MPS Logic:
2020-01-02-c

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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 BX01/BX02 Is Off, YAG01 Is In, or YAG02 Is In

3.1 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

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

4.1 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`

4.2 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`

5 Ignored when BXG Is Off or YAG01 Is In

5.1 Wakefield Shield Gun Spectrometer

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Fault	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	10 Hz	10 Hz	10 Hz	–	–	–	–

Where
A = `WL_BL231_IN_STATE`

6 Ignored when BXG Is On or YAG01 Is In

6.1 Wakefield Shield Straight Ahead

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 = `WL_BL231_OUT_STATE`

7 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, Diag Stopper XCS SB1 Is In, Stopper SH1 Is In, Stopper SH2 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

7.1 XCS SB1 VGC 02 Gate Valve Position

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

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

7.2 XCS SB2 VGC 01 Gate Valve Position

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

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

8 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, Stopper S5B Is In, Stopper SH1 Is In, Stopper SH2 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

8.1 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	0 Hz	0 Hz	–	–	–	–
Config 1 Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not In Config 1	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.2 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	0 Hz	0 Hz	–	–	–	–
Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not In Config 2	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.3 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	0 Hz	0 Hz	–	–	–	–
Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not in Config 3	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.4 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	0 Hz	0 Hz	–	–	–	–
Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not In Config 4	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.5 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	0 Hz	0 Hz	–	–	–	–
Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not In Config 5	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.6 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	0 Hz	0 Hz	–	–	–	–
Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not In Config 6	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.7 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	0 Hz	0 Hz	–	–	–	–
Ok	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Not In Config 7	2	120 Hz	120 Hz	120 Hz	–	–	–	–

8.8 CXI KB2 VGC 02 Gate Valve Position

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

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

8.9 CXI MPS PLC Readiness Status

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

Where
A = `CXI_MPS_PLC_01_OK_STATUS`

8.10 CXI User Patch Panel 1 Ready

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

Where
A = `CXI_USR_01_MPSFAULT_STATUS`

8.11 CXI User Patch Panel 2 Ready

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

Where
A = `CXI_USR_02_MPSFAULT_STATUS`

8.12 CXI:DG1:VGC:01 Gate Valve Open 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 = `CXI_DG1_VGC_01_OPN_DI_POSITION`

8.13 CXI:DG1:VGC:02 Gate Valve Open 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 = `CXI_DG1_VGC_02_OPN_DI_POSITION`

8.14 CXI:DG2:VGC:01 Gate Valve Position

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

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

8.15 CXI:DG2:VGC:02 Gate Valve Position

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

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

8.16 CXI:DG4:VGC:01 Gate Valve Position

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

Where
A = `CXI_DG4_VGC_01_OPN_DI_POSITION`,
B = `CXI_DG4_VGC_01_CLS_DI_POSITION`

8.17 CXI:DSC:VGC:01 Gate Valve Position

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

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

8.18 CXI:KB1:VGC:01 Gate Valve Open 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 = `CXI_KB1_VGC_01_OPN_DI_POSITION`

8.19 CXI:KB1:VGC:02 Gate Valve Open 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 = `CXI_KB1_VGC_02_OPN_DI_POSITION`

8.20 CXI:KB2:VGC:01 Gate Valve Open 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 = CXI_KB2_VGC_01_OPN_DI_POSITION

8.21 CXI:SC1:VGC:01 Gate Valve Position

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

Where
A = CXI_SC1_VGC_01_OPN_DI_POSITION,
B = CXI_SC1_VGC_01_CLS_DI_POSITION

8.22 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	0 Hz	0 Hz	–	–	–	–
Open or Closed	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = CXI_SC3_VGC_01_OPN_DI_POSITION

8.23 HF4 LAM VGC 01 Gate Valve 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 = HF4_LAM_VGC_01_OPN_DI_POSITION

9 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, Stopper SH1 Is In, Stopper SH2 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

9.1 CXI XRT Laser Reference Mirror Position

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

Where
A = `XRT_DIA_MMS_01_B_POSITION`

9.2 HFA:SND:VGC:01 Gate Valve Open 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 = `HFA_SND_VGC_01_OPN_DI_POSITION`

9.3 HFX:DIA:VGC:02 Gate Valve Open 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 = `HFX_DIA_VGC_02_OPN_DI_POSITION`

9.4 PPS Stopper S5B Position

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

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

9.5 XCS SB1 Diagnostic Stopper 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

9.6 XCS SB1 VGC 01 Gate Valve Position

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

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

9.7 XRT HXRAY DIA Isolation Valve HXX-DIA-VGC-01

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

Where
A = HXX_DIA_VGC_01_CLS_DI_STATE,
B = HXX_DIA_VGC_01_OPN_DI_STATE

10 Ignored when Diag Stopper HFX DG2 Is In, Diag Stopper HFX UM6 Is In, Stopper SH1 Is In, Stopper SH2 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

10.1 HFX:DG2:VGC:01 Gate Valve 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 = `HFX_DG2_VGC_01_OPN_DI_POSITION`

10.2 HFX:MON:VGC:01 Gate Valve 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 = `HFX_MON_VGC_01_OPN_DI_POSITION`

10.3 HFX:MON:VGC:02 Gate Valve 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 = `HFX_MON_VGC_02_OPN_DI_POSITION`

10.4 Stopper XRT S5 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 = `STPR_XRT1_1_S5OUT_POSITION`,
B = `STPR_XRT1_1_S5IN_POSITION`

11 Ignored when Diag Stopper HFX UM6 Is In, Stopper MFX S4.5 Is In, Stopper SH1 Is In, Stopper SH2 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

11.1 MFX MPS Summary - Downstream of Stopper 4.5

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 = `MFX_MPS_1_SUM_STATE`

12 Ignored when Diag Stopper HFX UM6 Is In, Stopper SH1 Is In, Stopper SH2 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

12.1 MEC DV4 VCG 01 Gate Valve 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 = `MEC_DV4_VGC_01_OPN_DI_POSITION`

12.2 MEC DV5 VGC 01 Gate Valve 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 = `MEC_DV5_VGC_01_OPN_DI_POSITION`

12.3 MEC HXM VGC 01 Gate Valve 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 = `MEC_HXM_VGC_01_OPN_DI_POSITION`

12.4 MEC XT1 Reference Laser 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 = `MEC_XT1_MMS_01_B_POSITION`

12.5 MEC XT1 VGC 01 Gate Valve 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 = `MEC_XT1_VGC_01_OPN_DI_POSITION`

12.6 MEC XT2 VGC 02 Gate Valve 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 = `MEC_XT2_VGC_02_OPN_DI_POSITION`

12.7 MEC XT2 VGC 03 Gate Valve 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 = `MEC_XT2_VGC_03_OPN_DI_POSITION`

12.8 MEC XT2 VGC 04 Gate Valve 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 = `MEC_XT2_VGC_04_OPN_DI_POSITION`

12.9 MEC XT2 VGC 05 Gate Valve Position

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

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

12.10 MEC XT2 VGC 06 Gate Valve 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 = `MEC_XT2_VGC_06_OPN_DI_POSITION`

13 Ignored when Diag Stopper HFX UM6 Is In, Stopper SH1 Is In, Stopper SH2 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

13.1 DG2 Diagnostic Stopper Position

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

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

13.2 MEC BXL VGC 01 Gate Valve 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 = `MEC_BXL_VGC_01_OPN_DI_POSITION`

13.3 MEC XRT Attenuator Inspection Mirror Position

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

Where
A = `MEC_HXM_MMS_04_B_POSITION`

13.4 MFX Gate Valve Summary - Upstream of Stopper 4.5

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

Where
A = `MFX_XRT_VGC_OUT_SUM_STATE`

13.5 Stopper MFX S4.5 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

13.6 Stopper XRT S6 Position

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

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

13.7 XRT HXRAY LOM Isolation Valve HXX-LOM-VGC-01

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

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

13.8 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:01

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 = `HXX_MXT_VGC_01_OPN_DI_POSITION`

13.9 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:02

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 = `HXX_MXT_VGC_02_OPN_DI_POSITION`

13.10 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:03

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

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

13.11 XRT HXRAY MXT Gate Valve HXX:MXT:VGC:05

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 = `HXX_MXT_VGC_05_OPN_DI_POSITION`

