FOREWORD

This publication covers servicing and trouble shooting for the Ford Remote Control Valve, Part No. 311877.

Instructions for disassembly, inspection and reassembly are given by major valve components. If complete disassembly of the valve is required, simply follow the steps outlined for each major component in the order given.

The section covering trouble shooting is intended as a time saver, or a general guide to a quick diagnosis of valve or system malfunctioning. Its purpose is to point out conditions that may be corrected by examining and servicing a specific portion of the valve before branching out into the connecting components or tractor hydraulic system.

Keep this manual with your other service material so that it will be available for reference when required.

TRACTOR AND IMPLEMENT DIVISION
FORD MOTOR COMPANY
SERVICE DEPARTMENT

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FORD REMOTE CONTROL VALVE

The Ford Remote Valve is of the "open center", four-way spool type and can be utilized for directing oil flow to or from double or single acting remote cylinders.

The assembly bolts directly to the accessory pad of the tractor lift cover and utilizes oil flow from the tractor primary lift system for remote cylinder operation.

Internal valve components provide for an automatic return of the control spool to "neutral" from the "raise" or "lower" position when activating double acting cylinders and an automatic return to neutral from the "raise" position when actuating single acting cylinders. A float adjusting screw is provided in the valve for double acting remote cylinder applications when it is desirable to adjust the down pressure or floating characteristic of the implement in use. An auxiliary port is provided in the valve assembly for utilizing the tractor primary system's oil flow to operate a single acting cylinder with the tractor hydraulic control lever.

The remote valve design is such that either the tractor primary system or the valve assembly may be actuated independently, which provides for a "delayed lift action" such as employed in certain cultivator operations involving front and rear gang usage.

Since the remote valve assembly and the tractor primary system are dependent on the same oil flow, they cannot be operated together.

CONSTRUCTION

The remote valve assembly consists of three main bores which run the full length of the valve body. These bores are connected by cross passages which direct oil flow for operation of the components within each bore and ultimately to or from the inlet or outlet valve port connections as follows.

Control Valve Spool: The manually operated spool is connected to a handle assembly by means of a grooved slot at the rear or spindle end of the spool which accommodates a pivot lug on the handle assembly. Lands and valleys on the spool direct oil to or from the remote cylinders when the spool is moved in either direction from the neutral position.

Check Valves: There are two identical spring loaded check valve assemblies, one located at each end of the check valve bore. These check valves permit oil flow (as directed by the raise or lower positioning of the spool) to flow to or from the remote cylinders, but they prevent oil from returning from the cylinder when the control spool is in neutral.

Kick Off Valves: Two identical kick off valve assemblies, loaded by a single spring, are located one at each end of the kick-off bore. These valves function alternately to divert a portion of the oil flow received from the check valves for the purpose of automatically returning the control spool to its neutral position after the raise or lowering cycle of the remote cylinder is completed. This is accomplished by a back pressure build up directed to either the front or rear of the spool and is dependent upon the type of remote cylinder application in use.

In addition to the three main valve bores and their components, there are three cross bores to be considered.

Control Spool Detent Bore: This bore crosses the spool bore at the front end of the valve body and contains two sets of interchangeable springs and a steel ball for each spring set. The springs and balls make up the detent mechanism used for locating the control spool in the raise, neutral and lowering positions. Spring tension on each ball is such that it can be overcome by manual positioning of the control spool or by kick-off valve pressure directed to either end of the control spool.

Float Adjusting Screw: This screw assembly is threaded into a cross bore on the left side of the valve body. The cross bore in turn is connected by internal passages to the front cylinder port connection of the valve body. By adjusting the position of the screw in the cross bore, discharge oil directed to the rear valve port from a double acting remote cylinder can be metered or restricted as it flows through the valve and back to the tractor sump.

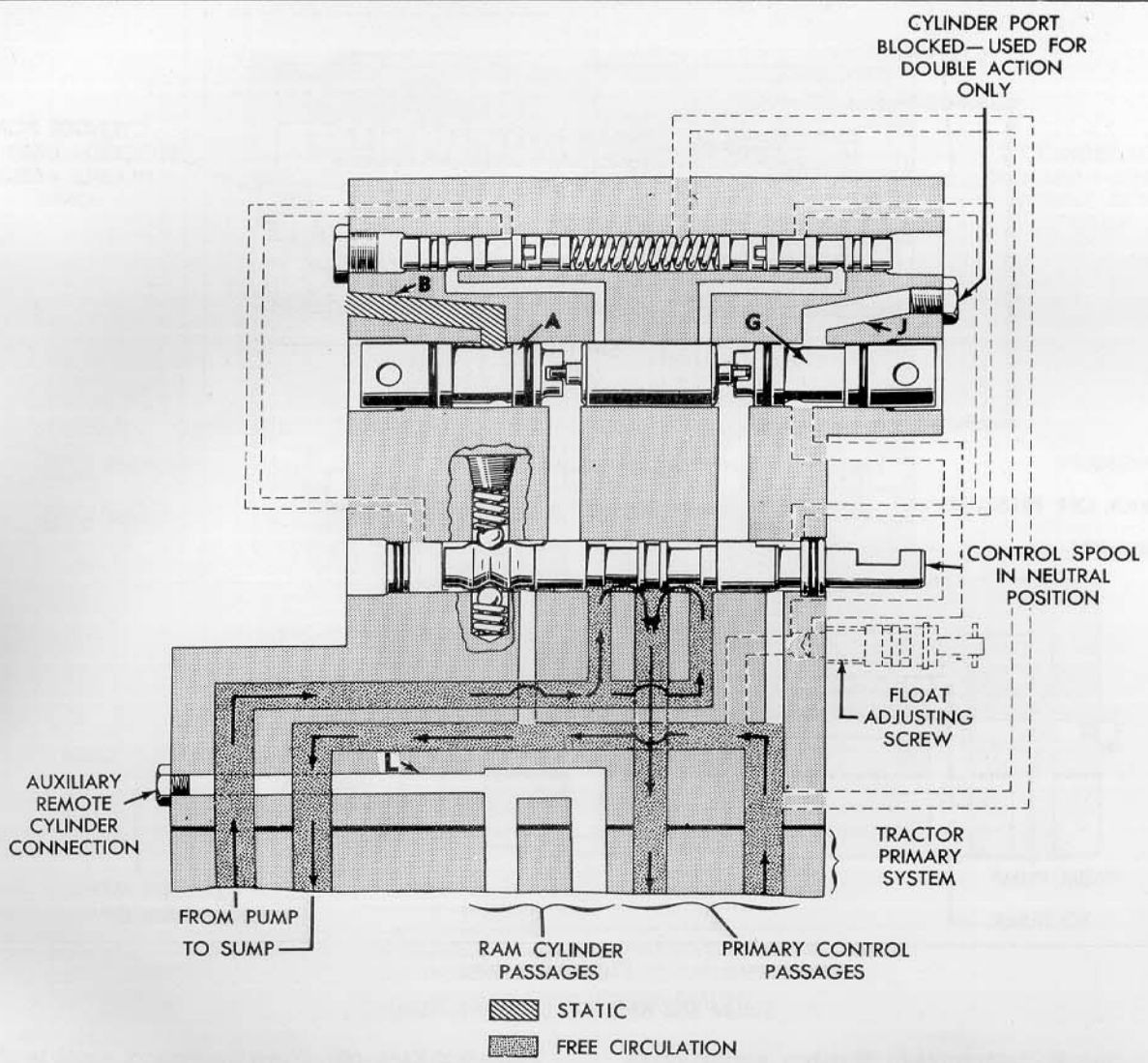
Auxiliary Port Connection: This connection represents a cross bore which is located on the left side and toward the front of the valve body. It taps into the ram cylinder passages of the tractor primary system and serves as a connection for utilizing a single acting remote cylinder which is activated by the tractor touch control lever. Actually the auxiliary port connection provided in the remote valve body serves the same purpose as does the port connection found on the accessory cover of the tractor hydraulic system. As a convenience factor it eliminates the necessity of removing the remote valve assembly from the tractor when it is desired to install a remote cylinder that operates with the flow of the tractor hydraulic system.

NOTE: When utilizing the remote valve auxiliary port connection for operating a remote cylinder, hold-down arms should be used on the tractor lift arms if the remote cylinder has an equal or greater cubic area than that of the tractor ram cylinder.

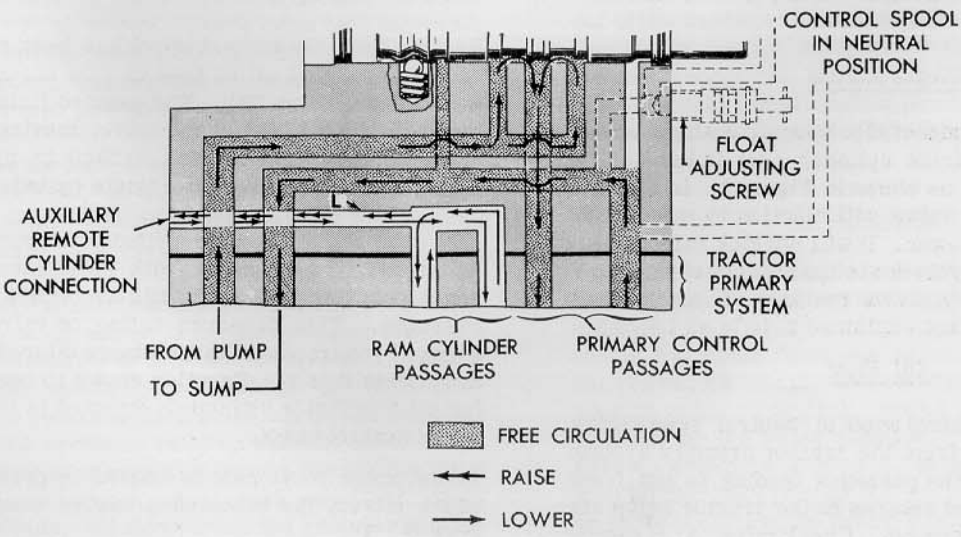
OPERATION

Figures 1 through 5 represent schematic oil flow diagrams for the Ford Remote Control Valve. An effort should be made to become familiar with these schematics as a knowledge of the flow characteristics will aid materially in trouble shooting and servicing of the valve assembly.

