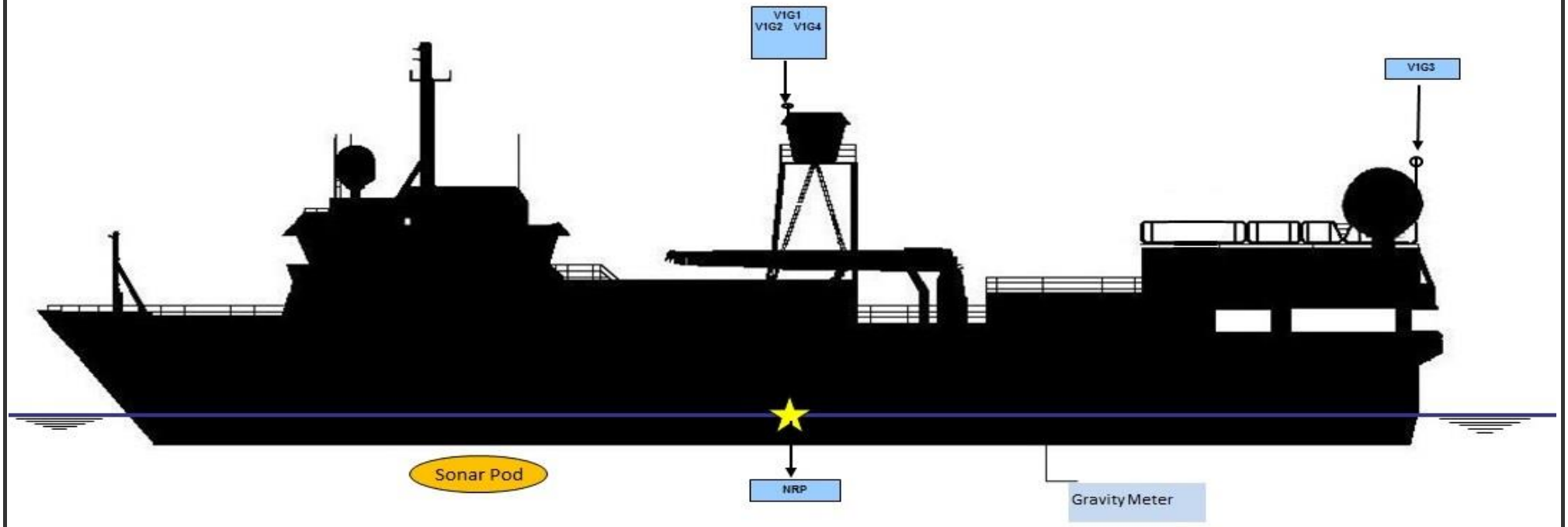
Company: L-DEO - Lamont - Doherty Earth Observatory
Vessel: Marcus G. Langseth
Client: Trehu - OSU / NSF

Project: MGL1610
Area: South Atlantic Ocean
Start Date: 21-Oct-16

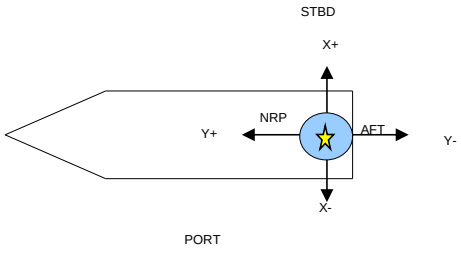
R/V Marcus G. Langseth - Vessel Sensor Offsets