13.12 XRT-M2 Mirror and DG2 STP Fault

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

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

14 Ignored when Laser Heater Attenuator Is In

14.1 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`

14.2 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`

14.3 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`

15 Ignored when Stopper S1 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

15.1 NEH AMO Laser Reference Mirror 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 = SAS_MMM_01_B_POSITION

15.2 NEH AMO Valves Ok for Beam - Summary From PLC

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 = AMO_MPS_VAC_OK_SUM_STATE

15.3 NEH1 Camera 1124 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = CAMR_NEH1_1124_OUT_STATE,
B = CAMR_NEH1_1124_IN_STATE

15.4 NEH1 XTOD S1 Isolation Valve Summary

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

Where
A = `VMPS_NEH_703_ISOL_S1_STATE`

16 Ignored when Stopper S2 Is In, Stopper S2B Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

16.1 NEH SXR Differential Pump Isolation Valve SXR-DFP-VGC-01

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

Where
A = `SXR_DFP_VGC_01_CLS_DI_STATE`,
B = `SXR_DFP_VGC_01_OPN_DI_STATE`

16.2 NEH SXR End Station Ready SXR-EXP-MPS-01

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

Where
A = `SXR_EXP_MPS_01_STATE`

16.3 NEH SXR Intensity Monitor Isolation Valve SXR-FLX-VGC-01

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

Where
A = SXR_FLX_VGC_01_CLS_DI_STATE,
B = SXR_FLX_VGC_01_OPN_DI_STATE

16.4 NEH SXR KB Optics Isolation Valve SXR-KBO-VGC-01

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

Where
A = SXR_KBO_VGC_01_CLS_DI_STATE,
B = SXR_KBO_VGC_01_OPN_DI_STATE

16.5 NEH SXR Laser In-coupling Mirror Isolation Valve SXR-LIN-VGC-01

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

Where
A = SXR_LIN_VGC_01_CLS_DI_STATE,
B = SXR_LIN_VGC_01_OPN_DI_STATE

17 Ignored when Stopper S2 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

17.1 NEH Camera 2124 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `CAMR_NEH1_2124_OUT_STATE`,
B = `CAMR_NEH1_2124_IN_STATE`

17.2 NEH SXR Collimator 3 Isolation Valve SXR-COL-VGC-01

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

Where
A = `SXR_COL_VGC_01_CLS_DI_STATE`,
B = `SXR_COL_VGC_01_OPN_DI_STATE`

17.3 NEH SXR Exit Slits Isolation Valve SXR-EXS-VGC-01

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

Where
A = SXR_EXS_VGC_01_CLS_DI_STATE,
B = SXR_EXS_VGC_01_OPN_DI_STATE

17.4 NEH SXR GMD VGC 01 Protection

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In Transit: SXR GMD VGC 01 In Motion	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Safe: SXR GMD VGC 01 Open	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Closed: SXR GMD VGC 01 Closed	T	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Error: SXR GMD VGC 01 Open and Closed	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = SXR_GMD_VGC_01_OPN_DI_POSITION,
B = SXR_GMD_VGC_01_CLS_DI_POSITION

17.5 NEH SXR Monochromator Tank Isolation Valve SXR-MON-VGC-01

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

Where
A = SXR_MON_VGC_01_CLS_DI_STATE,
B = SXR_MON_VGC_01_OPN_DI_STATE

17.6 NEH SXR Photon Stoppers Isolation Valve SXR-PST-VGC-01

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

Where
A = SXR_PST_VGC_01_CLS_DI_STATE,
B = SXR_PST_VGC_01_OPN_DI_STATE

17.7 NEH SXR Transmission Sample System Isolation Valve SXR-TSS-VGC-01

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

Where
A = SXR_TSS_VGC_01_CLS_DI_STATE,
B = SXR_TSS_VGC_01_OPN_DI_STATE

17.8 NEH SXR Zero Order Interlock SXR-MON-MMS-06, SXR-EXS-MMS-01

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Slits Not Open, No Zero Order	F	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Slits Not Open, Zero Order Fault	F	T	0 Hz	0 Hz	0 Hz	–	–	–	–
Slits Open, No Zero Order	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Slits Open, Zero Order	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = SXR_MON_MMS_06_B_STATE,
B = SXR_EXS_MMS_01_B_STATE

17.9 NEH1 XTOD S2 Isolation Valve Summary

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

Where
A = `VMPS_NEH_703_ISOL_S2_STATE`

18 Ignored when Stopper SH1 Is In, Stopper SH2 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	0 Hz	0 Hz	–	–	–	–
In	F	T	–	–	–	–	–	–	–
Out	T	F	–	–	–	–	–	–	–
Broken	T	T	0 Hz	0 Hz	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	0 Hz	0 Hz	–	–	–	–
Closed	F	T	0 Hz	0 Hz	0 Hz	–	–	–	–
Open	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	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	0 Hz	0 Hz	–	–	–	–
Out	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
In	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

19 Ignored when Stopper SH1 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

19.1 NEH3 HXRAY DVD Isolation Valve HX3-DVD-VGC-01

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

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

20 Ignored when Stopper SH1 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

20.1 XPP SB2 VGC 01 Gate Valve Position

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

Where
A = `XPP_SB2_VGC_01_OPN_DI_POSITION`,
B = `XPP_SB2_VGC_01_CLS_DI_POSITION`

20.2 XPP SB2 VGC 02 Gate Valve 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 = `XPP_SB2_VGC_02_OPN_DI_POSITION`

20.3 XPP SB2 VGC 03 Gate Valve 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 = `XPP_SB2_VGC_03_OPN_DI_POSITION`

21 Ignored when Stopper SH1 Is In, Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

21.1 HX2 UVD VGC 01 Gate Valve Position

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

Where
A = `HX2_SB1_VGC_01_OPN_DI_STATE`,
B = `HX2_SB1_VGC_01_CLS_DI_STATE`

21.2 HX3 MON VGC 01 Gate Valve Position

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

Where
A = `HX3_MON_VGC_01_OPN_DI_POSITION`,
B = `HX3_MON_VGC_01_CLS_DI_POSITION`

21.3 NEH HXTD Vacuum Valve Summary

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

Where
A = `VMPS_NEH1_HXTD_SUM_FAULT`

21.4 NEH1 Camera 124 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `CAMR_NEH1_124_OUT_STATE`,
B = `CAMR_NEH1_124_IN_STATE`

21.5 NEH1 Camera 195 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `CAMR_NEH1_195_OUT_STATE`,
B = `CAMR_NEH1_195_IN_STATE`

21.6 NEH2 HXRAY DVD Isolation Valve HX2-DVD-VGC-01

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

Where
A = `HX2_DVD_VGC_01_CLS_DI_STATE`,
B = `HX2_DVD_VGC_01_OPN_DI_STATE`

21.7 NEH3 HXRAY UVD Isolation Valve HX3-UVD-VGC-01

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

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

22 Ignored when Stopper: BSY D2 Summary Is In or TDUND Is In

22.1 HXRSS Beamline 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `BMLN_UND1_1650_OUT_LMTSW_STATE`,
B = `BMLN_UND1_1650_IN_LMTSW_STATE`

22.2 HXRSS Chicane Bend Magnet Power Supply

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

Where
A = `BEND_UND1_1640_ON_STATE`,
B = `BEND_UND1_1640_OFF_STATE`

22.3 HXRSS Crystal 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = XTAL_UND1_1650_OUT_LMTSW_STATE,
B = XTAL_UND1_1650_IN_ENCDR_STATE

22.4 HXRSS Crystal Valid Position

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

Where
A = XTAL_UND1_1650_POSITIONSTAT_STATE

22.5 HXRSS Mode State

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 : full rate (120 Hz) beam allowed, HXRSS SASE Mode
 * state = 2 : full rate (120 Hz) beam allowed, HXRSS Phase Shifter
    Mode
 * state = 3 : no beam allowed, HXRSS undefined state
*/

/* Initialize to a guard value */
state = (unsigned int) -1;

/*
 * Allow beam if HXRSS is ON, Seeded Mode: the raft is in;
 *                            the magnet is on in and tolerance;
 *                            the photon energy is OK;
 *                            the crystal is IN
 * Allow beam if HXRSS is OFF, SASE Mode: the raft is out;
 *                             the magnet is off;
 *                             the crystal is out
 * Allow beam if HXRSS is in Phase Shifter Mode: the raft is in;
 *                             the magnet is in ANY state;
 *                             the crystal is out
 * Otherwise, do not allow beam.
```

