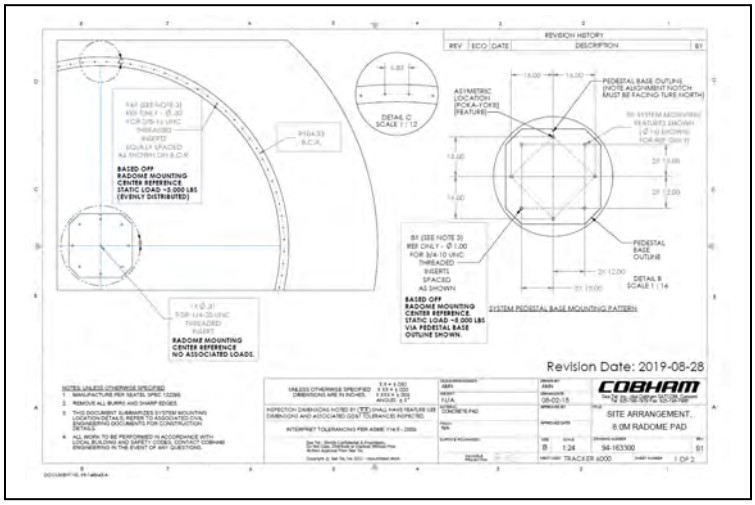
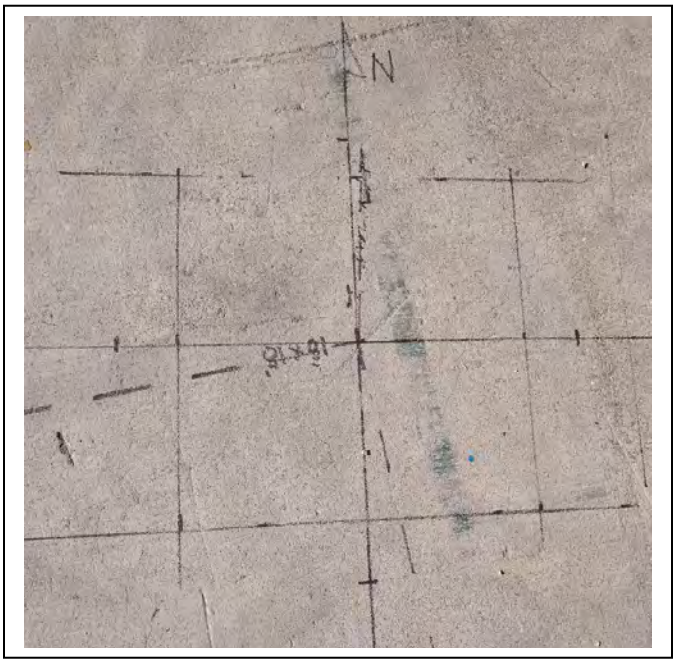
2.2. Method 2 – Lay Out by Hand Using Site Drawing

Again, by using the center mark and true north line construct a grid of lines.

- Locate Site Drawing 94-163300. Antenna mounting dimensions are located on upper right.



- Using a straight edge, rule and square layout mounting pattern. Example below is from Cobham prototype installation.



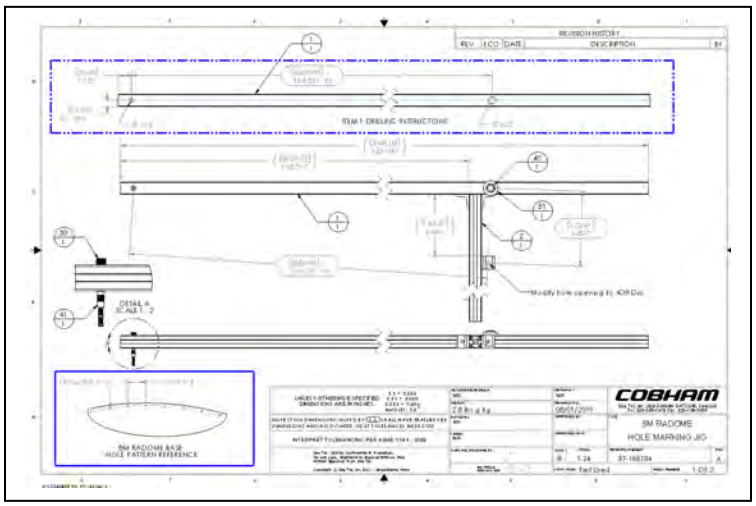
3. Step 3 – Locating Radome Mounting Holes

There is 2 approaches to laying out the holes on for the radome.