Negative values are above water line

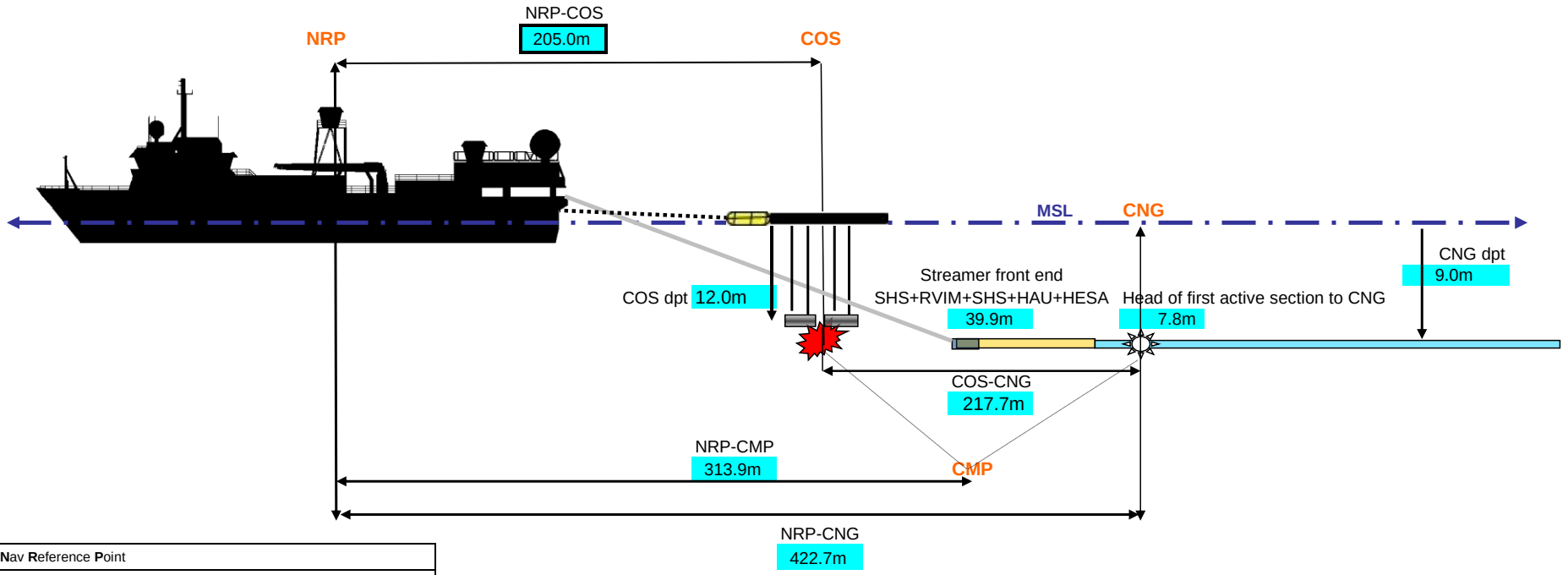
All measurements in meters

		STBD/PORT (X)	FORE/AFT (Y)	UP/DOWN (Z)
NRP	NAVIGATION REFERENCE POINT	0.00	0.00	0.00
V1G1	C-Nav 3050	0.00	0.00	-16.90
V1G2	SeaPath 200	0.00	1.50	-16.90
V1G3	C-Nav 2000	-2.10	-29.20	-14.50
V1G4	Pos MV	-1.30	1.20	-16.90
V1R1	PosNet	-1.30	0.00	-16.90
Sonar Pod	EM122 Knudsen ADCP	0.00	20.20	7.49
	EM122 Center Beam offset (in Spectra)	0/00	13.4	7.49
MRU	Seapath MRU	2.30	14.16	-4.30
BGM	Bell Gravity Meter	0.00	-13.10	1.10



Note: All Echosounders are used in Spectra with 6.6m ship's draft correction applied.

R/V Marcus G. Langseth - Towing Offsets



NRP	**N**av **R**eference **P**oint				
COS	**C**entre of **S**ource				
CNG	**C**entre of **N**ear **G**roup	**Trace #**	**1**	**Of S1**	
CMP	**C**ommon **M**id-**P**oint				
MSL	**Mean Sea Level**				
NRP-Stern	**29.5m**				
NRP-COS	**205.0m**				

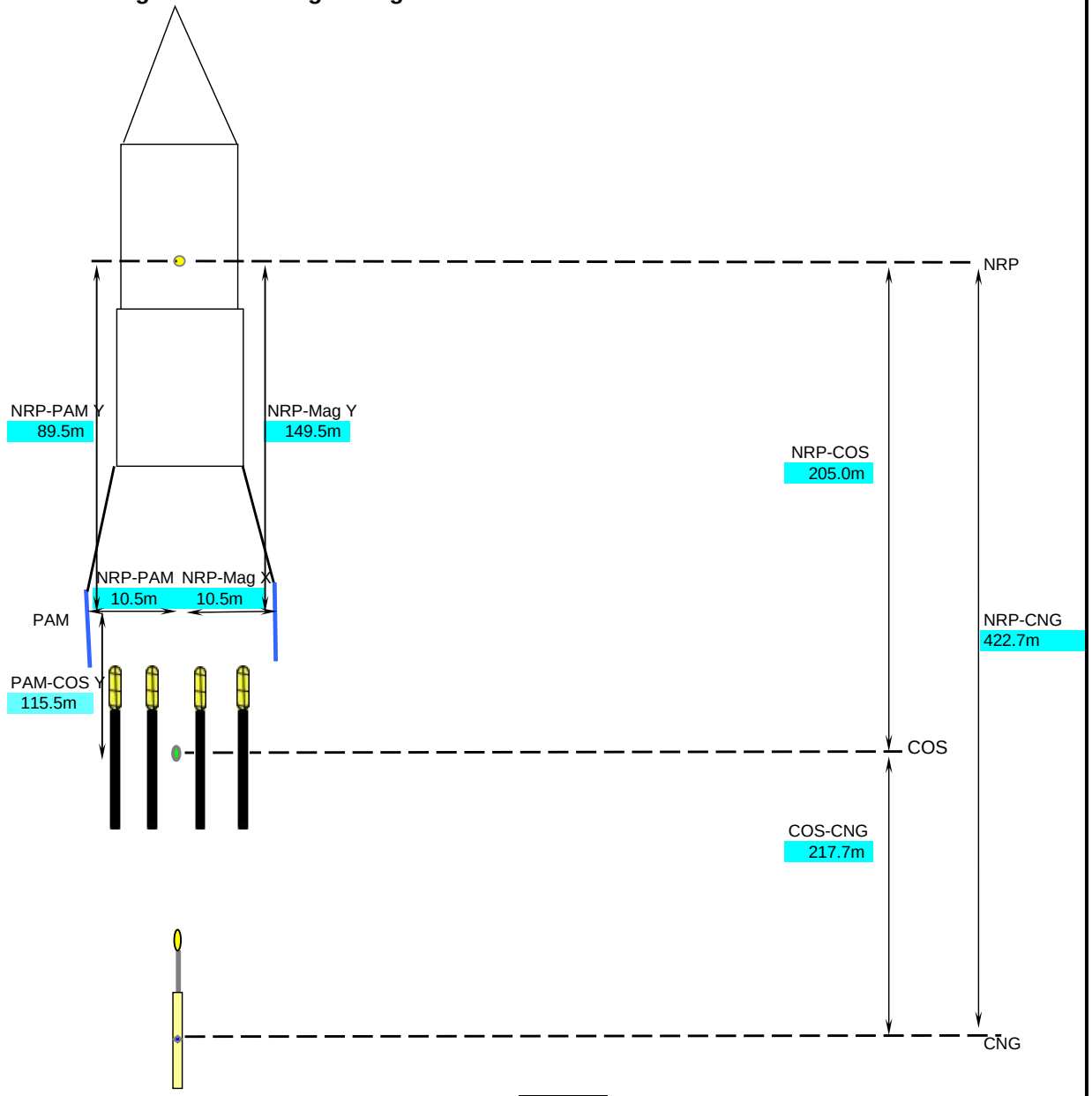
All measurements in meters

Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - Towing Configuration

	# Streamers	Length	Channels	Spacing
SEAL	1	12600	1008	12.5m

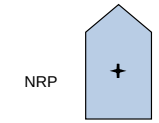
# Gun Strings Used	4	Vol (in^3)	6600



NOT to Scale

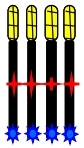
Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - Acoustic Offsets



