Introduction to MDSplus Terminology and Tools

Elements of an MDSplus Tree

A Traverser View of the various nodes Icons, Types, and Syntax The NSTX trees Devices currently selectable Looking at trees with TCL

Scope and Pad Pad button grids and Scope displays Setting up the Data Source Copying from a Pad button to a Scope panel

> What to Type Logical Names and Directories

CMOD Web pages for MDSplus: http://www.pfc.mit.edu/mdsplus/

NSTX Web pages for MDSplus: http://NSTX.pppl.gov/nstx/Software/

Introductory material on IDL: http://NSTX.pppl.gov/nstx/Software/idl_intro.html

See individual application documents (or html versions) for details about the Traverser and Scope programs; no illustrated Pad document yet.

P.Roney, PPPL

A Demo MDSplus Tree Showing All Node Types

The Device node is for an LC6810 digitizer: choosing a device automatically adds all necessary tree nodes for that device. Nodes with subnodes are followed by "..."

			TRAVERSER - Tr	ee: DEMOTREE Shot: -1	
File	<u>E</u> dit	<u>D</u> ata	<u>C</u> ustomize	<u> </u>	<u>l</u> elp
	OP : ACTION_ : AXIS_1 : DEVICE_[# : ACTIVI # : ACTIVI # : ACTIVI # : COMM - : EXT_C # : FREQ - : INPUT - : INPUT - : INPUT - : INPUT - : INPUT - : INPUT - : STORI - : SIGNAL_ - : SIGNA - : SIGNA - : SIGNA - : SIGNA - : SIGNA - : SIGNA	1 6810 E_CHANS E_MEM IENT LOCK_IN ACTION _01 _02 _03 _04 PRIES _TRIG E_ACTION H_1 2 L_2A AL_2B AL_2C	Add Node Add Device Add Child Delete Node Modify Tags Rename Node Display Data Display Mci Modify Data Set Default Set Default Setup Device Do Action Toggle On/Off Open Close Quit		

Mouse Button 3 (right button) brings up a short-cut menu; any nodes added now will be subnodes of SIGNAL_2C, since it is currently selected.

Nodes appear in Traverser in alphabetical order within a level.

MDSplus expressions require close attention to punctuation.

CHILD NODES : "DOT" syntax	MEMBER NODES "COLON" syntax
e.g. .child_1	:device_6810:name
\nstx::top.operations.flux_loops.rawdata	:sfl_h908_01:input_01

ICON	NODE TYPE	ICON	NODE TYPE
ቘ፞፝	CHILD	<mark>ر ا</mark>	ACTION
			AXIS
4	(sub) TREE		DEVICE
		\odot	DISPATCH
		#	NUMERIC
		\sim	SIGNAL
		Ч —	TASK
			TEXT
		┉	WINDOW

NODE NAMES are limited to 12 characters. The full path name to a node may be arbitrarily long. Life is made much simpler if a TAG NAME is defined. Tags may be 24 characters long; they represent the full path up to and including the named node. They can be used in further mixed expressions to reach subnodes without a lot of typing. *Short tags are best.* \IP1 is the tag for \OPERATIONS::TOP.IP_ROGOWSKI:PLASMA_CUR_1 \IP1:COMMENT points to the comment entered for that signal.

A node has one node name but may have multiple tags. NSTX policy so far is that we will

 always create tag names for all Physics or Engineering signals but not for "raw data" channels

• always add a :COMMENT subnode to a Physics or Engineering signal that can reasonably be used as a plotting label.

The NSTX Trees as of 2/1/99

A Top-level view from Traverser of the NSTX tree:

			TRAVERSER - Tree: NSTX Shot: -1	I B
File	Edit	Data	Customize	Help
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A Closer Look at the Operations Tree:

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点 Fl	_UX_LOOF	°S		
	: CS1			
	: CS10	•		
	: CS11	•		
	: CS12	•		
	: CS13	•		
	: CS14	•		
	: CS15	•		
	: CS16	•		
	: CS17	•		
<u> </u>	: CS2			
	: CS3			
	: CS4			
	: CS5			
	: CS6			
	: CS7			
	: CS8			
	: CS9			
	: IDL1			
	: IDL2			
	: IDL3			
	: 1001			
	: IDUZ			
	: IDU3			
	· MVLL	•		
	: MVUI.	••		