NOTE: Since the remote valve may be used for either single or double acting remote cylinder applications, the schematic diagrams cover both installations. It should be remembered that even though the schematics and their accompanying explanations cover a full raise or lowering situation, this does not mean that these



NEUTRAL POSITION (SINGLE ACTION)



AUXILIARY FLOW (VALVE NOT OPERATING)

Figure 1

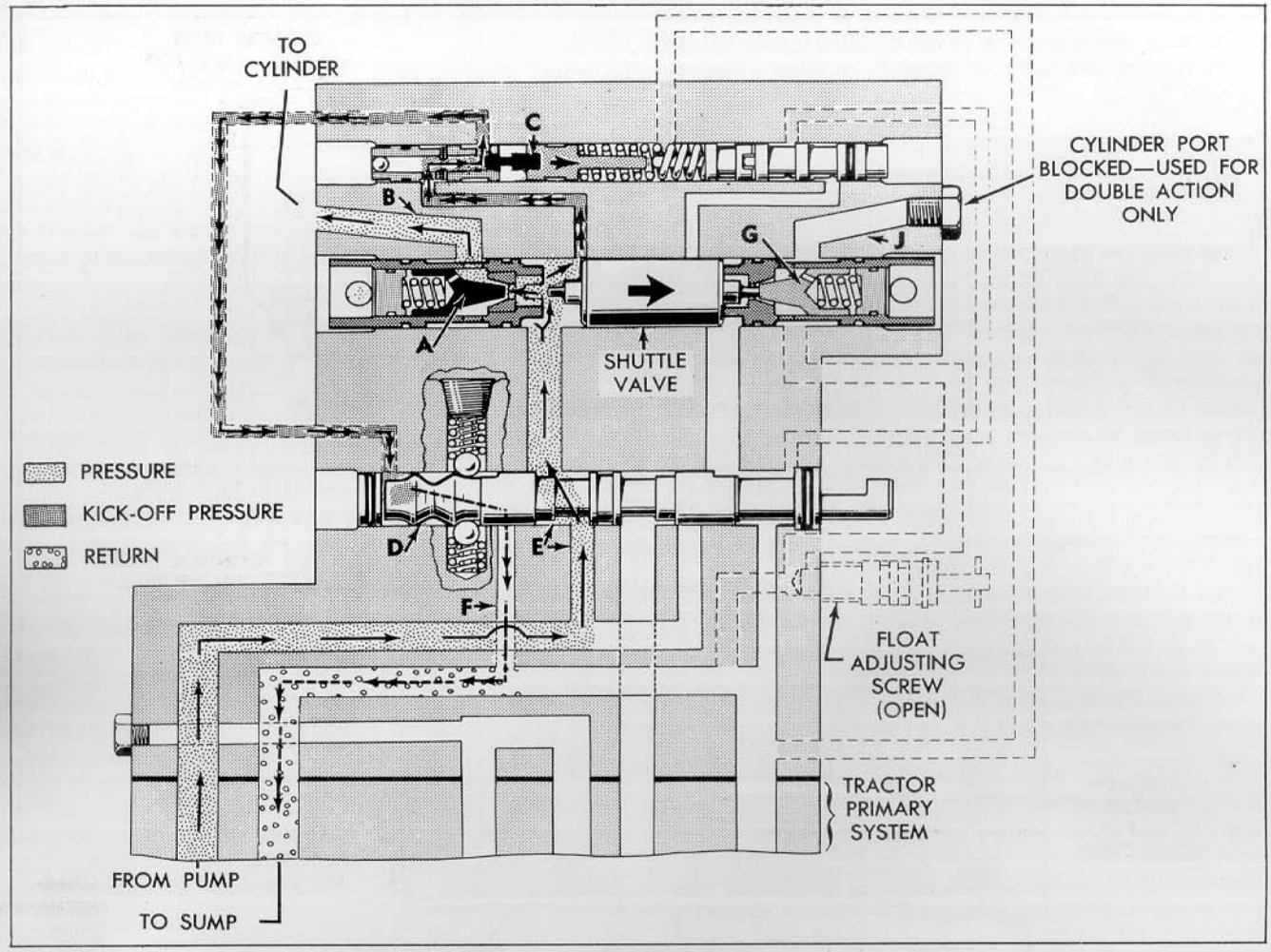


Figure 2

Raise and Kick-Off (Single Action)

cycles cannot be interrupted. If only a partial raise or drop action is desired, the valve handle can be manually returned to neutral for any given position of the remote cylinder or cylinders.

Single Action

When the valve is connected to operate a single acting cylinder, only the front cylinder port is used. The rear port is plugged as shown in Figure 1. In a single acting capacity, the valve will function to raise, kick back to neutral and lower. It will not kick back to neutral at the lowering cycle due to the absence of pressure that is required to activate the kick off mechanism. The various cycles are explained briefly as follows.

Oil Flow

Neutral: With the control spool in "neutral" (see Figure 1) oil being pumped from the tractor primary system circulates through the passages leading to and from the control spool and returns to the tractor sump via the tractor primary system. Check valve "A" is seated either by spring tension or back pressure on the remote cylinder; therefore, there can be no return flow from the cylinder port "B". In this situation there is no movement of the remote cylinder.

Raise and Kick-off: When the control spool is shifted to "raise" position, as shown in Figure 2, there are two flow sequences as follows:

Raise: Since the control spool has been shifted from neutral, pumped oil is free to flow across the spool and to check valve "A". The pumped fluid overcomes the resistance of the check valve, moving the shuttle valve as shown and passes on through cylinder port "B" to raise or extend the remote cylinder.

Kick-Off: As the remote cylinder reaches the end of its stroke, the oil meets with resistance to its flow and a resulting pressure build-up occurs in the valve passages. This pressure acting on valve "C", (see Figure 2) overcomes the resistance offered by the valve and moves it in the direction shown to open a passage for oil flow that is ultimately directed to the detent end of the control spool.

Actual spool movement is caused by pressure at "D" which offsets the balanced pressure condition in the area of "E".

At the moment the control spool is kicked back to neutral, oil being pumped from the primary system flows freely through the valve passages leading to and from

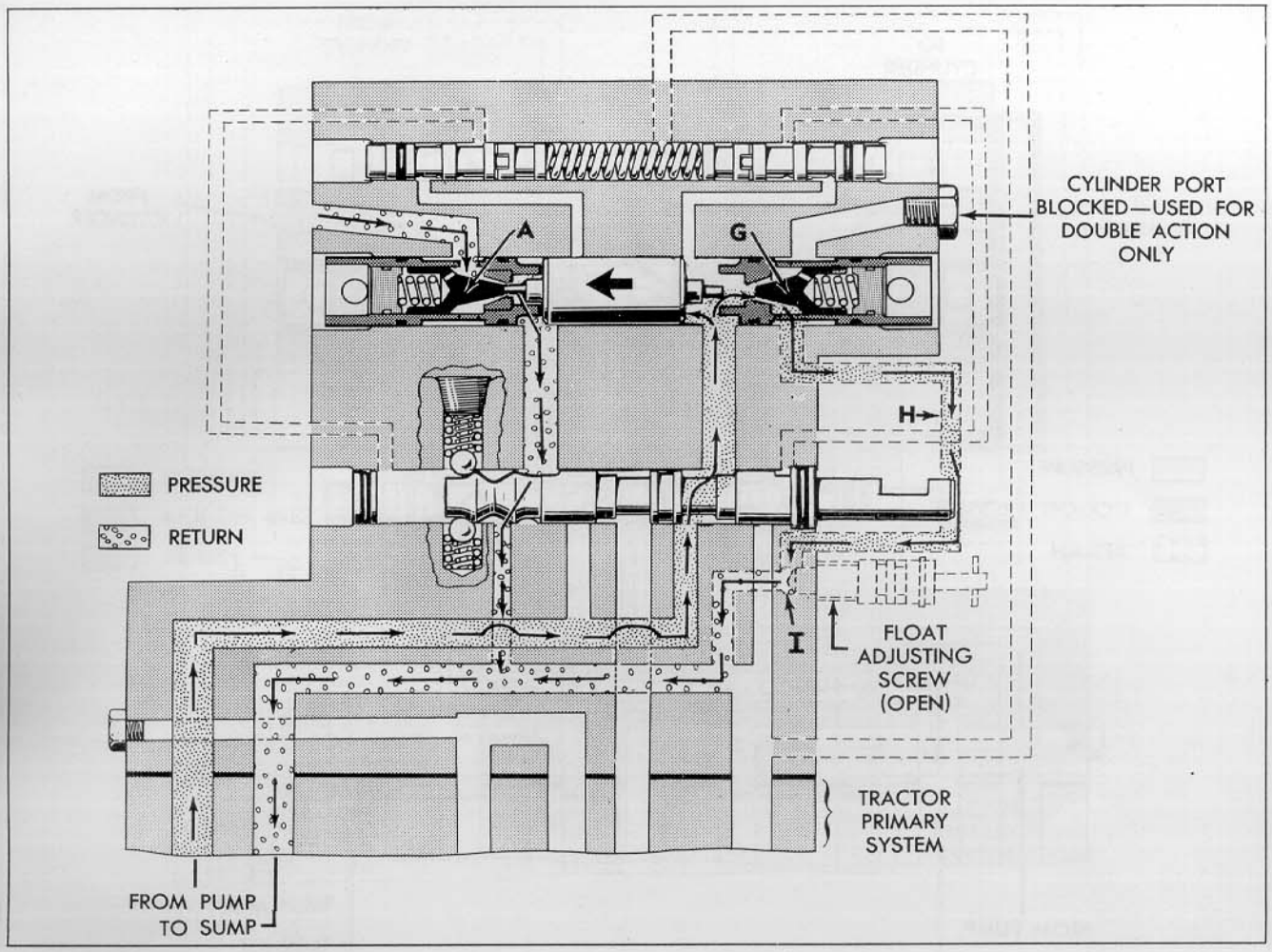


Figure 3

Lower or Drop (Single Action)

