# MPS Logic:
# 2024-08-13-b

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# 1 Ignored when A-Line Kicker Is Not Enabled, A-Line SL10 Is Closed, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 1.1 Flowswitch: COLL BSYA 2060 (PC20)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `COLL_BSYA_2060_FLOW_SW_STATE`

## 1.2 Flowswitch: COLL BSYA 2410 (COLL24H)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `COLL_BSYA_2470_H_FLOW_SW_STATE`

## 1.3 Flowswitch: COLL BSYA 2410 (COLL24V)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `COLL_BSYA_2470_V_FLOW_SW_STATE`

## 1.4 Flowswitch: COLL BSYA 2410 (PC24)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = COLL_BSYA_2410_FLOW_SW_STATE

## 1.5 Flowswitch: COLL BSYA 2600 (PC26)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = COLL_BSYA_2600_FLOW_SW_STATE

## 1.6 Flowswitch: COLL BSYA 2990 (PC29)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = COLL_BSYA_2990_FLOW_SW_STATE

## 1.7 Flowswitch: COLL BSYA 3710 (C37)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = COLL_BSYA_3710_FLOW_SW_STATE

## 1.8 Flowswitch: COLL BSYA 4120 (3C1A)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = COLL_ESA0_4120_FLOW_SW_STATE

## 1.9 PIC Raw Charge Thresholds: BSYA 2061

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2061_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2061_LOSSH_THRESHOLD`

## 1.10 PIC Raw Charge Thresholds: BSYA 2120

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2120_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2120_LOSSH_THRESHOLD`

## 1.11 PIC Raw Charge Thresholds: BSYA 2220

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2220_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2220_LOSSH_THRESHOLD`

## 1.12 PIC Raw Charge Thresholds: BSYA 2321

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2321_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2321_LOSSH_THRESHOLD`

## 1.13 PIC Raw Charge Thresholds: BSYA 2411

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2411_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2411_LOSSH_THRESHOLD`

## 1.14 PIC Raw Charge Thresholds: BSYA 2472

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2472_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2472_LOSSH_THRESHOLD`

## 1.15 PIC Raw Charge Thresholds: BSYA 2473

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2473_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2473_LOSSH_THRESHOLD`

## 1.16 PIC Raw Charge Thresholds: BSYA 2474

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2474_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2474_LOSSH_THRESHOLD`

## 1.17 PIC Raw Charge Thresholds: BSYA 2475

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2475_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2475_LOSSH_THRESHOLD`

## 1.18 PIC Raw Charge Thresholds: BSYA 2520

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2520_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2520_LOSSH_THRESHOLD`

## 1.19 PIC Raw Charge Thresholds: BSYA 2601

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2601_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2601_LOSSH_THRESHOLD`

## 1.20 PIC Raw Charge Thresholds: BSYA 2861

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2861_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2861_LOSSH_THRESHOLD`

## 1.21 PIC Raw Charge Thresholds: BSYA 2990

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_2990_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_2990_LOSSH_THRESHOLD`

## 1.22 PIC Raw Charge Thresholds: BSYA 3320

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_3320_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_3320_LOSSH_THRESHOLD`

## 1.23 PIC Raw Charge Thresholds: BSYA 3720

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYA_3720_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_3720_LOSSH_THRESHOLD`

## 1.24 PIC Raw Charge Thresholds: BSYA 3721

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = PICM_BSYA_3721_LOSSL_THRESHOLD,
*B* = PICM_BSYA_3721_LOSSH_THRESHOLD

## 1.25 PIC Raw Charge Thresholds: BSYA 3890

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = PICM_BSYA_3890_LOSSL_THRESHOLD,
*B* = PICM_BSYA_3890_LOSSH_THRESHOLD

## 1.26 PIC Trigger Missed (LN42)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Missed | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = PICM_BSYA_2061_NO_TRIG_MISSED

## 1.27 Stopper BSYA 2275 (ST22) Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| MOVING | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OUT | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| IN | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| BROKEN | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |

Where
*A* = STPR_BSYA_2275_ST22_OUT_LIM_STATE,
*B* = STPR_BSYA_2275_ST22_IN_LIM_STATE

## 1.28 Stopper BSYA 2930 (ST29) Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| MOVING | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OUT | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| IN | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |

Where
*A* = STPR_BSYA_2930_ST29_OUT_LIM_STATE,
*B* = STPR_BSYA_2930_ST29_IN_LIM_STATE

## 1.29 Temperature RTD Summary: A-line Past SL10

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = RTD_BSYA_2060_PASTSL10SUM_STATUS

## 1.30 Vac Valve BSYA 4005 (IV40)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = VVPG_BSYA_4005_POSITION_STATE

## 1.31 Vac Valve: VVFS BSYA 2855 (FV28)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OPEN | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = VVFS_BSYA_2855_POSITION_STATE

## 1.32 Vac Valve: VVPG BSYA 2635 (IV26)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OPEN | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = VVPG_BSYA_2635_POSITION_STATE

## 1.33 Vac Valve: VVPG ESA0 4195 POSITION (IV41)

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = VVPG_ESA0_4195_POSITION_STATE

# 2 Ignored when A-Line Kicker Is Not Enabled, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 2.1 A-Line SL10 Position

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
state = (unsigned int) -1;

if ( SLIT_BSYA_2010_SL10_FB_IN_STATE &&
        SLIT_BSYA_2010_SL10_FT_IN_STATE &&
        SLIT_BSYA_2010_SL10_RB_IN_STATE &&
        SLIT_BSYA_2010_SL10_RT_IN_STATE )
{
    state = 0; /* SL10 is Closed */
}

else
{
    state = 1; /* SL10 is Not Closed */
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Closed | 0 | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| Not_Closed | 1 | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

## 2.2 Flowswitch: BPM BSYA 1020 (BPM10)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| IS_NOT_OK | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `BPM_BSYA_1020_FLOW_SW_STATE`

## 2.3 Flowswitch: BPM BSYA 1240 (BPM12)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| IS_NOT_OK | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `BPM_BSYA_1240_FLOW_SW_STATE`

## 2.4 Flowswitch: COLL BSYA 1015 (PC10)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| IS_NOT_OK | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `COLL_BSYA_1015_FLOW_SW_STATE`

## 2.5 Flowswitch: COLL BSYA 1230 (PC12)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| IS_NOT_OK | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `COLL_BSYA_1230_FLOW_SW_STATE`

## 2.6 Flowswitch: COLL BSYA 1490 (PC14)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `COLL_BSYA_1490_FLOW_SW_STATE`

## 2.7 Flowswitch: COLL BSYA 1700 (PC17)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `COLL_BSYA_1700_FLOW_SW_STATE`

## 2.8 PIC Raw Charge Thresholds: BSYA 1016

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1016_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1016_LOSSH_THRESHOLD`

## 2.9 PIC Raw Charge Thresholds: BSYA 1021

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1021_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1021_LOSSH_THRESHOLD`

## 2.10 PIC Raw Charge Thresholds: BSYA 1120

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1120_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1120_LOSSH_THRESHOLD`

## 2.11 PIC Raw Charge Thresholds: BSYA 1320

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1320_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1320_LOSSH_THRESHOLD`

## 2.12 PIC Raw Charge Thresholds: BSYA 1520

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1520_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1520_LOSSH_THRESHOLD`

## 2.13 PIC Raw Charge Thresholds: BSYA 1701A

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1701A_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1701A_LOSSH_THRESHOLD`

## 2.14 PIC Raw Charge Thresholds: BSYA 1701B

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1701B_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1701B_LOSSH_THRESHOLD`

## 2.15 PIC Raw Charge Thresholds: BSYA 1980

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | – | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `PICM_BSYA_1980_LOSSL_THRESHOLD`,
*B* = `PICM_BSYA_1980_LOSSH_THRESHOLD`

## 2.16 Temperature RTD Summary: A-Line Before SL10

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `RTD_BSYA_1015_PRESL10SUM_STATUS`

## 2.17 Vac Valve: VVFS BSYA 1030 (FV10)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OPEN | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `VVFS_BSYA_1030_POSITION_STATE`

## 2.18 Vac Valve: VVPG BSYA 1018 (IV10)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | 0 Hz | 0 Hz | – | – | – | – | – |
| OPEN | T | 120 Hz | 120 Hz | – | – | – | – | – |

Where
*A* = `VVPG_BSYA_1018_POSITION_STATE`

## 2.19 VVPG BSYA 340 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Open | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_BSYA_340_OPEN_LIMSW_POSITION`

# 3 Ignored when BKRCUS Is On, STCLTS Is In, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 3.1 BRCUS1 and BRCUSDC Consistent

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| BRCUS1 Not On BRCUSDC On | F | T | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| BRCUS1 On BRCUSDC Not On | T | F | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| BRCUS1 and BRCUSDC On | T | T | – | – | – | – | – | – | – |

Where
$A$ = `BEND_CLTS_180_ON_STATE`,
$B$ = `BEND_CLTS_765_ON_STATE`

# 4 Ignored when BKRCUS Is On, SXR Beamline is in SC Mode, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 4.1 BRCUSDC Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `BEND_CLTS_180_CURRENT_THRESHOLD`

# 5 Ignored when BRCUSDC Is On, STCLTS Is In, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 5.1 BRCUS1 and BKRCUS Consistent

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| BRCUS1 Not On BKRCUS On | F | T | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| BRCUS1 On BKRCUS Not On | T | F | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| BRCUS1 and BKRCUS On | T | T | – | – | – | – | – | – | – |

Where
$A$ = `KICK_CLTS_185_ON_STATE`,
$B$ = `BEND_CLTS_765_ON_STATE`

# 6 Ignored when BRCUSDC Is On, SXR Beamline is in SC Mode, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 6.1 BKRCUS Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `KICK_CLTS_185_CURRENT_THRESHOLD`

# 7 Ignored when BX01/BX02 Is Off, YAG01 Is In, or YAG02 Is In

## 7.1 Toroid Comparator Dogleg 1 (IM02 vs IM03)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Downstream > Upstream | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Upstream > Downstream | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = `TC203L1_STATE`,
$B$ = `TC203L2_STATE`

# 8 Ignored when BX01/BX02 Is On, YAG01 Is In, or YAG02 Is In

## 8.1 BXS Status

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `BEND_IN20_931_OK_STATE`

## 8.2 Toroid Comparator Inj Spectrometer (IM02 vs IMS1)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Downstream > Upstream | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Upstream > Downstream | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `TC2S1L1_STATE`,
*B* = `TC2S1L2_STATE`

# 9 Ignored when BXG Is Off or YAG01 Is In

## 9.1 Wakefield Shield Gun Spectrometer

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `WL_BL231_IN_STATE`

# 10 Ignored when BXG Is On or YAG01 Is In

## 10.1 Wakefield Shield Straight Ahead

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `WL_BL231_OUT_STATE`

# 11 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, Diag Stopper XCS SB1 Is In, HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper XRT S5 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 11.1 XCS SB1 VGC 02 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `XCS_SB1_VGC_02_OPN_DI_POSITION`,
*B* = `XCS_SB1_VGC_02_CLS_DI_POSITION`

## 11.2 XCS SB2 VGC 01 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `XCS_SB2_VGC_01_OPN_DI_POSITION`,
*B* = `XCS_SB2_VGC_01_CLS_DI_POSITION`

# 12 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, HXR Beamline is in SC Mode, Stopper S5B Is In, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper XRT S5 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 12.1 CXI Configuration 1 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigOne = -1;
{
        if ( CXI_MPS_CFG_1_CONFID ) /* EPS PLC asserts we are in config
            1 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                   state for Cfg 1 */
                if ((! CXI_DG1_MMS_03_A_POSITION) ||
                (! CXI_DG2_MMS_06_B_POSITION) ||
                (! CXI_SC1_VGC_02_OPN_DI_POSITION) )
                {
                        evalCXIConfigOne = 0;
                }
                else
                {
                        evalCXIConfigOne = 1;
                }
        }
}
```

```
switch( evalCXIConfigOne )
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Config 1 Fault | 0 | – | – | 0 Hz | – | – | – | – |
| Config 1 Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not In Config 1 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.2 CXI Configuration 2 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigTwo = -1;
{
        if ( CXI_MPS_CFG_2_CONFID ) /* EPS PLC asserts we are in config
            2 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                    state for Cfg 2 */
                if (    (! CXI_DG1_MMS_03_A_POSITION) ||
                        (! CXI_SC1_VGC_02_OPN_DI_POSITION) || /* If the
                            valve is not open, trip */
                        (       (! CXI_DIA_ATTEN_OK_POSITION) && /* DIA
                            attenuation */
                                (! (    CXI_DG1_MMS_08_B_POSITION &&
                                                CXI_DG1_MMS_08_B_POSITION
                                                    &&
```

```
                                                        CXI_DG2_MMS_08_B_POSITION
                                                            &&
                                                        CXI_DG2_MMS_09_B_POSITION
                                                            &&
                                                        CXI_DG2_MMS_10_B_POSITION
                                                            &&
                                                        CXI_DG4_MMS_05_B_POSITION
                                                            &&
                                                        CXI_DG4_MMS_03_B_POSITION

                                                    )
                                                )
                                            )
                                            )
                        {
                                            evalCXIConfigTwo = 0;
                        }
                        else
                        {
                                            evalCXIConfigTwo = 1;
                        }
        }
}

switch( evalCXIConfigTwo )
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | 0 | – | – | 0 Hz | – | – | – | – |
| Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not In Config 2 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.3 CXI Configuration 3 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
```

```
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigThree = -1;
{
        if ( CXI_MPS_CFG_3_CONFID ) /* EPS PLC asserts we are in config
            3 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                   state for Cfg 3 */
                if ((! CXI_DG1_MMS_03_A_POSITION) ||
                (! CXI_SC1_VGC_02_OPN_DI_POSITION) )
                {
                        evalCXIConfigThree = 0;
                }
                else
                {
                        evalCXIConfigThree = 1;
                }
        }
}

switch( evalCXIConfigThree )
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | 0 | – | – | 0 Hz | – | – | – | – |
| Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not in Config 3 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.4 CXI Configuration 4 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigFour = -1;
{
        if ( CXI_MPS_CFG_4_CONFID ) /* EPS PLC asserts we are in config
            4 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                   state for Cfg 4 */
                if ((! CXI_DG1_MMS_03_A_POSITION) ||
                (! CXI_SC1_VGC_02_OPN_DI_POSITION) )
                {
                        evalCXIConfigFour = 0;
                }
                else
                {
                        evalCXIConfigFour = 1;
                }
        }
}

switch( evalCXIConfigFour )
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | 0 | – | – | 0 Hz | – | – | – | – |
| Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not In Config 4 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.5 CXI Configuration 5 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigFive = -1;
{
        if ( CXI_MPS_CFG_5_CONFID ) /* EPS PLC asserts we are in config
            5 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                   state for Cfg 5 */
                if ((! CXI_DG1_MMS_03_A_POSITION) ||
                (! CXI_SC1_VGC_02_OPN_DI_POSITION) )
                {
                        evalCXIConfigFive = 0;
                }
                else
                {
                        evalCXIConfigFive = 1;
                }
        }
}

switch( evalCXIConfigFive )
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
```

```
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | 0 | – | – | 0 Hz | – | – | – | – |
| Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not In Config 5 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.6 CXI Configuration 6 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigSix = -1;
{
        if ( CXI_MPS_CFG_6_CONFID ) /* EPS PLC asserts we are in config
            6 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                    state for Cfg 6 */
                if ((! CXI_DG1_MMS_03_A_POSITION) ||
                        (! CXI_DG2_MMS_06_B_POSITION) ||
                (! CXI_SC2_VGC_02_OPN_DI_POSITION) )
                {
                        evalCXIConfigSix = 0;
                }
                else
                {
                        evalCXIConfigSix = 1;
                }
        }
}

switch( evalCXIConfigSix )
```

```
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | 0 | – | – | 0 Hz | – | – | – | – |
| Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not In Config 6 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.7 CXI Configuration 7 Summary

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/*
state = 0 beam dump
state = 1 beam allowed
state = 2 other, beam allowed
*/

/* Initialize to a guard value */
state = (unsigned int) -1;
{
int evalCXIConfigSeven = -1;
{
        if ( CXI_MPS_CFG_7_CONFID ) /* EPS PLC asserts we are in config
            7 */
        {
                /* Evaluate inputs to identify if we're in beam dump
                   state for Cfg 7 */
                if ((! CXI_DG1_MMS_03_A_POSITION)        ||
                        (! CXI_SC1_VGC_02_OPN_DI_POSITION) ||
                (! CXI_SC2_VGC_02_OPN_DI_POSITION) )
                {
                        evalCXIConfigSeven = 0;
                }
                else
                {
                        evalCXIConfigSeven = 1;
                }
```

```
        }
}

switch( evalCXIConfigSeven )
{
        case 0: state = 0; break;
        case 1: state = 1; break;
        default: state = 2; break;
}
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | 0 | – | – | 0 Hz | – | – | – | – |
| Ok | 1 | – | – | 120 Hz | – | – | – | – |
| Not In Config 7 | 2 | – | – | 120 Hz | – | – | – | – |

## 12.8 CXI KB2 VGC 02 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `CXI_KB2_VGC_02_OPN_DI_POSITION`,
*B* = `CXI_KB2_VGC_02_CLS_DI_POSITION`

## 12.9 CXI MPS PLC Readiness Status

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| PLC Not OK | F | – | – | 0 Hz | – | – | – | – |
| PLC OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_MPS_PLC_01_OK_STATUS`

## 12.10 CXI User Patch Panel 1 Ready

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Ready | F | – | – | 0 Hz | – | – | – | – |
| Ready | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_USR_01_MPSFAULT_STATUS`

