# DEADMAN SYSTEM

The DEADMAN SYSTEM is an optional stand alone system consisting of hydraulic control fluid and electrical power in order to performed a pre-programmed sequence of BOP function operations in response to a catastrophic event, such as a break or separation of the riser somewhere above the LMRP. The DEADMAN responds to the following conditions, all of which must be present simultaneously to determine that the riser has parted.

- Loss of Communication with Second Pod
- Loss of Electrical Power & Communication
- Loss of Hydraulic Conduit Pressure

DEADMAN SYSTEM Major Components

- Dedicated Hydraulic System with Accumulators
- Dedicated Printed Circuit Board for each SEM
- Batteries (30 vdc and 6 vdc)
- Bitable "Latching" Relay
- Pressure Transducer (850 bar) monitoring Hydraulic Conduit Pressure
- Pressure Transducer (350 bar) monitoring Hydrostatic Head Pressure

Operation

1. Fill (Charge) the DEADMEN accumulators using the ACCUMULATOR Charge/Dump/Vent function on either the Driller's or Toolpushers Panel.
2. ARM the DEADMAN system using the ARM/DISARM DEADMAN function on either the Driller's or Toolpusher's Panel.

The DEADMAN printed circuit board (PCB) will now monitor mux system operation.

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*Warning: The Deadman circuit should be disarmed during the following operations. Failure to adhere could result in loss of property severe personal injury and loss of life.*

1. *Lowering or retrieving the stack.*
2. *Flushing conduit lines.*
3. *Working on control pods.*
4. *Lowering or retrieving the LMRP*

Theory of Operation (Electrical)

Arming the DEADMAN from the surface operates a bistable relay which applies battery power to the DEADMAN board. The Lithium batteries are capable of supplying power for 2 years.

Once energized, the DEADMAN (PCB) printed circuit board begins monitoring pulsed signals from SEM output boards. If these conditions are present and normal, the DEADMAN board sends a voltage to an analog input channel in the SEM to indicate it is powered and functioning properly. The SEM also transmits this signal back to operate the DEADMAN lights on the Driller's and Toolpusher's Panel indicating that the DEADMAN has been ARMED.

*Loss of Communication with Second Pod (Condition 1a)*

The DEADMAN board monitor a pulsed signal from an output board in the SEM A and SEM B in the "other" pod. The pulsed is generated by the SEMs to indicate that the SEMs are powered and functioning. Signal/communication (verification) between the Blue and Yellow pods are routed through the riser Control Box located on or near the Ball Joint above the LMRP.

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A loss of both SEM A & B signal from the second pod is necessary to satisfy one of the conditions that will activate the DEADMAN sequence.

*Loss of Electrical Power & communication (Condition 1b)*

The DEADMAN board monitors a pulsed signal from an output board in both SEM A and SEM B. This signal indicates the SEMs within the pod are active. Loss of this signal indicates a loss of umbilical electrical power to the SEM power supplies. Without power the modem is unable to communicate.

A loss of these signals, A & B, indicates a loss of power and as a result of this, communication to the SEMs. To meet this condition fully, power and communication must be lost from both SEM A and SEM B.

**SUMMARY:** **ALL SEMs must have lost power or failed to fulfill this condition.**

*Loss of Hydraulic Fluid Supply into the Pod (Condition 2)*

Pressure transducers mounted in the Subsea Transducer Module (STM) monitor Hydrostatic Head Pressure and Conduit Hydraulic Pressure. Signals from these transducers are monitored for signal input to the DEADMAN board. The SEM power supplies normally supply power to these transducers. This power is routed through the DEADMAN board to power the transducers to provide capability to power the transducers from the DEADMAN batteries when the DEADMAN is activated.

The Conduit Hydraulic Pressure needs to fall and be equal to the Hydrostatic Head Pressure to fulfill this condition.

*SEM Reboot*

When both condition are met simultaneously, a switch on the DEADMAN board is activated and power to the SEMs and Transducers is transferred to the DEADMAN battery banks via the DEADMAN board.

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Supplying power to the SEM from the dead conditions initiates a power reboot. During the reboot process the SEM always check for the DEADMAN Armed signal from the DEADMAN board. If the DEADMAN board is active when the SEM boots up, the SEM prepares for the DEADMAN sequence by verifying the following:

1.) The Conduit (rigid) Hydraulic Pressure is equal to the Hydrostatic Head Pressure.

Having satisfied this condition, the SEM initiates its preprogrammed shut down sequence. There is a limit of (5) five vales that can be activated at any one time.

*SEM Powerdown*

Once the shut down sequence is completed, the SEM powers down both the DEADMAN system and the SEM by sending a pulse to the bistable relay.

*Shutdown Sequence*

The shutdown sequence initiated by the DEADMAN is programmed to meet customer requirements, the only limitation is that one more than 5 solenoids can be activated at any one time. A *typical* sequence is as follows:

Time=0 (Start 0f DEADMAN SEQUENCE)

| | |
|---|---|
| INCREASE | Manifold Pressure to 3000 psi |
| CLOSE | Casing Shear Ram |
| | Lower Outer Kill Valve |
| | Lower Inner Kill Valve |
| | Lower Inner Choke Valve |

Time=10 sec.

| | |
|---|---|
| DE-ENERGIZE | Choke and Kill Valves from pervious step |
| CLOSE | Lower Outer Choke |
| | Upper Outer Kill |
| | Upper Inner Kill |

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| | |
|---|---|
| Time=20 sec. | |
| DE-ENERGIZE | Choke and Kill Valves from pervious step |
| CLOSE | Upper Inner Choke |
| | Upper Outer Choke |
| | Shear Ram Preventer |
| Time=30 sec. | |
| DE-ENERGIZED | Choke Valves and Shear Ram from previous step |
| DEACTIVE | DEADMAN System Hydraulic (de-energize Casing Shear Rams) |
| Time=40 sec. | |
| DE-ENERGIZE | BL &YL Stack Stinger Seals |
| Time=50 sec. | |
| RETRACT | BL & YL Stack Stingers |
| Time=60 sec. | |
| ENERGIZE | BL & YL Stinger Seals |

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