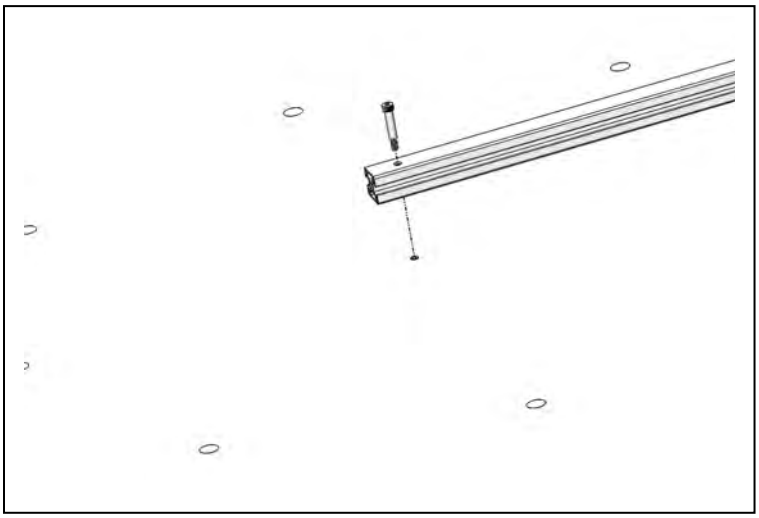
1. Jig with side attachment
2. Jig with Compass

3.1. Method 1 – Jig with Side Attachment

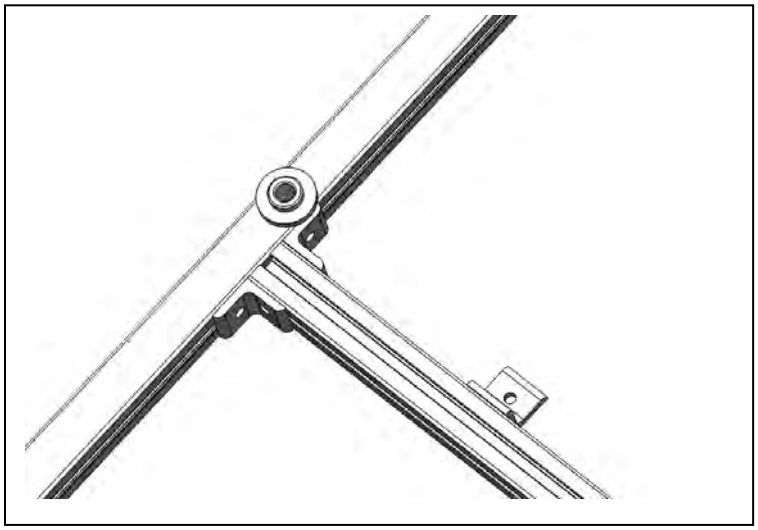
- Locate or assemble marking jig.



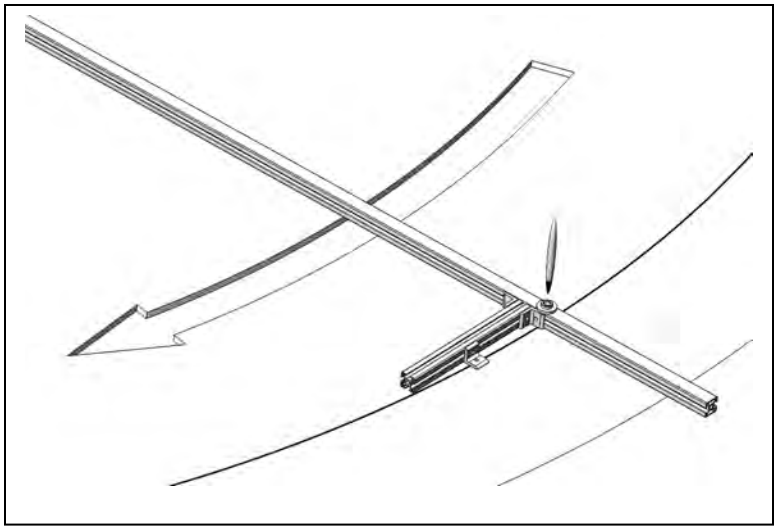
- Remove template and attach marking jig to center point by threading shoulder bolt into 1/4-20 threaded anchor.