## 12.11 CXI User Patch Panel 2 Ready

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Ready | F | – | – | 0 Hz | – | – | – | – |
| Ready | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_USR_02_MPSFAULT_STATUS`

## 12.12 CXI:DG1:VGC:01 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_DG1_VGC_01_OPN_DI_POSITION`

## 12.13 CXI:DG1:VGC:02 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_DG1_VGC_02_OPN_DI_POSITION`

## 12.14 CXI:DG2:VGC:01 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `CXI_DG2_VGC_01_OPN_DI_POSITION`,
*B* = `CXI_DG2_VGC_01_CLS_DI_POSITION`

## 12.15 CXI:DG2:VGC:02 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `CXI_DG2_VGC_02_OPN_DI_POSITION`,
*B* = `CXI_DG2_VCG_02_CLS_DI_POSITION`

## 12.16 CXI:DSC:VGC:01 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `CXI_DSC_VGC_01_OPN_DI_POSITION`,
*B* = `CXI_DSC_VGC_01_CLS_DI_POSITION`

## 12.17 CXI:KB1:VGC:01 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_KB1_VGC_01_OPN_DI_POSITION`

## 12.18 CXI:KB1:VGC:02 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_KB1_VGC_02_OPN_DI_POSITION`

## 12.19 CXI:KB2:VGC:01 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CXI_KB2_VGC_01_OPN_DI_POSITION`

## 12.20 CXI:SC1:VGC:01 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
$A$ = CXI_SC1_VGC_01_OPN_DI_POSITION,
$B$ = CXI_SC1_VGC_01_CLS_DI_POSITION

## 12.21 CXI:SC3:VGC:01 Be Gate Valve Position - Status from PLC

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Moving or Broken | F | – | – | 0 Hz | – | – | – | – |
| Open or Closed | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = CXI_SC3_VGC_01_OPN_DI_POSITION

## 12.22 HF4 LAM VGC 01 Gate Valve Position

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = HF4_LAM_VGC_01_OPN_DI_POSITION

# 13 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper XRT S5 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 13.1 CXI XRT Laser Reference Mirror Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Mirror In Beam | F | – | – | 0 Hz | – | – | – | – |
| Mirror Out of Beam | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `XRT_DIA_MMS_01_B_POSITION`

## 13.2 HFA:SND:VGC:01 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HFA_SND_VGC_01_OPN_DI_POSITION`

## 13.3 HFX:DIA:VGC:02 Gate Valve Open Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HFX_DIA_VGC_02_OPN_DI_POSITION`

## 13.4 PPS Stopper S5B Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| In | F | T | – | – | – | – | – | – | – |
| Out | T | F | – | – | – | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `STPR_FEH1_5_S5BIN_POSITION`,
*B* = `STPR_FEH1_5_S5BOUT_POSITION`

## 13.5 XCS SB1 Diagnostic Stopper Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `XCS_SB1_STP_01_OPN_DI_POSITION`,
*B* = `XCS_SB1_STP_01_CLS_DI_POSITION`

## 13.6 XCS SB1 VGC 01 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `XCS_SB1_VGC_01_OPN_DI_POSITION`,
*B* = `XCS_SB1_VGC_01_CLS_DI_POSITION`

## 13.7 XRT HXRAY DIA Isolation Valve HXX-DIA-VGC-01

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Closed | F | T | – | – | 0 Hz | – | – | – | – |
| Open | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
$A$ = `HXX_DIA_VGC_01_CLS_DI_STATE`,
$B$ = `HXX_DIA_VGC_01_OPN_DI_STATE`

# 14 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 14.1 HFX:DG2:VGC:01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HFX_DG2_VGC_01_OPN_DI_POSITION`

## 14.2 HFX:MON:VGC:01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HFX_MON_VGC_01_OPN_DI_POSITION`

## 14.3 HFX:MON:VGC:02 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HFX_MON_VGC_02_OPN_DI_POSITION`

## 14.4 Stopper XRT S5 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | – | – | – | – | – |
| In | T | F | – | – | – | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `STPR_XRT1_1_S5OUT_POSITION`,
*B* = `STPR_XRT1_1_S5IN_POSITION`

# 15 Ignored when Diag Stopper HFX UM6 Is In, HXR Beamline is in SC Mode, Stopper MFX S4.5 Is In, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 15.1 MFX MPS Summary - Downstream of Stopper 4.5

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Ok | F | – | – | 0 Hz | – | – | – | – |
| Ok | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = `MFX_MPS_1_SUM_STATE`

# 16 Ignored when Diag Stopper HFX UM6 Is In, HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper XRT S6 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 16.1 MEC DV4 VCG 01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_DV4_VGC_01_OPN_DI_POSITION`

## 16.2 MEC DV5 VGC 01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_DV5_VGC_01_OPN_DI_POSITION`

## 16.3 MEC HXM VGC 01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_HXM_VGC_01_OPN_DI_POSITION`

## 16.4 MEC XT1 Reference Laser Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Out | F | – | – | 0 Hz | – | – | – | – |
| Out | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_XT1_MMS_01_B_POSITION`

## 16.5 MEC XT1 VGC 01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_XT1_VGC_01_OPN_DI_POSITION`

## 16.6 MEC XT2 VGC 02 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_XT2_VGC_02_OPN_DI_POSITION`

## 16.7 MEC XT2 VGC 03 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_XT2_VGC_03_OPN_DI_POSITION`

## 16.8 MEC XT2 VGC 04 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_XT2_VGC_04_OPN_DI_POSITION`

## 16.9 MEC XT2 VGC 05 Gate Valve Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Open | F | T | – | – | 120 Hz | – | – | – | – |
| Closed | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `MEC_XT2_VGC_05_OPN_DI_POSITION`,
*B* = `MEC_XT2_VGC_05_CLS_DI_POSITION`

## 16.10 MEC XT2 VGC 06 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_XT2_VGC_06_OPN_DI_POSITION`

# 17 Ignored when Diag Stopper HFX UM6 Is In, HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 17.1 DG2 Diagnostic Stopper Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| In | F | T | – | – | – | – | – | – | – |
| Out | T | F | – | – | – | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `HFX_DG2_STP_01_IN_DI_POSITION`,
*B* = `HFX_DG2_STP_01_OUT_DI_POSITION`

## 17.2 MEC BXL VGC 01 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_BXL_VGC_01_OPN_DI_POSITION`

## 17.3 MEC XRT Attenuator Inspection Mirror Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Mirror Not Out | F | – | – | 0 Hz | – | – | – | – |
| Mirror Out | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MEC_HXM_MMS_04_B_POSITION`

## 17.4 MFX Gate Valve Summary - Upstream of Stopper 4.5

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not All Out | F | – | – | 0 Hz | – | – | – | – |
| All Out | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MFX_XRT_VGC_OUT_SUM_STATE`

## 17.5 Stopper MFX S4.5 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `STPR_XRT_1_S45OUT_STATE`,
*B* = `STPR_XRT_1_S45IN_STATE`

## 17.6 Stopper XRT S6 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| In | F | T | – | – | 120 Hz | – | – | – | – |
| Out | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `STPR_XRT1_1_S6IN_POSITION`,
*B* = `STPR_XRT1_1_S6OUT_POSITION`

## 17.7 XRT HXRAY LOM Isolation Valve HXX-LOM-VGC-01

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Closed | F | T | – | – | 0 Hz | – | – | – | – |
| Open | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `HXX_LOM_VGC_01_CLS_DI_STATE`,
*B* = `HXX_LOM_VGC_01_OPN_DI_STATE`

## 17.8 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:01

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HXX_MXT_VGC_01_OPN_DI_POSITION`

## 17.9 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:02

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HXX_MXT_VGC_02_OPN_DI_POSITION`

## 17.10 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:03

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Closed | F | T | – | – | 0 Hz | – | – | – | – |
| Open | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `HXX_MXT_VGC_03_CLS_DI_POSITION`,
*B* = `HXX_MXT_VGC_03_OPN_DI_POSITION`

## 17.11 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:05

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 0 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `HXX_MXT_VGC_05_OPN_DI_POSITION`

## 17.12 XRT-M2 Mirror and DG2 STP Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS |
|---|---|---|---|---|---|---|---|---|
| In Transit: DG2 STP Not In Beam, XRT-M2 Mirror Not Out | F | F | – | – | 0 Hz | – | – | – |
| In Transit: DG2 STP Not In Beam, XRT-M2 Mirror Out | F | T | – | – | 120 Hz | – | – | – |
| Safe: DG2 STP In Beam, XRT-M2 Mirror Not Out | T | F | – | – | 120 Hz | – | – | – |
| Safe: DG2 STP In Beam, XRT-M2 Mirror Out | T | T | – | – | 120 Hz | – | – | – |

Where
*A* = `HXX_HXM_MMS_01_B_POSITION`,
*B* = `HFX_DG2_STP_01_IN_DI_POSITION`

# 18 Ignored when HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 18.1 UM6 Diagnostic Stopper Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| In | F | T | – | – | – | – | – | – | – |
| Out | T | F | – | – | – | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = HFX_UM6_STP_01_IN_DI_POSITION,
*B* = HFX_UM6_STP_01_OUT_DI_POSITION

## 18.2 XRT HXRAY UM6 Isolation Valve HXX-UM6-VGC-01

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Closed | F | T | – | – | 0 Hz | – | – | – | – |
| Open | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = HXX_UM6_VGC_01_CLS_DI_STATE,
*B* = HXX_UM6_VGC_01_OPN_DI_STATE

## 18.3 XRT UM6 Camera Position HXX-UM6-CVP-01

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
$A$ = `HXX_UM6_CVP_01_B_STATE`,
$B$ = `HXX_UM6_CVP_01_A_STATE`

# 19 Ignored when HXR Beamline is in SC Mode, Stopper SH2 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 19.1 XRT HOMS Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| Ok | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = `MPLN_FEEH_1_XRTHOMSFSTFLT_STATE`

# 20 Ignored when HXR Beamline is in SC Mode, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, XPP-NH3-POS-00 Beamline Is In, YAG01 Is In, or YAG02 Is In

## 20.1 NEH3 HXRAY DVD Isolation Valve HX3-DVD-VGC-01

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Closed | F | T | – | – | 0 Hz | – | – | – | – |
| Open | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `HX3_DVD_VGC_01_CLS_DI_STATE`,
*B* = `HX3_DVD_VGC_01_OPN_DI_STATE`

# 21 Ignored when HXR Beamline is in SC Mode, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, XPP-NH3-POS-00 Beamline Is Not In, YAG01 Is In, or YAG02 Is In

## 21.1 XPP SB2 VGC 02 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 120 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `XPP_SB2_VGC_02_OPN_DI_POSITION`

## 21.2 XPP SB2 VGC 03 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 120 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `XPP_SB2_VGC_03_OPN_DI_POSITION`

## 21.3 XPP SB2 VGC 04 Gate Valve Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Open | F | – | – | 120 Hz | – | – | – | – |
| Open | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `XPP_SB2_VGC_04_OPN_DI_POSITION`

# 22 Ignored when HXR Beamline is in SC Mode, Stopper ST1L0 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 22.1 NEH3 HXRAY UVD Isolation Valve HX3-UVD-VGC-01

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Closed | F | T | – | – | 0 Hz | – | – | – | – |
| Open | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `HX3_UVD_VGC_01_CLS_DI_STATE`,
*B* = `HX3_UVD_VGC_01_OPN_DI_STATE`

## 22.2 SH2 PPS Stopper Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `STPR_XRT1_1_SH2OUT_STATE`,
*B* = `STPR_XRT1_1_SH2IN_STATE`

# 23 Ignored when HXR Beamline is in SC Mode, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 23.1 BLMH13 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CBLM_UNDH_1375_I1_THRESHOLD`

## 23.2 BLMH13 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CBLM_UNDH_1375_I0_THRESHOLD`

## 23.3 BLMH14 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `CBLM_UNDH_1475_I1_THRESHOLD`

## 23.4 BLMH14 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = CBLM_UNDH_1475_I0_THRESHOLD

## 23.5 BLMH15 Threshold 500 ms Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = CBLM_UNDH_1575_I1_THRESHOLD

## 23.6 BLMH15 Threshold Single Shot Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = CBLM_UNDH_1575_I0_THRESHOLD

## 23.7 BLMH16 Threshold 500 ms Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = CBLM_UNDH_1675_I1_THRESHOLD

## 23.8 BLMH16 Threshold Single Shot Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = CBLM_UNDH_1675_I0_THRESHOLD

## 23.9 BLMH17 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_1775_I1_THRESHOLD

## 23.10 BLMH17 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_1775_I0_THRESHOLD

## 23.11 BLMH18 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_1875_I1_THRESHOLD

## 23.12 BLMH18 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_1875_I0_THRESHOLD

## 23.13 BLMH19 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_1975_I1_THRESHOLD

## 23.14 BLMH19 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_1975_I0_THRESHOLD

## 23.15 BLMH20 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2075_I1_THRESHOLD

## 23.16 BLMH20 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2075_I0_THRESHOLD

## 23.17 BLMH21 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2175_I1_THRESHOLD

## 23.18 BLMH21 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2175_I0_THRESHOLD

## 23.19 BLMH22 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2275_I1_THRESHOLD

## 23.20 BLMH22 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2275_I0_THRESHOLD

## 23.21 BLMH23 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2375_I1_THRESHOLD

## 23.22 BLMH23 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2375_I0_THRESHOLD

## 23.23 BLMH24 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2475_I1_THRESHOLD

## 23.24 BLMH24 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2475_I0_THRESHOLD

## 23.25 BLMH25 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2575_I1_THRESHOLD

## 23.26 BLMH25 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2575_I0_THRESHOLD

## 23.27 BLMH26 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2675_I1_THRESHOLD

## 23.28 BLMH26 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2675_I0_THRESHOLD

## 23.29 BLMH27 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2775_I1_THRESHOLD

## 23.30 BLMH27 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2775_I0_THRESHOLD

## 23.31 BLMH28 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2875_I1_THRESHOLD

## 23.32 BLMH28 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2875_I0_THRESHOLD

## 23.33 BLMH29 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2975_I1_THRESHOLD

## 23.34 BLMH29 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_2975_I0_THRESHOLD

## 23.35 BLMH30 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3075_I1_THRESHOLD

## 23.36 BLMH30 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3075_I0_THRESHOLD

## 23.37 BLMH31 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3175_I1_THRESHOLD

## 23.38 BLMH31 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3175_I0_THRESHOLD

## 23.39 BLMH32 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3275_I1_THRESHOLD

## 23.40 BLMH32 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3275_I0_THRESHOLD

## 23.41 BLMH33 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3375_I1_THRESHOLD

## 23.42 BLMH33 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3375_I0_THRESHOLD

## 23.43 BLMH34 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3475_I1_THRESHOLD

## 23.44 BLMH34 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3475_I0_THRESHOLD

## 23.45 BLMH35 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3575_I1_THRESHOLD

## 23.46 BLMH35 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3575_I0_THRESHOLD

## 23.47 BLMH36 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3675_I1_THRESHOLD

## 23.48 BLMH36 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3675_I0_THRESHOLD

## 23.49 BLMH37 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3775_I1_THRESHOLD

## 23.50 BLMH37 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3775_I0_THRESHOLD

## 23.51 BLMH38 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3875_I1_THRESHOLD

## 23.52 BLMH38 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3875_I0_THRESHOLD

## 23.53 BLMH39 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3975_I1_THRESHOLD

## 23.54 BLMH39 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_3975_I0_THRESHOLD

## 23.55 BLMH40 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4075_I1_THRESHOLD

## 23.56 BLMH40 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4075_I0_THRESHOLD

## 23.57 BLMH41 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4175_I1_THRESHOLD

## 23.58 BLMH41 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4175_I0_THRESHOLD

## 23.59 BLMH42 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4275_I1_THRESHOLD

## 23.60 BLMH42 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4275_I0_THRESHOLD

## 23.61 BLMH43 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4375_I1_THRESHOLD

## 23.62 BLMH43 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4375_I0_THRESHOLD

## 23.63 BLMH44 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4475_I1_THRESHOLD

## 23.64 BLMH44 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4475_I0_THRESHOLD

## 23.65 BLMH45 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4575_I1_THRESHOLD

## 23.66 BLMH45 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4575_I0_THRESHOLD

## 23.67 BLMH46 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4675_I1_THRESHOLD

## 23.68 BLMH46 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = CBLM_UNDH_4675_I0_THRESHOLD

## 23.69 BLMH47 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `CBLM_UNDH_4775_I1_THRESHOLD`

## 23.70 BLMH47 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `CBLM_UNDH_4775_I0_THRESHOLD`

## 23.71 BYDSH Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `BEND_DMPH_395_CURRENT_THRESHOLD`

## 23.72 BYDSH Magnet Power Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | 0 Hz | – | – | – | – |
| On | F | T | – | – | 120 Hz | – | – | – | – |
| Off | T | F | – | – | 0 Hz | – | – | – | – |
| Inconsistent | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `BEND_DMPH_395_ON_STATE`,
*B* = `BEND_DMPH_395_OFF_STATE`

## 23.73 FEE Summary Fault - HXR Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MPLN_FEEH_1_FASTFLT_STATE`

## 23.74 FEE Summary Fault - HXR Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MPLN_FEEH_2_FASTFLT_STATE`

## 23.75 FEE Summary Fault - HXR Gas System Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MPLN_FEEH_1_GASFASTFLT_STATE`

## 23.76 FEE Summary Fault - HXR Gas System Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MPLN_FEEH_2_GASFASTFLT_STATE`

## 23.77 FEE Summary Fault - HXR Motion Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = `MPLN_FEEH_1_MCFASTFLT_STATE`