the spool as shown in Figure 1. At the same time, oil in area "D", Figure 2, and leading to area "D" from the kick-off valve "C" is free to flow back to the sump via passage "F" as shown. Check valve "A", however, seats due to spring loading and thereby traps oil in the remote cylinder, causing the cylinder to maintain its raise or extended position.

Lower: When the control spool is shifted to the "lower" or "drop" position, as shown in Figure 3, there are two simultaneous flow sequences within the remote valve as shown.

Oil being delivered from the pump flows across the spool and to check valve "G". The pumped oil overcomes the resistance of this check valve and moves it in the direction shown to open passage "H" which permits the oil to return to the tractor sump. At the same instant that the pressure build-up unseats check valve "G", this same pressure also moves the shuttle valve in the direction shown to unseat check valve "A". With check valve open, oil flows from the remote cylinder through the check valve and back to the tractor sump with a resulting lowering or dropping of the cylinder.

NOTE: In the "lower" position, there is no kick-back sequence and the control spool must be manually returned to the neutral position. This is due to the fact that the float adjusting screw (see Figure 3) is backed out of the passage "H" sufficiently to permit return oil flow to the tractor sump under reduced pressure. If the adjusting screw were turned "in" sufficiently, the kick-off cycle would function prematurely. Screw adjustment should be such that a smooth lowering action is obtained.

Double Action

When the remote valve is connected to operate a double acting cylinder, both cylinder ports in the valve are utilized. In a double acting capacity, the valve performs the same functions as in single acting applications except that the kick-off cycle which returns the control spool to neutral, works in the lower position as well as the raise position. The float adjusting screw, shown in Figure 4, is normally closed, but may be partially opened for certain applications such as those involving the dozer blade. See Page 7 for flow description. The various cycles for double acting operations are explained as follows.

Neutral: Oil flow in the neutral position is the same

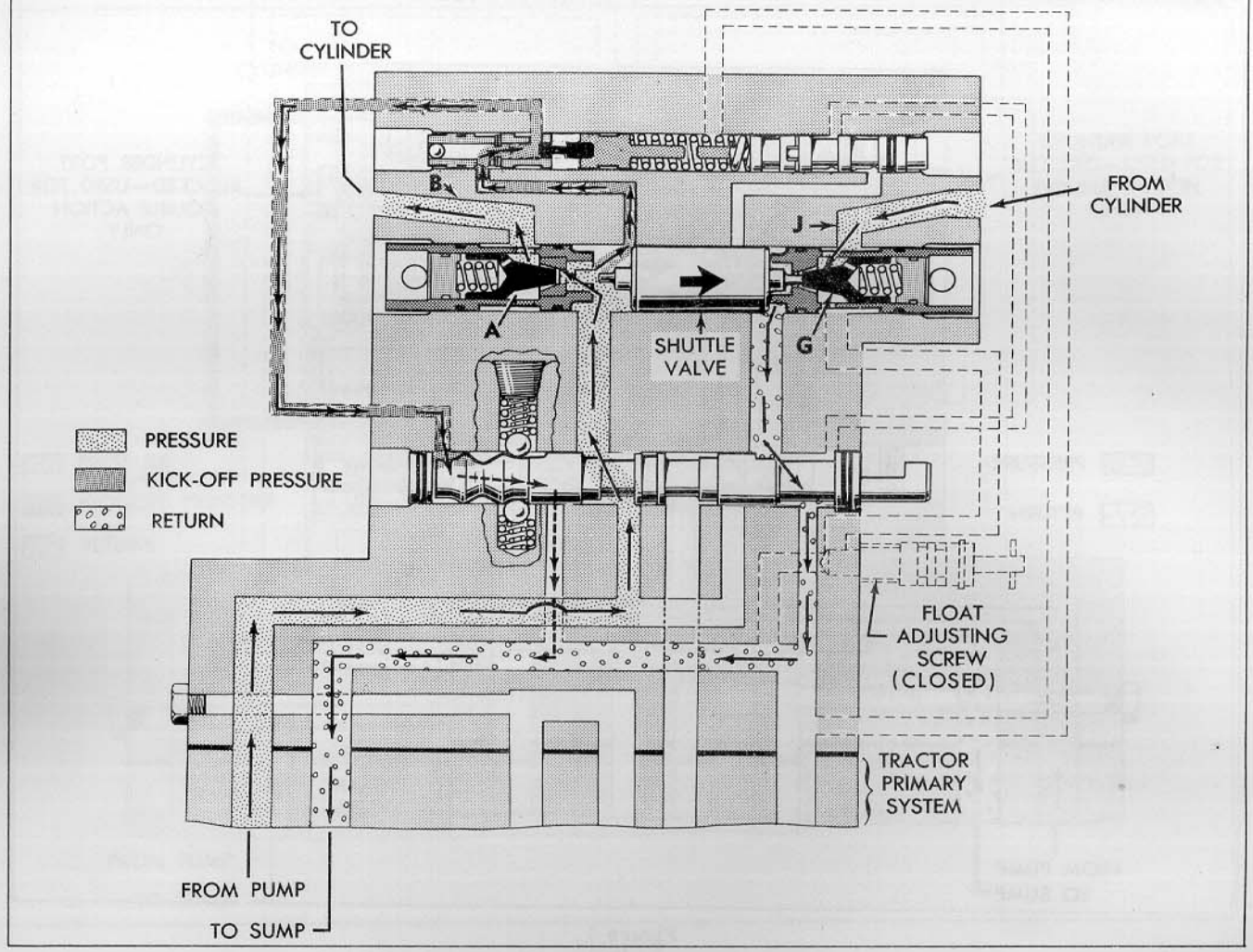


Figure 4

Raise and Kick-Off (Double Action)

as shown in Figure 1 for single acting applications. However, as shown in Figure 4, passage "J" is connected to the opposite end of the remote cylinder instead of being plugged as shown in Figure 1. Check valves "A" and "G" are both closed to return oil flow; therefore, there can be no movement of the cylinder.

Raise and Kick-Off: When the control spool is shifted to the "raise" or lift position as shown in Figure 4, oil is pumped to the remote cylinder from passage "B" in exactly the same manner as described previously for single action operation. However, at the same time, oil can now be unloaded from the opposite end of the remote cylinder through passage "J" and check valve "G" which opens a flow path back to the tractor sump as shown.

As the remote cylinder nears the end of its raise or lift stroke, the kick-off cycle produced by a pressure rise in the valve passage, returns the control spool to neutral in exactly the same manner as described for single action operation.

In this case, however, when the control spool is returned to neutral, both check valves "A" and "G" close off any return flow from the remote cylinder, causing a holding action on the raise position of the cylinder when the control spool is in neutral.

Lower and Kick-Off: When the control spool is shifted to the "lower" or drop position as shown in Figure 5, it will be noticed that oil flow has reversed from the flow shown in Figure 4.

Oil is now pumped through passage "J" to one end of the remote cylinder. Oil at the opposite end of the remote cylinder is forced through passage "B" and back to the tractor sump as shown.

