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The table below lists the MDsplus nodes associated with NSTX Gas Injectors. Since 1999 the gas configuration has changed several times. This is the configuration used for the final campaign leading up to NSTX-U. NSTX run ended 10/29/2010, last shot # 142524. First 4 weeks of FY11 campaign completed.

Main Injectors

- Main Injector 1 - Bay K Top
- Main Injector 2 - Bay J Lower
- Main Injector 3 - Bay J Upper
- Lower Dome/Injector 4 - not included here. This has not been used for gas injection for years.

Diagnostic Injectors

- Bay B Low Flow
- Bay B High Flow
- SGI - Bay I
- Bay E Bottom

Puff Valves

- Center Stack Shoulder
- Center Stack Midplane
- Bay K Bottom

Massive Gas Injection

- Bay J Midplane
- Bay F Bottom

ToDo List:

- 1) Add plenum volumes to tree.
- 2) Make some GAS scopes for valve control signals and PE signals , where available. Include IG1.
- 3) Look into In-Use reliability per EPICS database design. Should sample records shortly after EOP and 'latch' pressure reading.
- 4) Come up with and add standardized MDsplus TAGS, where possible, to aid in a possible future "Total Gas" application.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay K Top Main Injector #1 with Piezoelectric Valve	In-use indicator	TOP.EPICS.GAS.PARAMETERS: INJ1_READY	VM_PLC31_INJ1RDYPER M_BI	string Ready or Not Ready	
	Plenum Pressure	TOP.EPICS.GAS.DIGITIZERS: PE101_TD	GS_PE101_TD	MDS signal Torr	
	Plenum volume = 89.1 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Piezoelectric valve control signal	TOP.EPICS.GAS.DIGITIZERS: PZV1_TD	GS_PZV1_TD	MDS signal Volts (typical 130 volts = ON)	
	Gas Type	TOP.EPICS.GAS.PARAMETERS: INJ1_GAS	VM_PLC31_INJ1GAS_SI	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) Piezo valve command signal also recorded via PCS GIS SAD.
- 2) All signals in ENGINEERING tree.
- 3) Items in Blue are an MDS signal.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay J Lower Main Injector #2 with Piezoelectric Valve	In-use indicator	TOP.EPICS.GAS.PARAMETERS: INJ2_READY	VM_PLC31_INJ2RDYPER M_BI	string Ready or Not Ready	
	Plenum Pressure	TOP.EPICS.GAS.DIGITIZERS: PE102_TD	GS_PE102_TD	MDS signal Torr	
	Plenum volume = 72 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Piezoelectric valve control signal	TOP.EPICS.GAS.DIGITIZERS: PZV2_TD	GS_PZV2_TD	MDS signal Volts (typical 130 volts = ON)	
	Gas Type	TOP.EPICS.GAS.PARAMETERS: INJ2_GAS	VM_PLC31_INJ2GAS_SI	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) All signals in ENGINEERING tree.
- 2) Items in Blue are an MDS signal.
- 3) Piezo valve command signal also recorded via PCS GIS SAD.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay J Top Main Injector #3 with Piezoelectric Valve	In-use indicator	TOP.EPICS.GAS.PARAMETERS: INJ3_READY	VM_PLC31_INJ3RDYPER M_BI	string Ready or Not Ready	
	Plenum Pressure	TOP.EPICS.GAS.DIGITIZERS: PE103_TD	GS_PE103_TD	MDS signal Torr	
	Plenum volume = 70 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Piezoelectric valve control signal	TOP.EPICS.GAS.DIGITIZERS: PZV3_TD	GS_PZV3_TD	MDS signal Volts (typical 130 volts = ON)	
	Gas Type	TOP.EPICS.GAS.PARAMETERS: INJ3_GAS	VM_PLC31_INJ3GAS_SI	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) All signals in ENGINEERING tree.
- 2) Items in Blue are an MDS signal.
- 3) Piezo valve command signal also recorded via PCS GIS SAD.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay B Low Flow Diagnostic injector	In-use indicator	TOP.EPICS.GAS.DIAG_GIS: PZV501_STATE	GS_DI_ARM1_BI	string Armed or Disarmed	see note 1
