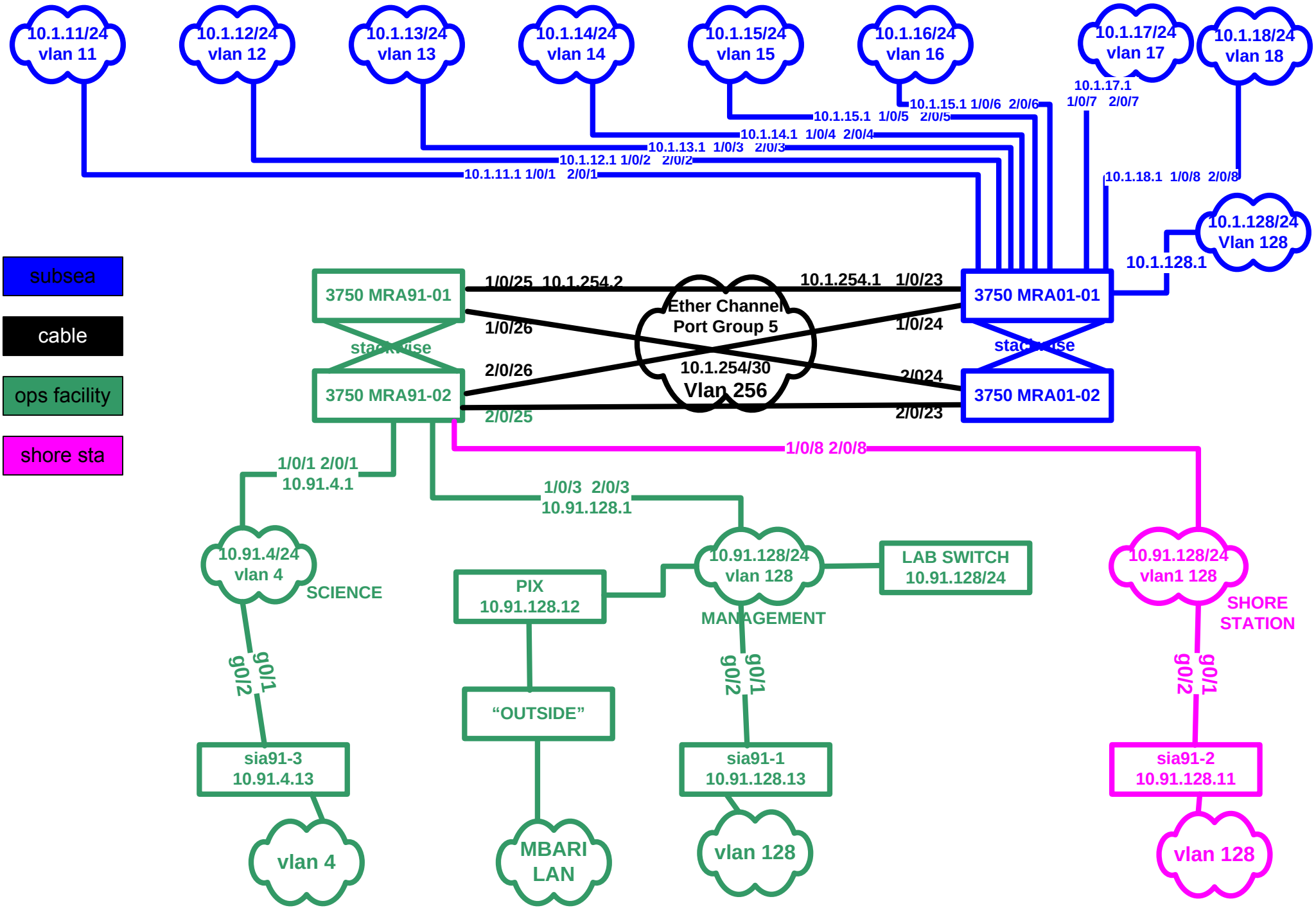
NETWORK CABLE/ CAT 5 CHECKUP

1) Check all CAT5 connections in both subsea and shore stations. Compare to manual to insure that they agree with both:

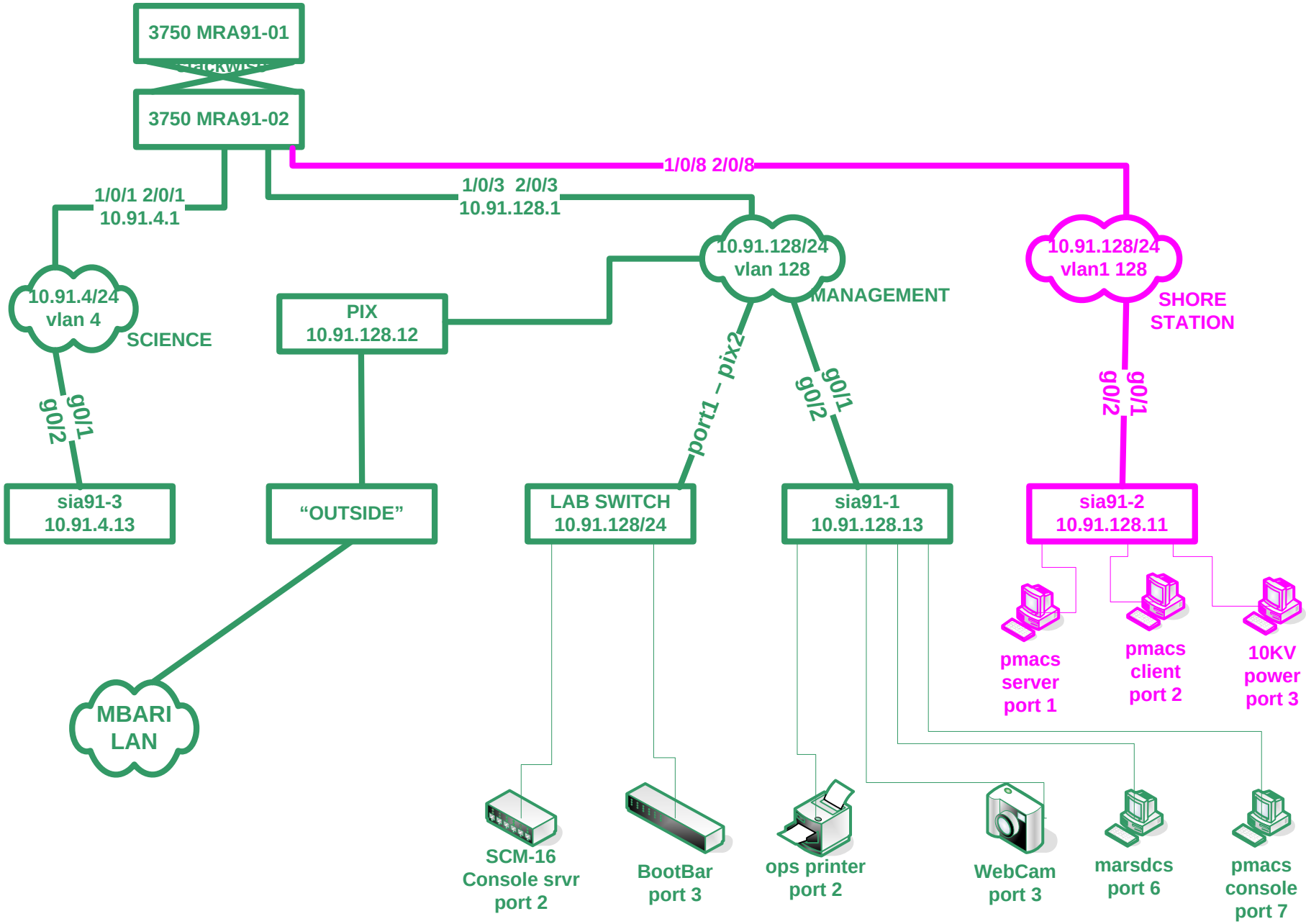
Network Diagrams that follow

Network Tables that follow

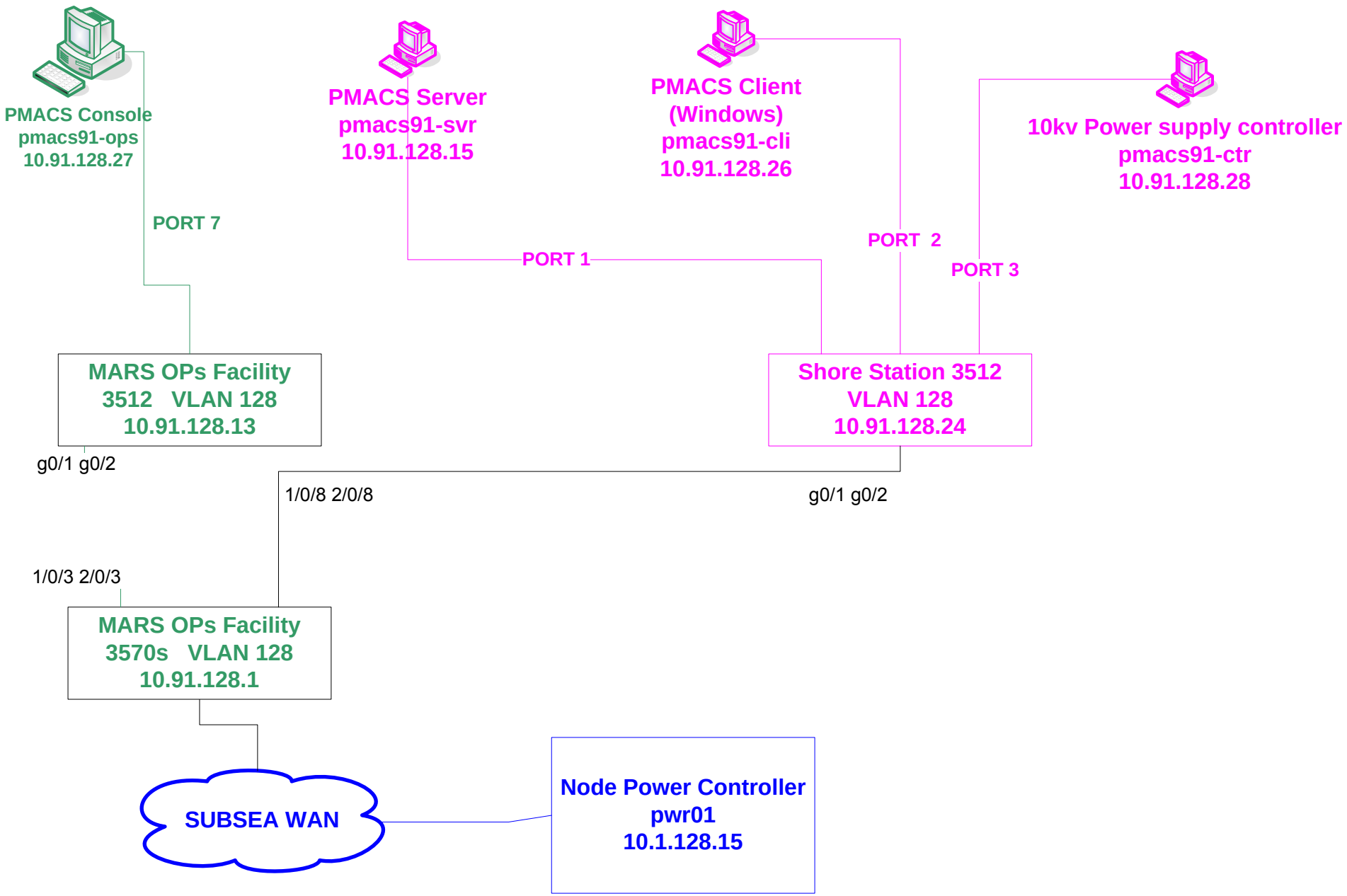
V02 – DCS Opened Node Validation (subnets)



V02 – DCS Opened Node Validation (detail of 10.91.128.0/24 subnet)



Network Diagram 4 (detail of MARS power systems Elements)



V02 – DCS Opened Node Validation – ports for mra91-01 and mra91-02

01-East SHORE 02-West

port	vlans	to	port	Desc
1/0/01	4T	Sia91-3	Gi0/1	Science switch
1/0/02	4			
1/0/03	128T	Sia91-1	Gi0/1	ops fac switch
1/0/04	128			
1/0/05	128	linksys	1	linksys
1/0/06	128			
1/0/07	128			
1/0/08	128T	sia91-2	Gi0/1	shore sta switch
1/0/09	128			
1/0/10	128			
1/0/11	128	(lanf-temp)		
1/0/12	128			
1/0/13	128			
1/0/14	128	PIX		10.91.128.12
1/0/15	128	GYDA		10.91.128.14
1/0/16	128			
1/0/17	128	ntp		10.91.128.55
1/0/18	128			
1/0/19				
1/0/20				
1/0/21				
1/0/22				
1/0/23				
1/0/24				
1/0/25	256	Mra01-01	1/0/23	etherchannel
1/0/26	256	Mra01-02	2/0/24	etherchannel
1/0/27				
1/0/28				

port	vlans	to	port	Desc
2/0/01	4T	Sia91-3	Gi0/2	Science switch
2/0/02	4			
2/0/03	128T	Sia91-1	Gi0/2	ops fac switch
2/0/04	128			
2/0/05	128			
2/0/06	128			
2/0/07	128			
2/0/08	128T	sia91-2	Gi0/2	shore sta switch
2/0/09	128			
2/0/10	128			
2/0/11	128			
2/0/12	128			
2/0/13	128			
2/0/14	128			
2/0/15	128			
2/0/16	128			
2/0/17	128			
2/0/18	128			
2/0/19				
2/0/20				
2/0/21				
2/0/22				
2/0/23				
2/0/24				
2/0/25	256	Mra01-02	2/0/23	etherchannel
2/0/26	256	Mra01-01	1/0/24	etherchannel
2/0/27				
2/0/28				

V02 – DCS Opened Node Validation – ports for mra01-01 and mra01-02

01 (A51) SEA 02 (A52)

port	vlans	to	port	Desc
1/0/01	11	ADCP		science
1/0/02	12			science
1/0/03	13			science
1/0/04	14			science
1/0/05	15			science
1/0/06	16			science
1/0/07	17			science
1/0/08	18			science
1/0/09	128	Node pwr ctl		10.1.128.15
1/0/10	128			
1/0/11	128			
1/0/12	128			
1/0/13				
1/0/14				
1/0/15				
1/0/16				
1/0/17				
1/0/18				
1/0/19				
1/0/20				
1/0/21				
1/0/22				
1/0/23	256	Mra91-01	1/0/25	**A51J23 – B04**
1/0/24	256	Mra91-02	2/0/26	**A51J24 – B06**
1/0/25				
1/0/26				
1/0/27				
1/0/28				

port	vlans	to	port	Desc
2/0/01	11			science
2/0/02	12			science
2/0/03	13			science
2/0/04	14			science
2/0/05	15			science
2/0/06	16			science
2/0/07	17			science
2/0/08	18			science
2/0/09	128	GYDA	**A52J09**	10.1.128.14 – B03
2/0/10	128			
2/0/11	128	cyclades	**A51J11**	10.1.128.20 – B02
2/0/12	128			
2/0/13				
2/0/14				
2/0/15				
2/0/16				
2/0/17				
2/0/18				
2/0/19				
2/0/20				
2/0/21				
2/0/22				
2/0/23	256	Mra91-02	2/0/25	**A52J23 – B07**
2/0/24	256	Mra91-01	1/0/26	**A52J24 – B05**
2/0/25				
2/0/26				
2/0/27				
2/0/28				

LOGS are on /var/log/ciscl.log

DCS OPTICAL CHECKUP

Repeat of the V01_DCSoptical test is somewhat invasive at this point, so we will only test a subset of key optical points. Using the designators in the test sheets that follow, check the optical levels at and record in the tables that follow:

SEA

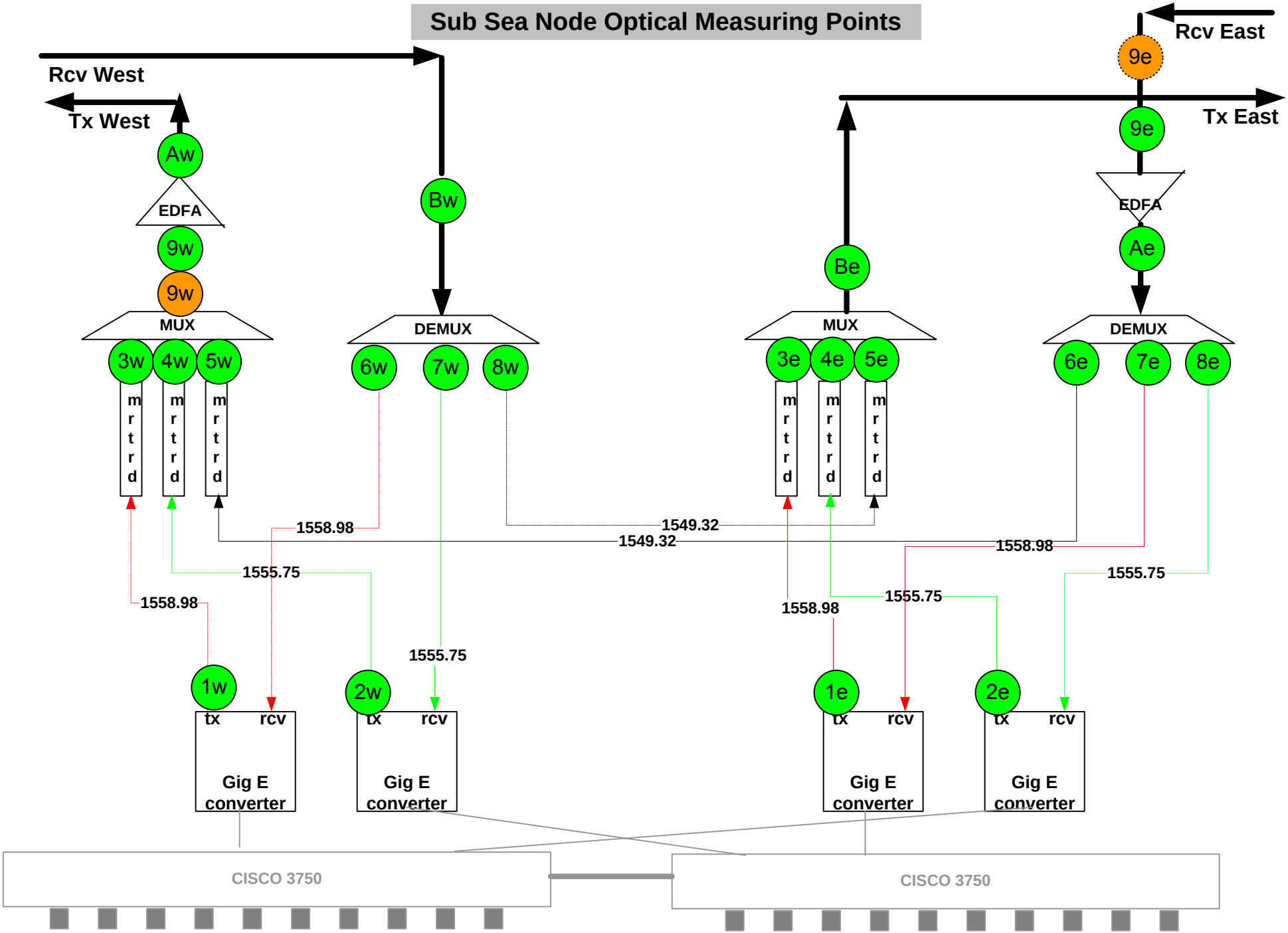
AW – West EDFA out	BW – West Demux input
BE - East mux out	9E - East EDFA input