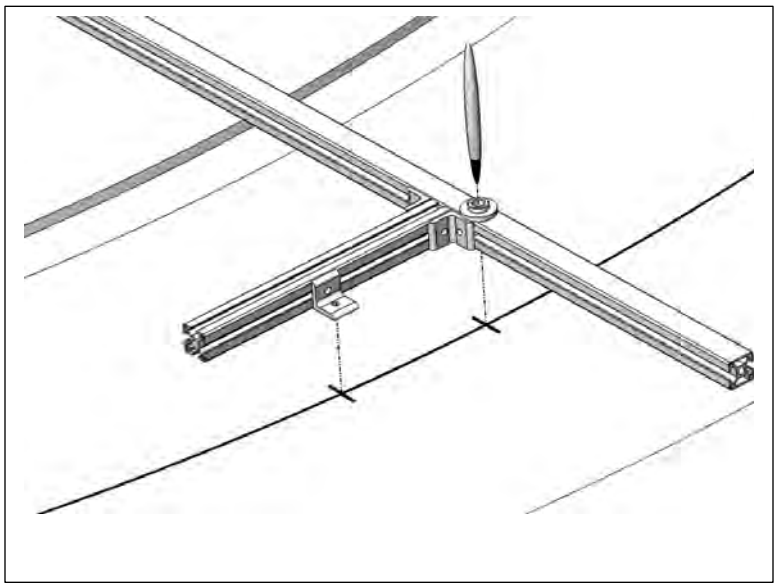
- The marking end of the jig has two holes locations set at the chord length between mounting holes.



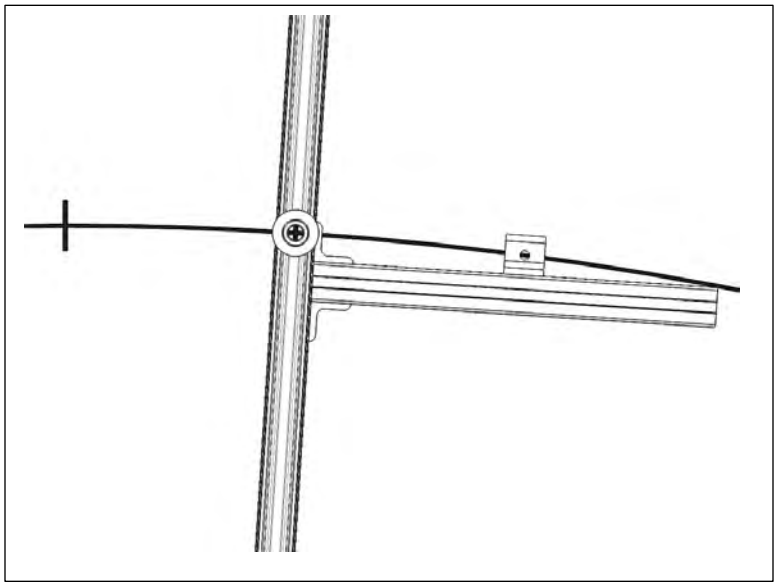
- Use the marking jig to construct the B.C.R. (bolt circle radius).



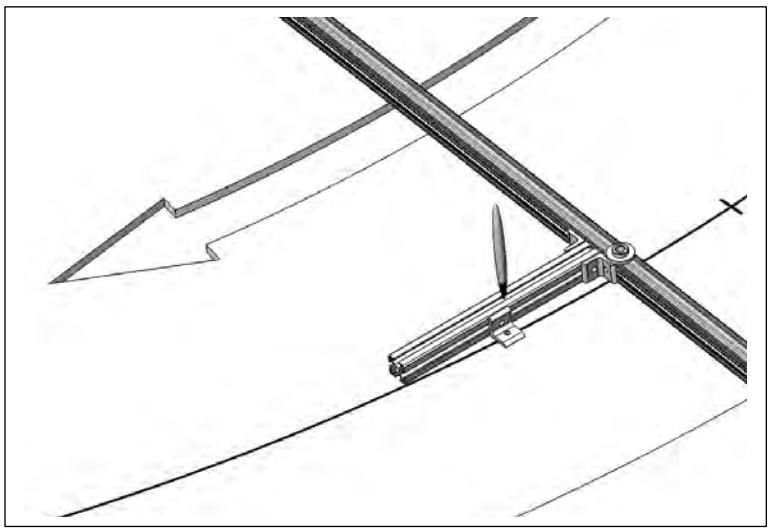
- Mark the 1st two holes, possibly using true north for 1st hole.



