TERMS FOR HYDRAULIC CONTROL VALVES

POWER BEYOND (Also referred to as high-pressure carryover), obtained by using a sleeved outlet that carries oil under pressure directly from the open center passageway of a control valve to the inlet of a down-stream control valve bank. This sleeve outlet prevents back pressure on the exhaust or return passage of a control valve which normally is not designed to take high pressure. This option also prevents back pressure on spool seals and also does not put back pressure on the built-in relief valve which, if allowed, tends to increase the relief valve opening point to the total of the relief valve's original setting by the amount of back pressure in the control valve's exhaust passage. This option is often used to obtain more valve sections or spools than normally obtainable by one control valve bank, or used when additional spools need to be added in the field. Still another use is to obtain a circuit in which it is desirable to have certain valve functions take "Priority" on flow. This is accomplished by having those functions requiring "Priority" flow be controlled by the upstream valve bank equipped with power beyond, then whenever a spool of the power beyond valve is fully activated, this will take all oil from pump and stop the flow of oil to any downstream valve until the power beyond valve spool is returned to neutral, at which time oil will again flow to the downstream valves. **NOTE: It is always necessary to provide a tank return port on all power beyond valves in order that the "return" or "dump" oil from a cylinder or motor can be returned to the tank.**

When several valves are fitted in a power beyond hook-up, it is also possible to provide different relief valve settings for each bank of valves in the circuit provided the highest pressure is in the valve bank closest to the pump and the next highest in the second bank, etc. If all valve spool functions are to operate at same pressure, then only the first valve bank needs to be equipped with a relief valve and all downstream valve banks do not need a relief valve, however if they are equipped, the reliefs in all valve banks should have the same setting.

CLOSED CENTER VALVE has a blocked "open-center" flow passage thus stopping the pump flow from going to the tank when the control valve is in neutral position. This can be accomplished by either of two methods. One by the design of the spool lands to block the flow or use standard open-center spools and block a power beyond sleeve or provide a closed center plug which serves the same purpose as a plugged power beyond sleeve.

OPEN CENTER VALVE (Also referred to as tandem-center), has an open center flow passage provided by the spool land openings that connect the pump flow to the tank when the control valve spool is in its neutral position.

PARALLEL VALVE is a multiple spool valve whereby all spools may simultaneously control different functions. The oil flow will be divided equally providing the operating pressure requirements for all functions are the same. The function requiring the lowest pressure will operate first. The next function will operate when pressure reaches it's requirements, before or after the first function is fully operated. The CROSS "BA" valve is an example of a Parallel Valve.

SERIES-PARALLEL VALVE is a multi-spool valve which feeds pressure to the cylinder ports from the open center passage, so that only the upstream spool, if fully actuated, would take priority over all pump flow. However, the return circuit is common to all cylinder ports so that actually a double-acting cylinder and a single-acting cylinder (when lowering) can both be operated simultaneously. The CROSS model "CA", "CD" or "CS" two spool valves are of this type.

FOUR-WAY VALVE (Also referred to as double-acting). A valve which has four functional port connections so that either a double-acting cylinder or a reversible hydraulic motor can be operated. Ports usually consist of two work ports, a "pump" or "inlet" port and a "tank" or "return" port.

THREE-WAY VALVE (Also referred to as single-acting). A valve which has three functional flow port connections so that either a single-acting cylinder or undirectional motor can be operated with such a valve. Ports usually consist of one "work" port, a "pump" or "inlet" port and a "tank" or "return" port.

MOTOR SPOOL (Also referred to as free-flow). A spool designed to provide flow from "work" ports to "tank" when spool is in neutral position. This allows a motor to coast to a stop after the spool is placed in neutral position.

FLOAT SPOOL A spool designed to provide for a position called "Float" whereby the "work" ports and "pump" ports (in open center valve) are connected to the "tank" port when spool is in "Float" position. This type of 4-position spool is a 3-position spool with a fourth position in the "Float" which has a detent to hold in "Position", allowing the cylinder or motor to "Float" or travel back and forth at will.

"Float" function can also be obtained with a three-way or "single-acting" spool by using a "IN" spool - 1 position detent (with spring centering) spool action option. With a three-way spool in the "lowering cylinder" position the pump flow and cylinder port flow are both open to tank (with an open-center valve), thus a "float" position is achieved.

LOAD CHECK (Sometimes called lift-check). This is a feature which will keep a given load from dropping as the control valve spool is being shifted until the inlet pressure and flow is equal to a greater load requirement. At this time the load check will open and movement of the load can then be controlled by control valve spool. Please note that the load check has nothing to do with the load holding ability of the valve when the spool is in the neutral position, only when the spool is being shifted.

RELIEF VALVES are used to control system pressures or the pressure within an individual circuit of a hydraulic system. The Relief Valve installed in a control valve will normally be used to control the maximum pressure of a complete hydraulic circuit (i.e. pump, valve, cylinder, motor, etc.). A relief valve is a separate housing can often be used as a circuit relief for a specific function (i.e. protecting one end of a cylinder from external loads, when the control valve spool is in the "neutral" position). Relief valve performance refers to the difference or differential between the cracking pressure (i.e. that pressure when the first drop of oil flows over the relief) and its "Full-Flow" setting, (i.e. that pressure at which the full pump flow passes through the relief). In actual practice it is very difficult to find the "cracking" pressure of a relief valve, so normally, with a pressure gauge in the circuit, the user is seeing the pressure of the full flow if oil through the relief. Therefore in Cross pre-setting of relief valves it should be noted in our sales literature that all relief valves, unless otherwise specified, are set to the customers pressure requirements at a flow of 10 GPM. If the customer prefers this setting at a different gallonage, it can easily be done at the factory with a conversion chart. Even though we use 10 GPM, we can adjust the pressure to give the proper setting at the customer's gallonage.

Various types of relief valves are used in mobile hydraulic applications and three of the most common being the ball-spring, pilot-operated, and differential type. CROSS actually manufactures all three types of variations thereof. The Model CA, CD, CS, and FC, use a ball spring type relief, while the RV relief is a pilot-operated type, and the BA control valve and the RD relief are a variation of the differential type relief which is actually a "hydraulically-dampened" differential poppet relief.