## 23.78 FEE Summary Fault - HXR Motion Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = `MPLN_FEEH_2_MCFASTFLT_STATE`

## 23.79 FEE Summary Fault - HXR Optics Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = `MPLN_FEEH_1_OPTFASTFLT_STATE`

## 23.80 FEE Summary Fault - HXR Optics Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = MPLN_FEEH_2_OPTFASTFLT_STATE

## 23.81 FEE Summary Fault - HXR Vacuum Fast Fault 1

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = MPLN_FEEH_1_VACFASTFLT_STATE

## 23.82 FEE Summary Fault - HXR Vacuum Fast Fault 2

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = MPLN_FEEH_2_VACFASTFLT_STATE

## 23.83 FEE Vacuum - LFE Fast Shutter Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = VVFS_FEEH_1_POSITION_STATE

## 23.84 HXR CBLM Alive and Updating

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = MPS_UNDH_1_CBLM_WDOG_STATE_STATE

## 23.85 HXR CBLM PMT High Voltage

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_UNDH_1_CBLM_RMON_STATE_STATE

## 23.86 HXRSS Chicane Bend Power Supply

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| ON | F | T | – | – | 120 Hz | – | – | – | – |
| OFF | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
$A$ = BEND_UNDH_2810_ON_STATE,
$B$ = BEND_UNDH_2810_OFF_STATE

## 23.87 HXRSS Crystal Position

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
$A$ = XTAL_UNDH_2850_OUT_LMTSW_STATE,
$B$ = XTAL_UNDH_2850_IN_ENCDR_STATE

## 23.88 HXRSS Crystal Valid Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Valid | F | – | – | 0 Hz | – | – | – | – |
| Valid | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `XTAL_UNDH_2850_POSITIONSTAT_STATE`

## 23.89 HXRSS Mode

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/* state = 0 : full rate (120 Hz) beam allowed, HXRSS Seeded Mode
 * state = 1 : fulle rate (120 Hz) beam allowed, HXRSS Phase Shifter /
    Sase Mode
 * state = 2 : no beam allowed, HXRSS undefined state
 */

state = (unsigned int) -1;

/*
 * Allow beam if HXRSS is on in SEEDED Mode:
 *   Magnet is on
 *     BEND_UNDH_2810_ON_STATE
 *   Magnet is in tolerance
 *     BEND_UNDH_2810_INTOL_BMIN_STATE
 *   Photon energy is OK (10 < E < 17 GeV)
 *     BEND_DMPH_400_INTOL_BRANGE_STATE
 *   Crystal is IN
 *     XTAL_UNDH_2850_IN_ENCDR_STATE
 * Allow beam if HXRSS is in Phase Shifter / Sase Mode:
 *   Magnet in ANY state
 *   Crystal is OUT
 *     XTAL_UNDH_2850_OUT_LMTSW_STATE
 * Otherwise no beam allowed
 */

if ( BEND_UNDH_2810_INTOL_BMIN_STATE &&
     BEND_UNDH_2810_ON_STATE &&
     BEND_UNDH_2810_INTOL_BMIN_STATE &&
     XTAL_UNDH_2850_IN_ENCDR_STATE )
{
```

```
  state = 0;
}
else if ( XTAL_UNDH_2850_OUT_LMTSW_STATE )
{
  state = 1;
}
else
{
  state = 2;
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| HXRSS Seeded Mode | 0 | – | – | 120 Hz | – | – | – | – |
| HXRSS Sase / Phase Shifter Mode | 1 | – | – | 120 Hz | – | – | – | – |
| HXRSS Undefined Mode | 2 | – | – | 0 Hz | – | – | – | – |

## 23.90 Magnet In Tolerance: QE31

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `QUAD_LTUH_720_INTOL_STATUS`

## 23.91 Magnet In Tolerance: QUM1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `QUAD_LTUH_820_INTOL_STATUS`

## 23.92 Magnet In Tolerance: QUM2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = QUAD_LTUH_840_INTOL_STATUS

## 23.93 Magnet In Tolerance: QUM3

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = QUAD_LTUH_860_INTOL_STATUS

## 23.94 Magnet In Tolerance: QUM4

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = QUAD_LTUH_860_INTOL_STATUS

## 23.95 Magnet Power: QE31

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | – | – | 0 Hz | – | – | – | – |
| ON | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = QUAD_LTUH_720_STATE_STATUS

## 23.96 Magnet Power: QUM1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | – | – | 0 Hz | – | – | – | – |
| ON | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `QUAD_LTUH_820_STATE_STATUS`

## 23.97 Magnet Power: QUM2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | – | – | 0 Hz | – | – | – | – |
| ON | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `QUAD_LTUH_840_STATE_STATUS`

## 23.98 Magnet Power: QUM3

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | – | – | 0 Hz | – | – | – | – |
| ON | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `QUAD_LTUH_860_INTOL_STATUS`

## 23.99 Magnet Power: QUM4

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | – | – | 0 Hz | – | – | – | – |
| ON | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `QUAD_LTUH_880_STATE_STATUS`

## 23.100 OTR01 IN20 541 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `OTRS_IN20_541_OUT_LMTSW_STATE`,
$B$ = `OTRS_IN20_541_IN_LMTSW_STATE`

## 23.101 OTR02 IN20 571 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `OTRS_IN20_571_OUT_LMTSW_STATE`,
$B$ = `OTRS_IN20_571_IN_LMTSW_STATE`

## 23.102 OTR03 IN20 621 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `OTRS_IN20_621_OUT_LMTSW_STATE`,
$B$ = `OTRS_IN20_621_IN_LMTSW_STATE`

## 23.103 OTR04 IN20 711 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `OTRS_IN20_711_OUT_LMTSW_STATE`,
$B$ = `OTRS_IN20_711_IN_LMTSW_STATE`

## 23.104 OTR11 LI21 237 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `OTRS_LI21_237_OUT_LMTSW_STATE`,
$B$ = `OTRS_LI21_237_IN_LMTSW_STATE`

## 23.105 OTR12 LI21 291 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `OTRS_LI21_291_OUT_LMTSW_STATE`,
$B$ = `OTRS_LI21_291_IN_LMTSW_STATE`

## 23.106 OTR21 Position When TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_LI24_807_OUT_LMTSW_STATE`,
*B* = `OTRS_LI24_807_IN_LMTSW_STATE`

## 23.107 OTR33 Position and TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 0 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `OTRS_LTUH_745_OUT_LIMIT_POSITION`,
*B* = `OTRS_LTUH_745_IN_LIMIT_POSITION`

## 23.108 OTRH1 Position When TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRH1_OUT_LIMIT_STATE`,
*B* = `OTRH1_IN_LIMIT_STATE`

## 23.109 OTRH2 Position When TDUND Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRH2_OUT_LIMIT_STATE`,
*B* = `OTRH2_IN_LIMIT_STATE`

## 23.110 PMPS HXR Rate Limit

| Name | *C* | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|---|
| PMPS HXR Rate Limit: 0Hz | F | F | F | – | – | 0 Hz | – | – | – | – |
| PMPS HXR Rate Limit: 1Hz | F | F | T | – | – | 1 Hz | – | – | – | – |
| PMPS HXR Fault: Arbiter Inconsistent | F | T | F | – | – | 0 Hz | – | – | – | – |
| PMPS HXR Rate Limit: 10Hz | F | T | T | – | – | 10 Hz | – | – | – | – |
| PMPS HXR Fault: Arbiter Inconsistent | T | F | F | – | – | 0 Hz | – | – | – | – |
| PMPS HXR Fault: Arbiter Inconsistent | T | F | T | – | – | 0 Hz | – | – | – | – |
| PMPS HXR Fault: Arbiter Inconsistent | T | T | F | – | – | 0 Hz | – | – | – | – |
| PMPS HXR Rate: Full Rate | T | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `MPLN_FEEH_1_RATEREQ_STATE`,
*B* = `MPLN_FEEH_10_RATEREQ_STATE`,
*C* = `MPLN_FEEH_120_RATEREQ_STATE`

## 23.111 RFBHX12 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `BPMS_UNDH_1305_XCUHBR_ORBIT`,
*B* = `BPMS_UNDH_1305_YCUHBR_ORBIT`

## 23.112 RFBHX13 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1390_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1390_YCUHBR_ORBIT

## 23.113 RFBHX14 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1490_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1490_YCUHBR_ORBIT

## 23.114 RFBHX15 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1590_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1590_YCUHBR_ORBIT

## 23.115 RFBHX16 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1690_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1690_YCUHBR_ORBIT

## 23.116 RFBHX17 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1790_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1790_YCUHBR_ORBIT

## 23.117 RFBHX18 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1890_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1890_YCUHBR_ORBIT

## 23.118 RFBHX19 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_1990_XCUHBR_ORBIT,
*B* = BPMS_UNDH_1990_YCUHBR_ORBIT

## 23.119 RFBHX20 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2090_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2090_YCUHBR_ORBIT

## 23.120 RFBHX21 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2190_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2190_YCUHBR_ORBIT

## 23.121 RFBHX22 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2290_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2290_YCUHBR_ORBIT

## 23.122 RFBHX23 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2390_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2390_YCUHBR_ORBIT

## 23.123 RFBHX24 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2490_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2490_YCUHBR_ORBIT

## 23.124 RFBHX25 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2590_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2590_YCUHBR_ORBIT

## 23.125 RFBHX26 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2690_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2690_YCUHBR_ORBIT

## 23.126 RFBHX27 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2790_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2790_YCUHBR_ORBIT

## 23.127 RFBHX28 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2890_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2890_YCUHBR_ORBIT

## 23.128 RFBHX29 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_2990_XCUHBR_ORBIT,
*B* = BPMS_UNDH_2990_YCUHBR_ORBIT

## 23.129 RFBHX30 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3090_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3090_YCUHBR_ORBIT

## 23.130 RFBHX31 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3190_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3190_YCUHBR_ORBIT

## 23.131 RFBHX32 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3290_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3290_YCUHBR_ORBIT

## 23.132 RFBHX33 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3390_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3390_YCUHBR_ORBIT

## 23.133 RFBHX34 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3490_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3490_YCUHBR_ORBIT

## 23.134 RFBHX35 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3590_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3590_YCUHBR_ORBIT

## 23.135 RFBHX36 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3690_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3690_YCUHBR_ORBIT

## 23.136 RFBHX37 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3790_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3790_YCUHBR_ORBIT

## 23.137 RFBHX38 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3890_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3890_YCUHBR_ORBIT

## 23.138 RFBHX39 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_3990_XCUHBR_ORBIT,
*B* = BPMS_UNDH_3990_YCUHBR_ORBIT

## 23.139 RFBHX40 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_4090_XCUHBR_ORBIT,
*B* = BPMS_UNDH_4090_YCUHBR_ORBIT

## 23.140 RFBHX41 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_4190_XCUHBR_ORBIT,
*B* = BPMS_UNDH_4190_YCUHBR_ORBIT

## 23.141 RFBHX42 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_4290_XCUHBR_ORBIT,
*B* = BPMS_UNDH_4290_YCUHBR_ORBIT

## 23.142 RFBHX43 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_4390_XCUHBR_ORBIT,
*B* = BPMS_UNDH_4390_YCUHBR_ORBIT

## 23.143 RFBHX44 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_4490_XCUHBR_ORBIT,
*B* = BPMS_UNDH_4490_YCUHBR_ORBIT

## 23.144 RFBHX45 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = BPMS_UNDH_4590_XCUHBR_ORBIT,
*B* = BPMS_UNDH_4590_YCUHBR_ORBIT

## 23.145 RFBHX46 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `BPMS_UNDH_4690_XCUHBR_ORBIT`,
*B* = `BPMS_UNDH_4690_YCUHBR_ORBIT`

## 23.146 RFBHX47 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | 0 Hz | – | – | – | – |
| Y Faulted | F | T | – | – | 0 Hz | – | – | – | – |
| X Faulted | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `BPMS_UNDH_4790_XCUHBR_ORBIT`,
*B* = `BPMS_UNDH_4790_YCUHBR_ORBIT`

## 23.147 SIOC UNDH MP04 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `SIOC_UNDH_MP04_HEARTBEAT_STATE`

## 23.148 SIOC UNDH MP05 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = SIOC_UNDH_MP05_HEARTBEAT_STATE

## 23.149 SIOC UNDH MP06 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = SIOC_UNDH_MP06_HEARTBEAT_STATE

## 23.150 SIOC UNDH MP07 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = SIOC_UNDH_MP07_HEARTBEAT_STATE

## 23.151 SIOC UNDH MP08 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = SIOC_UNDH_MP08_HEARTBEAT_STATE

## 23.152 SIOC UNDH MP09 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = SIOC_UNDH_MP09_HEARTBEAT_STATE

## 23.153 SIOC UNDH MP11 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `SIOC_UNDH_MP11_HEARTBEAT_STATE`

## 23.154 ST1L0 PPS Stopper Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `STPR_FEE1_ST1_OUT_POSITION`,
*B* = `STPR_FEE1_ST1_IN_POSITION`

## 23.155 VVFS DMPH 157 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVFS_DMPH_157_POSITION_STATE`

## 23.156 VVMG DMPH 643 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVMG_DMPH_643_POSITION_STATE`

# 23.157 VVMG DMPH 681 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_DMPH_681_POSITION_STATE

# 23.158 VVMG UNDH 1338 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_1338_POSITION_STATE

# 23.159 VVMG UNDH 1343 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_1343_POSITION_STATE

# 23.160 VVMG UNDH 1498 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_1498_POSITION_STATE

## 23.161 VVMG UNDH 1798 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_1798_POSITION_STATE

## 23.162 VVMG UNDH 2138 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_2138_POSITION_STATE

## 23.163 VVMG UNDH 2143 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_2143_POSITION_STATE

## 23.164 VVMG UNDH 2498 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_2498_POSITION_STATE

# 23.165 VVMG UNDH 2838 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_2838_POSITION_STATE

# 23.166 VVMG UNDH 2844 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_2844_POSITION_STATE

# 23.167 VVMG UNDH 3298 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_3298_POSITION_STATE

# 23.168 VVMG UNDH 3598 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_UNDH_3598_POSITION_STATE

## 23.169 VVMG UNDH 4098 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVMG_UNDH_4098_POSITION_STATE`

## 23.170 VVMG UNDH 4398 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVMG_UNDH_4398_POSITION_STATE`

## 23.171 VVPG DMPH 355 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_DMPH_355_POSITION_STATE`

## 23.172 VVPG DMPH 396 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_DMPH_396_POSITION_STATE`

## 23.173 VVPG UNDH 1288 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_1288_POSITION_STATE

## 23.174 VVPG UNDH 2098 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = VVPG_UNDH_2098_POSITION_STATE

## 23.175 VVPG UNDH 2298 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_2298_POSITION_STATE

## 23.176 VVPG UNDH 2798 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_2798_POSITION_STATE

## 23.177 VVPG UNDH 2998 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_2998_POSITION_STATE

## 23.178 VVPG UNDH 3798 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_3798_POSITION_STATE

## 23.179 VVPG UNDH 4598 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_4598_POSITION_STATE

## 23.180 VVPG UNDH 5196 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVPG_UNDH_5196_POSITION_STATE

# 24 Ignored when HXR Beamline is in SC Mode, Stopper: BSY D2 Summary Is In, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 24.1 BCS LION LTU1 404 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION404_STATE`

## 24.2 BCS LION LTU1 405 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION405_STATE`

## 24.3 BCS LION LTU1 504 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION504_STATE`

## 24.4 BCS LION LTU1 505 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = LION505_STATE

## 24.5 BCS LION LTU1 584 Threshold

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = LION584_STATE

## 24.6 BCS LION LTU1 585 Threshold

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = LION585_STATE

## 24.7 BCS LION LTU1 716 Threshold

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = LION716_STATE

## 24.8 BCS LION LTU1 717 Threshold

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = LION717_STATE

## 24.9 BCS LION LTU1 732 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION732_STATE`

## 24.10 BCS LION LTU1 733 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION733_STATE`

## 24.11 BCS LION LTU1 752 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION752_STATE`

## 24.12 BCS LION LTU1 753 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `LION753_STATE`

## 24.13 BCS LION LTU1 765 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `LION765_STATE`

## 24.14 BCS LION LTU1 766 Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `LION766_STATE`

## 24.15 BLM Heartbeat: Dechirper LTUH BLF545

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `BLM_LTUH_BLF545_TEST_L_THRESHOLD`,
*B* = `BLM_LTUH_BLF545_TEST_H_THRESHOLD`

## 24.16 BLM Pedestal Thresholds: Dechirper LTUH BLF545

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = BLM_LTUH_BLF545_PED_L_THRESHOLD,
$B$ = BLM_LTUH_BLF545_PED_H_THRESHOLD

## 24.17 BLM Raw Charge Thresholds: Dechirper LTUH BLF545

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = BLM_LTUH_BLF545_LOSS_L_THRESHOLD,
$B$ = BLM_LTUH_BLF545_LOSS_H_THRESHOLD

## 24.18 BYD Current

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = BEND_DMPH_400_CURRENT_THRESHOLD

## 24.19 BYD Magnet Power Status

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | 0 Hz | – | – | – | – |
| On | F | T | – | – | 120 Hz | – | – | – | – |
| Off | T | F | – | – | 0 Hz | – | – | – | – |
| Inconsistent | T | T | – | – | 0 Hz | – | – | – | – |

Where
$A$ = BEND_DMPH_400_ON_STATE,
$B$ = BEND_DMPH_400_OFF_STATE

## 24.20 BYD Watchdog

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `BEND_DMP1_400_BACT_WDOG_STATE`

