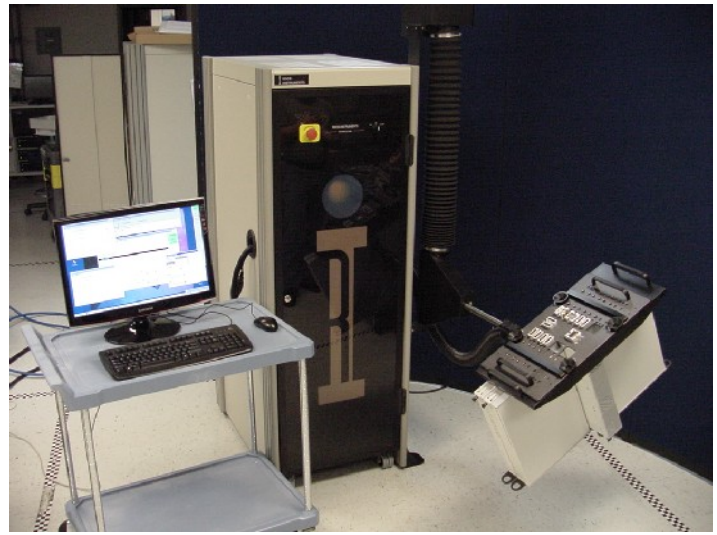
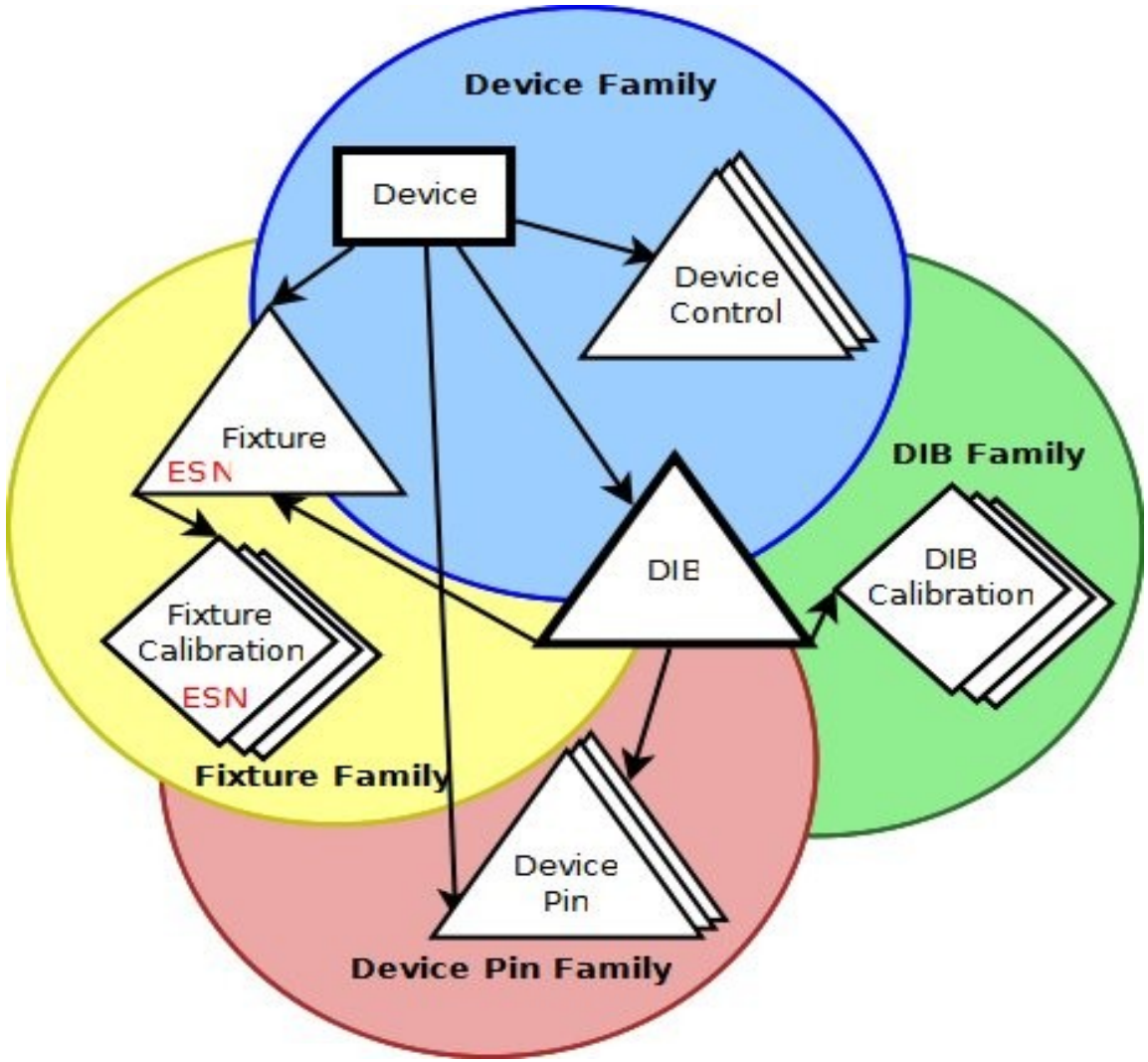
CASSINI RF/ Microwave ATE System
Advanced Test Plan Concepts



Device Centric Testing
Family Definitions



Connection the Device to the ATE

Create a Device Definition

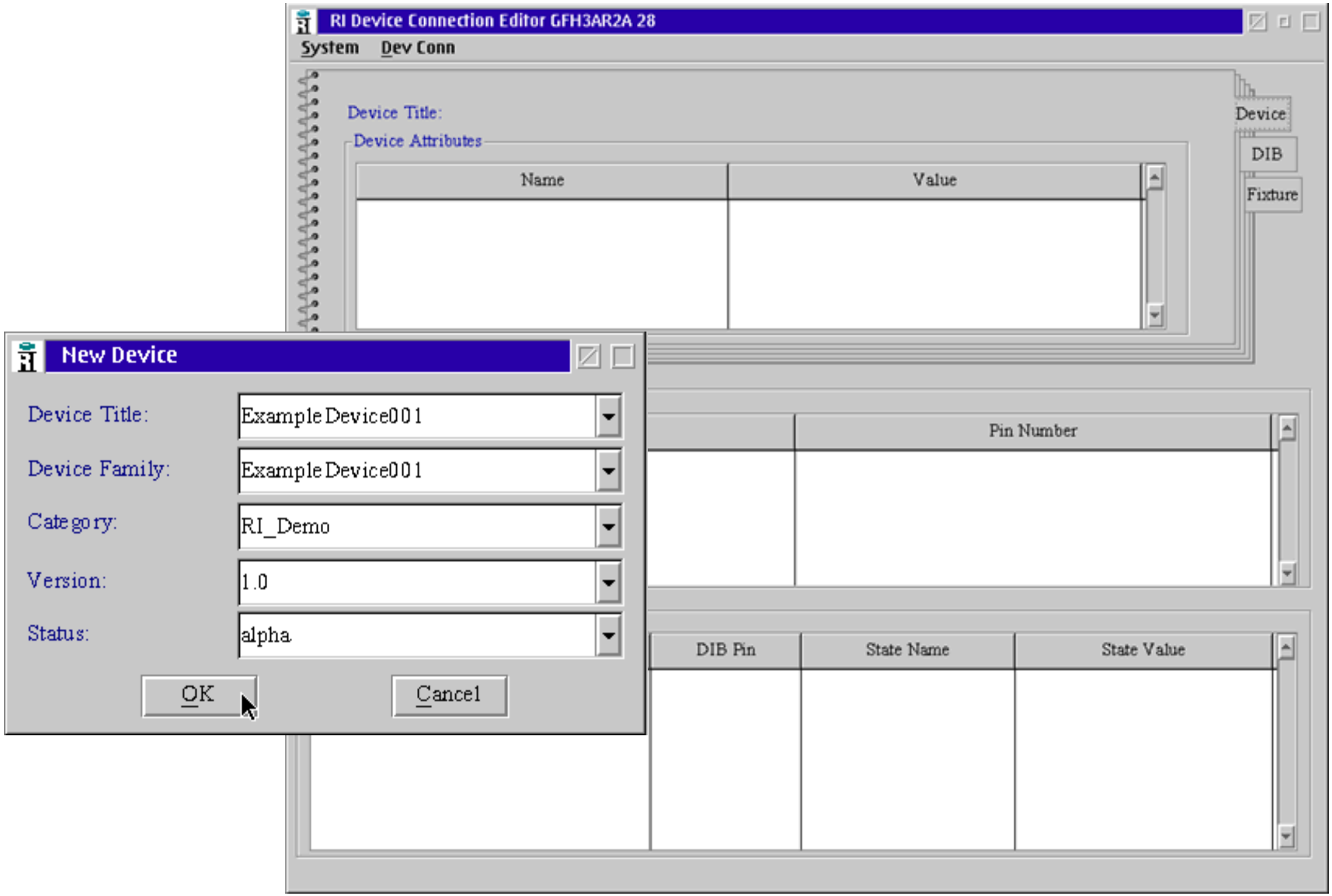
Create a Device Pins Definition

Create a Fixture Definition

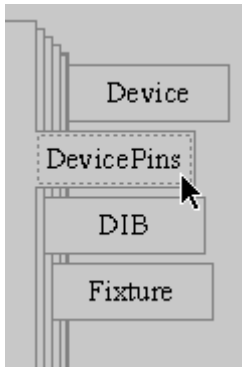
Create a Device Interface Board (DIB)

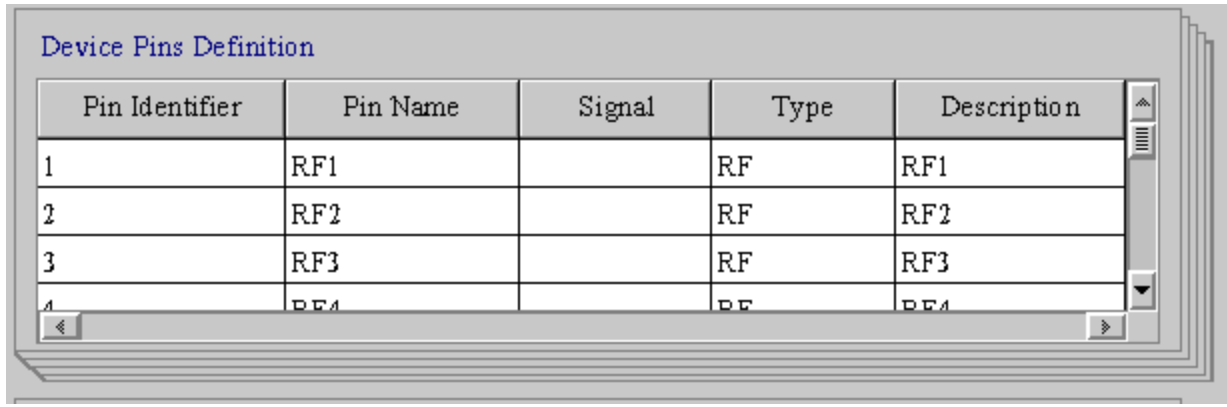
Create a Protocol Aware Device Control Definition

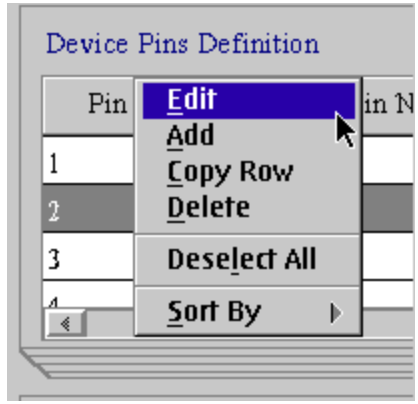
First Create a Device Definitions file

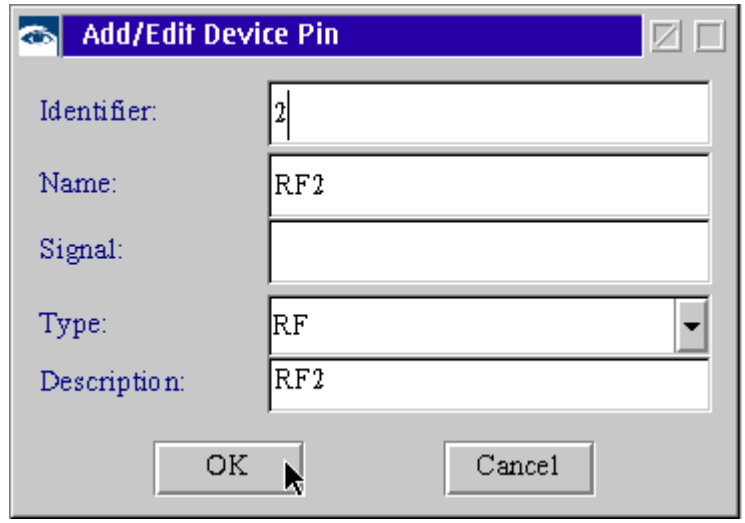


Create a Device Pins Definition

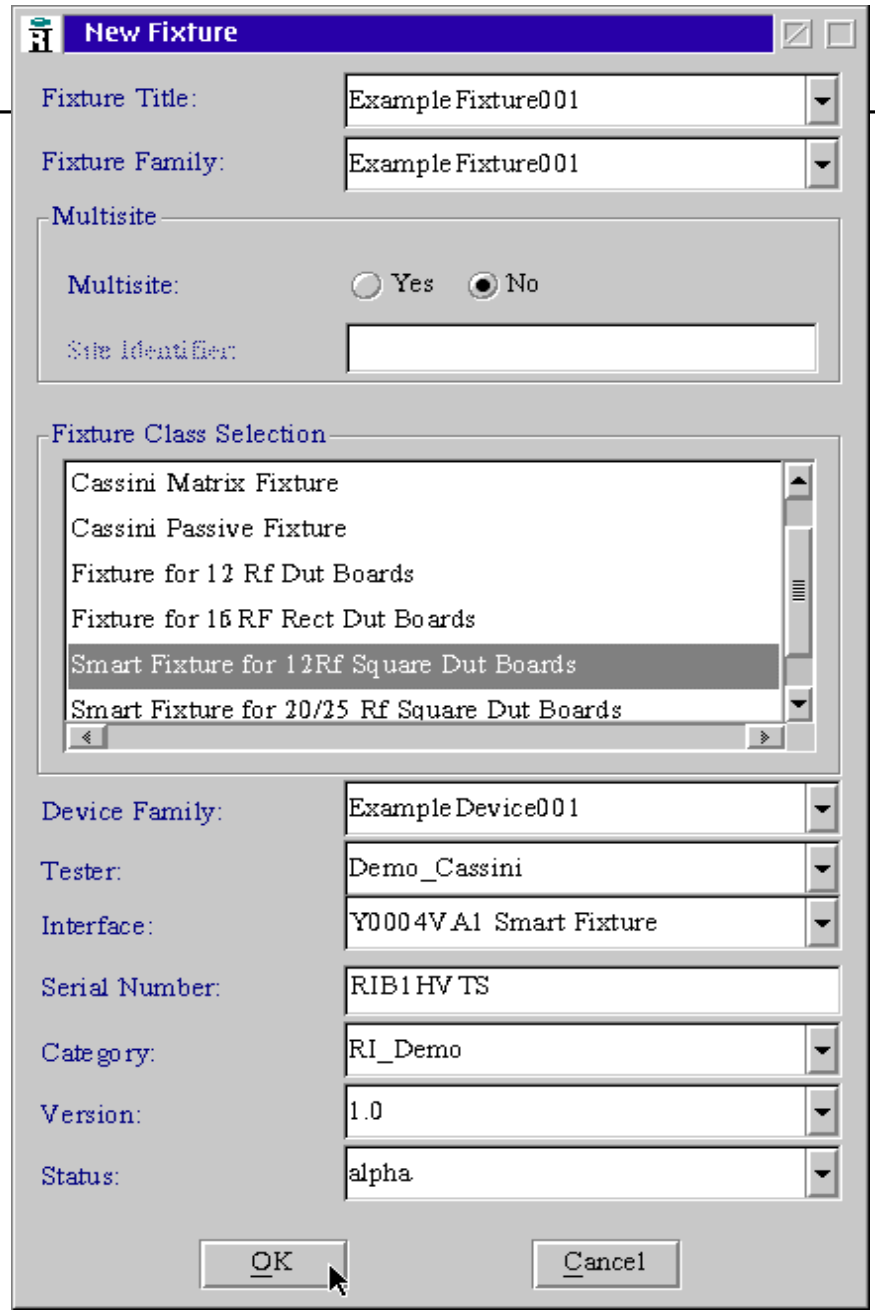




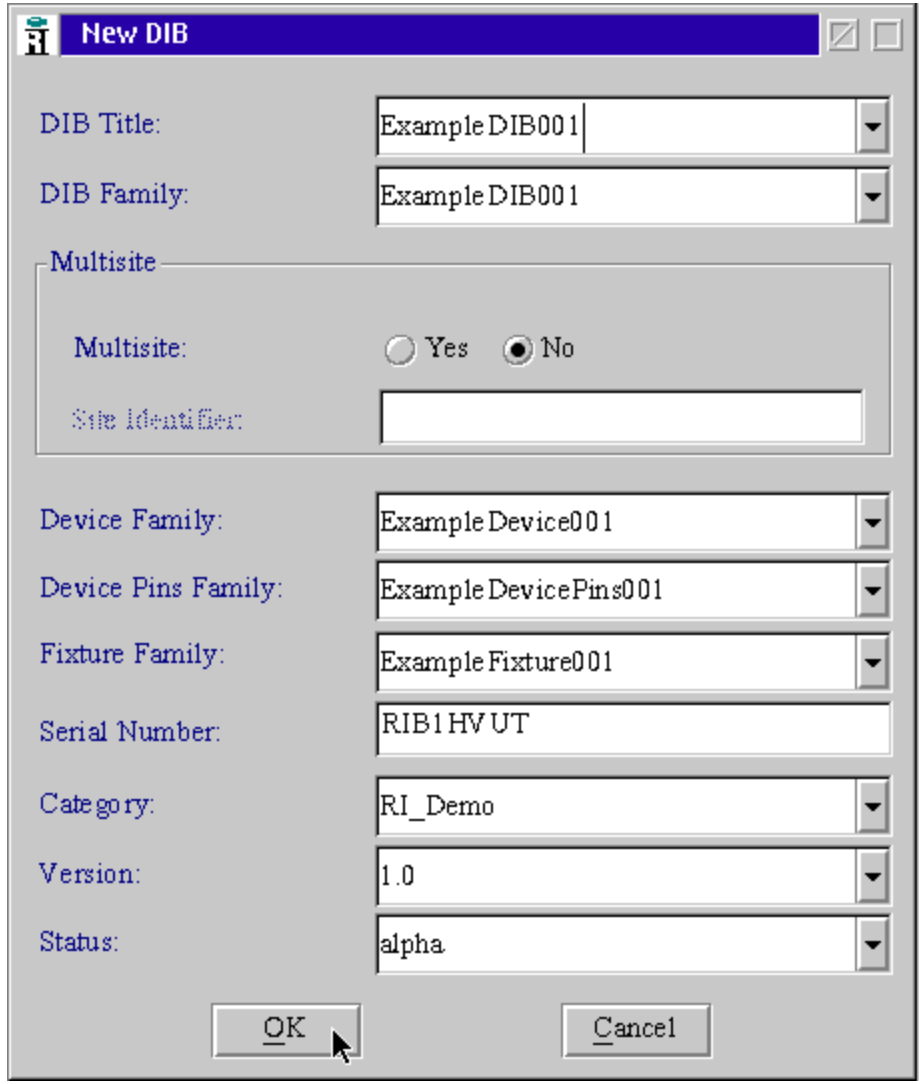




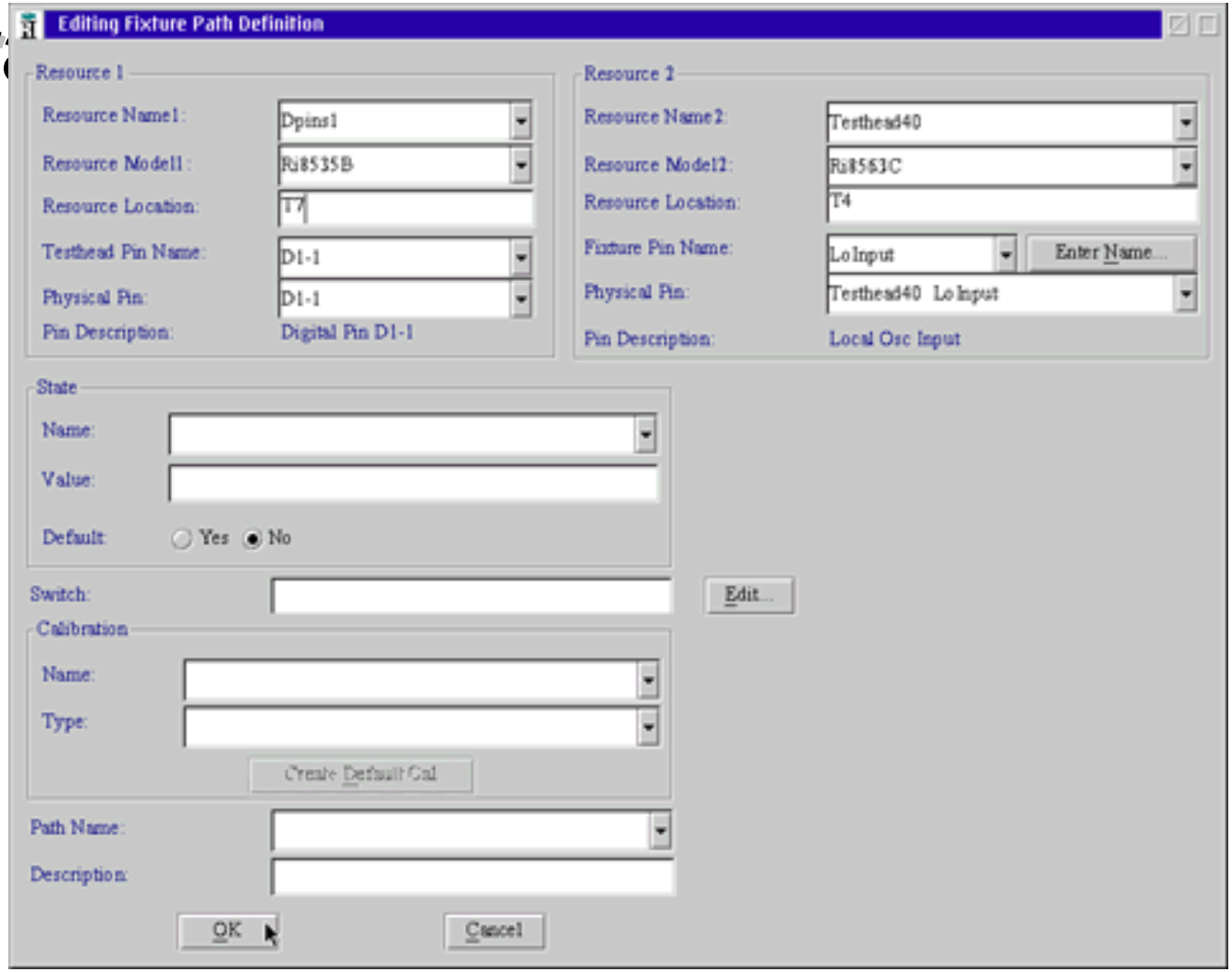
Create a Test Fixture Definitions file



Create a Device Interface Definitions file DIB or Load Board



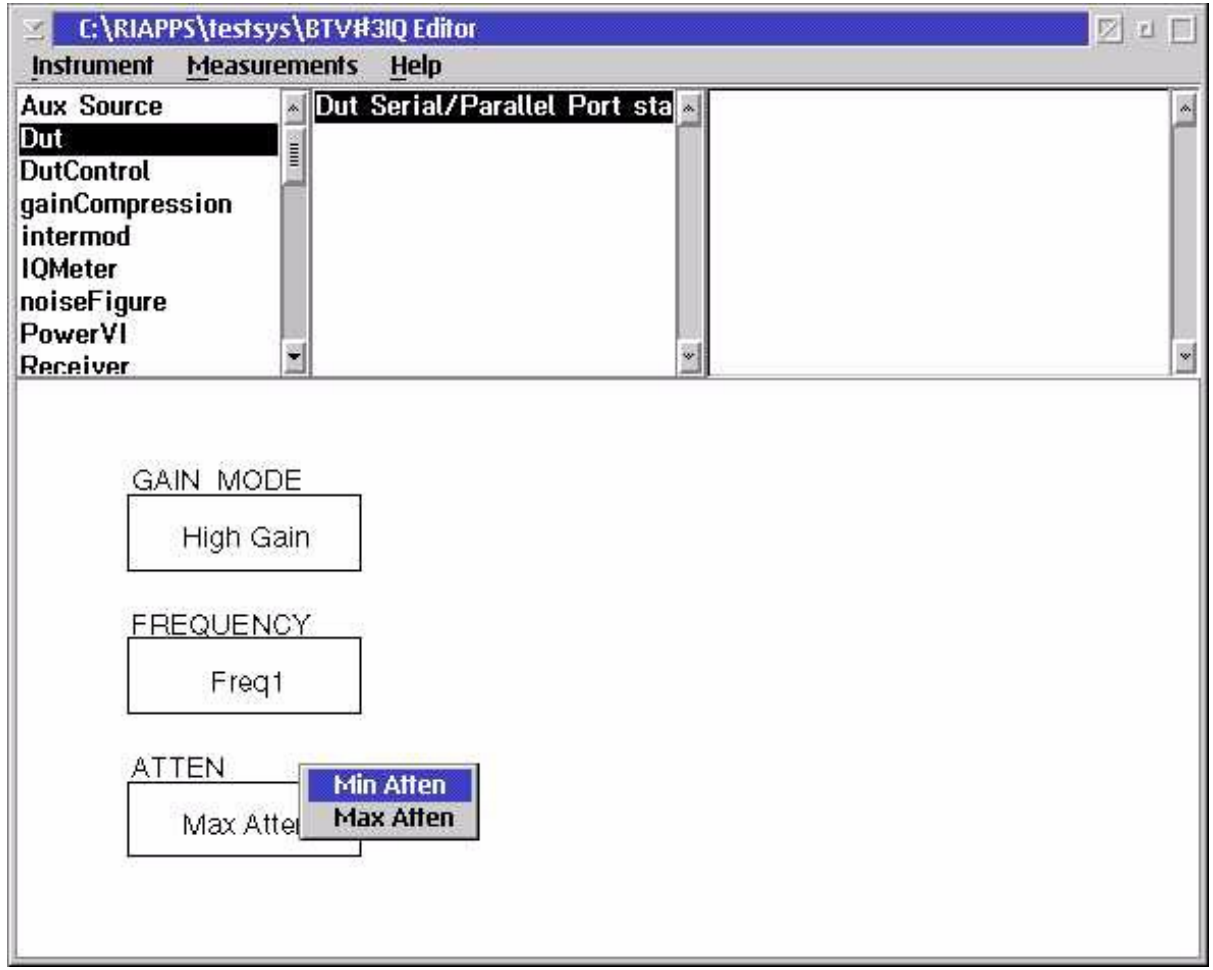
Create a Protocol Aware Device Control Definition – Serial or Para



Dut Controlled by Serial or Parallel Port

DUT Serial Port

DUT Created
Put in Test Plan



DB Lines

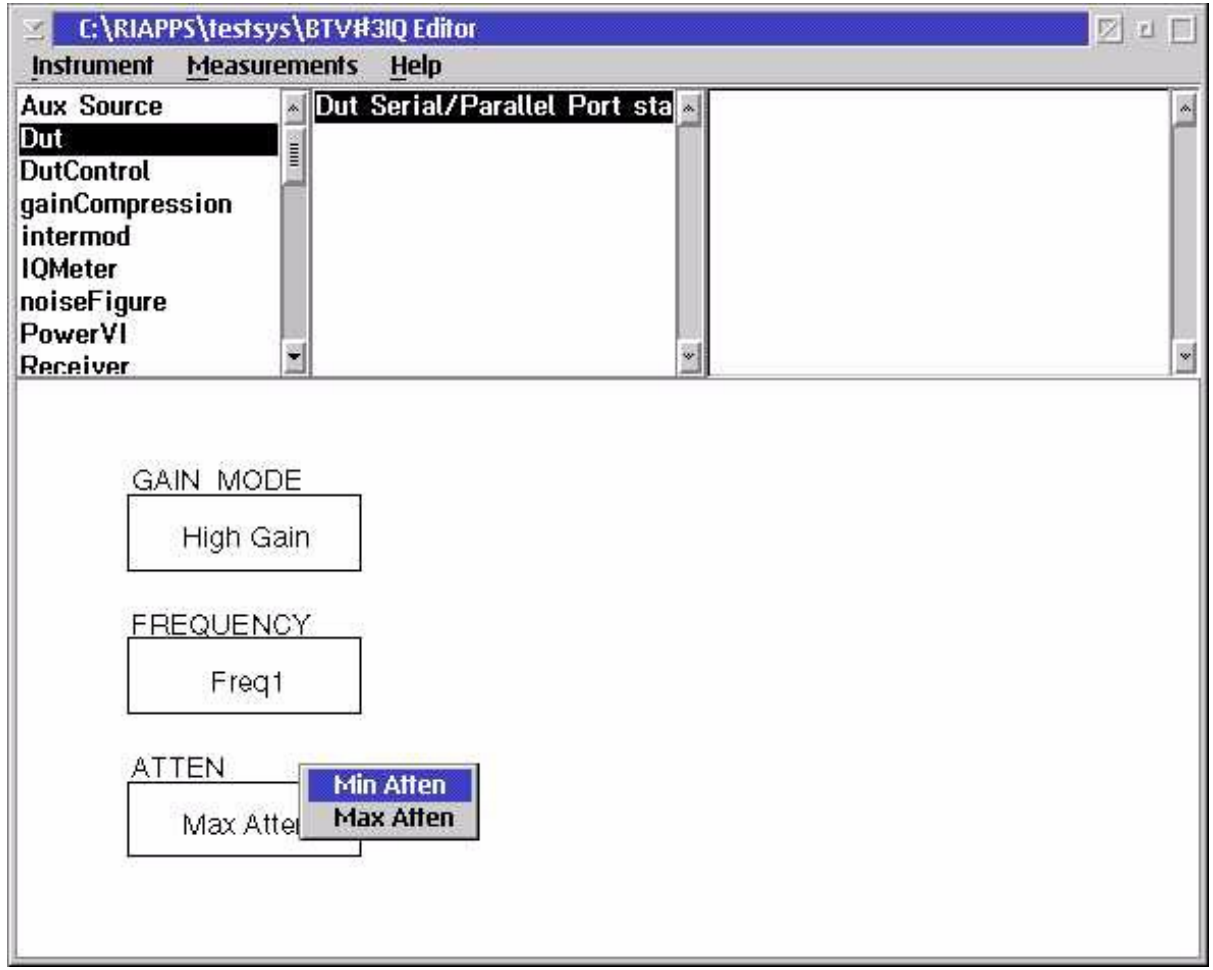
Static digital control
Serial bus
Parallel bus
Leakage (low current) measurements
ESD diode check (force current)