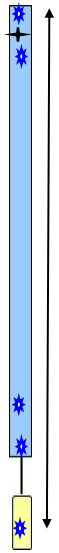
cng
acoustic

Source acoustic offsets are referenced to COS on individual gun string



G1T1	-9.6m
G2T1	-9.6m
G3T1	-9.6m
G4T1	-9.6m

Streamer acoustic offsets are referenced to CNG on individual streamer



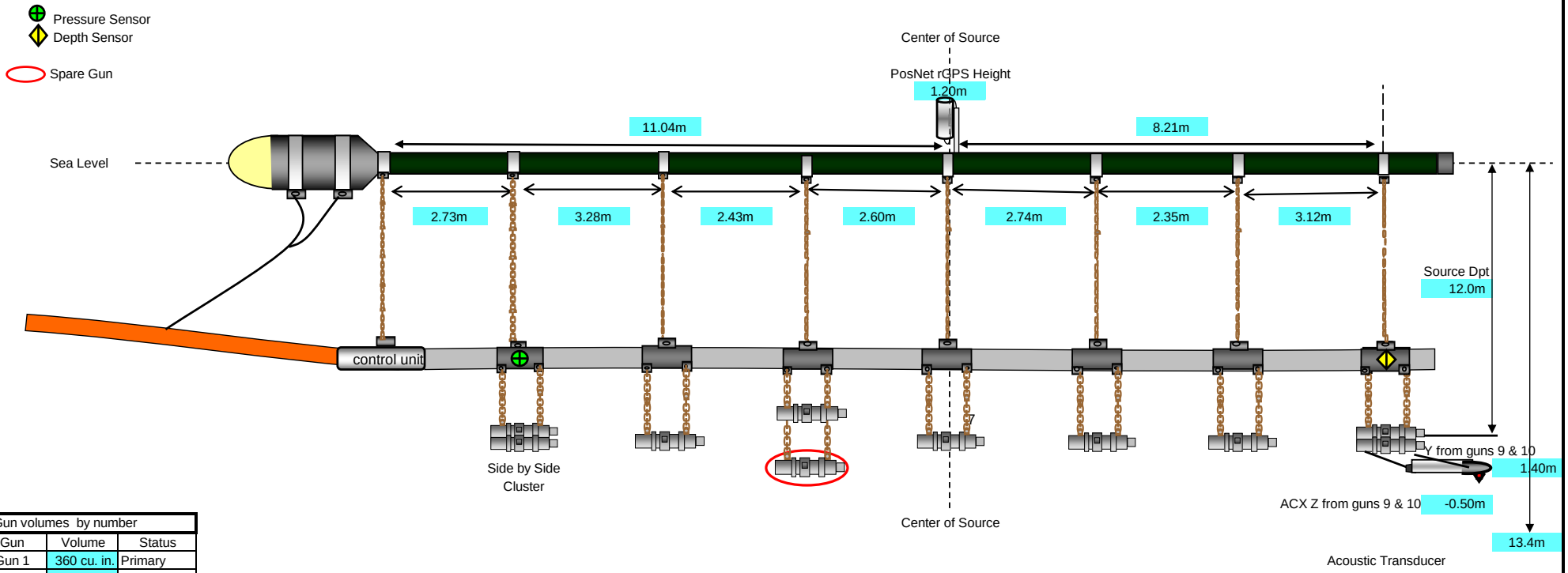
S1T1	-17.0m		
		S1T1-S1T2	150.3m
S1T2	-167.3m		

Head of first section to Tail buoy
########

S1T3	########		
		S1T3-S1T4	149.7m
S1T4	########		
		S1T4-S1T5	200.8m
S1T5	-1.0m	Tailbuoy acoustics referenced to RGPS pod	

Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - Gun Array Offsets



Gun volumes by number		
Gun	Volume	Status
Gun 1	360 cu. in.	Primary
Gun 2	360 cu. in.	Primary
Gun 3	40 cu. in.	Primary & Mitigation
Gun 4	180 cu. in.	Primary
Gun 5	180 cu. in.	Spare
Gun 6	90 cu. in.	Primary
Gun 7	120 cu. in.	Primary
Gun 8	60 cu. in.	Primary
Gun 9	220 cu. in.	Primary
Gun 10	220 cu. in.	Primary

Array total volume (without spares) is 6600 cu. in.

Total volume/string (without spare) 1650 cu. in.

Guns (1 &2) in a horizontal cluster, (5 & 6) and (9 & 10) in a vertical cluster

Horizontal Clusters are 1m from gun port to gun port

Gun clusters have 0.75m between guns and hang 0.95m from center of hanger

Single guns hang from hanger 1.15m

All measurements in meters

NOTE: drawing not to scale

All gun volumes, numbering, locations, and offsets were inspected and verified by Chief Source Mechanic.

Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - Gun Configuration

DT = Depth Transducer
ACX = Acoustic
P = Pressure Sensor - located in front of gun's 1 & 2

