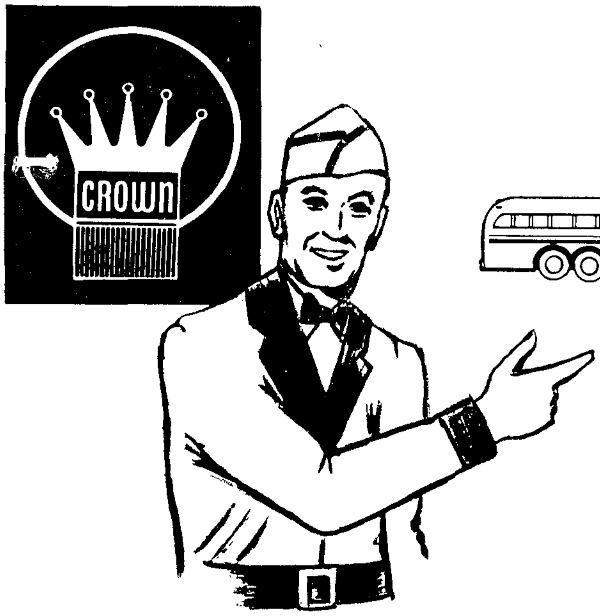
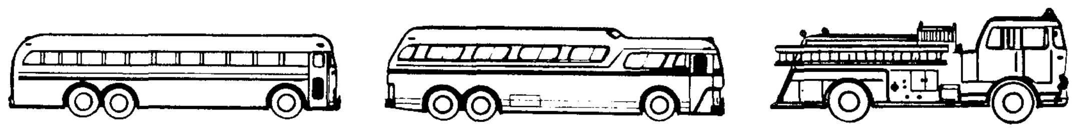
CROWN TIP SHEET





"YOUR CROWN COACH DESERVES THE BEST POSSIBLE CARE

MAY WE HELP YOU?"

POWER STEERING

Power steering gives both driver and vehicle owner many benefits. One of these benefits is the reduction in steering effort which reduces driver fatigue allowing longer runs with greater safety.

WHAT IS POWER STEERING

Power steering is essentially a hydraulic boost incorporated into the basic manual steering system. There is a fail-safe feature built into the power steering system in that it allows the mechanical steering to function without interruption in the event the power steering system fails.

POWER STEERING ELEMENTS

The three basic elements of the power steering system are the hydraulic pump, actuating or control valve and hydraulic cylinder. There are many different arrangements as to where these elements may be located within the system, depending upon the manufacturer. In all systems, however, the three basic elements will be found. As we further discuss power steering, the G-21 actuating valve, manufactured by Garrison, will be used as an example.

HYDRAULIC PUMP

The pump can be belt driven or direct driven off the vehicle engine. The hydraulic pump impeller is rotated by the vehicle engine. The impeller rotation pressurizes the power steering system hydraulic fluid which is pumped throughout the system under pressure. This fluid, under pressure, is the force that will give the power assist. The hydraulic pump, therefore, changes engine horsepower in to hydraulic energy that ultimately does the work.