## 24.21 BYKIK Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `KICK_LTUH_320_CURRENT_THRESHOLD`

## 24.22 BYKIK Magnet Power Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | 0 Hz | – | 0 Hz | – | – |
| On | F | T | – | – | 120 Hz | – | 120 Hz | – | – |
| Off | T | F | – | – | 0 Hz | – | 0 Hz | – | – |
| Inconsistent | T | T | – | – | 0 Hz | – | 0 Hz | – | – |

Where
*A* = `KICK_LTUH_320_ON_STATE`,
*B* = `KICK_LTUH_320_OFF_STATE`

## 24.23 BYKIK Timing Delay Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| TDES OOT | F | – | – | – | – | 0 Hz | – | – |
| TDES OK | T | – | – | – | – | 120 Hz | – | – |

Where
*A* = `KICK_LTUH_320_TDES_TIMING`

## 24.24 BYKIK Timing Reference Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| TREF OOT | F | – | – | – | – | 0 Hz | – | – |
| TREF OK | T | – | – | – | – | 120 Hz | – | – |

Where
*A* = KICK_LTUH_320_TREF_TIMING

## 24.25 CEDL1 Temperature

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = COLL_LTUH_253_TEMP_STATE

## 24.26 CEDL3 Temperature

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = COLL_LTUH_452_TEMP_STATE

## 24.27 CXQ6 Temperature

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = COLL_BSYH_892_TEMP_STATE

## 24.28 CXQT22 Temperature

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `COLL_LTUH_393_TEMP_STATE`

## 24.29 CYBX32 Temperature

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `COLL_LTUH_276_TEMP_STATE`

## 24.30 CYBX36 Temperature

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `COLL_LTUH_475_TEMP_STATE`

## 24.31 Dechirper Mirror Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 120 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `MIRR_LTUH_548_OUT_LIMIT_POSITION`,
*B* = `MIRR_LTUH_548_IN_LIMIT_POSITION`

## 24.32 LTU Dechirper - Horizontal Gap Too Small

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Both ends gap too small | F | F | – | – | 0 Hz | – | – | – | – |
| Downstream end gap too small | F | T | – | – | 0 Hz | – | – | – | – |
| Upstream end gap too small | T | F | – | – | 0 Hz | – | – | – | – |
| Gap OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = DCHP_LTUH_555_GAP_LIMSW_NEGZ_POSITION,
*B* = DCHP_LTUH_555_GAP_LIMSW_POSZ_POSITION

## 24.33 LTU Dechirper - Vertical Gap Too Small

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Both ends gap too small | F | F | – | – | 0 Hz | – | – | – | – |
| Downstream end gap too small | F | T | – | – | 0 Hz | – | – | – | – |
| Upstream end gap too small | T | F | – | – | 0 Hz | – | – | – | – |
| Gap OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = DCHP_LTUH_545_GAP_LIMSW_NEGZ_POSITION,
*B* = DCHP_LTUH_545_GAP_LIMSW_POSZ_POSITION

## 24.34 OTR33 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 10 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = OTRS_LTUH_745_OUT_LIMIT_POSITION,
*B* = OTRS_LTUH_745_IN_LIMIT_POSITION

## 24.35 PIC HVPS B911 - Location B911-2135

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `PICM_LTUH_B911_HV_PWR_STATE`

## 24.36 PIC HVPS B912 - Location B912-2135

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `PICM_LTUH_B912_HV_PWR_STATE`

## 24.37 PIC Raw Charge Thresholds: LTUH 220

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | 0 Hz | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | 0 Hz | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `PICM_LTUH_220_LOSSL_THRESHOLD`,
*B* = `PICM_LTUH_220_LOSSH_THRESHOLD`

## 24.38 PIC Raw Charge Thresholds: LTUH 253

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | 0 Hz | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | 0 Hz | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = PICM_LTUH_253_LOSSL_THRESHOLD,
$B$ = PICM_LTUH_253_LOSSH_THRESHOLD

## 24.39 PIC Raw Charge Thresholds: LTUH 280

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | 0 Hz | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | 0 Hz | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = PICM_LTUH_280_LOSSL_THRESHOLD,
$B$ = PICM_LTUH_280_LOSSH_THRESHOLD

## 24.40 PIC Raw Charge Thresholds: LTUH 420

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = PICM_LTUH_420_LOSSL_THRESHOLD,
$B$ = PICM_LTUH_420_LOSSH_THRESHOLD

## 24.41 PIC Raw Charge Thresholds: LTUH 452

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = PICM_LTUH_452_LOSSL_THRESHOLD,
$B$ = PICM_LTUH_452_LOSSH_THRESHOLD

## 24.42 PIC Raw Charge Thresholds: LTUH 480

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `PICM_LTUH_480_LOSSL_THRESHOLD`,
*B* = `PICM_LTUH_480_LOSSH_THRESHOLD`

## 24.43 PIC Raw Charge Thresholds: LTUH 722

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | – | – | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | – | – | 0 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `PICM_LTUH_722_LOSSL_THRESHOLD`,
*B* = `PICM_LTUH_722_LOSSH_THRESHOLD`

## 24.44 PIC Trigger Missed (LN28)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Missed | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_LTUH_220_NO_TRIG_MISSED`

## 24.45 PIC Trigger Missed (LN29)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = PICM_LTUH_480_NO_TRIG_MISSED

## 24.46 SIOC LTUH MP03 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = SIOC_LTUH_MP03_HEARTBEAT_STATE

## 24.47 SIOC LTUH MP05 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = SIOC_LTUH_MP05_HEARTBEAT_STATE

## 24.48 SIOC LTUH MP06 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = SIOC_LTUH_MP06_HEARTBEAT_STATE

## 24.49 SIOC UNDH MP02 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = SIOC_UNDH_MP02_HEARTBEAT_STATE

## 24.50 SIOC UNDH MP03 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | – | – | – |
| OK | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = SIOC_UNDH_MP03_HEARTBEAT_STATE

## 24.51 TDUND Flow Switch Fault with TDUND Not Out

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Fault | F | F | – | – | 0 Hz | – | – | – | – |
| OK | F | T | – | – | 120 Hz | – | – | – | – |
| OK, TDUND Out | T | F | – | – | 120 Hz | – | – | – | – |
| OK | T | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = DUMP_LTUH_970_FLOW_SW_STATE,
*B* = DUMP_LTUH_970_OUT_LIMIT_POSITION

## 24.52 TDUND Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | T | – | – | 120 Hz | – | – | – | – |
| In | T | F | – | – | 30 Hz | – | – | – | – |
| Broken | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = DUMP_LTUH_970_OUT_LIMIT_POSITION,
*B* = DUMP_LTUH_970_IN_LIMIT_POSITION

## 24.53 Undulator Beam Energy Lower Limit

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = BEND_DMPH_400_INTOL_BMIN_STATE

## 24.54 VVFS LTUH 102 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = VVFS_LTUH_102_POSITION_STATE

## 24.55 VVMG LTUH 174 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = VVMG_LTUH_174_POSITION_STATE

## 24.56 VVMG LTUH 355 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = VVMG_LTUH_355_POSITION_STATE

## 24.57 VVMG LTUH 505 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
$A$ = VVMG_LTUH_505_POSITION_STATE

## 24.58 VVMG LTUH 670 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_LTUH_670_POSITION_STATE

## 24.59 VVMG LTUH 742 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_LTUH_742_POSITION_STATE

## 24.60 VVMG LTUH 774 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = VVMG_LTUH_774_POSITION_STATE

## 24.61 VVPG LTUH 100 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = VVPG_LTUH_102_POSITION_STATE

## 24.62 VVPG LTUH 265 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `VVPG_LTUH_265_POSITION_STATE`

## 24.63 VVPG LTUH 435 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_LTUH_435_POSITION_STATE`

## 24.64 VVPG LTUH 580 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_LTUH_580_POSITION_STATE`

## 24.65 VVPG LTUH 725 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_LTUH_725_POSITION_STATE`

## 24.66 VVPG LTUH 757 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | – | – | – |
| OPEN | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `VVPG_LTUH_757_POSITION_STATE`

## 24.67 YAGPSI (YAGS:LTUH:743) Position

| Name | *C* | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | F | – | – | 0 Hz | – | – | – | – |
| Out | F | F | T | – | – | 120 Hz | – | – | – | – |
| P1 (YAG) | F | T | F | – | – | 10 Hz | – | – | – | – |
| Broken | F | T | T | – | – | 0 Hz | – | – | – | – |
| P2 (OTR) | T | F | F | – | – | 10 Hz | – | – | – | – |
| Broken | T | F | T | – | – | 0 Hz | – | – | – | – |
| Broken | T | T | F | – | – | 0 Hz | – | – | – | – |
| Broken | T | T | T | – | – | 0 Hz | – | – | – | – |

Where
*A* = `YAGS_LTUH_743_OUT_LMTSW_POSITION`,
*B* = `YAGS_LTUH_743_P1_LMTSW_POSITION`,
*C* = `YAGS_LTUH_743_P2_LMTSW_POSITION`

# 25 Ignored when HXR Beamline is in SC Mode, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

## 25.1 Magnet In Tolerance: BYD1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `BEND_DMPH_400_INTOL_STATUS`

## 25.2 Magnet Power: BYD1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | – | – | 0 Hz | – | 0 Hz | – | – |
| ON | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `BEND_DMPH_400_STATE_STATUS`

# 26 Ignored when HXR Beamline is in SC Mode, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 26.1 BCS PIC RAW Charge Threshold DMP 997

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | 120 Hz | 120 Hz | 120 Hz |

Where
*A* = `PIC997_STATE`

## 26.2 BCS PIC RAW Charge Threshold DMP 998

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | 120 Hz | 120 Hz | 120 Hz |

Where
*A* = `PIC998_STATE`

## 26.3 D2 Summary Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | 0 Hz | – | 0 Hz | – | – |
| Out | F | T | – | – | 120 Hz | – | 120 Hz | – | – |
| In | T | F | – | – | 0 Hz | – | 120 Hz | – | – |
| Broken | T | T | – | – | 0 Hz | – | 0 Hz | – | – |

Where
*A* = `STPR_BSYH_847_OUT_LIMIT_POSITION`,
*B* = `STPR_BSYH_847_IN_LIMIT_POSITION`

## 26.4 PIC Raw Charge Thresholds: BSYH 762 (PC90)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYH_762_LOSSL_THRESHOLD`,
*B* = `PICM_BSYH_762_LOSSH_THRESHOLD`

## 26.5 PIC Raw Charge Thresholds: BSYH 836 (PC119)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `PICM_BSYH_836_LOSSL_THRESHOLD`,
*B* = `PICM_BSYH_836_LOSSH_THRESHOLD`

## 26.6 SIOC BSYH MP01 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `SIOC_BSYH_MP01_HEARTBEAT_STATE`

## 26.7 SIOC BSYH MP02 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `SIOC_BSYH_MP02_HEARTBEAT_STATE`

## 26.8 SIOC BSYH MP03 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `SIOC_BSYH_MP03_HEARTBEAT_STATE`

## 26.9 VVPG BSYH 470 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `VVPG_BSYH_470_POSITION_STATE`

## 26.10 VVPG BSYH 541 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = `VVPG_BSYH_541_POSITION_STATE`

## 26.11 VVPG BSYH 837 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OPEN | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = `VVPG_BSYH_837_POSITION_STATE`

# 27 Ignored when Laser Heater Attenuator Is In

## 27.1 Laser Heater Photodiode Shutter Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | 0 Hz | – | – | – |
| Out | F | T | – | – | – | 0 Hz | – | – | – |
| In | T | F | – | – | – | 120 Hz | – | – | – |
| Broken | T | T | – | – | – | 0 Hz | – | – | – |

Where
*A* = `LHPHD_OUT_LIMIT_STATE`,
*B* = `LHPHD_IN_LIMIT_STATE`

## 27.2 OTRH1 Position When LH Atten Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | 0 Hz | – | – | – |
| Out | F | T | – | – | – | 120 Hz | – | – | – |
| In | T | F | – | – | – | 0 Hz | – | – | – |
| Broken | T | T | – | – | – | 0 Hz | – | – | – |

Where
*A* = `OTRH1_OUT_LIMIT_STATE`,
*B* = `OTRH1_IN_LIMIT_STATE`

## 27.3 OTRH2 Position When LH Atten Not In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | 0 Hz | – | – | – |
| Out | F | T | – | – | – | 120 Hz | – | – | – |
| In | T | F | – | – | – | 0 Hz | – | – | – |
| Broken | T | T | – | – | – | 0 Hz | – | – | – |

Where
*A* = `OTRH2_OUT_LIMIT_STATE`,
*B* = `OTRH2_IN_LIMIT_STATE`

# 28 Ignored when MR1K1 Is In, ST3K4 Is In, STCLTS Is In, TD11 Is In, TDUNDB Is In, YAG01 Is In, or YAG02 Is In

## 28.1 FEE Summary Fault - TMO Fast Shutter Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_XGMDFSTFLT_STATE`

## 28.2 FEE Summary Fault - TMO Motion Control Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_TMOMCFASTFLT_STATE`

## 28.3 FEE Summary Fault - TMO Motion Control Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_2_TMOMCFASTFLT_STATE`

## 28.4 FEE Summary Fault - TMO Vacuum Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = `MPLN_FEES_2_TMOVACFASTFLT_STATE`

# 29 Ignored when MR1K1 Is In, STCLTS Is In, TD11 Is In, TDUNDB Is In, YAG01 Is In, or YAG02 Is In

## 29.1 FEE Summary Fault - TMO Fast Shutter Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_GMDFSTFLT_STATE`

## 29.2 FEE Summary Fault - TMO Vacuum Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_TMOVACFASTFLT_STATE`

## 29.3 SXR TMO Optics Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_TMOOPTFASTFLT_STATE`

# 30 Ignored when MR1K1 Is Out, STCLTS Is In, TD11 Is In, TDUNDB Is In, YAG01 Is In, or YAG02 Is In

## 30.1 SXR RIX Motion Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_RIXMCFASTFLT_STATE`

## 30.2 SXR RIX Vacuum Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_RIXVACFASTFLT_STATE`

# 31 Ignored when STCLTS Is In, SXR Beamline is in SC Mode, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 31.1 SIOC BSYS MP01 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = SIOC_BSYS_MP01_HEARTBEAT_STATE

## 31.2 SIOC BSYS MP02 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = SIOC_BSYS_MP02_HEARTBEAT_STATE

## 31.3 SIOC BSYS MP03 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = SIOC_BSYS_MP03_HEARTBEAT_STATE

## 31.4 SIOC BSYS MP04 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
$A$ = SIOC_BSYS_MP04_HEARTBEAT_STATE

# 32 Ignored when STCLTS Is In, SXRSS M1/Grating Is Out, TD11 Is In, TDUNDB Is In, YAG01 Is In, or YAG02 Is In

## 32.1 SXRSS Guardian OK

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = `MPS_UNDS_1_SXRSS_GUARDIAN_OK_STATE`

## 32.2 SXRSS Guardian ON

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = `MPS_UNDS_1_SXRSS_GUARDIAN_ON_STATE`

# 33 Ignored when STCLTS Is In, TD11 Is In, TDUNDB Is In, YAG01 Is In, or YAG02 Is In

## 33.1 BLMS26 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_2610_I1_THRESHOLD

## 33.2 BLMS26 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_2610_I0_THRESHOLD

## 33.3 BLMS27 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_2710_I1_THRESHOLD

## 33.4 BLMS27 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = CBLM_UNDS_2710_I0_THRESHOLD

## 33.5 BLMS28 Threshold 500 ms Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = CBLM_UNDS_2810_I1_THRESHOLD

## 33.6 BLMS28 Threshold Single Shot Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = CBLM_UNDS_2810_I0_THRESHOLD

## 33.7 BLMS29 Threshold 500 ms Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = CBLM_UNDS_2910_I1_THRESHOLD

## 33.8 BLMS29 Threshold Single Shot Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = CBLM_UNDS_2910_I0_THRESHOLD

## 33.9 BLMS30 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3010_I1_THRESHOLD

## 33.10 BLMS30 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3010_I0_THRESHOLD

## 33.11 BLMS31 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3110_I1_THRESHOLD

## 33.12 BLMS31 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3110_I0_THRESHOLD

## 33.13 BLMS32 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3210_I1_THRESHOLD

## 33.14 BLMS32 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3210_I0_THRESHOLD

## 33.15 BLMS33 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3310_I1_THRESHOLD

## 33.16 BLMS33 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3310_I0_THRESHOLD

## 33.17 BLMS34 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3410_I1_THRESHOLD

## 33.18 BLMS34 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3410_I0_THRESHOLD

## 33.19 BLMS35 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3510_I1_THRESHOLD

## 33.20 BLMS35 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3510_I0_THRESHOLD

## 33.21 BLMS36 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3610_I1_THRESHOLD

## 33.22 BLMS36 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3610_I0_THRESHOLD

## 33.23 BLMS37 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3710_I1_THRESHOLD

## 33.24 BLMS37 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3710_I0_THRESHOLD

## 33.25 BLMS38 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3810_I1_THRESHOLD

## 33.26 BLMS38 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3810_I0_THRESHOLD

## 33.27 BLMS39 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3910_I1_THRESHOLD

## 33.28 BLMS39 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_3910_I0_THRESHOLD

## 33.29 BLMS40 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4010_I1_THRESHOLD

## 33.30 BLMS40 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4010_I0_THRESHOLD

## 33.31 BLMS41 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4110_I1_THRESHOLD

## 33.32 BLMS41 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4110_I0_THRESHOLD

## 33.33 BLMS42 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4210_I1_THRESHOLD

## 33.34 BLMS42 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4210_I0_THRESHOLD

## 33.35 BLMS43 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4310_I1_THRESHOLD

## 33.36 BLMS43 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4310_I0_THRESHOLD

## 33.37 BLMS44 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4410_I1_THRESHOLD

## 33.38 BLMS44 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4410_I0_THRESHOLD

## 33.39 BLMS45 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4510_I1_THRESHOLD

## 33.40 BLMS45 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4510_I0_THRESHOLD

## 33.41 BLMS46 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4610_I1_THRESHOLD

## 33.42 BLMS46 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4610_I0_THRESHOLD

## 33.43 BLMS47 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4710_I1_THRESHOLD

## 33.44 BLMS47 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = CBLM_UNDS_4710_I0_THRESHOLD

## 33.45 BLMS48 Threshold 500 ms Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `CBLM_UNDS_4810_I1_THRESHOLD`

## 33.46 BLMS48 Threshold Single Shot Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `CBLM_UNDS_4810_I0_THRESHOLD`

## 33.47 BYDSS Magnet Power Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | – | – | – | – | 0 Hz |
| On | F | T | – | – | – | – | – | – | 120 Hz |
| Off | T | F | – | – | – | – | – | – | 0 Hz |
| Inconsistent | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `BEND_DMPS_395_ON_STATE`,
*B* = `BEND_DMPS_395_OFF_STATE`