Center of Source

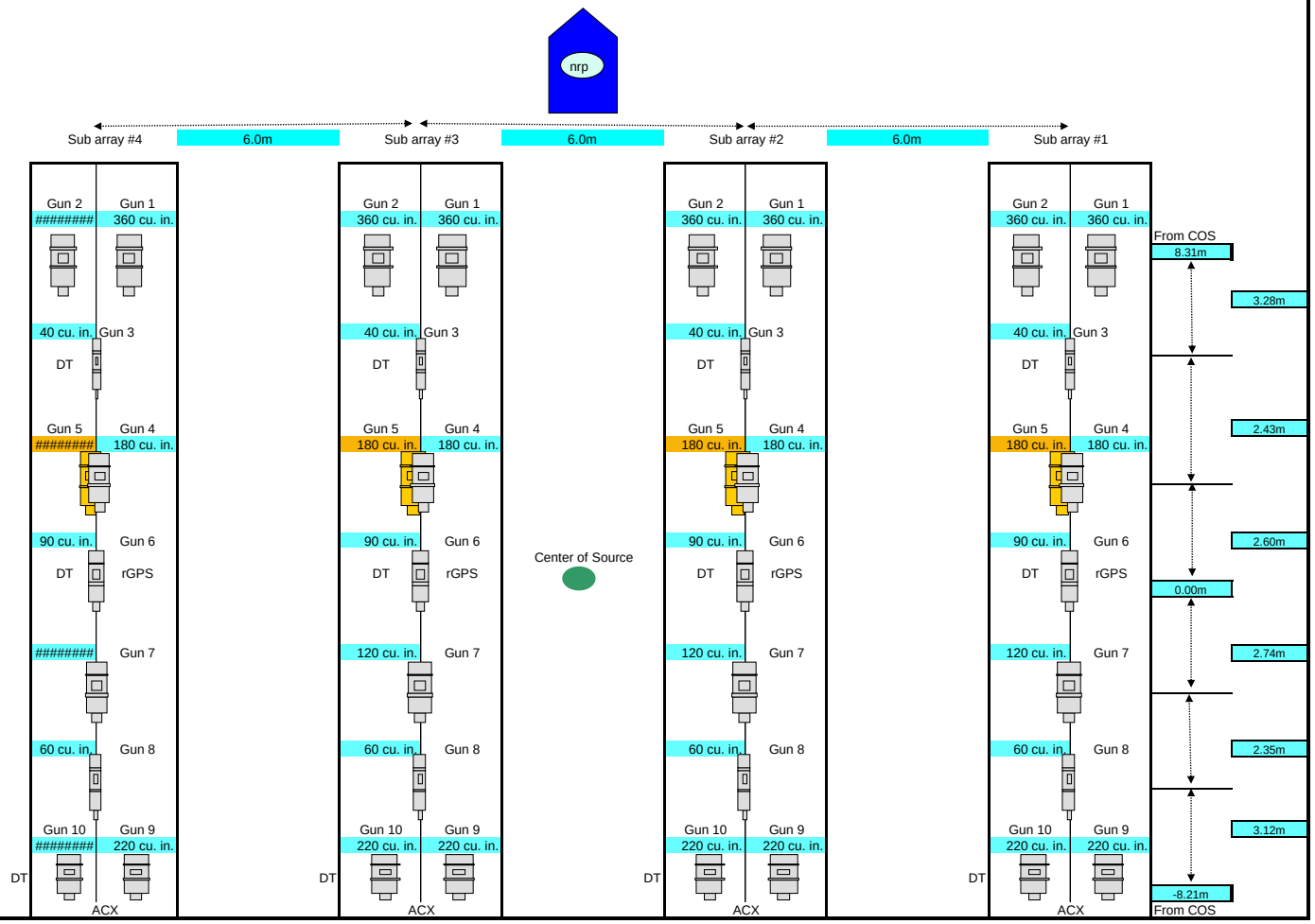
Spare Gun

Gun Clusters
Guns 1 & 2 horizontal array
Guns 4 & 5 vertical array
Guns 9 & 10 horizontal array

Gun Offsets relative to Center of String

	X	Y
Gun 1	0.50m	8.31m
Gun 2	-0.50m	8.31m
Gun 3	0.00m	5.03m
Gun 4	0.00m	2.60m
Gun 5	0.00m	2.60m
Gun 6	0.00m	0.00m
Gun 7	0.00m	-2.74m
Gun 8	0.00m	-5.09m
Gun 9	0.50m	-8.21m
Gun 10	-0.50m	-8.21m

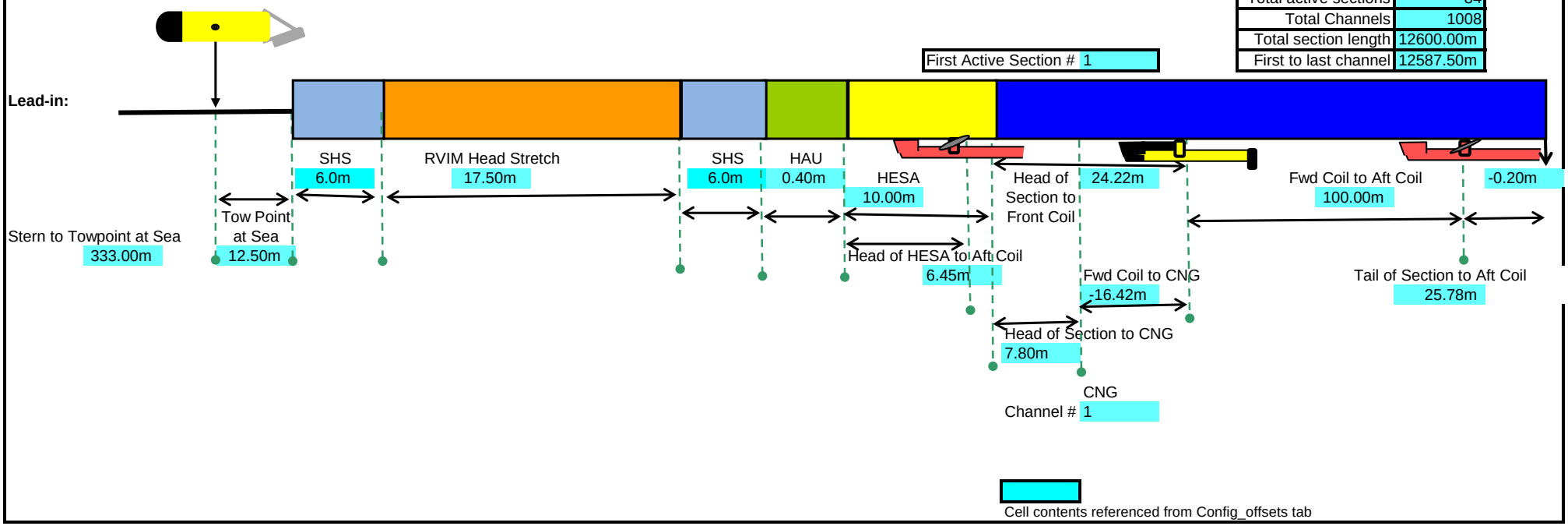
All measurements in meters



R/V Marcus G. Langseth - Streamer Front End

Total active sections	84
Total Channels	1008
Total section length	12600.00m
First to last channel	12587.50m