SHORE

BW – West EDFA out	CW – West Demux input
CE - East mux out	AE - East EDFA input

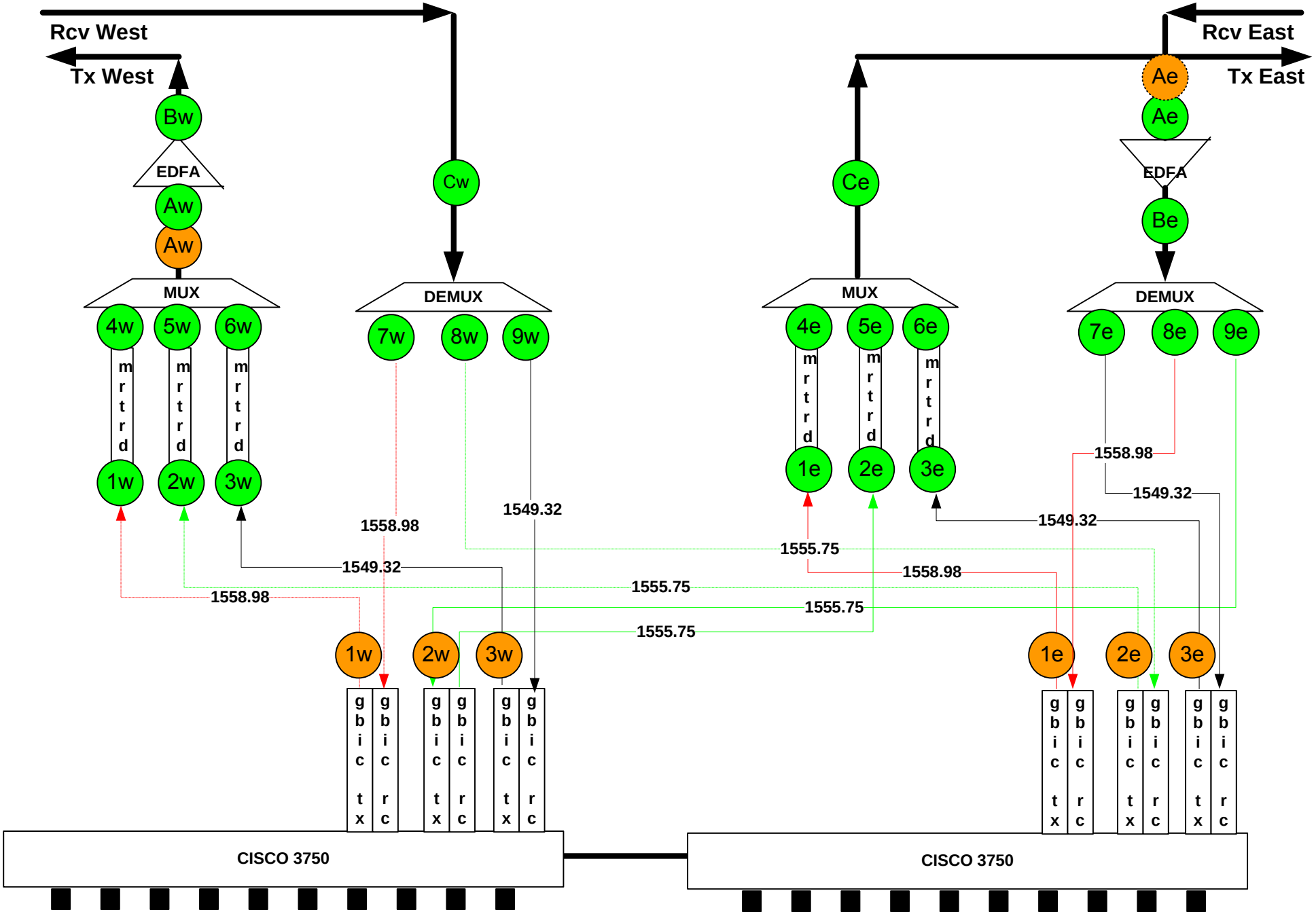
V01 - MARS Validation - DCS Optical Testing

Sub Sea Node Optical Measuring Points



V01 - MARS Validation - DCS Optical Testing

Shore Node Optical Measuring Points



V01 - MARS Validation - DCS Optical Testing

Optical Table for SUB SEA NODE - EAST			
point	λ	desc	measured
1e	1310	OE converter output to 1558.98	
2e	1310	OE converter output to 1555.75	
3e	1550	Mux input from MRTR 1558.98	
4e	1550	Mux input from MRTR 1555.75	
5e	1550	Mux input from MRTR 1549.32	
6e	1550	Demux received input 1558.98	
7e	1550	Demux received input 1555.75	
8e	1550	Demux received input 1549.32	
9e	1550	Input into EDFA	
Ae	1550	Output of EDFA	
Be	1550	Mux Output	

Optical Table for SUB SEA NODE - WEST			
point	λ	desc	measured
1w	1310	OE converter output to 1558.98	
2w	1310	OE converter output to 1555.75	
3w	1550	Mux input from MRTR 1558.98	
4w	1550	Mux input from MRTR 1555.75	
5w	1550	Mux input from MRTR 1549.32	
6w	1550	Demux received input 1558.98	
7w	1550	Demux received input 1555.75	
8w	1550	Demux received input 1549.32	
9w	1550	Input into EDFA *after* attenuator	
Aw	1550	Output of EDFA	
Bw	1550	DeMux Input	

V01 - MARS Validation - DCS Optical Testing

Optical Table for SHORE STATION EAST			
point	λ	desc	measured
1e	1310	SFP output to 1558.98 *AFTER* attenuator	
2e	1310	SFP output to 1555.75 *AFTER* attenuator	
3e	1310	SFP output to 1549.32 *AFTER* attenuator	
4e	1550	Mux input from MRTR 1558.98	
5e	1550	Mux input from MRTR 1555.75	
6e	1550	Mux input from MRTR 1549.32	
7e	1550	Demux received input 1558.98	
8e	1550	Demux received input 1555.75	
9e	1550	Demux received input 1549.32	
Ae	1550	EDFA Input	
Be	1550	EDFA Output	
Ce	1550	Mux Output	

Optical Table for SHORE STATION WEST			
point	λ	desc	measured
1w	1310	SFP output to 1558.98 *AFTER* attenuator	
2w	1310	SFP output to 1555.75 *AFTER* attenuator	
3w	1310	SFP output to 1549.32 *AFTER* attenuator	
4w	1550	Mux input from MRTR 1558.98	
5w	1550	Mux input from MRTR 1555.75	
6w	1550	Mux input from MRTR 1549.32	
7w	1550	Demux received input 1558.98	
8w	1550	Demux received input 1555.75	
9w	1550	Demux received input 1549.32	
Aw	1550	EDFA Input *AFTER* attenuator	
Bw	1550	EDFA Output	
Cw	1550	DeMux Input	

LINK and FAILOVER TEST

The V02_DCSopen_node was the most extensive test for DCS Validation. It involved a lot of invasive pulling of fibers, sfps and BER testing which was important to test initial integration properties but a repeat is not required. We have done failover testing at UW but will repeat it here as a final check of the fibering. In addition the first tests of data over the science cables are performed here:

Using the following pages, start with the link-propagation test.

Next perform to the failover test as described in the procedure and diagrams that follow. Record the results in the table

V02- DCS Opened Node Validation - Test Router Failover

PRELIMINARY TEST

Before beginning, we will test the link propagation function of the four etherchannel links.
From the shore Routers, disconnect each of the following links, Watching the subsea router note the corresponding port LED and insure that the LED goes out. Then re-attach the shore link and insure that the LED relights to green.
Now repeat the process, this time disonnecting the four links, listed below, on the subsea node.

SHORE SIDE TEST

Pull this port		Check this LED	
Shore Router	Shore Port	Subsea Router	Subsea Port
mra91-01	25	mra01-01	23
mra91-01	26	mra01-02	24
mra91-02	25	mra01-02	23
mra91-02	26	mra01-01	24

SubSEA SIDE TEST

Pull this prot		Check this LED	
Subsea Router	Subsea Port	Shore Router	Shore Port
mra01-01	23	mra91-01	25
mra01-02	24	mra91-01	26
mra01-02	23	mra91-02	25
mra01-01	24	mra91-02	26

V02- DCS Opened Node Validation - Test Router Failover

This test is done both before and after the Node is closed. Data is passed from the science wet port to the shore using a Lanforge data generator. The basic physical setup is shown on the next page. The following pages show schematics which demonstrate dissconnecting various paths on the Shore station to isolate and test individual data paths.