Serial/Parallel Bus Control

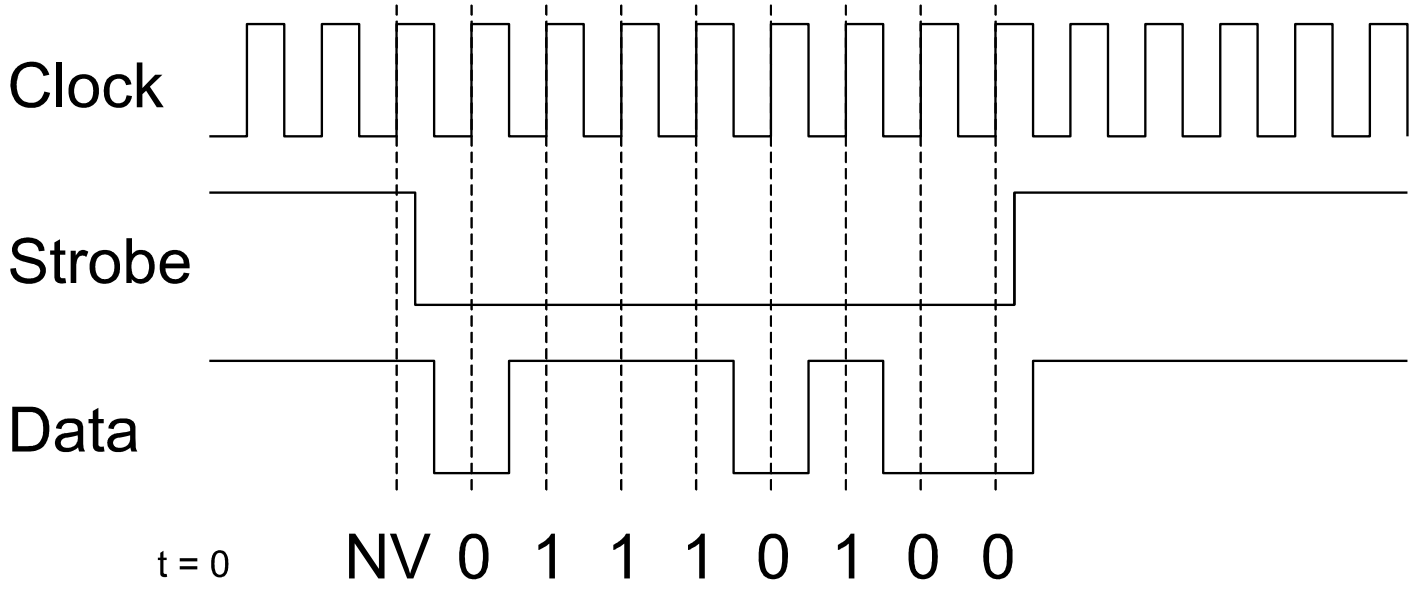
DUT Defined or "Brute Force"
DUT Defined Contained in Dut Instrument
Single Button Programming
Allows Descriptive Names
DUT buttons created

DUT Serial/ Parallel Device Control

DUT Created
Put in Test Plan



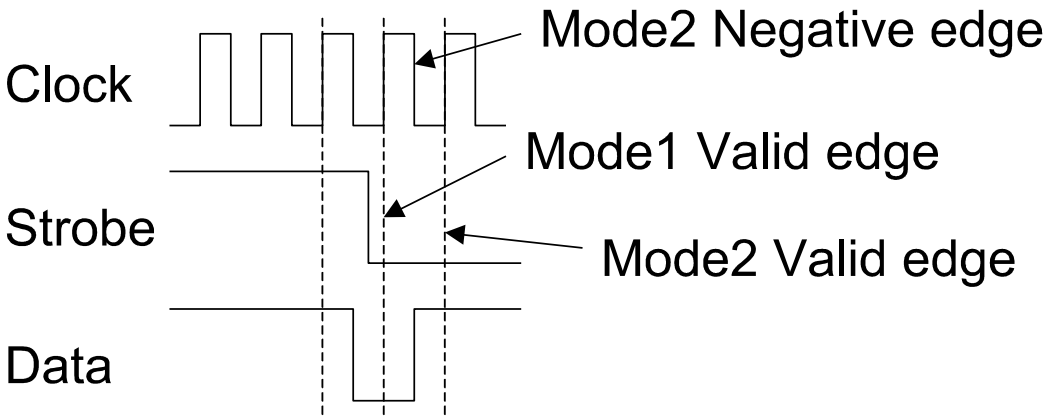
Serial Port Basics



Data: MSB First
Clock: Positive
Strobe: Negative, Long

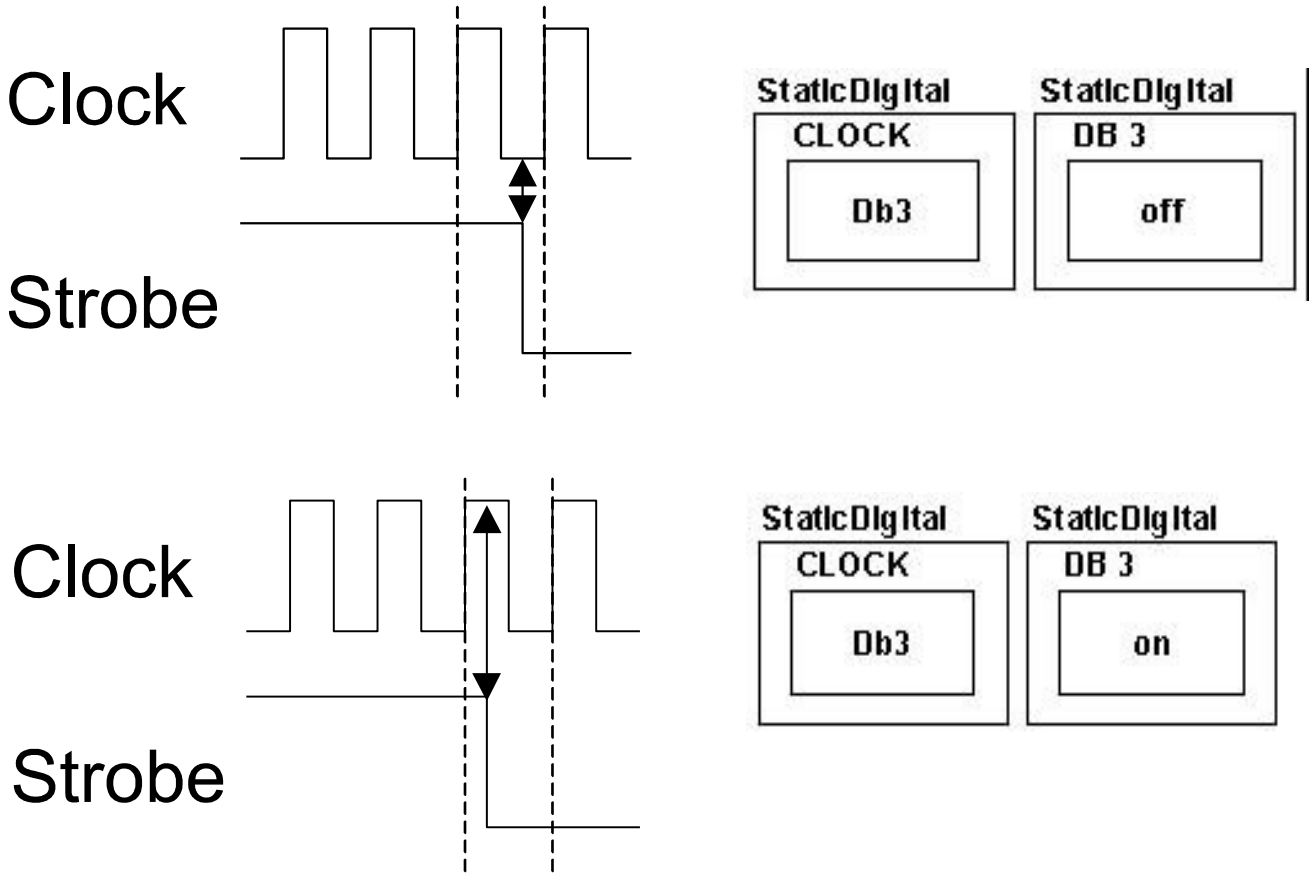
Data: 01110100 Binary
116 Integer

Testplan Serial Bus Control Initial Condition Setup



t = 0	NV 0 1	Mode1
	NV NV 0	Mode2 (requires negative edge after strobe, then clocks on positive)

Testplan Serial Bus Control Initial Condition Setup



Serial Port Basics Fields

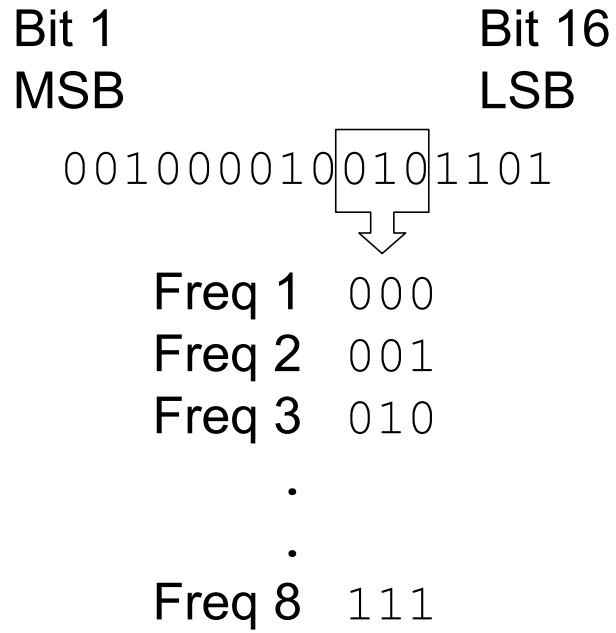
16 Bit Bus

Frequency Field

1st Bit: Bit 10

Size: 3 Bits

8 Potential States



RI Serial Definitions

Bit order 1 thru N (no bit 0)

Bit 1 is MSB

Bit 1/MSB is on Left

Bit 1	Bit 16
MSB	LSB

0010000100101101

Serial Port Basics Registers

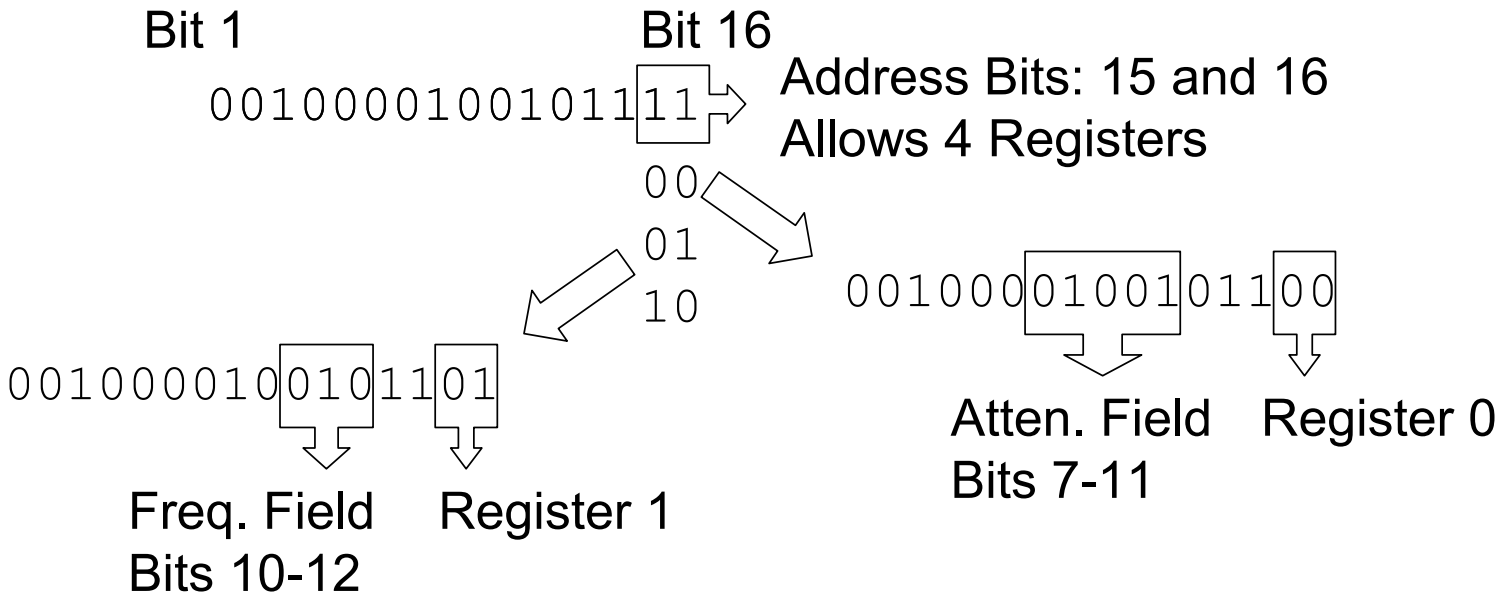
Serial Bus can be Multiplexed into Registers

Bits are Allocated to Register "Address"

Specific Address Changes Field Definition

Allows Expansion of Serial Capability

Serial Port Basics
Registers



Programming Serial Port

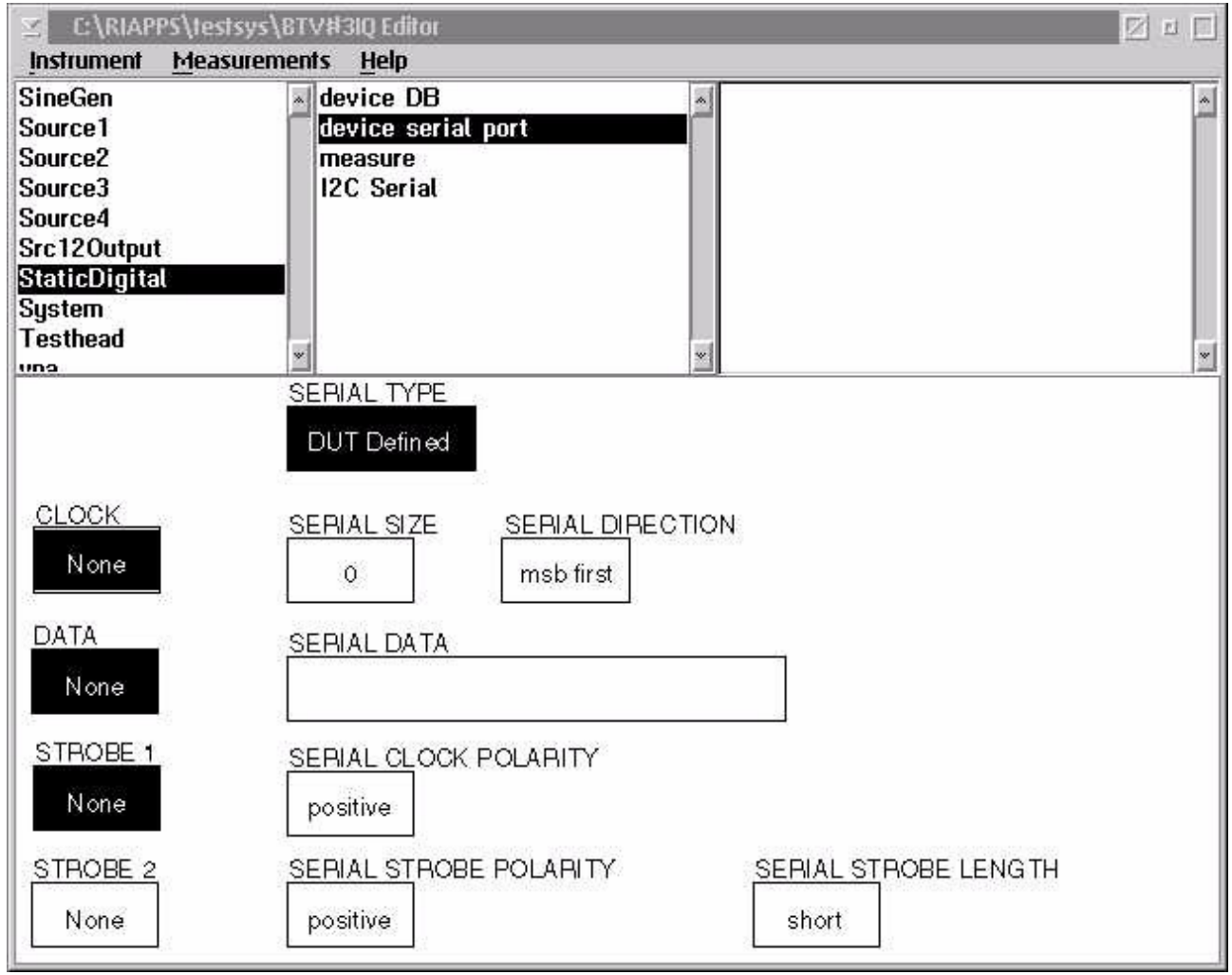
- Select Serial Type
  - Dut Defined/Local/I2C/I3C
- Assign Static Digital Resources
  - Clock
  - Data
  - Strobe
- Define Dut

Fast Serial Control

- Standard Serial: 60 KB/Second
- Fast Serial: Up to 2.5 MB/Second
  - Fast I2C: Up to 600 KB/Second
- Specific Digital Resources
  - Read: DB 1 or 9, Write: DB 2 or 10
  - Clock; DB 3 or 11
  - Must be adjacent

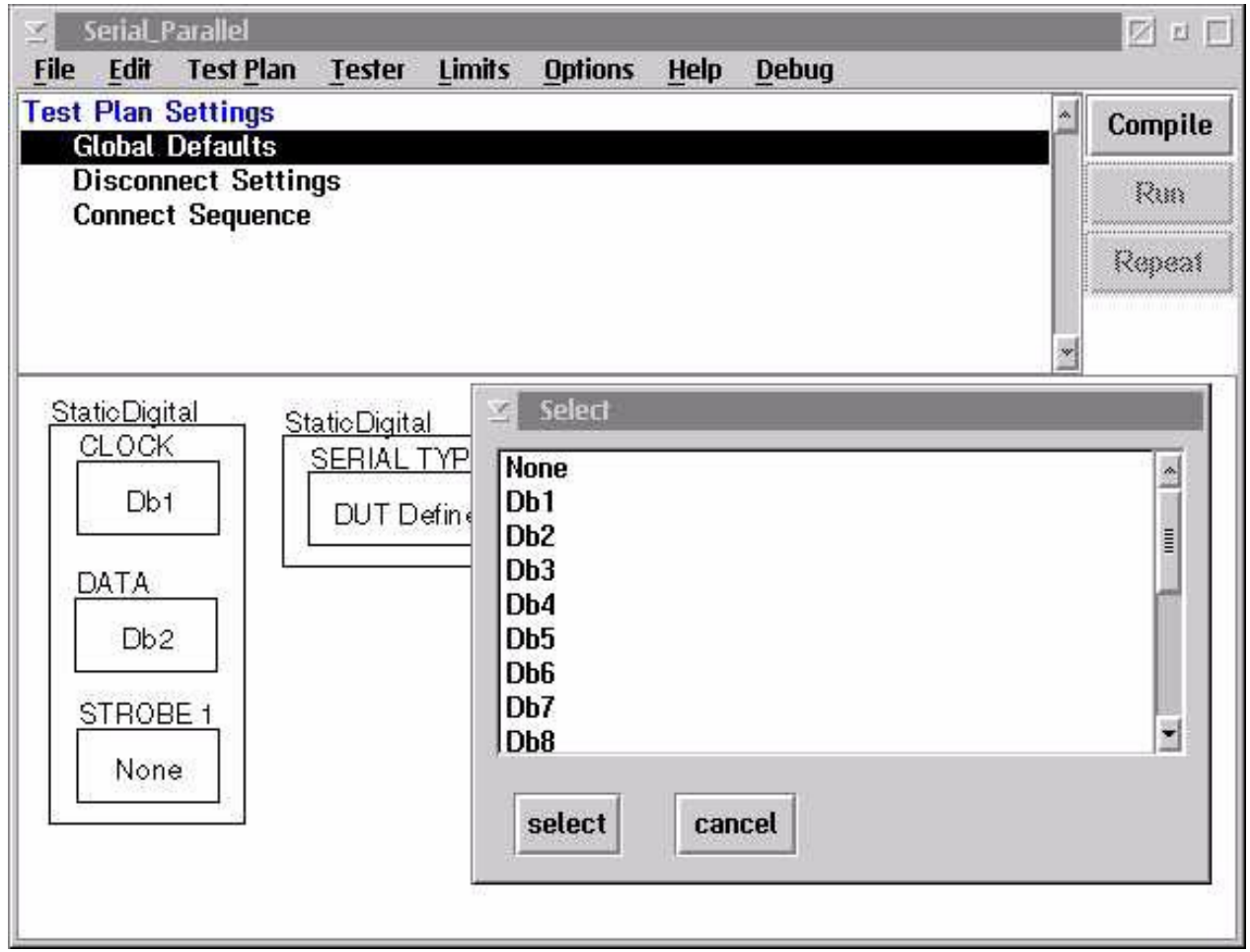
Static Digital Resources

Type
Read
Clock
Data
Strobe



Static Digital Resources

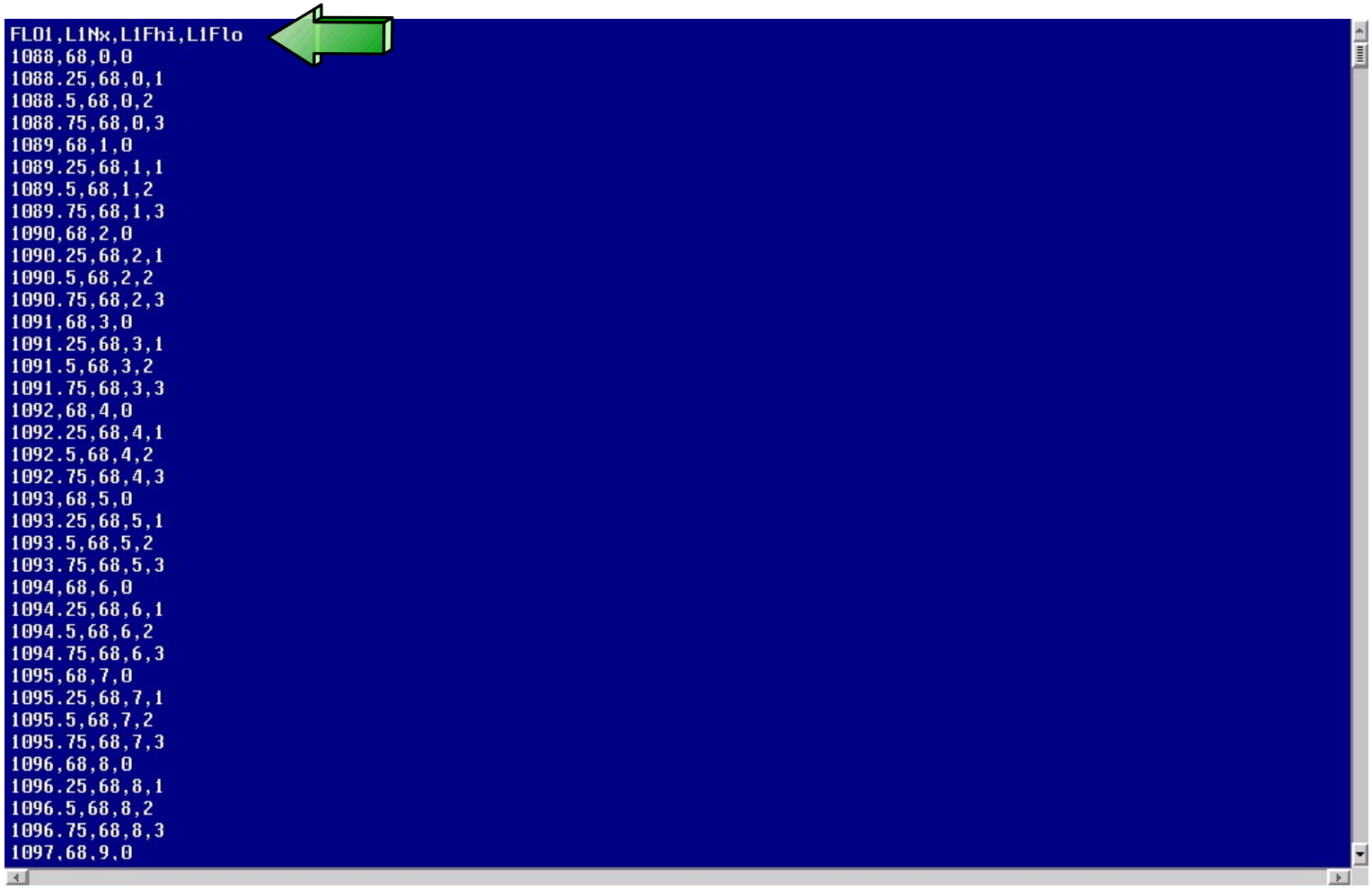
Assign DB Lines



Serial Control
Creating Compound States

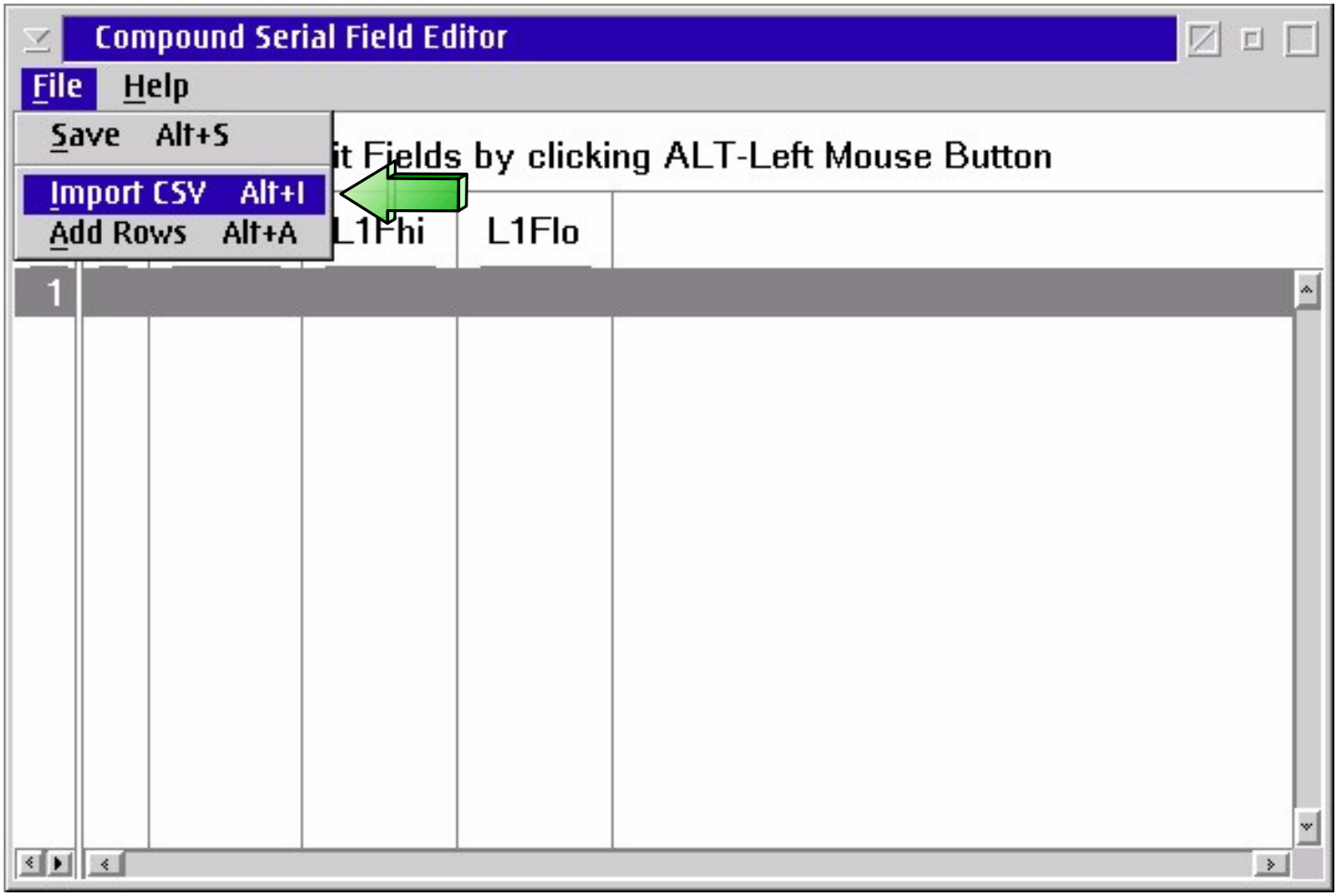
- Compound States allow High Level Functional Buttons of many Registers
- System Rounds Variable Input Data to the Nearest Valid State
- Spread Sheet Data Import for Complex or Large Compound State Tables