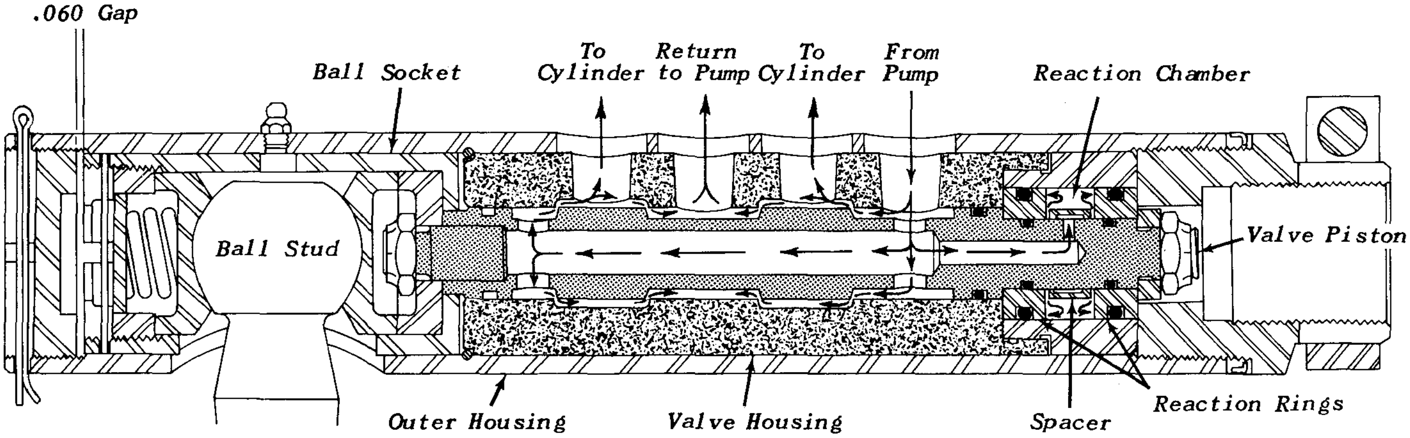
ACTUATING VALVE

The actuating valve is in all cases a mechanically activated valve that controls the directional flow of the fluid. It may be adapted to the mechanical steering system at various points. The Garrison G-21 valve is incorporated in the drag link. Either the forward or rear ball stud which holds the drag link in position fits into the actuating valve ball socket. This ball socket has a limited movement within the valve outer housing. This movement, undetectable to the driver, is the action that controls the entire power steering system. The ball socket has to move .035 minimum to .060 maximum of an inch in either direction from the center neutral position to obtain full power at the hydraulic cylinder. It is, therefore, very important that the ball socket is free to move back and forth in the outer housing.

HYDRAULIC CYLINDER

The hydraulic cylinder is designed to be double acting. There are fluid inlet ports on both ends of the cylinder which allow the fluid into the cavities on either side of the piston. The piston is designed to move in both directions from the center neutral position. The piston is connected to the mechanical steering system through a push rod or other means.

Fluid Flow Pattern with Actuating Valve Piston in Neutral Position.



NEUTRAL POSITION

The illustration is a cutaway of the Garrison G-21 actuating valve with arrows indicating fluid flow through the valve. The valve is drawn with the piston in the center or neutral position.

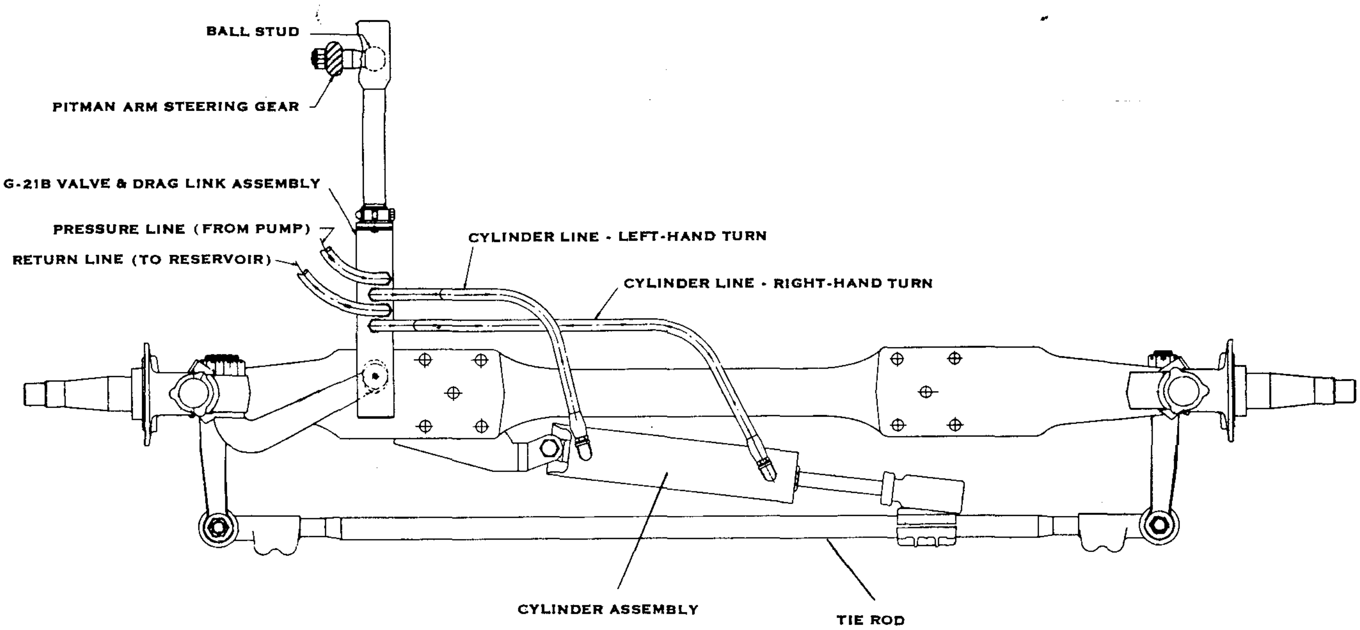
The pressurized fluid comes from the pump, thru a connecting hose, and enters the inlet cavity. A similar cavity is located at the left hand end of the piston which is also considered an inlet cavity. Fluid enters this second inlet cavity through the hollow piston.