			TRAVERSER - Tree: OPERATIONS			
File	Edit	Data	Customize			
🚺 : ТС)P					
FI	LUX_LOC	OPS				
	: SEG_	SPU2				
	: SEG_	SPU3				
	: SEG	SPU4				
	: SPUF	(IL 911)				
	SPDF	11 U 121				
	· SPDF	211 211				
	: SPDF	3L				
	: SPDF	30				
	: SPDF	84L				
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	: SPL2					
	: SPL3					
	SPL4					
	· SPU2	•••				
	: SPU3					
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	RAWDA	TA				
	E : SF	L_H404_01				
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			TRAVERSER - Tree: OPERATIONS
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	.	SFL_H404_01	
	+	• ACTIVE CH	 IANS
	# 5	· COMMENT	
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	\bowtie	: INPUT_04.	
	2	: INPUT_05 .	
	2	: INPUT_06 .	•
	2	: INPUT_07 .	••
	2	: INPUT_08 .	
	2	· INPUT_09.	
	2	: INPUT 11	

On the following page, the TCL utility shows the same information in a more concise format, but it is harder to get the overall picture.

BIRCH\$ tcl TCL> set tree n TCL> dir	stx/shot=-1			
\NSTX::TOP				
:LONGSHOT :S	HOTMODE :	SHOTNO		
ACTIVESPEC ENGINEERING PASSIVESPEC	CAMERAS MICROWAVE RF	CLOCK NBI	DUMMYDATA EI OPERATIONS PA	DGE ARTICLES
Total of 15 nod TCL> set def .c TCL> dir	les. operations			
\OPERATIONS::TC	P			
CLOCK CUR IP_ROGOWSKI MIR	RENTS NOV	DIAMAGNETIC VOLTAGES	EDDY_CURRNTS	FLUX_LOOPS
Total of 8 node TCL> set def .f TCL> dir	es. lux_loops			
\OPERATIONS::TC	P.FLUX_LOOP	S		
:CS1 : CS14 : CS3 : CS8 : IDU1 : ODL1 : ODU2 : PF3L : PPDR3L : PPL2 : PPU3 : SEG_PPL4 : SEG_PPU6 : SEG_SPL3 : SEG_SPU4 : SEG_SPU3 : SEG_SG_SGU3 : SEG_SGU3	CS10 CS15 CS4 CS9 IDU2 ODL2 ODU3 PF3U PPDR1L PPDR3U PPL3 PPU4 SEG_PPU2 SEG_PPU2 SEG_PPU7 SEG_SPL4 SPDR1L SPDR3U SPL3 SPU4	:CS11 :CS16 :CS5 :IDL1 :IDU3 :ODL3 :ODU4 :PF4L :PPDR1U :PPDR4L :SEG_PPL1 :SEG_PPL6 :SEG_PPU8 :SEG_PPU8 :SEG_PPU8 :SEG_SPU1 :SPDR1U :SPDR4L :SPL4	:CS12 :CS17 :CS6 :IDL2 :MVL1 :ODL4 :PF2L :PF4U :PPDR2L :PPDR4U :PPU1 :SEG_PPL2 :SEG_PPL7 :SEG_PPL4 :SEG_SPL1 :SEG_SPL1 :SEG_SPL2 :SPDR2L :SPDR4U :SPU1	:CS13 :CS2 :CS7 :IDL3 :MVU1 :ODU1 :PF2U :PF5L :PPDR2U :PPL1 :PPU2 :SEG_PPL3 :SEG_PPL8 :SEG_PPL8 :SEG_PPU5 :SEG_SPL2 :SEG_SPU3 :SPDR2U :SPL1 :SPU2

RAWDATA

Total of 98 nodes.

A wide variety of standard CAMAC devices are already supported in MDSplus. While in EDIT mode, add the device node, then choose Data/Setup Device.

TRAVERSER – Tree: DEMOTREE Shot: – 1					
File	<u>E</u> dit <u>D</u> ata	Customize			<u>H</u> elp
👗 : TOI	Add Node				
	Add Device 🎽	A12	JOERGER_ADC	L8818	ΠA
	Add Child	A14	JOERGER_ADCP	L8828	
💮 : 🖸	<u>D</u> elete Node	A3204	JOERGER_CG	MDSDCL	
#	<u>M</u> odify Tags	B2408	JOERGER_DAC16	MIT_CLOCK	
	<u>R</u> ename Node	B3224	JOERGER_TR16	MIT_DCLOCK	
🚟 : T	EXT_1	B5910A	JOERGER_TR612	MIT_DECODER	
点 CHI	LD 1	DSP2904	JOERGER_TR812	MIT_ENCODER	
	-	DUMMY908	L2232	MIT_GATE	
		EC727	L2256	MIT_GCLOCK	
		FERA	L2415	MIT_PULSE	
		H404	L3512	MIT_CLOCK	
		H908	L4202	MIT_DCLOCK	
		H908PPPL	L6810	MITGATE	
		H911	L6810A	MPB_DECODER	
		H912	L6810B	PARAGON_HIST	
		HM650	L8100	PARAGON_RPT	
		HV1440	L8201	PREAMP	
		HV1443	L8206	RETICON120	
		HV4032	L8210	T2812	
		HV4032A1	L8212_04	T2814	
		IDL	L8212_08	T2824	
		INCAA16	L8212_16	T2825	
TCL>		INCAA4	L8212_32	T2860	
Ĭ		INCAA6	L8501	T4012	
		J1819	L8590	TESTMPB_DECODE	R
		J221	L8590_MEM	UMCCD	
		J412	L8590_SCLR	U_OF_M_SPECT	