1) ON THE SHORE SIDE Place a Lanforge cable into one of the science VLAN ports of one of the CISCO routers

2) ON THE SUB SEA SIDE Using a WET ethernet connector connect a Lanforge port to one of the subsea science ports. Depending upon circumstances you may connect directly to the sub-sea router.

3) Run continuous pings from virtual devices from the shore to the sea and vice versa. Clock and interuptions in the pings while perfroming the folllowing actions:

4) On the SHORE SIDE remove the fibers one at a time from:

CISCO 91-01 port 26.
CISCO 91-02 port 25
CISCO 91-02 port 26

This cuts off the the other paths so that only the East-East .98 channel is being tested. Use Figure set_finalE98 to help understand the setup. Record any interuption in data and the length of the time to resume.

5) Repeat this test for the following channels (see set_data1 and set_data2 pages)

East .75 - remove the fiber from CISCO 91-01 port 25 and CISCO 91-02 port 25, 26.
West .98 - remove the fiber from CISCO 91-02 port 26 and CISCO 91-01 port 25, 26.
West .75 - remove the fiber from CISCO 91-02 port 25 and CISCO 91-01 port 25,26.

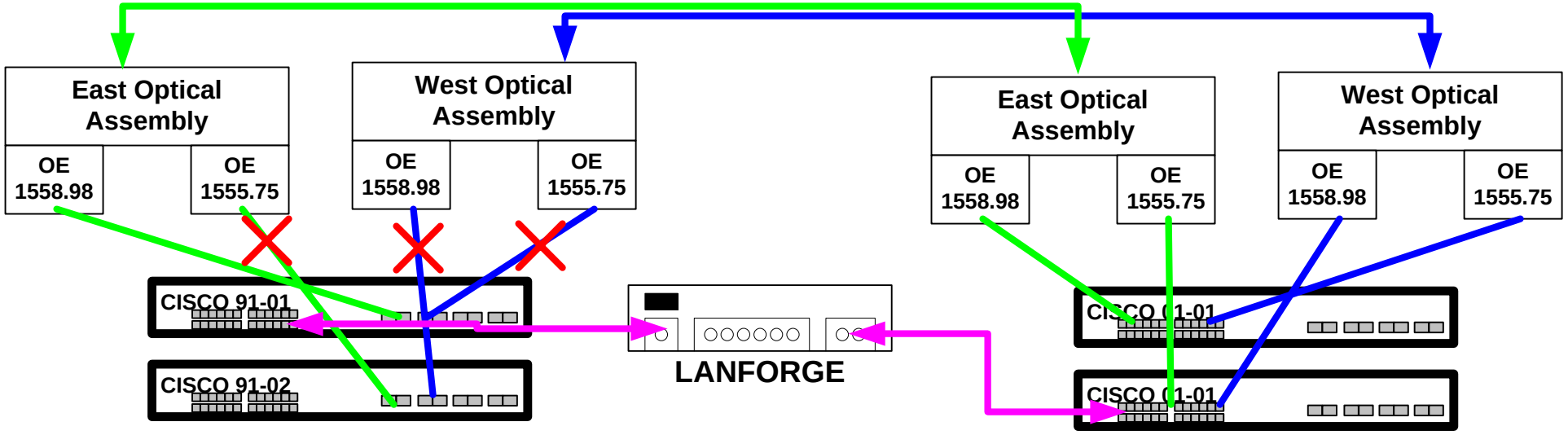
6) Repeat this test for the following channels on the sub-sea side.

East .75 - remove the fiber from CISCO 01-01 port 25 and CISCO 01-02 port 25, 26.
East .98 - remove the fiber from CISCO 01-01 port 25 and CISCO 01-02 port 25, 26.
West .98 - remove the fiber from CISCO 01-02 port 26 and CISCO 01-01 port 25, 26.
West .75 - remove the fiber from CISCO 01-02 port 25 and CISCO 01-01 port 25,26.

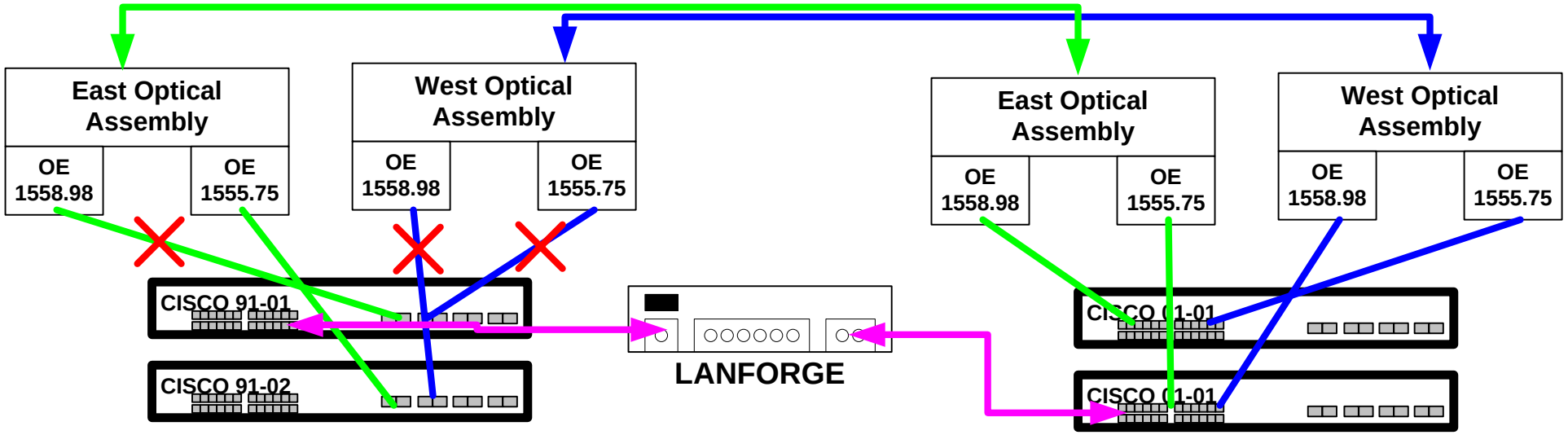
7) Using the listing in page “set_data3” disable each device and record the time to recover.