## 33.48 FEE Summary Fault - SXR Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_FASTFLT_STATE`

## 33.49 FEE Summary Fault - SXR Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_2_FASTFLT_STATE`

## 33.50 FEE Summary Fault - SXR Gas Attenuator Fast Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_GASATTNFSTFLT_STATE`

## 33.51 FEE Summary Fault - SXR Motion Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_MCFASTFLT_STATE`

## 33.52 FEE Summary Fault - SXR Motion Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_2_MCFASTFLT_STATE`

## 33.53 FEE Summary Fault - SXR Vacuum Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_VACFASTFLT_STATE`

## 33.54 FEE Summary Fault - SXR Vacuum Fast Fault 2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_2_VACFASTFLT_STATE`

## 33.55 PEPPEX Zone Plate Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `MOVR_UNDS_5013_OUT_LMTSW_POSITION`,
*B* = `MOVR_UNDS_5013_IN_LMTSW_POSITION`

## 33.56 PMPS SXR Rate Limit

| Name | *C* | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|---|
| PMPS SXR Rate Limit: 0Hz | F | F | F | – | – | – | – | – | – | 0 Hz |
| PMPS SXR Rate Limit: 1Hz | F | F | T | – | – | – | – | – | – | 1 Hz |
| PMPS SXR Fault: Arbiter Inconsistent | F | T | F | – | – | – | – | – | – | 0 Hz |
| PMPS SXR Rate Limit: 10Hz | F | T | T | – | – | – | – | – | – | 10 Hz |
| PMPS SXR Fault: Arbiter Inconsistent | T | F | F | – | – | – | – | – | – | 0 Hz |
| PMPS SXR Fault: Arbiter Inconsistent | T | F | T | – | – | – | – | – | – | 0 Hz |
| PMPS SXR Fault: Arbiter Inconsistent | T | T | F | – | – | – | – | – | – | 0 Hz |
| PMPS SXR Rate: Full Rate | T | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_RATEREQ_STATE`,
*B* = `MPLN_FEES_10_RATEREQ_STATE`,
*C* = `MPLN_FEES_120_RATEREQ_STATE`

## 33.57 RFBSX16 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_1690_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_1690_YCUSBR_ORBIT`

## 33.58 RFBSX19 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_1990_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_1990_YCUSBR_ORBIT`

## 33.59 RFBSX21 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = BPMS_UNDS_2190_XCUSBR_ORBIT,
*B* = BPMS_UNDS_2190_YCUSBR_ORBIT

## 33.60 RFBSX24 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = BPMS_UNDS_2490_XCUSBR_ORBIT,
*B* = BPMS_UNDS_2490_YCUSBR_ORBIT

## 33.61 RFBSX25 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = BPMS_UNDS_2590_XCUSBR_ORBIT,
*B* = BPMS_UNDS_2590_YCUSBR_ORBIT

## 33.62 RFBSX26 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_2690_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_2690_YCUSBR_ORBIT`

## 33.63 RFBSX27 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_2790_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_2790_YCUSBR_ORBIT`

## 33.64 RFBSX28 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_2890_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_2890_YCUSBR_ORBIT`

## 33.65 RFBSX29 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_2990_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_2990_YCUSBR_ORBIT`

## 33.66 RFBSX30 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3090_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3090_YCUSBR_ORBIT`

## 33.67 RFBSX31 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3190_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3190_YCUSBR_ORBIT`

## 33.68 RFBSX32 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3290_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3290_YCUSBR_ORBIT`

## 33.69 RFBSX33 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3390_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3390_YCUSBR_ORBIT`

## 33.70 RFBSX34 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3490_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3490_YCUSBR_ORBIT`

## 33.71 RFBSX35 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3590_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3590_YCUSBR_ORBIT`

## 33.72 RFBSX36 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3690_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3690_YCUSBR_ORBIT`

## 33.73 RFBSX37 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_3790_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_3790_YCUSBR_ORBIT`

## 33.74 RFBSX38 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = `BPMS_UNDS_3890_XCUSBR_ORBIT`,
$B$ = `BPMS_UNDS_3890_YCUSBR_ORBIT`

## 33.75 RFBSX39 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = `BPMS_UNDS_3990_XCUSBR_ORBIT`,
$B$ = `BPMS_UNDS_3990_YCUSBR_ORBIT`

## 33.76 RFBSX40 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = `BPMS_UNDS_4090_XCUSBR_ORBIT`,
$B$ = `BPMS_UNDS_4090_YCUSBR_ORBIT`

## 33.77 RFBSX41 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_4190_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_4190_YCUSBR_ORBIT`

## 33.78 RFBSX42 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_4290_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_4290_YCUSBR_ORBIT`

## 33.79 RFBSX43 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_4390_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_4390_YCUSBR_ORBIT`

## 33.80 RFBSX44 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_4490_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_4490_YCUSBR_ORBIT`

## 33.81 RFBSX45 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_4590_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_4590_YCUSBR_ORBIT`

## 33.82 RFBSX46 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `BPMS_UNDS_4690_XCUSBR_ORBIT`,
*B* = `BPMS_UNDS_4690_YCUSBR_ORBIT`

## 33.83 RFBSX47 Orbit Fault

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| X and Y Faulted | F | F | – | – | – | – | – | – | 0 Hz |
| Y Faulted | F | T | – | – | – | – | – | – | 0 Hz |
| X Faulted | T | F | – | – | – | – | – | – | 0 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = BPMS_UNDS_4790_XCUSBR_ORBIT,
*B* = BPMS_UNDS_4790_YCUSBR_ORBIT

## 33.84 SIOC UNDS MP01 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP01_HEARTBEAT_STATE

## 33.85 SIOC UNDS MP02 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP02_HEARTBEAT_STATE

## 33.86 SIOC UNDS MP03 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP03_HEARTBEAT_STATE

## 33.87 SIOC UNDS MP04 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP04_HEARTBEAT_STATE

## 33.88 SIOC UNDS MP05 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP05_HEARTBEAT_STATE

## 33.89 SIOC UNDS MP06 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP06_HEARTBEAT_STATE

## 33.90 SIOC UNDS MP07 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_UNDS_MP07_HEARTBEAT_STATE

## 33.91 SXR CBLM Alive and Updating

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = MPS_UNDS_1_CBLM_WDOG_STATE_STATE

## 33.92 SXR CBLM PMT High Voltage

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = MPS_UNDS_1_CBLM_RMON_STATE_STATE

## 33.93 SXR CRIX Motion Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = MPLN_FEES_1_CRIXMCFASTFLT_STATE

## 33.94 SXR CRIX Vacuum Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = MPLN_FEES_1_CRIXVACFASTFLT_STATE

## 33.95 SXR RIX Optics Fast Fault 1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Fault | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `MPLN_FEES_1_RIXOPTFASTFLT_STATE`

## 33.96 SXRSS BOD10 Position (YAGS:UNDS:3575)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 10 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `YAGS_UNDS_3575_OUT_LIMIT_POSITION`,
*B* = `YAGS_UNDS_3575_IN_LIMIT_POSITION`

## 33.97 SXRSS BOD12 Position(YAGS:UNDS:3795)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 10 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `YAGS_UNDS_3795_OUT_LIMIT_POSITION`,
*B* = `YAGS_UNDS_3795_IN_LIMIT_POSITION`

## 33.98 SXRSS Mode

The following code assigns the truth table's state number to the `unsigned int` variable `state`.

```
/* Production MPS SXRSS Modes
 *
 * state = 0 : full rate (120 Hz) beam allowed, SXRSS Seeded Mode
 * state = 1 : full rate (120 Hz) beam allowed, SXRSS SLIT Mode
 * state = 2 : full rate (120 Hz) beam allowed, SXRSS SASE Mode
 * state = 3 : no beam allowed, SXRSS undefined state
 *
 * Allow beam if SXRSS is ON, Seeded Mode:
 *                                { grating/M1 is IN and M3 is IN or OUT
    }
 *                                chicane is ON;
 *                                e- beam position OK  [mm]
 *                                e- beam energy   OK [GeV]
 *                                SXRSS Guardian ON
 *                                SXRSS Guardian OK
 * Allow beam if SXRSS is ON, SLIT Mode:
 *                                { slit is IN and grating/M1/M2/M3 are
   OUT }
 *                                chicane is ON;
 *                                e- beam position OK  [mm]
 *                                e- beam energy   OK [GeV]
 * Allow beam if SXRSS is OFF, SASE Mode:
 *                                grating/M1 is OUT;
 *                                slit is OUT;
 *                               M2 is OUT;
 *                               M3 is OUT;
 *                                e- beam position    OK  [mm]
 * Otherwise, do not allow beam.
 *
 * Input Descriptions
 *
 *  Link Node MPS PV Name                Link Node MPS Fault Name
                Desciption
 * ------------------------------
    ---------------------------------
    ------------------------------------------------
 *  BEND:UND3:3510:ON_MPS               =  BEND_UND3_3510_ON_STATE
               =  Chicane power supply on
 *  MIRR:UND3:3520:IN_LIMIT_MPS         =
    MIRR_UND3_3520_IN_LIMIT_POSITION     =  Grating/M1 IN limit switch
 *  MIRR:UND3:3520:OUT_LIMIT_MPS        =
    MIRR_UND3_3520_OUT_LIMIT_POSITION    =  Grating/M1 OUT limit switch
 *  SLIT:UND3:3555:IN_LIMIT_MPS         =
```

```
    SLIT_UNDS_3555_IN_LIMIT_POSITION     =  Slit IN limit switch
 *  SLIT:UNDS:3555:OUT_LIMIT_MPS         =
    SLIT_UNDS_3555_OUT_LIMIT_POSITION    =  Slit OUT limit switch
 *  MIRR:UNDS:3560:IN_LIMIT_MPS          =
    MIRR_UNDS_3560_IN_LIMIT_POSITION     =  M2 IN limit switch
 *  MIRR:UNDS:3560:OUT_LIMIT_MPS         =
    MIRR_UNDS_3560_OUT_LIMIT_POSITION    =  M2 OUT limit switch
 *  MIRR:UNDS:3565:IN_LIMIT_MPS          =
    MIRR_UNDS_3565_IN_LIMIT_POSITION     =  M3 IN limit switch
 *  MIRR:UNDS:3565:OUT_LIMIT_MPS         =
    MIRR_UNDS_3565_OUT_LIMIT_POSITION    =  M3 OUT limit switch
 *  MPS:UNDS:3500:SX_HRMNC_ENERGY_MPS =
    MPS_UNDS_3500_SX_HRMNC_ENERGY_STATE =  e- beam energy safe for
    Harmonic mode
 *  MPS:UNDS:3500:SX_HRMNC_X_MPS         =  MPS_UNDS_3500_SX_HRMNC_X_STATE
        =  e- beam position safe for Harmonic mode
 *  MPS:UNDS:3500:SX_SASE_X_MPS          =  MPS_UNDS_3500_SX_SASE_X_STATE
        =  e- beam position safe for SASE mode
 *  MPS:UNDS:3500:SX_SS_ENERGY_MPS       =
    MPS_UNDS_3500_SX_SS_ENERGY_STATE     =  e- beam energy safe for
    Seeded mode
 *  MPS:UNDS:3500:SX_SS_X_MPS            =  MPS_UNDS_3500_SX_SS_X_STATE
          =  e- beam position safe for Seeded mode
 *  MPS:UNDS:1:SXRSS:GUARDIAN_ON_STATE=
    MPS_UNDS_1_SXRSS_GUARDIAN_ON_STATE   =  SXRSS Guardian Process is ON
 *  MPS:UNDS:1:SXRSS:GUARDIAN_OK_STATE=
    MPS_UNDS_1_SXRSS_GUARDIAN_OK_STATE   =  SXRSS Guardian Process is
    reporting OK
 */

/* Initialize to a guard value */
state = (unsigned int) -1;

if (     (MIRR_UNDS_3520_IN_LIMIT_POSITION &&
         (MIRR_UNDS_3565_IN_LIMIT_POSITION ||
            MIRR_UNDS_3565_OUT_LIMIT_POSITION)) &&
         BEND_UNDS_3510_ON_STATE &&
         MPS_UNDS_3500_SX_SS_X_STATE &&
         MPS_UNDS_3500_SX_SS_ENERGY_STATE &&
         MPS_UNDS_1_SXRSS_GUARDIAN_ON_STATE &&
         MPS_UNDS_1_SXRSS_GUARDIAN_OK_STATE )
{
    state = 0; /* SXRSS Seeded Mode, okay to run beam */
}
```

```
else if (    (SLIT_UNDS_3555_IN_LIMIT_POSITION  &&
    MIRR_UNDS_3520_OUT_LIMIT_POSITION &&
         MIRR_UNDS_3560_OUT_LIMIT_POSITION &&
             MIRR_UNDS_3565_OUT_LIMIT_POSITION) &&
         BEND_UNDS_3510_ON_STATE &&
         MPS_UNDS_3500_SX_SS_X_STATE &&
         MPS_UNDS_3500_SX_SS_ENERGY_STATE &&
         MPS_UNDS_1_SXRSS_GUARDIAN_ON_STATE &&
         MPS_UNDS_1_SXRSS_GUARDIAN_OK_STATE )
{
    state = 1; /* SXRSS SLIT Mode, okay to run beam */
}

else if ( MIRR_UNDS_3520_OUT_LIMIT_POSITION &&
         SLIT_UNDS_3555_OUT_LIMIT_POSITION &&
         MIRR_UNDS_3560_OUT_LIMIT_POSITION &&
         MIRR_UNDS_3565_OUT_LIMIT_POSITION &&
         MPS_UNDS_3500_SX_SASE_X_STATE )
{
    state = 2; /* SXRSS SASE Mode, okay to run beam */
}

else
{
    state = 3; /* SXRSS Undefined State, no beam allowed */
}
```

| Name | State | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| SXRSS Seeded Mode | 0 | – | – | – | – | – | – | 120 Hz |
| SXRSS SLIT Mode | 1 | – | – | – | – | – | – | 120 Hz |
| SXRSS SASE Mode | 2 | – | – | – | – | – | – | 120 Hz |
| SXRSS Undefined Mode | 3 | – | – | – | – | – | – | 0 Hz |

## 33.99 SXRSS MSXS1 Position (MIRR:UNDS:3520)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
$A$ = MIRR_UNDS_3520_OUT_LIMIT_POSITION,
$B$ = MIRR_UNDS_3520_IN_LIMIT_POSITION

## 33.100 SXRSS MSXS2 Position (MIRR:UNDS:3560)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
$A$ = MIRR_UNDS_3560_OUT_LIMIT_POSITION,
$B$ = MIRR_UNDS_3560_IN_LIMIT_POSITION

## 33.101 SXRSS MSXS3 Position (MIRR:UNDS:3565)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
$A$ = MIRR_UNDS_3565_OUT_LIMIT_POSITION,
$B$ = MIRR_UNDS_3565_IN_LIMIT_POSITION

## 33.102 SXRSS SLSXS1 Position (SLIT:UNDS:3555)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Moving | T | T | – | – | – | – | – | – | 0 Hz |

Where
$A$ = SLIT_UNDS_3555_OUT_LIMIT_POSITION,
$B$ = SLIT_UNDS_3555_IN_LIMIT_POSITION

## 33.103 SXRSS Watchdog

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = MPS_UNDS_3500_SXRSS_WDOG_STATE

## 33.104 VVFS DMPS 157 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVFS_DMPS_157_POSITION_STATE

## 33.105 VVMG DMPS 643 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVMG_DMPS_643_POSITION_STATE

## 33.106 VVMG DMPS 681 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVMG_DMPS_681_POSITION_STATE

## 33.107 VVMG UNDS 3511 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVMG_UNDS_3511_POSITION_STATE

## 33.108 VVMG UNDS 3568 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVMG_UNDS_3568_POSITION_STATE

## 33.109 VVMG UNDS 4998 Position

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVMG_UNDS_4998_POSITION_STATE

## 33.110 VVPG DMPS 355 POSITION

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = VVPG_DMPS_355_POSITION_STATE

