AUTO-LOCK PBL BYPASS SYSTEM

OPERATING INSTRUCTIONS

ACTIVATE PBL AS PER PBL OPERATING INSTRUCTIONS

Auto-Lock Activation Procedure

1. After activating the PBL and prior to dropping locking ball, **Record Pump Pressure** _____ **and Pump Strokes** _____. This will be used as a reference to confirm when PBL is locked open.
2. Calculate the fluid displacement **volume and time** in the drill string to estimate when the locking ball will reach the Bypass Tool. Break drill string at floor and drop one (1) ertalyte/ torlon locking ball. Refer to chart below to determine proper size.
3. It is then recommended to maintain normal drilling pump rates, keeping the pressure 500 psi below the locking ball shearing pressure as indicated on the Tool Order. Displace 70% of the volume inside the drill string, and then reduce the pump rate to 50% until the ball lands in the port. The vinyl ball may seat sooner than the calculated pump strokes. The vinyl locking ball has an equivalent density of 11.2 PPG drilling fluid. **NOTE: Care should be taken when pumping the vinyl ball down. Pumping the locking ball into port at high fluid rates or pressures may cause the locking ball to blow through the port.**
4. When the locking ball lands into port, one of the two bypass ports will be blocked and a **pressure increase** might be noted. Compare the pump pressure and pump strokes recorded in step one to determine if the ball is into the port. The pumps may now be switched off and the tool is locked open. Fluid will drain or fill through the one open port. Use caution not to over pump after tool is locked open, causing the locking ball to shear.
5. Rotating and reciprocating the drill string is good practice while activating the PBL tool.

De-Activation Procedure

Follow Same De-Activation Procedures as per PBL Operating Instructions

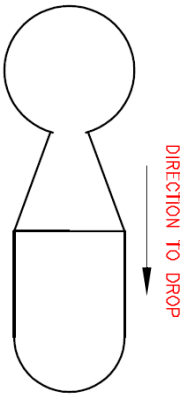
Auto-Lock Activation while RIH

1. Pick up the Kelly and make up in the top of the tool.
2. Pick up string out of the slips and lower into the hole ensuring that the opening ports are below the rotary table with in drilling fluid.
3. Drop one (1) heavy weighted dart ball/ Fast (hollow) dart to activate the tool (it is not advisable to use the standard activation ball); this is to eliminate any chances of ball

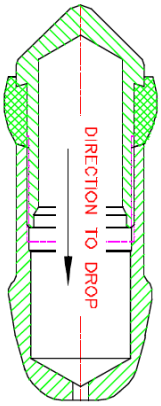
coming off the seat when RIH. It is recommended to fill up the drill string with fluid prior to dropping the heavy weighted dart ball / Fast (hollow) dart.

4. Engage the pump very slowly and watch for the sleeve opening and the fluid diverting through the ports. It will not take a lot of pressure to overcome the spring tension when opening the sleeve (100 - 200 psi).
5. When fully satisfied that the tool is functioning properly, stop pumping, and pick up string and place in the slips. **The PBL Sub piston will close when the pumping is stopped.**
6. Break the string and drop the locking ball and start pumping. Once the locking ball seats, a slight increase in SPP can be observed and you will notice flow through one port.
7. Stop pumping, pick up PBL above rotary, visually check and confirm the position of the locking ball. One of the ports will be open and the other blocked with a locking ball.
8. Proceed with RIH as required.

Weighted Ball/Dart



Fast Dart (Hollow Dart)



If Fast Dart (Hollow Dart) is utilized in conditions when circulation is possible, see below table for maximum flow rate when pumping down Dart. Each activation by Fast Dart (Hollow Dart) reduces the total available cycles by one.

Tool Size	Max. Flow Rate for pumping down dart
4-3/4”	100 GPM
6-3/4”	150 GPM
8” to 12”	200 GPM

De-Activation Procedure

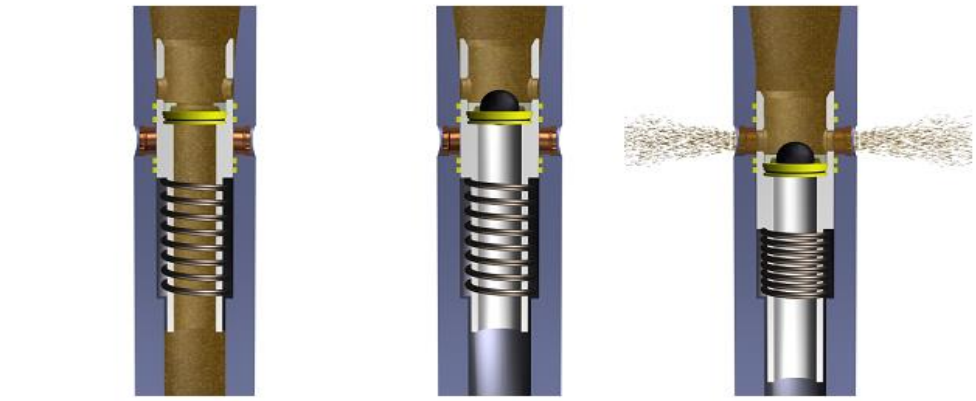
Follow Same De-Activation Procedures as per PBL Operating Instructions

Should there be any questions regarding the operational procedures of the PBL tool please contact a DSI representative or visit our website www.dsi-pbl.com

Locking Ball Sizes

Tool Size	Locking Ball Size	Ball Type
2-7/8", 3-1/8" & 3-1/2" PBL	0.700"	Torlon
4-3/4" PBL	1-1/8"	Torlon
6-1/4", 6-1/2", 6-3/4" & 7-1/4" PBL	1-1/8"	Ertalyte/ Torlon
8", 8 ¼", 9 ½", 12" PBL	1-3/8"	Ertalyte/ Torlon

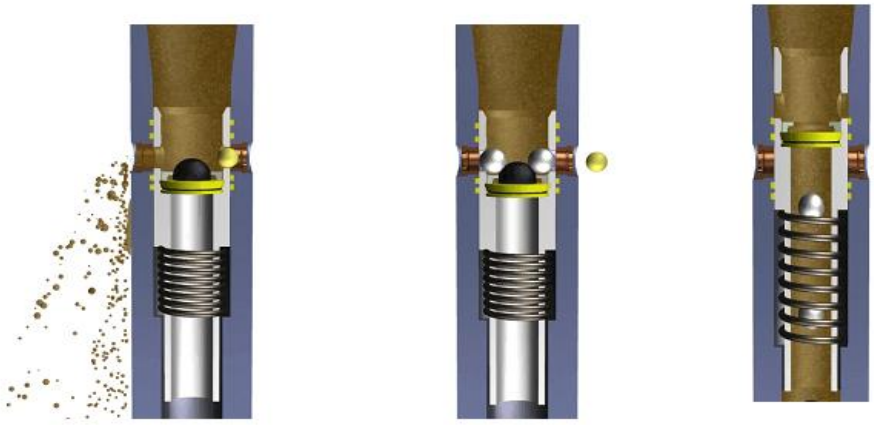
PBL AUTO-LOCK OPERATIONAL SEQUENCE



Drilling Mode

Activation Ball Seated

Open Position
FLOW thru PORTS



Pump down Locking Ball
LOCK OPEN PORT
Trip Dry Pipe / Fill Pipe

Tool can be hydraulically reset (unlocked) downhole by dropping 2 steel deactivation balls. Locking Ball and Activation Ball will shear and FLOW to BIT resumed.