	Plenum Pressure before shot	TOP.EPICS.GAS.DIAG_GIS: PE501_BEGIN	GS_DI_PE001_AI	scalar Torr	
	Plenum volume = 67.1 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Delta Plenum Pressure	TOP.EPICS.GAS.DIAG_GIS: PE501_DELTA	GS_DI_PE001_DELTA_CALC	scalar Torr	Plenum pressure difference before (@SOP), and (about 60 secs) after shot.
	Valve-Open Start	TOP.EPICS.GAS.DIAG_GIS:PZV501_START	GS_DI_GATETRIG1_AO	scalar milliseconds	Time relative to T(0)
	Valve-Open duration	TOP.EPICS.GAS.DIAG_GIS:PZV501_DUR	GS_DI_GATEDUR1_AO	scalar milliseconds	Fixed voltage
	Plenum Pressure signal	TOP.EPICS.GAS.DIGITIZERS:DI _PE001_TD	GS_DI_PE001_TD	MDS signal Torr	unfiltered, may be noisy.
	Gas Type	TOP.EPICS.GAS.DIAG_GIS:PZV501_GAS	GS_DI_GAS1_SO	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) All signals in ENGINEERING tree.
- 2) Items in Blue are an MDS signal.
- 3) The in-Use indicator was unreliable prior to 2012.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay B High Flow Diagnostic injector	In-use indicator	TOP.EPICS.GAS.DIAG_GIS: PZV502_STATE	GS_DI_ARM3_BI	string Armed or Disarmed	see note 1
	Plenum Pressure before shot	TOP.EPICS.GAS.DIAG_GIS: PE502_BEGIN	GS_DI_PE002_AI	scalar Torr	
	Plenum volume = 26.82 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Delta Plenum Pressure	TOP.EPICS.GAS.DIAG_GIS: PE502_DELTA	GS_DI_PE002_DELTA_CALC	scalar Torr	Plenum pressure difference before (@SOP), and (about 60 secs) after shot.
	Valve-Open Start	TOP.EPICS.GAS.DIAG_GIS: PZV502_START	GS_DI_GATETRIG2_AO	scalar milliseconds	Time relative to T(0)
	Valve-Open duration	TOP.EPICS.GAS.DIAG_GIS: PZV502_DUR	<i>no tag defined</i>	scalar milliseconds	Fixed voltage
	Plenum Pressure signal	TOP.EPICS.GAS.DIGITIZERS: DI_PE002_TD	GS_DI_PE002_TD	MDS signal	unfiltered, may be noisy.
	Gas Type	TOP.EPICS.GAS.DIAG_GIS: PZV502_GAS	GS_DI_GAS2_SO	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) All signals in ENGINEERING tree.
- 2) Items in Blue are an MDS signal.
- 3) The in-Use indicator was unreliable prior to 2012.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay I Midplane SGI Diagnostic injector	In-use indicator	TOP.EPICS.GAS.SGI:PZV503_STATE	SGI_STATE	string Armed or Disarmed	see note 4
	Plenum Pressure before shot	TOP.EPICS.GAS.SGI:PE503_BEGIN	SGI_BEGIN_P	scalar Torr	
	Plenum volume = ~250 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Delta Plenum Pressure	TOP.EPICS.GAS.SGI:PE503_DELTA	SGI_DELTA_P	scalar Torr	Plenum pressure difference before (@SOP), after shot.
	Valve-Open Start	TOP.EPICS.GAS.DIAG_GIS:PZV503_START	SGI_PZV_START_T	scalar milliseco nds	Time relative to T(0) Only valid prior to 3/24/2006. SEE NOTES 1 & 2 BELOW.
	Valve-Open duration	TOP.EPICS.GAS.DIAG_GIS:PZV503_DUR	PZV503_DUR SGI_PZV_DUR_T	scalar milliseco nds	Fixed voltage Only valid prior to 3/24/2006. SEE NOTES 1 & 2 BELOW.
	Piezo valve voltage CONTROL signal	TOP.EPICS.GAS.DIGITIZERS:SGI_PV503_TD	GS_SGI_PZV503_TD GS_SGI_PV503_TD	MDS signal raw Volts (nominal 3.2V = ON)	Fixed amplitude, up to 50 pulses. SEE NOTES 1 & 2 BELOW.
	Plenum Pressure	TOP.EPICS.GAS.DIGITIZERS:SGI_PE503_TD	GS_SGI_PE503_TD	MDS signal	unfiltered, may be noisy.

	signal			Torr	
	Gas Type	TOP.EPICS.GAS.SGI:PZV503_GAS	SGI_GASTYPE	string e.g. He,D2,Xe	2-char abbreviation
	Radial Position	TOP.EPICS.GAS.SGI:RAD_POSITION	SGI_POSITION	scalar cm (radial from center)	Home is about 198 cm