## 33.111 VVPG DMPS 396 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_DMPS_396_POSITION_STATE

## 33.112 VVPG UNDS 1651 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_1651_POSITION_STATE

## 33.113 VVPG UNDS 2177 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_2177_POSITION_STATE

## 33.114 VVPG UNDS 2877 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_2877_POSITION_STATE

## 33.115 VVPG UNDS 3477 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_3477_POSITION_STATE

## 33.116 VVPG UNDS 3577 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_3577_POSITION_STATE

## 33.117 VVPG UNDS 3877 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_3877_POSITION_STATE

## 33.118 VVPG UNDS 4477 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = VVPG_UNDS_4477_POSITION_STATE

# 33.119 VVPG UNDS 5198 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVPG_UNDS_5198_POSITION_STATE`

# 34 Ignored when STCLTS Is In, TD11 Is In, YAG01 Is In, or YAG02 Is In

## 34.1 BRCUS1 Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = BEND_CLTS_765_CURRENT_THRESHOLD

## 34.2 BY1B Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = BEND_LTUS_525_CURRENT_THRESHOLD

## 34.3 BY1B Magnet Power Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | – | – | – | 0 Hz | 0 Hz |
| On | F | T | – | – | – | – | – | 120 Hz | 120 Hz |
| Off | T | F | – | – | – | – | – | 0 Hz | 0 Hz |
| Inconsistent | T | T | – | – | – | – | – | 0 Hz | 0 Hz |

Where
*A* = BEND_LTUS_525_ON_STATE,
*B* = BEND_LTUS_525_OFF_STATE

## 34.4 BYDB Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = BEND_DMPS_400_CURRENT_THRESHOLD

## 34.5 BYDB Magnet Power Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | – | – | – | – | 0 Hz |
| On | F | T | – | – | – | – | – | – | 120 Hz |
| Off | T | F | – | – | – | – | – | – | 0 Hz |
| Inconsistent | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = BEND_DMPS_400_ON_STATE,
*B* = BEND_DMPS_400_OFF_STATE

## 34.6 BYKIKS Current

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = KICK_LTUS_350_CURRENT_THRESHOLD

## 34.7 BYKIKS Magnet Power Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Inconsistent | F | F | – | – | – | – | – | 0 Hz | 0 Hz |
| On | F | T | – | – | – | – | – | 120 Hz | 120 Hz |
| Off | T | F | – | – | – | – | – | 0 Hz | 0 Hz |
| Inconsistent | T | T | – | – | – | – | – | 0 Hz | 0 Hz |

Where
$A$ = KICK_LTUS_350_ON_STATE,
$B$ = KICK_LTUS_350_OFF_STATE

## 34.8 BYKIKS Timing Delay Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| TDES OOT | F | – | – | – | – | – | 0 Hz | – |
| TDES OK | T | – | – | – | – | – | 120 Hz | – |

Where
$A$ = KICK_LTUS_350_TDES_TIMING

## 34.9 BYKIKS Timing Reference Fault

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| TREF OOT | F | – | – | – | – | – | 0 Hz | – |
| TREF OK | T | – | – | – | – | – | 120 Hz | – |

Where
$A$ = KICK_LTUS_350_TREF_TIMING

## 34.10 CEDL13 Temperature

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
$A$ = COLL_LTUS_235_TEMP_STATE

## 34.11 CEDL17 Temperature

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
$A$ = COLL_LTUS_372_TEMP_STATE

## 34.12 CXBP34 Temperature

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
$A$ = COLL_BSYS_859_TEMP_STATE

## 34.13 CYBDL Temperature

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
$A$ = COLL_LTUS_116_TEMP_STATE

## 34.14 CYDL16 Temperature

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
$A$ = COLL_LTUS_345_TEMP_STATE

## 34.15 Merge Magnet Ok

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| BRCUS1 Current Wrong | F | T | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| Not Faulted | T | F | – | – | – | – | – | – | – |
| Pulsed Mode Ok | T | T | – | – | – | – | – | – | – |

Where
$A$ = BEND_CLTS_765_ON_STATE,
$B$ = BEND_CLTS_765_CURRENT_THRESHOLD

## 34.16 OTRDL18 (OTRS:LTUS:417) Position

| Name | $C$ | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | F | T | – | – | – | – | – | – | 120 Hz |
| P1 (YAG) | F | T | F | – | – | – | – | – | – | 10 Hz |
| Broken | F | T | T | – | – | – | – | – | – | 0 Hz |
| P2 (OTR) | T | F | F | – | – | – | – | – | – | 10 Hz |
| Broken | T | F | T | – | – | – | – | – | – | 0 Hz |
| Broken | T | T | F | – | – | – | – | – | – | 0 Hz |
| Broken | T | T | T | – | – | – | – | – | – | 0 Hz |

Where
$A$ = OTRS_LTUS_417_OUT_LMTSW_POSITION,
$B$ = OTRS_LTUS_417_P1_LMTSW_POSITION,
$C$ = OTRS_LTUS_417_P2_LMTSW_POSITION

## 34.17 SIOC LTUS MP01 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = SIOC_LTUS_MP01_HEARTBEAT_STATE

## 34.18 SIOC LTUS MP02 HEARTBEAT

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = SIOC_LTUS_MP02_HEARTBEAT_STATE

# 34.19 SIOC LTUS MP03 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_LTUS_MP03_HEARTBEAT_STATE

# 34.20 SIOC LTUS MP04 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = SIOC_LTUS_MP04_HEARTBEAT_STATE

# 34.21 SIOC LTUS MP05 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = SIOC_LTUS_MP05_HEARTBEAT_STATE

# 34.22 SIOC LTUS MP06 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | – | 0 Hz |
| OK | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = SIOC_LTUS_MP06_HEARTBEAT_STATE

## 34.23 ST34AB Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | 0 Hz | 0 Hz |
| Out | F | T | – | – | – | – | – | 120 Hz | 120 Hz |
| In | T | F | – | – | – | – | – | 0 Hz | 0 Hz |
| Broken | T | T | – | – | – | – | – | 0 Hz | 0 Hz |

Where
*A* = `STPR_BSYS_891_OUT_LIMIT_POSITION`,
*B* = `STPR_BSYS_891_IN_LIMIT_POSITION`

## 34.24 SXR Facility Mode

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NC Mode | F | – | – | – | – | – | – | – |
| SC Mode | T | – | – | – | – | – | 0 Hz | – |

Where
*A* = `MPS_UNDS_1_FACMODE_STATE`

## 34.25 TDUNDB Position (10 Hz)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 10 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `DUMP_LTUS_972_OUT_LIMIT_POSITION`,
*B* = `DUMP_LTUS_972_IN_LIMIT_POSITION`

## 34.26 TDUNDB Power when TDUNDB Is IN

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| OK (TDUNDB Not In) | F | F | – | – | – | – | – | – | 120 Hz |
| Fault | F | T | – | – | – | – | – | – | 0 Hz |
| OK (TDUNDB Not In) | T | F | – | – | – | – | – | – | 120 Hz |
| OK | T | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `DUMP_LTUS_972_IN_LIMIT_POSITION`,
*B* = `DUMP_LTUS_972_MPSPOWER_THRESHOLD`

## 34.27 VVFS LTUS 109 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVFS_LTUS_109_POSITION_STATE`

## 34.28 VVMG LTUS 185 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVMG_LTUS_185_POSITION_STATE`

## 34.29 VVMG LTUS 348 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVMG_LTUS_348_POSITION_STATE`

## 34.30 VVMG LTUS 451 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_451_POSITION_STATE`

## 34.31 VVMG LTUS 505 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is Not Open | F | – | – | – | – | – | – | 0 Hz |
| Is Open | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_505_POSITION_STATE`

## 34.32 VVMG LTUS 552 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_552_POSITION_STATE`

## 34.33 VVMG LTUS 656 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is Not Open | F | – | – | – | – | – | – | 0 Hz |
| Is Open | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_656_POSITION_STATE`

## 34.34 VVMG LTUS 744 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_744_POSITION_STATE`

## 34.35 VVMG LTUS 802 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_802_POSITION_STATE`

## 34.36 VVMG LTUS 827 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVMG_LTUS_827_POSITION_STATE`

## 34.37 VVPG BSYS 904 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVPG_BSYS_904_POSITION_STATE`

## 34.38 VVPG CLTS 685 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVPG_CLTS_685_POSITION_STATE`

## 34.39 VVPG LTUS 108 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVPG_LTUS_108_POSITION_STATE`

## 34.40 VVPG LTUS 272 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = `VVPG_LTUS_272_POSITION_STATE`

## 34.41 VVPG LTUS 442 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVPG_LTUS_442_POSITION_STATE`

## 34.42 VVPG LTUS 586 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVPG_LTUS_586_POSITION_STATE`

## 34.43 VVPG LTUS 726 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVPG_LTUS_726_POSITION_STATE`

## 34.44 VVPG LTUS 757 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | – | 0 Hz |
| OPEN | T | – | – | – | – | – | – | 120 Hz |

Where
*A* = `VVPG_LTUS_757_POSITION_STATE`

## 34.45 XLEAP: UMXL1H Downstream Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `WIGG_LTUS_724_DS_OUT_STATE`,
*B* = `WIGG_LTUS_724_DS_IN_STATE`

## 34.46 XLEAP: UMXL1H Upstream Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `WIGG_LTUS_724_US_OUT_STATE`,
*B* = `WIGG_LTUS_724_US_IN_STATE`

## 34.47 XLEAP: UMXL3H Downstream Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `WIGG_LTUS_770_DS_OUT_STATE`,
*B* = `WIGG_LTUS_770_DS_IN_STATE`

## 34.48 XLEAP: UMXL3H Upstream Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `WIGG_LTUS_770_US_OUT_STATE`,
*B* = `WIGG_LTUS_770_US_IN_STATE`

## 34.49 XLEAP: UMXL4H Downstream Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `WIGG_LTUS_774_DS_OUT_STATE`,
*B* = `WIGG_LTUS_774_DS_IN_STATE`

## 34.50 XLEAP: UMXL4H Upstream Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | 120 Hz |
| In | T | F | – | – | – | – | – | – | 120 Hz |
| Broken | T | T | – | – | – | – | – | – | 0 Hz |

Where
*A* = `WIGG_LTUS_774_US_OUT_STATE`,
*B* = `WIGG_LTUS_774_US_IN_STATE`

# 35 Ignored when TD11 Is In, YAG01 Is In, or YAG02 Is In

## 35.1 Attempt to deliver Beam Code 1 when SXR DC extraction magnet is ON

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OK | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `LP_DC_MODE_BC1`

## 35.2 BKRCUS Timing Delay Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| TDES OOT | F | – | – | – | – | – | 0 Hz | – |
| TDES OK | T | – | – | – | – | – | 120 Hz | – |

Where
*A* = `KICK_CLTS_185_TDES_TIMING`

## 35.3 BKRCUS Timing Reference Fault

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| TREF OOT | F | – | – | – | – | – | 0 Hz | – |
| TREF OK | T | – | – | – | – | – | 120 Hz | – |

Where
*A* = `KICK_CLTS_185_TREF_TIMING`

## 35.4 BLM/PIC Watchdog BSY0/BSYA

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_BSY0_1_PICBLM_WD_STATUS

## 35.5 BLM/PIC Watchdog LI24

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_LI24_1_PICBLM_WD_STATUS

## 35.6 BLM/PIC Watchdog LI30

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_LI30_1_PICBLM_WD_STATUS

## 35.7 BLRCUS Current

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = BEND_CLTS_280_CURRENT_THRESHOLD

## 35.8 BRCUSDC on and HXR Mode

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Normal NC Operation | F | F | – | – | – | – | – | – | – |
| HXR in SC mode and DC magnet not on | F | T | – | – | – | – | 0 Hz | – | – |
| Normal NC Operation | T | F | – | – | – | – | – | – | – |
| Normal SC operation | T | T | – | – | – | – | – | – | – |

Where
$A$ = MPS_UNDH_1_FACMODE_STATE,
$B$ = BEND_CLTS_765_ON_STATE

## 35.9 Bunch Length Monitor BL21 Position

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = BL22_OUT_STATE,
$B$ = BL22_IN_STATE

## 35.10 Dump LI28 5879 Flowswitch

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = DUMP_5879_FLOW_SW_STATE

## 35.11 Dump LI28 5879 Klixon

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = DUMP_5879_KLIXON_OK_STATE

## 35.12 Flowswitch: CE21

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `COL_805_FLOSW_STATE`

## 35.13 Flowswitch: COLL LI28-9

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FLOW_SW_28_9_STATE`

## 35.14 Flowswitch: COLL LI29-1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FLOW_SW_29_1_STATE`

## 35.15 Flowswitch: COLL LI29-4

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FLOW_SW_29_4_STATE`

## 35.16 Flowswitch: COLL LI29-5

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `FLOW_SW_29_5_STATE`

## 35.17 Flowswitch: COLL LI29-9

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `FLOW_SW_29_9_STATE`

## 35.18 Flowswitch: COLL LI30-1

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `FLOW_SW_30_1_STATE`

## 35.19 Flowswitch: COLL LI30-4

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `FLOW_SW_30_4_STATE`

## 35.20 Flowswitch: COLL LI30-5

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FLOW_SW_30_5_STATE`

## 35.21 HXR Facility Mode

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NC Mode | F | – | – | – | – | – | – | – |
| SC Mode | T | – | – | – | – | 0 Hz | – | – |

Where
*A* = `MPS_UNDH_1_FACMODE_STATE`

## 35.22 HXR Magnet Mode

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| Not Faulted | F | T | – | – | – | – | – | – | – |
| Not Faulted | T | F | – | – | – | – | – | – | – |
| HXR Mode | T | T | – | – | – | – | – | – | – |

Where
*A* = `BEND_CLTS_180_OFF_STATE`,
*B* = `KICK_CLTS_185_OFF_STATE`

## 35.23 Inconsistent Magnet Mode

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| Not Faulted | F | T | – | – | – | – | – | – | – |
| Not Faulted | T | F | – | – | – | – | – | – | – |
| Both On | T | T | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |

Where
$A$ = BEND_CLTS_180_ON_STATE,
$B$ = KICK_CLTS_185_ON_STATE

## 35.24 Main Manifold Gauge: LI22 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI22_STATE

## 35.25 Main Manifold Gauge: LI23 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI23_STATE

## 35.26 Main Manifold Gauge: LI24 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI24_STATE

## 35.27 Main Manifold Gauge: LI25 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI25_STATE

## 35.28 Main Manifold Gauge: LI26 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI26_STATE

## 35.29 Main Manifold Gauge: LI27 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI27_STATE

## 35.30 Main Manifold Gauge: LI28 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI28_STATE

## 35.31 Main Manifold Gauge: LI29 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_STATE

## 35.32 Main Manifold Gauge: LI30 Station 5

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_MM_GAUGE_30_5_OK_STATE`

## 35.33 OTR LI25 920 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTR_TCAV_OUT_STATE`,
*B* = `OTR_TCAV_IN_STATE`

## 35.34 OTR21 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_LI24_807_OUT_LMTSW_STATE`,
*B* = `OTRS_LI24_807_IN_LMTSW_STATE`

## 35.35 PIC Gas Pressure LI24

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = PIC_GAS_PRESS_STATE

## 35.36 PIC HVPS BSY 1 - Location B005-3921

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = PICM_BSY0_1_HV_PWR_STATE

## 35.37 PIC HVPS BSY 2 - Location B005-3921

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = PICM_BSY0_2_HV_PWR_STATE

## 35.38 PIC HVPS BSY 3 - Location B005-3921

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = PICM_BSY0_3_HV_PWR_STATE

## 35.39 PIC HVPS BSY 4 - Location B005-3918

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = PICM_BSY0_4_HV_PWR_STATE

## 35.40 PIC HVPS BSY 5 - Location B005-3918

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_BSY0_5_HV_PWR_STATE`

## 35.41 PIC HVPS BSY 6 - Location B005-3918

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_BSY0_6_HV_PWR_STATE`

## 35.42 PIC HVPS LI24 - Location LKF24-0235

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_LI24_1_HV_PWR_STATE`

## 35.43 PIC HVPS LI30 - KG30-C1322

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_LI30_1_HV_PWR_STATE`

## 35.44 PIC Raw Charge Thresholds: CLTS 280 (BLRCUS)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_CLTS_280_LOSSL_THRESHOLD,
*B* = PICM_CLTS_280_LOSSH_THRESHOLD

## 35.45 PIC Raw Charge Thresholds: LI24 791

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI24_791_LOSSL_THRESHOLD,
*B* = PICM_LI24_791_LOSSH_THRESHOLD

## 35.46 PIC Raw Charge Thresholds: LI24 811

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI24_811_LOSSL_THRESHOLD,
*B* = PICM_LI24_811_LOSSH_THRESHOLD

## 35.47 PIC Raw Charge Thresholds: LI28 916

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI28_916_LOSSL_THRESHOLD,
*B* = PICM_LI28_916_LOSSH_THRESHOLD

## 35.48 PIC Raw Charge Thresholds: LI29 146

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI29_146_LOSSL_THRESHOLD,
*B* = PICM_LI29_146_LOSSH_THRESHOLD

## 35.49 PIC Raw Charge Thresholds: LI29 446

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI29_446_LOSSL_THRESHOLD,
*B* = PICM_LI29_446_LOSSH_THRESHOLD

## 35.50 PIC Raw Charge Thresholds: LI29 546

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI29_546_LOSSL_THRESHOLD,
*B* = PICM_LI29_546_LOSSH_THRESHOLD

## 35.51 PIC Raw Charge Thresholds: LI29 801

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI29_801_LOSSL_THRESHOLD,
*B* = PICM_LI29_801_LOSSH_THRESHOLD

## 35.52 PIC Raw Charge Thresholds: LI29 956

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI29_956_LOSSL_THRESHOLD,
*B* = PICM_LI29_956_LOSSH_THRESHOLD

## 35.53 PIC Raw Charge Thresholds: LI30 146

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_LI30_146_LOSSL_THRESHOLD`,
*B* = `PICM_LI30_146_LOSSH_THRESHOLD`

## 35.54 PIC Raw Charge Thresholds: LI30 446

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_LI30_446_LOSSL_THRESHOLD`,
*B* = `PICM_LI30_446_LOSSH_THRESHOLD`

## 35.55 PIC Raw Charge Thresholds: LI30 546

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_LI30_546_LOSSL_THRESHOLD`,
*B* = `PICM_LI30_546_LOSSH_THRESHOLD`

## 35.56 PIC Raw Charge Thresholds: LI30 801

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI30_801_LOSSL_THRESHOLD,
*B* = PICM_LI30_801_LOSSH_THRESHOLD

## 35.57 PIC Trigger Missed (LN16)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI24_791_NO_TRIG_MISSED

## 35.58 PIC Trigger Missed (LN22)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI28_916_NO_TRIG_MISSED

## 35.59 PIC Trigger Missed (LN25)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_BSY0_16_NO_TRIG_MISSED

## 35.60 Pulsed Magnet Mode Ok

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| BKRCUS Current Wrong | F | T | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| Not Faulted | T | F | – | – | – | – | – | – | – |
| Pulsed Mode Ok | T | T | – | – | – | – | – | – | – |