The fluid is able to flow into the two adjacent cylinder cavities through a slight unsealed opening, designed into the valve. The fluid flows on into the hydraulic cylinder.

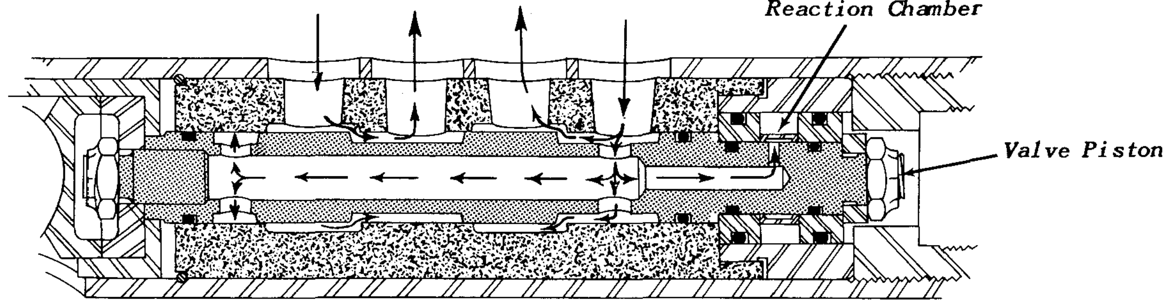
Excess fluid from the cylinder cavities is able to flow into the center or return cavity by means of the same type of unsealed opening as mentioned before. This excess fluid returns to the hydraulic pump completing the fluid cycle. The fluid pressure remains comparatively low as long as the valve piston is in the neutral position with the resulting equal forces exerted on oppisite faces of the hydraulic cylinder piston canceling each other.

REACTION CHAMBER

There is a small hydraulic cylinder type chamber incorporated into the valve at the right hand end of the piston which stabilizes the piston in the neutral position. This hydraulic cylinder is called the reaction chamber. The reaction chamber receives pressurized fluid from the pump through the hollow center of the piston. The pressurized fluid pushes on the faces of the two moveable pistons which are called reaction rings and forces them apart. When the reaction rings are at their extremes in their travel they hold the valve piston in the neutral position. Therefore, a force greater than the pressure exerted on the face of either reaction ring must be applied to the valve piston before it will move from the neutral position.



Power Steering Lay-out.



Fluid Flow Pattern with Actuating Valve Piston in Turning Position

TURNING

When the driver wishes to turn the vehicle he rotates the steering wheel in the required direct-ion. This moves the pitman arm on the steering gear in the corresponding direction. The drag link, connected to the pitman arm ball stud, also moves in the same direction.

When the force exerted by the pitman arm on the drag link is sufficient to overcome the force created by the reaction chamber which centers the valve piston, the ball socket within the valve housing will move .060 of an inch.

As you can see by the illustration the piston and ball socket move as a unit, This movement closes off the flow of fluid between the left hand inlet cavity and its adjacent cylinder cavity. At the same time enlarging the opening between the right hand inlet cavity and its adjacent cylinder cavity. This allows the total pressurized fluid output of the pump to be directed to one end of the hydraulic cylinder. The pressurized fluid, therefore, pushes on one side of the cylinder piston only. Since the fluid flow is prevented from entering the oppisite end of the cylinder, the piston moves away from the pressurized inlet port of the hydraulic cylinder toward the oppisite end.

The fluid on the un-pressurized side of the cylinder piston flows out of the cylinder into the actuating valve. The opening between the cylinder cavity and the return cavity was enlarged when the piston moved from the center position, allows the fluid to flow into the return cavity and back to the pump.

As long as the driver maintains the steering wheel in the turning position and the valve piston is in the off-center position the pressure will increase in the pressurized end of the hydraulic cylinder until the predetermined setting of the by-pass which is in the pump is reached. At this point the pressure is maintained in the cylinder, with excessive pressurized fluid returning to the pump.