Notes:

1) SGI Piezo Valve Control

- 2004: SGI initially used single, gated piezo valve control similar to Bay B valve (501,502). Use PZV503_START & DUR nodes for timing config..
- 3/24/2006 Moved valve driver controls from timed gate to 412, thus single-pulse to multi-pulse configuration. multi-pulse supports (5) pulses. USE TON & DUR nodes under the MULTIPULSE branch for timing config.
- 5/18/2006 multi-pulse supports (10) pulses. shot 120712 uses 10 pulses. Still using TON & DUR nodes.
- 10/26/2010 multipulse expanded to 50 pulses, uses IDL waveform editor on nstxpool. The 50 timing configs are in MULTIPULSE branch, in MP_T for time

2)

- In the MULTIPULSE branch, MP_T is a time array, MP_V is a voltage array of the configured piezo valve control timing. I don't know what MP_TRACE signal is.

3) Lower Dome (inj 4, LDGIS) systems ignored.

4) The in-Use indicator was unreliable prior to 2012.

5) All signals in ENGINEERING tree.

6) Items in [Blue](#) are an MDS signal.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay E Bottom Diagnostic injector	In-use indicator	TOP.EPICS.GAS.BAYE: PZV504_STATE	none	string Armed or Disarmed	see note 1
	Plenum Pressure before shot	TOP.EPICS.GAS.BAYE: PE504_BEGIN	none	scalar Torr	
	Plenum volume = 180 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Delta Plenum Pressure	TOP.EPICS.GAS.BAYE: PE504_DELTA	none	scalar Torr	Plenum pressure difference before (@SOP), and (about 60 secs) after shot.
	Valve-Open Start	TOP.EPICS.GAS.BAYE: PZV501_START	GS_DI_GATETRIG1_AO	scalar milliseconds	Time relative to T(0)
	Valve-Open duration	TOP.EPICS.GAS.BAYE: PZV501_DUR	GS_DI_GATEDUR1_AO	scalar milliseconds	Fixed voltage
	Piezo valve voltage CONTROL signal	TOP.EPICS.GAS.DIGITIZERS: DI_PZV504_TD	GS_DI_PZV509_TD <i>(not sure why 509 instead of 504)</i>	MDS signal raw Volts (nominal 8 V = ON)	Fixed amplitude, up to 50 pulses. SEE NOTES 1 & 2 BELOW.
	Plenum Pressure signal	TOP.EPICS.GAS.DIGITIZERS: DI_PE504_TD	GS_DI_PE504_TD	MDS signal Torr	unfiltered, may be noisy.
	Gas Type	TOP.EPICS.GAS.BAYE: PZV504_GAS	none	string e.g. He, D2, Xe	2-char abbreviation

Notes:

- 1) The in-Use indicator was unreliable prior to 2012.
- 2) The Bay E Bottom piezoelectric valve is controlled by a 'multipulse' (up to 10) set of nodes.
 - a) Ton1 - Ton10. Start time of a pulse in millisec relative to T(0).
 - b) Dur1 - Dur10. Duration of a pulse in millisec.
 - c) Use1 - Use10. String (Yes, No) to indicate if a pulse was used.
 - d) In-use indicator PZV504_STATE must be Armed (see note 1).
 - e) The actual valve voltage control waveform is digitized in node DI_PZV4_TD