Where
*A* = KICK_CLTS_185_ON_STATE,
*B* = KICK_CLTS_185_CURRENT_THRESHOLD

## 35.61 Scraper Water LI21-9 (Station 22-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = MPS_SCRAPPER_FLOW_OK_LI22_STATE

## 35.62 Scraper Water LI22-9 (Station 23-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = MPS_SCRAPPER_FLOW_OK_LI23_STATE

## 35.63 Scraper Water LI23-9 (Station 24-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = MPS_SCRAPPER_FLOW_OK_LI24_STATE

## 35.64 Scraper Water LI24-9 (Station 25-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SCRAPPER_FLOW_OK_LI25_STATE`

## 35.65 Scraper Water LI25-9 (Station 26-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SCRAPPER_FLOW_OK_LI26_STATE`

## 35.66 Scraper Water LI26-9 (Station 27-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SCRAPPER_FLOW_OK_LI27_STATE`

## 35.67 Scraper Water LI27-9 (Station 28-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SCRAPPER_FLOW_OK_LI28_STATE`

## 35.68 Scraper Water LI28-9 (Station 29-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = MPS_SCRAPPER_FLOW_OK_LI29_STATE

## 35.69 Scraper Water LI29-9 (Station 30-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = MPS_SCRAPPER_FLOW_OK_LI30_STATE

## 35.70 SIOC CLTS MP01 HEARTBEAT

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULTED | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OK | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = SIOC_CLTS_MP01_HEARTBEAT_STATE

## 35.71 STCLTS Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | – | – | 0 Hz | 0 Hz |
| Out | F | T | – | – | – | – | – | 120 Hz | 120 Hz |
| In | T | F | – | – | – | – | – | 120 Hz | 120 Hz |
| Broken | T | T | – | – | – | – | – | 0 Hz | 0 Hz |

Where
*A* = STPP_CLTS_585_OUT_LIMIT_POSITION,
*B* = STPR_CLTS_585_IN_LIMIT_POSITION

## 35.72 Stopper LI28 950 and 960 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OUT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OUT | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `BASII_STOPPER_OUT_STATE`

## 35.73 Sub-booster Ready: LI22

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SBST_OK_READY_LI22_STATE`

## 35.74 Sub-booster Ready: LI25

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SBST_OK_READY_LI25_STATE`

## 35.75 Sub-booster Ready: LI26

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SBST_OK_READY_LI26_STATE`

## 35.76 Sub-booster Ready: LI27

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `MPS_SBST_OK_READY_LI27_STATE`

## 35.77 Sub-booster Ready: LI28

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `MPS_SBST_OK_READY_LI28_STATE`

## 35.78 Sub-booster Ready: LI29

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `MPS_SBST_OK_READY_LI29_STATE`

## 35.79 Sub-booster Ready: LI30

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `MPS_SBST_OK_READY_LI30_STATE`

## 35.80 SXR Magnet Mode Ok

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Not Faulted | F | F | – | – | – | – | – | – | – |
| BRCUSDC Current Wrong | F | T | 0 Hz | 0 Hz | 0 Hz | – | 0 Hz | 0 Hz | 0 Hz |
| Not Faulted | T | F | – | – | – | – | – | – | – |
| SXR Mode Ok | T | T | – | – | – | – | – | – | – |

Where
*A* = `BEND_CLTS_180_ON_STATE`,
*B* = `BEND_CLTS_180_CURRENT_THRESHOLD`

## 35.81 Temperature RTD Summary: BSY Common Line

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `RTD_BSY0_16_CLINESUM_STATUS`

## 35.82 Timing / MPS Destination Mismatch

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| MISMATCH | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `LP_DESTINATION_MATCH`

## 35.83 Toroid Chassis LI24 IMBC2

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = CHASIMB2_STATE

## 35.84 Toroid Comparator BC2 (IMBC2IN vs IMBC2OUT)

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Downstream > Upstream | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Upstream > Downstream | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = TCBC2L1_STATE,
$B$ = TCBC2L2_STATE

## 35.85 VVFS CLTH 101 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
$A$ = VVFS_CLTH_101_OPEN_LIMSW_POSITION

## 35.86 VVFS LI21-9 Position (Station 22-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = FAST_VLV_OPEN_LI22_STATE

## 35.87 VVFS LI22-9 Position (Station 23-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI23_STATE`

## 35.88 VVFS LI23-9 Position (Station 24-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI24_STATE`

## 35.89 VVFS LI24-9 Position (Station 25-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI25_STATE`

## 35.90 VVFS LI25-9 Position (Station 26-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI26_STATE`

## 35.91 VVFS LI26-9 Position (Station 27-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI27_STATE`

## 35.92 VVFS LI27-9 Position (Station 28-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI28_STATE`

## 35.93 VVFS LI28-9 Position (Station 29-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI29_STATE`

## 35.94 VVFS LI29-9 Position (Station 30-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `FAST_VLV_OPEN_LI30_STATE`

## 35.95 VVPG CLTH 178 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = VVPG_CLTH_178_OPEN_LIMSW_POSITION

## 35.96 VVPG CLTH 375 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | – | – | 0 Hz | – | 0 Hz | – | – |
| OK | T | – | – | 120 Hz | – | 120 Hz | – | – |

Where
*A* = VVPG_CLTH_375_OPEN_LIMSW_POSITION

## 35.97 VVPG CLTS 372 POSITION

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_OPEN | F | – | – | – | – | – | 0 Hz | 0 Hz |
| OPEN | T | – | – | – | – | – | 120 Hz | 120 Hz |

Where
*A* = VVPG_CLTS_372_POSITION_STATE

## 35.98 VVPG LI21-9 Position (Station 22-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = SLOW_VLV_OPEN_LI22_STATE

## 35.99 VVPG LI22-9 Position (Station 23-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `SLOW_VLV_OPEN_LI23_STATE`

## 35.100 VVPG LI23-9 Position (Station 24-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `SLOW_VLV_OPEN_LI24_STATE`

## 35.101 VVPG LI24 710 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV21_STATE`

## 35.102 VVPG LI24 896 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV22_STATE`

## 35.103 VVPG LI25-9 Position (Station 26-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `SLOW_VLV_OPEN_LI26_STATE`

## 35.104 VVPG LI26-9 Position (Station 27-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `SLOW_VLV_OPEN_LI27_STATE`

## 35.105 VVPG LI27-9 Position (Station 28-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `SLOW_VLV_OPEN_LI28_STATE`

## 35.106 VVPG LI28-9 Position (Station 29-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `SLOW_VLV_OPEN_LI29_STATE`

## 35.107 VVPG LI29-9 Position (Station 30-1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `SLOW_VLV_OPEN_LI30_STATE`

## 35.108 VVPG LI30-9 Position (Station 30-9)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `SLOW_VLV_30_9_OK_OPEN_STATE`

# 36 Ignored when YAG01 Is In

## 36.1 BXG Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Off | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| On | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | – |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |

Where
$A$ = `BEND_IN20_231_OFF_STATE`,
$B$ = `BEND_IN20_231_OK_STATE`

## 36.2 Toroid Peak Current Monitor IM01

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = `TR_BL215_STATE`

## 36.3 YAG02 IN20 241 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `YAGS_IN20_241_OUT_LMTSW_STATE`,
$B$ = `YAGS_IN20_241_IN_LMTSW_STATE`

# 37 Ignored when YAG01 Is In or YAG02 Is In

## 37.1 BLM/PIC Watchdog Upstream of TDUND

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_MCC0_1_PICBLM_WD_STATUS`

## 37.2 BX01/BX02 Status

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Off | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| On | T | F | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |

Where
*A* = `BEND_IN20_751_OFF_STATE`,
*B* = `BEND_IN20_751_OK_STATE`

## 37.3 Flowswitch: CE11

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `COLL_LI21_235_OPEN_STATE`

## 37.4 Flowswitch: TD11

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = FS_BL305_STATE

## 37.5 Main Manifold Gauge: LI21 Station 5

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = MPS_MM_GAUGE_OK_LI21_STATE

## 37.6 Mirror BL11 Position

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = MIR_BL11_OUT_STATE,
$B$ = MIR_BL11_IN_STATE

## 37.7 OTR01 IN20 541 Position

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = OTRS_IN20_541_OUT_LMTSW_STATE,
$B$ = OTRS_IN20_541_IN_LMTSW_STATE

## 37.8 OTR02 IN20 571 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_IN20_571_OUT_LMTSW_STATE`,
*B* = `OTRS_IN20_571_IN_LMTSW_STATE`

## 37.9 OTR03 IN20 621 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_IN20_621_OUT_LMTSW_STATE`,
*B* = `OTRS_IN20_621_IN_LMTSW_STATE`

## 37.10 OTR04 IN20 711 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_IN20_711_OUT_LMTSW_STATE`,
*B* = `OTRS_IN20_711_IN_LMTSW_STATE`

## 37.11 OTR11 LI21 237 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_LI21_237_OUT_LMTSW_STATE`,
*B* = `OTRS_LI21_237_IN_LMTSW_STATE`

## 37.12 OTR12 LI21 291 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRS_LI21_291_OUT_LMTSW_STATE`,
*B* = `OTRS_LI21_291_IN_LMTSW_STATE`

## 37.13 OTRH1 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRH1_OUT_LIMIT_STATE`,
*B* = `OTRH1_IN_LIMIT_STATE`

## 37.14 OTRH2 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `OTRH2_OUT_LIMIT_STATE`,
*B* = `OTRH2_IN_LIMIT_STATE`

## 37.15 Sub-booster Ready: LI21

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_SBST_OK_READY_LI21_STATE`

## 37.16 TD11 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | – | – | – | – | – |
| Out | F | T | 120 Hz | 120 Hz | – | – | – | – | – |
| In | T | F | 120 Hz | 120 Hz | – | – | – | – | – |
| Broken | T | T | 0 Hz | 0 Hz | – | – | – | – | – |

Where
*A* = `TD11_OUT_LIMIT_STATE`,
*B* = `TD11_IN_LIMIT_STATE`

## 37.17 Toroid Chassis IN20 IM11

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = CHASIM11_STATE

## 37.18 Toroid Chassis IN20 IM12

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = CHASIM12_STATE

## 37.19 Toroid Comparator BC1 (IMBC1IN vs IMBC1OUT)

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Downstream - Upstream > 50 pC | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Upstream - Downstream > 200 pC | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
$A$ = TCBC1L1_STATE,
$B$ = TCBC1L2_STATE

## 37.20 VVFV IN20 785 Position

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
$A$ = VVFV_IN20_785_OPEN_LMTSW_POSITION

## 37.21 VVPG IN20 155 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_BL155_STATE`

## 37.22 VVPG IN20 435 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_BL435_STATE`

## 37.23 VVPG IN20 545 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_BL545_STATE`

## 37.24 VVPG IN20 635 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_BL635_STATE`

## 37.25 VVPG IN20 915 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_IS915_STATE`

## 37.26 VVS Circuit Breaker: LI22

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VVS_BRKR_OK_READY_LI22_STATE`

## 37.27 VVS Circuit Breaker: LI24

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VVS_BRKR_OK_READY_LI24_STATE`

## 37.28 VVS Circuit Breaker: LI26

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VVS_BRKR_OK_READY_LI26_STATE`

## 37.29 VVS Circuit Breaker: LI28

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VVS_BRKR_OK_READY_LI28_STATE`

## 37.30 VVS Circuit Breaker: LI30

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VVS_BRKR_OK_READY_LI30_STATE`

## 37.31 YAG03 IN20 351 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `YAGS_IN20_351_OUT_LMTSW_STATE`,
*B* = `YAGS_IN20_351_IN_LMTSW_STATE`

## 37.32 YAGS1 IN20 921 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = YAGS_IN20_921_OUT_LMTSW_STATE,
$B$ = YAGS_IN20_921_IN_LMTSW_STATE

## 37.33 YAGS2 IN20 995 Position

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = YAGS_LI21_995_OUT_LMTSW_STATE,
$B$ = YAGS_LI21_995_IN_LMTSW_STATE

# 38 Always Evaluated

## 38.1 Backward Beam Stopper (RST1)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Out | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Out | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `ST_BL551_STATE`

## 38.2 Beam Destination: HXR

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not True | F | – | – | – | – | – | – | – |
| True | T | – | – | – | – | – | – | – |

Where
*A* = `LP_DESTINATION_HXR`

## 38.3 Beam Destination: SXR

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not True | F | – | – | – | – | – | – | – |
| True | T | – | – | – | – | – | – | – |

Where
*A* = `LP_DESTINATION_SXR`

## 38.4 BLM/PIC Watchdog IN20

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_IN20_1_PICBLM_WD_STATUS`

## 38.5 Bypass Recover

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Recovering | F | 0 Hz | 0 Hz | 0 Hz | 0 Hz | – | – | – |
| OK | T | 120 Hz | 120 Hz | 120 Hz | 120 Hz | – | – | – |

Where
*A* = `LP_BYPASS_RECOVER`

## 38.6 Gun RF Peak Power 20-6

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| OK | F | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| Fault | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `FLT_20_6_TRP_STATE`

## 38.7 Gun Waveguide Vacuum Summary

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `WGVACGUN_STATE`

## 38.8 HX2: 8 Hour Watchdog Timer

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Ok | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `HXRC_B969_1_TIMER_STATE`

## 38.9 HX2: Recombiner 50% LEL Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Ok | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = HXRC_B969_1_RCBR_LEL_THRESHOLD

## 38.10 HX2: Room 50% LEL Threshold

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Faulted | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Ok | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = HXRC_B969_1_ROOM_LEL_THRESHOLD

## 38.11 IOC-IN20-MP01 MPS Support IOC Heartbeat

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = MN_HEART_STATE

## 38.12 Laser Heater Attenuator Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | – | – | – | 0 Hz | – | – | – |
| Out | F | T | – | – | – | – | – | – | – |
| In | T | F | – | – | – | – | – | – | – |
| Broken | T | T | – | – | – | 0 Hz | – | – | – |

Where
*A* = LHATTEN_OUT_LIMIT_STATE,
*B* = LHATTEN_IN_LIMIT_STATE

## 38.13 MCC Emergency Radiation Stopper

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not OK | F | 0 Hz | 0 Hz | 0 Hz | 0 Hz | 0 Hz | 0 Hz | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | 120 Hz | 120 Hz | 120 Hz | 120 Hz |

Where
*A* = `EMG_RAD_STOP_STATE`

## 38.14 Mechanical Shutter Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | – | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | – | – | – | – | – | – | – |
| In | T | F | – | – | – | – | – | – | – |
| Broken | T | T | 0 Hz | – | 0 Hz | – | – | – | 0 Hz |

Where
*A* = `MPS_IN20_200_MSHT1_OUT_FAULT`,
*B* = `MPS_IN20_200_MSHT1_IN_FAULT`

## 38.15 Mirror AM01 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Out | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |
| Out | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |

Where
*A* = `MR_BL191_STATE`

## 38.16 MPS Beam Permit: BYKIK

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | – | – | 0 Hz | – | – | – | – |
| Permitted | T | – | – | 120 Hz | – | – | – | – |

Where
*A* = `LP_ALLOWS_BEAM_BYKIK`

## 38.17 MPS Beam Permit: BYKIKS

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | – | – | – | – | – | – | 0 Hz |
| Permitted | T | – | – | – | – | – | – | 120 Hz |

Where
$A$ = LP_ALLOWS_BEAM_BYKIKS

## 38.18 MPS Beam Permit: Gun RF

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | 0 Hz | – | – | – | – | – | – |
| Permitted | T | 120 Hz | – | – | – | – | – | – |

Where
$A$ = LP_ALLOWS_BEAM_POCKELS_CELL

## 38.19 MPS Beam Permit: Gun RF HXR

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | – | – | – | – | 0 Hz | – | – |
| Permitted | T | – | – | – | – | 120 Hz | – | – |

Where
$A$ = LP_ALLOWS_BEAM_GUN_HXR

## 38.20 MPS Beam Permit: Gun RF SXR

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | – | – | – | – | – | 0 Hz | – |
| Permitted | T | – | – | – | – | – | 120 Hz | – |

Where
$A$ = LP_ALLOWS_BEAM_GUN_SXR

## 38.21 MPS Beam Permit: Heater Shutter

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | – | – | – | 0 Hz | – | – | – |
| Permitted | T | – | – | – | 120 Hz | – | – | – |

Where
*A* = LP_ALLOWS_BEAM_LH_SHUT

## 38.22 MPS Beam Permit: Mechanical Shutter

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Permitted | F | – | 0 Hz | – | – | – | – | – |
| Permitted | T | – | 120 Hz | – | – | – | – | – |