When the cylinder nears the end of its lowering stroke, the kick-off cycle induced by a pressure rise in the valve passage returns the spool to neutral by overcoming the resistance of valve "K" which permits pressure flow to the front end of the control spool as shown. As was the case in raise position, check valves "A" and "G" close off any return flow from the remote cylinder, causing a holding action on the lowered position of the cylinder when the control spool is in

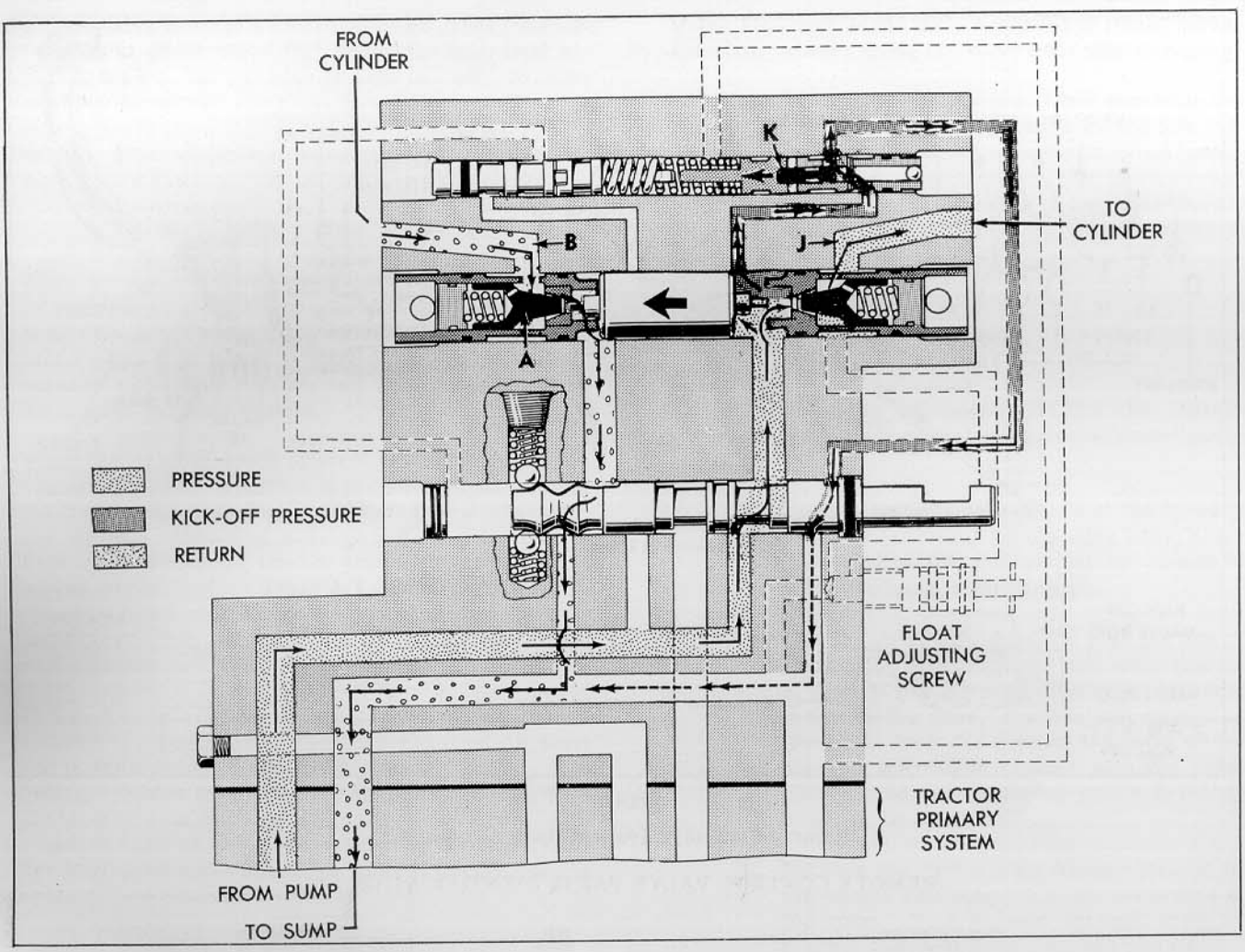


Figure 5
Lower or Drop and Kick Off (Double Action)

neutral.

Float Action

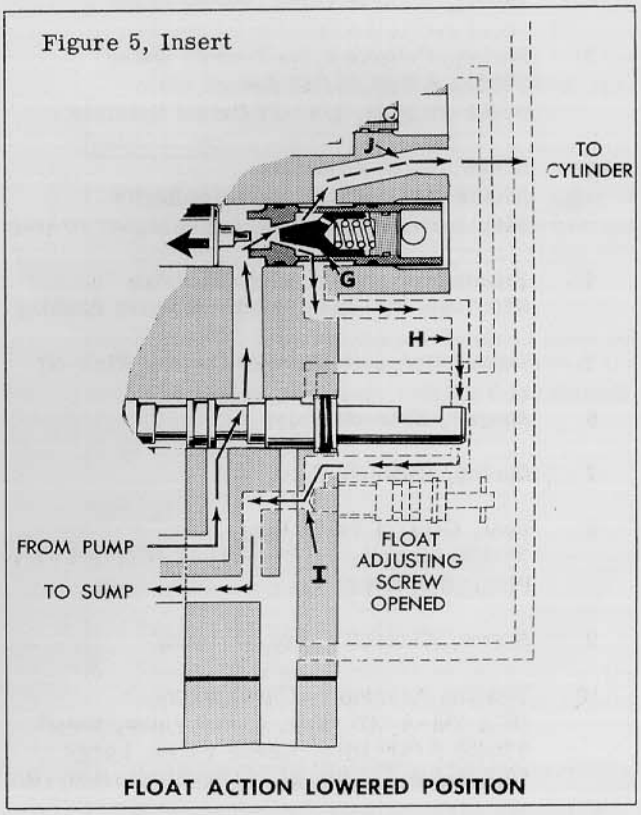
In cases where the double acting remote valve application requires a floating of the cylinder in the lowered or drop position, the float adjusting screw shown closed in Figure 5, is opened and the control handle placed in the down or lowering position.

If it is necessary to maintain a down pressure (as in the case of the dozer blade) the float adjusting screw is only opened approximately 1/4 turn.

Float is accomplished as follows:

Pumped oil flowing past check valve "G" and to the cylinder port "J" lowers the cylinder as shown in Figure 5. In the insert to Figure 5, however, passage "H" also leading from the check valve is opened to passage "I" which permits part of the pumped oil to flow back to the tractor sump as shown. In this situation there is insufficient pressure build-up in the kick-off valve passages to cycle the control spool from "lower" to neutral and the control spool remains in the "lower" position. Since check valve "A" is held open by the

Figure 5, Insert



FLOAT ACTION LOWERED POSITION

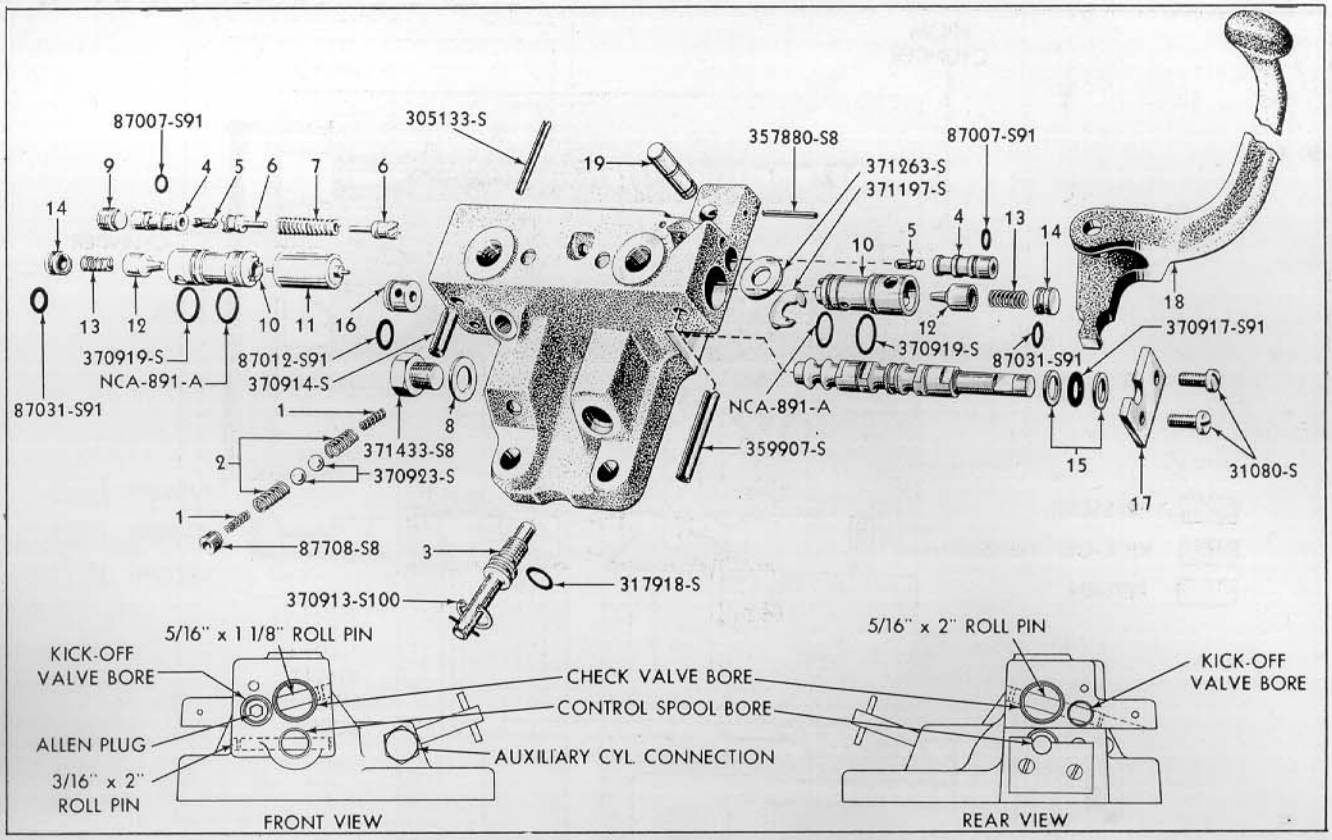


Figure 6

Remote Control Valve and Hose Adapter Kit

REMOTE CONTROL VALVE PARTS IDENTIFICATION LIST

No.	Description
1	Spring, Control Valve Detent, Inner
2	Spring, Control Valve Detent, Outer 370923-S Ball, 5/16" Detent 87708-S8 Plug, 1/8"-27 Detent Retainer
3	Screw, Float Adjusting 370918-S "O" Ring, Adjusting Screw 370913-S100 Ring, 11/16" Adjusting Screw Snap
4	Bushing Assembly, Kick-off Valve 87007-S91 "O" Ring, Kick-off Valve Bushing
5	Valve, Hydraulic Remote Control Kick-off
6	Spacer, Kick-off Valve
7	Spring, Kick-off Valve
8	Seal, Control Valve Plug 371433-S8 Bolt, 9/16"-18 x .62 (Control Valve Plug) Hex Head
9	Screw, Kick-off Valve Adjusting
10	Bushing Assembly, Check Valve NCA-891-A "O" Ring, Check Valve, Small 370919-S "O" Ring, Check Valve, Large 370914-S Pin, 5/16" x 1.12 (Bushing to Body) Roll
11	Shuttle, Check Valve
12	Valve, Remote Control Check
13	Spring, Check Valve
14	Plug, Check Valve 87031-S91 "O" Ring, Check Valve Plug Valve, Remote Control - N.S.
15	Washer, Remote Control Valve 370917-S91 "O" Ring, Control Valve
16	Plug, Control Valve 87012-S91 "O" Ring, Control Valve Plug 305133-S Pin, 3/16" x 2" (Plug to Body) Roll
17	Plate, Control Valve 31080-S Screw, 1/4"-20 x .62 (Plate to Valve Body) Fill. Hd.
18	Handle, Control Valve
19	Pin, Handle Retaining 357880-S8 Pin, 1/8" x 1.25 (Retaining Pin) Spring 371263-S Washer, 7/16" Flat 371197-S Ring, 7/16" Handle Retaining