```
 */


/* Input Descriptions
*
* BEND_DMP1_400_INTOL_BRANGE_STATE= HXRSS Beam Energy OK when 10 GeV <
    E < 15 GeV
* XTAL_UND1_1650_OUT_LMTSW_STATE    = Crystal OUT Limit Switch
* XTAL_UND1_1650_IN_ENCDR_STATE      = Crystal IN Limit Switch, from
    encoder
* BMLN_UND1_1650_IN_LMTSW_STATE      = HXRSS Raft IN Limit Switch
* BMLN_UND1_1650_OUT_LMTSW_STATE    = HXRSS Raft OUT Limit Switch
* BEND_UND1_1640_INTOL_BMIN_STATE    = HXRSS Chicane Bend INTOL, greater
    than +0.6 kG-m
* BEND_UND1_1640_OFF_STATE                = HXRSS Chicane Bend String is
    OFF
* BEND_UND1_1640_ON_STATE                 = HXRSS Chicane Bend String is
    ON
*
*/

if ( BMLN_UND1_1650_IN_LMTSW_STATE &&
            BEND_UND1_1640_INTOL_BMIN_STATE &&
            BEND_UND1_1640_ON_STATE &&
            BEND_DMP1_400_INTOL_BRANGE_STATE &&
            ( XTAL_UND1_1650_IN_ENCDR_STATE   ) )
{
    state = 0; /* HXRSS ON, HXRSS Seeded Mode, okay to run beam */
}

else if ( BMLN_UND1_1650_OUT_LMTSW_STATE &&
            BEND_UND1_1640_OFF_STATE &&
            XTAL_UND1_1650_OUT_LMTSW_STATE )
{
    state = 1; /* HXRSS OFF,SASE Mode, okay to run beam */
}

else if ( BMLN_UND1_1650_IN_LMTSW_STATE &&
            XTAL_UND1_1650_OUT_LMTSW_STATE )
{
    state = 2; /* HXRSS in Phase Shifter Mode, okay to run beam */
}