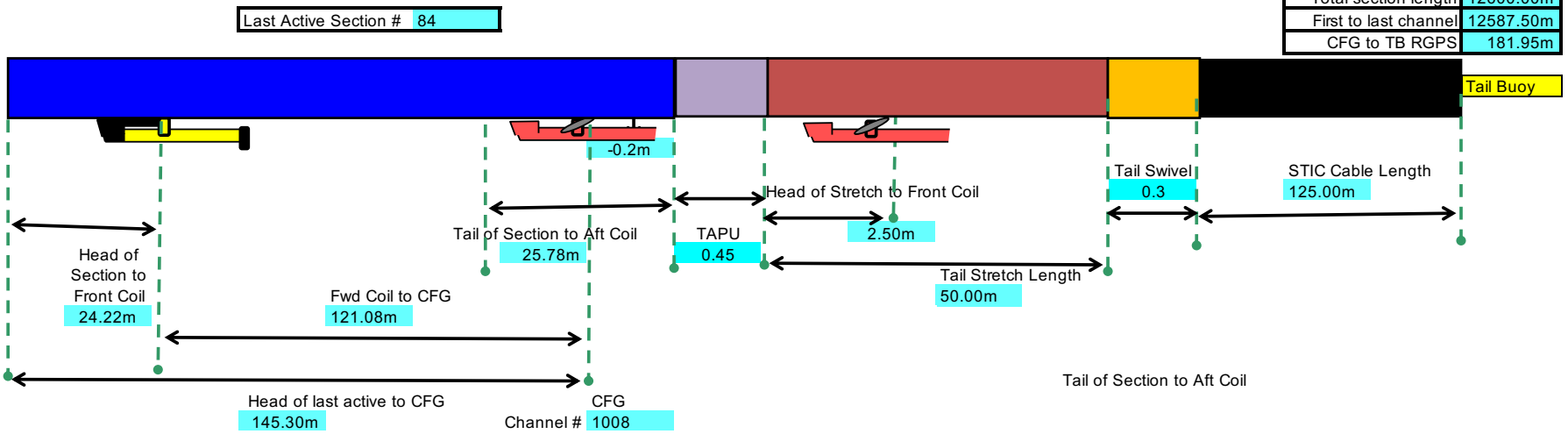
First Active Section # 1



Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - Streamer Tail End

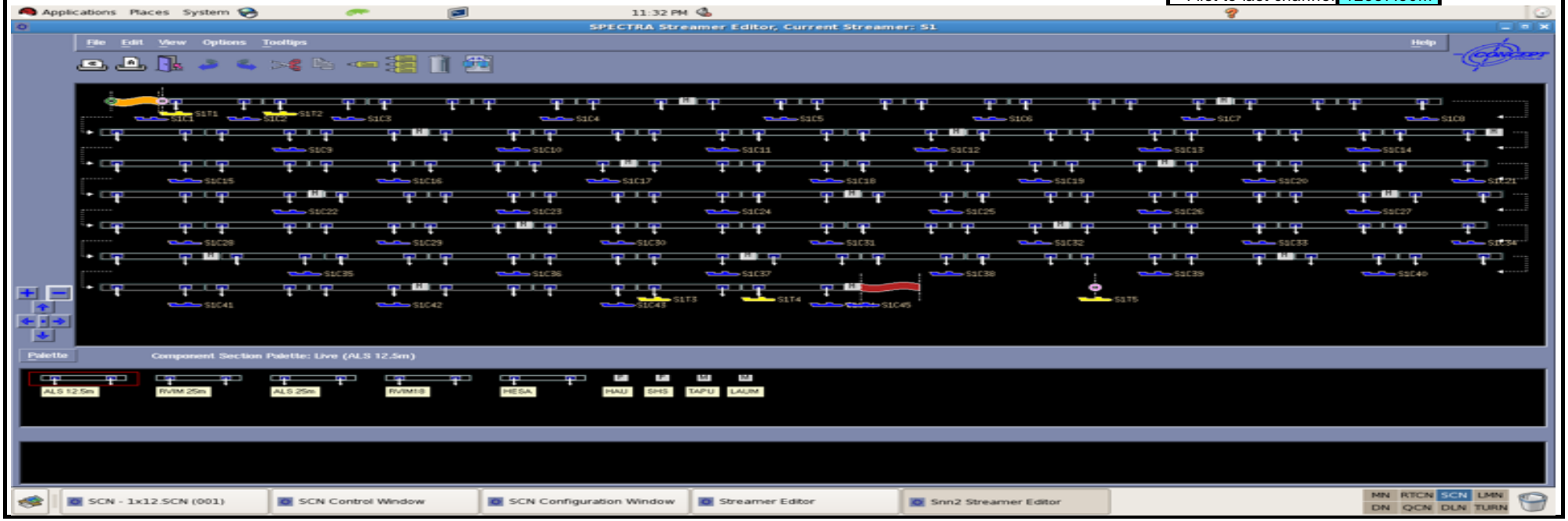
Total active sections	84
Total Channels	1008
Total section length	12600.00m
First to last channel	12587.50m
CFG to TB RGPS	181.95m



Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - Streamer Complete

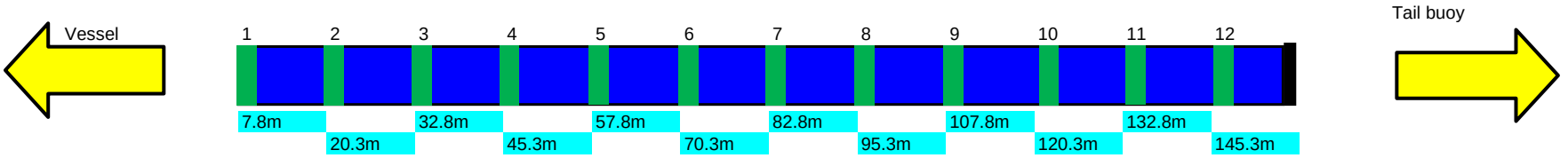
Total active sections	84
Total Channels	1008
Total section length	12600.00m
First to last channel	12587.50m



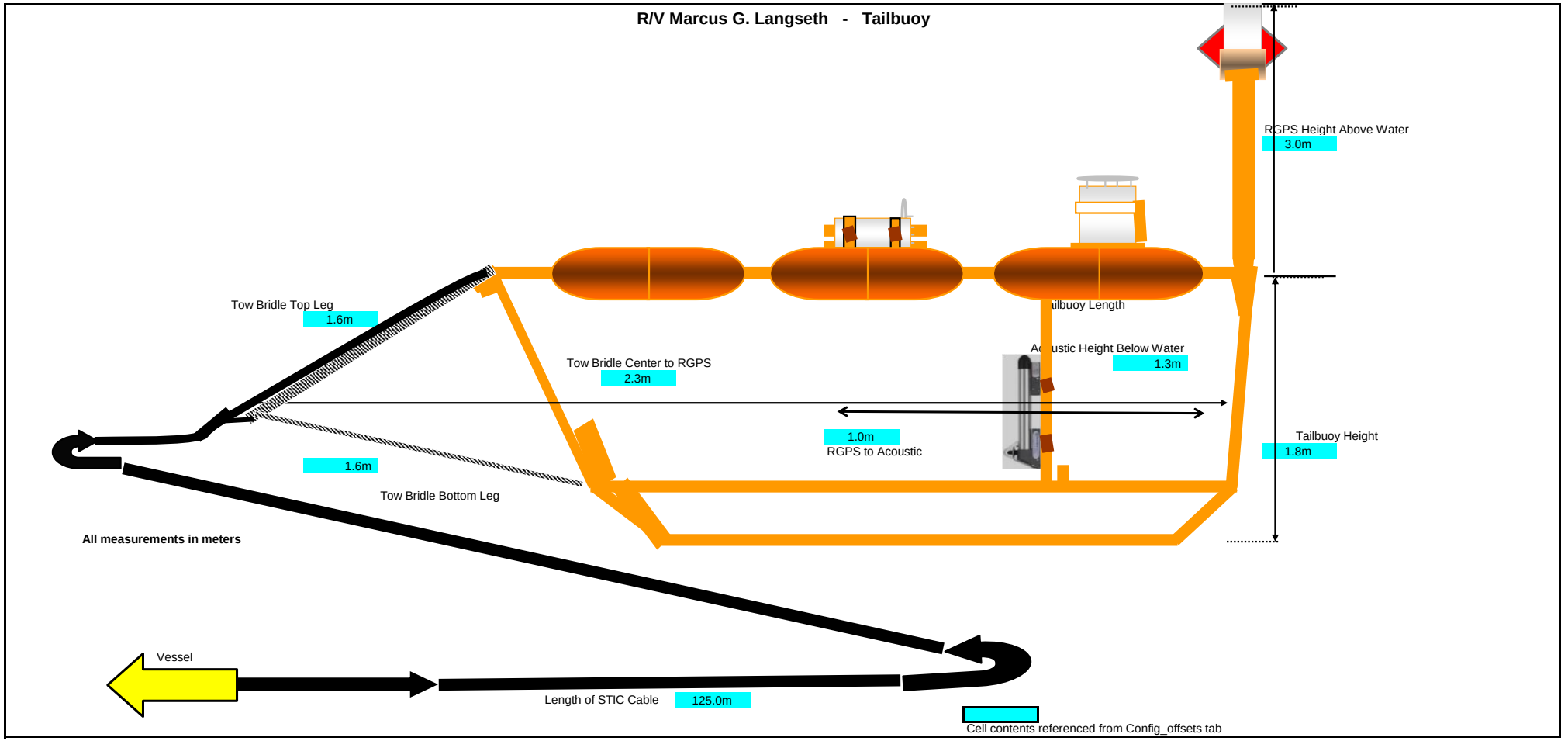
R/V Marcus G. Langseth - Hydrophone Offsets