shuttle valve and since there can be no great pressure build-up at check valve "G" due to the open float adjusting screw, the cylinder is free to float, or move in either direction.

NOTE: This application is desirable in dozer blade work where grading obstructions are encountered.

Auxiliary Flow

When the remote control valve is not in use, oil can be ported from the valve to operate a single acting remote cylinder in conjunction with the tractor hydraulic lift system. The insert to Figure 1 shows the auxiliary passage which taps into the ram cylinder passages of the tractor primary system.

When the tractor touch control lever is moved to "raise" position, a portion of the pumped oil flows to the tractor ram cylinder, and also to the remote cylinder through connecting passage "L" as indicated in Figure 1. When the tractor touch control lever is moved to the "lower" position, oil from the remote cylinder flows back through "L" to the ram cylinder passage where it joins return oil flow from the tractor ram cylinder and flows to the primary syster sump.

NOTE: The raising and lowering action of this remote cylinder is dependent upon the tractor hydraulic system and is independent of the remote control valve. The remote cylinder must require less pressure than does the tractor ram cylinder for correct operation. If it requires equal or more pressure, then the ram cylinder hold-down arms should be used on the tractor lift arms.

SERVICE PROCEDURES

Valve Orientation: Throughout the manual, referenence will be made to a specific side, top or bottom of the valve assembly. These references should be associated with the position of the unit when it is installed on the tractor.

Parts Identification: Prior to servicing the valve assembly, study the exploded view, plus the front and rear end views shown in Figure 6. These illustrations will help to identify the components and to orient them as to location in their respective bores.

Valve Manifold: Since the valve assembly is to be clamped in a vise during disassembly and reassembly, the machined face of the manifold plate at the bottom of the valve must be protected. Remove the nine "O" rings from the counterbores, wipe the face clean and apply strips of masking tape over the entire area of the machined face.

Cleanliness: As with any hydraulic unit, the Ford Remote Control Valve must be protected against dirt or other abrasive materials that may enter the ports and passages of the assembly. The exterior of the valve should be cleaned with kerosene after removing the unit from the tractor and a clean work surface should be available for use in servicing valve components. Handle all parts carefully. Avoid dropping valve components which can only lead to surface damage.

Valve Flushing: If the valve assembly is totally disassembled, always flush the valve body with kerosene.

"O" Rings and Valve Components: When servicing any portion of the valve assembly, always install new "O" rings. Lubricate them with hydraulic oil to aid installation. All valve components should also be immersed in hydraulic oil prior to inserting in the valve bores. This will reduce friction and lessen the possibility of scratching the contacting surfaces.

VALVE HANDLE

Removal:

1. Place the valve assembly in a vise (handle end up) and move the handle to "raise" position.

2. Using a suitable drift or rod at the forward end of the pivot ear on the valve body, drive the 1/8" x 1-1/4" roll pin out far enough to clear the handle retaining pin.

   NOTE: On some valves the yoke portion of the handle may interfere with the removal of the roll pin due to insufficient clearance. If this is the case, remove just enough of the metal from the yoke at the point where the roll pin makes contact with the yoke. This can be accomplished with a grinding wheel or by filing.

3. Remove the "U" spring washer located on the handle retaining pin at the underside of the yoke. This is best accomplished by placing a screw driver across the flats of the washer and then striking the side of the screw driver with a hammer blow. Remove the flatwashers, handle retaining pin and slide the handle off of the valve pivot ear.

Installation:

1. Install the handle using the reverse order of the steps given for removal. Make certain, however, that the handle lug engages the slot in the spindle of the valve spool.

2. If the "U" type spring pin retainer does not force the handle yoke against the bottom face of the valve pivot ear, replace this retainer.

B. Float Adjusting Screw

Removal:

The float adjusting screw is located on the right side toward the rear of the valve.

1. Turn the screw in until it seats.
2. Remove the snap ring from the I.D. of the adjusting screw bore using Waldes Truarc No. 1 pliers.
3. Turn the screw counterclockwise to remove.
4. Remove the "O" ring from the assembly.

Inspection:

Check the tapered shoulder of the screw assembly. If it is damaged, out of round, or shows any indication that leakage could occur when the shoulder is in its seated position, replace the assembly. Check the bore in the valve body. Make sure that all dirt particles or paint chips are removed by flushing with kerosene.

Installation:

1. Install a new "O" ring on the float adjusting screw assembly and start the assembly straight into the bore to avoid cross threading.
2. Turn the screw in far enough to clear the annular snap ring groove in the bore of the valve body.
3. Install the snap ring and check to make sure it is fully engaged in the annular groove.
4. Turn the screw assembly clockwise until it is finger tight. Recommended torque is 10 to 15 ft. lbs.

KICK-OFF VALVES

The kick-off valve components are contained in a bore that runs the length of the valve body. These parts are retained in the bore by an adjusting screw at one end of the bore and a roll pin at the opposite end. See valve "end" views, Figure 6.

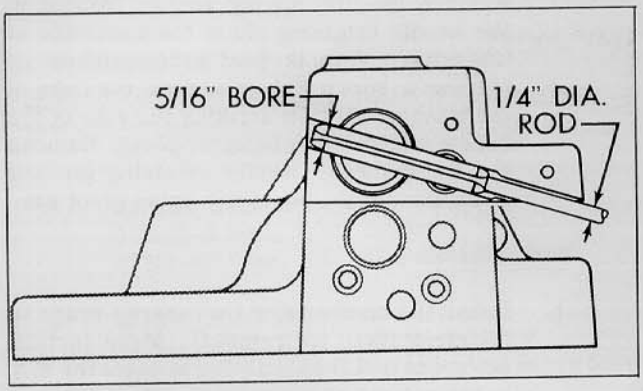


Figure 7

Roll Pin Removal - Rear View of Valve

Removal:

1. Remove the kick-off valve adjusting screw from the bore at the front end of the valve body, using a 1/4" Allen wrench.
2. Remove the handle from the opposite end of the valve body to gain access to the pilot hole for removing the 5/16" x 2" roll pin which secures both the kick-off valve components and the check valve components.
3. Drive this roll pin clear of the kick-off valve bore, using a 1/4" diameter rod or drift inserted in the pilot hole at the bottom face of the handle pivot ear on the valve body. See Figure 7.

IMPORTANT: Move the roll pin only in the direction shown in Figure 7. If the pin is driven from the opposite end, it will be tightly compressed into the 1/4" pilot hole.

4. Stand the valve assembly on a wood surface with either end facing up and rap the opposite end sharply on the wood surface to dislodge one of the kick-off valve bushing assemblies from the bore.

   NOTE: These bushing assemblies fit snugly in the bore due to the use of an "O" ring on the O.D. of each bushing.
5. With one bushing removed from the bore, slide the two kick-off valves, spring, and the two kick-off spacers from the bore.
6. Remove the remaining bushing assembly from the opposite end of the bore by tapping it out with a blunt rod inserted in the bore. Use a rod that has a diameter smaller than the bore diameter and avoid any contact of the rod with the polished surface of the bore.

Inspection:

Examine the lands of the kick-off valves for scoring. Also check the I.D. of the two bushings for similar scoring. Replace the bushing and kick-off valves if scoring or damage is noted.

NOTE: The two bushing and kick-off valve assemblies are interchangeable and may be used at either end of the bore. However, an attempt should be made to keep the valves with their respective bushings.

Replace the two spacers and the kick-off spring if any damage is noted. Use new "O" rings on the O.D. of the two bushings. The kick-off valve adjusting screw is of the dry seal thread type and should be replaced if the threads show any signs of damage.

Installation:

NOTE: If the check valve (See Figure 6) ar also going to be serviced, do not install the kick-off valve components at this time. Service the check valves first (See Page 12 for these instructions).

1. Lubricate all kick-off valve parts in hydraulic oil and flush the bore in the valve body assembly with kerosene.
2. Place each kick-off valve in its respective bushing assembly bore as shown in Figure 8.

   IMPORTANT: If the kick-off valves are installed in the bores in the reverse of the position, shown in Figure 8, the kick-off mechanism will always remain open to fluid flow. This will cause premature neutral positioning of the valve spool.