else
{
```

```
    state = 3; /* HXRSS Undefined State, no beam allowed */
}
```

Name	State	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
HXRSS Seeded Mode	0	120 Hz	120 Hz	120 Hz	–	–	–	–
HXRSS SASE Mode	1	120 Hz	120 Hz	120 Hz	–	–	–	–
HXRSS Phase Shifter Mode	2	120 Hz	120 Hz	120 Hz	–	–	–	–
HXRSS Undefined State	3	0 Hz	0 Hz	0 Hz	–	–	–	–

22.6 SXRSS Grating/M1 GRAT UND1 934 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `GRAT_UND1_934_OUT_LIMIT_POSITION`,
B = `GRAT_UND1_934_IN_LIMIT_POSITION`

22.7 SXRSS M2 MIRR UND1 964 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `MIRR_UND1_964_OUT_LIMIT_POSITION`,
B = `MIRR_UND1_964_IN_LIMIT_POSITION`

22.8 SXRSS M3 MIRR UND1 966 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `MIRR_UND1_966_OUT_LIMIT_POSITION`,
B = `MIRR_UND1_966_IN_LIMIT_POSITION`

22.9 SXRSS Mode State

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 SASE Mode
 * state = 2 : full rate (120 Hz) beam allowed, Harmonic 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
    }
 *                             OR
 *                             { slit is IN and grating/M1/M2/M3 are
   OUT }
 *                             chicane is ON;
 *                             e- beam position OK  [mm]
 *                             e- beam energy   OK [GeV]
 *                             upstream undulators IN OK
 * 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]
 * Allow beam if SXRSS is in Harmonic Mode:
 *                              grating/M1 is OUT;
 *                              slit is NOT_IN and NOT_OUT;
 *                             M2 is OUT;
```

```
*                                M3 is OUT;
*                                chicane is ON;
*                                e- beam position  OK  [mm]
*                                e- beam energy     OK       [GeV]
* Otherwise, do not allow beam.
*
* Input Descriptions
*
*  Link Node MPS PV Name                  Link Node MPS Fault Name
                Desciption
* ------------------------------
   --------------------------------
   ------------------------------------------------
*  BEND:UND1:940:ON_MPS                =  BEND_UND1_940_ON_STATE
              =  Chicane power supply on
*  GRAT:UND1:934:IN_LIMIT_MPS          =  GRAT_UND1_934_IN_LIMIT_POSITION
      =  Grating/M1 IN limit switch
*  GRAT:UND1:934:OUT_LIMIT_MPS         =
   GRAT_UND1_934_OUT_LIMIT_POSITION    =  Grating/M1 OUT limit switch
*  SLIT:UND1:962:IN_LIMIT_MPS          =  SLIT_UND1_962_IN_LIMIT_POSITION
      =  Slit IN limit switch
*  SLIT:UND1:962:OUT_LIMIT_MPS         =
   SLIT_UND1_962_OUT_LIMIT_POSITION    =  Slit OUT limit switch
*  MIRR:UND1:964:IN_LIMIT_MPS          =  MIRR_UND1_964_IN_LIMIT_POSITION
      =  M2 IN limit switch
*  MIRR:UND1:964:OUT_LIMIT_MPS         =
   MIRR_UND1_964_OUT_LIMIT_POSITION    =  M2 OUT limit switch
*  MIRR:UND1:966:IN_LIMIT_MPS          =  MIRR_UND1_966_IN_LIMIT_POSITION
      =  M3 IN limit switch
*  MIRR:UND1:966:OUT_LIMIT_MPS         =
   MIRR_UND1_966_OUT_LIMIT_POSITION    =  M3 OUT limit switch
*  MPS:UND1:950:SX_HRMNC_ENERGY_MPS =
   MPS_UND1_950_SX_HRMNC_ENERGY_STATE =  e- beam energy safe for
   Harmonic mode
*  MPS:UND1:950:SX_HRMNC_X_MPS         =  MPS_UND1_950_SX_HRMNC_X_STATE
       =  e- beam position safe for Harmonic mode
*  MPS:UND1:950:SX_SASE_X_MPS          =  MPS_UND1_950_SX_SASE_X_STATE
        =  e- beam position safe for SASE mode
*  MPS:UND1:950:SX_SS_ENERGY_MPS       =  MPS_UND1_950_SX_SS_ENERGY_STATE
      =  e- beam energy safe for Seeded mode
*  MPS:UND1:950:SX_SS_UND_MPS          =  MPS_UND1_950_SX_SS_UND_STATE
        =  Inserted upstream undulators safe for Seeded mode
*  MPS:UND1:950:SX_SS_X_MPS            =  MPS_UND1_950_SX_SS_X_STATE
          =  e- beam position safe for Seeded mode
*/
```

```
/* Initialize to a guard value */
state = (unsigned int) -1;

if (     ((GRAT_UND1_934_IN_LIMIT_POSITION &&
         (MIRR_UND1_966_IN_LIMIT_POSITION ||
             MIRR_UND1_966_OUT_LIMIT_POSITION)) ||
          (SLIT_UND1_962_IN_LIMIT_POSITION  &&
              GRAT_UND1_934_OUT_LIMIT_POSITION &&
            MIRR_UND1_964_OUT_LIMIT_POSITION &&
                MIRR_UND1_966_OUT_LIMIT_POSITION)) &&
         BEND_UND1_940_ON_STATE &&
         MPS_UND1_950_SX_SS_X_STATE &&
         MPS_UND1_950_SX_SS_ENERGY_STATE &&
         MPS_UND1_950_SX_SS_UND_STATE )
{
    state = 0; /* SXRSS Seeded Mode, okay to run beam */
}

else if ( GRAT_UND1_934_OUT_LIMIT_POSITION &&
         SLIT_UND1_962_OUT_LIMIT_POSITION &&
         MIRR_UND1_964_OUT_LIMIT_POSITION &&
         MIRR_UND1_966_OUT_LIMIT_POSITION &&
         MPS_UND1_950_SX_SASE_X_STATE )
{
    state = 1; /* SXRSS SASE Mode, okay to run beam */
}

else if ( GRAT_UND1_934_OUT_LIMIT_POSITION &&
         !SLIT_UND1_962_IN_LIMIT_POSITION && !
             SLIT_UND1_962_OUT_LIMIT_POSITION &&
         MIRR_UND1_964_OUT_LIMIT_POSITION &&
         MIRR_UND1_966_OUT_LIMIT_POSITION &&
         BEND_UND1_940_ON_STATE &&
         MPS_UND1_950_SX_HRMNC_X_STATE &&
         MPS_UND1_950_SX_HRMNC_ENERGY_STATE )
{
    state = 2; /* SXRSS Harmonic 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	120 Hz	120 Hz	–	–	–	–
SXRSS SASE Mode	1	120 Hz	120 Hz	120 Hz	–	–	–	–
SXRSS Harmonic Mode	2	120 Hz	120 Hz	120 Hz	–	–	–	–
SXRSS Undefined State	3	0 Hz	0 Hz	0 Hz	–	–	–	–

22.10 SXRSS SLIT UND1 962 Position

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

Where
A = `SLIT_UND1_962_OUT_LIMIT_POSITION`,
B = `SLIT_UND1_962_IN_LIMIT_POSITION`

22.11 SXRSS Watchdog

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 = `MPS_UND1_950_SXRSS_WDOG_STATE`

23 Ignored when Stopper: BSY D2 Summary Is In, TD11 Is In, TDUND Is In, YAG01 Is In, or YAG02 Is In

23.1 BCS PIC RAW Charge Threshold DMP 997

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

Where
A = `PIC997_STATE`

23.2 BCS PIC RAW Charge Threshold DMP 998

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

Where
A = `PIC998_STATE`

23.3 BLM/PIC Watchdog: Downstream of TDUND

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

Where
A = `MPS_MCC0_2_PICBLM_WD_STATUS`

23.4 BOD UND1 1005

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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = BOD_UND1_1005_OUT_LIMIT_POSITION,
B = BOD_UND1_1005_IN_LIMIT_POSITION

23.5 BOD UND1 1305

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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = BOD_UND1_1305_OUT_LIMIT_POSITION,
B = BOD_UND1_1305_IN_LIMIT_POSITION

23.6 BPM Summary (1-9) - Status From IOC-UND1-BP01

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

Where
A = IOC_UNDH_BP01_MPSSTAT_STATE

23.7 BPM Summary (10-18) - Status From IOC-UND1-BP02

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

Where
A = `IOC_UNDH_BP02_MPSSTAT_STATE`

23.8 FEE Camera 1692 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `CAMR_FEE1_1692_OUT_STATE`,
B = `CAMR_FEE1_1692_IN_STATE`

23.9 FEE Camera 1953 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `CAMR_FEE1_1953_OUT_STATE`,
B = `CAMR_FEE1_1953_IN_STATE`

23.10 FEE Camera 2953 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `CAMR_FEE1_2953_OUT_STATE`,
B = `CAMR_FEE1_2953_IN_STATE`

23.11 FEE Camera 852 Position Fault - Status From PLC

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 = `CAMR_FEE1_852_STATUS_FAULT`

23.12 FEE Camera 913 Position Fault - Status From PLC

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 = `CAMR_FEE1_913_STATUS_FAULT`

23.13 FEE Gas System Summary

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 = `VMPS_FEE1_GAS_SUM_FAULT`

23.14 FEE HXTD Vacuum Valve Summary

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

Where
A = `VMPS_FEE1_HXTD_SUM_FAULT`

23.15 FEE M1S Mirror Beam Energy Upper Limit

Name	B	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Fault	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Mirror Out	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Energy Ok	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Mirror Out and Energy Ok	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `MIRR_FEE1_1560_OUT_LIMIT1_POSITION`,
B = `MIRR_FEE1_1560_ENERGY_STATE`

23.16 FEE M1S Mirror State

Name	B	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Not Out	F	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Inconsistent	F	T	0 Hz	0 Hz	0 Hz	–	–	–	–
Inconsistent	T	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Out	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `MIRR_FEE1_1560_OUT_LIMIT1_POSITION`,
B = `MIRR_FEE1_1560_OUT_LIMIT2_POSITION`

23.17 FEE Spectrometer Crystal - Beam Energy Too Low When Crystal Not Out

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Fault	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Energy Ok	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Crystal Out	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Crystal Out and Energy Ok	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `XTAL_FEE1_441_ENERGY_STATE`,
B = `XTAL_FEE1_441_OUT_LIMSW_POSITION`

23.18 FEE Spectrometer Crystal - Pulse Energy Too High When Crystal Not Out

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Fault	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Pulse Energy Ok	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Crystal Out	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Crystal Out and Pulse Energy Ok	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `XTAL_FEE1_441_PULSEENERGY_THRESHOLD`,
B = `XTAL_FEE1_441_OUT_LIMSW_POSITION`

23.19 FEE XTOD S1 Isolation Valve Summary

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 = `VMPS_FEE1_703_ISOL_S1_FAULT`

23.20 FEE XTOD S2 Isolation Valve Summary

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 = `VMPS_FEE1_703_ISOL_S2_FAULT`

23.21 Gas Detector Problem When FEE Spectrometer Crystal Not Out

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Fault	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Gas Detector Ok	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Crystal Out	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Crystal Out and Gas Detector Ok	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `GDET_FEE1_1_CAL_OK_STATE`,
B = `XTAL_FEE1_441_OUT_LIMSW_POSITION`

23.22 HXR - Beam Energy Too Low With M1S Out

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

Where
A = `MIRR_FEE1_1560_ENERGY_STATE`,
B = `MIRR_FEE1_1560_OUT_LIMIT1_POSITION`

23.23 Magnet In Tolerance: QE31

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Yes	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = QUAD_LTU1_720_INTOL_STATUS

23.24 Magnet In Tolerance: QUM1

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Yes	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = QUAD_LTU1_820_INTOL_STATUS

23.25 Magnet In Tolerance: QUM2

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Yes	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = QUAD_LTU1_840_INTOL_STATUS

23.26 Magnet In Tolerance: QUM3

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Yes	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = QUAD_LTU1_860_INTOL_STATUS

23.27 Magnet In Tolerance: QUM4

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Yes	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = QUAD_LTU1_880_INTOL_STATUS

23.28 Magnet Power: QE31

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

Where
A = QUAD_LTU1_720_STATE_STATUS

23.29 Magnet Power: QUM1

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

Where
A = QUAD_LTU1_820_STATE_STATUS

23.30 Magnet Power: QUM2

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

Where
A = QUAD_LTU1_840_STATE_STATUS

23.31 Magnet Power: QUM3

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

Where
A = QUAD_LTU1_860_STATE_STATUS

23.32 Magnet Power: QUM4

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

Where
A = QUAD_LTU1_880_STATE_STATUS

23.33 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	–	–	–	–
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 = OTRS_IN20_541_OUT_LMTSW_STATE,
B = OTRS_IN20_541_IN_LMTSW_STATE

23.34 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	–	–	–	–
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 = `OTRS_IN20_571_OUT_LMTSW_STATE`,
B = `OTRS_IN20_571_IN_LMTSW_STATE`

23.35 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	–	–	–	–
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 = `OTRS_IN20_621_OUT_LMTSW_STATE`,
B = `OTRS_IN20_621_IN_LMTSW_STATE`

23.36 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	–	–	–	–
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 = `OTRS_IN20_711_OUT_LMTSW_STATE`,
B = `OTRS_IN20_711_IN_LMTSW_STATE`

23.37 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	–	–	–	–
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 = `OTRS_LI21_237_OUT_LMTSW_STATE`,
B = `OTRS_LI21_237_IN_LMTSW_STATE`

23.38 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	–	–	–	–
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 = `OTRS_LI21_291_OUT_LMTSW_STATE`,
B = `OTRS_LI21_291_IN_LMTSW_STATE`

23.39 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	–	–	–	–
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 = `OTRS_LI24_807_OUT_LMTSW_STATE`,
B = `OTRS_LI24_807_IN_LMTSW_STATE`

23.40 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	–	–	–	–
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 = `OTRH1_OUT_LIMIT_STATE`,
B = `OTRH1_IN_LIMIT_STATE`

23.41 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	–	–	–	–
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 = `OTRH2_OUT_LIMIT_STATE`,
B = `OTRH2_IN_LIMIT_STATE`

24 Ignored when 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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	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
Exceeded	F	0 Hz	0 Hz	0 Hz	–	–	–	–
OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `LION766_STATE`

24.15 BLM Heartbeat: Dechirper LTU1 BLF545

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 = `BLM_LTUH_BLF545_TEST_L_THRESHOLD`,
B = `BLM_LTUH_BLF545_TEST_H_THRESHOLD`

24.16 BLM Pedestal Thresholds: Dechirper LTU1 BLF545

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 = BLM_LTUH_BLF545_PED_L_THRESHOLD,
B = BLM_LTUH_BLF545_PED_H_THRESHOLD

24.17 BLM Raw Charge Thresholds: Dechirper LTU1 BLF545

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 = BLM_LTUH_BLF545_LOSS_L_THRESHOLD,
B = BLM_LTUH_BLF545_LOSS_H_THRESHOLD

