment.

OVERLOADING

Do not overload the tractor tires by mounting equipment on the tractor which exceeds the load capacity of the size of the tires on the tractor.

TIRE CHAINS

In wet grass or ground conditions, use lug-type chains. The flexing of the tire and the creeping of chains will break the mud loose as the wheel rotates. **Note:** There is a possibility of the tire slipping within the chain; to prevent this, the use of spring-type chain fasteners is recommended.

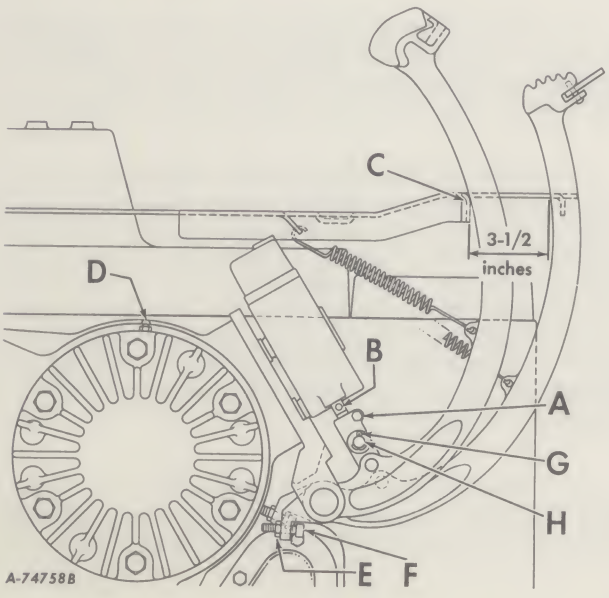
BRAKES

The tractor is equipped with automatic adjusting, self-equalizing power-actuated hydraulic brakes.

The brakes are controlled by foot pedals which can be operated individually, or simultaneously when latched together.

In the event of engine cut-off, brake application is possible. The brakes are not intended for use in parking, or other stationary jobs since normal fluid seepage tends to release the brake. The park lock is provided for this purpose.

BRAKE ADJUSTMENT



Illust. 99
Brake pedal adjustment.

The full travel of the brake pedal when the system is not charged with hydraulic fluid is 3-1/2-inches between the platform and pedal at point "C". **See Illust. 105.** Adjust the brakes as follows:

Remove cotter pin "G" and pin "H" unlock nut "E" and adjust set screw "F" to obtain 3-1/2-inch pedal travel. Lock nut "E", reinstall pin "H" and the cotter pin "G".

ADJUSTING THE HYDRAULIC BRAKE VALVE

To adjust the hydraulic brake valve, loosen cap screw "A" **(Illust. 99)** and turn valve spool "B" until the brake pedal moves away from the platform at point "C" without moving the valve spool. Then turn the valve spool "B" into the yoke just enough to take up the slack in the linkage between the hydraulic brake valve and the pedal, so the valve spool will move as soon as the pedal is moved away from the platform. Then rotate the valve spool "B" an additional 1/4 turn into the yoke and tighten cap screw "A".

BLEEDING THE BRAKES

To bleed the brakes start the engine, then attach a length of hose to the bleeder valve "D", **Illust. 99.** End of tube is to be immersed in a container of Hy-Tran Fluid. With the engine idling push the right brake pedal forward to set brake. Hold pedal in this position and loosen bleeder valve until no more bubbles appear in the fluid in the container. Then close valve "D" securely.

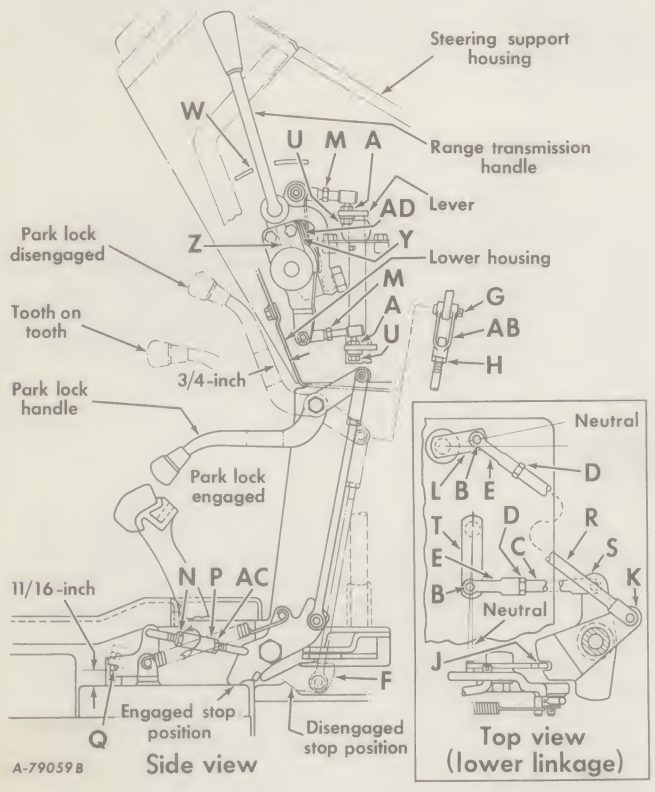
Repeat this procedure for the left brake.

Check brakes for spongy pedal. If this occurs, repeat above instruction.

With the engine stopped, braking takes effect near middle of the pedal travel.

BRAKES

PARK LOCK ADJUSTMENT



Illust. 100
Park lock adjustment.

The park lock should be adjusted after disassembly or an improper adjustment. When the park lock lever is actuated, it should lower to the engaged or park position. If it stops midway, this indicates contact between the pawl tooth and the gear tooth. The lever will drop to the park position when the tractor moves forward or rearward.

1. With the engine stopped, move the transmission range lever to the neutral position.

2. Remove the torque amplifier lever (if the tractor is equipped with torque amplifier) and the steering support housing.

3. Disconnect both upper ball joint linkages at studs "A" (**Illust. 100**). Also remove the two cotter pins and two pins "B". Remove the lower linkages "C" and "R", loosen nuts "D" from clevises "E".

4. Rotate the bellcrank "F" overcenter until it contacts the stop on the support base disengaged position. Remove pin "G" and its cotter pin; loosen nut "H" from clevis "AB". With the park lock lever approximately 3/4-inch from the lower housing (**Illust. 100**) adjust clevis "AB" so pin "G" will pass through. Replace cotter pin and tighten nut "H".

5. Move the park lock lever to the engaged position so that pawl "J" passes through notch in plates "K" and "S". (Rotate plates "K" and "S" to align the notch if necessary). With the lever "L" in the neutral position and pawl "J" centered in the notch of plate "K", adjust the lower reverse transmission linkage "R" by rotating clevis "E" until pin "B" can be freely assembled. Replace the cotter pin and tighten nut "D". With lever "T" in neutral position and pawl "J" centered in notch of plate "S", adjust the HI-LO transmission linkage "C" by rotating clevis "E" until pin "B" can be freely assembled. Replace the cotter pin and tighten nut "D".

6. With the transmission range lever centered in the neutral gate on shift pattern cover "W", position shift hub "AD" and reverse shift hub "Y" to allow pin "Z" in the range lever assembly to enter slots on the hubs freely when the lever is moved from side to side. Adjust both upper ball joint linkages in the following manner: Loosen and back off nut "M", rotate stud end "A" so that it will pass freely through the hole in the lever. While holding stud "A", replace the lockwasher and tighten nut "U" to 11 to 13 foot pounds torque. Tighten jam nut "M" to the same torque.

7. Replace the previously removed steering support housing and torque amplifier lever, (if tractor is equipped with torque amplifier).

8. With the park lock lever in the engaged position, disconnect the park lock actuating spring and also loosen and back off nuts "N" and "AC" (nut "N" has a left hand thread).

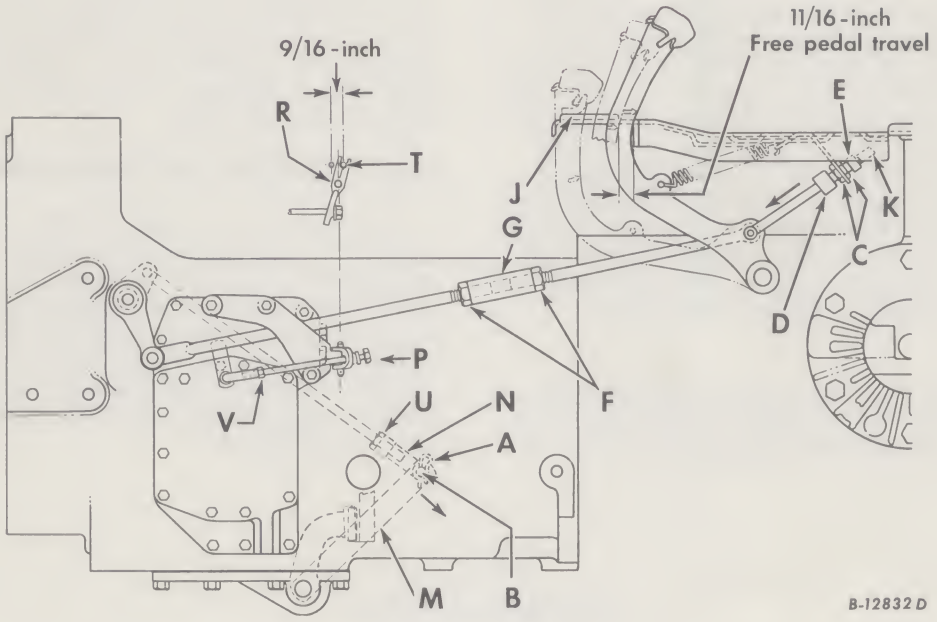
9. With the stop surface on bellcrank "F" contacting the rear frame front cover (engaged position), rock the rear wheel and apply downward pressure to the operating rod by rotating the turnbuckle "P" in the direction of the arrow until finger tight. With the jam nuts "N" and "AC" tightened and the park lock actuating spring connected, a moderate force should be felt at the park lock lever to actuate the bellcrank overcenter.

10. When the park lock is engaged, a dimension of approximately 11/16-inch should exist between the rear frame cover and pin "Q".

11. Check the operation of the park lock lever.

ENGINE CLUTCH

Farmall and International Tractors



Illust. 101
Engine clutch and torque amplifier dump valve adjustments.

The engine is equipped with a spring-loaded, 12-inch diameter, dry-disc clutch.

As a result of normal clutch facing wear, the free travel between the clutch release levers and the release bearing is reduced. Lack of clearance causes overheating of the clutch, and early replacement of clutch facing.

Check the clutch for free movement after every 250 hours of operation until the proper inspection interval is determined according to usage. Check the free movement thereafter, as required, to provide proper clearance between the clutch release bearing and the clutch release levers.

CARE OF THE ENGINE CLUTCH

The engine clutch is designed so that it requires a minimum of attention. It is important, however, that a clearance of approximately 3/16-inch be maintained between the engine clutch release bearing and the engine clutch release levers. Also, the clutch release shaft and release bearing should be lubricated at proper intervals as instructed in the "Lubrication Guide".

ENGINE CLUTCH ADJUSTMENT

In order to maintain this clearance, remove cotter pin "A" and pin "B" **(Illust. 101)** disconnect the transmission brake operating rod. Adjust the clutch pedal free travel by loosening nuts "F"; adjust turnbuckle "G" until pedal travel of 11/16-inch is obtained, then tighten nuts "F" securely. This will provide 5/64-inch running clearance for clutch discs. Repeat the entire adjustment when pedal has free travel of 3/8-inch.

Note: If "gear clash" is experienced the clevis may be turned out one to one-and-one-half turns to reduce engagement time.

ENGINE CLUTCH

Farmall and International Tractors

TRANSMISSION BRAKE ADJUSTMENT

Depress the clutch pedal until stop lug "J" on the clutch pedal strikes the platform. **See Illust. 101.** Holding the pedal in this position, move lever "M" in the direction of the arrow as far as possible. Adjust clevis "N" until pin "B" can be freely inserted through clevis "N" and hole in lever "M". Remove pin "B" and turn clevis end out one-half turn to lengthen the rod and then tighten nut "U". Release the clutch pedal. Reinsert pin "B" through clevis "N" and hole in lever "M". Then replace cotter pin "A". This procedure should be repeated each time the engine clutch is adjusted.

Note: If hard shifting is experienced, the clevis may be turned out one to one-and-one-half turns to reduce the engagement time.

TRACTORS WITH TORQUE AMPLIFIER

To locate the dump valve, depress the clut clutch pedal until stop lug "J" on the clutch pedal strikes the platform. Loosen jam nut "V" and turn the dump valve operating screw "P" until lever "R" positions the dump valve pin "T" in 9/16-inch extended position. Secure jam nut "V" to the clevis. This adjustment should be repeated each time the clutch linkage adjustment is made.