First Create a CSV file with Serial Data

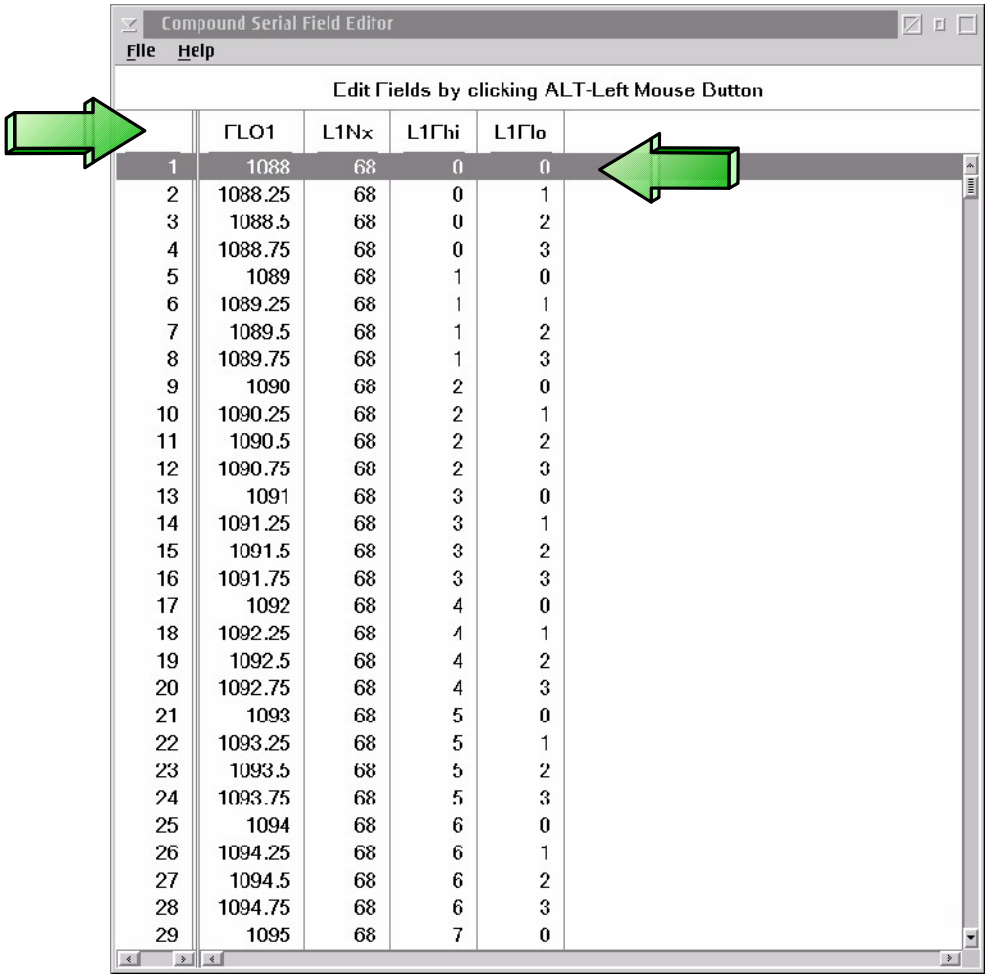


```
FLO1,L1Nx,L1Fhi,L1Flo
1088,68,0,0
1088.25,68,0,1
1088.5,68,0,2
1088.75,68,0,3
1089,68,1,0
1089.25,68,1,1
1089.5,68,1,2
1089.75,68,1,3
1090,68,2,0
1090.25,68,2,1
1090.5,68,2,2
1090.75,68,2,3
1091,68,3,0
1091.25,68,3,1
1091.5,68,3,2
1091.75,68,3,3
1092,68,4,0
1092.25,68,4,1
1092.5,68,4,2
1092.75,68,4,3
1093,68,5,0
1093.25,68,5,1
1093.5,68,5,2
1093.75,68,5,3
1094,68,6,0
1094.25,68,6,1
1094.5,68,6,2
1094.75,68,6,3
1095,68,7,0
1095.25,68,7,1
1095.5,68,7,2
1095.75,68,7,3
1096,68,8,0
1096.25,68,8,1
1096.5,68,8,2
1096.75,68,8,3
1097,68,9,0
```

Import the CSV Data into Compound Spread Sheet

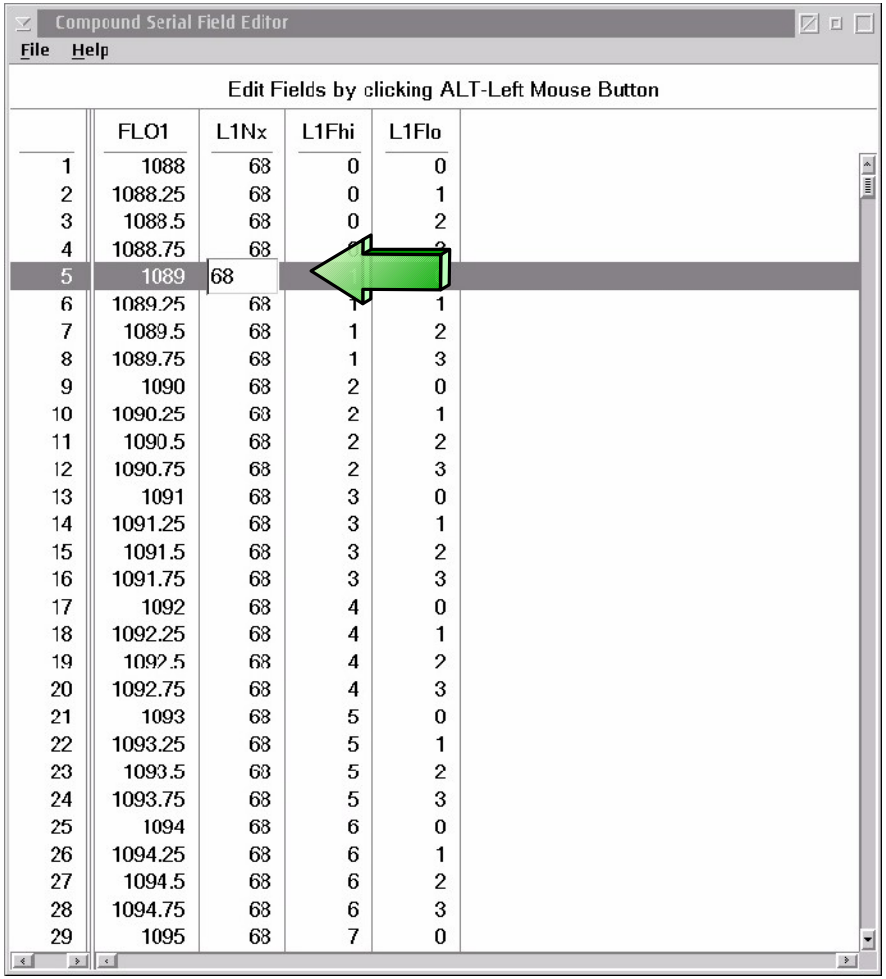


First Row in CSV are Field Names,
Each Row is a Compound State



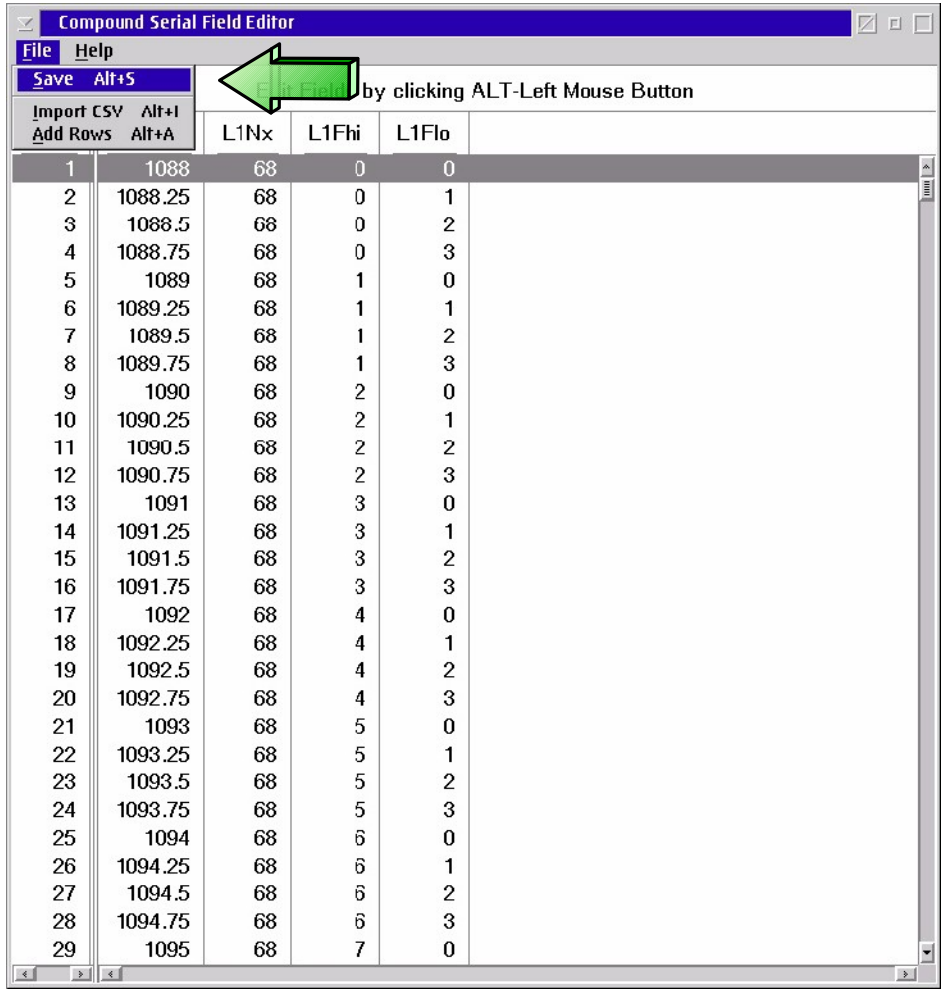
	FLO1	L1Nx	L1Fhi	L1Flo
1	1088	68	0	0
2	1088.25	68	0	1
3	1088.5	68	0	2
4	1088.75	68	0	3
5	1089	68	1	0
6	1089.25	68	1	1
7	1089.5	68	1	2
8	1089.75	68	1	3
9	1090	68	2	0
10	1090.25	68	2	1
11	1090.5	68	2	2
12	1090.75	68	2	3
13	1091	68	3	0
14	1091.25	68	3	1
15	1091.5	68	3	2
16	1091.75	68	3	3
17	1092	68	4	0
18	1092.25	68	4	1
19	1092.5	68	4	2
20	1092.75	68	4	3
21	1093	68	5	0
22	1093.25	68	5	1
23	1093.5	68	5	2
24	1093.75	68	5	3
25	1094	68	6	0
26	1094.25	68	6	1
27	1094.5	68	6	2
28	1094.75	68	6	3
29	1095	68	7	0

Editing the Compound Data, Use Alt & Left Mouse Button



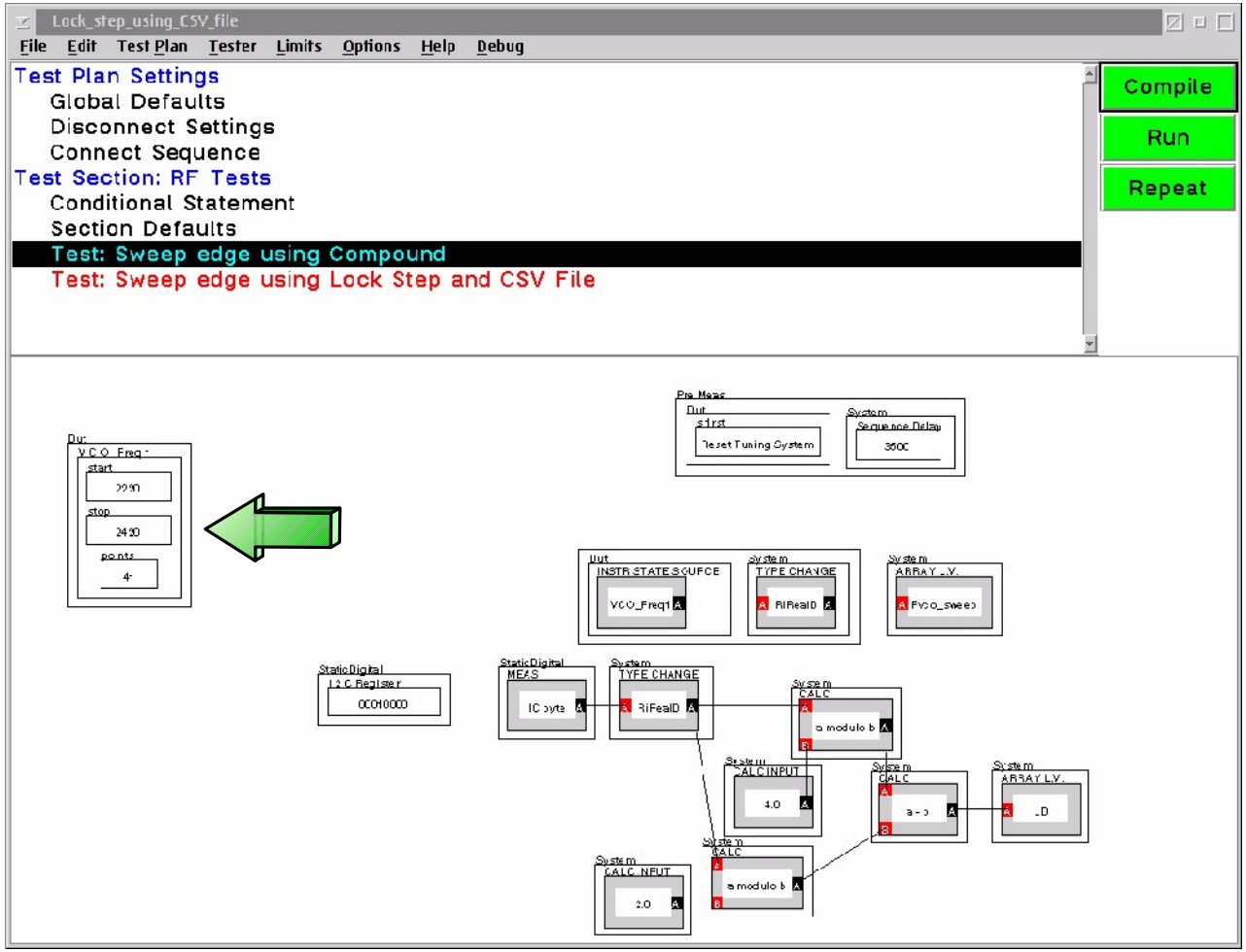
	FLO1	L1Nx	L1Fhi	L1Flo
1	1088	68	0	0
2	1088.25	68	0	1
3	1088.5	68	0	2
4	1088.75	68		
5	1089	68		
6	1089.25	68	1	1
7	1089.5	68	1	2
8	1089.75	68	1	3
9	1090	68	2	0
10	1090.25	68	2	1
11	1090.5	68	2	2
12	1090.75	68	2	3
13	1091	68	3	0
14	1091.25	68	3	1
15	1091.5	68	3	2
16	1091.75	68	3	3
17	1092	68	4	0
18	1092.25	68	4	1
19	1092.5	68	4	2
20	1092.75	68	4	3
21	1093	68	5	0
22	1093.25	68	5	1
23	1093.5	68	5	2
24	1093.75	68	5	3
25	1094	68	6	0
26	1094.25	68	6	1
27	1094.5	68	6	2
28	1094.75	68	6	3
29	1095	68	7	0

Save the Compound Field Data



		L1Nx	L1Fhi	L1Flo
1	1088	68	0	0
2	1088.25	68	0	1
3	1088.5	68	0	2
4	1088.75	68	0	3
5	1089	68	1	0
6	1089.25	68	1	1
7	1089.5	68	1	2
8	1089.75	68	1	3
9	1090	68	2	0
10	1090.25	68	2	1
11	1090.5	68	2	2
12	1090.75	68	2	3
13	1091	68	3	0
14	1091.25	68	3	1
15	1091.5	68	3	2
16	1091.75	68	3	3
17	1092	68	4	0
18	1092.25	68	4	1
19	1092.5	68	4	2
20	1092.75	68	4	3
21	1093	68	5	0
22	1093.25	68	5	1
23	1093.5	68	5	2
24	1093.75	68	5	3
25	1094	68	6	0
26	1094.25	68	6	1
27	1094.5	68	6	2
28	1094.75	68	6	3
29	1095	68	7	0

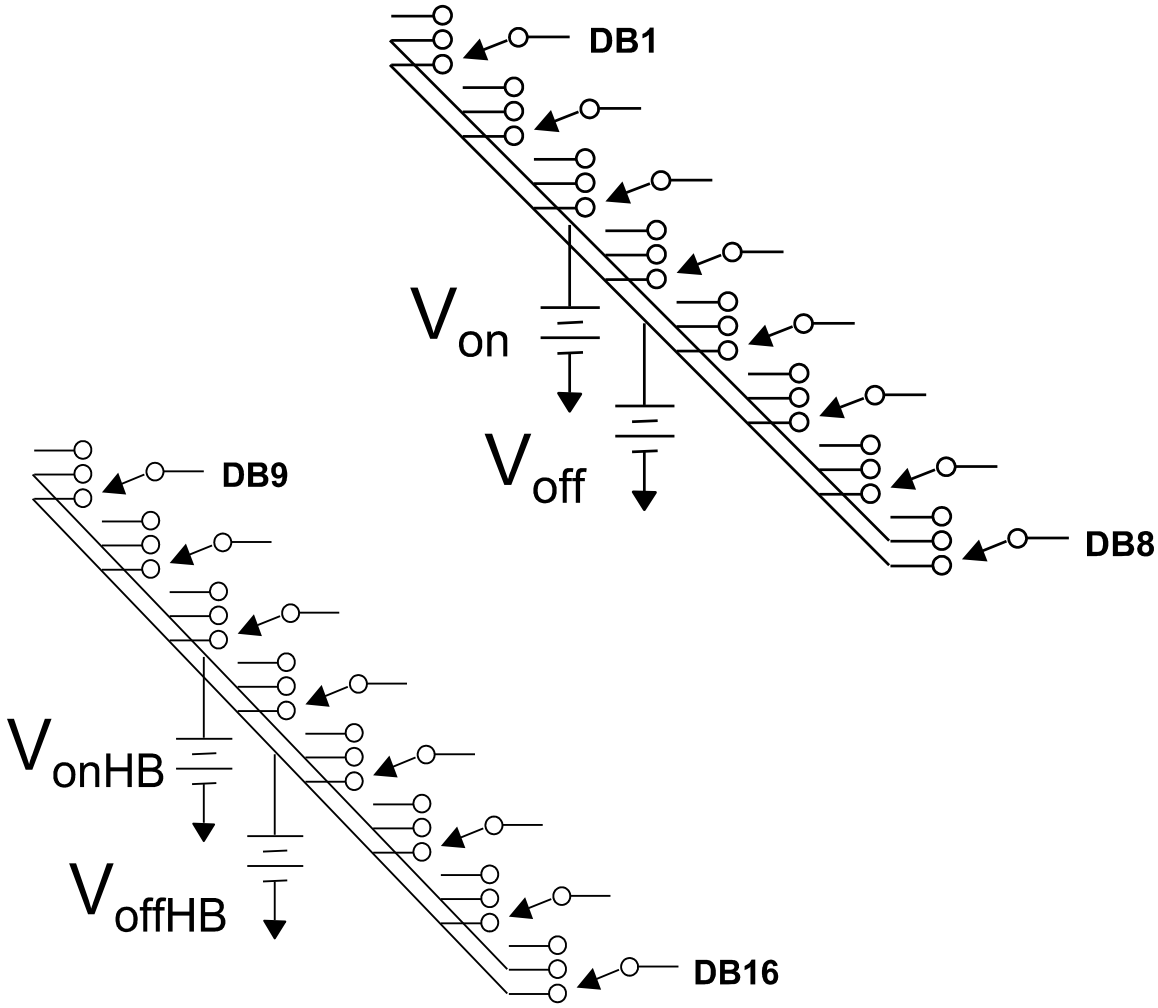
Sweeping DUT Frequency using Compound Setting



DB Lines Description

Switch between Von. Voff, Open
16 lines, 2 banks
4 voltage supplies
1 Precision Multimeter
2 mA limit
+/- 10V

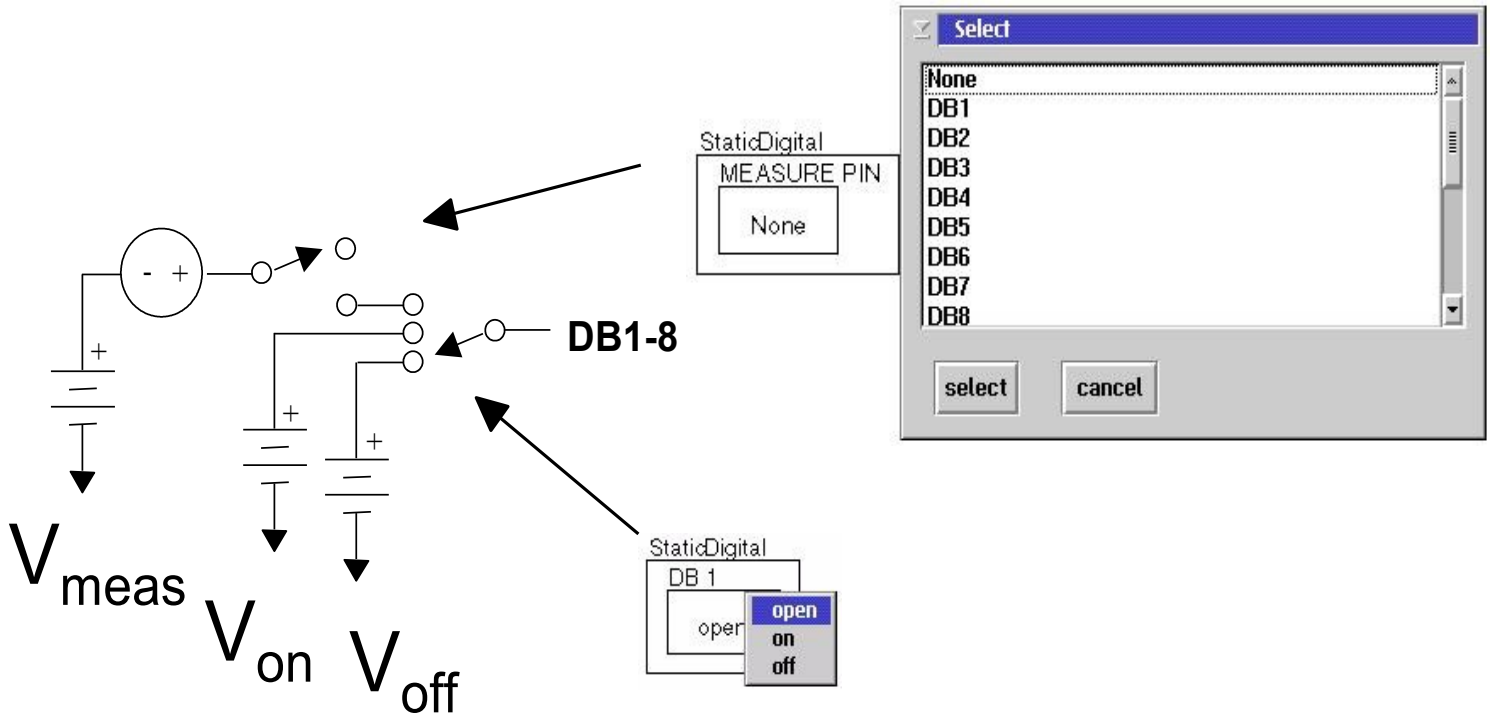
Schematic



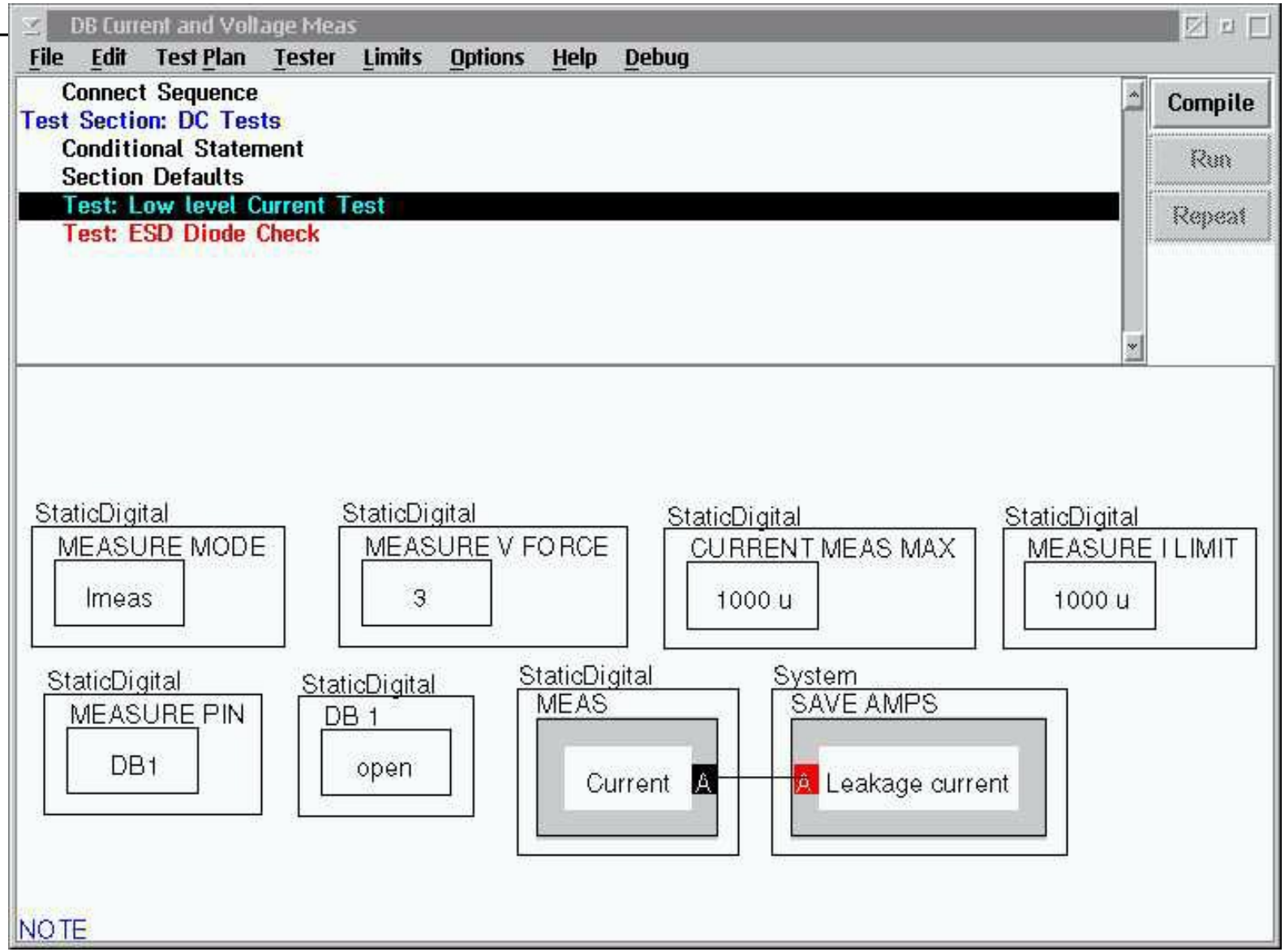
Measuring Leakage Current or ESD Diode Voltage with DB Lines

Select voltage or current measure mode
Set Opposing Limit (V or I Hard Limit)
Set Measure Max. (sets Resolution)
Set DB pin to Open
Select DB pin to be Measured

