Parmac L.L.C.

Coffeyville, Kansas

FUNCTION of the HYDROMATIC BRAKE

The Hydromatic brake is a hydrodynamic retarder that absorbs power by converting mechanical energy into heat in the working fluid which is normally water. Since the brake is a hydrodynamic device and not a friction device it can only retard the load to a safe speed and can not stop the load.

When the brake shaft is rotated by an external torque, the brake shaft will rotate at a speed or Rpm where the brake torque equals the applied torque. The speed or Rpm that a particular brake model will operate at, when full of water, for an applied torque, is determined from Parmac's published torque/ Rpm curves.

The internal braking action of the brake is dependent on the fluid flow between the rotor vanes and stator vanes in the brake. When the working chamber or pocket section is full of fluid, the brake is operating at maximum absorption. The amount of fluid contained in the pocket section is determined and controlled by the amount of fluid flowing through the brake. With the brake connected to a fluid source or tank, that applies a positive head at the inlet of the brake, and the brake inlet line full open, the brake will be absorbing the maximum energy.

Since the Hydromatic brake functions as a pump, it will draw water from the fluid supply or tank, and pump the water back to the tank, provided the tank is vented to the atmosphere.

Increasing the pressure on the brake by restricting the flow from the brake, with a valve in the outlet line of the brake, will not increase the brake power absorption or provide brake control. Restricting the outlet flow will only increase the internal pressure in the brake, and cause excessive seal wear, reducing the life of the brake seals or possibly blowing out the internal brake seals. Since the brake is absorbing energy and converting the energy into heat in the water, restricting the outlet flow will also increase the outlet water temperature, and steam formation inside the brake may result.

BRAKE WATER SYSTEM

All Hydromatic brakes, installed on oil drilling or workover rigs, should be connected to the hoisting drum with a brake clutch, to disengage the brake when hoisting, and avoid rotating the brake in the reverse direction.

The water system can either be a fluid pump feed system, or a level tank system as shown on the attached drawings. The pump can be eliminated, on smaller brakes used on mobile workover rigs, and the brake be gravity fed from an elevated water tank.

The pump feed system is used on smaller brakes including the 262, and the level control system used on the 341, 342, 342-A, 481, V-200, and V-295.

To obtain maximum performance from the Hydromatic brake, the inlet and outlet line size, should be equal to or larger than the sizes shown on the water system drawings.

The water pressure, at the brake, should not exceed 25 Psi for 121 thru 22DR brakes, and 15 Psi for all other sizes of Hydromatic brakes. Higher inlet pressures will only decrease the life of the brake water seals.

Using a pump feed system, the brake is controlled by a valve in the inlet line to the brake. Manual operated valves such as gate valves or ball valves provide the best control, since the operator can open the valve to a precise setting. A remote operated valve should only be a ball valve that has automatic positioning. that will provide the same opening and flow with the same control signal. Air operated butterfly valves are not recommended due to their poor flow control abilities.

OPERATION OF THE HYDROMATIC BRAKE

Provided the Hydromatic brake and water system have been properly designed for the oil drilling or workover rig, the Hydromatic brake will provide safe retarding of the pipe into the well.

At the start of a trip, and light hook loads, the load can be lowered into the well, without the Hydromatic brake engaged, using the hoisting drum friction brakes.

When the load increases and falls at speed unsafe for the operator or driller, the Hydromatic brake should be engaged and the inlet control valve opened until the desired retarding speed is obtained.

As more pipe is run into the well, and the hook load increases, the drop speed of the brake will gradually increase with the load.

When the drop speed is greater than the speed desired by the driller, the inlet or control valve is opened more until a slower drop speed is obtained. Tripping into the well can continue, and the driller may have to adjust the brake control valve four or five times during the trip.

Once the inlet valve is full open, the Hydromatic brake is at maximum capacity, and the drop speed will continue to increase as the hook load increases.

The Hydromatic brake is designed and installed on drilling rigs for tripping drill pipe into the well at a minimum drop speed of 200 feet per minute. On some workover rigs the Hydromatic brake will only provide speeds of 300 feet per minute.