Sercel 150meter SSAS

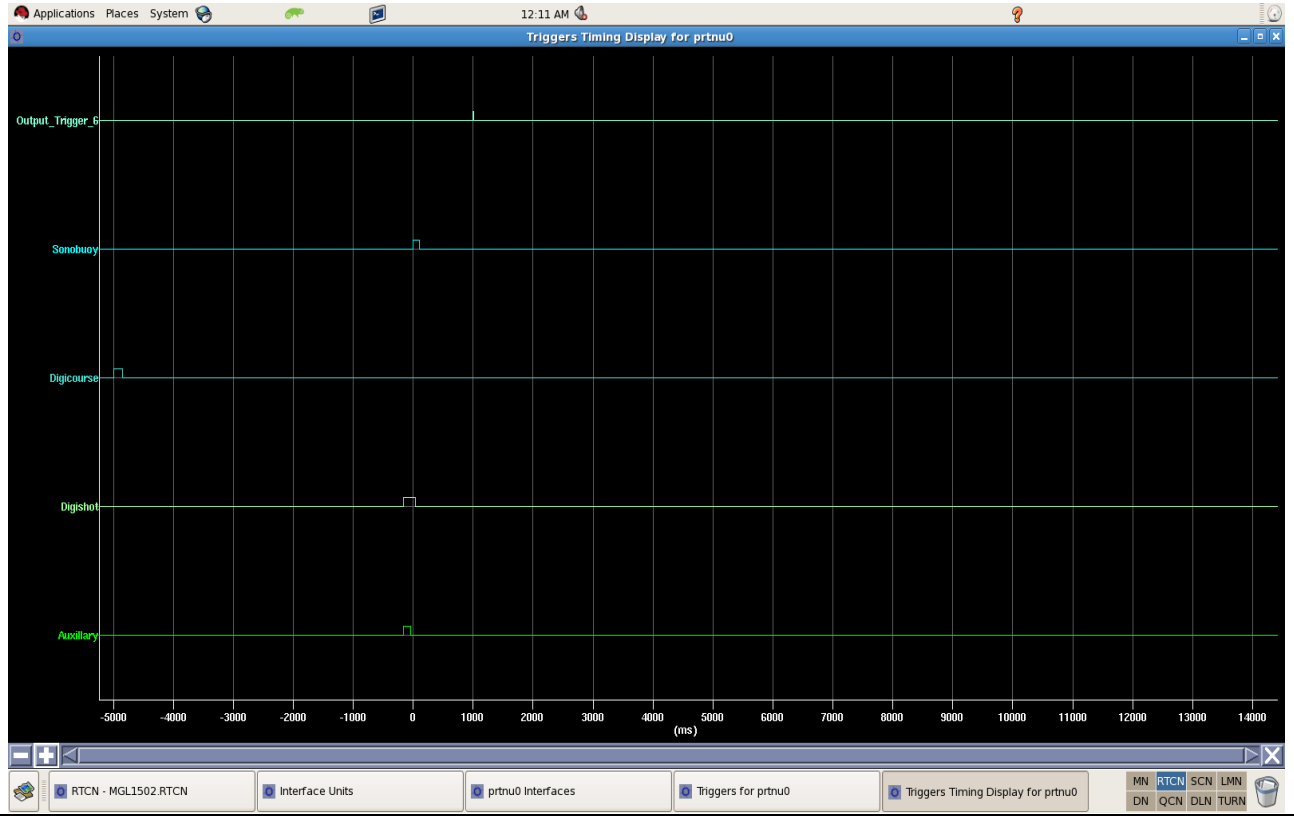
Number of SSAS Sections	84
Channels per active section	12
Total channels	1008



Cell contents referenced from Config_offsets tab


R/V Marcus G. Langseth - Tailbuoy
RGPS Height Above Water
3.0m
Tow Bridle Top Leg
1.6m
Tow Bridle Center to RGPS
2.3m
Acoustic Height Below Water
1.3m
1.0m
RGPS to Acoustic
Tailbuoy Height
1.8m
1.6m
Tow Bridle Bottom Leg
All measurements in meters
Vessel
Length of STIC Cable
125.0m
Cell contents referenced from Config_offsets tab

R/V Marcus G. Langseth - System Timing Diagram



Job Specific	
NRP to COS Y	205
NRP to COS X	0
Source Depth	12
Streamer Depth	9
# streamer sections	84
# channels	1008
CNG Channel #	1
CFG Channel #	1008
#MCS Streamers	1
lead-in: stern to tow point at sea	333
MCS Streamer Sep.	0
Gun volume total	6600
Volume per string	1650
# of guns used	36
# Gun Strings	4
gun string separation	6
PAM Y from stern	60
PAM X - (outside of stern rail)	3
Stern to MAG Y	120
Stern to MAG X - (outside of stern rail)	3

Derived Offsets (formula)	
NRP to CMP	313.85
COS-CNG	217.7
CNG-CFG	12587.5
NRP-Mag Y	149.5
NRP--Mag X	10.5
NRP to tail buoy RGPS	13167.9
Total Length of Streamer sections	12600
PAM-COS Y	115.5
PAM-COS X	10.5
NRP-PAM Y	89.5
NRP-PAM X	10.5
NRP-CNG	422.7

Derived Offsets (formula)	
Towing Offsets Tab	
NRP-COS	205
NRP-CNG	422.7
NRP-CMP	313.85
COS-CNG	217.7
CNG Channel #	1
NRP-Stern	29.5
Distance from Head of first section to CNG	7.8
Source Depth	12
Streamer Depth	9
Front End Length	39.9

Derived Offsets (formula)	
Towing Configuration TAB	
NRP-COS	205
NRP-CNG	422.7
COS-CNG	217.7
NRP-Pcable CNG	0
COS-Pcable CNG	0
P-Cable Streamer Sep	0
NRP-PAM Y	89.5
NRP-PAM X	10.5
PAM-COS Y	115.5
PAM-COS X	10.5
# Gun Strings	4
gun volume	6600
Gun separation	6
# 2D Streamers	1
2D Streamer Ch Spacing	12.5
Number 2D Channels	1008
2D Streamer Length	12600
2D Streamer Sep.	0
NRP-MAG X	10.5
NRP-MAG Y	149.5

Derived Offsets	
Acoustic Overhead TAB	
G1T1	-9.61
G2T1	-9.61
G3T1	-9.61
G4T1	-9.61
S1T1	-16.99
S1T2	-167.39
S1T3	-12322.92
S1T4	-12472.0
S1T5	-1
S1T6	0
S1T7	0
S2T1	0
S2T2	0
S2T3	0
S2T4	0
S2T5	0
S2T6	0
S2T7	0
S3T1	0
S3T2	0
S3T3	0
S3T4	0
S3T5	0
S3T6	0
S3T7	0
S4T1	0
S4T2	0
S4T3	0
S4T4	0
S4T5	0
S4T6	0
S4T7	0
Front to TB	12775
S1T3-S1T1	150.53
S1T3-S1T4	149.86
S1T4-S1T1	299.77