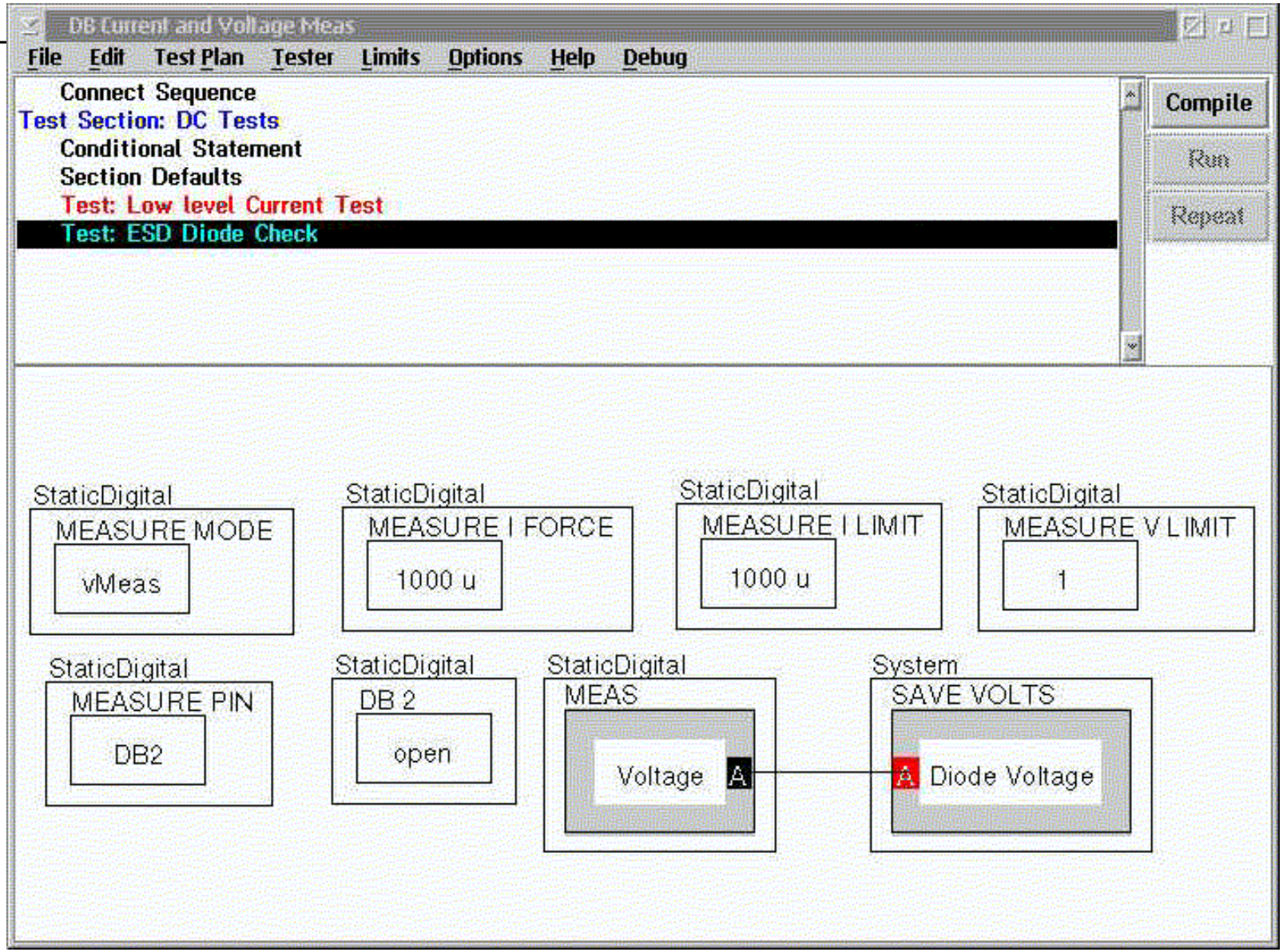
How to Make Low Current Measurements using DB lines



Leakage Current Measurement



Diode Voltage Check



Setup The Tester to Meaasure a Device

Definitions - Tester Settings

Tester Idle State - Lowest Level Default

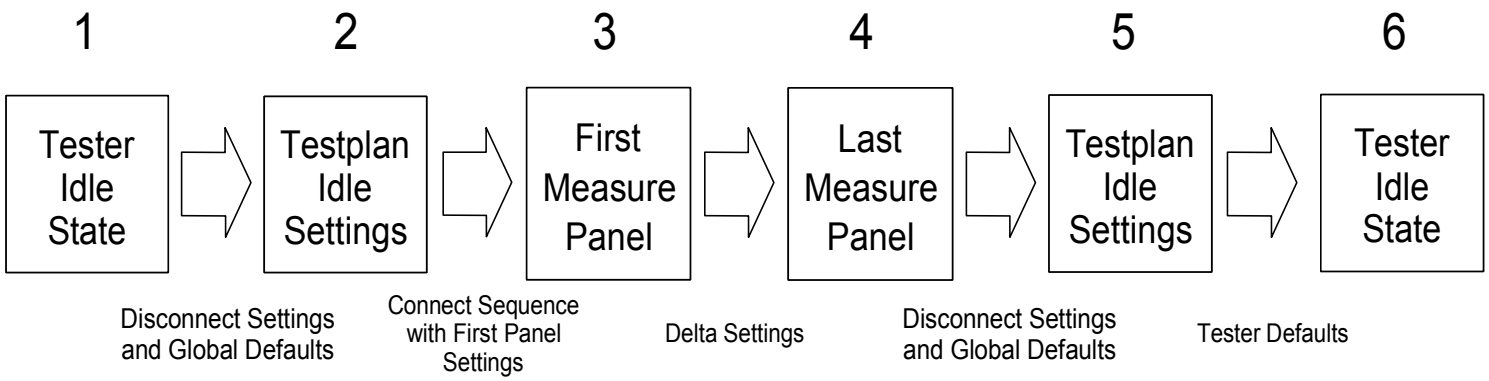
Global Defaults - Next Level Default
  Test Plan Controlled

Disconnect Settings - Sequence Control
  Highest Level Default

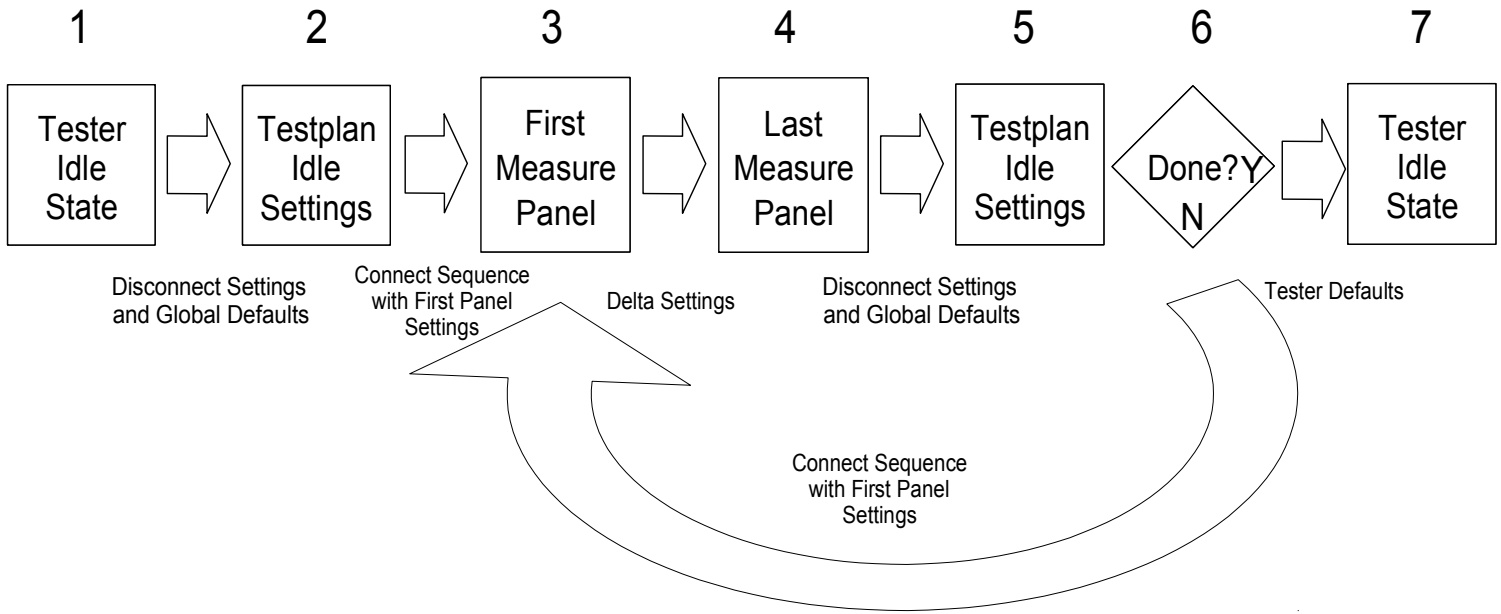
Test Plan Idle Settings - Combination of all
  Condition Just Before Connect

Connect Sequence - Only Sequence Control
  Must put all buttons here in Disconnect!

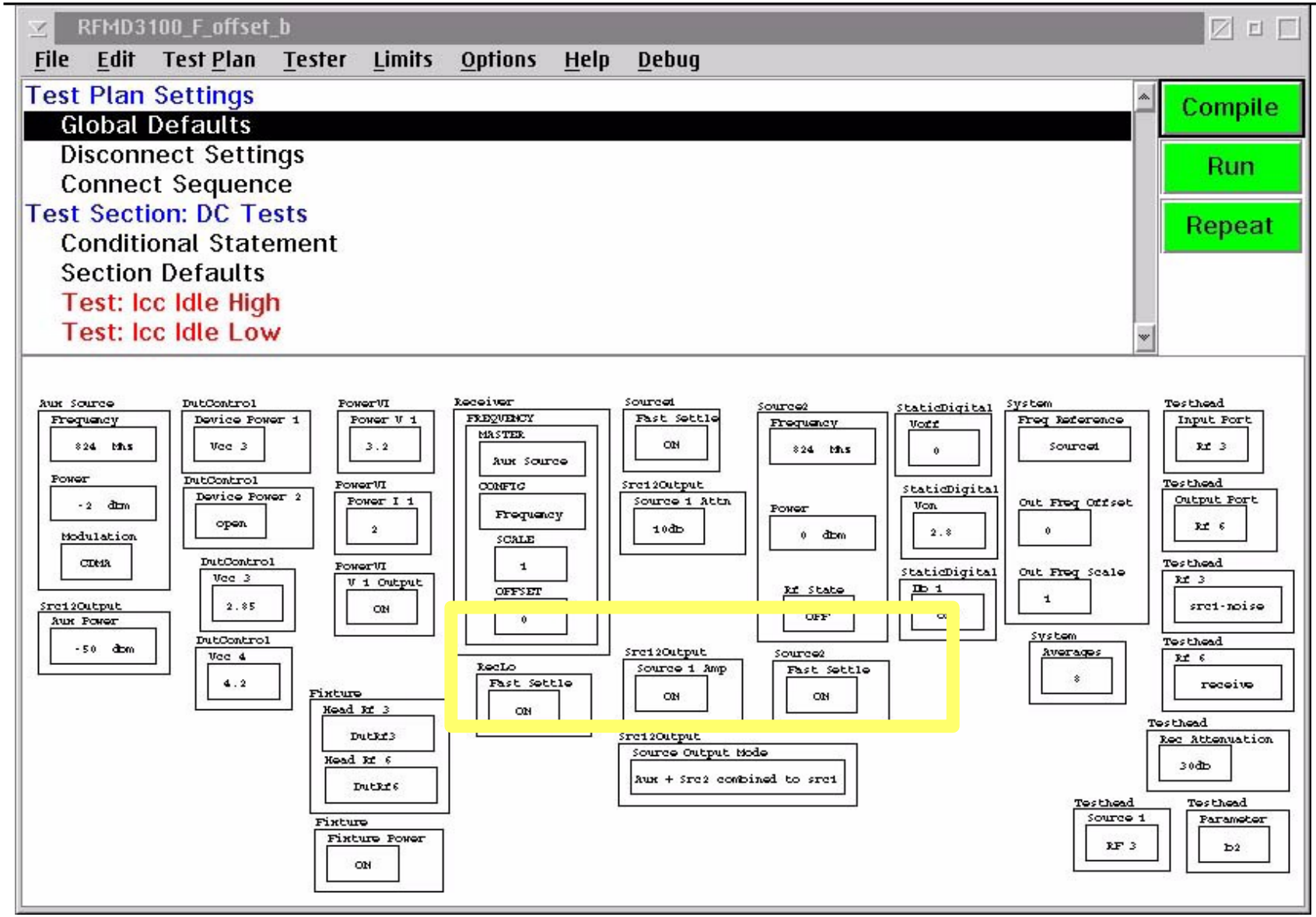
Test Plan Editor Run Time Sequence - Single Run



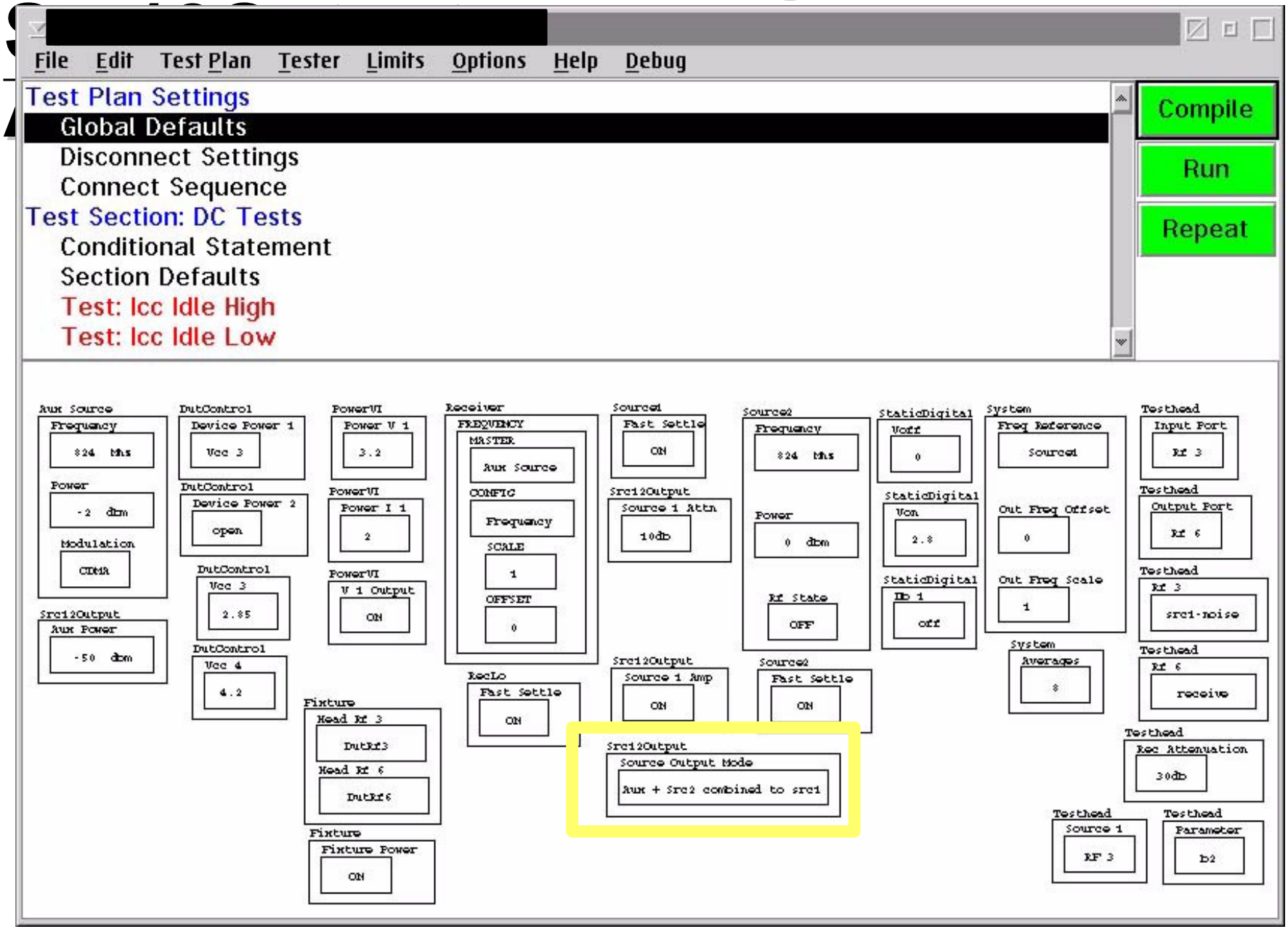
Test Plan Editor Run Time Sequence - Repeat/Test Exec



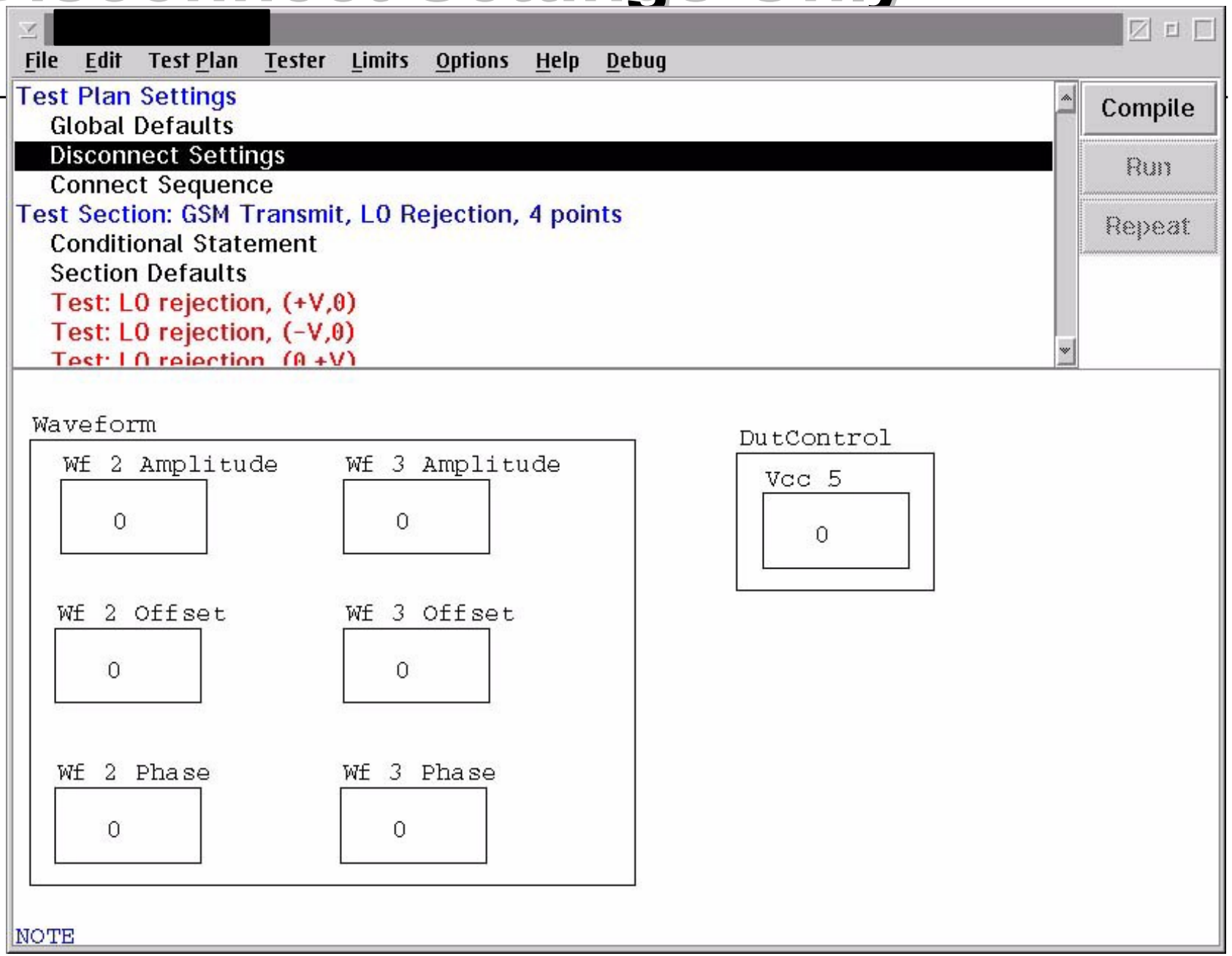
Global Defaults for Source 1, 2 & Settle



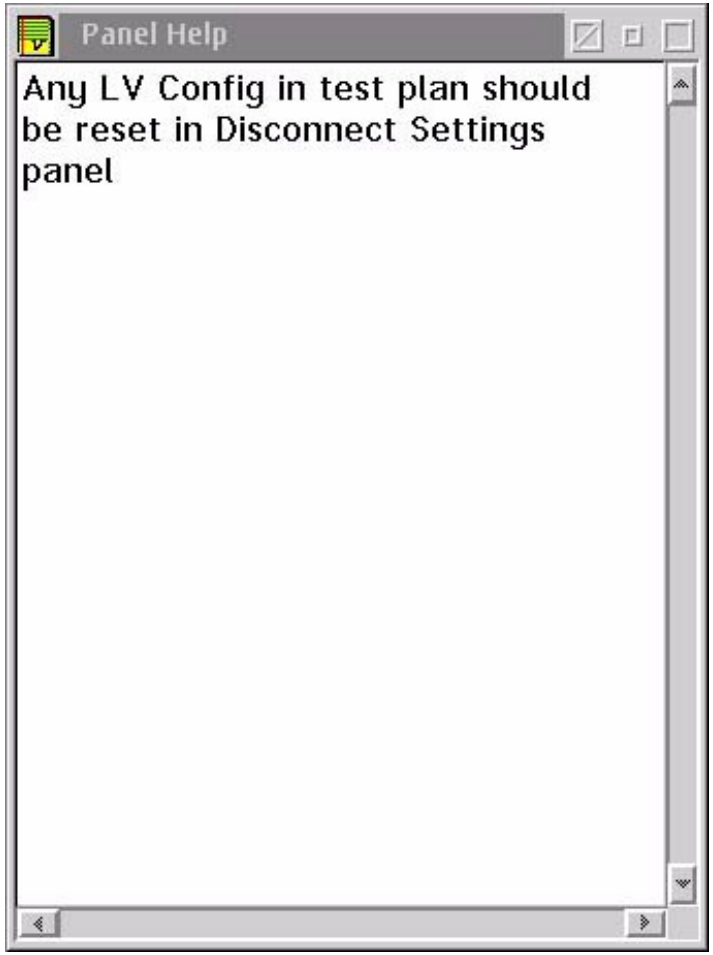
Global Default Setting for



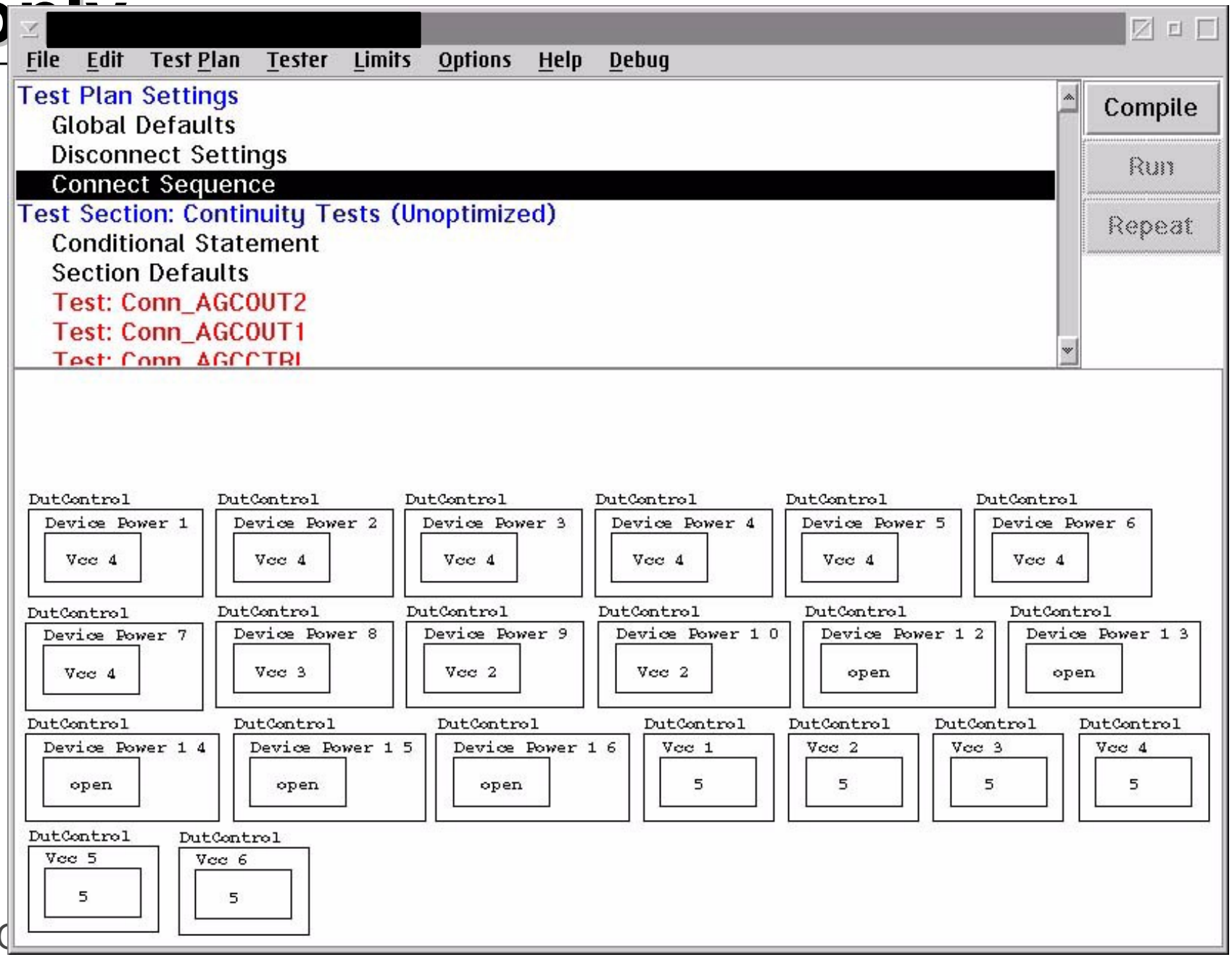
Disconnect Settings Only



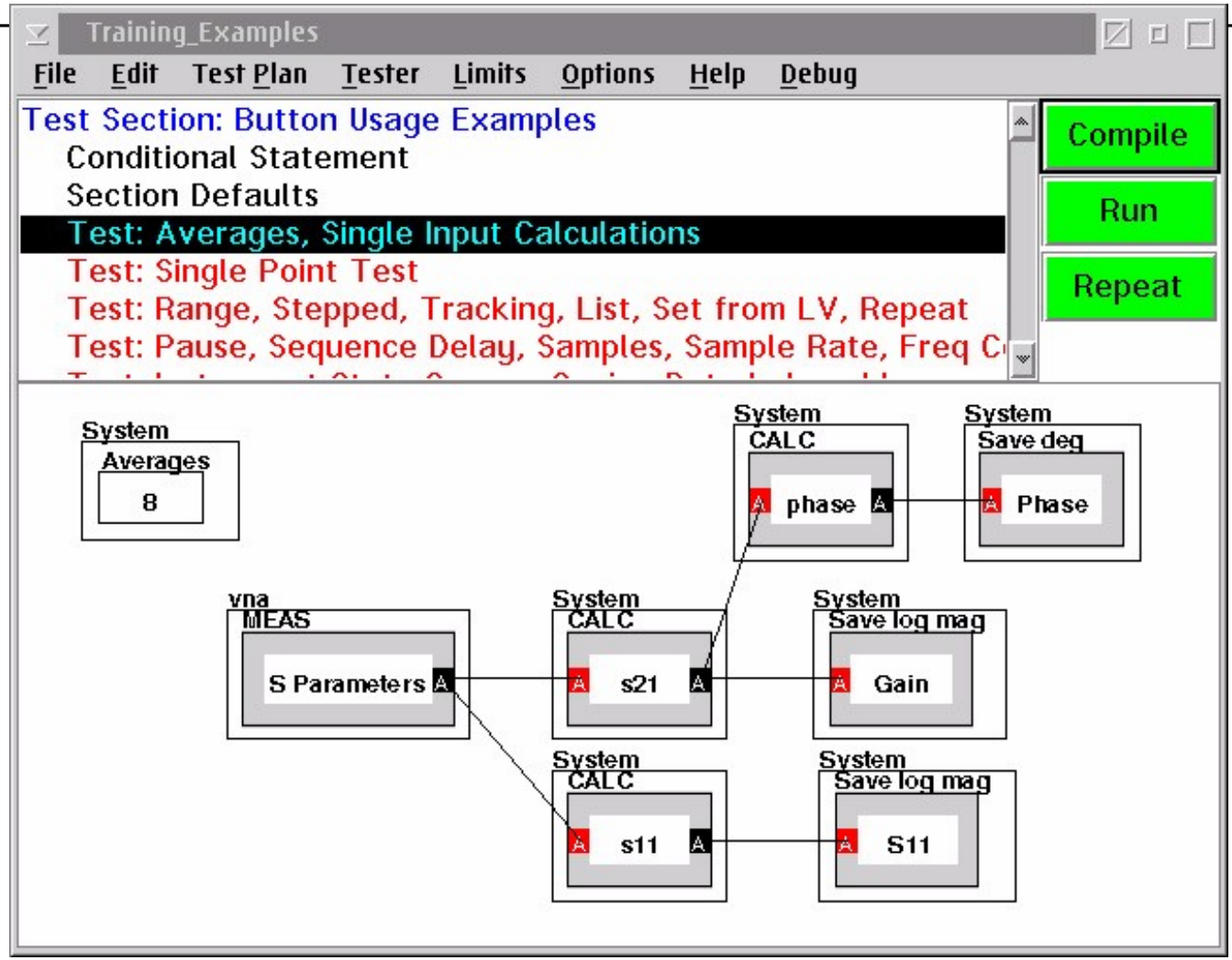
Disconnect Settings Panel Must include all Parameters set by Local Variable in Test Plan