8) Record the results in the RESULTS section of this document

V02- MARS BER OPEN Test-Link Outage Handling

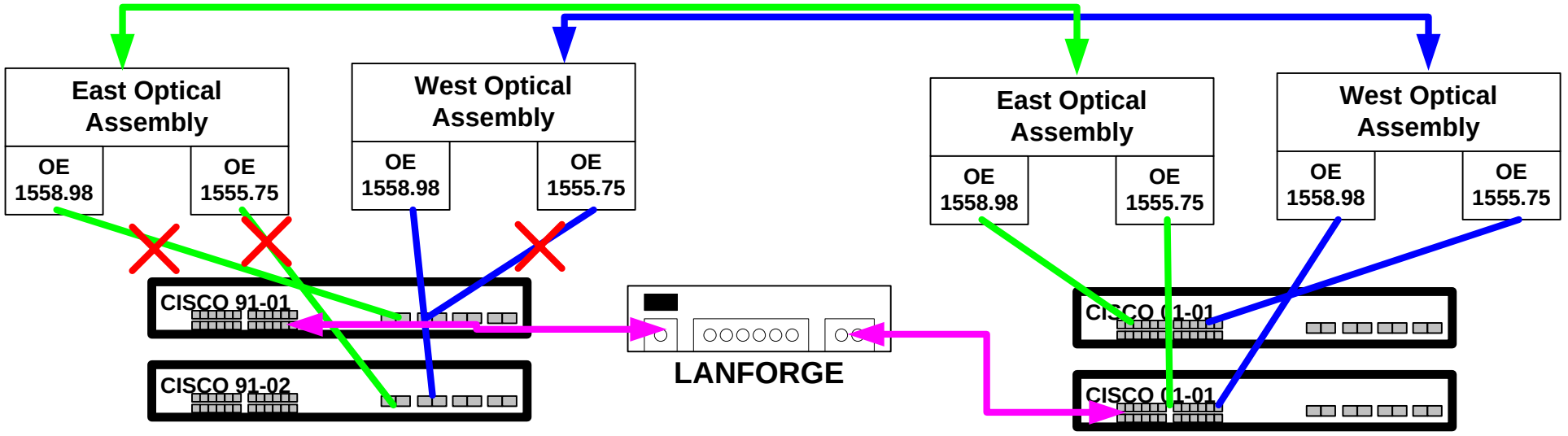


CHECKING EAST 1558.98 CHANNEL

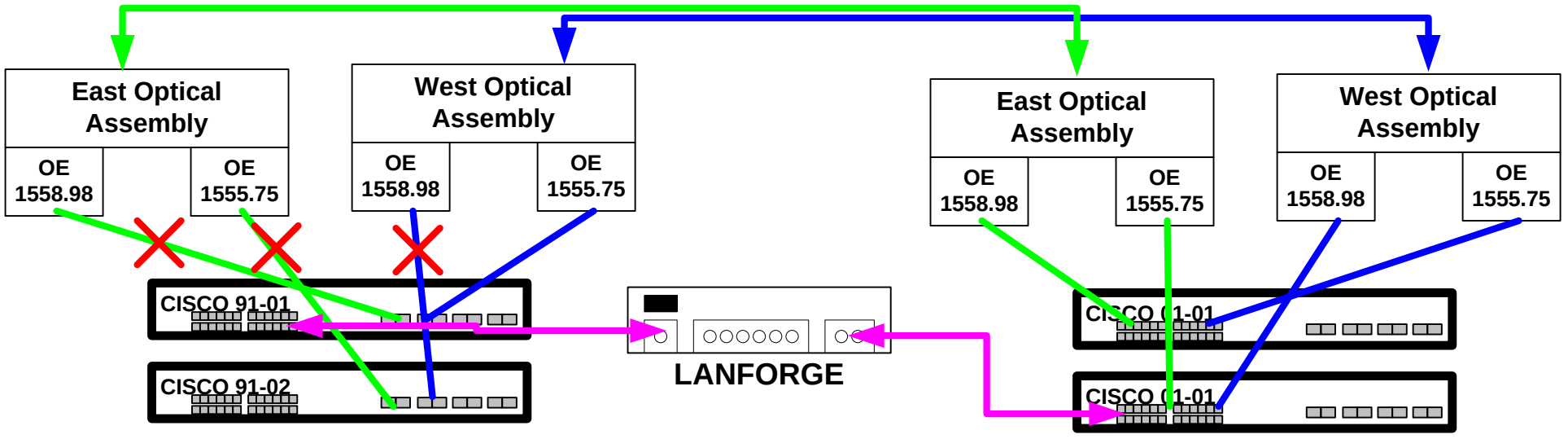


CHECKING EAST 1555.75 CHANNEL

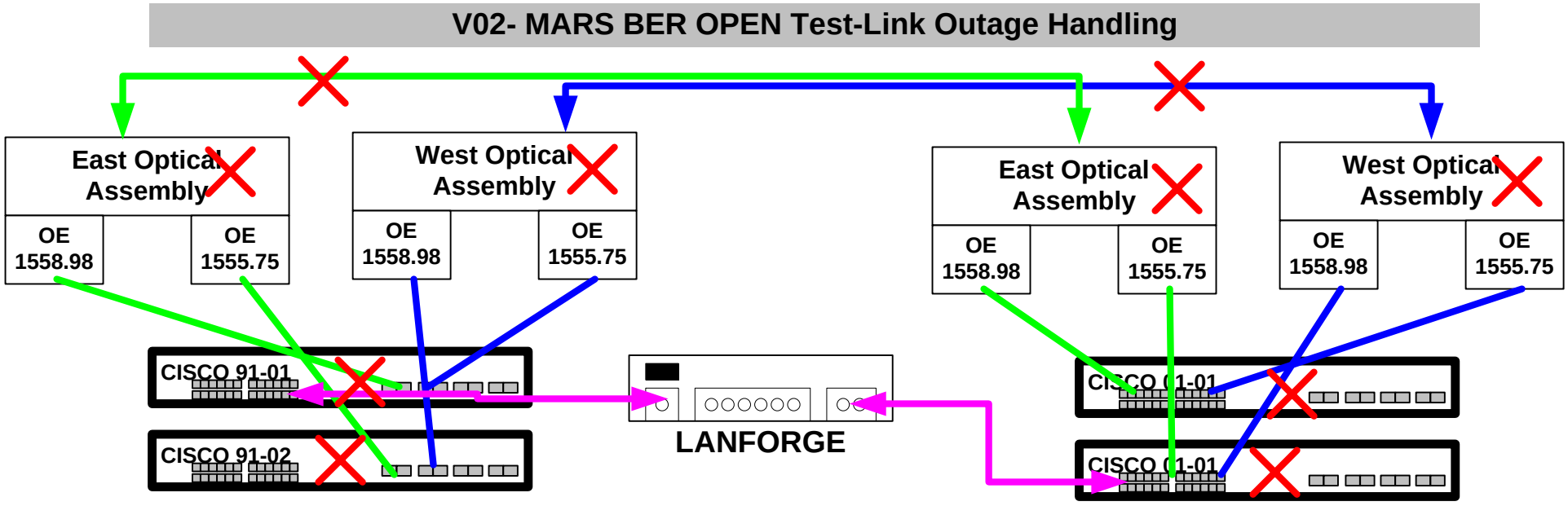
V02- MARS BER OPEN Test-Link Outage Handling



CHECKING WEST 1558.98 CHANNEL



CHECKING WEST 1555.75 CHANNEL



CHECKING FAILOVER OF ROUTES DUE TO VARIOUS DEVICE FAILURES

East Optical Assembly – SEA
West Optical Assembly – SEA
East Optical Assembly – SHR
West Optical Assembly – SHR

East Switch – SEA
West Switch– SEA
East Switch– SHR
West Switch– SHR

East Cable
West Cable

V02 – DCS Opened Node Validation – FAILOVER TESTS

COMMENTS	Test under 50% load.

LANFORGE SETUP -- Science Ports Used										
Local Port	Remote Port	Tx Load	Rx Load	Type	Local Port	Remote Port	Tx Load	Rx Load	Type
eth0	eth3	200M	56k	TCP	eth1	eth7	50M	56k	TCP
eth1	eth4	50M	56k	TCP					
eth1	eth5	50M	56k	TCP					
eth1	eth 6	50M	56k	TCP					

ETHERCHANNEL FAILOVER TEST							
Shore Ports Down				SEA Ports Down			
PATH Left Open	Test Start	Failover Time	Comment	PATH Left Open	Test Start	Failover Time	Comment
E98 1/25				E98 1/23			
E75 1/26				E75 2/24			
W98 2/25				W98 2/23			
W75 2/26				W75 1/24			

DCS DEVICE FAILOVER TEST							
Data Failover Test SHORE Devices Down				Data Failover Test SEA Devices Down			
Device Off	Test Start	Failover Time	Comment	Device Off	Test Start	Failover Time	Comment
NE East				NE East			
NE West				NE West			
mra91-01				mra01-01			
mra91-02				mra01-02			
West Cable				E75 OE			
East Cable				E98 OE			
				W75 OE			
				W98 OE			

Current and Temperature Test

Read all of the current readings and record them in the datasheets. It would be wise to check them both with Steve's front end and the PMACs front end to insure that they agree.

Record the Temperature readings in the table

V02 – DCS Opened Node Validation Temperature & Current

System Current Readings	
Device	amps
EDFA east	
EDFA west	
NE East	
NE West	
OE East .98	
OE East .75	
OE West .98	
OE West .75	
OBC	
node comms controllers	

System Termperature Readings	
Device	deg C
EDFA east	
EDFA west	
NE East	
NE West	
OE East .98	
OE West .98	
OBC	

Science Cable BER Test

This is an IP throughput test of each science cable with and without loads.

It has not been completed in the past. due to unsolved noise issues and is mandatory at this point.

V02 – DCS Opened Node Validation – Science Cable Tests

This test is done both before the Node is closed. Data is passed from the science wet port to the shore using a Lanforge data generator.

1) Using the Lanforge run 100 Mbs data through a science cable and record, in the table that follows, any errors reported by the lanforge. Also log into the CISCO routers at each end of the connection and do a “sh int gx/x/x” to look for errors.

2) This test is to be repeated with each of the 8 science cables.

3) This test is to be repeated again with heavy and undulating electrical power drawn through the cable being tested. See MBARI for details.

4) Again record the results in the second table.

V02 – DCS Opened Node Validation – Science Cable Tests

This test is done both before the Node is closed. Data is passed from the science wet port to the shore using a Lanforge data generator.

1) Run 100 Mbs data through a science cable and record any errors at the lanforge.

2) This test is to be repeated with each science cable

3) This test is to be repeated with heavy and undulating electrical power drawn through the cable being tested. See MBARI for details.

4) Record any error results in the RESULTS section of this document

V02 – DCS Opened Node Validation – Science Cable Tests- Under power load

COMMENTS	Test under 100% data load. NO POWER LOAD

LANFORGE SETUP -- Science Ports Used			
Local LF Port	Remote LF Port	Router loca	Router remote
eth0	eth4	g1/0/9	g1/0/2-8

Science Cable	Test Duration	Errors	Tx Load	Rx Load	Type
S1			100M	56k	TCP
S1			100M	56k	UDP
S2			100M	56k	TCP
S2			100M	56k	UDP
S3			100M	56k	TCP
S3			100M	56k	UDP
S4			100M	56k	TCP
S4			100M	56k	UDP
S5			100M	56k	TCP
S5			100M	56k	UDP
S6			100M	56k	TCP
S6			100M	56k	UDP
S7			100M	56k	TCP
S7			100M	56k	UDP
S8			100M	56k	TCP
S8			100M	56k	UDP

V02 – DCS Opened Node Validation – Science Cable Tests- Under power load

COMMENTS	Test under 100% data load. Perform with power load on cables (e.g. motor of similar per MBARI)

LANFORGE SETUP -- Science Ports Used			
Local LF Port	Remote LF Port	Router loca	Router remote
eth0	eth4	g1/0/9	g1/0/2-8

Science Cable	Test Duration	Errors	Tx Load	Rx Load	Type
S1			100M	56k	TCP
S1			100M	56k	UDP
S2			100M	56k	TCP
S2			100M	56k	UDP
S3			100M	56k	TCP
S3			100M	56k	UDP
S4			100M	56k	TCP
S4			100M	56k	UDP
S5			100M	56k	TCP
S5			100M	56k	UDP
S6			100M	56k	TCP
S6			100M	56k	UDP
S7			100M	56k	TCP
S7			100M	56k	UDP
S8			100M	56k	TCP
S8			100M	56k	UDP

OBC power test

This is a repeat of the V05A_OBCclosed_node. It is the last chance to fix an optical problem with the subsea OBC before sealing the node.

Complete this test as quoted on the following pages. The diagram should help. BE SURE to record the results in the following table for future debugging.