SAFETY STARTING SWITCH ADJUSTMENT

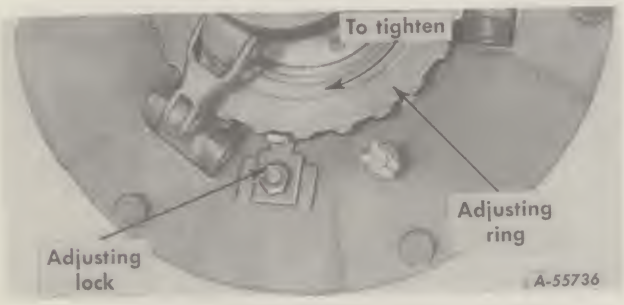
Loosen nuts "C" **(Illust. 101)** on the safety switch bracket and move switch "D" in the direction of the arrow until nut "C" strikes boot "E". Depress the clutch pedal until stop lug "J" on the clutch pedal strikes the platform. With the pedal in this position, adjust safety switch "D" until the plunger is depressed 1/8-inch by operating lever "K", then tighten nuts "C" securely.

International Tractors

CARE OF THE OVERCENTER, HAND-LEVER OPERATED ENGINE CLUTCH

These clutches are designed to require only a minimum amount of attention. However, adjustment must be made when the engine clutch slips. This condition is apparent by a low engagement effort for the overcenter clutch. It is also important to follow the lubrication instruction given in the "Lubrication Guide".

ADJUSTING THE OVERCENTER HAND LEVER ENGINE CLUTCH



Illust. 102
Adjustment of the overcenter clutch.

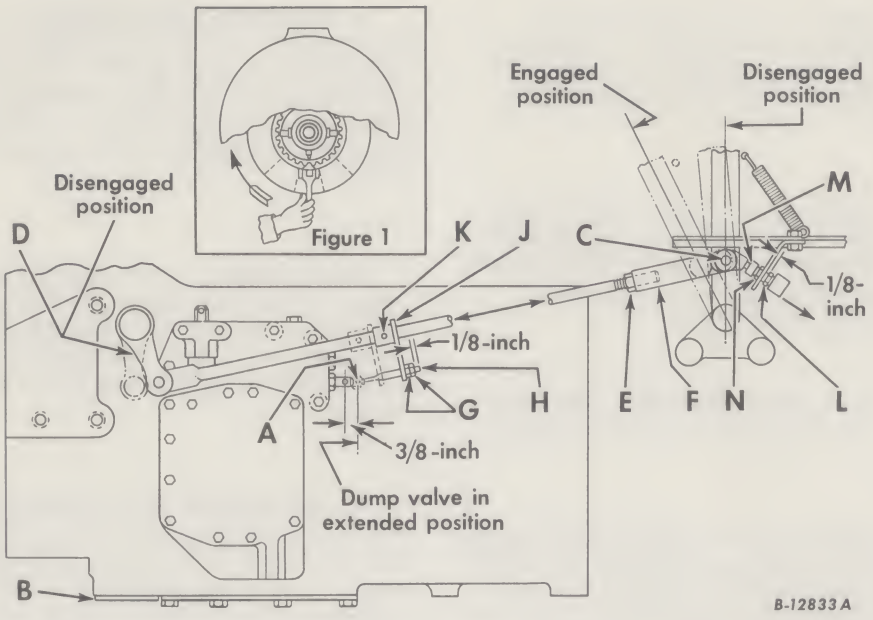
Caution! Adjust the clutches with the engine stopped. Be sure that the cable is pulled out of the center coil terminal on the (gasoline engine) and the governor control handle is in the shut-off position and the ignition key turned off on the (diesel engine).

With the clutch handle in the disengaged position, remove pin "A". **See Illust. 103.**

Remove the clutch compartment bottom cover "B" **(Illust. 103)** from underneath the front portion of the clutch housing. Turn the engine with the cranking motor until the overcenter clutch adjusting lock is accessible. **See Illust. 102.** Loosen the hex. nut and move the adjusting lock away from the adjusting ring. Turn the adjusting ring **(Illust. 102)** in a clockwise direction, as viewed from the rear of the clutch, until 30 to 40 pounds of engagement effort are required at the hand lever to engage the clutch. This may require turning the ring from two to four notches, depending on the service involved. Each notch will produce about two pounds change in the engagement effort. Put the lock back into position and tighten the nut. Replace the clutch compartment bottom cover.

Repeat overcenter clutch adjustment when slippage occurs.

When the engine is running, the engagement effort will be approximately ten pounds less than it is with the engine stopped.



Illust. 103
Overcenter clutch and controls adjustments.

Overcenter Clutch Linkage Adjustment

The overcenter clutch control linkage adjustment should be repeated each time the engine clutch is adjusted. To adjust the linkage, remove pin "C" from clevis "F" and loosen nut "E". While holding the clutch operating lever "D" and the clutch operating handle to the extreme rear position, adjust clevis "F" (see note) until pin "C" can be inserted freely through clevis "F" and handle while the handle and lever "D" is in extreme position.

Note: To disengage clevis "F" from handle, move lever "D" to the engaged position and move the handle against the rear stop. This will provide clearance to rotate clevis "F" for adjustment of rod length.

Tractor Equipped With Torque Amplifier

With the overcenter clutch handle in the disengaged position, loosen nuts "G" and set screw "K". Extend the dump valve 3/8-inch as indicated. With pin "A" in the extended position of 3/8-inch secure nuts "G" approximately 1/8-inch from the end of pull rod "H" as shown in **Illust. 103.** Secure lever "J" against nuts "G" and secure set screw "K".

Safety Starting Switch Adjustment

Loosen nut "L" **(Illust. 103)** on the safety switch then move the switch in the direction of the arrow until nut "N" strikes boot "M". With the clutch control handle located against the rear stop, position the switch to contact the pad on the control handle. Then adjust nut "L" 1/8-inch from the bracket as shown. Tighten nut "N" on switch, securely to the bracket.

STORING THE TRACTOR

STORAGE

When your tractor is not to be used for some time, it should be stored in a dry and protected place. Leaving your tractor outdoors, exposed to the elements, materially shortens its life.

Follow the procedure outlined below when your tractor is placed in storage, and repeat steps 1, 4, and 6 every six months thereafter. Also caution must be used when starting an engine that has been in storage.

1. Wash or clean and **completely** lubricate the tractor. See "Lubrication Guide" **on pages 121 to 126.**

2. Run the engine long enough to thoroughly warm the oil in the crankcase before draining the oil. Remove the oil filter element or elements (diesel engine). (If any evidence of rust is found on the retaining bolt, clean it thoroughly). Replace the oil filter element with a new one and flush out any sludge from the filter base. Refill the crankcase with fresh oil and run the engine from two to five minutes.

3. **Gasoline Engine:** Drain the fuel from the fuel tank and carburetor, and clean out the fuel strainer sediment bowl.

Note: Gum will eventually form in the fuel tanks, lines, and carburetor if the unit is not used. Gum in carburetor jets and passages affects engine starting. Gum can be dissolved with acetone or a 50-50 mixture of alcohol and benzol.

LP Gas Engine: Start and run the engine until the engine stops from lack of fuel.

Diesel Engine: Drain all the fuel from the fuel tank. Completely fill the fuel tank with Grade 1 diesel fuel. Run the engine for several minutes to distribute the fuel throughout the system.

4. **Gasoline or LP Gas Engines:** After the engine has cooled, remove the spark plugs and pour one tablespoonful of SAE-30 lubricating oil of good quality into each cylinder. Crank the engine two or three times to distribute the oil over the cylinder walls. Then replace the spark plugs.

Diesel Engine: Remove the nozzle bodies. Spray about one ounce of SAE-30 oil into each cylinder, then crank the engine two or three revolutions. Clean the gasket seats and install new gaskets, when reinstalling the nozzle bodies.

5. **Gasoline, LP Gas or Diesel Engines:** Drain the entire cooling system by opening the drain cock (on the right side of the gasoline and LP Gas engines) (on the left side of the diesel engine) and open the radiator drain cock on the radiator and fuel regulator on LP Gas engines.

When draining the cooling system, be sure to drain the diesel engine oil cooler **(Illust. 114B)** by opening the water drain cock at the bottom of the oil cooler header.

Drain the water from the regulator on the LP Gas engine by opening the water drain cock at the bottom of the regulator.

6. Clean and remove the valve cover, then slush the valves, rocker arms, and push rods with SAE-30 oil. (If any evidence of rust is found, remove it before lubricating.) Use a paint brush to coat the inside of the valve housing cover with SAE-30 lubricating oil. Replace the valve housing cover. The engine must not be run after the slushing operation.

7. Plug up the end of the breather pipe and exhaust pipe.

STORAGE - Continued

8. Remove the battery or batteries and place them in a cool, dry place above freezing (+32°F.). Check the battery or batteries at least once a month for water level and specific gravity.

9. Block or tie the clutch pedal in the disengaged position. This will keep the clutch facing from sticking to the flywheel or clutch pressure plate.

10. If your tractor is stored with the muffler and weather cap installed, the weather cap lid must be taped shut or if the muffler is stored separately, the exhaust pipe opening must be covered to prevent excessive moisture from entering the exhaust pipe.

11. Store the tractor so the tires are protected from light. Before storing the tractor, clean the tires thoroughly. Jack up the tractor so the load is off the tires, when it is to be out of service for a long period. If not jacked up, inflate the tires at regular intervals.

REMOVING FROM STORAGE

1. Remove the valve cover and slush the valve and valve operating mechanism with a mixture of one-half kerosene and one-half SAE-10W engine oil.

Omit steps 2, 3 and 15 if performed before the tractor was stored.

2. Drain the crankcase and flush out with kerosene or flushing oil and fill with the specified lubricating oil. See the "Lubrication Guide".

3. Be sure the lubricating oil filter has a new element before starting the engine.

4. Remove the crankcase breather pipe plug and the exhaust pipe plug.

5. Fill the cooling system. Be sure the cooling system has a rust inhibitor added to the coolant.

6. Install fully charged battery or batteries and be sure the proper connections are made.

7. Fill the fuel tank (gasoline engine).

8. Release the clutch pedal.

9. Before driving the tractor, inflate the tires to the correct operating pressures.

10. Remove the tape from the weather cap or exhaust pipe. If removed, reinstall the muffler.

11. **Gasoline or LP Gas Engines:** Remove the spark plugs and pour a mixture of one-half gasoline and one-half light lubricating oil into each cylinder; one ounce (two tablespoonfuls) per cylinder is enough.

Crank the engine rapidly until excess oil has been blown out of the spark plug holes. This operation will loosen any tight piston rings and wash old, gummy oil from valves and pistons.

12. Install the spark plugs after cleaning and setting the gaps.

Caution! Keep the doors wide open or move the machine outside the storage room immediately to avoid danger from exhaust fumes. Do not accelerate the engine rapidly, or operate it at high speed immediately after starting.

13. Start the engine and let it run slowly. If any valves are sticking, pour a small quantity of diesel fuel or kerosene on the valve stems until free.

14. Install the valve cover.

15. Clean the air cleaner.

COLD WEATHER PRECAUTIONS

When operating the tractor in temperatures of +32 degrees F. or lower, observe the following precautions:

FUEL SYSTEM

Use only a winter-grade fuel for ease of starting, and keep your supply in a closed container so the more volatile portions do not evaporate.

Fill the fuel tank at the end of the day's run to prevent condensation in the tank.

LUBRICATION

Be sure to use lubricant of the correct viscosity in the engine crankcase as specified in the "Lubrication Table".

COOLING SYSTEM

When the temperature is likely to be +32 degrees F. or lower, there is danger of the water freezing in the cooling system. To prevent this, use IH permanent type antifreeze.

Draining and refilling the Cooling System

If antifreeze is to be used:

1. Inspect the hose connections. They must be in good condition both inside and out. Then tighten all water connections.

2. Inspect the water pump for leaks.

3. Inspect the fan belt and adjust it, if necessary, to the proper tension. If the belt is worn or oil-soaked, install a new one.

4. Open the radiator drain cock and open the crankcase water drain cock on the right side of the gasoline and LP Gas engines; and the crankcase water drain cock on the left side of the diesel engine.

When draining the cooling system on diesel engines, be sure to drain the engine oil cooler **(Illust. 114B)** by opening the water drain cock at the bottom of the oil cooler header. On LP Gas tractors, drain the water from the regulator **(Illust. 15)** by opening the water drain cock at the bottom of the regulator.

See that the drains are not clogged and that the water drains completely. Then close the two drain cocks and the drain cock on the engine oil cooler header. Close the drain cock at the bottom of the engine oil cooler on diesel engines or the regulator on LP Gas engines.

5. Check to be sure that the radiator drain cock and the crankcase drain cock (on the right side of gasoline and LP Gas engines or left side of diesel engine) are tightly closed, also the engine oil cooler drain cock on diesel engines and the regulator drain cock on LP Gas engines. Then fill the cooling system, as follows:

Put the required amount of IH permanent type antifreeze into the cooling system as instructed on the container. Add sufficient clean water (use soft or rain water if possible) to a level approximately 2 inches above the radiator core. See "Specifications" **on page 130** for the cooling system capacity. Start the engine and run it until operating temperature is reached to permit the thermostat to open and allow the antifreeze and water to mix thoroughly. After the engine is warm, check the coolant level in the radiator, and if necessary, add water to bring it up to the proper level.