When the valve piston is in the off center position the two reaction rings are forced against the spacer that seperates them. This shuts off the supply of pressurized fluid to the reaction chamber. This reduces the tendency for the valve piston to return to the neutral position.

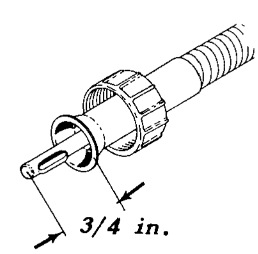
As the steering wheel is returned to the center position, the valve piston moves to the neutral position through the action of the pitman arm on the drag link. Pressurized fluid is gradually admitted to the un-pressurized side of the hydraulic cylinder until the center or neutral position is reached. At this point the balancing of pressures condition is achieved.

The actuating valve piston is able to move in either direction from the center neutral position thereby admitting pressurized fluid to either end of the hydraulic cylinder obtaining a right or left hand turn. Thus the actuating valve piston is normally in the center neutral position and will return to this position after the needed power boost is given to the mechanical steering system.

HOW TO MAKE FLEXIBLE SHAFT CORES

The accepted method for making replacement cores for speedometer or tachometer flexible drive shafts is as follows:

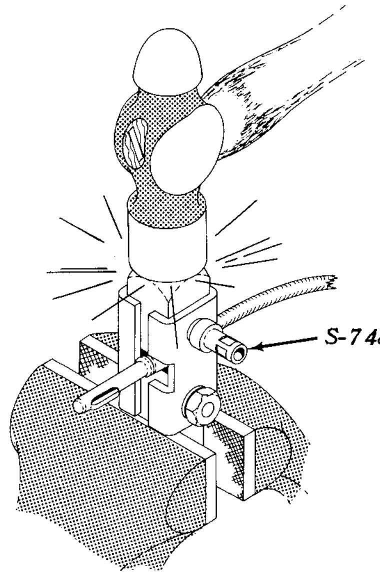
1. Disconnect both ends of the housing and remove the deffective core.
2. Obtain a length of suitable replacement core which is the proper diameter and approximately 6 inches longer than the old core.
3. Swage on the proper output or gauge core tip.



Tip projection of completed core.

4. Insert the replacement core into the gauge end of the housing tipless end first seating the tip firmly into the housing ferrule.
5. Cutoff the excess core at the input end of the housing leaving a 3/4 inch projection beyond the housing ferrule face. The overall length of the replacement core is now determined.
6. Remove the core from the housing.
7. Subtract the depth of the bore into which the core is inserted in the input core tip from the overall length of the tip. Cut this amount off the tipless end of the replacement core.
8. Swage on the input core tip.
9. Insert the replacement core back into the housing input tip first. Lubricate the core as it is being inserted into the housing by passing the core through light petroleum jelly held in the palm of one hand. Lubricate the rear 3/4 of the core only.
10. Connect both ends of the housing.

Swaging tool, part number S-748, is used for the crimping of tips onto replacement cores for speedometer or tachometer flexible drive shafts. This relatively inexpensive tool is available from our parts and service division.

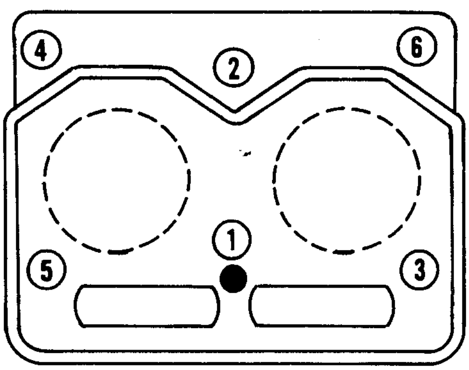


CUMMINS CYLINDER HEAD BOLTS

Cylinder heads on late style Cummins engines are being installed with one stud (part no. 100645) and five capscrews (part no. 188329). Formally, each head was mounted with six studs.

CAUTION: Do not attempt to use capscrews in blocks tapped for studs. The thread size and depth are different

1. Install stud in position number one with longest thread in block and 5-3/8 inches projection. Minimum 60 ft. lbs. torque required to seat stud.
2. Install cylinder head gasket, grommets and grommet retainers.
3. Using stud as a guide install cylinder head. Tighten the capscrews and stud nut in increments of 80 to 100 ft. lbs. torque to a final torque of 460 to 480 ft. lbs. using the accompanying tightening sequence.
4. Install remaining heads in the same manner.



Cylinder Head Tightening Sequence.