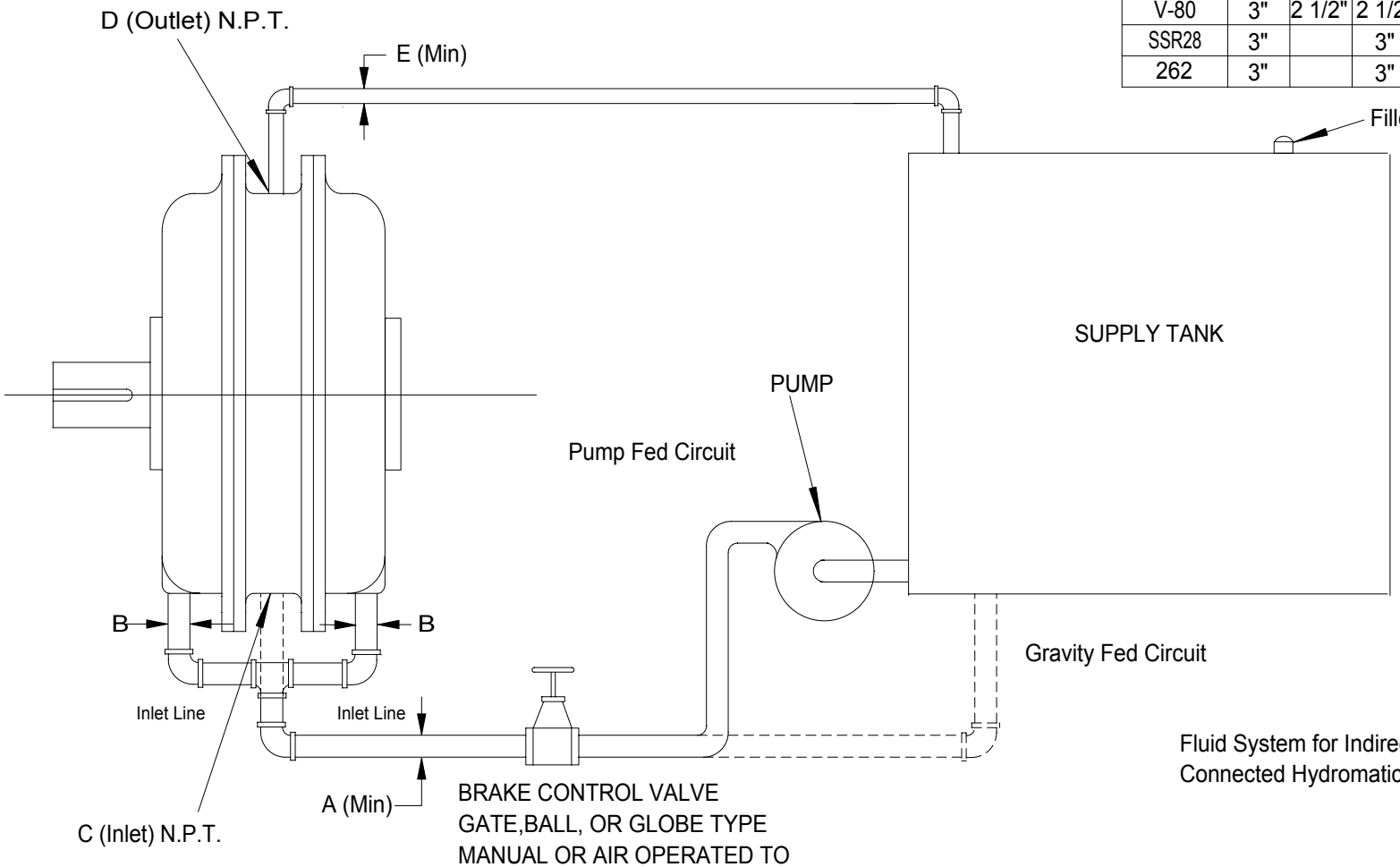
The drum friction brakes, on most drilling rigs, can continuously stop the blocks for each stand of pipe lowered, without over heating, when the hook is retarded to 250 Fpm by the Hydromatic brake.

The Hydromatic brake is not designed to provide very slow speeds for heavy hook loads such as casing. If heavy casing loads are to be tripped at slow speeds, more lines must be strung in the blocks.

Numerous workover rig operators, have desired to use what is called double fast line, or the dead or anchored block line, is attached to the hoisting drum with the live block line. When hoisting, since two lines are being wrapped on the drum, the block speed is doubled for the same drum Rpm, that was obtained with a single line.

In regards to the Hydromatic brake, double fast line halves the number of lines strung in the blocks, and doubles the load on the brake. If the rig has four lines strung, the line pull is one fourth the block weight, if eight lines are strung the line pull is one eight the block weight. Since the line pull in the live line and the anchored or dead line is the same, double lines on the drum, double the drum torque and brake torque. The brake performance would be equal to half the lines actually strung.