24.18 BYD Watchdog

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 = BEND_DMP1_400_BACT_WDOG_STATE

24.19 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	0 Hz	0 Hz	–	–	–	–
Downstream end gap too small	F	T	0 Hz	0 Hz	0 Hz	–	–	–	–
Upstream end gap too small	T	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Gap ok	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = DCHP_LTUH_555_GAP_LIMSW_NEGZ_POSITION,
B = DCHP_LTUH_555_GAP_LIMSW_POSZ_POSITION

24.20 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	0 Hz	0 Hz	–	–	–	–
Downstream end gap too small	F	T	0 Hz	0 Hz	0 Hz	–	–	–	–
Upstream end gap too small	T	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Gap ok	T	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `DCHP_LTUH_545_GAP_LIMSW_NEGZ_POSITION`,
B = `DCHP_LTUH_545_GAP_LIMSW_POSZ_POSITION`

24.21 Magnet In Tolerance: BYD1

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Yes	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `BEND_DMP1_400_INTOL_STATUS`

24.22 Magnet Power: BYD1

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

Where
A = `BEND_DMP1_400_STATE_STATUS`

24.23 PIC HVPS B911 - Location B911-2135

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

Where
A = `PICM_LTUH_B911_HV_PWR_STATE`

24.24 PIC HVPS B912 - Location B912-2135

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

Where
A = PICM_LTUH_B912_HV_PWR_STATE

24.25 PIC HVPS B913 - Location B913-2135

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

Where
A = PICM_LTUH_B913_HV_PWR_STATE

24.26 PIC Raw Charge Thresholds: LTU1 220

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_LTUH_220_LOSSL_THRESHOLD,
B = PICM_LTUH_220_LOSSH_THRESHOLD

24.27 PIC Raw Charge Thresholds: LTU1 252

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_LTUH_253_LOSSL_THRESHOLD,
B = PICM_LTUH_253_LOSSH_THRESHOLD

24.28 PIC Raw Charge Thresholds: LTU1 280

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_LTUH_280_LOSSL_THRESHOLD,
B = PICM_LTUH_280_LOSSH_THRESHOLD

24.29 PIC Raw Charge Thresholds: LTU1 420

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_LTUH_420_LOSSL_THRESHOLD,
B = PICM_LTUH_420_LOSSH_THRESHOLD

24.30 PIC Raw Charge Thresholds: LTU1 450

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_LTUH_452_LOSSL_THRESHOLD,
B = PICM_LTUH_452_LOSSH_THRESHOLD

24.31 PIC Raw Charge Thresholds: LTU1 480

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_LTUH_480_LOSSL_THRESHOLD`,
B = `PICM_LTUH_480_LOSSH_THRESHOLD`

24.32 PIC Raw Charge Thresholds: LTU1 722

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_LTUH_722_LOSSL_THRESHOLD`,
B = `PICM_LTUH_722_LOSSH_THRESHOLD`

24.33 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`

24.34 PIC Trigger Missed (LN29)

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_480_NO_TRIG_MISSED

24.35 TDUND Flow Switch Fault With TDUND Not Out

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

Where
A = DUMP_LTUH_970_FLOW_SW_STATE,
B = DUMP_LTU1_970_TDUND_OUT_POSITION

24.36 TDUND 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	–	–	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = DUMP_LTU1_970_TDUND_OUT_POSITION,
B = DUMP_LTU1_970_TDUND_IN_POSITION

24.37 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_DMP1_400_INTOL_BMIN_STATE

25 Ignored when TD11 Is In, YAG01 Is In, or YAG02 Is In

25.1 BLM/PIC Watchdog BSY0/BSYA

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

Where
A = `MPS_BSY0_1_PICBLM_WD_STATUS`

25.2 BLM/PIC Watchdog LI24

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

Where
A = `MPS_LI24_1_PICBLM_WD_STATUS`

25.3 BLM/PIC Watchdog LI30

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

Where
A = `MPS_LI30_1_PICBLM_WD_STATUS`

25.4 Bunch Length Monitor BL21 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = BL22_OUT_STATE,
B = BL22_IN_STATE

25.5 Dump LI28 5879 Flowswitch

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = DUMP_5879_FLOW_SW_STATE

25.6 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

25.7 Flowswitch: BSY RAD LCW Slit 10/30

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 = HTEXCH2_STATE

25.8 Flowswitch: CE21

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 = `COL_805_FLOSW_STATE`

25.9 Flowswitch: COLL BSYH 479, 487, 495, 503 (PCAPM1-4)

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_BSYH_479_PCAPM_FLOW_SW_STATE`

25.10 Flowswitch: COLL LI28-9

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_28_9_STATE`

25.11 Flowswitch: COLL LI29-1

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_29_1_STATE`

25.12 Flowswitch: COLL LI29-4

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_29_4_STATE`

25.13 Flowswitch: COLL LI29-5

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_29_5_STATE`

25.14 Flowswitch: COLL LI29-9

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_29_9_STATE`

25.15 Flowswitch: COLL LI30-1

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_30_1_STATE`

25.16 Flowswitch: COLL LI30-4

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_30_4_STATE`

25.17 Flowswitch: COLL LI30-5

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
No Flow	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Flow OK	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = `FLOW_SW_30_5_STATE`

25.18 Hydrogen Recombiner For BSY 1 Collimator

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 = `HYDRECM1_STATE`

25.19 Hydrogen Recombiner For BSY 2 Slit 10/30

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 = `HYDRECM2_STATE`

25.20 KICK BSYH 475 PM1 State (A-Line Kicker)

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Inconsistent	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Is_OFF	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Is_ON	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Inconsistent	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = KICK_BSY0_66_PM1_OFF_STATUS,
B = KICK_BSY0_66_PM1_ON_STATUS

25.21 KICK BSYH 475 PM1 Trigger State (A-Line Kicker)

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Inconsistent	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Is_Triggered	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Is_Trig_Disabled	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Inconsistent	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = KICK_BSY0_66_PM1_TRIG_ENB_STATUS,
B = KICK_BSY0_66_PM1_TRIG_LOCK_STATUS

25.22 KICK BSYH 491 PM3 State (A-Line Kicker)

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Inconsistent	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Is_OFF	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Is_ON	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Inconsistent	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = KICK_BSY0_66_PM2_OFF_STATUS,
B = KICK_BSY0_66_PM2_ON_STATUS

25.23 KICK BSYH 491 PM3 Trigger State (A-Line Kicker)

Name	*B*	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Inconsistent	F	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Is_Triggered	F	T	120 Hz	120 Hz	120 Hz	–	–	–	–
Is_Trig_Disabled	T	F	120 Hz	120 Hz	120 Hz	–	–	–	–
Inconsistent	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = KICK_BSY0_66_PM2_TRIG_ENB_STATUS,
B = KICK_BSY0_66_PM2_TRIG_LOCK_STATUS

25.24 Main Manifold Gauge: LI22 Station 5

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 = MPS_MM_GAUGE_OK_LI22_STATE

25.25 Main Manifold Gauge: LI23 Station 5

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 = MPS_MM_GAUGE_OK_LI23_STATE

25.26 Main Manifold Gauge: LI24 Station 5

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 = MPS_MM_GAUGE_OK_LI24_STATE

25.27 Main Manifold Gauge: LI25 Station 5

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 = `MPS_MM_GAUGE_OK_LI25_STATE`

25.28 Main Manifold Gauge: LI26 Station 5

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 = `MPS_MM_GAUGE_OK_LI26_STATE`

25.29 Main Manifold Gauge: LI27 Station 5

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 = `MPS_MM_GAUGE_OK_LI27_STATE`

25.30 Main Manifold Gauge: LI28 Station 5

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 = `MPS_MM_GAUGE_OK_LI28_STATE`

25.31 Main Manifold Gauge: LI29 Station 5

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 = `MPS_MM_GAUGE_OK_STATE`

25.32 Main Manifold Gauge: LI30 Station 5

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 = `MPS_MM_GAUGE_30_5_OK_STATE`

25.33 OTR LI25 920 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `OTR_TCAV_OUT_STATE`,
B = `OTR_TCAV_IN_STATE`

25.34 OTR21 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = OTRS_LI24_807_OUT_LMTSW_STATE,
B = OTRS_LI24_807_IN_LMTSW_STATE

25.35 PIC Gas Pressure LI24

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 = PIC_GAS_PRESS_STATE

25.36 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	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_BSY0_1_HV_PWR_STATE

25.37 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	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_BSY0_2_HV_PWR_STATE

25.38 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	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_BSY0_3_HV_PWR_STATE

25.39 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	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_BSY0_4_HV_PWR_STATE

25.40 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	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_BSY0_5_HV_PWR_STATE

25.41 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	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_BSY0_6_HV_PWR_STATE

25.42 PIC HVPS LI24 - Location LKF24-0235

Name	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Not On	F	0 Hz	0 Hz	0 Hz	–	–	–	–
On	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = PICM_LI24_1_HV_PWR_STATE

25.43 PIC HVPS LI30 - KG30-C1322

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

Where
A = `PICM_LI30_1_HV_PWR_STATE`

25.44 PIC Raw Charge Thresholds: BSYH 479 (PCAPM1)

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_479_LOSSL_THRESHOLD`,
B = `PICM_BSYH_479_LOSSH_THRESHOLD`

25.45 PIC Raw Charge Thresholds: BSYH 487 (PCAPM2)

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_487_LOSSL_THRESHOLD`,
B = `PICM_BSYH_487_LOSSH_THRESHOLD`

25.46 PIC Raw Charge Thresholds: BSYH 495 (PCAPM3)

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_495_LOSSL_THRESHOLD`,
B = `PICM_BSYH_495_LOSSH_THRESHOLD`

25.47 PIC Raw Charge Thresholds: BSYH 503 (PCAPM4)

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_503_LOSSL_THRESHOLD`,
B = `PICM_BSYH_503_LOSSH_THRESHOLD`

25.48 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`

25.49 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`

25.50 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	–	–	–	–
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_LI24_791_LOSSL_THRESHOLD`,
B = `PICM_LI24_791_LOSSH_THRESHOLD`

25.51 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	–	–	–	–
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_LI24_811_LOSSL_THRESHOLD`,
B = `PICM_LI24_811_LOSSH_THRESHOLD`

25.52 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	–	–	–	–
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_LI28_916_LOSSL_THRESHOLD`,
B = `PICM_LI28_916_LOSSH_THRESHOLD`

25.53 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	–	–	–	–
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_LI29_146_LOSSL_THRESHOLD`,
B = `PICM_LI29_146_LOSSH_THRESHOLD`

25.54 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	–	–	–	–
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_LI29_446_LOSSL_THRESHOLD`,
B = `PICM_LI29_446_LOSSH_THRESHOLD`

25.55 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	–	–	–	–
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_LI29_546_LOSSL_THRESHOLD,
B = PICM_LI29_546_LOSSH_THRESHOLD

25.56 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	–	–	–	–
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_LI29_801_LOSSL_THRESHOLD,
B = PICM_LI29_801_LOSSH_THRESHOLD

25.57 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	–	–	–	–
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_LI29_956_LOSSL_THRESHOLD,
B = PICM_LI29_956_LOSSH_THRESHOLD

25.58 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	–	–	–	–
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_LI30_146_LOSSL_THRESHOLD,
B = PICM_LI30_146_LOSSH_THRESHOLD

25.59 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	–	–	–	–
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_LI30_446_LOSSL_THRESHOLD,
B = PICM_LI30_446_LOSSH_THRESHOLD

25.60 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	–	–	–	–
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_LI30_546_LOSSL_THRESHOLD,
B = PICM_LI30_546_LOSSH_THRESHOLD

25.61 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	–	–	–	–
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_LI30_801_LOSSL_THRESHOLD,
B = PICM_LI30_801_LOSSH_THRESHOLD

25.62 PIC Trigger Missed (LN16)

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_LI24_791_NO_TRIG_MISSED

25.63 PIC Trigger Missed (LN22)

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_LI28_916_NO_TRIG_MISSED

25.64 PIC Trigger Missed (LN25)

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_BSY0_16_NO_TRIG_MISSED

25.65 Scraper Water LI21-9 (Station 22-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI22_STATE`

25.66 Scraper Water LI22-9 (Station 23-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI23_STATE`

25.67 Scraper Water LI23-9 (Station 24-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI24_STATE`

25.68 Scraper Water LI24-9 (Station 25-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI25_STATE`

25.69 Scraper Water LI25-9 (Station 26-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI26_STATE`

25.70 Scraper Water LI26-9 (Station 27-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI27_STATE`

25.71 Scraper Water LI27-9 (Station 28-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI28_STATE`

25.72 Scraper Water LI28-9 (Station 29-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI29_STATE`

25.73 Scraper Water LI29-9 (Station 30-1)

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 = `MPS_SCRAPPER_FLOW_OK_LI30_STATE`

25.74 Stopper LI28 950 and 960 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 = `BASII_STOPPER_OUT_STATE`

25.75 Stopper: BSY D2, 60, 61 DM60 Summary

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