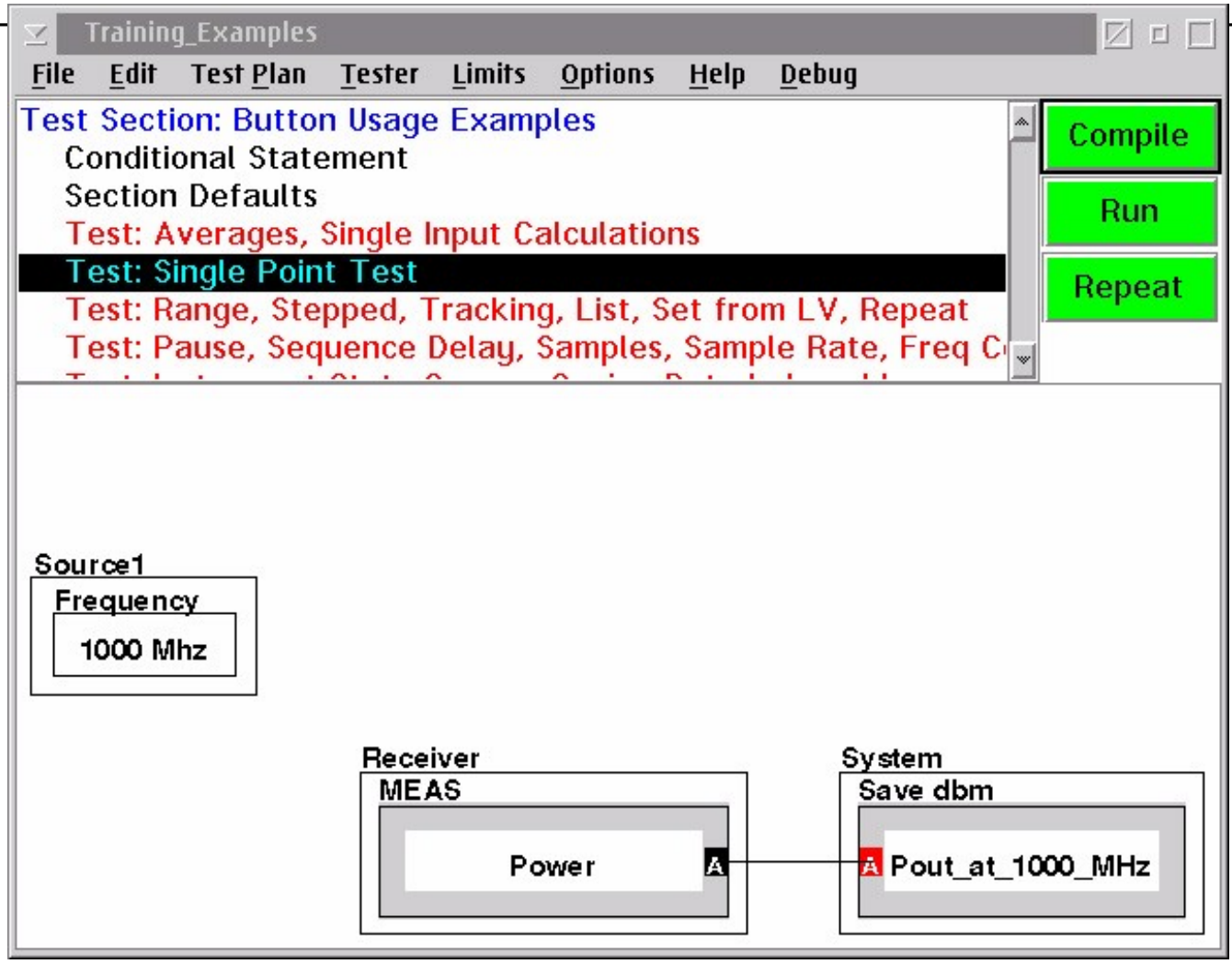
Connect Sequence: Left to Right only



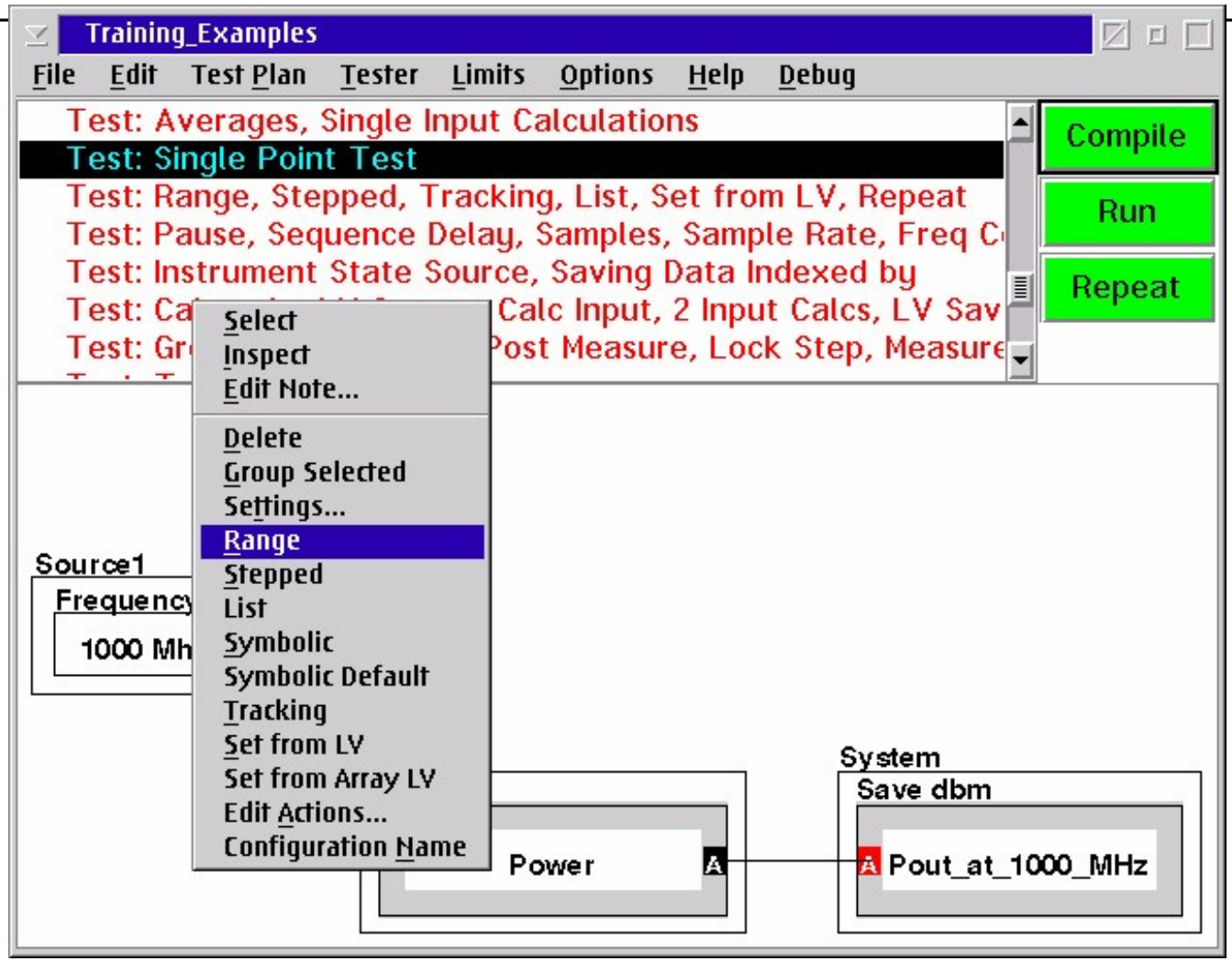
Averages, One Input Calculations



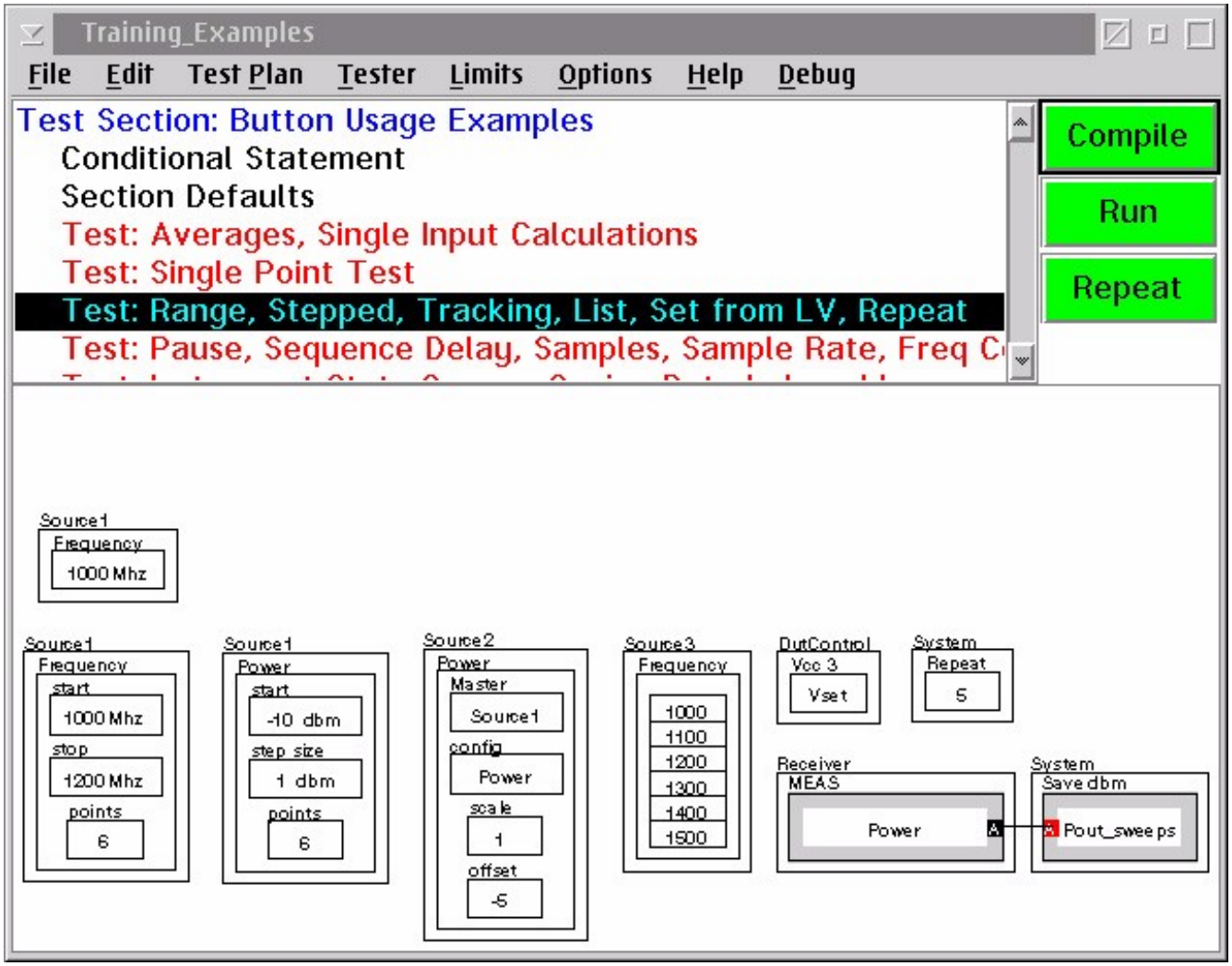
Simple Test at 1 Frequency



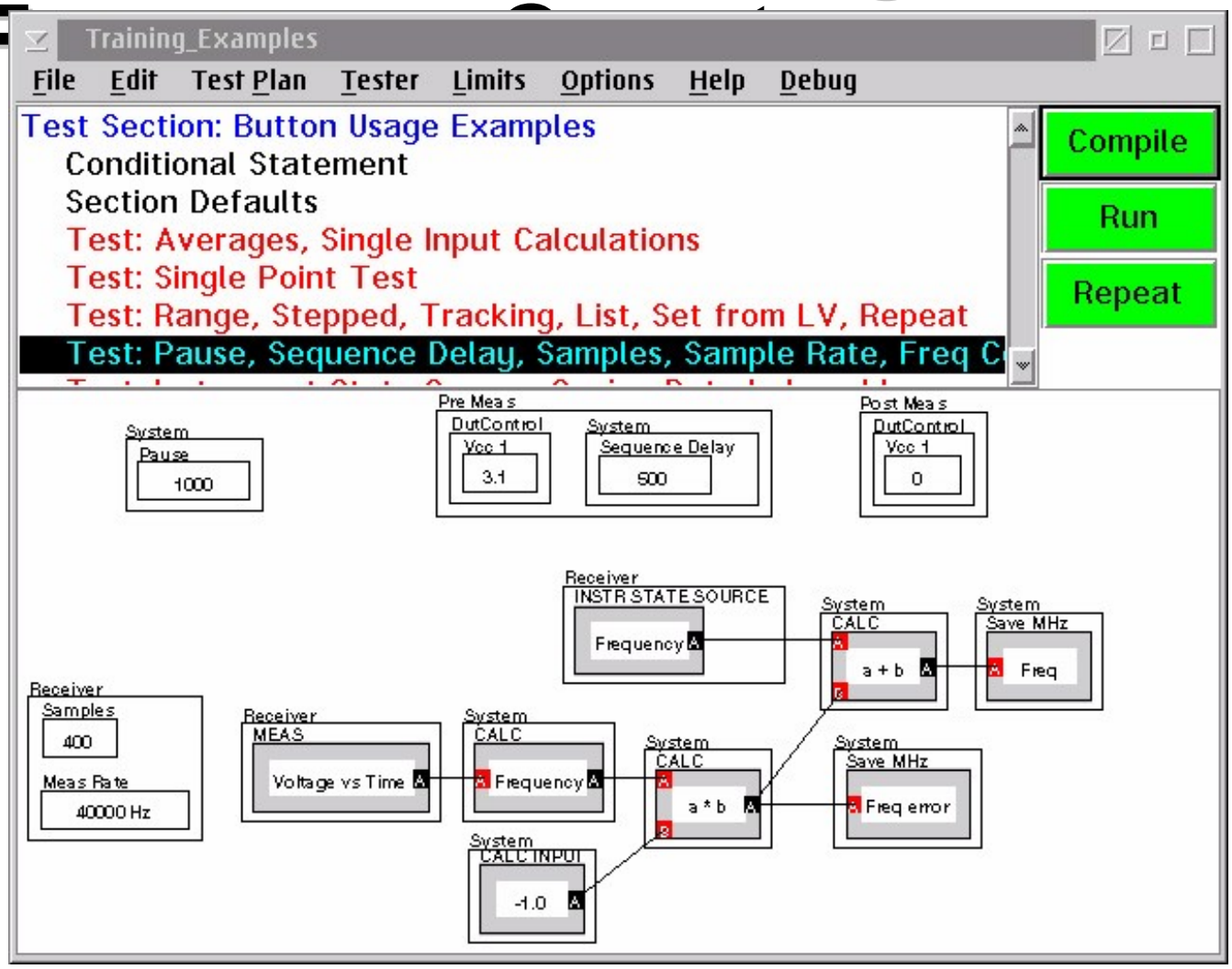
Using Button 2 Functions



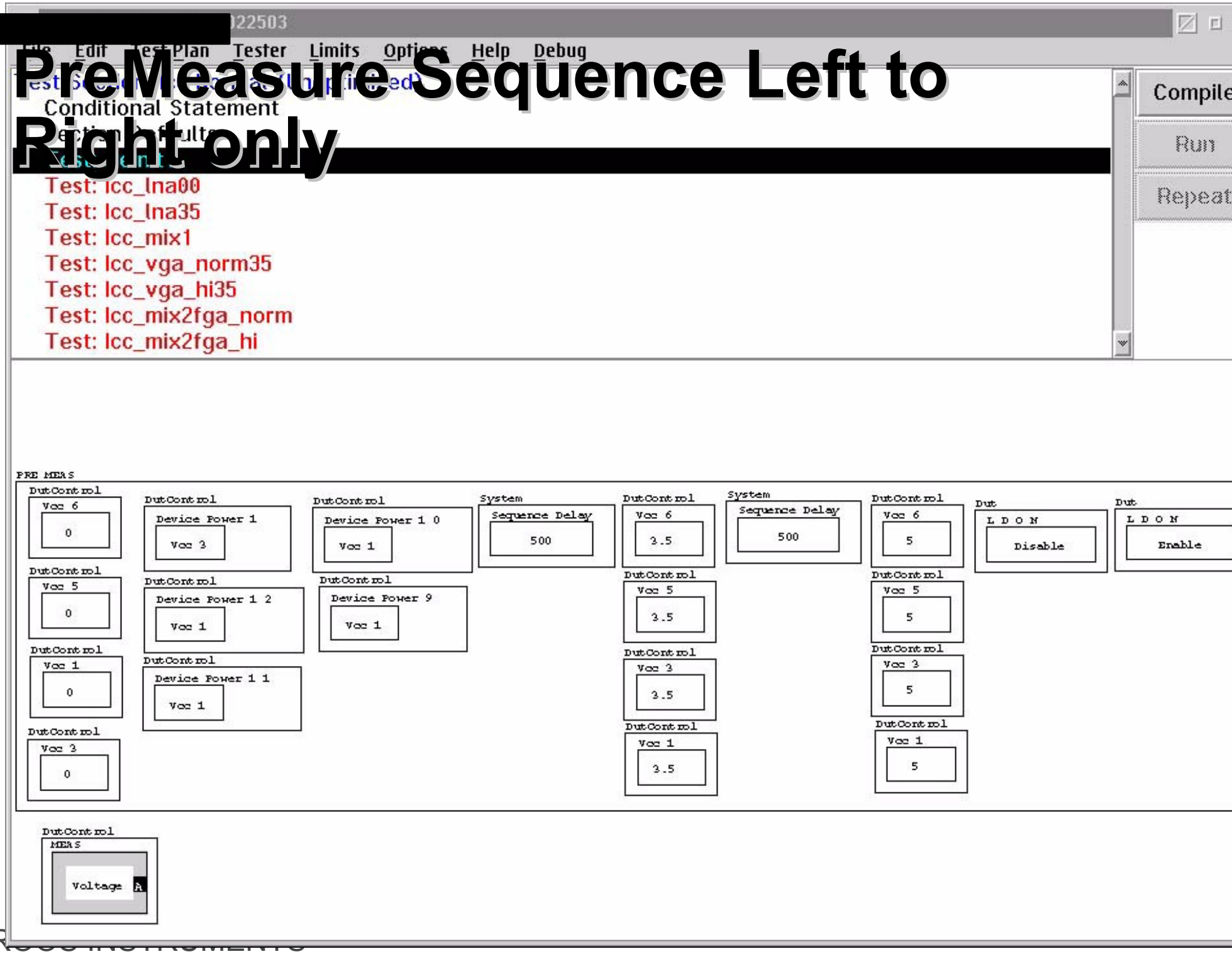
Range, Stepped, Tracking, List, Set from LV and Repeat



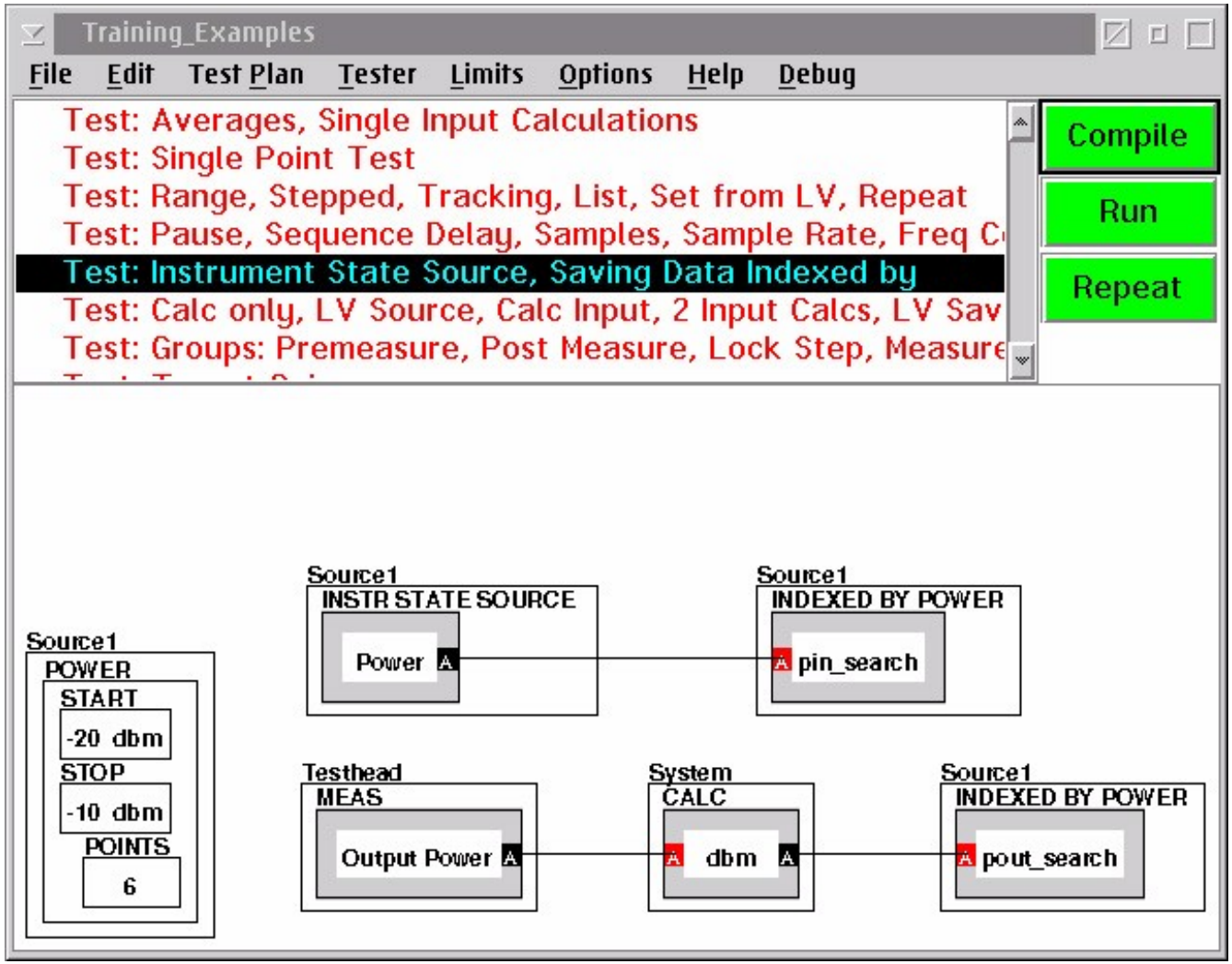
Pause, Pre/Post Measure, Sequence Delay, Samples, Sample Rate, Voltage vs Time & F



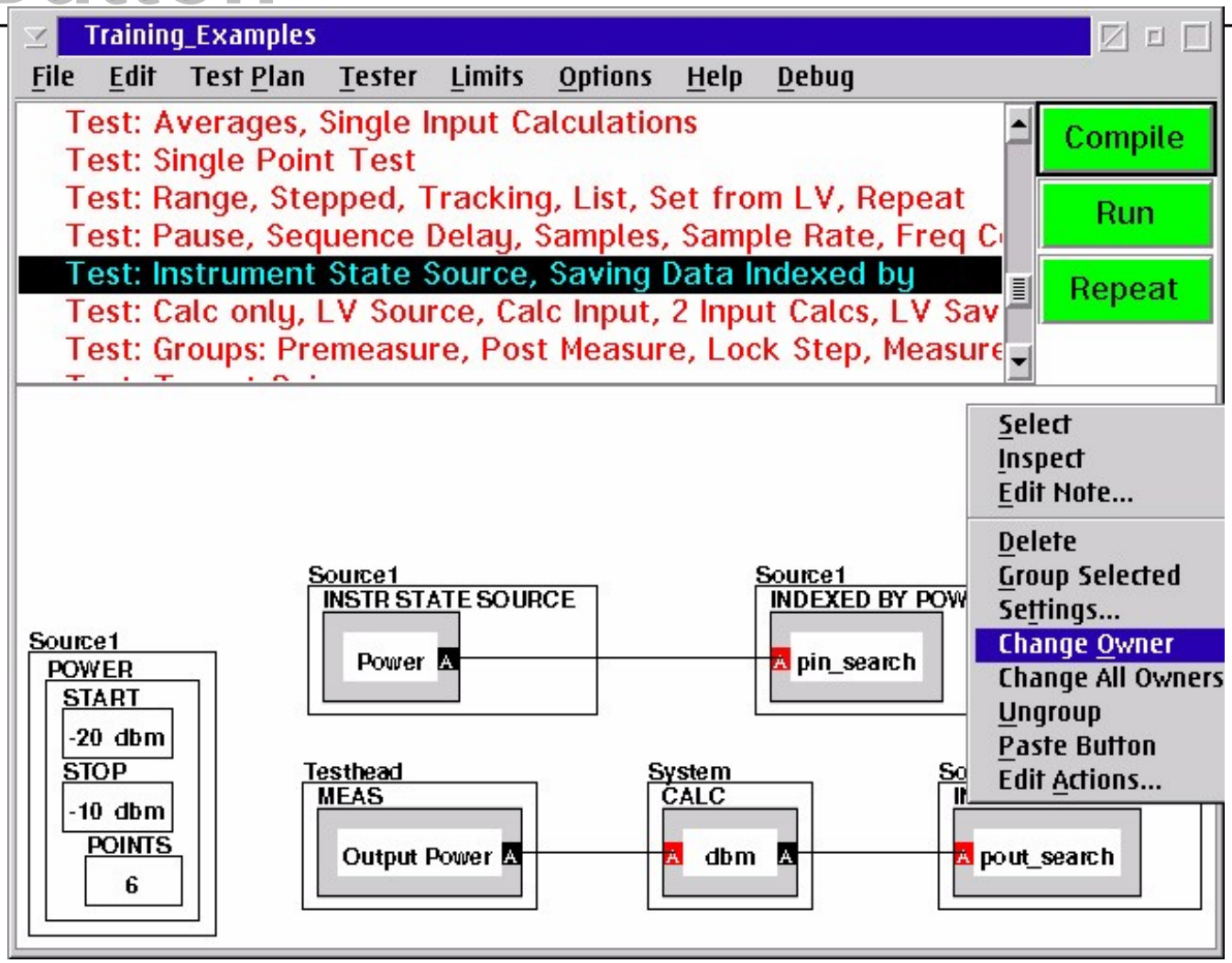
PreMeasure Sequence Left to Right only



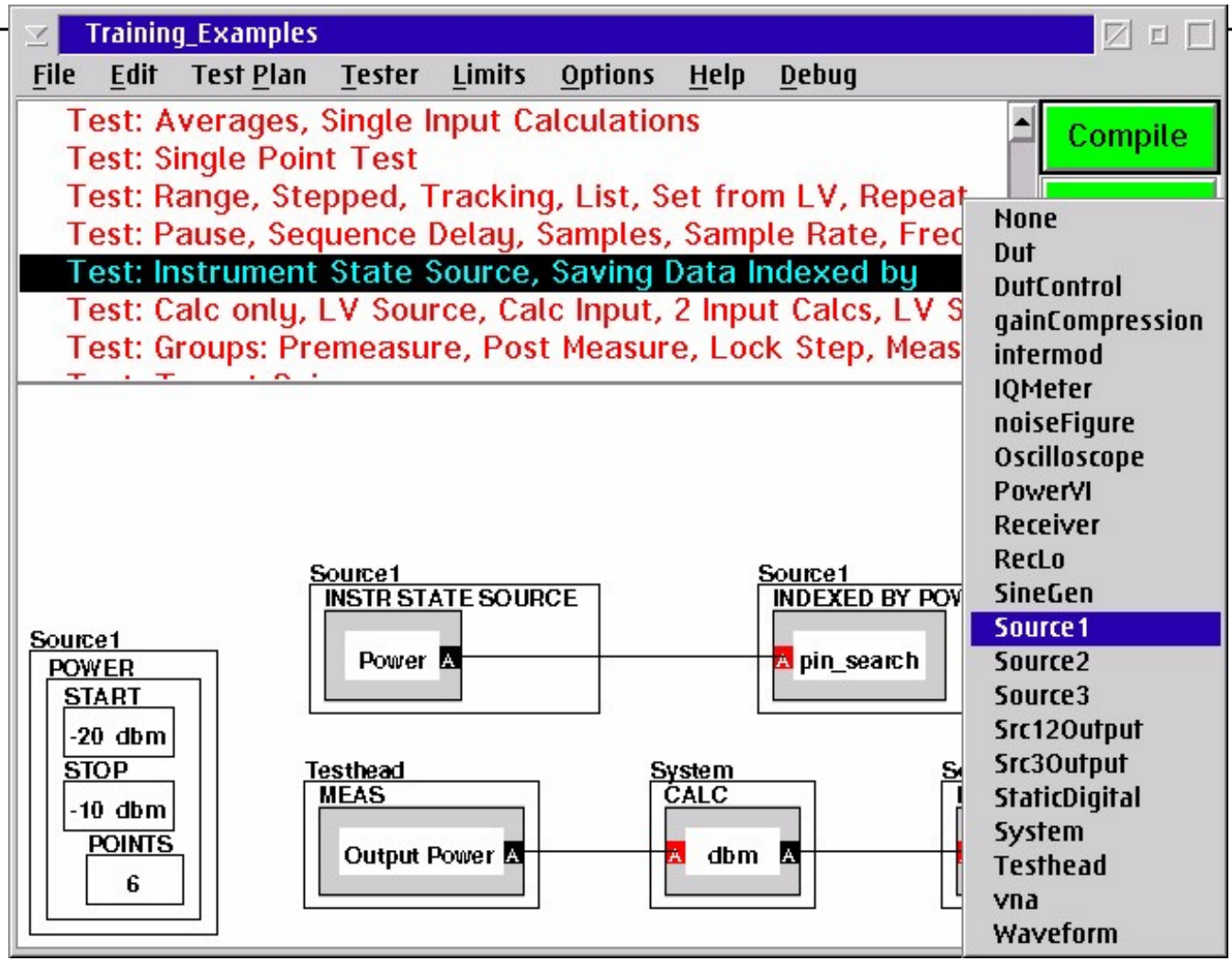
Sweep Power and Save Data Indexed by Sweep Parameter