6. Check the cooling system for leaks, paying special attention to the hose connections.

Antifreeze Solutions

The use of alcohol as an antifreeze is not recommended because denatured alcohol boils at +173 degrees F.

Note: Use only one type of antifreeze solution. Do not mix solutions, as it will be difficult to determine the exact amount of protection.

Never use any of the following in the cooling water as an antifreeze - honey, salt, kerosene, fuel oil, glucose or sugar, calcium chloride, of any alkaline solution.

TROUBLE SHOOTING

Mechanical Problems and their Probable Cause

If any trouble is experienced, make sure of the cause before attempting to make any adjustments. When making an adjustment, keep in mind the previous setting in case the adjustment doesn't solve the problem.

Possible Cause	Possible Remedy
HARD TO START	
No fuel in the tank or carburetor (gasoline engine)	Fill the tank with fuel; open the fuel shut-off valve. Check the fuel lines, fuel strainer, and carburetor.
No fuel in tank (LP Gas engine)	Fill the tank with fuel; open the vapor service valve; check the fuel filter, carburetor and regulator. **See pages 15 to 19.**
Fuel strainer or fuel lines clogged	Clean the fuel strainer, check the fuel lines and carburetor.
Fuel filter clogged (LP Gas and diesel engines)	Replace the fuel filter; for LP Gas engine, **see page 18,** and for diesel engine, **see page 23.**
Water in the gasoline (gasoline engine)	Drain the fuel tank and carburetor. Use new fuel and dry the spark plugs. *
Water in the fuel (diesel engine)	Drain the fuel tank; then fill the fuel tank with clean fuel, open the fuel shut-off valve. Then vent the fuel system. **See pages 20 and 21.**
Water in the cylinders	Check the cylinder head gasket.
Engine speed control lever not advanced. Flooded engine.	Follow the starting instructions; for gasoline engine, **page 13** for LP Gas engine, **page 17** and for diesel engine, **see page 21.**
Defective ignition or loose wiring (gasoline and LP Gas engines)	Check the wiring, plugs, distributor and coil and safety starting switch, etc. **See pages 60 to 63, and 64 to 67.**
Defective battery or cranking motor	Check and service; **see pages 66 and 67** or replace. *
Spark plugs dirty; wrong gap or wrong type.	Clean, reset the gaps, or replace. **See pages 61 and 62.**
Lack of compression	Check the cylinder head gasket. *
Flywheel ring gear teeth broken	*
Lubricating oil of too high viscosity	Drain and refill with proper lubricant. See the "Lubrication Table" **on page 120.**
Gears engaged	Put the range lever in the neutral position.
Internal seizure	*
Carburetor fuel shut-off valve inoperative (gasoline engine)	With the ignition switch on, by breaking and making electrical connections at the carburetor you should be able to hear the valve click. If not then remove and check the wiring and valve.
Safety starting switch	Check switch operation.
ENGINE OPERATES IRREGULARLY OR KNOCKS	
Engine incorrectly timed	Retime. *
Spark plugs dirty; wrong gap or wrong type.	Clean, reset the gaps, or replace. **See pages 61 and 62.**
Poor or weak spark (gasoline and LP Gas engines)	Check the distributor and coil unit, spark plugs, and wiring.
Injection nozzles dirty or stuck (diesel engine)	Use clean fuel. *
Injection nozzles leaking (diesel engine)	*

Continued on next page.

* See your International Harvester dealer.

Possible Cause	Possible Remedy
ENGINE OPERATES IRREGULARLY OR KNOCKS - Continued	
Combustion knocks (diesel engine)	*
Carburetor setting incorrect (gasoline and LP Gas engines)	Adjust; see "Carburetor" see pages 14 and 18.
Injection pump out of time (diesel engine)	*
Poor grade fuel or water in fuel	Drain and use a good grade of clean fuel.
Engine overheating	Check the cooling system and fan belt; adjust the radiator shutter if used; see "Engine Overheats" on page 109.
Engine valves at fault	Check the valve clearance. See pages 77 and 78.*
Air leaks around intake manifold	Check the gasket and tighten the nuts.
Air intake restricted	Service the air cleaner.
Air in fuel lines (diesel engine)	Check connections and vent the fuel system.
Engine smokes (gasoline and LP Gas engines)	Check the fuel delivery at the carburetor. Check for worn piston and rings. *
Engine smokes (diesel engine)	Engine overloaded. Reduce the load. Check the lubricant used. Check the injection pump timing. See smoke table on page 22. *
Excessive carbon in the engine	*
Loose piston pin or bearings	*
Broken rings or loose pistons	*
Worn connecting rod and main bearings	*
Governor sticking or needs adjustment (gasoline and LP Gas engines)	Adjust; See "Governor Adjustment" on pages 79 and 80. *
Injection pump governor out of adjustment (diesel engine)	Adjust; See "Engine Speed Control Lever Linkage Adjustment" on page 81.
LACK OF POWER	
Engine speed control lever not advanced	Advance the engine speed control lever.
Engine cold or overheated	Run the engine until warm before putting it under load. Check the cooling system. *
Engine overloaded	Reduce the load.
Engine knocks excessively	Use good fuel; also check the timing. *
Governor not working properly	See "Governor Adjustments" on pages 79 to 81.
Poor compression	Service the valves and piston rings. *
Injection nozzle valves dirty or stuck (diesel engine)	* Use clean fuel.
Poor fuel or too lean a mixture (gasoline and LP Gas engines)	See "Carburetor" on pages 14 and 18.
Poor fuel (diesel engine)	Use correct fuel; see the "Lubrication Table" on page 120.
Fuel lines or strainer obstructed (gasoline engine)	Clean; see page 13.
Fuel filter obstructed (diesel engine)	Replace filter; see page 23.
Fuel filter clogged (LP Gas engine)	Replace element; see page 18.
Air in fuel lines (diesel engine)	Check connections and vent the fuel system.
Fuel tank air vent closed (gasoline and diesel engines)	Open the vent in the cap.
Exhaust pipe clogged	Clean out.
Air cleaner clogged or air leakage between carburetor and engine (gasoline and LP Gas engines)	Clean the air cleaner as instructed on pages 58 to 59. Tighten the carburetor and manifold mounting nuts.

* See your International Harvester dealer.

Possible Cause	Possible Remedy
LACK OF POWER - Continued	
Oil of too high viscosity in crankcase.	Drain and refill with proper lubricant. See the "Lubrication Table" on page 120.
Incorrect timing or faulty ignition (gasoline and LP Gas engines).	Retime. *
Incorrect timing of the injection pump (diesel engine)	*
Clutch slipping or oil on the facings.	Adjust the free travel, replace the facings. *
Brakes drag	Adjust the hydraulic brake valves: see pages 99 and 100.
Carburetor intake manifold or cylinder head intake ports restricted by carbon (gasoline and LP Gas engines)	Clean. *
ENGINE OVERHEATS	
Cooling system clogged or limed.	Clean the system; see pages 54 and 55. *
Fan belt slipping	Adjust or replace the belt; see pages 55 and 56.
Insufficient water in cooling system.	Fill the radiator to the proper level; see pages 53 and 54.
Thermostat not functioning.	Install a new thermostat of the correct range.
Radiator cap not pressure-tight	Screw the cap on tight or replace with a new cap.
Radiator cores clogged	Remove all chaff or dirt from the radiator grille; clean with forced air or water also between the oil cooler fins and the radiator, behind the cooler.
Wrong kind of fuel	Change to a correct grade of fuel.
Carburetor improperly set (gasoline and LP Gas engines).	See "Carburetor" on pages 14 and 18.
Engine timing incorrect (gasoline and LP Gas engines).	Retime. *
Incorrect timing of the fuel injection pump (diesel engine)	*
Breaker point opening incorrect (gasoline and LP Gas engines).	Adjust the opening; see "Distributor" on pages 62 and 63.
Excess load.	Reduce the load .
Excess carbon in engine	*
Heat indicator defective.	Replace the gauge cluster.
NO OIL PRESSURE (Tellite goes on)	
Wrong viscosity, diluted or insufficient oil . . .	See the "Lubrication Table" on page 120. Check the oil level; if diluted, replace with fresh oil.
Broken, loose, or plugged oil lines	Clean and tighten. *
Low oil level in crankcase	Add oil; see "Lubrication Guide". Check for an oil leak.
Defective or dirty oil pressure regulating valve	*
Oil pump strainer clogged or pump not working	Clean. *
Worn bearings	*

*** See your International Harvester dealer.**

Possible Cause	Possible Remedy
OIL DILUTION OR USES TOO MUCH OIL	
Oil of incorrect viscosity	See the "Lubrication Table" on page 120.
Leaks in oil lines or filter or in oil pan plug or gasket	Check and tighten. *
Worn piston or oil rings	*
Loose connecting rod bearings	*
Long engine idling	Stop the engine.
Engine overheating or too cold	See "Lack of Power" and "Engine Overheats" on pages 108 and 109.
Engine speed too high	See "Governor" on pages 79 to 81.
Crankcase breather pipe clogged	Clean; on page 60.
USING TOO MUCH FUEL	
Fuel mixture too rich. Carburetor out of adjustment (gasoline and LP Gas engines)	Check choke and see "Carburetor" on pages 14 and 18.
Fuel leaks	Tighten or replace the fuel lines or fuel strainer gasket.
Poor grade of fuel	Use a correct grade of fuel.
Choke closed (gasoline engine)	Investigate for the choke not operating.
Engine overloaded	Reduce the load or shift to a lower speed.
Poor compression	*
Faulty ignition (gasoline and LP Gas engines)	See page 63.
Engine not operating at proper temperature	Check the cooling system. Check the lubricating oil. *
Air cleaner clogged	Service the air cleaner; see pages 58 to 59.
Wrong viscosity or amount of lubricating oil	See the "Lubrication Table" on page 120 and keep the oil up to the proper level.
Fuel injection nozzle not operating properly (diesel engine)	*
Injection pump timing incorrect (diesel engine)	*
ENGINE STOPS	
Fuel low in tank	Fill the fuel tank and check the fuel lines.
Restriction in fuel flow	Check the lines for obstructions or breaks gasoline engine, clean the fuel strainer and sediment bowl; LP Gas engine, replace the fuel filter; diesel engine, replace the fuel filters, if necessary, and vent the fuel system.
No fuel being delivered	Check the fuel system; for gasoline engine, pages 12 to 14 for LP Gas engine, pages 15 to 19 and for diesel engine, pages 19 to 23.
Air vent hole in fuel tank cap plugged up (gasoline and diesel engines)	Clean out the vent hole.
Fuel shut-off valve closed or partly open (gasoline and diesel engines)	Open the valve; see the starting instructions; for gasoline engine, page 13 and for diesel engine, page 21.
Dirty or clogged fuel strainer screen or line (gasoline engine)	Clean as instructed; See page 13.
Injection nozzle inoperative (diesel engine)	Use clean fuel. *
Faulty timing of the injection pump to the engine (diesel engine)	*

* See your International Harvester dealer.

Possible Cause	Possible Remedy
ELECTRICAL	
Wrong kind, oily, cracked, dirty, or poorly set spark plugs (gasoline and LP Gas engines) . .	Clean and set the gaps as instructed **on pages 61 and 62** for gasoline engine, .023-inch, for LP Gas engine, .015-inch or replace with new plugs.
Loose wiring or improper connections	Check the wiring to see that all connections are clean and tight; **see pages 68 to 76.**
Distributor not timed correctly (gasoline and LP Gas engines)	Retime. *
Distributor cap, rotor, or breaker chamber dirty (gasoline and LP Gas engines)	Clean as instructed **on pages 62 and 63.**
Breaker points dirty, pitted, or improperly set (gasoline and LP Gas engines)	Clean and reset the opening or replace with new points; **see pages 61 and 62.**
Breaker arm stuck, weak, or broken spring (gasoline and LP Gas engines).	Check and replace; **see pages 62 and 63.**
Battery defective, low charge, or loose connections	Recharge, clean, and tighten the cable lugs or replace; check the ground strap; **see pages 66 and 67.**
Cranking motor failure	Replace. *
Alternator-generator inoperative	*
Voltage regulator not functioning properly	*
Alternator-generator Tellite inoperative	Check the wiring. Replace the Tellite bulb.
Alternator-generator Tellite bulb remains on .	Check the battery and alternator-generator; check the drive belts and wiring.
Lights will not burn	Check the battery ground strap. Turn on the switch; replace the headlight sealed beam units, combination rear light sealed beam unit, tail light lamp, instrument lamps, or fuse; recharge the battery; check the wiring. *
Lights burn dim	Turn the switch to bright. Recharge the battery, tighten the cable terminals, check the headlight sealed beam units, combination rear light sealed beam unit, tail light lamp, instrument lamps, alternator-generator, and clean the contacts.
WHITE SMOKE (Indicates misfiring) (diesel engine)	
Low engine temperature	Check thermostat, increase engine temperature.
Faulty injectors	*
Poor fuel	Drain and refill with fuel as recommended in "Diesel Fuel specification Table" **on page 19.** *
Poor compression	See "Engine Operates Irregularly or Knocks"
Injection pump timing incorrect	*

* See your International Harvester dealer.