Where
*A* = LP_ALLOWS_BEAM_MECH_SHUT

## 38.23 MPS Mechanical Shutter Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| OK | F | 120 Hz | 120 Hz | 120 Hz | – | – | – | – |
| Readback Does Not Match | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | – |

Where
*A* = SHFLT_STATE

## 38.24 PIC HVPS LI20 - Location LKG-1535

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| NOT_ON | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| ON | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = PICM_LI20_1_HV_PWR_STATE

## 38.25 PIC Raw Charge Thresholds: IN20 185

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_185_LOSSL_THRESHOLD`,
*B* = `PICM_IN20_185_LOSSH_THRESHOLD`

## 38.26 PIC Raw Charge Thresholds: IN20 232

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_232_LOSSL_THRESHOLD`,
*B* = `PICM_IN20_232_LOSSH_THRESHOLD`

## 38.27 PIC Raw Charge Thresholds: IN20 245

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_245_LOSSL_THRESHOLD`,
*B* = `PICM_IN20_245_LOSSH_THRESHOLD`

## 38.28 PIC Raw Charge Thresholds: IN20 665

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_665_LOSSL_THRESHOLD`,
*B* = `PICM_IN20_665_LOSSH_THRESHOLD`

## 38.29 PIC Raw Charge Thresholds: IN20 775

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_775_LOSSL_THRESHOLD`,
*B* = `PICM_IN20_775_LOSSH_THRESHOLD`

## 38.30 PIC Raw Charge Thresholds: IN20 933

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Broken | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Over High Threshold | F | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Under Low Threshold | T | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_933_LOSSL_THRESHOLD`,
*B* = `PICM_IN20_933_LOSSH_THRESHOLD`

## 38.31 PIC Trigger Missed (LN11)

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `PICM_IN20_665_NO_TRIG_MISSED`

## 38.32 Pockels Cell AND Gate 100

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_IN20_100_ANDALLACTV_STATE`

## 38.33 Pockels Cell AND Gate 200

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `MPS_IN20_200_ANDALLACTV_STATE`

## 38.34 Rate Request: BYKIK 1 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | 120 Hz | – | – | – | – |
| Requested | T | – | – | 1 Hz | – | – | – | – |

Where
*A* = `LP_MAX_RATE_BYKIK_1_HZ`

## 38.35 Rate Request: BYKIK 10 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | 120 Hz | – | – | – | – |
| Requested | T | – | – | 10 Hz | – | – | – | – |

Where
*A* = `LP_MAX_RATE_BYKIK_10_HZ`

## 38.36 Rate Request: BYKIK 30 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | 120 Hz | – | – | – | – |
| Requested | T | – | – | 30 Hz | – | – | – | – |

Where
*A* = `LP_MAX_RATE_BYKIK_30_HZ`

## 38.37 Rate Request: BYKIK 60 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | 120 Hz | – | – | – | – |
| Requested | T | – | – | 60 Hz | – | – | – | – |

Where
*A* = `LP_MAX_RATE_BYKIK_60_HZ`

## 38.38 Rate Request: BYKIK Burst

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | 120 Hz | – | – | – | – |
| Requested | T | – | – | Burst Mode | – | – | – | – |

Where
*A* = `LP_MAX_RATE_BYKIK_BURST`

## 38.39 Rate Request: BYKIK Single Shot

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | 120 Hz | – | – | – | – |
| Requested | T | – | – | Single Shot | – | – | – | – |

Where
*A* = LP_MAX_RATE_BYKIK_SINGLE_SHOT

## 38.40 Rate Request: BYKIKS 1 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | – | 120 Hz |
| Requested | T | – | – | – | – | – | – | 1 Hz |

Where
*A* = LP_MAX_RATE_BYKIKS_1_HZ

## 38.41 Rate Request: BYKIKS 10 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | – | 120 Hz |
| Requested | T | – | – | – | – | – | – | 10 Hz |

Where
*A* = LP_MAX_RATE_BYKIKS_10_HZ

## 38.42 Rate Request: BYKIKS 30 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | – | 120 Hz |
| Requested | T | – | – | – | – | – | – | 30 Hz |

Where
*A* = LP_MAX_RATE_BYKIKS_30_HZ

## 38.43 Rate Request: BYKIKS 60 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | – | 120 Hz |
| Requested | T | – | – | – | – | – | – | 60 Hz |

Where
*A* = LP_MAX_RATE_BYKIKS_60_HZ

## 38.44 Rate Request: BYKIKS Burst

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | – | 120 Hz |
| Requested | T | – | – | – | – | – | – | Burst Mode |

Where
*A* = LP_MAX_RATE_BYKIKS_BURST

## 38.45 Rate Request: BYKIKS Single Shot

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | – | 120 Hz |
| Requested | T | – | – | – | – | – | – | Single Shot |

Where
*A* = LP_MAX_RATE_BYKIKS_SINGLE_SHOT

## 38.46 Rate Request: Gun RF HXR 1 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | 120 Hz | – | – |
| Requested | T | – | – | – | – | 1 Hz | – | – |

Where
*A* = LP_MAX_RATE_GUN_HXR_1_HZ

## 38.47 Rate Request: Gun RF HXR 10 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | 120 Hz | – | – |
| Requested | T | – | – | – | – | 10 Hz | – | – |

Where
*A* = `LP_MAX_RATE_GUN_HXR_10_HZ`

## 38.48 Rate Request: Gun RF HXR 30 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | 120 Hz | – | – |
| Requested | T | – | – | – | – | 30 Hz | – | – |

Where
*A* = `LP_MAX_RATE_GUN_HXR_30_HZ`

## 38.49 Rate Request: Gun RF HXR 60 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | 120 Hz | – | – |
| Requested | T | – | – | – | – | 60 Hz | – | – |

Where
*A* = `LP_MAX_RATE_GUN_HXR_60_HZ`

## 38.50 Rate Request: Gun RF HXR Burst

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | 120 Hz | – | – |
| Requested | T | – | – | – | – | Burst Mode | – | – |

Where
*A* = `LP_MAX_RATE_GUN_HXR_BURST`

## 38.51 Rate Request: Gun RF HXR Single Shot

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | 120 Hz | – | – |
| Requested | T | – | – | – | – | Single Shot | – | – |

Where
*A* = LP_MAX_RATE_GUN_HXR_SINGLE_SHOT

## 38.52 Rate Request: Gun RF SXR 1 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | 120 Hz | – |
| Requested | T | – | – | – | – | – | 1 Hz | – |

Where
*A* = LP_MAX_RATE_GUN_SXR_1_HZ

## 38.53 Rate Request: Gun RF SXR 10 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | 120 Hz | – |
| Requested | T | – | – | – | – | – | 10 Hz | – |

Where
*A* = LP_MAX_RATE_GUN_SXR_10_HZ

## 38.54 Rate Request: Gun RF SXR 30 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | 120 Hz | – |
| Requested | T | – | – | – | – | – | 30 Hz | – |

Where
*A* = LP_MAX_RATE_GUN_SXR_30_HZ

## 38.55 Rate Request: Gun RF SXR 60 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | 120 Hz | – |
| Requested | T | – | – | – | – | – | 60 Hz | – |

Where
*A* = LP_MAX_RATE_GUN_SXR_60_HZ

## 38.56 Rate Request: Gun RF SXR Burst

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | 120 Hz | – |
| Requested | T | – | – | – | – | – | Burst Mode | – |

Where
*A* = LP_MAX_RATE_GUN_SXR_BURST

## 38.57 Rate Request: Gun RF SXR Single Shot

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | – | – | – | – | – | 120 Hz | – |
| Requested | T | – | – | – | – | – | Single Shot | – |

Where
*A* = LP_MAX_RATE_GUN_SXR_SINGLE_SHOT

## 38.58 Rate Request: Pockels Cell 1 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | 120 Hz | – | – | – | – | – | – |
| Requested | T | 1 Hz | – | – | – | – | – | – |

Where
*A* = LP_MAX_RATE_PC_1_HZ

## 38.59 Rate Request: Pockels Cell 10 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | 120 Hz | – | – | – | – | – | – |
| Requested | T | 10 Hz | – | – | – | – | – | – |

Where
*A* = LP_MAX_RATE_PC_10_HZ

## 38.60 Rate Request: Pockels Cell 30 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | 120 Hz | – | – | – | – | – | – |
| Requested | T | 30 Hz | – | – | – | – | – | – |

Where
*A* = LP_MAX_RATE_PC_30_HZ

## 38.61 Rate Request: Pockels Cell 60 Hz

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | 120 Hz | – | – | – | – | – | – |
| Requested | T | 60 Hz | – | – | – | – | – | – |

Where
*A* = LP_MAX_RATE_PC_60_HZ

## 38.62 Rate Request: Pockels Cell Burst

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | 120 Hz | – | – | – | – | – | – |
| Requested | T | Burst Mode | – | – | – | – | – | – |

Where
*A* = LP_MAX_RATE_PC_BURST

## 38.63 Rate Request: Pockels Cell Single Shot

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not Requested | F | 120 Hz | – | – | – | – | – | – |
| Requested | T | Single Shot | – | – | – | – | – | – |

Where
*A* = `LP_MAX_RATE_PC_SINGLE_SHOT`

## 38.64 VVMG IN20 175 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_BL175_STATE`

## 38.65 VVMG LI21 195 Position

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VV_BL195_STATE`

## 38.66 VVS Circuit Breaker: LI20

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| FAULT | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| OK | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |

Where
*A* = `VVS_BRKR_OK_READY_LI20_STATE`

## 38.67 YAG01 IN20 211 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `YAGS_IN20_211_OUT_LMTSW_STATE`,
$B$ = `YAGS_IN20_211_IN_LMTSW_STATE`

## 38.68 YAGG1 IN20 841 Position

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Moving | F | F | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |
| Out | F | T | 120 Hz | 120 Hz | 120 Hz | – | – | – | 120 Hz |
| In | T | F | 10 Hz | 10 Hz | 10 Hz | – | – | – | 10 Hz |
| Broken | T | T | 0 Hz | 0 Hz | 0 Hz | – | – | – | 0 Hz |

Where
$A$ = `YAGS_IN20_841_OUT_LMTSW_STATE`,
$B$ = `YAGS_IN20_841_IN_LMTSW_STATE`

# 39 Ignore Logic

## 39.1 A-Line Kicker Is Not Enabled

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Is Not Enabled | F | F | – | – | – | – | – | – | – |

Where
*A* = KICK_BSY0_66_PM1_TRIG_ENB_STATUS,
*B* = KICK_BSY0_66_PM2_TRIG_ENB_STATUS

## 39.2 A-Line SL10 Is Closed

| Name | *D* | *C* | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Closed | T | T | T | T | – | – | – | – | – | – | – |

Where
*A* = SLIT_BSYA_2010_SL10_FB_IN_STATE,
*B* = SLIT_BSYA_2010_SL10_FT_IN_STATE,
*C* = SLIT_BSYA_2010_SL10_RB_IN_STATE,
*D* = SLIT_BSYA_2010_SL10_RT_IN_STATE

## 39.3 BKRCUS Is On

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| On | T | – | – | – | – | – | – | – |

Where
*A* = KICK_CLTS_185_ON_STATE

## 39.4 BRCUSDC Is Off

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Off | T | – | – | – | – | – | – | – |

Where
*A* = BEND_CLTS_180_OFF_STATE

## 39.5 BRCUSDC Is On

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| On | T | – | – | – | – | – | – | – |

Where
*A* = BEND_CLTS_180_ON_STATE

## 39.6 BX01/BX02 Is Off

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Off | F | T | – | – | – | – | – | – | – |

Where
*A* = BEND_IN20_751_OFF_STATE,
*B* = BEND_IN20_751_OK_STATE

## 39.7 BX01/BX02 Is On

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| On | T | F | – | – | – | – | – | – | – |

Where
*A* = BEND_IN20_751_OFF_STATE,
*B* = BEND_IN20_751_OK_STATE

## 39.8 BXG Is Off

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| Off | F | T | – | – | – | – | – | – | – |

Where
*A* = BEND_IN20_231_OFF_STATE,
*B* = BEND_IN20_231_OK_STATE

## 39.9 BXG Is On

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| On | T | F | – | – | – | – | – | – | – |

Where
*A* = BEND_IN20_231_OFF_STATE,
*B* = BEND_IN20_231_OK_STATE

## 39.10 Destination HXR

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| HXR | T | – | – | – | – | – | – | – |

Where
*A* = LP_DESTINATION_HXR

## 39.11 Destination SXR

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| SXR | T | – | – | – | – | – | – | – |

Where
*A* = LP_DESTINATION_SXR

## 39.12 Diag Stopper HFX DG2 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = HFX_DG2_STP_01_IN_DI_POSITION

## 39.13 Diag Stopper HFX UM6 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = HFX_UM6_STP_01_IN_DI_POSITION

## 39.14 Diag Stopper XCS SB1 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = XCS_SB1_STP_01_CLS_DI_POSITION

## 39.15 HXR Beamline is in SC Mode

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| SC Mode | T | – | – | – | – | – | – | – |

Where
*A* = MPS_UNDH_1_FACMODE_STATE

## 39.16 Laser Heater Attenuator Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = LHATTEN_IN_LIMIT_STATE

## 39.17 LTU Dechirper Is Out

| Name | *D* | *C* | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Out | T | T | T | T | – | – | – | – | – | – | – |

Where
*A* = DCHP_LTUH_545_OUT_LIMSW_NEGY_POSITION,
*B* = DCHP_LTUH_545_OUT_LIMSW_POSY_POSITION,
*C* = DCHP_LTUH_555_OUT_LIMSW_NEGX_POSITION,
*D* = DCHP_LTUH_555_OUT_LIMSW_POSX_POSITION

## 39.18 MR1K1 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is In | T | – | – | – | – | – | – | – |

Where
*A* = STPR_FEES_MR1K1_IN_STATE

## 39.19 MR1K1 Is Out

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is Out | T | – | – | – | – | – | – | – |

Where
*A* = MIRR_FEES_MR1K1_OUT_POSITION

## 39.20 ST1K2 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is In | T | – | – | – | – | – | – | – |

Where
*A* = STPR_FEES_ST1K2_IN_STATE

## 39.21 ST3K4 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is In | T | – | – | – | – | – | – | – |

Where
*A* = STPR_FEES_ST1K4_IN_STATE

## 39.22 STCLTS Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
$A$ = STPR_CLTS_585_IN_LIMIT_POSITION

## 39.23 Stopper MFX S4.5 Is In

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Is In | T | – | – | – | – | – | – | – |

Where
$A$ = STPR_XRT_1_S45IN_STATE

## 39.24 Stopper S5B Is In

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
$A$ = STPR_FEH1_5_S5BIN_POSITION

## 39.25 Stopper SH2 Is In

| Name | $B$ | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| In | T | F | – | – | – | – | – | – | – |

Where
$A$ = STPR_XRT1_1_SH2OUT_STATE,
$B$ = STPR_XRT1_1_SH2IN_STATE

## 39.26 Stopper ST1L0 Is In

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
$A$ = STPR_FEE1_ST1_IN_POSITION

## 39.27 Stopper XRT S5 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = STPR_XRT1_1_S5IN_POSITION

## 39.28 Stopper XRT S6 Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = STPR_XRT1_1_S6IN_POSITION

## 39.29 Stopper: BSY D2 Summary Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = STPR_BSYH_847_IN_LIMIT_POSITION

## 39.30 SXR Beamline is in SC Mode

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| SC Mode | T | – | – | – | – | – | – | – |

Where
*A* = MPS_UNDS_1_FACMODE_STATE

## 39.31 SXR Wire Scanner Mode Disabled

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Disabled | F | – | – | – | – | – | – | – |

Where
$A$ = LP_SXR_WS_MODE

## 39.32 SXR Wire Scanner Mode Enabled

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Enabled | T | – | – | – | – | – | – | – |

Where
$A$ = LP_SXR_WS_MODE

## 39.33 SXRSS M1/Grating Is Out

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| | T | – | – | – | – | – | – | – |

Where
$A$ = MIRR_UNDS_3520_OUT_LIMIT_POSITION

## 39.34 TD11 Is In

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
$A$ = TD11_IN_LIMIT_STATE

## 39.35 TDUND Is In

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
$A$ = DUMP_LTUH_970_IN_LIMIT_POSITION

## 39.36 TDUNDB Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = DUMP_LTUS_972_IN_LIMIT_POSITION

## 39.37 XPP-NH3-POS-00 Beamline Is In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
*A* = XPP_NH3_POS_00_IN_STATE

## 39.38 XPP-NH3-POS-00 Beamline Is Not In

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| Not_IN | F | – | – | – | – | – | – | – |

Where
*A* = XPP_NH3_POS_00_IN_STATE

## 39.39 XRT-M2 Mirror Is Out of Beam

| Name | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| IS_OUT | T | – | – | – | – | – | – | – |

Where
*A* = HXX_HXM_MMS_01_B_POSITION

## 39.40 YAG01 Is In

| Name | *B* | *A* | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|---|
| In | T | F | – | – | – | – | – | – | – |

Where
$A$ = YAGS_IN20_211_OUT_LMTSW_STATE,
$B$ = YAGS_IN20_211_IN_LMTSW_STATE

## 39.41 YAG02 Is In

| Name | $A$ | GUNL | MS | BYKIK | LHS | GUNH | GUNS | BYKIKS |
|---|---|---|---|---|---|---|---|---|
| In | T | – | – | – | – | – | – | – |

Where
$A$ = YAGS_IN20_241_IN_LMTSW_STATE