The CMOD MDSplus web pages give a more complete description of the supported devices. The "H404", not described there, is the Clock Decoder/Trigger Generator module needed to synchronize diagnostics.

A dwScope display and the dwPad it was created from

	FluxLo	ops PAD 1	
File Customize			Help
Vessel FluxLoops Ch1	Vessel FluxLoops Ch9	Vessel FluxLoops Ch17	Vessel FluxLoops Ch25
Vessel FluxLoops Ch2	Vessel FluxLoops Ch10	Vessel FluxLoops Ch18	Vessel FluxLoops Ch26
Vessel FluxLoops Ch3	Vessel FluxLoops Ch11	Vessel FluxLoops Ch19	Vessel FluxLoops Ch27
Vessel FluxLoops Ch4	Vessel FluxLoops Ch12	Vessel FluxLoops Ch20	Vessel FluxLoops Ch28
Vessel FluxLoops Ch5	Vessel FluxLoops Ch13	Vessel FluxLoops Ch21	Vessel FluxLoops Ch29
Vessel FluxLoops Ch6	Vessel FluxLoops Ch14	Vessel FluxLoops Ch22	Vessel FluxLoops Ch30
Vessel FluxLoops Ch7	Vessel FluxLoops Ch15	Vessel FluxLoops Ch23	Vessel FluxLoops Ch31
Vessel FluxLoops Ch8	Vessel FluxLoops Ch16	Vessel FluxLoops Ch24	Vessel FluxLoops Ch32
	Vessel FluxL	oops Scope 1	
<u>File</u> Pointer <u>M</u> ode P	rint Cu <u>s</u> tomize <u>U</u> pdate	s <u>A</u> utoscale	<u>H</u> elp
Г.П.Ф.В.В.НаћЛ166 Ф.Б.ВаСИ ' ??!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	Mulk: NoByle:19031 111116330 1111 1111111111111111111111111111111	Dig chan 9 of Crate 2 fli	ux loops 908 680
, ₩20 ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽	ייעטטטטעאיאיאיאיאטעע	0.59 0,1	0.11
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. ₩₽₽ ₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽	របបបបណ្ណារមេងងបប្បប	0.59	0.11
1 0.5 Dig chan 3 of Crate 2 f	lux loops 908 680	1 .5 Dig chan 11 of Crate 2 fl	ux loops 908 680
-0.59 0;1	0,11	0.59 0,1	0.11
1 0.5 Dig chan 4 of Crate 2 f	lux loops 908 680	Dig chan 12 of Crate 2 fl	ux loops 908
-0.59 0,1	0.11	0.59 0,1	0.11
1 0.5 Dig chan 5 of Crate 2 f	lux loops 908	1 5. Dig chan 13 of Crate 2 fl	ux loops 908 680
-0. 4 9		10, 4 9	<u></u>
1 0.5 Dig chan 6 of Crate 2 f	lux loops 908	1 5.5 Dig chan 14 of Crate 2 fl	ux loops 908 680
: :	0.11	0. 6 9 0/1	0.11
1 0.5	lux loops 908	Dig chan 15 of Crate 2 fl	ux loops 908 680
-0.49 0;1	0.11	-0,69 0,1	0.11
1 Dig chan 8 of Crate 2 f	1ux loops 908 680	1 Dig chan 16 of Crate 2 fl).5	ux loops 908 680
-0.59 071	0.11	0.59 0/1	0.11
💠 Point 💠 Zoom 💠 Pa	n 💠 Copy 🔲 Updates	680 Apply	

The Data Source set up in a Pad button can easily be copied into an identical structure in a Scope to define a data panel