Possible Cause	Possible Remedy
BLUE SMOKE (Indicates high oil consumption) (diesel engine)	
Worn or stuck rings	See "Oil Dilution" or "Uses Too Much Oil".
Low coolant temperatures	Check thermostat, increase engine temperature.
HEAVY BLACK SMOKE (diesel engine)	
Excessive fuel rate	*
Overloading engine	Reduce load.
Restriction in air supply	Clean air cleaner.
Low coolant temperature	Check thermostat, increase engine temperature.
BRAKES	
Do not hold	Adjust the hydraulic brake valves (pages 99 and 100) or new lining needed. *
Oil on lining	Replace the lining. *
Pedal return spring broken	Replace.
Spongy brakes	Bleed brakes. See page 99.
TRANSMISSION, BELT PULLEY, AND POWER TAKE-OFF	
Engine clutch drags	See "Lack of Power" on pages 108 and 109.
Gears clashing	Stop the tractor and disengage the clutch before shifting the gears. (Adjust the transmission brake on tractors with clutch pedal only - not overcenter clutch.)
Gears slipping out of mesh	*
Noisy	Check the oil level; use lubricant of the proper viscosity. *
Damaged parts	*
REAR WHEELS	
Do not rotate	Release the park lock. Transmission, differential, or clutch faulty. See the transmission section above. *
FRONT WHEELS	
Too tight or too loose	Check the lubricant in the bearings, check the bearing adjustment; see page 119.
Lubricant leakage	Check the oil seal. *

* See your International Harvester dealer.

Possible Cause	Possible Remedy
STEERING	
Faulty	Check the tire inflation. *
Defective front axle	Inspect the linkage, check and replace faulty parts. *
Tractor turns to one side.	Check and adjust the hydraulic brake valve; see page 99. Check the pneumatic tire air pressures.
PNEUMATIC TIRES	
Excessive or uneven wear	Check toe-in; Check the air pressure and load on the tires.
Slippage, rear tire	Add more weight, and check for high air pressure; see pages 97 and 98. If the tread is badly worn, the tires slip more readily. Replace with new tires or use lug-type chains.
HYDRAULIC SYSTEM AND HYDRAULIC REMOTE CONTROL	
Noisy pump, pump laboring, unsteady pressure.	Air in system. Check and free the system of trapped air; see page 45. *
Fails to lift or lower properly	Fluid filter clogged. Clean the filter; see page 118.

* See your International Harvester dealer.

LUBRICATION

The life of any tractor depends upon the care it is given. Proper lubrication is a very important part of that care.

Tractors shipped to destination in United States of America, Canada, and Mexico, have the engine crankcase filled with oil. Refer to "Engine Oil", the "Lubrication Guide", and the "Lubrication Table" for proper oil and service information.

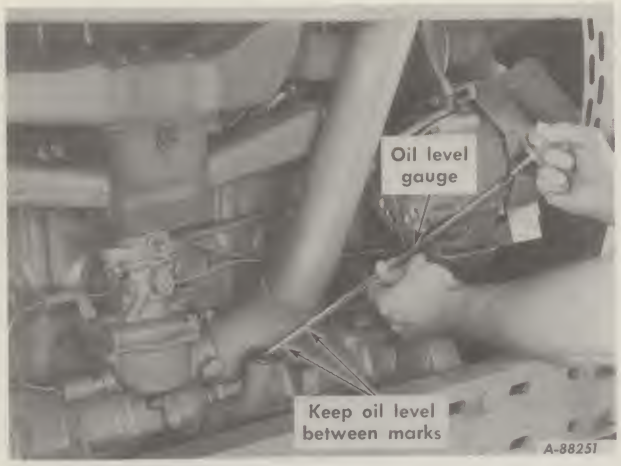
Gasoline and LP Gas engines have the crankcase filled with low ash shipaway oil. This oil may be used for the first 100 hours of engine operation at prevailing ambient temperatures from ten degrees below zero to ninety degrees above zero Fahrenheit. **Note:** This oil is not to be diluted with kerosene for cold weather operation.

Drain the shipaway oil from the diesel engine crankcase before placing the engine in use and replace it with the required amount of fresh oil having the physical properties and proper viscosity for the prevailing temperature. Refer to "Engine Oil" and the "Lubrication Table" and the "Lubrication Guide".

The engine has a pressure-feed lubrication system. A gear-type oil pump circulates the lubricating oil under pressure to the crankshaft bearings, connecting rod bearings, camshaft bearings, valve mechanism, and timing gears, thereby assuring positive lubrication of all parts.

The engine oil pressure Tellite indicates whether lubricating oil is circulating through the engine. Refer to page 65 for further information.

The gasoline and LP Gas engines are equipped with an oil filter which continually cleans the oil while the engine is running. The diesel engine is equipped with two oil filters. To obtain the full benefit from the filter, replace the used element with a new one every second time the oil in the crankcase is changed. After every 200 hours of operation). Cleaning the old element is not satisfactory.

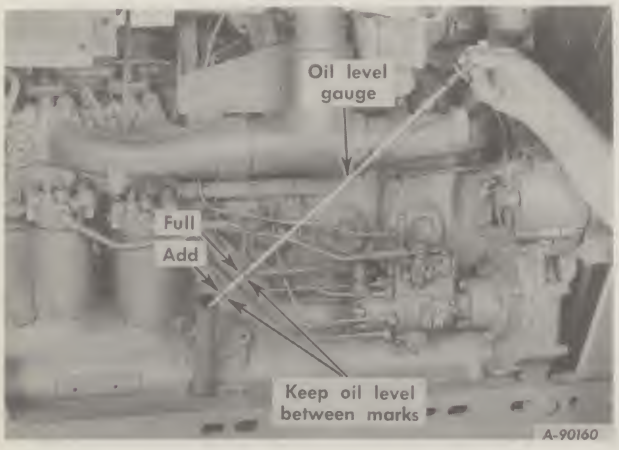


Illust. 114
Crankcase oil level gauge. (gasoline and LP Gas engines).

To check the oil level, remove the cap with the level gauge from the oil filler tube by turning the crosspiece counterclockwise to loosen it and then pulling out the gauge. The oil level should never be above the "FULL" mark nor below the "ADD" mark on the gauge.

When checking the oil level, the gauge must be withdrawn and wiped clean, then inserted all the way and withdrawn for a true reading.

Note: Stop the engine before removing the cap. Never check the oil level while the engine is running.

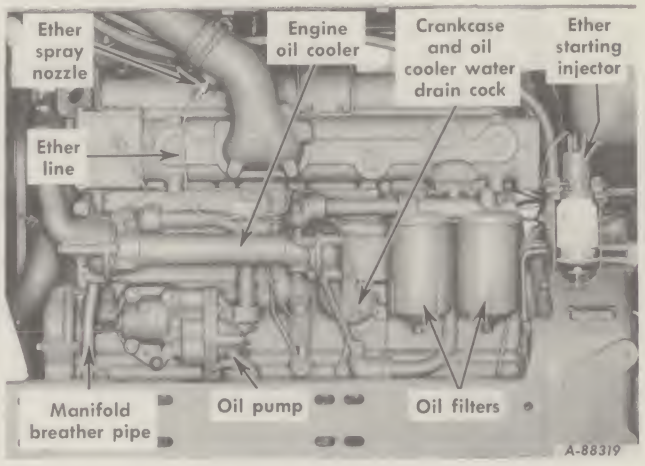


Illust. 114A
Crankcase and oil level gauge. (diesel engine).

OIL PUMP

A screen is attached to the oil intake of the gear-type oil pump in the crankcase. It stops large dirt particles from entering the lubricating system. This screen should be cleaned whenever the oil pan is removed.

ENGINE OIL COOLER (Diesel Engine)



Illust. 114B
Engine oil cooler.

The oil cooler, mounted on the left side of the crankcase and connected to the cooling system, reduces the temperature of the engine oil under high temperature operating conditions, and promotes rapid warm-up of the engine oil in cold weather operation, thus reducing engine wear, lengthening bearing life, and retarding the formation of sludge. **See Illust. 114B.**

ENGINE OIL

Gasoline and LP Gas Engines

The three types of crankcase oil marketed have been classified by the American Petroleum Institute (API) as "For Service ML", "For Service MM", and "For Service MS".

Gasoline Engine

Either single or multi-grade oils designated "For Service MS" and designated by the oil supplier as a qualified "Supplement 1" or "MIL-L-2104B" oil must be used for satisfactory performance.

LP Gas Engine

"Low Ash" engine oils which do not contain barium or calcium additive compounds must be used for satisfactory performance. These oils are formulated to the Supplement 1 performance level for API Service "MS" in LP Gas engines. Oils of this type are usually labeled and merchandised specifically for LP Gas engine use.

ENGINE OIL - Continued

Diesel Engine

"Series 3" lubricating oil must be used for satisfactory performance.

It is not the policy of the International Harvester Company to publish approved lists of lubricants or to guarantee oil performance in service. The responsibility for the quality of the lubricant, its performance under the conditions of operation, and its compatibility with the diesel fuels used must remain with the supplier of the lubricant.

High-speed diesel fuels and lubricants should be procured from a reliable source. When in doubt, consult your International Harvester dealer.

TO AID STARTING

To aid starting, the selection of crankcase lubricating oils should be based on the lowest anticipated temperature for the oil change interval. It is not necessary to change the crankcase oil every time the temperature rises or falls into another temperature range during some part of the 24-hour day.

Also see "Cold Weather Precautions" on page 106 for special instructions.

GEAR LUBRICANT

Illust. 115
Transmission oil level gauge.

Tractors shipped from the factory to destinations in the United States of America, Canada, and Mexico are filled with lubricant in the transmission, differential, and the rear axle housings.

Use only high-quality lubricating oils and grease as specified in "Lubrication Table". For your own protection, select only oils and greases of recognized manufacture.

The transmission oil pressure Tellite indicates whether the transmission is functioning properly. The light should go out within a few seconds after the engine starts. If the light remains on, stop the engine and check the fluid level. The level should be at the "FULL" mark on the level gauge. See your International Harvester dealer for further instructions if the problem persists.

LUBRICATION FITTING GREASE

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease, for lubrication fittings on which the hand lubricator is applied.

Note: Keep your supply of lubricating oil and grease absolutely clean and free from dust. Always use clean containers. Keep the lubricant clean and wipe dirt from the fittings before applying the lubricator.

FULL FLOW OIL FILTER

The life of your engine depends upon clean oil being circulated to all bearings.

The purpose of the oil filter is to separate and remove the dirt and other foreign substances from the oil to prevent these injurious materials from being circulated to the engine. This filter will keep the circulating oil free of harmful materials. Under normal operating conditions, replace the filter elements every 200 hours of operation.

If the elements are not serviced and become clogged the element by-pass valve will open and unfiltered oil will be circulated through the engine.

Note: To avoid delays, we recommend that you carry extra filter elements on hand so replacement can be made at the proper time.

CHANGING THE FILTER ELEMENT

Gasoline and LP Gas Engines

1. Do not change the element while the engine is running. Stop the engine.

2. Remove the oil filter base drain plug and allow the oil filter to drain completely.

3. Clean the outside of the filter case to prevent dirt from dropping into the base.

4. Unscrew the center tube.

5. Lift up and remove the center tube and case.

6. Remove the old element.

Note: If any equipment on the tractor prevents lifting the case over the element, remove the case and the element together.

7. Wipe out the base and the case with a cloth dampened with kerosene.

8. Install the new filter element as follows:

(a) Replace the drain plug in the filter base and install the new filter element.

(b) Inspect the center tube and make sure it is clean. Do not allow dirt to go into the threaded center of the base as this passage leads to the bearings.

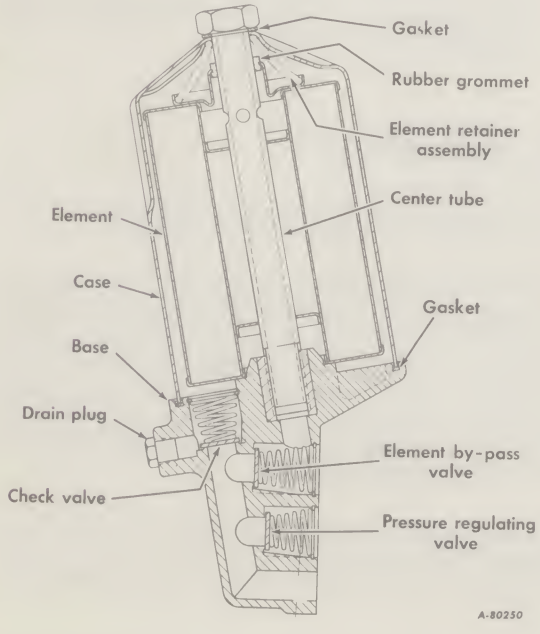
(c) Make sure that the case, center tube, and drain plug gaskets are in good condition. Replace with new ones if necessary.