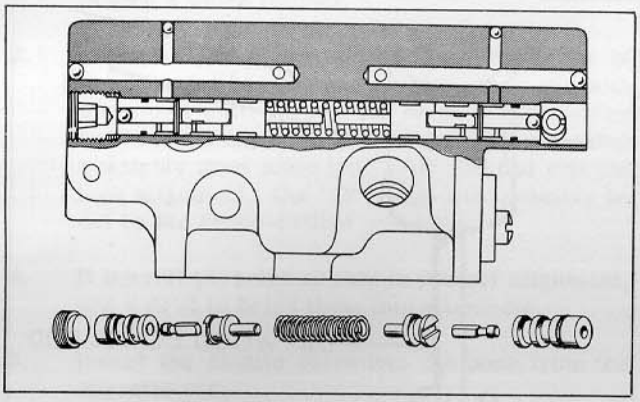


Figure 8
Kick-Off Valve Component Sequence

3. Clamp the remote valve assembly in a vise so that the kick-off valve bore is parallel with the floor, and start one bushing and valve assembly into the bore at the rear, or roll pin end of the valve body.

   IMPORTANT: The kick-off valve bore is counterbored at each end, which permits easy insertion of the bushing assemblies to a point where the counterbore ends. From this point on, however, the "O" ring on the O.D. of each bushing will offer resistance. In addition, the kick-off valve bore has cross drilled passages which will cut the bushing "O" rings if the bushings are inserted beyond their respective locations. To avoid possible leakage as a result of cut or torn "O" rings, follow Steps 4 through 7 carefully.

4. Use a small diameter rod and hammer to tap the bushing assembly into the rear end of the bore. Work slowly until the bushing end just clears the roll pin hole running at a right angle through the bore and valve body. If the bushing assembly goes more than 3/8" beyond the roll pin holes in the bore, the "O" ring may be damaged.

5. Sight through the opposite end of the bore to make sure that the kick-off valve has not fallen out of the bushing assembly.

6. Place one spacer into each end of the spring and slide the assembly into the bore from the threaded end.

7. Start the remaining bushing assembly into the threaded end of the bore and tap it slowly inward to overcome the resistance of the "O" ring. The bushing assembly is properly located when it just clears the bore threads.

8. Install the kick-off valve pressure adjusting screw in the bore. Turn the screw in until it is flush with the end of the remote valve body.

   NOTE: The position of this screw determines the pressure requirements for actuating the kick-off valves. Therefore, the screw must be adjusted during actual operation of the remote valve assembly. See Page 16 for adjustment procedures.

CHECK VALVES

Components of the two check valves are contained in a bore that runs the length of the valve body and are retained by a roll pin at each end of the bore. See valve end views, Figure 6.

IMPORTANT: The check valves cannot be serviced without disturbing the kick-off valve components. This procedure necessitates removal of the kick-off valve components first, followed by removal and installation of the check valves and finally by installation of the kick-off valves.

Removal:

Prior to disturbing the kick-off valve adjusting screw, measure the distance from the top of the screw to the top of the kick-off valve bore. Note this distance so that the screw can be re-installed the same distance into the bore, thus assuring the correct kick-off adjustment setting.

1. Follow Steps 1 through 6 for kick-off valve components removal.

2. Drive the 5/16" x 1-1/8" roll pin clear of the check valve bore at the front end of the remote valve body. See Figure 6.

3. Drive the 5/16" x 2" roll pin clear of the check valve bore at the rear end of the remote valve body. See Figures 6 and 7.

4. Remove the two check valve bushing assemblies, one located at each end of the bore, by angling a rod or drift into one of the roll pin holes as shown in Figure 9. Strike the rod or drift with a hammer in the direction shown until the bushing assemblies

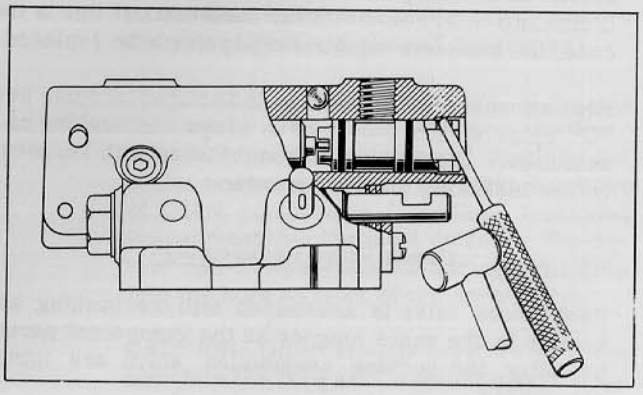


Figure 9
Removing Check Valve Bushing

can easily be removed from the bore. Use this same procedure for each bushing assembly.

5. Slide the shuttle valve out of the check valve bore.

NOTE: The two bushing assemblies previously removed contain the check valve components which are serviced parts.

Bushing Disassembly

1. Remove the two "O" rings from the O.D. of each bushing assembly.

2. Stand one bushing assembly on end as shown in Figure 10 and use a 1/8" diameter wood dowel applied at the top of the check valve, as shown, to drive the plug out of the bottom of the bushing assembly.

3. Strike the wood dowel with a sharp blow in the direction indicated in Figure 10. This action will cause the check valve to bear against the spring. The spring in turn will force the plug out of the bore of the bushing. With the plug removed, the check valve and spring can be removed from the bushing bore.

4. Remove the "O" ring from the plug and repeat the disassembly procedures for the remaining check valve bushing assembly.

Inspection: Check the tapered end of each check valve for any irregularities that could cause fluid leakage when the valve is seated. Replace doubtful check valves.

Examine the check valve seat in each bushing assembly in the same manner and replace bushing assemblies with faulty check valve seats.

NOTE: The check valve seats are pressed into the bushing bores and are not serviced separately.

The check valve shuttle, under normal conditions of valve usage, should last indefinitely. However, if the shuttle is severely scored, chances are that the bore it fits into will be in a similar condition. If this is the case, the complete valve assembly should be replaced.

Replace check valve springs if damaged and use new "O" rings on the check valve plugs and bushing assemblies. Flush the check valve bore with kerosene before installing the components.

Check Valve Reassembly

Each check valve is assembled into the bushing assembly in the same manner as the component parts, including the bushing assemblies which are interchangeable.

1. Use Figure 10 as a guide and insert the check valve into the bushing bore and then drop in the spring.

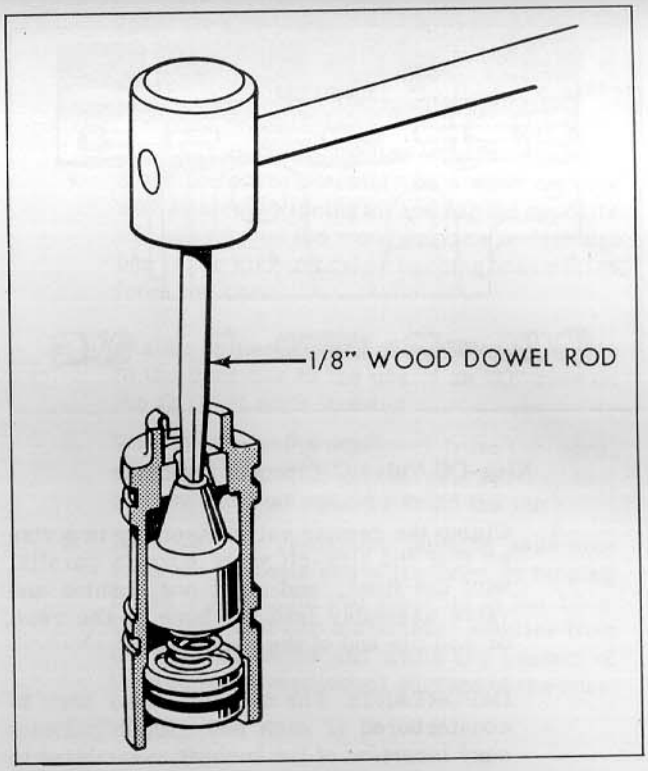


Figure 10

Check Valve Components Removal

2. Install a new "O" ring on the O.D. of the plug and start the plug into the bore with the counterbored face of the plug contacting the spring. (See Figure 10.)

3. Tap the plug into the bore (using a rod and hammer) until the plug just clears the roll pin holes in the bushing assembly.

4. Assemble the remaining check valve components in the other bushing in the same manner.

Installation:

1. Place the remote valve assembly in a vise so that the check valve bore is parallel with the floor.

2. Install new "O" rings, two each on the O.D. of both bushing assemblies, and start one of the assemblies into the check valve bore. Align the roll pin holes in the bushing with those of the bore.

NOTE: The check valve bore is counterbored at either end which permits an initial easy insertion of the bushing assemblies. However, these assemblies must be located further into the bore, which means that resistance will be met when the "O" rings are compressed. In addition, the bore is cross-drilled, and to prevent tearing the "O" rings, the bushings must not be inserted beyond the recommended distances given

in Step 3 which follows.

3. Place a 3/4" diameter rod against the face of the inserted bushing and tap the rod gently with a hammer until the roll pin holes in the bushing and those in the valve body align. If the bushing assembly goes more than 3/16" beyond roll pin hole alignment, the "O" rings will possibly be cut by the cross-drilled passages.

4. If the roll pin holes are not in perfect alignment, use a drift to bring them into alignment.

5. Insert the shuttle valve into the bore from the opposite end.

   NOTE: The shuttle valve may be inserted, either end first, as it is symmetrical.

6. Insert the remaining check valve assembly into the opposite end of the bore using the same procedures as previously outlined in Steps 1 through 4.