Perform the “OBC Connectivity test” show on the pages that follows. This will insure that everything was reconnnected properly

V05A OBCclosed_node – Optical Power Test

Purpose of Test:
This is a final test of the OBC optical power coming from the subsea transceivers. Since the OBC transceivers of the shore unit are readily accessable after node deployment, the V05_OBCopened_node test proceedure can be used for testing the shore station.

Procedure – Sub Sea Unit:
1) Procure a laptop with the serial_write.exe software (see WHOI)
2) Attach the laptop to the serial port on the **West A** OBC shore unit.
3) Disconnect the **A** fiber to the Shore OBC **East** unit.
3) Attach an optical power meter (1550nm) to the **East A** Shore OBC Fiber
4) We will send the ASCII "@" symbol which is a long pulse (X'40')
Start the serial_write.exe program to start sending a constant bit stream:

```
serial_write.exe -p/dev/ttyS0  -B23 -r-1 -x -c@
```

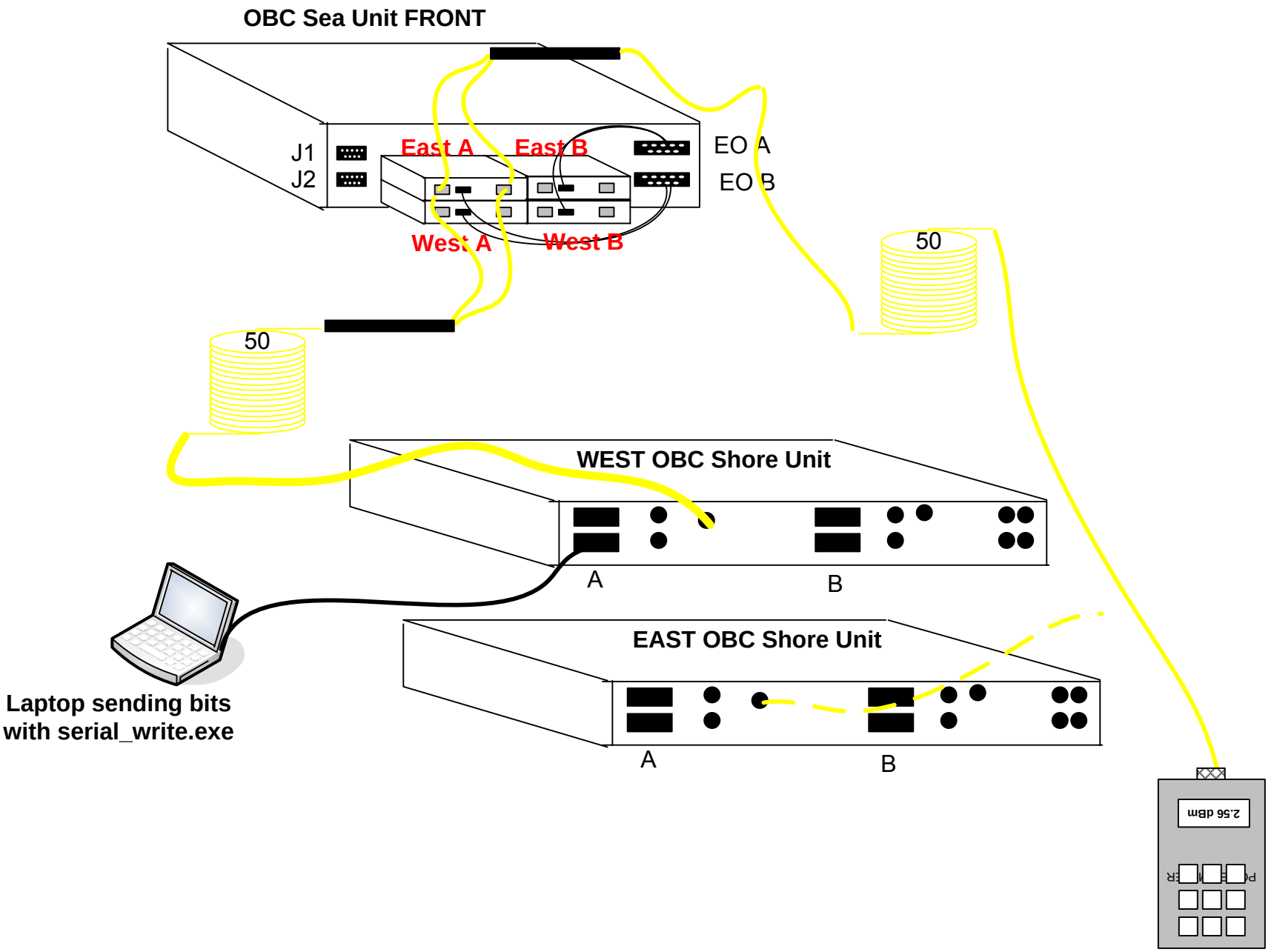
5) Record the optical power in the table at the end of this document.
6) We will send the ASCII "U" symbol which is a square wave (X'55')
Start the serial_write.exe program to start sending a constant bit stream:

```
serial_write.exe -p/dev/ttyS0  -B23 -r-1 -x -cU
```

7) Record the optical power in the table at the end of this document.
8) Repeat the test for the following:

LAPTOP	**OPTICAL POWER METER**
West B	East B
East A	West A
East B	West B

V05A OBCclosed_node Optical Power Test



V05A OBCclosed_node – OBC Connectivity Test

Procedure

Do a final check of the connectivity of OBC to the subsea for east of the four paths (East A, East B, West A, West B)

1) Connect a laptop to the WEST A serial port
2) Establish a serial connection 8N1 from the laptop
3) Check the connection by issuing a “help” command to the subsea OBC unit:
   ###S01AH

Move the serial cable to the other 3 OBC shore ports and issue the remaining help commands.

WEST A: ###S01AH
WEST B: ###S01BH
EAST A: ###S01AH
EAST B: ###S01BH

V05A OBCclosed_node

Date:		Location:		Engineer:	

Optical Power Sea	@	U
East A		
East B		
West A		
West B		

Timing Test

This is the “V06_OBCopen__time” test.

Most of the commands for synchronizing the timing system can be ignored since Steve has written a script to do this. However we repeat the commands on the following page.

The only requirement is to sync up the time and then measure the output signal from the subsea unit at the test points leading to and including the science cables.

Dick Littlefield has the small circuit for receiving at the science port.

Of course the key issue being checked for, other than excess jitter is any, noise on the line.

This test is to be performed with a heavy undulating load on the science cable.

Connect the scope probes are per the “V-06 OBC Opened Node Timing Test - Setup” page that follows. One probe connects to the subsea J1 port, the other to the shore staiton test point. Dick will help out here.
Snapshot or photograph the jitter.

Move the remote scope probe from the OBC box to the TD board and repeat the test

Move the remove scope probe to the end of the science cable and repeat the test. Dick will provide the circuit for the receiver

V-06 OBC Opened Node Timing Test-Setting the Time Offset

MEASURING and SETTING CLOCK DELAY

Expect an offset of (1sec x 2 x 10^8 ms^{-1})(fiber-length m)

STEP1: SYNC GPS TO THE SHORE CLOCK
#CKA address the shore clock
!GS have it send a #[gps-time]@ on the second and then unaddress
#CKA!S1 turn GPS sync on

STEP2: SYNC SEA TO SHORE CLOCK
#C01A address the sea clock
!T set in time mode
#CKA address the shore clock
?T have shore clock send the time
#C01A re-address the sea clock
?T display the sea clock time

STEP 3: LOG THE CURRENT SEA AND SHORE CLOCK TIMES
#CKA address the shore clock
!EC01A<cr> sends a #C01A!E@ to the SEA clock and then unadresses. This will cause the SEA clock to Echo an @ back
#CKA re-address the shore clock
?L2 display last two entries in the log
The log simply writes a timestamp anytime it sees an @. In this case the @ sent by the shore (CKA) writes the first entry and the one sent back from C01A writes the second entry

STEP 4: CALCULATE THE RELATIVE TIME OFFSET FROM SEA TO SHORE
the log will contain 2 lines with the times reported by the sea and shore clocks:
0000 19:49:19.590766
0000 19:49:19.576920
diff = (difference of times above) = 13846
round-trip = diff - 0.013333 = 513 (where 0.013333 is the pre programed delay for ring-around)
light-delay = round-trip / 2 = 256

STEP5: SET SEA CLOCK DELAY
#C01A address the SEA clock
?O display offset
!O0256 set light-delay from above

V-06 OBC Opened Node Timing Test

STEP6: Repeat the commands for the WEST B side using address:
CKB for the shore
C01B for the subsea

SUMMARY OF TIMING COMMANDS ISSUED TO CLOCKS

SHORE - #CKA #CKB

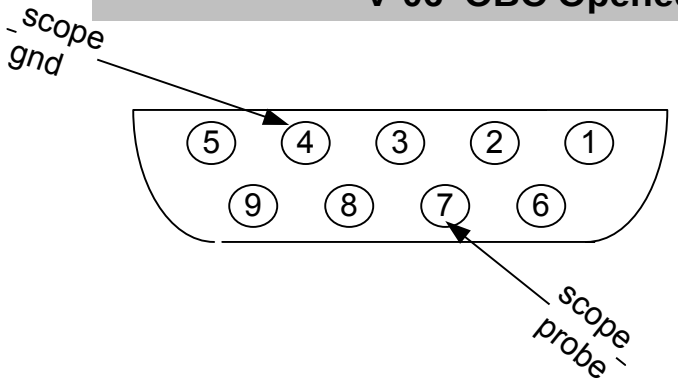
?T show real time clock value (not GPS)
?G determine if GPS is running V=no A=yes
?S show sync flag status
!S1 turn sync on
!T set clock
!S turn on sync flag after boot
?Ln display n log entries