To replace the center tube gasket, reach up inside the filter case and remove the element retainer assembly from the center tube. Then remove the center tube from the case and replace the gasket with a new one. Reassemble the center tube, filter case, and element retainer assembly in the reverse order of removal.

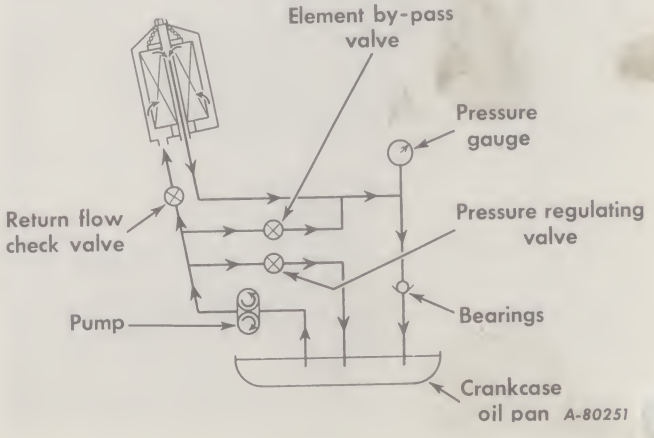
The rubber grommet in the element retainer assembly serves as an oil seal. **See Illust. 116.** The grommet must be in place in the element retainer assembly and must be in good condition when assembled on the center tube. Replace it with a new one if necessary.

Install the new filter element, then replace the case and center tube assembly. Carefully screw the center tube into the filter base and tighten securely.

9. Start the engine and check the oil pressure Tellite to see whether lubricating oil is circulating through the engine; then inspect the filter for oil leaks.



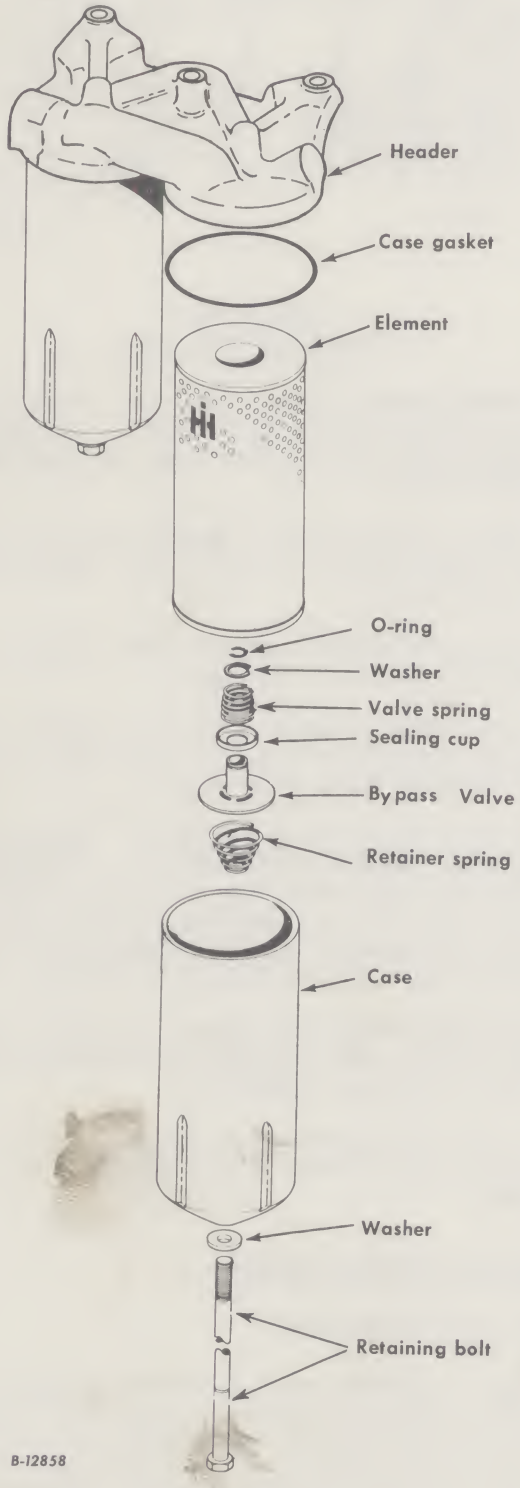
Illust. 116
Cutaway view of the oil filter.



Illust. 116A
Diagram showing flow of oil from crankcase to oil filter.

CHANGING THE FILTER ELEMENT - Continued

Diesel Engines



Illust. 117
Exploded view of the oil filter.

The diesel engine has two oil filter elements.

1. Do not change the element while the engine is running. Stop the engine; remove the crankcase oil pan drain plug and drain all oil from the crankcase while it is still warm.

2. Clean off all dirt from the oil filter head and cases. Unscrew the retaining bolts until it is possible to withdraw the bolts and cases from the filter head. Remove the old elements.

3. Wipe out the filter head, case, and by-pass valve assemblies with a cloth dampened with kerosene, diesel fuel, or other solvent.

Note: If any equipment on the tractor interferes with lifting the cases over the elements, remove the cases and elements together.

4. Install the new filter elements as follows:

Make sure that the case gasket and the bolt gaskets are in good condition. Replace them with new ones, if necessary.

To replace the bolt gasket, reach inside the filter case and remove the retaining ring, bypass valve assembly, and element hold down spring from the filter case bolt. Then remove the bolt from the case and replace the gasket with a new one. Reassemble the bolt, filter case, hold down spring, bypass valve assembly, and retaining ring in the reverse order of removal. **See Illust. 117.** Make sure the retaining ring is seated in the groove in the filter case bolt to prevent the valve assembly and spring falling out when changing elements.

Install the new filter elements, then install the cases, retaining bolts, and by-pass valve assemblies. Carefully insert the retaining bolts into the filter heads and tighten securely.

5. Reinstall the crankcase oil pan drain plug and refill the crankcase oil pan with new oil.

6. Start the engine, check the engine oil pressure Tellite to see whether lubricating oil is circulating through the engine; then inspect the filters for oil leaks.

HYDRAULIC FLUID FILTER

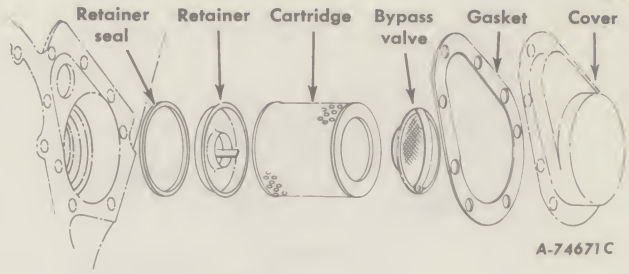
A fluid filter in the right side of the rear frame keeps foreign matter from entering the hydraulic system. **See Illust. 118.**

Clean the by-pass valve screen and replace the filter cartridge, retainer seal and cover gasket after the first 10, 100, and 250 hours of operation and every 250 hours of operation thereafter. Clean the screen and replace the cartridge more frequently when operating under unusual dirt or dust conditions. Also clean the by-pass valve screen and replace the filter cartridge whenever the transmission and hydraulic fluid is changed. To avoid delays, keep extra filter cartridges on hand so replacement can be made at the proper time.

Illust. 118
Fluid filter removed for cleaning.

The following sequence of filter service should be followed when the filter cartridge is changed:

Place a pan under the right side of the tractor below the fluid filter opening. Then remove the cover, gasket, by-pass valve and filter cartridge, and discard the gasket along with the cartridge. Some of the fluid will drain into the pan.



Illust. 118A
Fluid filter disassembled.

Reach inside of the fluid filter opening, in the rear frame and remove the filter cartridge retainer and seal. **See Illust. 118A.** Discard the retainer seal.

Place the new seal on the outside of the retainer and install in the fluid filter opening in the rear frame.

Clean the by-pass valve screen with a brush, using kerosene or diesel fuel.

Insert the new filter cartridge into the assembled retainer and the by-pass valve into the outside of the filter cartridge.

Holding the assembly in place, reinstall the fluid filter opening cover, using a new gasket. Secure the cover using the previously removed cap screws. Do not overtighten the cap screws as this may deform the cover flange resulting in air leakage into the hydraulic system.

Start the engine and allow it to run for one minute before operating the steering system or other hydraulic equipment.

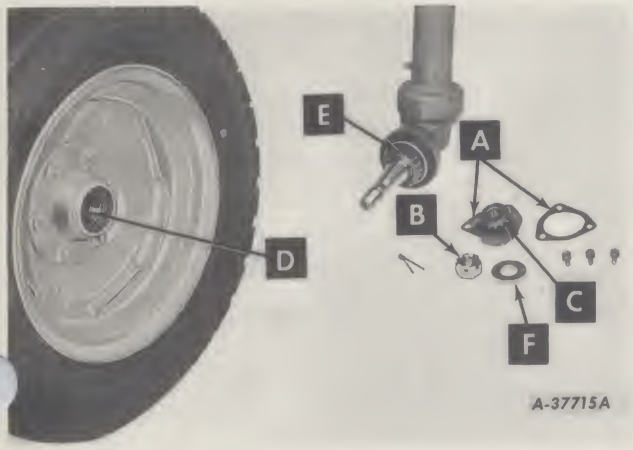
If air has entered the system, refer to "Freeing the System of Trapped Air", **on page 45.**

GREASING THE FRONT WHEELS

Single and Dual Front Wheel

Daily, or after every 10 hours of operation, use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply two or three strokes of the lubricator, or a sufficient amount of grease to flush out the old grease and dirt. The lubrication fitting is located on the end of the front axle nut for the single front wheel or on the hubs of the dual front wheels. **See Illust. 119.**

GREASING THE FRONT WHEELS - Continued



Illust. 119
Wheel removed for cleaning and greasing.

Dual Front Wheels

Be sure to keep all parts clean.

Twice a year (spring and fall), remove, clean and repack the front wheel bearings.

Raise the front end of the tractor until the wheels clear the ground. Remove hub cap and gasket "A", the cotter pin, nut "B" and washer "F". Remove bearing "C" and place it in hub cap "A" or in a clean container; then remove the wheel. **See Illust. 119.**

Clean the inside of hub "D", remove the old grease from the bearings, clean them with kerosene, and repack with IH 251H EP grease or equivalent #2 multi-purpose lithium grease.

It is advisable to leave bearing "E" on the axle and clean it with a brush and kerosene. Repack the rollers with new grease before reassembling the bearings.

Inspect the oil seal felt washer and gasket and if they are not in satisfactory condition, replace them with new ones. A dirt deflector is also provided on the axle to prevent dirt from entering at the inner bearing.

Reassemble the wheel and tighten nut "B" until the wheel binds slightly, rotating the wheel at the same time. Back the nut off one castellation from the cotter pin hole; replace the cotter pin and hub cap.

LUBRICATION TABLE

Engine oils meeting standards as shown on pages 114 and 115 under heading "Engine Oil" must be used in these engines.

Point of Lubrication	Capacity	Anticipated Air Temperatures			
		Above +32°F.	+32°F. to +10°F.	+10°F. to -10°F.	Below -10°F.
Gasoline or L. P. Gas engine crankcase with filter drained	8 qt.	SAE-30 or SAE-20W-40	SAE-10W or SAE-10W-30	SAE-5W-20 or 7-1/4 qt. SAE-10W w/3/4 qt. kerosene	6-1/2 qt. SAE-10W w/1-1/2 qt. kerosene
With filter change	9 qt.			SAE-5W-20 or 8 qt. SAE-10W w/1 qt. kerosene	7 qt. SAE-10W w/2 qt. kerosene
		Above +45°F.	+45°F. to +10°F.	+10°F. to -10°F.	Below -10°F.
Diesel engine crankcase with filter drained	9 qt.	SAE-30	SAE-10W	8 qt. SAE-10W w/1 qt. kerosene	7 qt. SAE-10W w/2 qt. kerosene
With filter change	11 qt.			10 qt. - SAE-10W w/1 qt. - kerosene	8-3/4 qt. - SAE-10W w/2-1/4 qt. - kerosene

Point of Lubrication	Capacity	Lubricant
Oil pump support	xxx	IH 251H EP grease or equivalent #2 multi-purpose lithium grease
Distributor and drive housing	xxx	IH 251H EP grease or equivalent #2 multi-purpose lithium grease
Cam hole felt (in distributor)	xxx	Light engine oil
Alternator-generator	xxx	No lubrication required
Transmission and differential case (also reservoir for hydraulic system)	Approx. 17 gal.	IH Hy-Tran® Fluid
Rear axle housings (each) (Hi-Clear tractors only)	4-1/2 qt.	
Rear axle carriers (each)	5 qt.	
Belt pulley housing	2 qt. *	
Differential housing (All-Wheel Drive tractors)	10 qt.	SAE-80 Multi-purpose gear lubricant
Lubrication fittings	xxx	Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease for fittings on which the hand lubricator is applied.