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Center Stack Shoulder Puff Valve	In-use indicator	TOP.EPICS.GAS.PARAMETERS: CSTK_SHLDR_F	none	string FILLED or NOT Filled	see note 1
	Plenum Pressure before shot	TOP.EPICS.GAS.PARAMETERS: CSTK_SHLDR_P	none	scalar Torr	
	Plenum volume = 43.9 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Valve 'Puff' Command signal	TOP.EPICS.GAS.DIGITIZERS: SAV125A_TD	GS_SAV125A_TD	MDS signal raw Volts (nominal 10 volts = OPEN)	Rising edge of 'puff' command opens and dumps plenum. Duration is benign.
	Gas Type	TOP.EPICS.GAS.PARAMETERS: INJ4GAS	VM_PLC31_INJ4GAS_SI	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) The in-Use indicator was unreliable prior to 2012.
- 2) Valve Puff command signal also recorded via PCS GIS SAD.
- 3) All signals in ENGINEERING tree.
- 4) Items in Blue are an MDS signal.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Center Stack Midplane Puff Valve	In-use indicator	TOP.EPICS.GAS.PARAMETERS: CSTK_MID_F	none	string FILLED or NOT Filled	see note 1
	Plenum Pressure before shot	TOP.EPICS.GAS.PARAMETERS: CSTK_MID_P	VM_PL31_PECSTK_AI	scalar Torr	
	Plenum volume = 42.5 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Valve 'Puff' Command signal	TOP.EPICS.GAS.DIGITIZERS: SAV125_TD	GS_SAV125_TD	MDS signal raw Volts (nominal 10 volts = OPEN)	Rising edge of 'puff' command opens and dumps plenum. Duration is benign.
	Gas Type	TOP.EPICS.GAS.PARAMETERS: INJ4GAS	VM_PL31_INJ4GAS_SI	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) The in-Use indicator was unreliable prior to 2012.
- 2) Valve Puff command signal also recorded via PCS GIS SAD.
- 3) All signals in ENGINEERING tree.
- 4) Items in Blue are an MDS signal.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay K Bottom <i>also known as</i> Lower Dome Branch 5 Puff Valve	In-use indicator	TOP.EPICS.GAS.PARAMETERS: LDGIS_5_F	none	string Filled or Not-Filled	see note 1
	Plenum Pressure before shot	TOP.EPICS.GAS.PARAMETERS: LDGIS_5_P and LD_5_PRESS	VM_PL31_PELDGIS_AI	scalar Torr	
	Plenum volume = 1.33 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Valve 'Puff' Command signal	TOP.EPICS.GAS.DIGITIZERS: SAV129_TD	no tag	MDS signal raw Volts (nominal 10 volts = OPEN)	Rising edge of 'puff' command opens and dumps plenum. Duration is benign.
	Gas Type	TOP.EPICS.GAS.PARAMETERS: INJ4_GAS	VM_PL31_INJ4GAS_SI	string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) The in-Use indicator was unreliable prior to 2012.
- 2) Valve Puff command signal also recorded via PCS GIS SAD.
- 3) All signals in ENGINEERING tree.
- 4) Items in Blue are an MDS signal.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay J Midplane Massive Gas Injection Puff Valves	In-use indicator	TOP.EPICS.GAS.MGI.BAYJ: SELECTED	none	selected/not- selected indicator	
	Plenum Pressure before shot	TOP.EPICS.GAS.MGI.BAYJ: PE506_BEGIN	none	scalar Torr	
	Delta Plenum Pressure	TOP.EPICS.GAS.MGI.BAYJ: PE506_DELTA	none	scalar Torr	Plenum pressure difference before (@SOP), and (about 60 secs) after shot.
	Plenum volume = 160 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Valve 'Puff' Command signal	TOP.EPICS.GAS.DIGITIZERS: SAV120122_TD	GS_SAV120122_TD	MDS signal raw Volts (nominal 10 volts = OPEN)	Rising edge of 'puff' command opens and dumps plenum. Duration is benign.
	Gas Type	<i>none yet, but same as SGI (via AV08)</i>		string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) Valve Puff command signal also recorded via PCS GIS SAD.
- 2) All signals in ENGINEERING tree.
- 3) Items in Blue are an MDS signal.

Injector Description	Signal Description	MDS Node	MDS Tag	Signal type, Units	Comment
Bay F Midplane Massive Gas Injection Puff Valves	In-use indicator	TOP.EPICS.GAS.MGI.BAYF: SELECTED	none	selected/not- selected indicator	
	Plenum Pressure before shot	TOP.EPICS.GAS.MGI.BAYF: PE505_BEGIN	none	scalar Torr	
	Delta Plenum Pressure	TOP.EPICS.GAS.MGI.BAYF: PE505_DELTA	none	scalar Torr	Plenum pressure difference before (@SOP), and (about 60 secs) after shot.
	Plenum volume = 160 cc	<i>plan to add</i>	<i>plan to add</i>	scalar cc	
	Valve 'Puff' Command signal	TOP.EPICS.GAS.DIGITIZERS: SAV130132_TD	GS_SAV130132_TD	MDS signal raw Volts (nominal 10 volts = OPEN)	Rising edge of 'puff' command opens and dumps plenum. Duration is benign.
	Gas Type	<i>none yet, but same as SGI (via AV08)</i>		string e.g. He,D2,Xe	2-char abbreviation

Notes:

- 1) Valve Puff command signal also recorded via PCS GIS SAD.
- 2) All signals in ENGINEERING tree.
- 3) Items in Blue are an MDS signal.