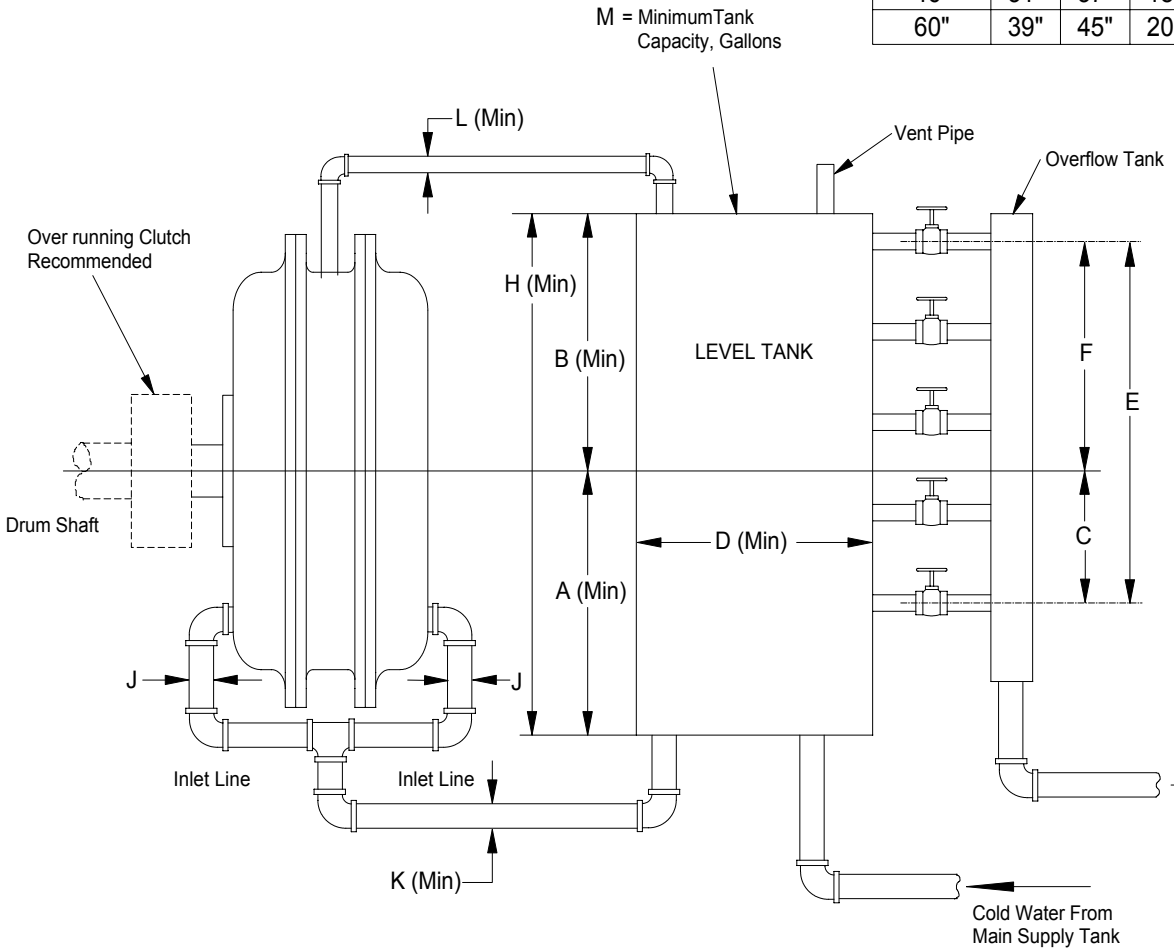
BRAKE SIZE	A	B	C	D	E
121	2"		2"	2"	2"
15 DR	3"	2"	2"	2"	2"
122	3"	2"	2"	2"	2"
201	3"		3"	2"	2"
22 SR	2"		2"	2"	2"
202	3"		3"	2"	2"
22 DR	3"	2"	2"	2"	2"
V-80	3"	2 1/2"	2 1/2"	2"	2"
SSR28	3"		3"	2"	2"
262	3"		3"	2"	2"



Fluid System for Indirect
Connected Hydromatic Brakes

GRAVITY FEED OR PUMP FEED CIRCUIT
HIGH SPEED HYDROMATIC® BRAKES

BRAKE SIZE	A	B	C	D	E	F	H	J	K	L	M
341,341A	27"	31"	10.5"	21"	35.5"	25"	58"	3"	3"	2"	87
342,342A	27"	31"	10.5"	24"	35.5"	25"	58"	3"	4"	2"	114
451	21"	32"	13"	30"	40"	27"	64"	4"	4"	3"	196
481	32"	33"	14"	30"	41"	27"	65"	4"	4"	3"	200
V-200	31"	37"	14"	30"	61"	31"	68"	3"	4"	3"	208
V-295	44"	54"	14.5"	38"	86"	48"	98"	4"	6"	4"	472
36"	25.5"	31.5"	18.5"	18"	44"	25.5"	57"	2"	3"	2"	63
40"	28"	34"	16"	21'	44"	28"	62"	2"	3"	2"	93
46"	31"	37"	18"	24"	49"	31"	68"	3"	4"	3"	133
60"	39"	45"	20"	28'	59"	39"	84"	3"	4"	3"	224



Dimension 'D' is the minimum diameter or equivalent diameter of a square tank that will provide sufficient water volume, at the lowest water level setting, to provide optimum operating conditions.

To prevent air entering the brake, the water level must not be below the inlet connections on the brake.

Return to Main Supply Tank
Line must be of sufficient size to gravity flow water from level tank at the maximum rate cold water will enter the level tank from main tank

LEVEL CONTROL and CIRCULATING SYSTEM for HYDROMATIC® BRAKES