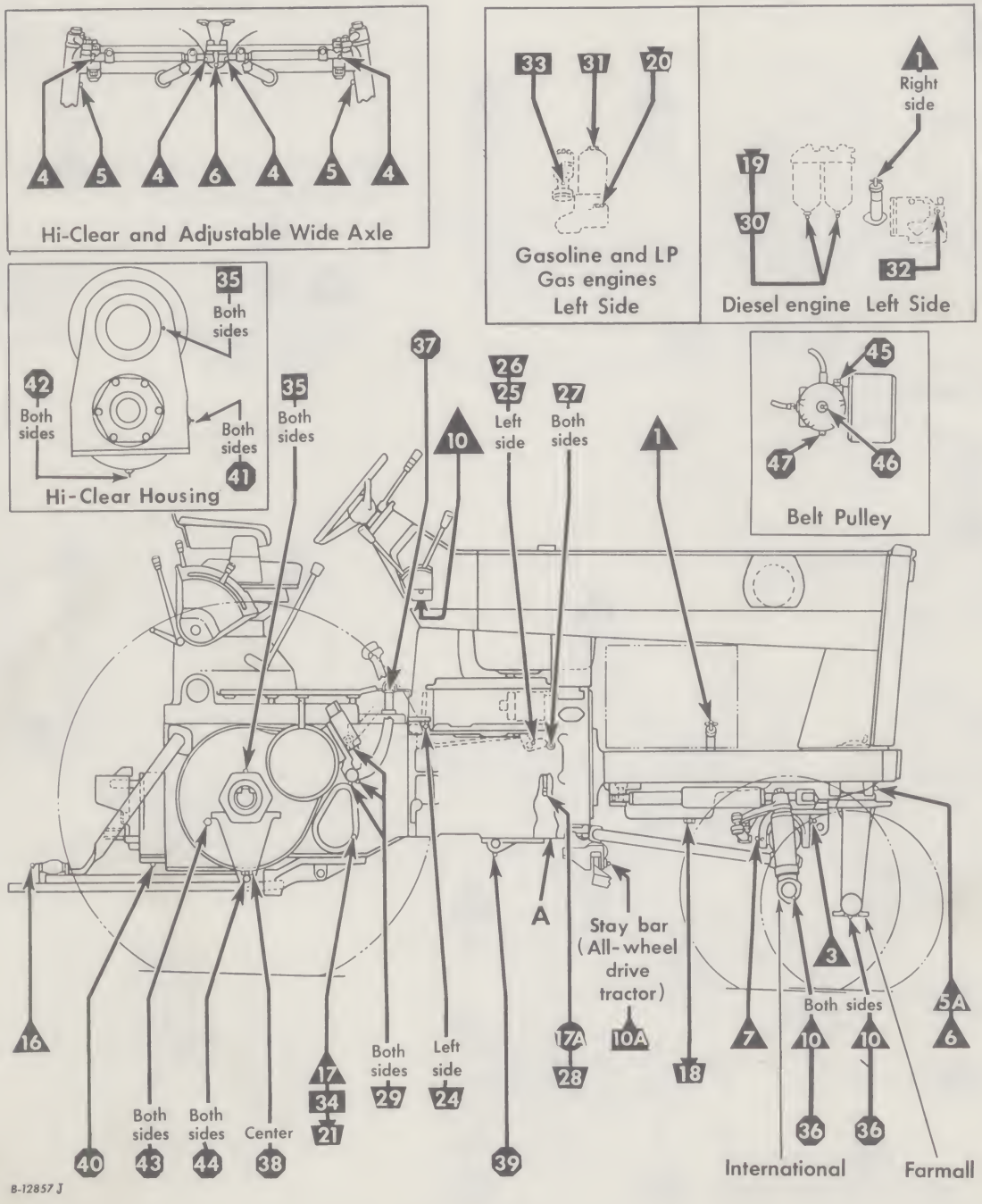
* Initial fill only. Refer to page 126.

LUBRICATION GUIDE

The symbols around the reference numbers indicate the intervals of lubrication.

▲ – 10 hours, ● – 50 hours ▼ – 100 hours, ▬ – 200 hours,

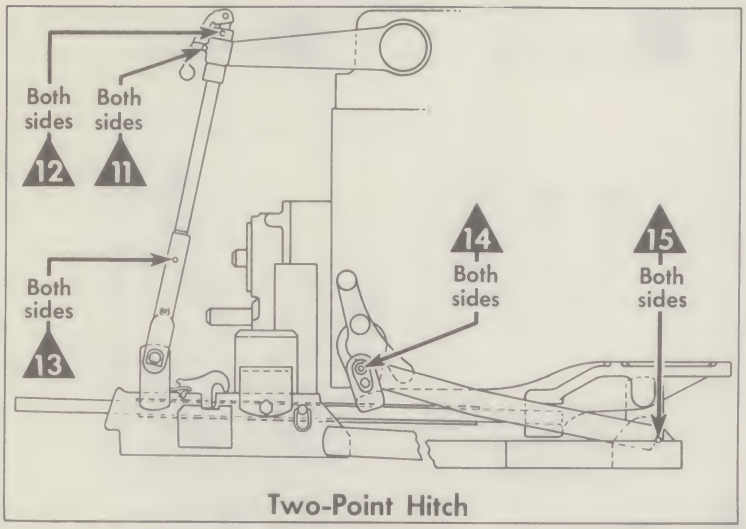
■ – 250 hours, ■ – 500 hours, ⬢ – Periodic



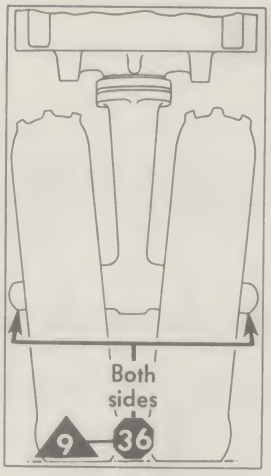
Illust. 121
Right side view of tractor.

The symbols around the reference numbers indicate the intervals of lubrication.

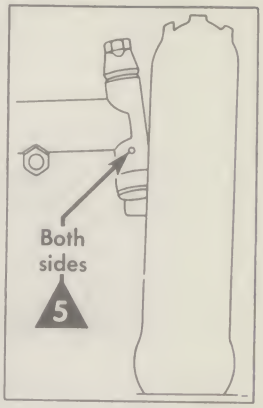
▲ – 10 hours ⬟ – 100 hours ⯃ – Periodic



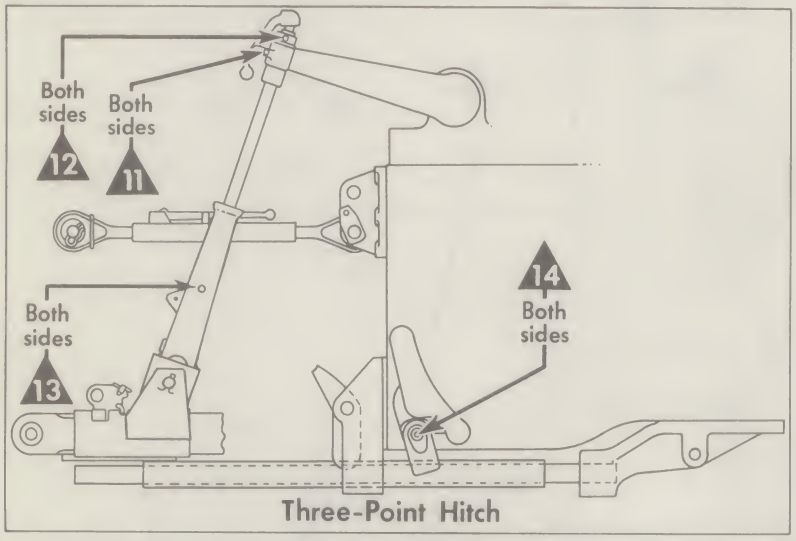
Two-Point Hitch



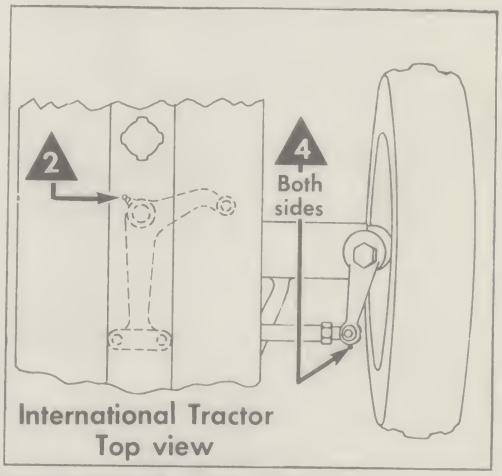
Farmall Tractor
Front view



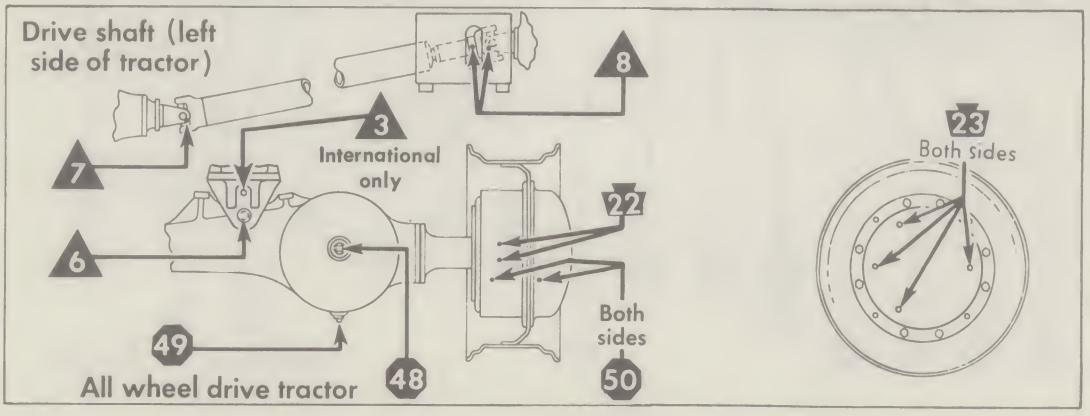
International
Tractor
Front view



Three-Point Hitch



International Tractor
Top view



All wheel drive tractor

A-77462 H

Illust. 122

The symbols shown around the reference numbers in Illusts. 121 and 122 indicate the intervals of lubrication. Paragraph numbers correspond to reference numbers in the illustrations.

▲ – Daily or After Every 10 Hours of Operation

1. Oil filler and level gauge.

Check the oil (with the engine stopped) and add sufficient new oil to bring it to the "FULL" mark on the level gauge. Do not check the oil level while the engine is operating or operate the engine if the oil level is below the "ADD" mark on the level gauge.

Note: The proper method of checking the oil level with the bayonet-type oil level gauge is: Turn the cross piece on the gauge counterclockwise to release it, remove the gauge from the oil filler tube and wipe it clean. Reinsert the gauge all the way without turning it, then remove the gauge and check the oil level. After checking, and adding oil if necessary, reinsert the gauge all the way, and turn the cross piece clockwise to tighten it.

2. Center steering arm. (International Tractors.)
3. Center steering arm pivot shaft (International tractors).
4. Adjustable tie rod. (Farmall with adjustable wide front axle, Hi-Clear Tractors (4), and International Tractors.) (2).
5. Steering knuckle post (2). (Farmall with adjustable wide front axle, Hi-Clear Tractors, and International Tractors.)
5A. Upper bolster (Farmall Tractors)
6. Front axle pivot shaft, (Farmall with adjustable wide front axle, Hi-Clear Tractors, and International and All-Wheel drive Tractors.)
7. Drive shaft, front. (All-Wheel drive tractors.)
8. Drive shaft, rear. (2).
9. Front wheel hubs.
10. Reverse shift hub
10A. Stay bar (All-Wheel Drive Tractors)

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply two or three strokes of the lubricator, or sufficient grease to flush out the old grease and dirt.

Three-Point and Two-Point Hitch.

11. Rockshaft arm (2).
12. Leveling screw collar (2).
13. Leveling screw housing (2).
14. Lower link pin (2).
15. Sensing link pin (2). (Two-Point Hitch)
16. Swinging drawbar roller.

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply sufficient lubricant to flush out the old grease and dirt.

17. Hydraulic fluid filter.

Note: After the first 10 hours only, remove and clean the by pass valve screen and replace the filter cartridge as instructed on pages 118 and 119. Change the cartridge at 100 hours and every 250 hours of operation thereafter.