7. Before installing the roll pins through each end of the check valve bore, assemble the kick-off valve components in the kick-off valve bore by following Steps 1 through 8 for installation of kick-off valves beginning on Page 11.

8. After installing the kick-off valve components, install the front and rear roll pins working from the LEFT side of the valve body as follows:

   a. Drive the 5/16" x 2" roll pin through the rear check valve bushing assembly roll pin holes. Make sure that the holes in the bushing assembly and valve body are in alignment to avoid pin or bushing damage.

   b. Continue to drive the roll pin on through the rear kick-off valve bore. Make certain that there is clearance between the roll pin and the kick-off bushing assembly in this bore.

   c. After clearing the kick-off bushing assembly, drive the pin downward until it is flush with the top surface of the remote valve body.

   d. Remove the kick-off valve, pressure adjusting screw from the front end of the remote valve body.

   e. Drive the 5/16" x 1-1/8" roll pin, untapered end first, through the FRONT check valve bushing assembly roll pin holes. Make certain that the roll pin holes in the valve body and bushing assembly are in alignment as the pin is driven in.

   f. Drive the roll pin until the untapered end just clears the threads in the kick-off valve bore. IMPORTANT: If the pin is not inserted far enough it will not furnish sufficient support for the check valve assembly. Also, if the pin is installed tapered end first, it will not provide sufficient check valve bushing support.

   g. Reinstall the kick-off valve pressure adjusting screw and turn it in until it is flush with the front face of the remote valve body.

9. Assemble the valve handle to the pivot ear and install the valve assembly on the tractor (see Form SE 6803 for these instructions if required).

10. Adjust the kick-off valve adjusting screw setting to the dimension previously noted at removal.

CONTROL VALVE SPOOL AND DETENT MECHANISM

There are two sets of control valve spool detent components located, one set on each side of the control valve spool in a cross-drilled passage at the forward end of the remote valve assembly. Servicing of these components requires the removal of the control valve spool which is not serviced separately from the body. However, the spool seal should be serviced at every valve overhaul.

Detent and Control Valve Components - Removal

1. To remove the left set of detent components, place the remote valve handle in the neutral position and remove the 1/8" pipe plug from the left front side of the valve body.

2. To remove the LEFT set of detent components, turn the valve assembly upside down (cup one hand over the detent passage) and shake out one outer and inner detent spring, plus one detent ball.

3. Place the remote valve assembly in a vise and drive the 3/16" x 2" roll pin clear of the control valve plug located in the spool bore at the front end of the valve (see valve end views, Figure 6).

4. At the rear end of the remote valve, remove the valve spool and plate (2 capscrews).

5. Position the remote valve handle all the way forward or toward the lowering position. This will pull the valve spool partially out of the body and release the right hand set of detent components from their tensioned engagement with the spool detents. The detent ball and possibly the springs will drop into the bore in front of the spool.

   CAUTION: Do not attempt to return the spool back into the bore as this action may damage or even break the smaller of the two springs, particularly if the small spring becomes hung up in the cross passage.

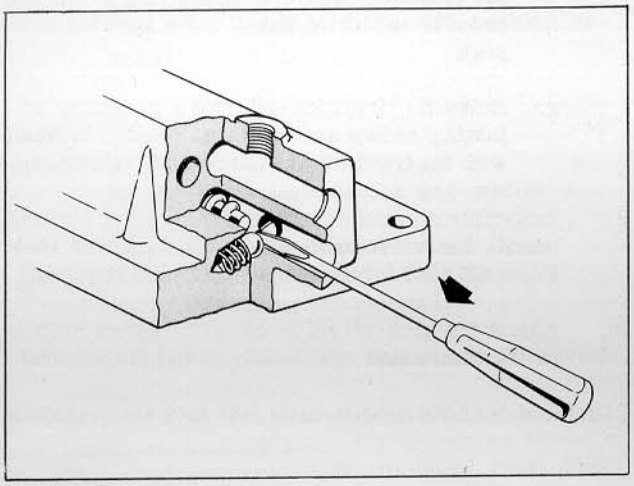


Figure 11

Depressing Detent Components

6. Disengage the pivot end of the handle from the slot in the spool spindle by swinging the handle all the way forward.

7. Pull the valve spool with the assembled washers and "O" ring seal from the body bore. Cup one hand over the bore opening. Tip the valve on end and shake the two springs, plus the detent ball, from the bore.

   NOTE: If the springs become cocked in the cross-passage, they can be removed by inserting a hooked wire through the threaded end of the cross-passage on the left side of the valve body.

8. Knock out the control valve plug located at the front end of the spool bore by inserting a wood dowel (narrower than the bore diameter) into the rear end of the spool bore. Be careful not to score the polished I.D. of the bore. The plug has an "O" ring on its O.D. and will offer some resistance before it can be dislodged from the bore.

Detent and Control Valve - Inspection:

1. Check the detent balls for dents, flats, or any irregularities that would hamper a rolling movement or produce drag on the spool detents during operation. Replace defective detent balls.

2. Replace broken or damaged springs.

3. The 1/8" pipe plug is of the dry seal thread type. Replace this plug if cross-threaded or other thread damage is evidenced.

Control Spool:

A defective control spool cannot be replaced or reworked. Use a new valve body and spool if excessive scoring or spool binding is noted. The valve body and spool are not available separately.

Spool Seal:

Examine the two flatwashers for burring at the I.D. and O.D. of the washers. Remove any burrs to provide for proper seating of the washers at reassembly.

Flush the spool bore in the valve body thoroughly with kerosene.

NOTE: If the valve assembly has been completely disassembled at this point, flush the body bores and all internal passages. This procedure should be followed at each overhaul.

Control Spool and Seal - Installation:

1. Insert the control spool in its bore (spindle end of the spool must be at the rear end of the valve body).

2. Install one flatwasher, "O" ring, and the remaining flatwasher on the spool spindle loosely.

3. Engage the handle ear in the slot of the spool spindle.

Detent Components:

The detent balls and springs are interchangeable and may be installed in the cross-passage either to the right or left of the control spool using the following procedure:

1. With one hand hold the valve assembly on the bench so that the detent cross bore faces straight up and down. The spool bore in this case is parallel with the bench.

2. Position the control spool so that the detent end is just to the rear of the detent cross-passage from the open end.

   NOTE: With the spool positioned in this manner, it will prevent the detent spring from rolling into the spool bore during installation.

3. Prop the one set of inner and outer detent springs (held together by grease) into the cross-passage. The springs should be just about flush with the O.D. of the spool bore when fully inserted.

4. Drop one detent ball into the cross-passage so that it falls to rest on top of the two springs. As this may take more than one attempt, use the control spool and tilt the valve body slightly forward so that the ball rests against the spool end when it is dropped into the cross-passage. Use the spool to guide it onto the springs if necessary.

5. While still holding the valve assembly with the detent cross-passage facing straight up and down, insert a screw driver into the front end of the spool bore. Position the blade flat of the screw driver over the detent ball as shown in Figure 11.

6. Press the ball downward with the screw driver, and at the same time move the control spool forward until it slides sufficiently over the ball to prevent the ball from being forced out of the cross-passage by the compressed springs. Remove the screw driver as the ball contacts the underside of the spool.

   CAUTION: Check through the front end of the spool bore to make sure that the ball has entered the cross-passage and that the small spring has not jumped out or become cocked in the bore.

7. Slowly move the control spool into the bore so that the valve handle is in "neutral" position. DO NOT MOVE the spool again until the control valve plate is installed.

8. Drop the remaining ball into the cross-passage, then the inner and outer detent springs (greasing of these springs is not necessary).

9. Install the 1/8" pipe plug. Thread it into the cross-passage until there is no more than 3/64" distance from the top of the plug to the spot face on the valve body.

   IMPORTANT: The pipe plug position in the cross-passage determines the correct amount of detent spring tension on the control spool. Care must be taken not to screw the plug in further than its original position since this could cause spool to jam.

Spool Seal and Control Valve Plate:

1. Stand the remote valve on its front end and position the first flat washer into the counterbore at the control spool spindle end of the valve assembly. Work the "O" ring into the counterbore and finally the remaining flat washer.

2. Install the control valve plate and secure it to the valve body end with the two capscrews.

Control Spool Plug:

1. Install a new "O" ring on the O.D. of the plug and orient the roll pin hole in the plug with the corresponding holes at the front of the valve body.

2. Start the plug into the control spool bore. Tap the plug using a hammer and wood dowel to overcome the resistance of the "O" ring.

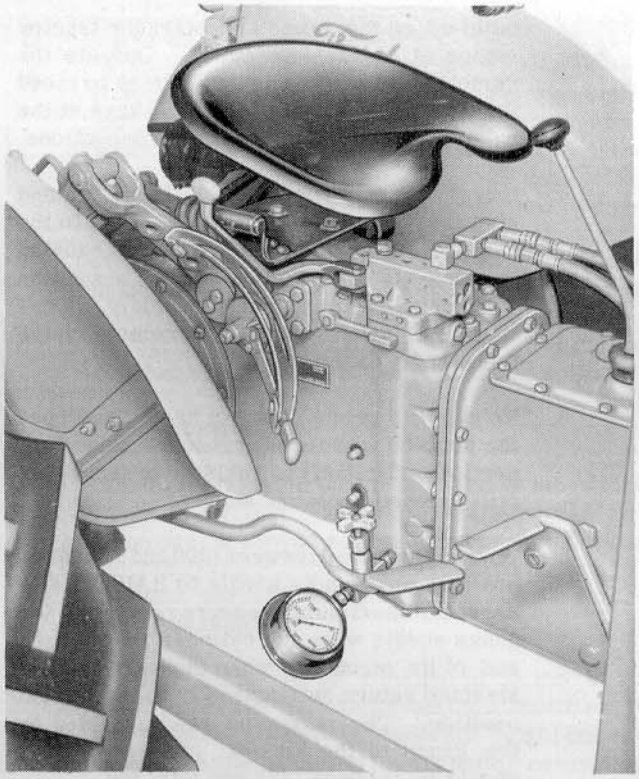


Figure 12
Kick-Off Pressure Adjustment Installation

   WORK SLOWLY, driving the plug into the bore until the roll pin holes align.