FluxLoops PAD 1					
File Customize			Help		
Vessel FluxLoops Ch1	Vessel FluxLoops Ch9	Vessel FluxLoops Ch17	Vessel FluxLoops Ch25		
Vessel FluxLoops Ch2	Vessel FluxLoops Ch10	Vessel FluxLoops Ch18	Vessel FluxLoops Ch26		
Vessel FluxLoops Ch3	Vessel FluxLoops Ch11	Vessel FluxLoops Ch19	Vessel FluxLoops Ch27		
Vessel FluxLoops Ch4	Vessel FluxLoops Ch12	Vessel FluxLoops Ch20	Vessel FluxLoops Ch28		
Vessel FluxLoops Ch5	Vessel FluxLoops Ch13	Vessel FluxLoops Ch21	Vessel FluxLoops Ch29		
Vessel FluxLoops Ch6	Vessel FluxLoops Ch14	Vessel FluxLoops Ch22	Vessel FluxLoops Ch30		
Vessel FluxLoops Ch7	Setup data source	Vessel FluxLoops Ch23	Vessel FluxLoops Ch31		
Vessel FluxLoops Ch8	Label	Vessel FluxLoops Ch24	Vessel FluxLoops Ch32		
	Erase				

	Setup for button at row 7, column 2	U 8
Y Axis:	joperations::top.flux_loops.rawdata:sfl_h908_01:input_15	4
Expand	🗖 Labels Min: 📜 Max:	Grid lines
X Axis:	<u>I</u>	
	Labels Min: Max:	Grid lines
Experiment:	operations Shot:	🗖 Step plot
Default node:	Į.	Show lines:
Update Event:	SFL_H908_01_ACQ Pad: Vessel FluxLoops Ch15	
Title:	"Dig chan 15 of Crate 2 flux loops 908 "//\$SHOT	Update Limits
Print Label:	I	Defaults
ок	Apply Reset E	rase Cancel
		11/

...the trick is knowing how to define the Y axis and the event "Experiment" is the (sub)tree name, and the title may be simply text Notice how the shot number is appended

After choosing the number of rows and columns with "Customize/Window", put the Scope into COPY mode and enter any good shot number



Click on a Pad button with Mouse Button 1 (left button) and then click on the destination Scope panel with MB2 (middle button). The curved arrow cursor is displayed when in COPY mode.

WHAT TO TYPE:

On a PPPL VMS Alpha (KEES or BIRCH recommended):

To get the NSTX MDSplus definitions:

\$ setup nstx

To get a Scope display using the SCOPE_DEFAULTS.DAT description file in your local directory:

\$ dwscope

To choose another description file:

\$ dwscope -default <filename>

e.g.

\$ dwscope -default nstx\$config:vessel_fluxloops_1.scope

[We will try to put lots of generally useful stuff into the NSTX\$CONFIG directory; if you make Scope or Pad files that you would like to share, let us know. This directory is read-only, to prevent accidental changes to public files.]

To browse the structure of NSTX model tree (-1 is the shot number of the model tree):

\$ traverser -tree nstx -shot -1

An NSTX shot number that currently has some "data" is 999999. For OPERATIONS, 679 and 680 also work. To locate other possibilities:

\$ dir nstx\$data:nstx_*.datafile

Other tree-names can be used instead of NSTX.

OPERATIONS	ENGINEERING
CAMERAS	MICROWAVE

Trees, Logical Names and Directories

MDSplus does NOT make any assumptions about the relationship between subtrees and directory structure. It is not necessary that the VMS directory hierarchy echo the MDSplus tree hierarchy, although it may. On CMOD, it does, on NSTX, it most definitely does not.

MDSplus always locates tree files using the logical names <treename>\$DATA.

For NSTX, we have	NSTX\$DATA
	OPERATIONS\$DATA
	ENGINEERING\$DATA
	MICROWAVE\$DATA
	Etc.

If you create your own private tree, you must define a <treename>\$DATA logical name that points to a directory where you have write privileges.

"Current" vs. "Archived" Data Directories

The data acquisition computer, KEES.PPPL.GOV, has a 26GB local RAID5 disk set where we will keep "current" data. We are expecting this to hold about a week's data, at least at first. Directories here are under KEES1:[NSTX_NEW].

Generally, looking for <treename>\$DATA:<treename>_<shotnumber>.DATAFILE Or <treename>\$DATA:<treename>_<shotnumber>.TREE will show you which shots have been taken. (\$ DIR NSTX\$DATA:*.DATAFILE; will work. The semicolon restricts the output to the most recent version of the file where there is more than one.)

"Mature" trees will be moved to a separate (collection of) RAID5 set(s) on BIRCH. Directories here will be in directories beginning with [NSTX_ARC], but then will be broken down into groups by shot number. A utility program, not yet written, will let users check on the existence of shot files. ALL SHOT DATA WILL REMAIN ON DISK FOR AS LONG AS POSSIBLE, and we hope that will be for 3 years, except for certain very large data sets.