● – After Every 50 Hours of Operation

17A. Clutch release bearing (Hand operated, over-center clutch)

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply one or two strokes of the lubricator. To reach the clutch release bearing, remove the clutch compartment bottom cover "A".

LUBRICATION GUIDE

– After Every 100 Hours of Operation

18. Crankcase oil drain plug.
19. Oil filter drain (diesel engine).
20. Oil filter drain plug (gasoline and LP Gas engines).

Diesel Engine: Remove the crankcase drain plug and loosen both oil filter case retaining bolts and drain all the oil from the crankcase and both oil filter cases while the engine is warm; then replace the crankcase drain plug and tighten the oil filter case retaining bolts and refill with new oil to the "FULL" mark on the oil level gauge. Refer to the "Lubrication Table".

Gasoline and LP Gas Engines: Remove the crankcase and oil filter drain plugs and drain all the oil from the crankcase and oil filter case while the engine is warm; then replace the crankcase and oil filter drain plugs and refill with new oil to the "FULL" mark on the oil level gauge. Refer to the "Lubrication Table".

21. Hydraulic fluid filter.

Note: After the first 100 hours only, remove and clean the bypass valve screen and replace the filter cartridge as instructed on pages 118 and 119. Change the cartridge every 250 hours of operation thereafter.

22. Front wheel pivot bearings. (All-Wheel Drive tractor.) (4).
23. Compensating ring bushings (8). (All-Wheel Drive tractors).

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply one or two strokes of lubricator, or sufficient grease to flush out the old grease and dirt.

Note: The lubrication fittings for the compensating ring bushings can be reached by removing the four dust plugs on each wheel cover, if so equipped. Replace the plugs when lubrication is completed. If the wheel covers are not equipped with dust plugs, remove each wheel cover by removing the four cap screws securing the cover to the hub. Apply lubricant to each fitting then replace the covers and tighten the cap screws securely.

– After Every 200 Hours of Operation

24. Torque amplifier valve operating bellcrank - rear.
25. Torque amplifier valve operating bellcrank - front.
26. Control bellcrank. (All-Wheel drive tractor).

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply one or two strokes of lubricator, or sufficient grease to flush out the old grease and dirt.

27. Clutch release shaft (2)
28. Clutch release bearing. (Foot pedal operated, spring loaded clutch.)

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply one or two strokes of the lubricator. To reach the clutch release bearing, remove the clutch compartment bottom cover "A".

29. Clutch pedal. Brake pedal.

Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply one or two strokes of lubricator.

30. Oil filter elements (diesel engine).

Replace the oil filter element every other time the crankcase oil is changed. Loosen both oil filter case retaining bolts and allow all the oil to drain out. Remove the retaining bolts and cases and remove the used filter elements. Replace the retaining bolts and cases and install new filter elements as instructed on page 117.

31. Oil filter element (gasoline and LP Gas engines).

Replace the oil filter element every other time the crankcase oil is changed. Remove the oil filter drain plug and allow all the oil to drain out. Remove the oil filter center tube and case, and remove the used filter element. Replace the drain plug and install a new filter element as instructed on pages 115 and 116.

Miscellaneous parts

Lubricate the clutch and brake pedal connections with a few drops of engine oil.
Grease the threads of the Three-Point Hitch upper link. Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease.

■ – After Every 250 Hours of Operation

32. Tachometer drive housing (diesel engine). — Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply one or two strokes of the lubricator.

33. Distributor (gasoline and LP Gas engines). — Remove the grease plug and insert a lubrication fitting. Apply four or five strokes of the lubricator (approx. 1/4 oz.) to the distributor fitting using IH 251H EP grease or equivalent #2 multi-purpose lithium grease.

34. Hydraulic fluid filter. — Remove and clean the by pass valve screen filter and replace the filter cartridge as instructed on pages 118 and 119.

■ – Every Six Months or After Every 500 Hours of Operation

35. Rear axle carrier (2). (Farmall and International and Hi-Clear Tractors). — Use IH 251H EP grease or equivalent #2 multi-purpose lithium grease and apply four or five strokes of lubricator.

● – Periodic

36. Front wheels. — Twice a year (spring and fall), remove, clean, and repack the front wheel bearings with IH 251H EP grease or equivalent #2 multi-purpose lithium grease.

Transmission and Hydraulic System

37. Oil filler and bayonet-type oil level gauge.
38. Drain plug (rear frame center plug).
39. Drain plug (clutch housing).
40. Drain plug I. P. T. O. (rear unit).

Check the level of the lubricant periodically. Use approved lubricant according to the "Lubrication Table".

Keep the lubricant up to the "FULL" mark on the transmission oil level gauge (Illust. 115).

Note: Change the lubricant in the transmission case at least once a year preferably before freezing weather sets in. However do not drive the tractor more than 1,000 hours without changing the lubricant.

Remove the center drain plug (38) and drain plug (39) and allow all the lubricant to drain out. For tractors with Independent Power Take-Off and/or Torque Amplifier, also remove the drain plug (40). Replace the drain plugs and remove the transmission oil level gauge (37) (Illust. 115). Refill with IH Hy-Tran Fluid up to the "FULL" mark on the gauge. Start the tractor engine and operate it at a moderate idle speed. Move the steering wheel first to one extreme, then to the other, and then back to center.

Then set the inside control lever on the quadrant and "Auxiliary Valve Levers" all the way forward.

Stop the engine and refill with IH Hy-Tran Fluid up to the "FULL" mark on the transmission oil level gauge and replace the gauge.

LUBRICATION GUIDE

– Periodic - Continued

Transmission and Hydraulic System

Note: If any of the hydraulic units are removed and replaced for any reason add IH Hy-Tran Fluid to the transmission and hydraulic system to bring it up to the "FULL" mark on the transmission oil level gauge. Then start the engine and operate at a moderate idle speed, actuate the hydraulic system as previously described.

Stop the engine and check the lubricant capacity on the transmission oil level gauge. Add IH Hy-Tran Fluid if necessary to the "FULL" mark and replace the gauge.

Rear Axle Housing Carriers (Hi-Clear tractors only)

41. Oil filler and level plug. (2).
42. Drain plugs (2).

Rear Axle Carriers

43. Oil filler and level plugs (2).
44. Oil drain plugs (2). (Rear frame, outside plugs)

Check the oil level periodically and add sufficient approved lubricant to bring it up to the level of plug.

Change the oil at least once a year and each time the oil in the transmission is changed. However, do not operate the tractor more than 1,000 hours without changing the oil. Remove the drain plug and allow the oil to drain; replace the drain plug and remove the filler plugs and level plugs. Refill with IH Hy-Tran Fluid up to the level plug opening and replace the plugs.

Belt Pulley Housing

45. Filler plug.
46. Level plug.
47. Drain plug.

Add two quarts of IH Hy-Tran fluid to the belt pulley housing before using the belt pulley for the first time. This additional fluid is required the first time only to assure lubrication of the parts until fluid from the transmission case is circulated throughout the system.

Differential housing (All-Wheel Drive tractor)

48. Oil filler and level plug.
49. Drain plug.

Change the oil once a year, however do not operate the tractor more than 1,000 hours without changing the oil. Remove the drain plug (49) and allow the oil to drain; replace the drain plug (49) and remove the filler and level plug (48). Refill with approved lubricant up to the level plug opening and replace the plug.

50. Front Wheel bearings. (4). (All-Wheel drive tractor)

Wheel bearings must be cleaned and repacked with IH 251H EP grease or equivalent #2 multi-purpose lithium grease once a year or after every 1,000 hours of operation whichever occurs first. For proper bearing adjustment it is recommended that this service be done by your International Harvester dealer.

Cranking motor

The cranking motor has oilless type bushings and requires no lubrication except when it is removed for service. When re-installed apply a few drops of light engine oil to both bushings.

Miscellaneous

Occasionally lubricate all external control linkage and the tilt steering wheel shaft at the bushing with a few drops of oil.

Alternator-generator.

No lubrication required.

PREVENTIVE MAINTENANCE GUIDE

To keep your tractor performing efficiently, it is advisable to systematically inspect the following points at intervals as outlined below.

Before Operating the Tractor

Before operating a new tractor for the first time, be sure to follow the instructions given on pages 6 to 12; also see Lubrication Section pages 113 to 126.

After the First 10 Hours of Operation

Hydraulic fluid filter	Clean the by pass valve screen and replace filter cartridge. See page 118.
Water pump, fan and alternator-generator belts	Check tension. See pages 55 to 56.
Rear wheel clamp retaining stud nuts or bolts	Check and tighten to proper torque. See page 91.

After Every 10 Hours of Operation

Cooling system	Check level of coolant in radiator (two inches above radiator core).
Fuel tank water drain cock (diesel engine)	Drain off water and sediment. See page 23.
Lubrication points	See "Lubrication Guide".

After the First 50 Hours of Operation

Cylinder head bolts (LP Gas engine)	Check and tighten to the proper torque. See page 77.*
Engine valves (LP Gas engine)	Check clearance. See pages 77 and 78.*
Flexible rubber connection between air cleaner and carburetor or manifold	Inspect for loose fit or leakage.

After Every 50 Hours of Operation

Rear wheel clamp retaining stud nuts or bolts.	Check and tighten to proper torque. See page 91.
Pneumatic tires	Check pressure. See pages 97 and 98.
Radiator core and transmission oil cooler	Inspect, clean if necessary. See page 55.
Water pump, fan and alternator-generator belts	Check tension; replace when necessary. See pages 55 to 56.
Lubrication points	See "Lubrication Guide".

After the First 100 Hours of Operation

Cylinder head bolts (gasoline and diesel engines)	Check and tighten to proper torque. See page 77.*
Engine valve (gasoline and diesel engines)	Check clearance. See pages 77 and 78.*
Hydraulic fluid filter	Clean the by pass valve screen and replace filter cartridge. See page 118.

* See your International Harvester dealer for this service.

PREVENTIVE MAINTENANCE GUIDE

After Every 100 Hours of Operation

Engine crankcase	Drain and change oil.

After Every 200 Hours of Operation

Lubricating oil filter	Replace the filter element. See pages 116 and 117.
Lubrication points	See "Lubrication Guide".
Brake pedals	Check for free movement. See page 99.
Clutch pedal (spring-loaded clutch)	Check for free movement. See pages 101 and 102.
Clutch handle (overcenter clutch)	Check for free movement. See pages 102 and 103.

After Every 250 Hours of Operation

Fuel strainer and sediment bowl (gasoline engine)	Take apart and clean. See page 13.
Hydraulic fluid filter	Clean the by pass valve screen and replace filter cartridge. See page 118.
Spark plugs (gasoline and LP Gas engines)	Remove and clean; check gaps. See pages 61 and 62.
Lubrication points	See "Lubrication Guide".

After Every 500 Hours of Operation

Distributor breaker points and chamber (gasoline and LP Gas engines)	Clean chamber and check breaker points and breaker point opening; retime. See pages 62 and 63.
Engine valves	Check for clearance. See pages 77 and 78. *
Lubrication points	See "Lubrication Guide".

Periodic

Crankcase breather	Remove and clean at time of major overhaul. See page 60.
Air cleaner filter element	Clean when necessary. See page 59. Replace the element with a new one after ten cleanings or one year service, whichever comes first.
Air cleaner safety element	Replace with a new element after one years service or when necessary, whichever occurs first.
Cooling system	Drain, flush, and fill twice a year (spring and fall). See pages 54 to 55.
Front wheels	Clean and repack with new grease twice a year (spring and fall). See page 119.
Fuel filter (LP Gas engines)	Replace when necessary. See page 18.
Fuel line screen (at carburetor, gasoline engine)	Remove and clean. See page 14.
Primary and final fuel filters (diesel engine)	Replace the filters when necessary. See page 23.
Storage battery	Check liquid level. See page 67.
Lubrication points	See "Lubrication Guide".

* See your International Harvester dealer for this service.

SPECIFICATIONS

Farmall and International 856 Tractors

GROUND SPEEDS

ENGINE OPERATING AT RATED SPEED OF 2400 R.P.M. AND AT 2100 R.P.M. FOR 1000 R.P.M. AND 540 R.P.M. POWER TAKE-OFF SPEED

No allowance for tire slippage.

Gear		Miles Per Hour					
		2400 r.p.m. Engine Speed			2100 r.p.m. Engine Speed		
		18.4-38, R-1 Tire			18.4-38, R-1 Tire		
		Forward		Reverse	Forward		Reverse
		Low	High		Low	High	
1st	Normal	1-3/4	6	3	1-1/2	5-1/2	2-3/4
	TA	1-1/2	5	2-1/2	1-1/4	4-1/4	2
2nd	Normal	2-1/2	8-1/2	4-1/4	2	7-1/4	3-1/2
	TA	2	6-1/2	3-1/4	1-3/4	5-3/4	2-3/4
3rd	Normal	4-1/4	14-1/2	7-1/4	3-3/4	12-3/4	6-1/4
	TA	3-1/4	11-1/2	5-1/2	2-3/4	10	5
4th	Normal	5-1/2	19-1/2	9-1/2	5	17	8-1/2
	TA	4-1/4	15-1/4	7-1/2	3-3/4	13-1/4	6-1/2

Note: Ground speeds with 23.1-30, R-1 tires, 4 per cent less; with 18.4-34, R-1 tires, 6 per cent less.