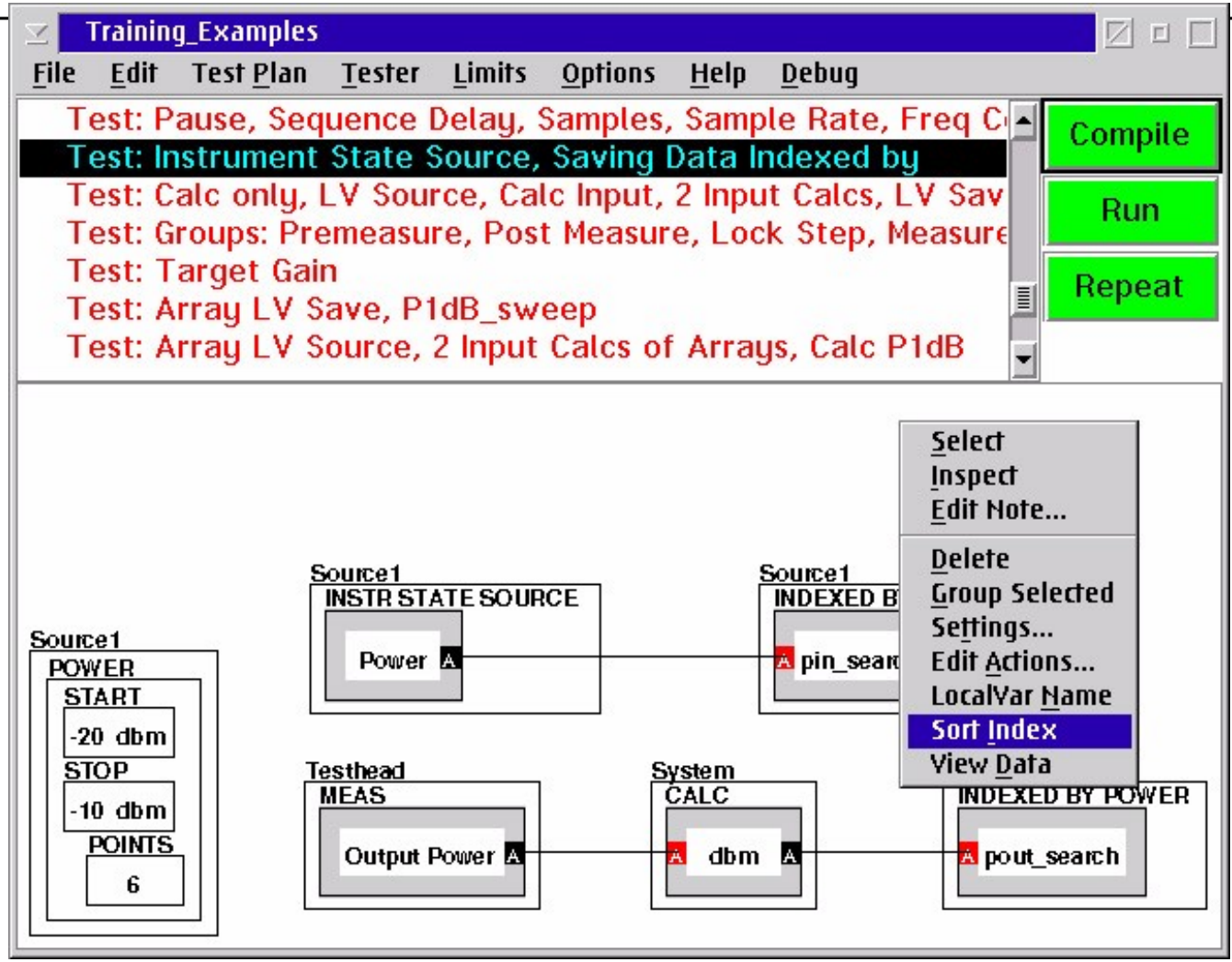
Changing the Owner of the Button



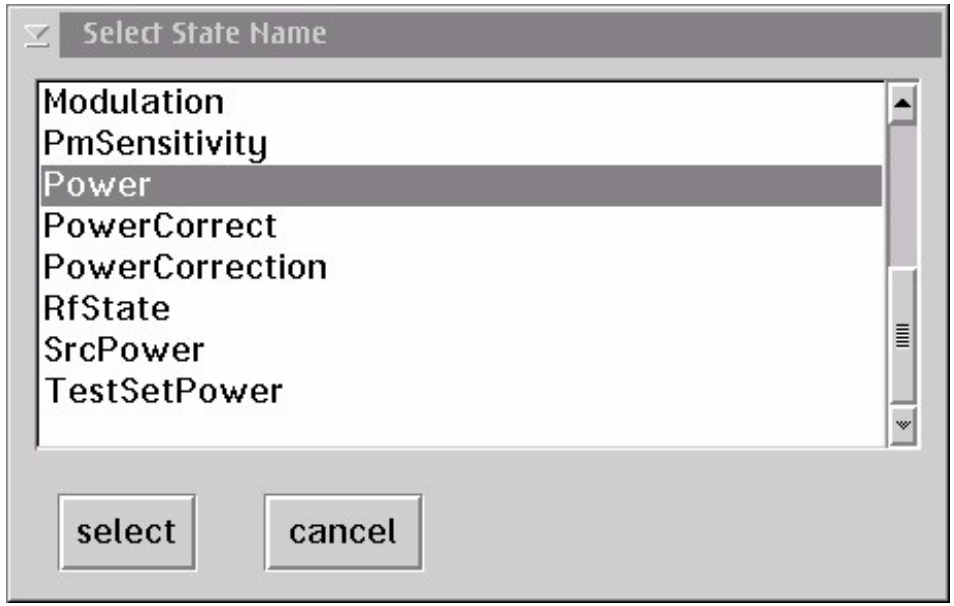
Changing the Owner to Source 1



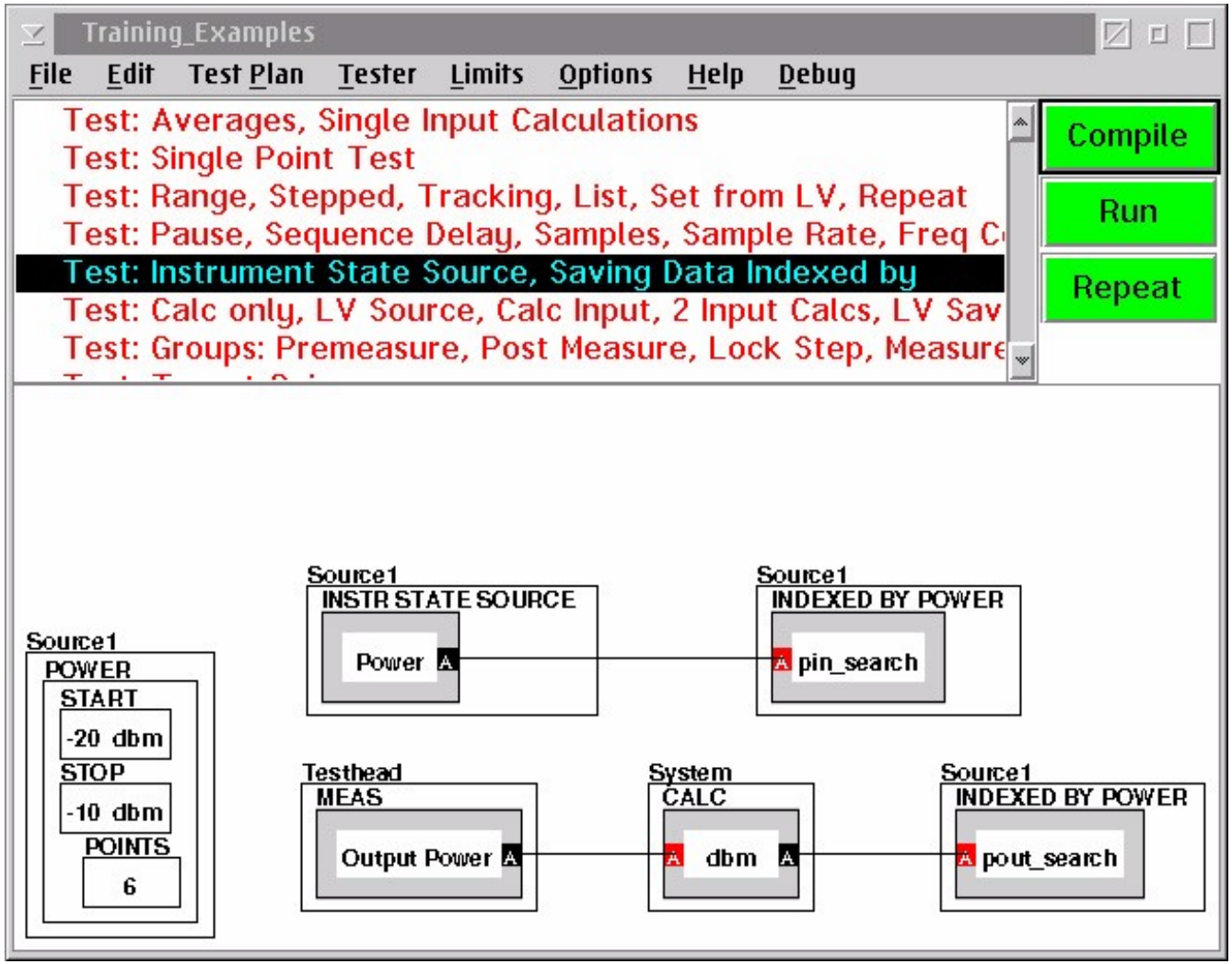
Selecting the Sort by Index



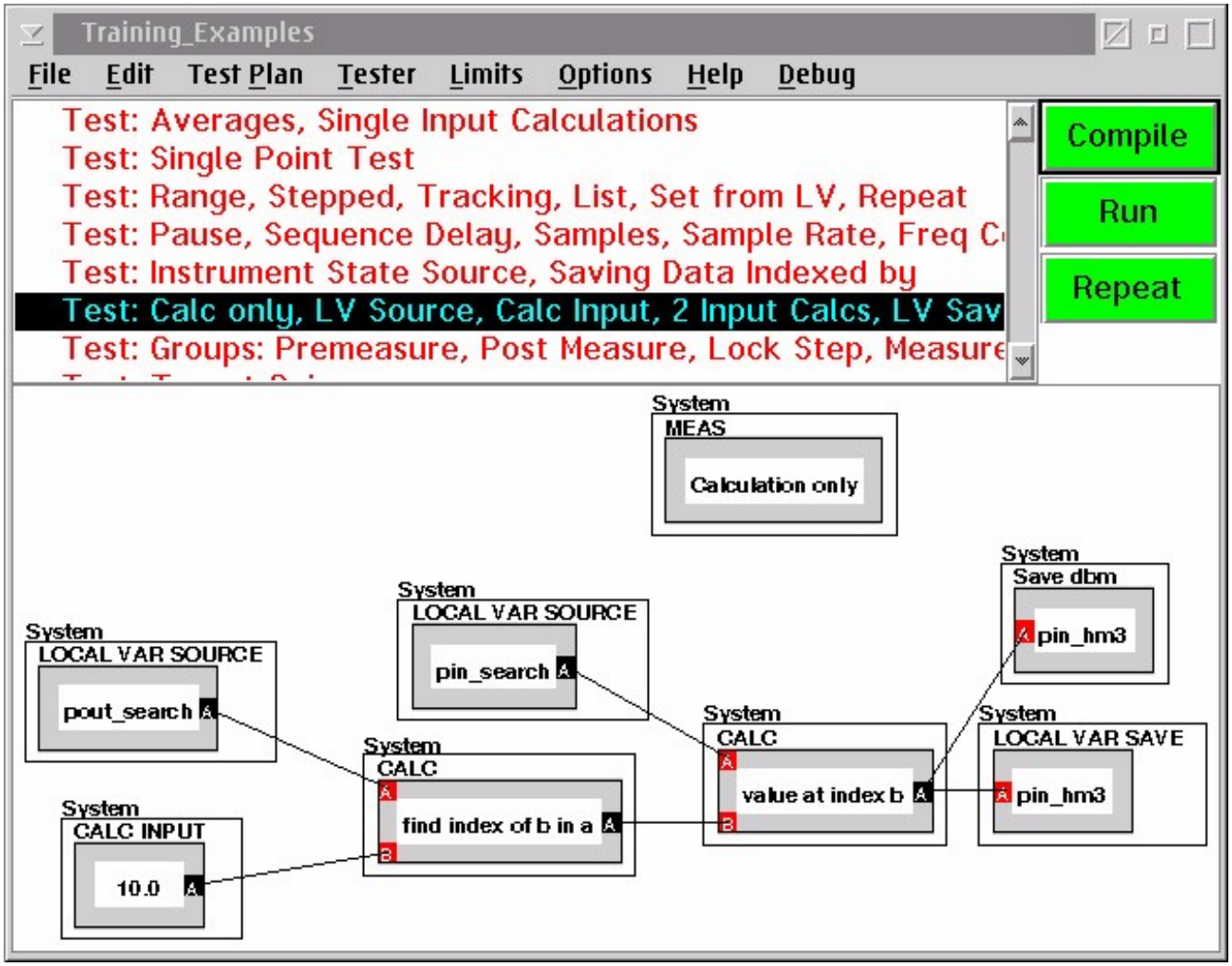
Selecting the Parameter Power as the Sort by Index



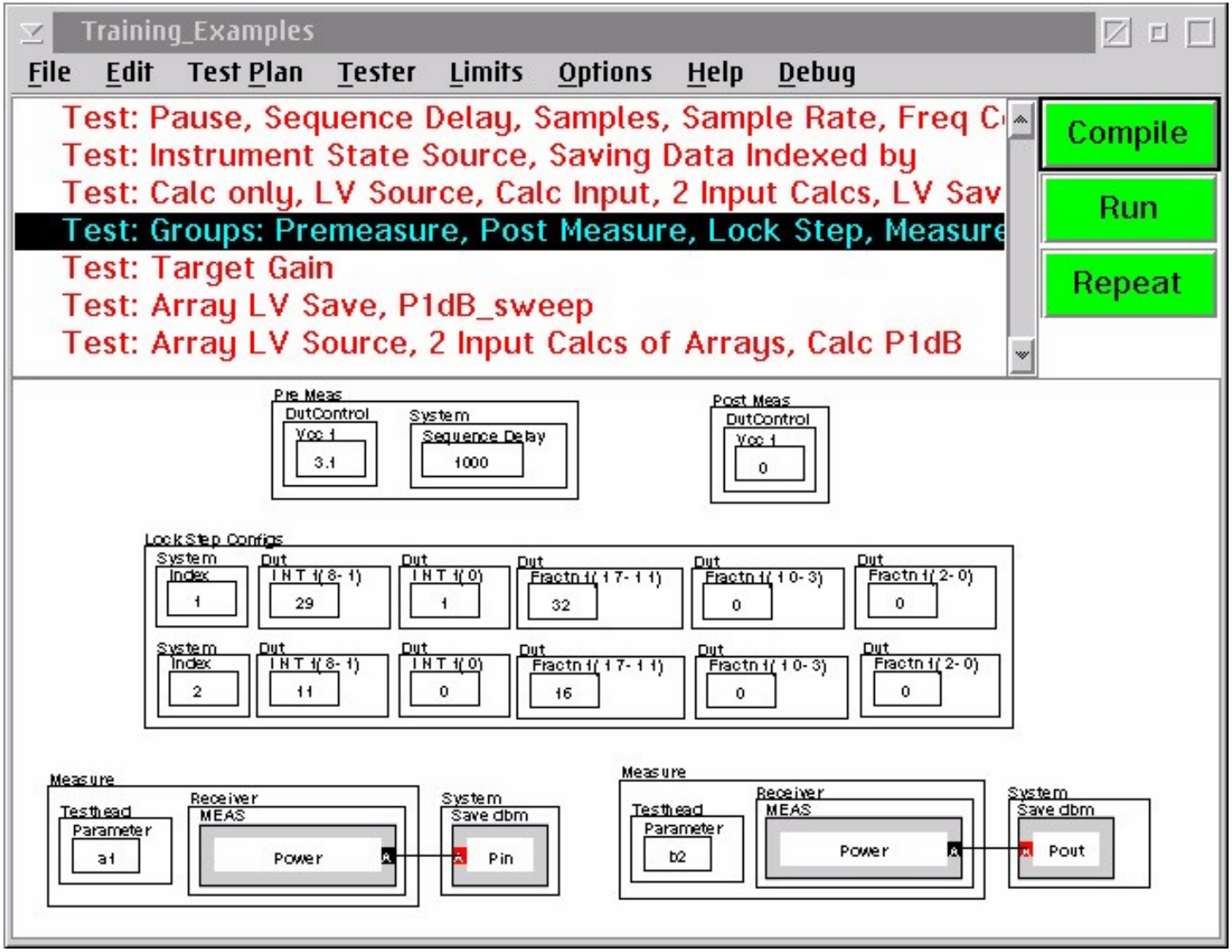
Data Save Button is now Owned by Source 1 & Indexed by Power



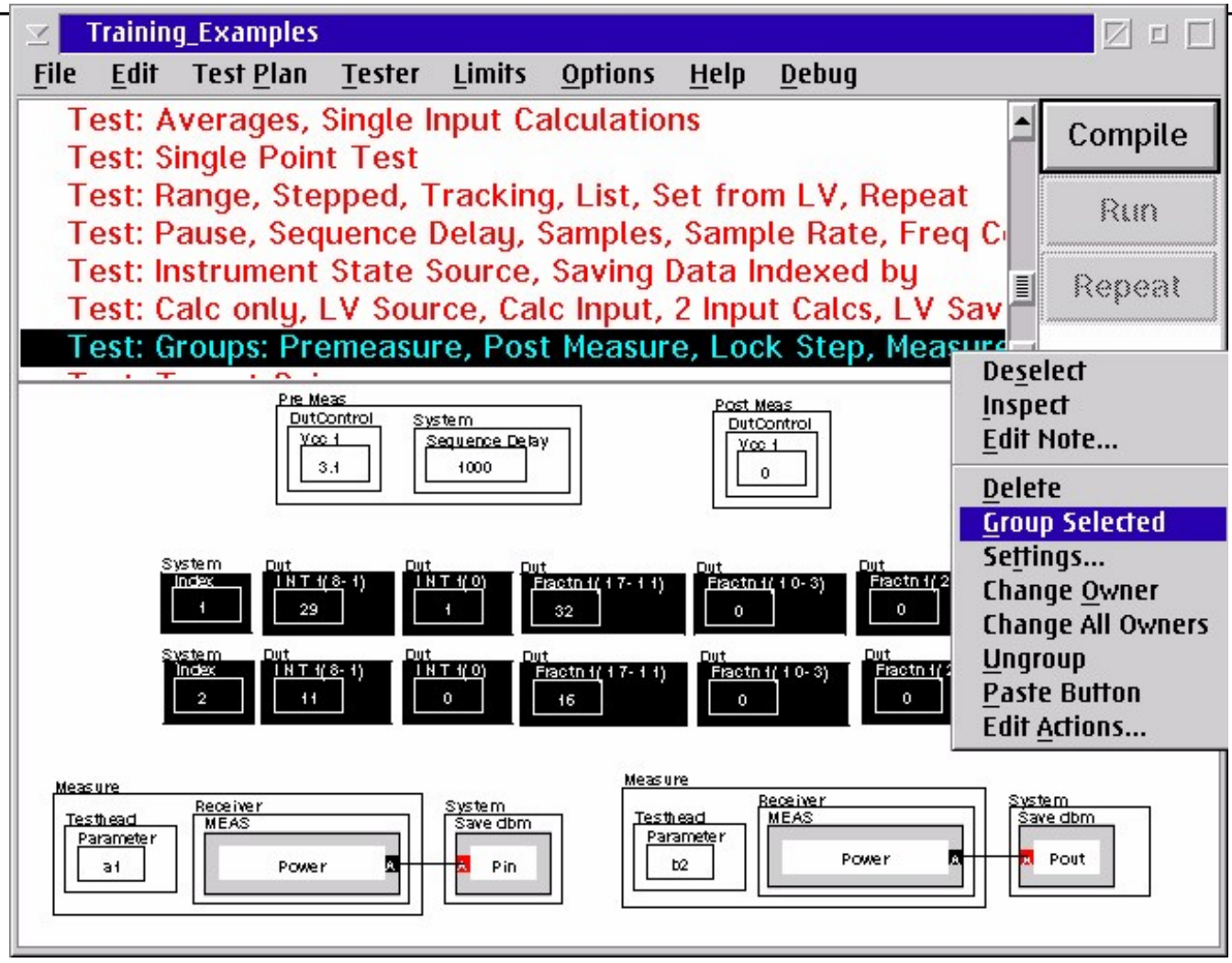
Calc Only, Local Variable Source, 2 Input Calcs & LV Save



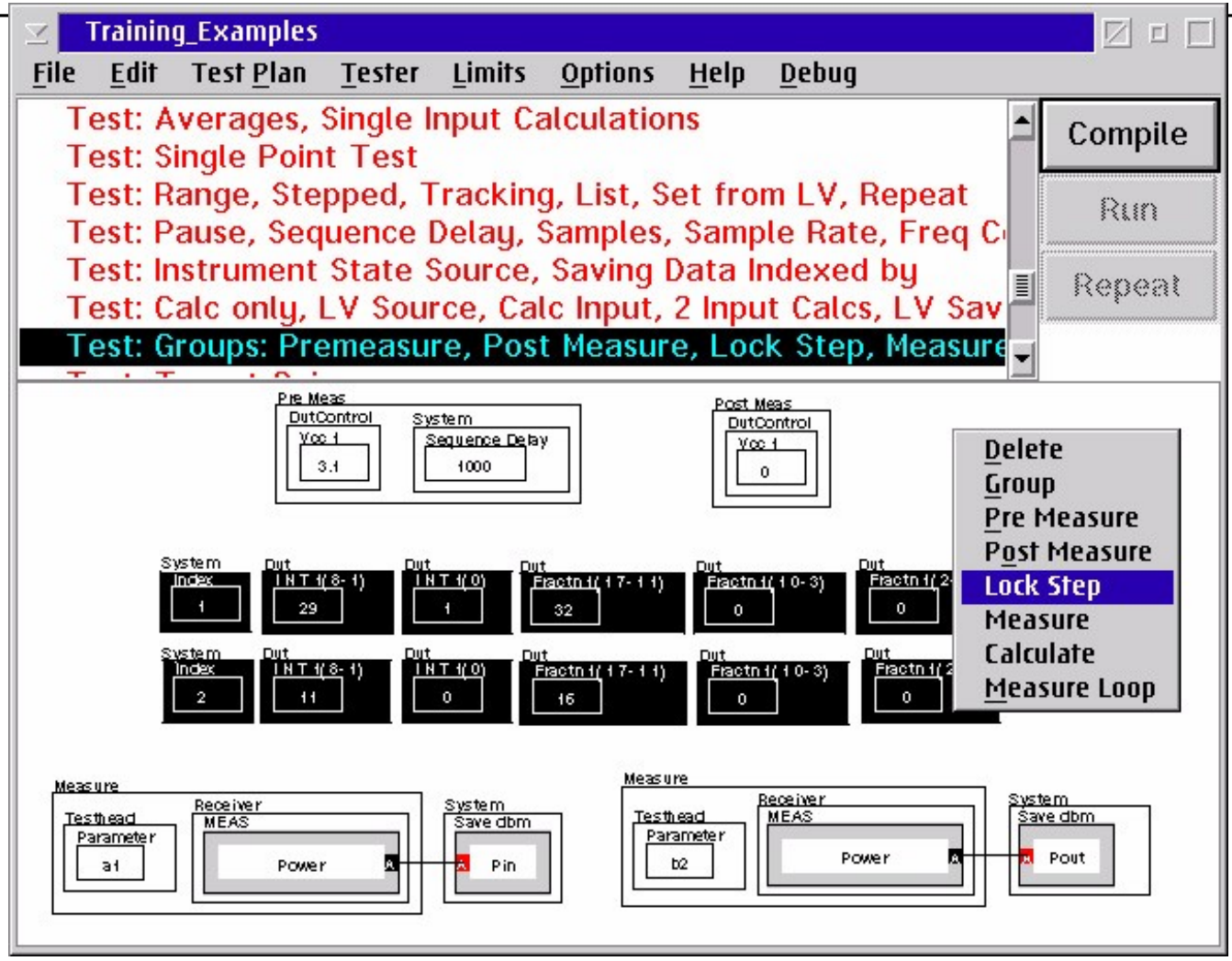
Pre Measure, Post Measure, Lockstep & Measure Groups