```
/*
 * state = 0 : full rate (120 Hz) beam allowed, ALL OUT
 * state = 1 : full rate (120 Hz) beam allowed, ALL IN
 * state = 2 : do not allow beam, Moving or Inconsistant
*/

/* Initialize to a guard value */
state = (unsigned int) -1;

/*
 * Stopper: BSY D2, 60, 61 DM60 Summary
 * Status given from PPS Stopper chassis very close to limit switches
    and CNTRL and passed to MPS via
 * opto's to insure fasts possible response. BTM60 has been documented
    to move at 200 msec from OUT to IN
 * Allow beam if ALL OUT
 * Allow beam if ALL IN
 * Otherwise, do not allow beam, Moving or Inconsistant
 */
```

```
/* Input Descriptions
*    INPUT_NAME                                                    ,
   FAULT_NAME (low)       , OK_NAME            , DESC
*       STPR_BSY0_89_IN_LIMSW_A_POSITION          , "IS_NOT_IN"
              , "IS_IN"       , "ST60 IN LIMSW CHAN A"
*       STPR_BSY0_89_IN_LIMSW_B_POSITION          , "IS_NOT_IN"
              , "IS_IN"       , "ST60 IN LIMSW CHAN B"
*       STPR_BSY0_89_OUT_LIMSW_A_POSITION         , "IS_NOT_OUT"
             , "IS_OUT"      , "ST60 OUT LIMSW CHAN A"
*       STPR_BSY0_89_OUT_LIMSW_B_POSITION         , "IS_NOT_OUT"
             , "IS_OUT"      , "ST60 OUT LIMSW CHAN B"
*       STPR_BSY0_90_IN_LIMSW_A_POSITION          , "IS_NOT_IN"
              , "IS_IN"       , "ST61 IN LIMSW CHAN A"
*       STPR_BSY0_90_IN_LIMSW_B_POSITION          , "IS_NOT_IN"
              , "IS_IN"       , "ST61 IN LIMSW CHAN B"
*       STPR_BSY0_90_OUT_LIMSW_A_POSITION         , "IS_NOT_OUT"
             , "IS_OUT"      , "ST61 OUT LIMSW CHAN A"
*       STPR_BSY0_90_OUT_LIMSW_B_POSITION         , "IS_NOT_OUT"
             , "IS_OUT"      , "ST61 OUT LIMSW CHAN B"
*       STPR_BSY0_88_IN_LIMSW_A_POSITION          , "IS_NOT_IN"
              , "IS_IN"       , "D2 IN LIMSW CHAN A"
*       STPR_BSY0_88_IN_LIMSW_B_POSITION          , "IS_NOT_IN"
              , "IS_IN"       , "D2 IN LIMSW CHAN B"
*       STPR_BSY0_88_OUT_LIMSW_A_POSITION         , "IS_NOT_OUT"
             , "IS_OUT"      , "D2 OUT LIMSW CHAN A"
*       BTM_BSY0_89_IN_LIMSW_A_POSITION           , "IS_NOT_IN"
              , "IS_IN"       , "BTM60 IN LIMSW CHAN A"
*       BTM_BSY0_89_IN_LIMSW_B_POSITION       , "IS_NOT_IN"          , "
   IS_IN"       , "BTM60 IN LIMSW CHAN B"
*       BTM_BSY0_89_OUT_LIMSW_A_POSITION          , "IS_NOT_OUT"
             , "IS_OUT"      , "BTM60 OUT LIMSW CHAN A"
*       BTM_BSY0_89_OUT_CNTRL_A_PPS_CNTRL         , "IS_NOT_OUT_RQ"
          , "IS_OUT_RQ" , "BTM60 OUT SOLN CNTRL CHAN A"
*       BTM_BSY0_89_OUT_CNTRL_B_PPS_CNTRL         , "IS_NOT_OUT_RQ"
          , "IS_OUT_RQ" , "BTM60 OUT SOLN CNTRL CHAN B2"
*
*/

if ( STPR_BSY0_89_OUT_LIMSW_A_POSITION &&
   STPR_BSY0_89_OUT_LIMSW_B_POSITION &&
            STPR_BSY0_90_OUT_LIMSW_A_POSITION &&
                STPR_BSY0_90_OUT_LIMSW_B_POSITION &&
            STPR_BSY0_88_OUT_LIMSW_A_POSITION &&
```