Farmall 856 Hi-Clear Tractors

GROUND SPEEDS

ENGINE OPERATING AT RATED SPEED OF 2400 R.P.M. AND AT 2100 R.P.M. FOR 1000 R.P.M. AND 540 R.P.M. POWER TAKE-OFF SPEED

No allowance for tire slippage.

Gear		Miles Per Hour					
		2400 r.p.m. Engine Speed			2100 r.p.m. Engine Speed		
		15.5-38, R-2 Tire			15.5-38, R-2 Tire		
		Forward		Reverse	Forward		Reverse
		Low	High		Low	High	
1st	Normal	1-1/2	5	2-1/2	1-1/4	4-1/2	2-1/4
	TA	1-1/8	4	2	1	3-1/2	1-3/4
2nd	Normal	2	6-3/4	3-1/4	1-3/4	5-3/4	2-3/4
	TA	1-1/2	5-1/2	2-1/2	1-1/4	4-1/2	2-1/4
3rd	Normal	3-1/4	11-1/2	5-3/4	3	10	5
	TA	2-1/2	9	4-1/2	2-1/4	8	3-3/4
4th	Normal	4-1/2	15-1/2	7-1/2	3-3/4	13-1/2	6-3/4
	TA	3-1/2	12	6	3	10-1/2	5-1/4

Note: Ground speeds with 14.9-38, R-2, and 18.4-34, R-2 tires approximately as above.

	Gasoline and LP Gas Engines	Diesel Engines
CAPACITIES (U.S. MEASURE - APPROXIMATE)		
Cooling system { Gasoline or diesel	21 qt.	24 qt.
Cooling system { LP Gas	21-1/2 qt.	
Fuel Tank { Gasoline or diesel	42 gal.	42 gal.
Fuel Tank { LP Gas	*48 gal.	
Crankcase pan (with filter change)	9 qt.	11 qt.
Transmission and differential case	Approx. 17 gal.	Approx. 17 gal.
Rear axle carrier (each)	5 qt.	5 qt.
Hi-clear housing (each)	4-1/2 qt.	4-1/2 qt.
Differential housing (All-Wheel Drive tractor)	10 qt.	10 qt.
Belt pulley housing (Initial fill only)	2 qt.	2 qt.
ENGINE		
Cylinders	6	6
Bore	3-13/16 in.	4.321 in.
Stroke	4-25/64 in.	4.625 in.
Displacement	301 cu. in.	407 cu. in.
Engine speeds:		
Full load (governed speed)	2400 r.p.m.	2400 r.p.m.
High idle (governed speed)	Approx. 2650 r.p.m.	Approx. 2640 r.p.m.
Low idle speed	Approx. 425 r.p.m.	Approx. 675 r.p.m.
Battery ignition distributor:		
Breaker point gap	.020 in.	
Spark timing at high idle		
Gasoline	22 degrees advance	
LP Gas	24 degrees advance	
Spark plug gap { Gasoline	.023 in.	
Spark plug gap { LP Gas	.015 in.	
Valve clearance (engine warm)		
Intake	.027 in.	.013 in.
Exhaust	.027 in.	.025 in.
Carburetor		
Gasoline	1-3/8 in.	
LP Gas American Bosch (Ensign)	1-1/2 in.	
Injection pump		Roosa-Master Model DB
Injection nozzles		Bosch
Injection pump timing, engine stopped Roosa-Master, end of injection		6 degrees before T.D.C.
POWER TAKE-OFF SHAFT SPEEDS		
540 r.p.m. PTO:		
At full load (governed speed) (2400 r.p.m.)	616 r.p.m.	616 r.p.m.
At high idle (governed speed)	680 r.p.m.	680 r.p.m.
At low idle speed	109 r.p.m.	167 r.p.m.
At 2100 r.p.m. engine speed (standard shaft speed)	539 r.p.m.	539 r.p.m.
1000 r.p.m. PTO:		
At full load (governed speed) (2400 r.p.m.)	1159 r.p.m.	1159 r.p.m.
At high idle (governed speed)	1280 r.p.m.	1280 r.p.m.
At low idle speed	205 r.p.m.	314 r.p.m.
At 2100 r.p.m. engine speed (standard shaft speed)	1014 r.p.m.	1014 r.p.m.

* - At 80 percent outage level.

	Gasoline and LP Gas Engines	Diesel
BELT PULLEY SPEEDS		
At full load (governed speed) (2400 r.p.m.)	1101 r.p.m.	1101 r.p.m.
At high idle (governed speed)	Approx. 1211 r.p.m.	Approx. 1217 r.p.m.
At low idle speed	Approx. 195 r.p.m.	Approx. 298 r.p.m.
Belt speed at 2400 r.p.m. engine speed	3170 ft. per min.	3170 ft. per min.
Pulley diameter	11 in.	11 in.
Pulley face	7-1/2 in.	7-1/2 in.
ELECTRICAL SYSTEM		
System voltage	12 volt neg. ground	12 volt neg. ground
Battery size	12-volt, 60amp. hr. (3EE	two-6volt, 204amp. hr. (4EH)
Alternator-Generator, Delco-Remy	55 amp.	55 amp.
Voltage Regulator, Delco-Remy	2 unit	2 unit
Cranking motor, Delco-Remy	Positive engagement, push button controlled	Positive engagement, push button controlled
Light switch	4 position	4 position
Lamps - all glass, sealed beam units	12 volt	12 volt
Fuse (cartridge type)	SFE-20 amp.	SFE-20 amp.

Sealed beam lamps (all 12 volt)	Lamp No.	IH Part No.	Assembly No.
Headlights (Farmall Tractors)	#4419	371 443 R91	387 727 R91
(International Tractors)	#4411	373 662 R91	387 730 R91
Headlights (Deluxe fender-outer)	#4411	373 662 R91	388 945 R91
Floodlights (Deluxe fender-inner)	#4406	390 756 R91	388 946 R91
Rear light (combination rear light and taillight)	#4603	371 461 R91	387 729 R91
Bulbs			
Taillight (combination rear light and taillight)	#1003	455 490	387 729 R91
Warning light	#1156	9 417 866	394 129 R91
Tellites	# 257	9 412 348	----------
Instrument lights	#1895	9 417 863	----------
Shift quadrant control light	#1155	9 417 865	397 946 R1

	Farmall Tractors	Farmall Hi-Clear Tractors	International Tractors
CLUTCH			
Single-plate, dry-disc, spring-loaded	12 in.	12 in.	12 in.
FOOT BRAKES			
Hydraulic, power, disc type, operated either individually or interlocked.			
WHEELS AND TREAD			
Front wheels, pneumatic tire size	‡10.00-16	7.50-20	‡11.00-16
All-Wheel drive tractor	‡11.2-24		‡11.2-24
Rear wheels, pneumatic tire size	‡18.4-38	‡15.5-38	‡18.4-38
Tread, front			
Tricycle type tractor (w/7.50-16 tires)	10 and 14 in.		
Adjustable wide front axle (w/10.00-16 tires) (3 different axles)	54 to 78 or 60 to 84, or 117 and 123 in.	64 to 84	
Adjustable front axle			60, 73, and 84 in.
Fixed front axle			57 in.
Tread, front (All-Wheel Drive tractor)			
Concave turned in	67 in.		67 in.
Concave turned out	75 in.		75 in.
Tread, rear (wheels with double-beaded rims):			
Wheel concaves turned in	56 to 86 in.	68 to 87 in.	60 to 72 in.
Wheel concaves turned out	62 to 94 in.	86 to 96 in.	72 to 84 in.

‡ - Other pneumatic tire sizes available

SPECIFICATIONS

	Farmall Tractors	Farmall Hi-Clear Tractors	International Tractors
WHEELS AND TREAD - Continued			
Tread, rear (power-adjusted wheels)	56 to 96 in.		
Wheelbase	*101 in.	106 in.	92 in.
All-Wheel drive tractor	99 in.		91 in.
GENERAL DIMENSIONS			
Length over-all	167 in.	166 in.	151 in.
All-Wheel Drive tractor	165 in.		153 in.
Width over-all			
Minimum (to outside edge of rear axle)	92 in.	98 in.	80 in.
Height over-all (to top of steering wheel)	86 in.	96 in.	86 in.
Ground clearance under front axle	22 in.	35 in.	22 in.
All-Wheel Drive tractor	13 in.		13 in.
Ground clearance under drawbar	15 in.	25 in.	13 in.
Drawbar height above ground	18 in.	28 in.	11 to 16 in.
Drawbar lateral swing	22 in.		22 in.
Drawbar hitch hole to end of power take-off shaft (horizontal)			
540 r.p.m. shaft	14 in.	†1-1/4 in.	14 in.
1000 r.p.m. shaft	16 in.	†3-1/4 in.	16 in.
Drawbar hitch hole to power take-off shaft (vertical)			
540 r.p.m. shaft	7 in.	7 in.	7 in.
1000 r.p.m. shaft	12 in.	12 in.	12 in.
Power take-off shaft above ground			
540 r.p.m. shaft	23 in.	†35 in.	24 in.
1000 r.p.m. shaft	29 in.	†39-3/4 in.	29 in.
Minimum turning radius (wheels in minimum tread)			
With brake applied, wide axle	11 ft.	13 ft.	11 ft.
All-Wheel Drive tractor, with brake applied	17 ft.		16 ft.

† - Farmall Hi-Clear tractors have standard power take-off shafts, but do not conform fully to A.S.A.E. standards due to their construction as high-clearance tractors.

	Farmall Tractors	Farmall Hi-Clear Tractors	International Tractors
APPROXIMATE SHIPPING WEIGHTS: **			
With gasoline engine	8500 lbs.	9120 lbs.	8600 lbs.
With LP Gas engine	8700 lbs.	9320 lbs.	8800 lbs.
With diesel engine	9270 lbs.	9880 lbs.	9370 lbs.

** - With pneumatic tires as indicated above, three-point hitch, wide front axle swinging drawbar, independent power take-off, torque amplifier, two auxiliary valves, deluxe seat, fenders, and liquid in cooling system, but without fuel, front or rear weights, or ballast in tires. Farmall 856 Hi-Clear Tractor weights are without independent power take-off. International 856 Tractor weights are with U-type drawbar and swinging drawbar instead of three-point hitch, and one auxiliary valve instead of two. The approximate shipping weight when equipped with the "All Wheel Drive" and 11.2-24, R-1 tires, is approximately 900 pounds more.

Specifications are subject to change without notice.

EXTRA EQUIPMENT AND ACCESSORIES

The tractor is used for so many different types of work and is called on to operate under so many different conditions that a considerable variety of equipment is necessary to adapt it to the varied requirements of the user.

When you purchased your tractor, you probably had it completely equipped for your particular needs at the time. However, later you may wish to obtain some of the equipment or accessories shown below. These items can be purchased from, and installed by, your International Harvester dealer.

Type of Equipment	Type of Equipment
Adjustable Wide-Tread Front Axle	Hydraulic seat
All-Wheel Drive	Independent Power Take-Off
Auxiliary Hydraulic Valves	Quick Coupler (Three-Point Hitch)
Belt Pulley	Single Front Wheel (Farmall Tractors)
Bushing and Pin Adapter (Three-Point Hitch)	Swinging Drawbar (Tractor with Vertically Adjustable Drawbar)
Cigarette Lighter	Swinging Drawbar (Two-Point or Three-Point Hitch)
Cross Drawbar	Three-Point Hitch
Deluxe Fenders	Tilt Steering Wheel
Foot Pedal Accelerator	Tool Box
Front Axle and lower bolster (For tricycle type front wheels) (Farmall Tractor)	Tractor Cab
Front End Weights	Tractor Cab Air Conditioner
Front End Weights Mounting Bracket	Tractor Cab Heater
Heavy Duty Swinging Drawbar (Tractors without hitch)	Two-Point Hitch
Heavy Duty Upper Link (Three-Point Hitch)	Vertically Adjustable Drawbar
Hydraulic Draft Control	Wheel Weights

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Use IH Parts

TO THE OWNER—

You have just purchased one of the finest pieces of equipment available today. You can look forward to years of good service because International Harvester machines are designed better and built better to last longer.

When you need to purchase replacement parts or have your equipment serviced, we will be here, ready to serve you.

We stock genuine IH *parts—the parts that are designed for your equipment, not just made for it.*

We also offer you IH *Blue Ribbon Service—the service that puts your equipment back to work in minimum time at an economical cost. We are here to serve you—call on us in the future.*

Sincerely,

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