SEA - #C01A #C01B

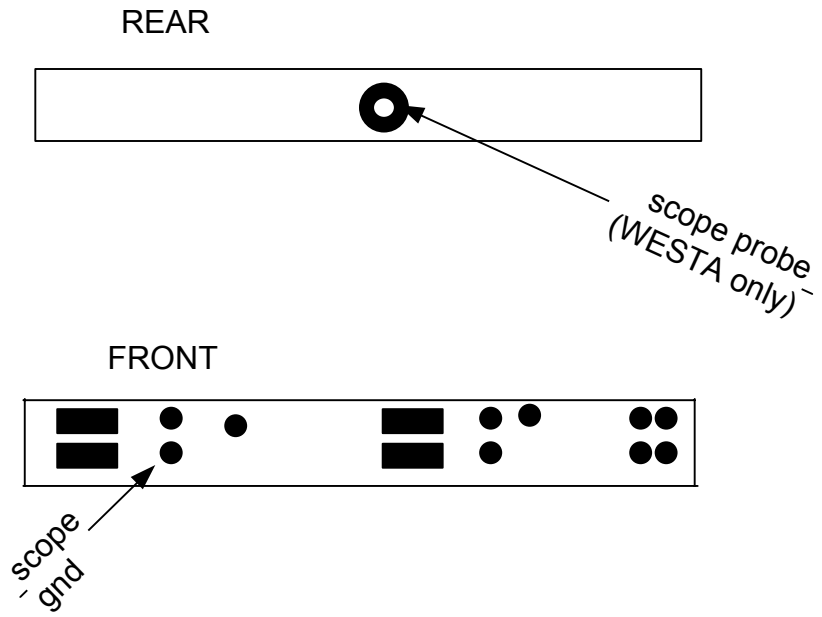
A locking status P gies (tiller – 6811 output)
!Q reset integrator
!T#CKA?T set the SEA clock to the value transmitted by the shore clock
!Tabcdefghij@ set the clock to time abcedfghij

AT OBC BOX

V-06 OBC Opened Node Timing Test - Setup



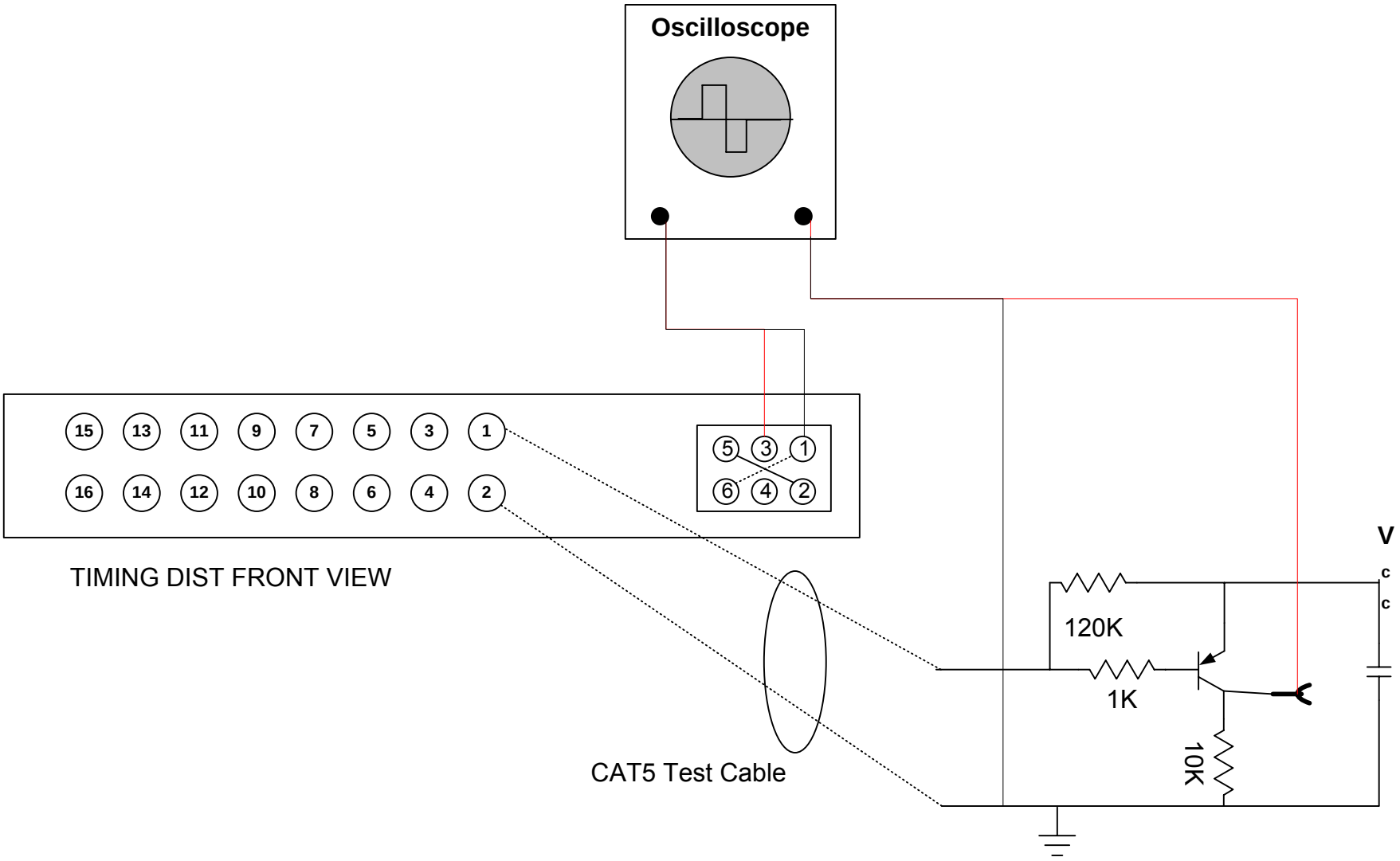
Probe points: J1-Time connector on OBC sub-sea unit