```
                BTM_BSY0_89_OUT_LIMSW_A_POSITION &&
            BTM_BSY0_89_OUT_CNTRL_A_PPS_CNTRL &&
                BTM_BSY0_89_OUT_CNTRL_B_PPS_CNTRL &&
            !( STPR_BSY0_89_IN_LIMSW_A_POSITION ||
                STPR_BSY0_89_IN_LIMSW_B_POSITION ||
                STPR_BSY0_90_IN_LIMSW_A_POSITION ||
                    STPR_BSY0_90_IN_LIMSW_B_POSITION ||
                STPR_BSY0_88_IN_LIMSW_A_POSITION ||
                    STPR_BSY0_88_IN_LIMSW_B_POSITION ||
                BTM_BSY0_89_IN_LIMSW_A_POSITION ||
                    BTM_BSY0_89_IN_LIMSW_B_POSITION ) )
{
    state = 0; /* ALL OUT, and NOT IN, okay to run beam */
}

else if ( STPR_BSY0_89_IN_LIMSW_A_POSITION &&
   STPR_BSY0_89_IN_LIMSW_B_POSITION &&
            STPR_BSY0_90_IN_LIMSW_A_POSITION &&
                STPR_BSY0_90_IN_LIMSW_B_POSITION &&
            STPR_BSY0_88_IN_LIMSW_A_POSITION &&
                STPR_BSY0_88_IN_LIMSW_B_POSITION &&
            BTM_BSY0_89_IN_LIMSW_A_POSITION &&
                BTM_BSY0_89_IN_LIMSW_B_POSITION &&
            !(STPR_BSY0_89_OUT_LIMSW_A_POSITION ||
                STPR_BSY0_89_OUT_LIMSW_B_POSITION ||
              STPR_BSY0_90_OUT_LIMSW_A_POSITION ||
                  STPR_BSY0_90_OUT_LIMSW_B_POSITION ||
              STPR_BSY0_88_OUT_LIMSW_A_POSITION ||
                  BTM_BSY0_89_OUT_LIMSW_A_POSITION ||
              BTM_BSY0_89_OUT_CNTRL_A_PPS_CNTRL ||
                  BTM_BSY0_89_OUT_CNTRL_B_PPS_CNTRL ) )
{
    state = 1; /* ALL IN and NOT OUT okay to run beam */
}