3. Secure the plug with the 3/16" x 2" roll pin previously backed off in the valve body. Drive the pin in until it is flush with the body face.

ADJUSTMENTS

Kick-Off Pressure

Any time the kick-off valve adjusting screw is disturbed, it will be necessary to readjust kick-off pressure unless the screw position has been measured prior to removing as outlined on Page 11 under "Removal". Once this adjustment has been established, the screw should not be tampered with unless valve servicing is required.

1. With the remote control valve installed on the tractor accessory pad, hook up valve-to-cylinder lines and check all connections. (See Form 6803 for installation instructions if required).

2. Install a pressure gauge (0 to 3000 PSI) equipped with a shut-off valve, to be used as a damper, to the 3/8" pressure port of the tractor primary hydraulic system. See Figure 12.

3. Close the shut-off valve to present pressure

build-up on the gauge and start the tractor engine at engine idle speed. Operate the remote valve circuit several times to bleed the system and check for oil leakage at the valve manifold face and all hose connections.

4. Increase engine speed to 1000-1200 RPM and hold the remote valve handle as close to the raise position as possible without causing the kick-off cycle to function. This action will cause the oil to heat up rapidly. Continue this process until the remote valve feels warm to the touch.

5. Release the remote control handle and open the shut-off valve in the pressure gauge connection sufficiently to register pressure but still dampen pressure surges.

6. With engine speed between 1000 and 1200 RPM, position the remote handle to RAISE. Observe the maximum pressure reading of the gauge needle when the cylinder reaches the end of its stroke or when the valve handle starts to return automatically to its neutral position. The maximum reading noted on the gauge is the kick-off pressure and it should be between 1725 and 1800 PSI.

7. If the reading is too high, turn the kick-off pressure adjusting screw (located at the front end of the remote valve) "OUT". If the reading is too low, turn the adjusting screw "IN".

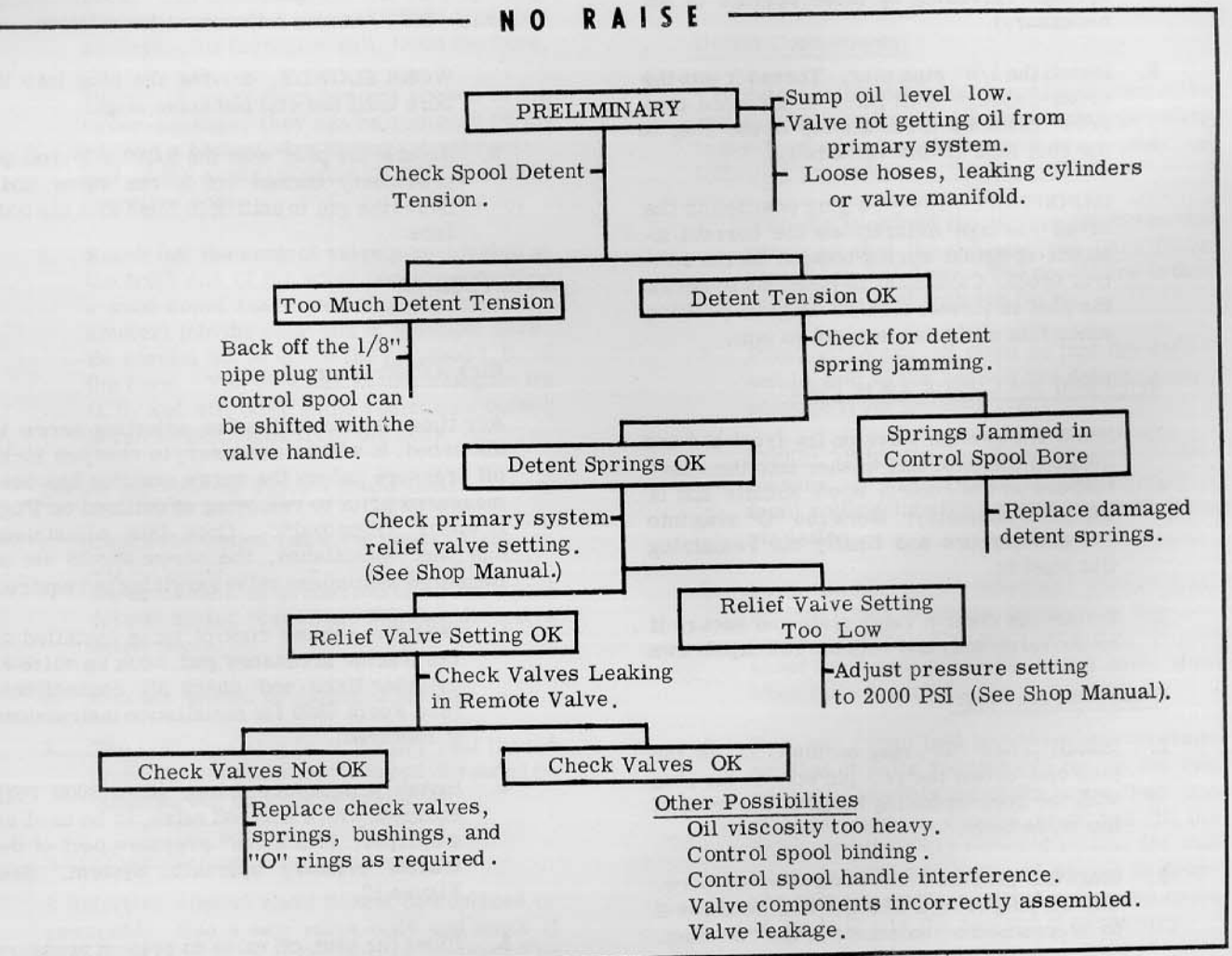
   NOTE: Several gauge readings may be required to make the adjustment, as the needle climbs quite rapidly at the end of the remote cylinder stroke. Use the shut-off valve to dampen the pressure shock on the gauge. This will help to establish a fairly accurate reading.

TROUBLE SHOOTING

In trouble shooting the Ford Remote Valve, always check to make sure that the tractor primary hydraulic system is functioning before disassembly of the valve components is considered.

A simple check for determining whether or not oil is being delivered to the valve from the primary system is to actuate the tractor lift links with the valve in neutral position. If the lift links operate properly, it can be assumed that the valve will also receive the necessary oil flow from the tractor primary system. By ruling out the possibility of a lack of oil flow, trouble shooting is narrowed down considerably.

NO RAISE



The road map and following suggestions are given to aid in the quick diagnosis of valve malfunctioning, plus coverage of any of the major related over-all system components that could contribute to faulty valve operation. These suggestions are offered merely as time savers and should not be construed as cure-all remedies for the complete hydraulic system.

A. No Raise
(See road map on Page 17.)

B. Premature Kick-Off Cycle

If the control valve spool kicks back to neutral before the raise (or lower - double action only) cycle is completed, this usually indicates incorrect kick-off valve adjustment.

Preliminary:

Check the valve kick-off pressure as recommended in this manual and adjust to 1725 to 1800 PSI.

Other Possibilities:

Check the kick-off valves for proper installation in the bushings. These valves may be installed backwards.

Check for faulty bushing "O" rings or a defective kick-off spring and replace these parts.

C. Kick-Off Cycle Does Not Function or Returns Slowly

When the control valve spool does not return to neutral from the raise position, or returns slowly the cause is usually due to one of two factors:

a. The tractor primary system relief valve setting is low.

b. The kick-off spring tension is too high.

Preliminary:

Check and adjust the primary system relief valve setting to 2000 PSI (see Tractor Shop Manual). Check the valve kick-off pressure as recommended in this manual and adjust to 1725 to 1800 PSI.

Other Possibilities:

Valve leakage.

D. Valve Re-cycles

If valve action is such that the control spool shifts automatically into lower position after being kickec off from the raise position, the valve is re-cycling. In most cases this action is caused by excessive engine speed such as intermittent wide open throttle and produces a sudden pressure surge that kicks the control spool past the n eutral position and into lowering action.

Re-cycling due to maximum engine RPM can be avoided by operating at normal engine speeds.

Other Possibilities:

Insufficient tension on the detent balls may cause valve re-cycling. Although this is highly improbable, it should not be overlooked. The detent components should be checked to make certain that parts have not been omitted or incorrectly assembled.

Another factor to be considered is the valve handle itself. If the handle has been modified in any manner, so as to increase its weight (an extension on the handle is an example) re-cycling can occur. Extra weight on the handle upsets its balance and the inertia developed during the kick-off cycle will carry the handle past neutral.

E. Valve Does Not Hold in Neutral

If the valve does not function to hold the remote cylinders in any given position, this is an indication of oil leakage.

Preliminary:

Check all hose connections at the valve and remote cylinders. Tighten loose connections and replace faulty hoses. Make certain that cylinder packings and seals are not leaking before servicing the valve assembly.

Inspect the check valve bushings, check valves, and springs. Replace any faulty components including the check valve assembly "O" rings.

Other Possibilities:

Faulty valve assembly. Replace the complete unit.