Probe points: With shore station open

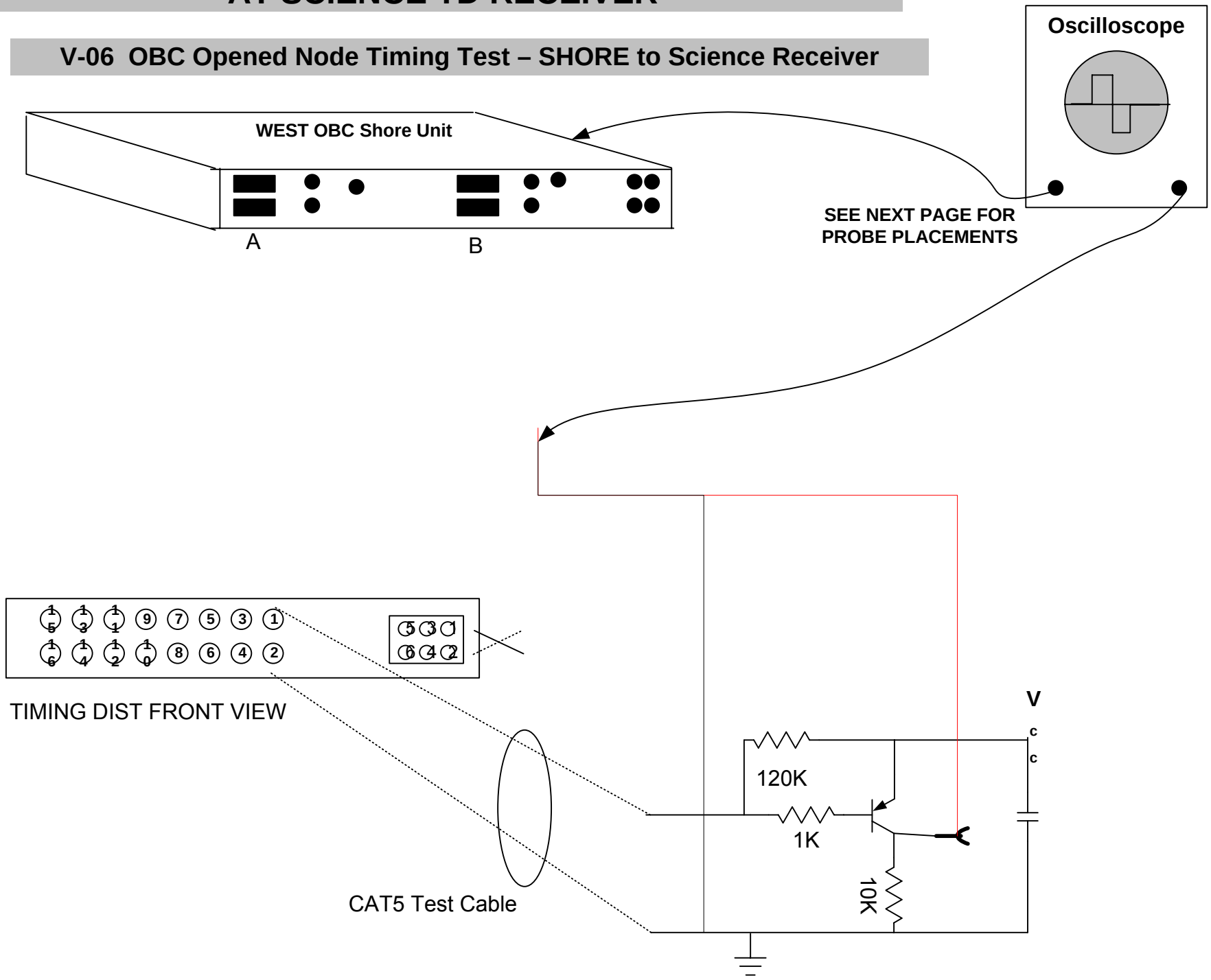
AT TD BOARD

V-06 OBC Opened Node Timing Test-TIMING DIST to SCIENCE RECIEVER

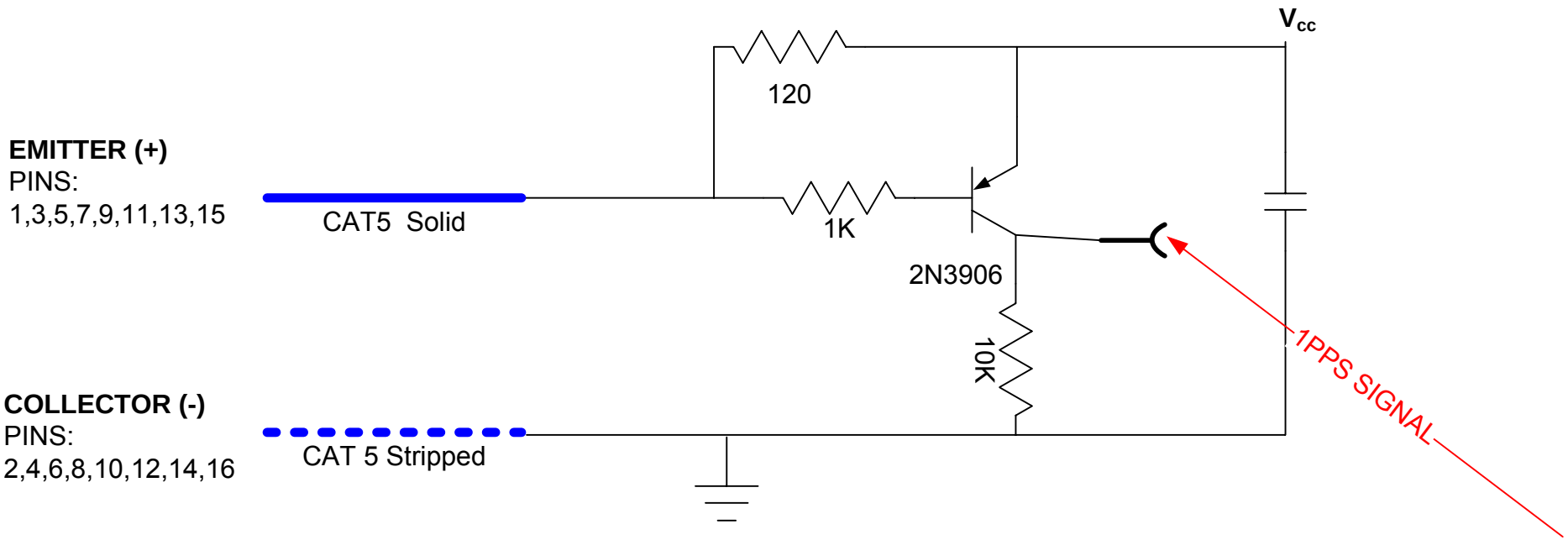


AT SCIENCE TD RECEIVER

V-06 OBC Opened Node Timing Test – SHORE to Science Receiver



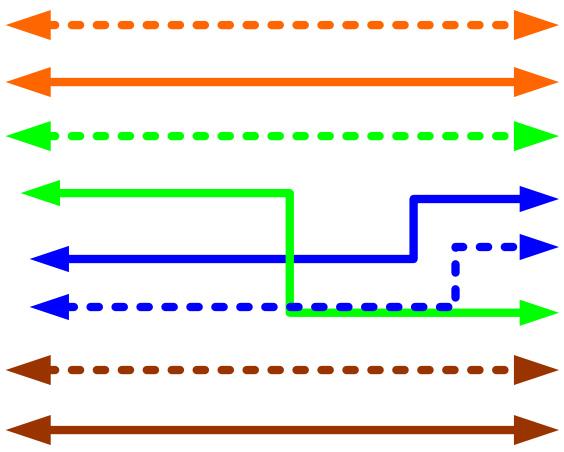
V-06 OBC Opened Node Timing Test-Science Timing Pulse Receiver



V-06 OBC Opened Node Timing Test-Science Wet Connector Pinout

WET CONNECTOR

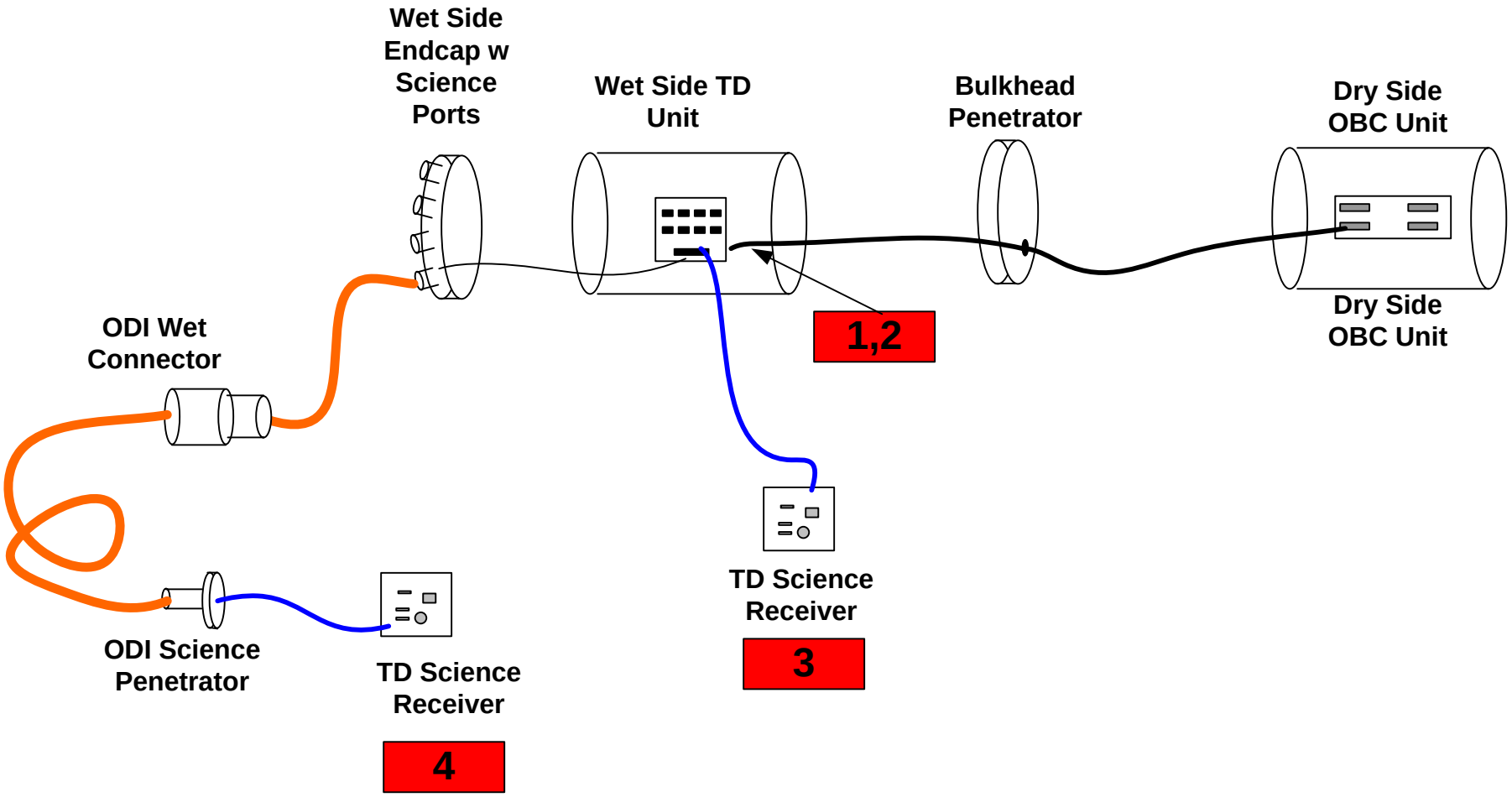
01	Orange White	Tx+
02	Orange	Tx-
03	Green White	Rx+
04	Green	Rx-
05	Blue	TD+
06	Blue White	TD-
07	Brown White	n/a
08	Brown	n/a
09	white	400V-
10	white	400V+
11	white	48V+
12	white	48V-



ETHERNET RJ45 T568B at SCIENCE INSTRUMENT

01	Orange White	Tx+
02	Orange	Tx-
03	Green White	Rx+
04	Blue	Rx-
05	Blue White	TD+
06	Green	TD-
07	Brown White	n/a
08	Brown	n/a

V-06 OBC Opened Node Timing Test



Test Points Shown in RED:

1) Power Source at Input to TD Board
2) Timing Pulse at Input to TD Board
3) Timing Pulse Directly From Output of TD Board
4) Timing Pulse at Science Penetrator

V-06 OBC Opened Node Timing Test

SCIENCE RECEIVER BOARD (LITTLEFIELD)