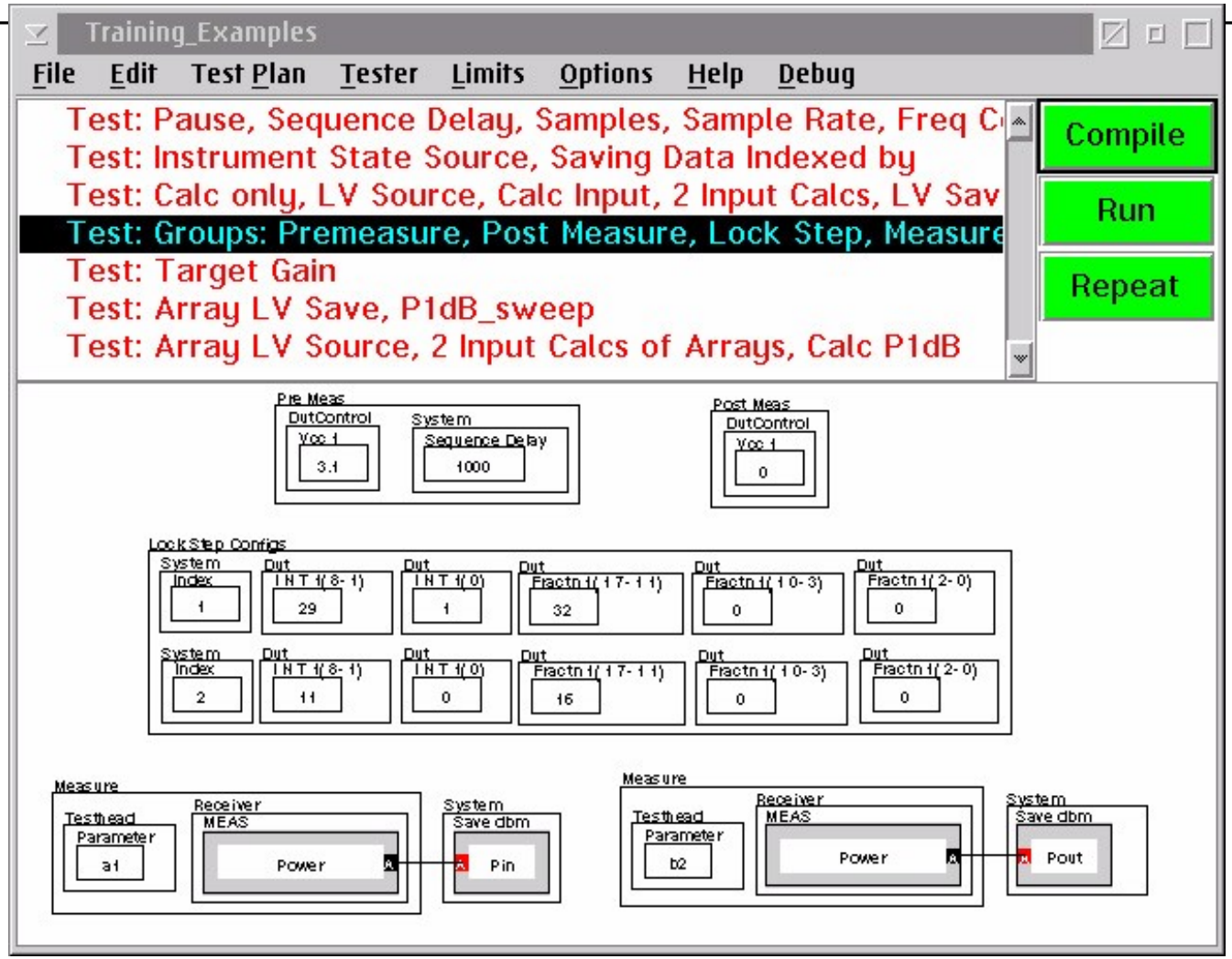
Select and Group Buttons



Selecting the Group Function



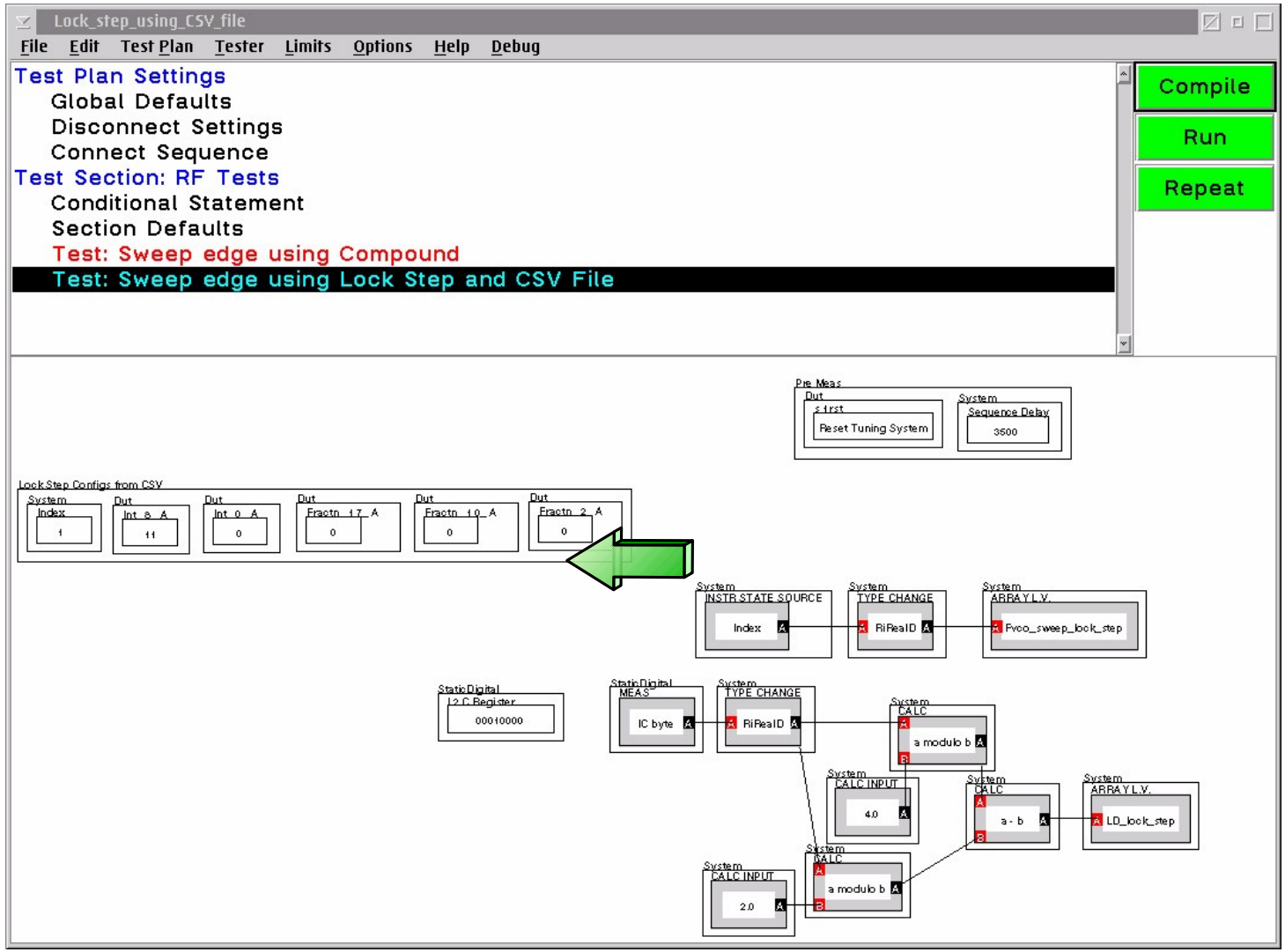
Creates Lockstep Group



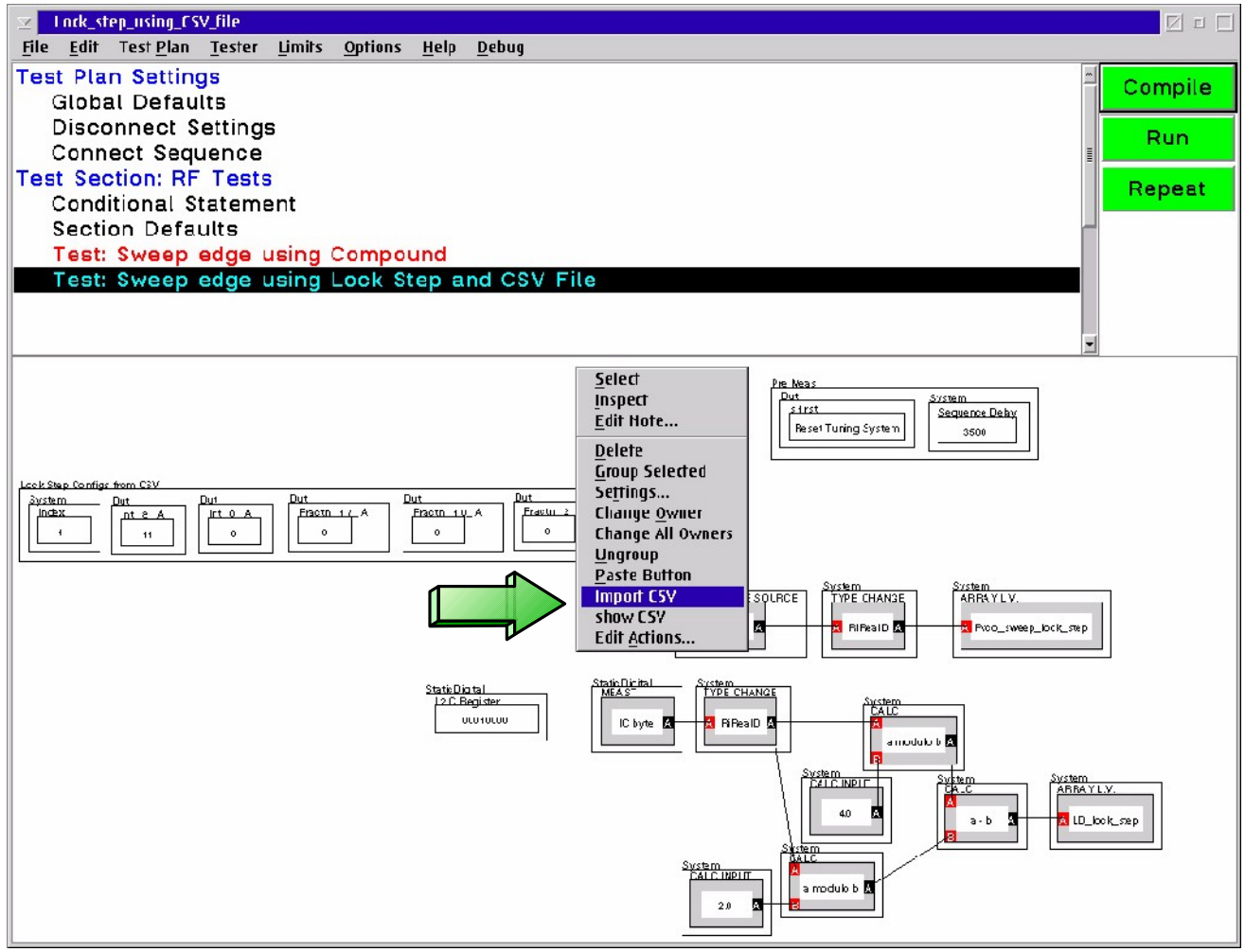
Lock Step Using CSV File

- Spread Sheet Data Import for Complex or Large Lock Step Tables
- All Points in the First Column must be Unique

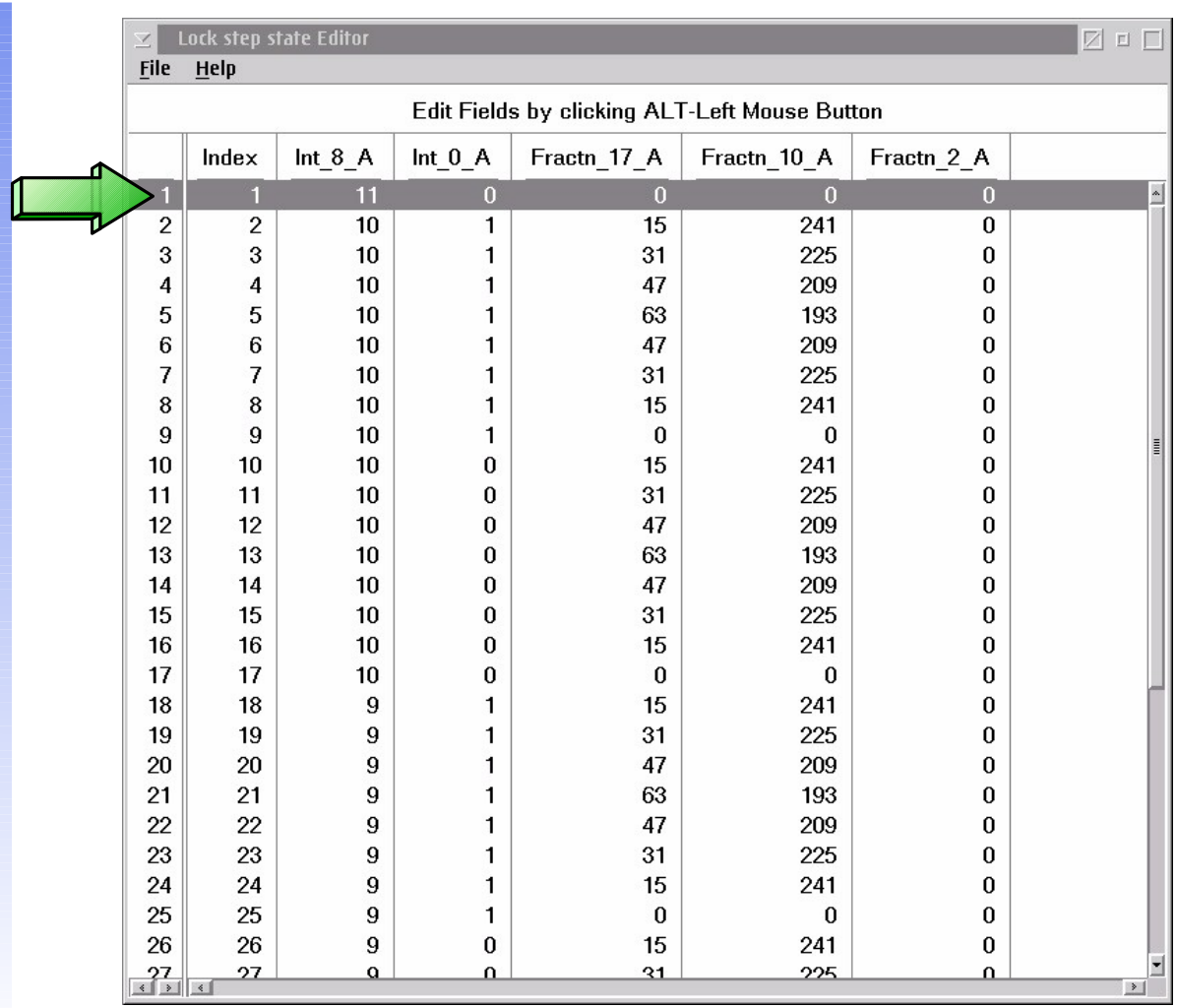
Sweeping DUT Frequency using Lock Step with CSV file Data



Importing CSV Data into Lock Step

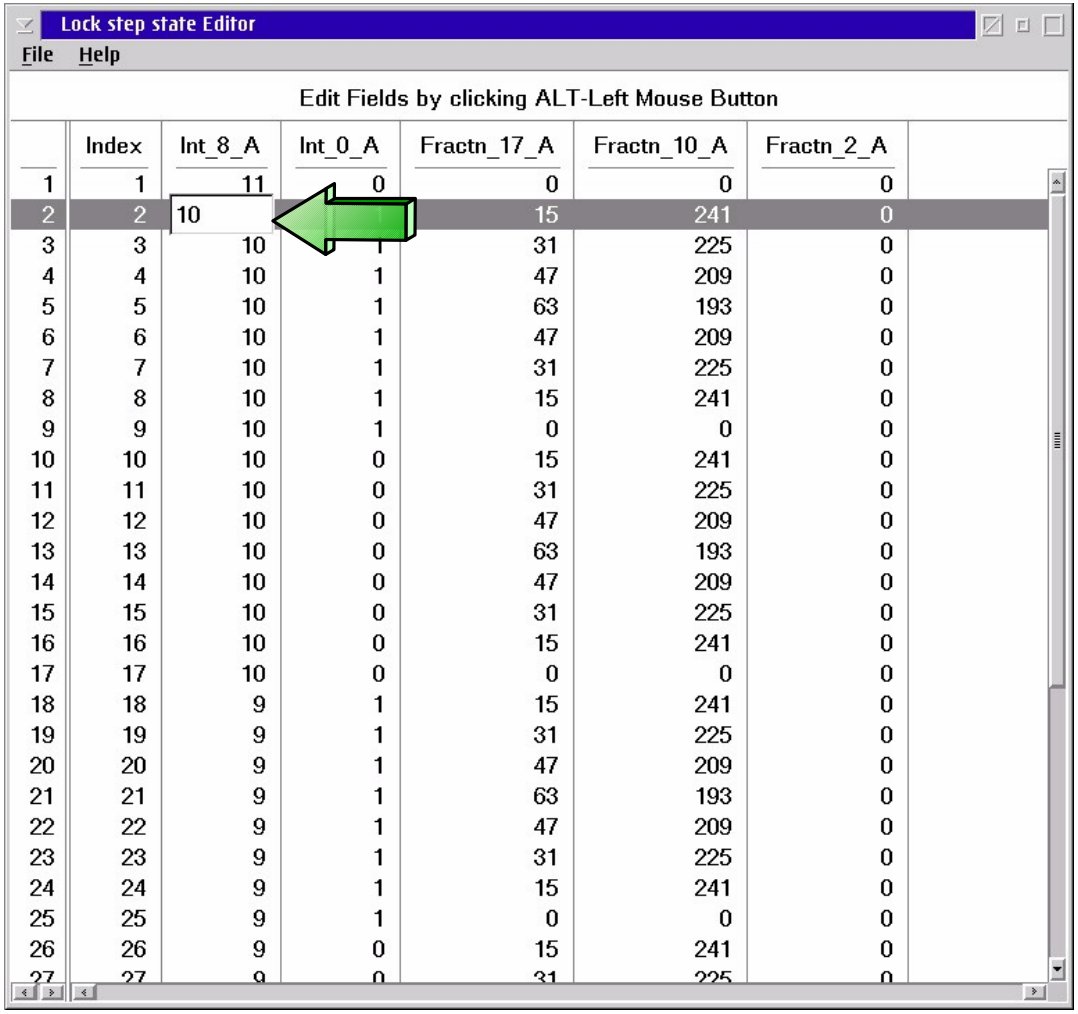


Lock Step with CSV Data First Row in CSV is Data, not Field Name



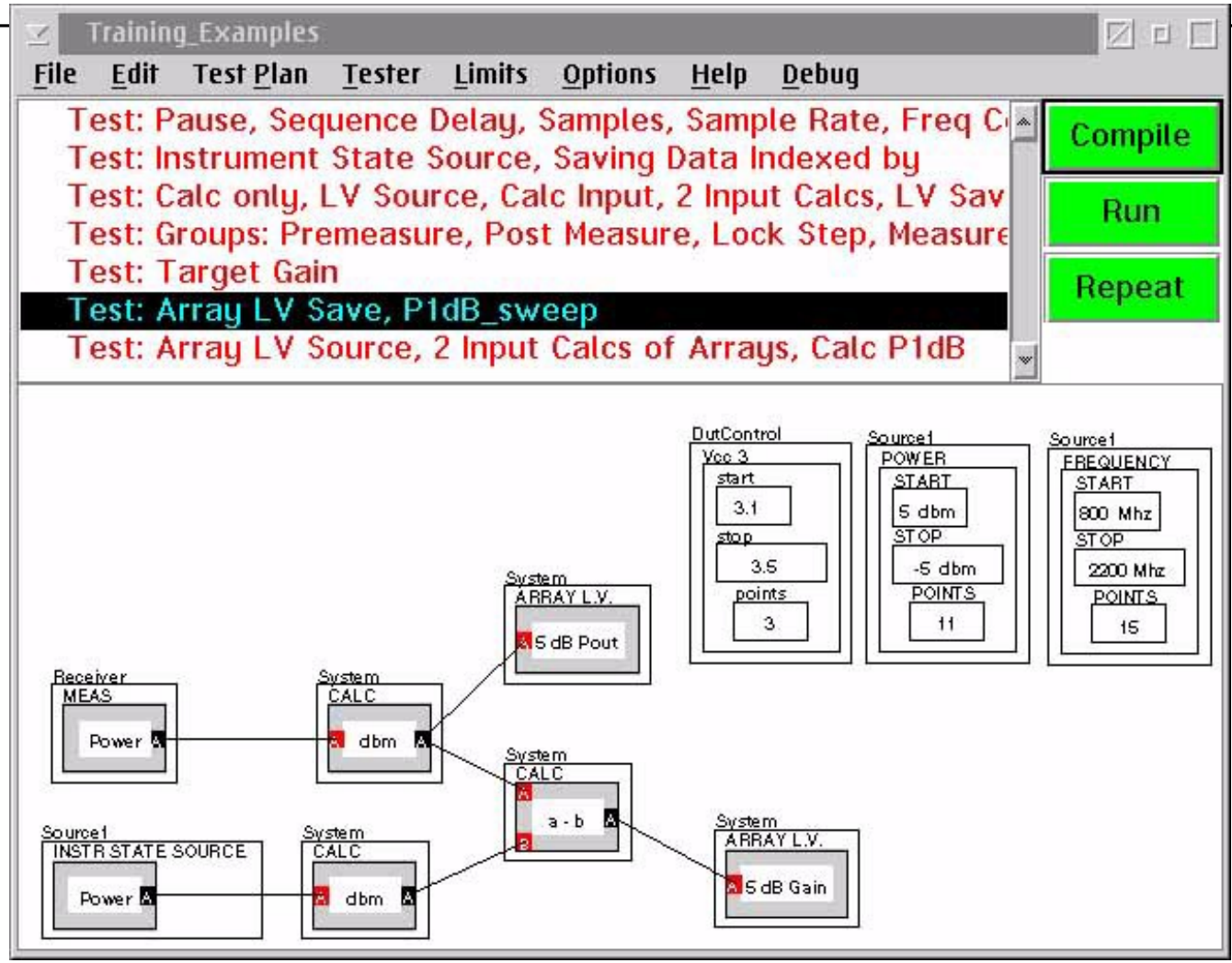
	Index	Int_8_A	Int_0_A	Fractn_17_A	Fractn_10_A	Fractn_2_A
1	1	11	0	0	0	0
2	2	10	1	15	241	0
3	3	10	1	31	225	0
4	4	10	1	47	209	0
5	5	10	1	63	193	0
6	6	10	1	47	209	0
7	7	10	1	31	225	0
8	8	10	1	15	241	0
9	9	10	1	0	0	0
10	10	10	0	15	241	0
11	11	10	0	31	225	0
12	12	10	0	47	209	0
13	13	10	0	63	193	0
14	14	10	0	47	209	0
15	15	10	0	31	225	0
16	16	10	0	15	241	0
17	17	10	0	0	0	0
18	18	9	1	15	241	0
19	19	9	1	31	225	0
20	20	9	1	47	209	0
21	21	9	1	63	193	0
22	22	9	1	47	209	0
23	23	9	1	31	225	0
24	24	9	1	15	241	0
25	25	9	1	0	0	0
26	26	9	0	15	241	0
27	27	9	0	31	225	0

Editing Lock Step Editor Panel Click ALT and Left Mouse Button

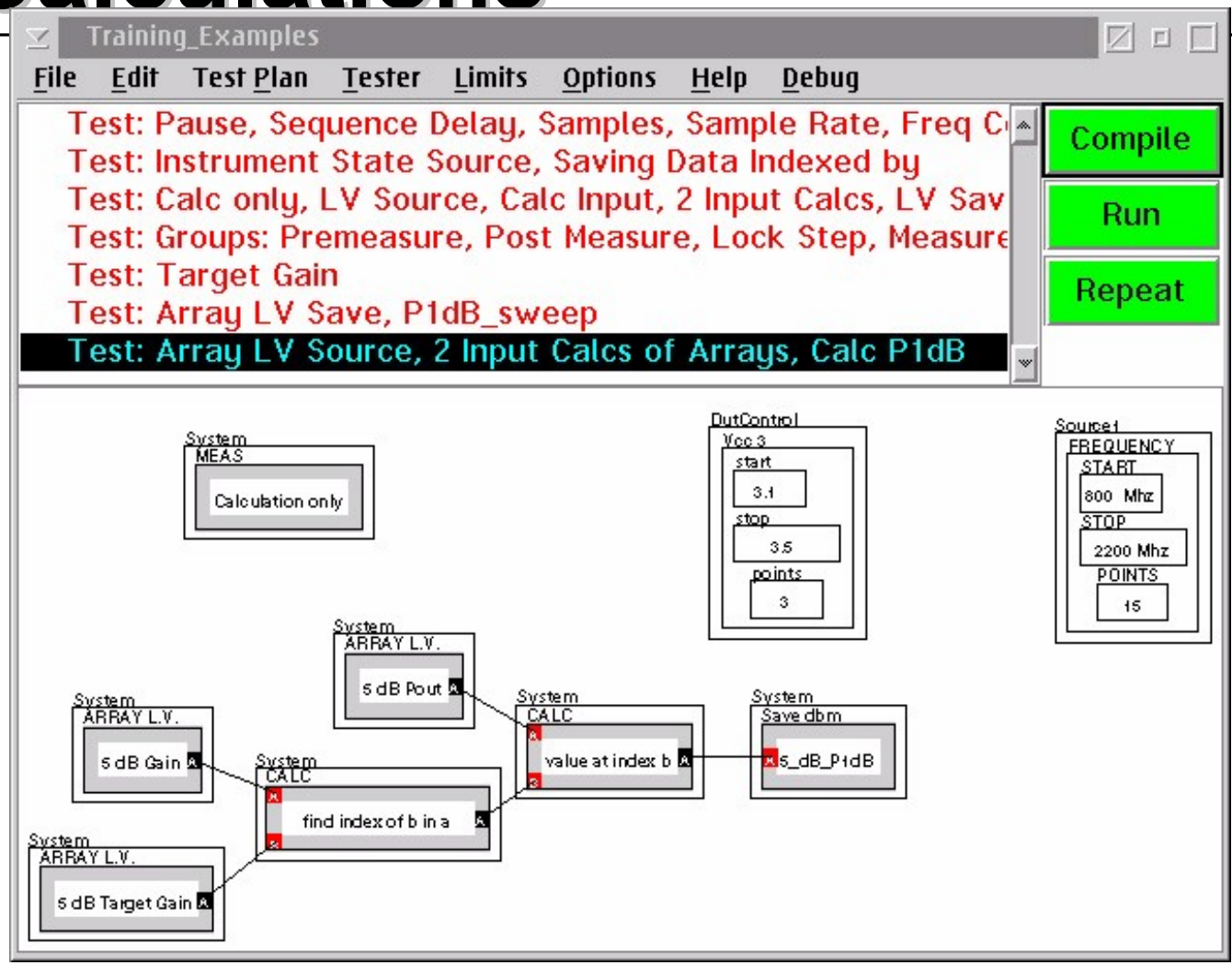


	Index	Int_8_A	Int_0_A	Fractn_17_A	Fractn_10_A	Fractn_2_A
1	1	11	0	0	0	0
2	2	10		15	241	0
3	3	10	1	31	225	0
4	4	10	1	47	209	0
5	5	10	1	63	193	0
6	6	10	1	47	209	0
7	7	10	1	31	225	0
8	8	10	1	15	241	0
9	9	10	1	0	0	0
10	10	10	0	15	241	0
11	11	10	0	31	225	0
12	12	10	0	47	209	0
13	13	10	0	63	193	0
14	14	10	0	47	209	0
15	15	10	0	31	225	0
16	16	10	0	15	241	0
17	17	10	0	0	0	0
18	18	9	1	15	241	0
19	19	9	1	31	225	0
20	20	9	1	47	209	0
21	21	9	1	63	193	0
22	22	9	1	47	209	0
23	23	9	1	31	225	0
24	24	9	1	15	241	0
25	25	9	1	0	0	0
26	26	9	0	15	241	0
27	27	9	0	31	225	0

Creating Array Local Variables



Array Local Variables Calculations



Overview

Tester Viewer Panels

Device Control

Advanced Test Plan Buttons

Generic GPIB Instruments

Generic GPIB Instruments

Creating a new GPIB instrument
Configuring GPIB instrument
Using the Instrument in the testplan

Creating GPIB instrument

From the RI System message window, use menu
Test --> Instruments

From the Instruments Window, use menu
Instrument --> Add Instrument

Select "GPIB Instrument"

Enter the Title of the new instrument

Enter the Name of new instrument

Enter the GPIB Address

Configuring GPIB instrument

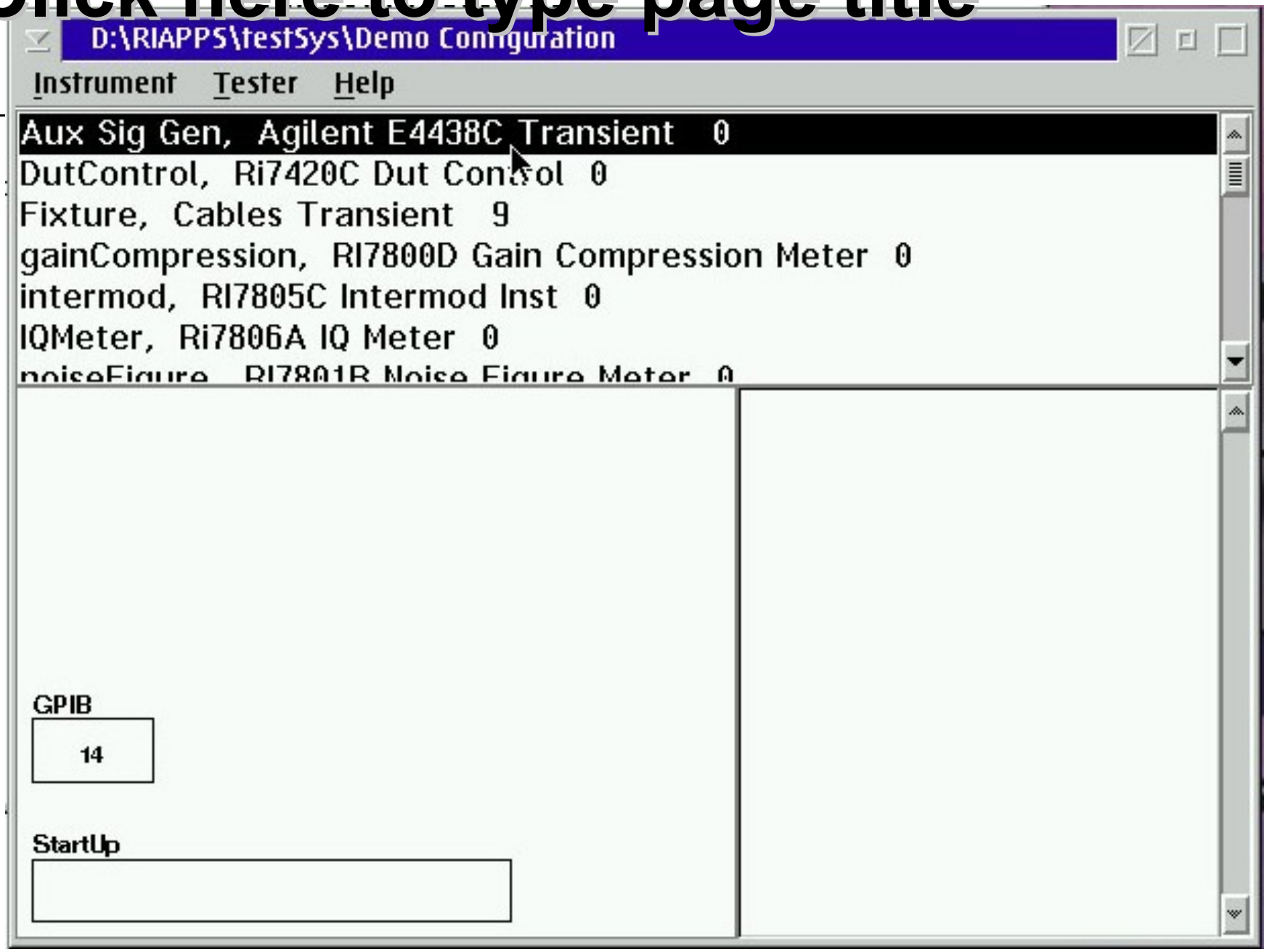
Activate the GPIB instrument then Startup the tester