else
{
    state = 2; /* do not allow beam, Moving or Inconsistent */
}
```

Name	State	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
IS_OUT	0	120 Hz	120 Hz	120 Hz	–	–	–	–
IS_IN	1	120 Hz	120 Hz	120 Hz	–	–	–	–
Moving or Inconsistent	2	0 Hz	0 Hz	0 Hz	–	–	–	–

25.76 Sub-booster Ready: LI22

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

Where
A = `MPS_SBST_OK_READY_LI22_STATE`

25.77 Sub-booster Ready: LI25

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

Where
A = `MPS_SBST_OK_READY_LI25_STATE`

25.78 Sub-booster Ready: LI26

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

Where
A = `MPS_SBST_OK_READY_LI26_STATE`

25.79 Sub-booster Ready: LI27

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

Where
A = `MPS_SBST_OK_READY_LI27_STATE`

25.80 Sub-booster Ready: LI28

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

Where
A = `MPS_SBST_OK_READY_LI28_STATE`

25.81 Sub-booster Ready: LI29

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

Where
A = `MPS_SBST_OK_READY_LI29_STATE`

25.82 Sub-booster Ready: LI30

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

Where
A = `MPS_SBST_OK_READY_LI30_STATE`

25.83 Temperature RTD Summary: BSY Common Line

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

Where
A = RTD_BSY0_16_CLINESUM_STATUS

25.84 Toroid Chassis LI24 IMBC2

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 = CHASIMB2_STATE

25.85 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

25.86 VVFS CLTH 101 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 = VVFS_CLTH_101_OPEN_LIMSW_POSITION

25.87 VVFS LI21-9 Position (Station 22-1)

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 = FAST_VLV_OPEN_LI22_STATE

25.88 VVFS LI22-9 Position (Station 23-1)

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 = FAST_VLV_OPEN_LI23_STATE

25.89 VVFS LI23-9 Position (Station 24-1)

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 = FAST_VLV_OPEN_LI24_STATE

25.90 VVFS LI24-9 Position (Station 25-1)

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 = FAST_VLV_OPEN_LI25_STATE

25.91 VVFS LI25-9 Position (Station 26-1)

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 = `FAST_VLV_OPEN_LI26_STATE`

25.92 VVFS LI26-9 Position (Station 27-1)

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 = `FAST_VLV_OPEN_LI27_STATE`

25.93 VVFS LI27-9 Position (Station 28-1)

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 = `FAST_VLV_OPEN_LI28_STATE`

25.94 VVFS LI28-9 Position (Station 29-1)

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 = `FAST_VLV_OPEN_LI29_STATE`

25.95 VVFS LI29-9 Position (Station 30-1)

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 = `FAST_VLV_OPEN_LI30_STATE`

25.96 VVPG CLTH 178 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_CLTH_178_OPEN_LIMSW_POSITION`

25.97 VVPG CLTH 375 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_CLTH_375_OPEN_LIMSW_POSITION`

25.98 VVPG LI21-9 Position (Station 22-1)

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 = `SLOW_VLV_OPEN_LI22_STATE`

25.99 VVPG LI22-9 Position (Station 23-1)

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 = SLOW_VLV_OPEN_LI23_STATE

25.100 VVPG LI23-9 Position (Station 24-1)

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 = SLOW_VLV_OPEN_LI24_STATE

25.101 VVPG LI24 710 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 = VV21_STATE

25.102 VVPG LI24 896 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 = VV22_STATE

25.103 VVPG LI25-9 Position (Station 26-1)

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 = SLOW_VLV_OPEN_LI26_STATE

25.104 VVPG LI26-9 Position (Station 27-1)

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 = SLOW_VLV_OPEN_LI27_STATE

25.105 VVPG LI27-9 Position (Station 28-1)

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 = SLOW_VLV_OPEN_LI28_STATE

25.106 VVPG LI28-9 Position (Station 29-1)

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 = SLOW_VLV_OPEN_LI29_STATE

25.107 VVPG LI29-9 Position (Station 30-1)

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 = SLOW_VLV_OPEN_LI30_STATE

25.108 VVPG LI30-9 Position (Station 30-9)

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 = SLOW_VLV_30_9_OK_OPEN_STATE

26 Ignored when YAG01 Is In

26.1 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`

26.2 Toroid Peak Current Monitor IM01

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 = `TR_BL215_STATE`

26.3 YAG02 IN20 241 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `YAGS_IN20_241_OUT_LMTSW_STATE`,
B = `YAGS_IN20_241_IN_LMTSW_STATE`

27 Ignored when YAG01 Is In or YAG02 Is In

27.1 BLM/PIC Watchdog: Upstream of TDUND

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

Where
A = `MPS_MCC0_1_PICBLM_WD_STATUS`

27.2 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`

27.3 Flowswitch: CE11

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_LI21_235_OPEN_STATE`

27.4 Flowswitch: TD11

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 = FS_BL305_STATE

27.5 Main Manifold Gauge: LI21 Station 5

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 = MPS_MM_GAUGE_OK_LI21_STATE

27.6 Mirror BL11 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	120 Hz	120 Hz	120 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = MIR_BL11_OUT_STATE,
B = MIR_BL11_IN_STATE

27.7 OTR01 IN20 541 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = OTRS_IN20_541_OUT_LMTSW_STATE,
B = OTRS_IN20_541_IN_LMTSW_STATE

27.8 OTR02 IN20 571 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.9 OTR03 IN20 621 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.10 OTR04 IN20 711 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.11 OTR11 LI21 237 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.12 OTR12 LI21 291 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.13 OTRH1 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.14 OTRH2 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

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

27.15 Sub-booster Ready: LI21

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

Where
A = `MPS_SBST_OK_READY_LI21_STATE`

27.16 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`

27.17 Toroid Chassis IN20 IM11

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 = CHASIM11_STATE

27.18 Toroid Chassis IN20 IM12

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 = CHASIM12_STATE

27.19 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

27.20 VVFV IN20 785 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 = VVFV_IN20_785_OPEN_LMTSW_POSITION

27.21 VVMG LI21 195 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 = `VV_BL195_STATE`

27.22 VVPG IN20 435 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 = `VV_BL435_STATE`

27.23 VVPG IN20 545 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 = `VV_BL545_STATE`

27.24 VVPG IN20 635 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 = `VV_BL635_STATE`

27.25 VVPG IN20 915 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 = VV_IS915_STATE

27.26 VVS Circuit Breaker: LI22

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

Where
A = VVS_BRKR_OK_READY_LI22_STATE

27.27 VVS Circuit Breaker: LI24

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

Where
A = VVS_BRKR_OK_READY_LI24_STATE

27.28 VVS Circuit Breaker: LI26

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

Where
A = VVS_BRKR_OK_READY_LI26_STATE

27.29 VVS Circuit Breaker: LI28

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

Where
A = VVS_BRKR_OK_READY_LI28_STATE

27.30 VVS Circuit Breaker: LI30

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

Where
A = VVS_BRKR_OK_READY_LI30_STATE

27.31 YAG03 IN20 351 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = YAGS_IN20_351_OUT_LMTSW_STATE,
B = YAGS_IN20_351_IN_LMTSW_STATE

27.32 YAGS1 IN20 921 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = YAGS_IN20_921_OUT_LMTSW_STATE,
B = YAGS_IN20_921_IN_LMTSW_STATE

27.33 YAGS2 LI21 995 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = YAGS_LI21_995_OUT_LMTSW_STATE,
B = YAGS_LI21_995_IN_LMTSW_STATE

28 Always Evaluated

28.1 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`

28.2 Beam Destination: HXR

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Not True	F	–	–	–	–	–	–	–
True	T	–	–	–	–	–	–	–

Where
A = `LP_DESTINATION_HXR`

28.3 Beam Destination: SXR

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Not True	F	–	–	–	–	–	–	–
True	T	–	–	–	–	–	–	–

Where
A = `LP_DESTINATION_SXR`

28.4 BLM/PIC Watchdog: IN20

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

Where
A = `MPS_IN20_1_PICBLM_WD_STATUS`

28.5 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`

28.6 Gun RF Peak Power 20-6

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

Where
A = `FLT_20_6_TRP_STATE`

28.7 Gun Waveguide Vacuum Summary

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 = `WGVACGUN_STATE`

28.8 IOC-IN20-MP01 MPS Support IOC Heartbeat

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 = `MN_HEART_STATE`

28.9 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`

28.10 MCC Emergency Radiation Stopper

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 = `EMG_RAD_STOP_STATE`

28.11 Mechanical Shutter Position

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

Where
A = `MPS_IN20_200_MSHT1_OUT_FAULT`,
B = `MPS_IN20_200_MSHT1_IN_FAULT`

28.12 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

28.13 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

28.14 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

28.15 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

28.16 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

28.17 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

28.18 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

28.19 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

28.20 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

28.21 PIC HVPS LI20 - Location LKG-1535

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

Where
A = PICM_LI20_1_HV_PWR_STATE

28.22 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	–	–	–	–
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_IN20_185_LOSSL_THRESHOLD,
B = PICM_IN20_185_LOSSH_THRESHOLD

28.23 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	–	–	–	–
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_IN20_232_LOSSL_THRESHOLD,
B = PICM_IN20_232_LOSSH_THRESHOLD

28.24 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	–	–	–	–
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_IN20_245_LOSSL_THRESHOLD`,
B = `PICM_IN20_245_LOSSH_THRESHOLD`

28.25 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	–	–	–	–
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_IN20_665_LOSSL_THRESHOLD`,
B = `PICM_IN20_665_LOSSH_THRESHOLD`

28.26 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	–	–	–	–
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_IN20_775_LOSSL_THRESHOLD`,
B = `PICM_IN20_775_LOSSH_THRESHOLD`

28.27 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	–	–	–	–
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_IN20_933_LOSSL_THRESHOLD,
B = PICM_IN20_933_LOSSH_THRESHOLD

28.28 PIC Trigger Missed (LN11)

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_IN20_665_NO_TRIG_MISSED

28.29 Pockels Cell AND Gate 100

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Bypassed	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Active	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = MPS_IN20_100_ANDALLACTV_STATE

28.30 Pockels Cell AND Gate 200

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Bypassed	F	0 Hz	0 Hz	0 Hz	–	–	–	–
Active	T	120 Hz	120 Hz	120 Hz	–	–	–	–

Where
A = MPS_IN20_200_ANDALLACTV_STATE

28.31 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`

28.32 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`

28.33 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`

28.34 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`

28.35 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

28.36 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

28.37 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

28.38 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

28.39 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`

28.40 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`

28.41 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`

28.42 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`

28.43 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`

28.44 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`

28.45 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`

28.46 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`

28.47 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

28.48 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

28.49 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

28.50 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

28.51 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

28.52 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

28.53 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

28.54 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

28.55 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

28.56 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

28.57 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

28.58 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

28.59 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`

28.60 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`

28.61 VVMG IN20 175 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 = `VV_BL175_STATE`

28.62 VVPG IN20 155 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 = `VV_BL155_STATE`

28.63 VVS Circuit Breaker: LI20

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

Where
A = `VVS_BRKR_OK_READY_LI20_STATE`

28.64 YAG01 IN20 211 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `YAGS_IN20_211_OUT_LMTSW_STATE`,
B = `YAGS_IN20_211_IN_LMTSW_STATE`

28.65 YAGG1 IN20 841 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	10 Hz	10 Hz	10 Hz	–	–	–	–
Broken	T	T	0 Hz	0 Hz	0 Hz	–	–	–	–

Where
A = `YAGS_IN20_841_OUT_LMTSW_STATE`,
B = `YAGS_IN20_841_IN_LMTSW_STATE`

29 Ignore Logic

29.1 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

29.2 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

29.3 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

29.4 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

29.5 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

29.6 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

29.7 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

29.8 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

29.9 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

29.10 Laser Heater Attenuator Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = LHATTEN_IN_LIMIT_STATE

29.11 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

29.12 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

29.13 Stopper S1 Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
Is In	T	–	–	–	–	–	–	–

Where
A = STPR_FEE1_1_S1IN_POSITION

29.14 Stopper S2 Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = STPR_FEE1_1_S2IN_STATE

29.15 Stopper S2B Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = STPR_FEE1_1_S2BIN_STATE

29.16 Stopper S5B Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = STPR_FEH1_5_S5BIN_POSITION

29.17 Stopper SH1 Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = STPR_FEE1_1_SH1IN_STATE

29.18 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

29.19 Stopper XRT S5 Is In

Name	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = STPR_XRT1_1_S5IN_POSITION

29.20 Stopper XRT S6 Is In

Name	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = STPR_XRT1_1_S6IN_POSITION

29.21 Stopper: BSY D2 Summary Is In

Name	B	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	T	–	–	–	–	–	–	–

Where
A = STPR_BSY0_88_IN_LIMSW_A_POSITION,
B = STPR_BSY0_88_IN_LIMSW_B_POSITION

29.22 TD11 Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = `TD11_IN_LIMIT_STATE`

29.23 TDUND Is In

Name	*A*	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = `DUMP_LTU1_970_TDUND_IN_POSITION`

29.24 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`

29.25 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`

29.26 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

29.27 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

29.28 YAG02 Is In

Name	A	GUNL	MS	BYKIK	LHS	GUNH	GUNS	BYKIKS
In	T	–	–	–	–	–	–	–

Where
A = YAGS_IN20_241_IN_LMTSW_STATE