Derived Offsets (formula)	
Gun array offsets	
Bracket distance 1-2	2.72
Bracket distance 2-3	3.28
Bracket distance 3-4	2.43
Bracket distance 4-5	2.8
Bracket distance 5-6	2.74
Bracket distance 6-7	2.35
Bracket distance 7-8	3.12
SourceGPS-COS Y	0
COS - Acoustic Y	-5.47
rGPS height above water	1.2
G1 Volume	360
G2 Volume	360
G3 Volume	40
G4 Volume	180
G5 Volume	180
G6 Volume	90
G7 Volume	120
G8 Volume	60
G9 Volume	220
G10 Volume	220
G-Depth 1	0.95
G-Depth 2	0.95
G-Depth 3	1.15
G-Depth 4	0.95
G-Depth 5	0.75
G-Depth 6	1.15
G-Depth 7	1.15
G-Depth 8	1.15
G-Depth 9	0.95
G-Depth 10	0.95
G-Depth 2	0.95
G-Depth 3	1.15
G-Depth 4	0.95
G-Depth 5	0.75
G-Depth 6	1.15
G-Depth 7	1.15
G-Depth 8	1.15
G-Depth 9	0.95
G-Depth 10	0.95
G10 to Acs Z	1.4
G10 to Acs X	-0.5
Surface to Acs	13.4
Fwd bracket to COS	11.04
Aft bracket to COS	8.21

Derived Offsets	
Streamer Front End	
Stern-towpoint at sea	333
towpoint at sea to end of lead-in	12.5
SHS Length	6
rvrm length	17.5
HAUSTU length	0.4
HESA Lgth	10
Fwd Coil to Aft Coil	100
Head to First RX	7.8
Fwd Coil to CNG	-16.423
Head to Fwd Coil	24.223
Tail to Aft Coil	25.777
CNG Channel #	1
Center of streamer to Acs transducer	-0.2
First Section #	1
# channels	1008
section length	12600
# sections	84
channel spacing	12.5
First to last	12587.5
HESA Head to aft coil	6.45

Derived Offsets	
Streamer Tail End	
Head to Fwd Coil	24.223
Tail to Aft Coil	25.777
Head to CFG	145.3
Coil to Coil	100
TAPU Lngth	0.45
Tail Stretch Length	50
Twisted Lngth	8.3
STIC Length	125
Last active	84
# channels	1008
# sections	84
total section length	12600
First to last	12587.5
Stretch Coil	
Center of streamer to Acs transducer	-0.2
channel spacing	12.5
CFG #	1008
Fwd coil to CFG	121.877
CFG to TBRGPS	181.95
Stretch head to fwd coil	2.5
Stretch head to aft coil	47.5

Derived Offsets	
Streamer complete	
#Sections	84
# Channels	1008
First to last	12587.5
Total section length	12600

Derived Offsets	
Hydrophone Offsets	
Channel 1	7.825
2	20.325
3	32.825
4	45.325
5	57.825
6	70.325
7	82.825
8	95.325
9	107.825
10	120.325
11	132.825
12	145.325
# channels	12
# Active's	84
Total Channels	1008

Derived Offsets	
Tailbuoy offsets	
RGPS height above water	3
TB length	2.8
TB height	1.83
RGPS-ACX	1
Bridle-RGPS	2.25
Top Leg	1.55
Bottom Leg	1.6
STIC	125
ACX below water line	1.3

Fixed Positions Streamer	
NRP to Stern	29.5
tow point at sea to end of lead-in	12.5
STU/module length	0.4
Coil to coil	100
head of section to coil	24.223
tail of section to coil	25.777
channel spacing	12.5
NRP to Port/STBD Rail	7.5
Head to First RX	7.8
Head to Last RX	145.3
Channels per section	12
Center of section to Acs transducer	-0.2
First Section Number	1
SHL/HAPU Length	0.4
SHS Length	6
RVM length	17.5
HESA Length	10
Active Section Length (SUAS)	150
TES tail stretch length	50
STIC	125
TES Fwd Coil	2.5
TES Aft Coil	47.5
HESA Aft Coil	6.45

Tailbuoy offsets	
RGPS height above water	3
TB length	2.8
TB height	1.83
RGPS-ACX	1
Bridle-RGPS	2.25
Top Leg	1.55
Bottom Leg	1.6
STIC	125
ACX below water line	1.3

Guns					
Source GPS-COS Y	0			G1 X	0.5
Bracket distance 1-2	2.72			G1 Y	8.33
Bracket distance 2-3	3.28			G2 X	-9.5
Bracket distance 3-4	2.43			G2 Y	8.33
Bracket distance 4-5	2.8			G3 X	0
Bracket distance 5-6	2.74			G3 Y	5.03
Bracket distance 6-7	2.35			G4 X	0
Bracket distance 7-8	3.12			G4 Y	2.8
COS - Acoustic Y	-5.47	G10 to Acs Z	-0.5	G5 X	0
rGPS height above water line	1.2	G10 to Acs Y	1.4	G5 Y	2.8
G1 Volume	360	G-Depth 1	0.95	G6 X	0
G2 Volume	360	G-Depth 2	0.95	G6 Y	0
G3 Volume	40	G-Depth 3	1.15	G7 X	0
G4 Volume	180	G-Depth 4	0.95	G7 Y	-2.74
G5 Volume	180	G-Depth 5	0.75	G8 X	0
G6 Volume	90	G-Depth 6	1.15	G8 Y	-5.09
G7 Volume	120	G-Depth 7	1.15	G9 X	0.5
G8 Volume	60	G-Depth 8	1.15	G9 Y	-8.21
G9 Volume	220	G-Depth 9	0.95	G10 X	-0.5
G10 Volume	220	G-Depth 10	0.95	G10 Y	-8.21

Acoustics referenced to CNG or COS	
G1T1	-9.61
G2T1	-9.61
G3T1	-9.61
G4T1	-9.61
S1T1	-16.99
S1T2	167.39
S1T3	-12322.92
S1T4	12472.0
S1T5	-1
S1T6	0
S1T7	0
S2T1	0
S2T2	0
S2T3	0
S2T4	0
S2T5	0
S2T6	0
S2T7	0
S3T1	0
S3T2	0
S3T3	0
S3T4	0
S3T5	0
S3T6	0
S3T7	0
S4T1	0
S4T2	0
S4T3	0
S4T4	0
S4T5	0
S4T6	0
S4T7	0