Configure the active tester and select the GPIB instrument

GPIB address

Startup GPIB command string

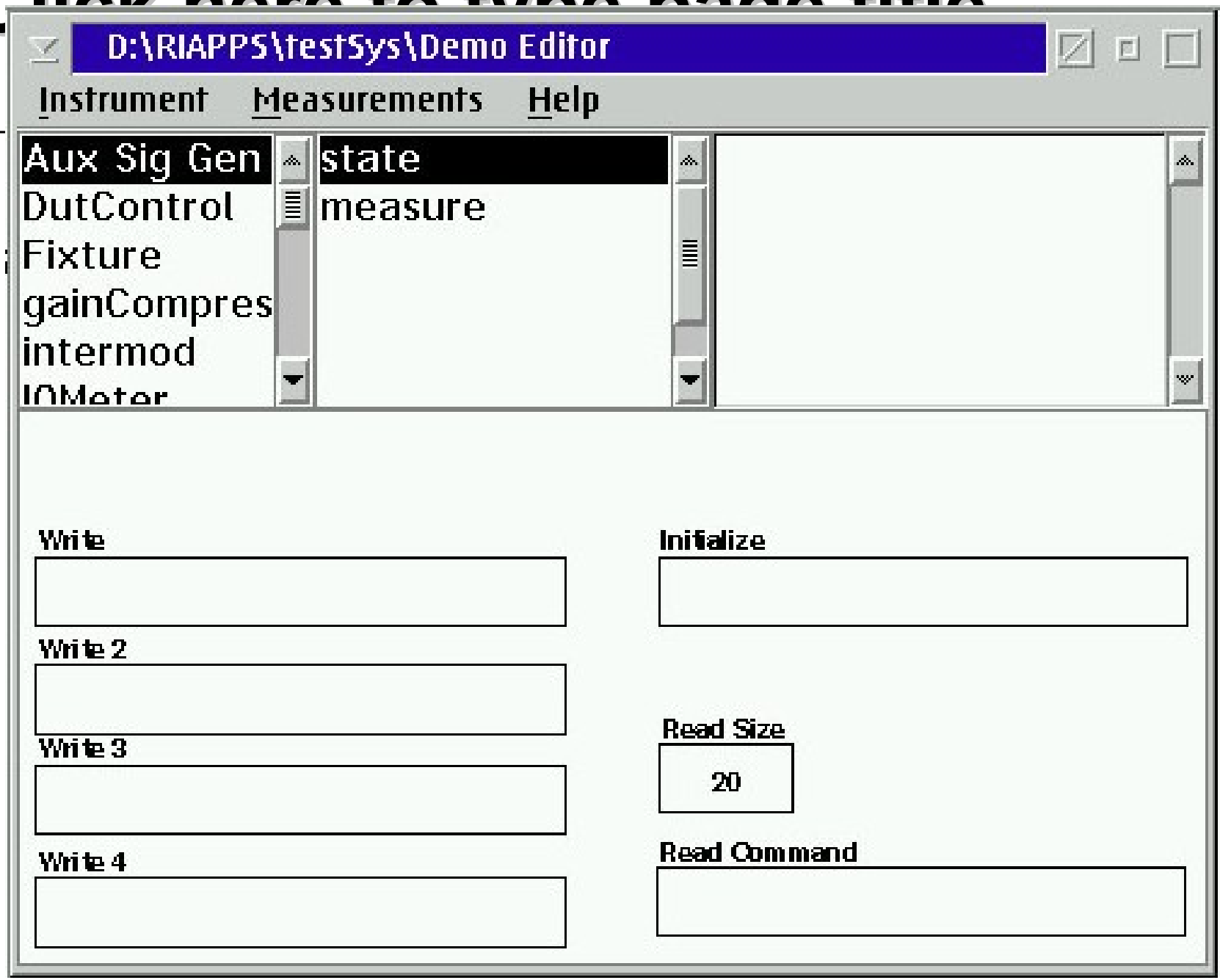
Click here to type page title



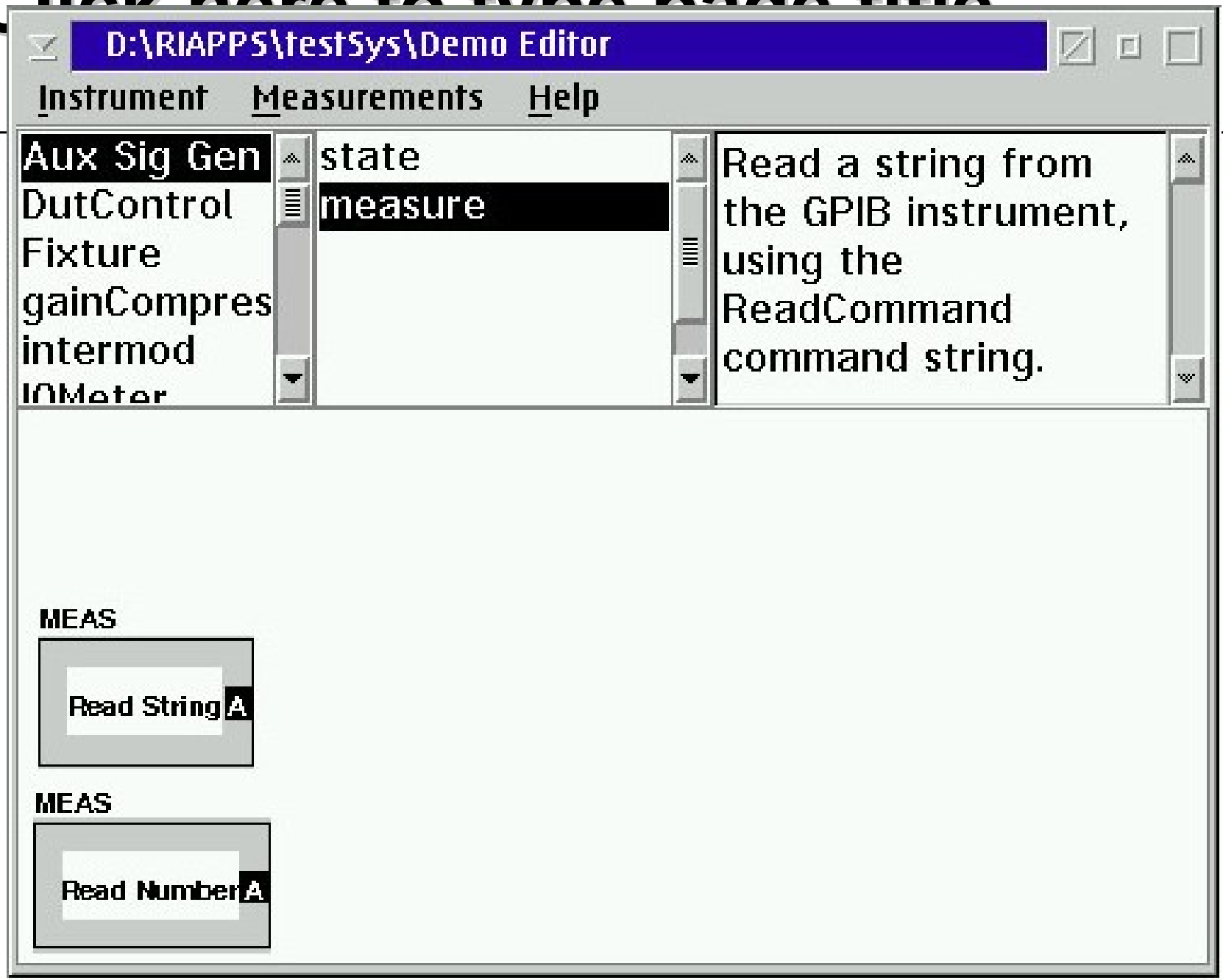
Using GPIB Instrument in the testplan

- State button
  - Initialize
  - Write, Write 2, Write 3, Write 4
  - Read Size
  - Read Command
- Measure Button
  - MEAS Read String
  - MEAS Read Number

Click here to type page title



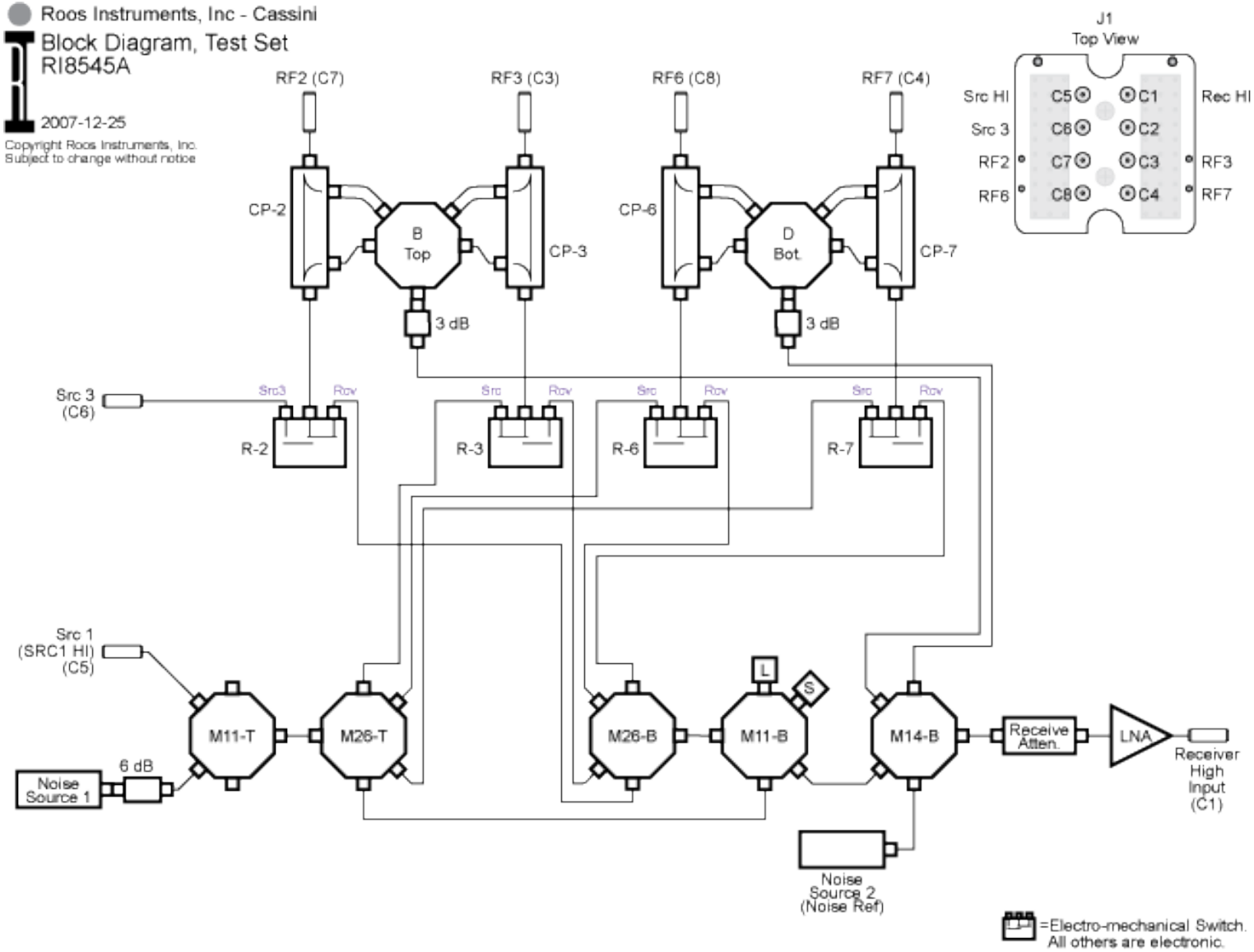
Click here to type page title



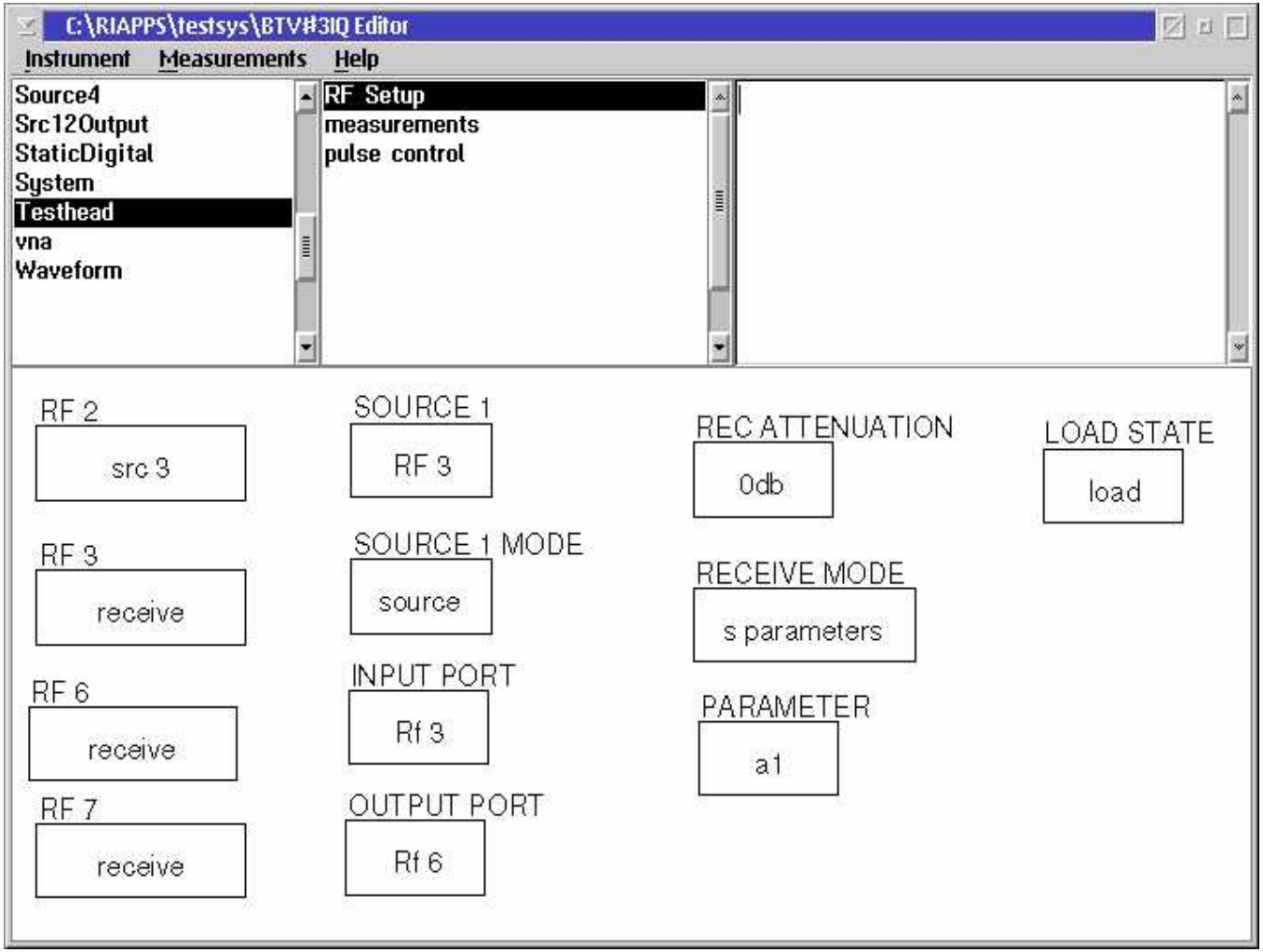
Overview

Tester Viewer Panels
Device Control
Advanced Test Plan Buttons
Generic GPIB Instruments
Questions?

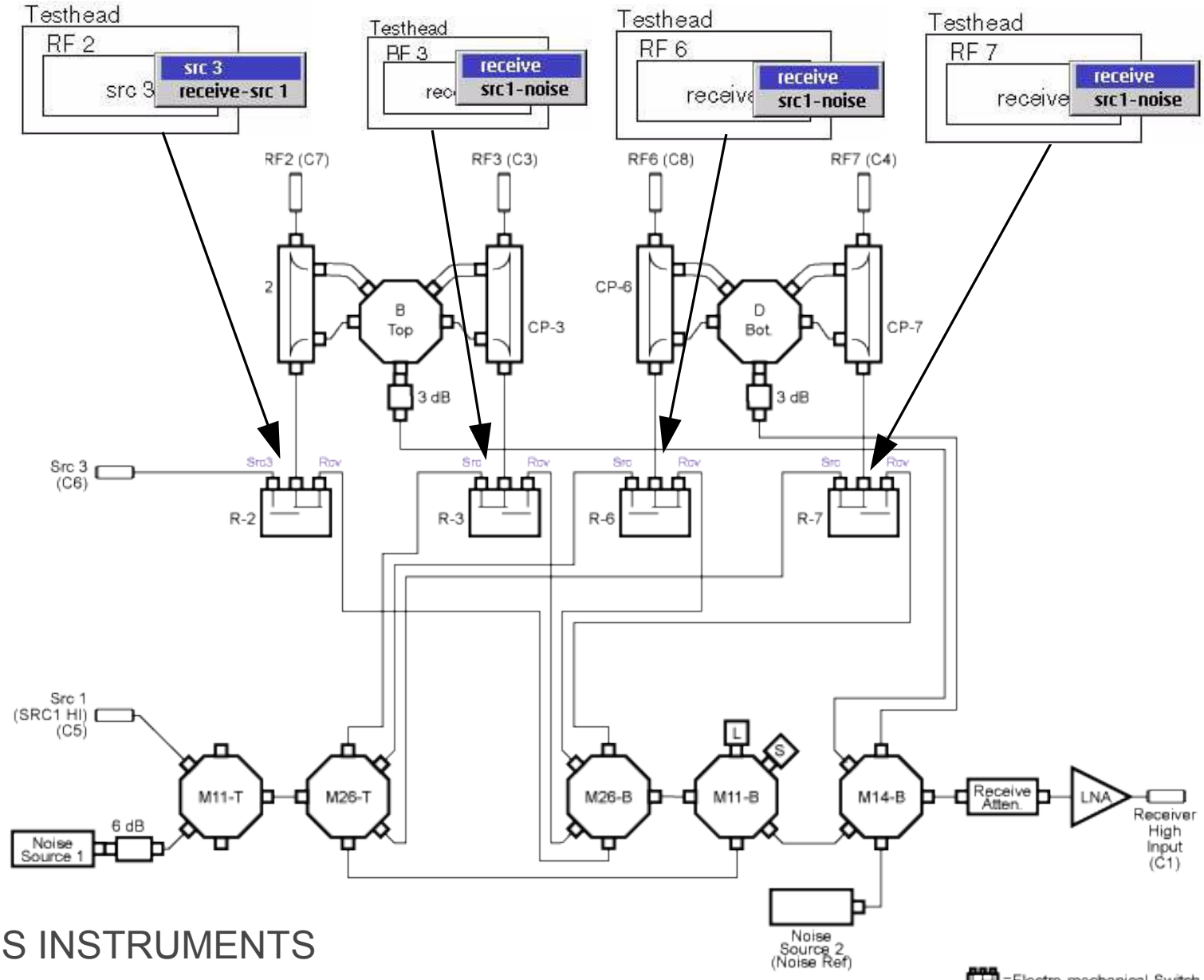
Testset Block Diagram



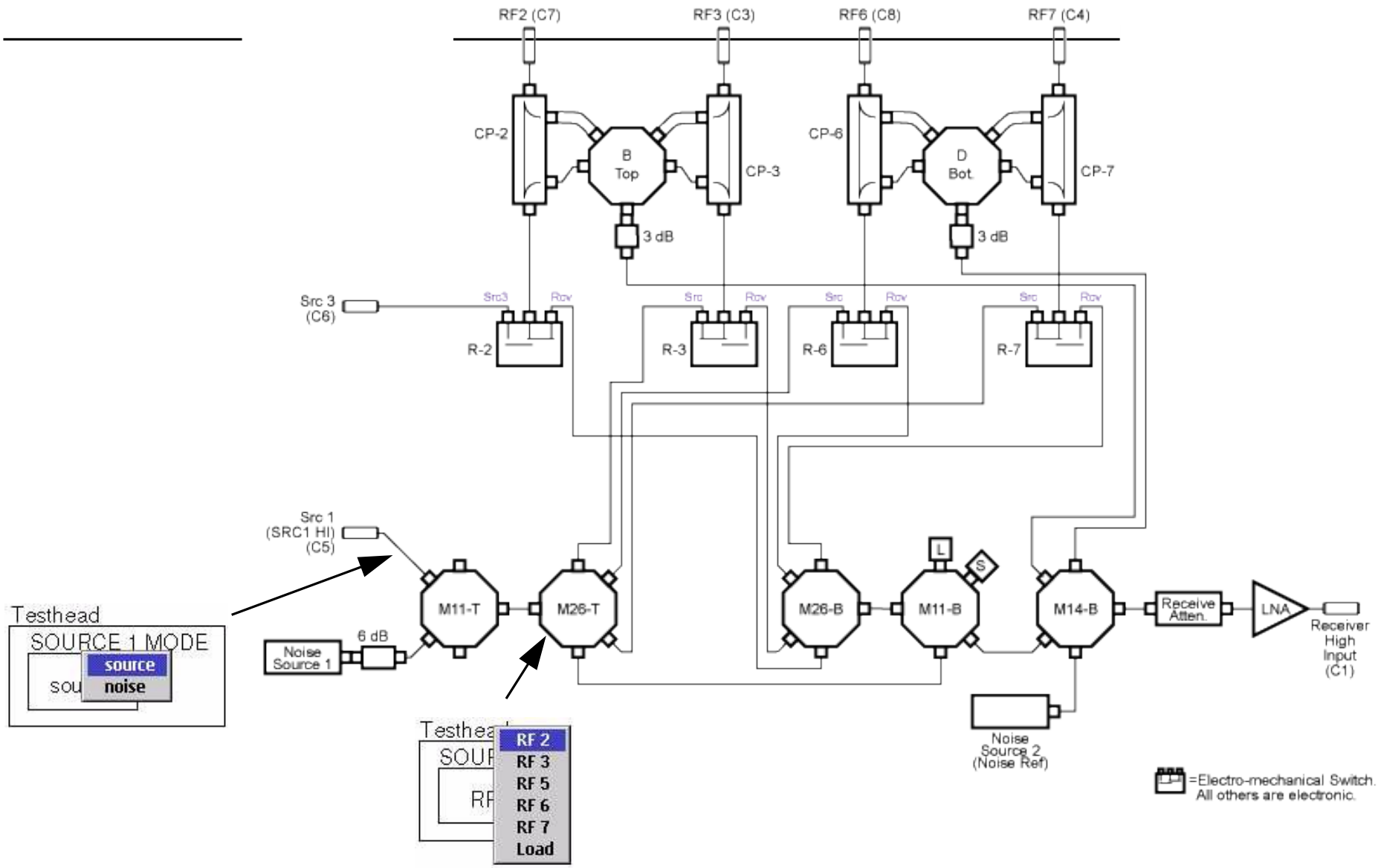
Testhead & Testset Editor



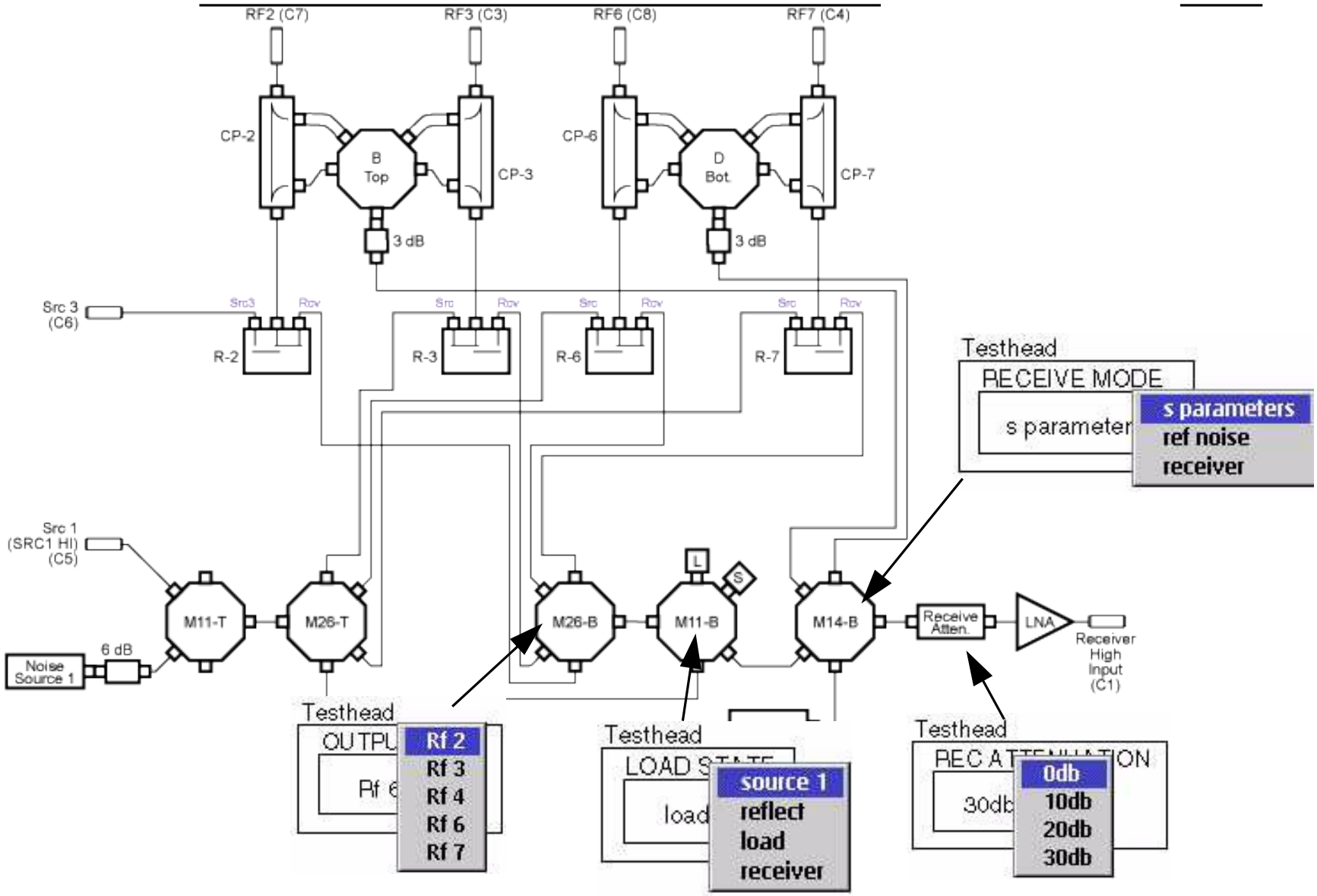
Port Set-up


Testhead
RF 2
src 3
src 3
receive-src 1
Testhead
RF 3
rec
receive
src1-noise
Testhead
RF 6
receive
receive
src1-noise
Testhead
RF 7
receive
receive
src1-noise
RF2 (C7)
RF3 (C3)
RF6 (C8)
RF7 (C4)
2
B
Top
CP-3
CP-6
D
Bot
CP-7
3 dB
3 dB
Src 3
(C6)
Src3
Rcv
Src
Rcv
Src
Rcv
Src
Rcv
R-2
R-3
R-6
R-7
Src 1
(SRC1 HI)
(C5)
M11-T
M26-T
M26-B
M11-B
L
S
M14-B
Receive
Atten.
LNA
Receiver
High
Input
(C1)
6 dB
Noise
Source 1
Noise
Source 2
(Noise Ref)
=Electro-mechanical Switch.
All others are electronic.

Stimulus


RF2 (C7)
RF3 (C3)
RF6 (C8)
RF7 (C4)
CP-2
B
Top
CP-3
CP-6
D
Bot
CP-7
3 dB
3 dB
Src 3
(C6)
Src3
Rcv
Src
Rcv
Src
Rcv
Src
Rcv
R-2
R-3
R-6
R-7
Src 1
(SRC1 HI)
(C5)
Testhead
SOURCE 1 MODE
source
noise
Noise
Source 1
6 dB
M11-T
M26-T
M26-B
L
S
M11-B
M14-B
Receive
Atten.
LNA
Receiver
High
Input
(C1)
Noise
Source 2
(Noise Ref)
RF 2
RF 3
RF 5
RF 6
RF 7
Load
=Electro-mechanical Switch.
All others are electronic.

Receive


RF2 (C7)
RF3 (C3)
RF6 (C8)
RF7 (C4)
CP-2
B
Top
CP-3
CP-6
D
Bot
CP-7
3 dB
3 dB
Src 3
(C6)
Src3
Rcv
Src
Rcv
Src
Rcv
Src
Rcv
R-2
R-3
R-6
R-7
Testhead
RECEIVE MODE
s parameter
s parameters
ref noise
receiver
Src 1
(SRC1 HI)
(C5)
M11-T
M26-T
M26-B
L
S
M11-B
M14-B
Receive
Atten.
LNA
Receiver
High
Input
(C1)
6 dB
Noise
Source 1
Testhead
OUTPU
Rf 2
Rf 3
Rf 4
Rf 6
Rf 7
Testhead
LOAD S
load
source 1
reflect
load
receiver
Testhead
REC AT ON
30db
0db
10db
20db
30db

Sampled Waves