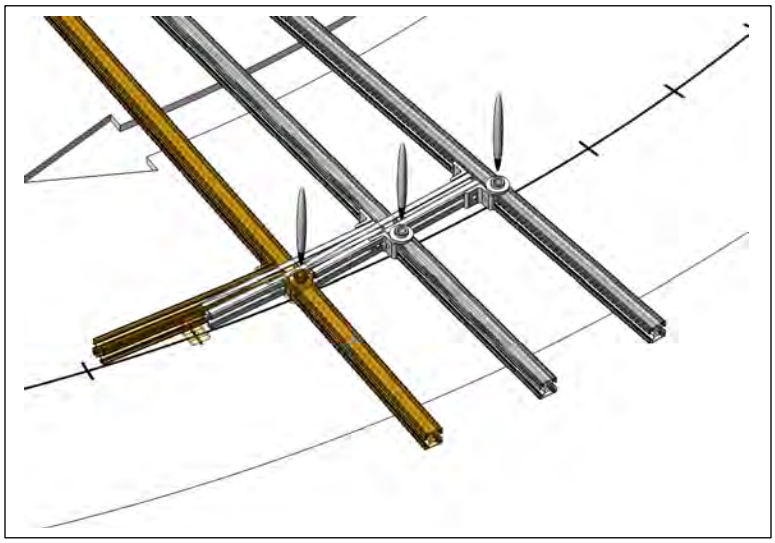
- Rotate jig so the 1st hole is over 2nd chord mark.



- Mark open hole.

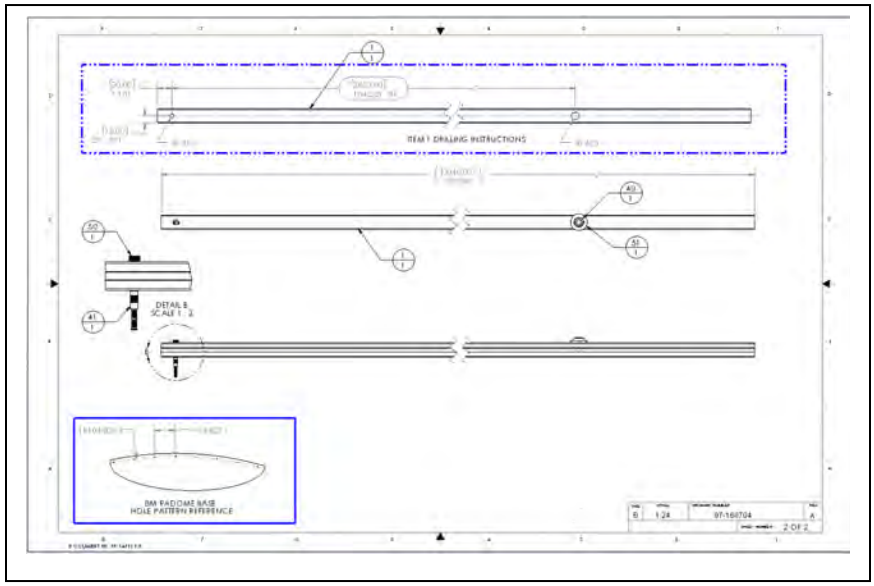


- Repeat the last 2 steps until all 96 holes are marked.

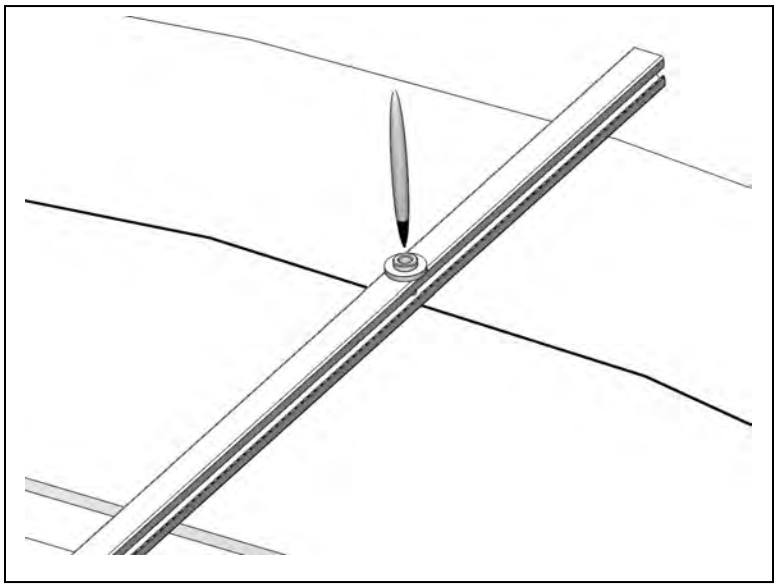


3.2. Method 2 – Jig with Compass

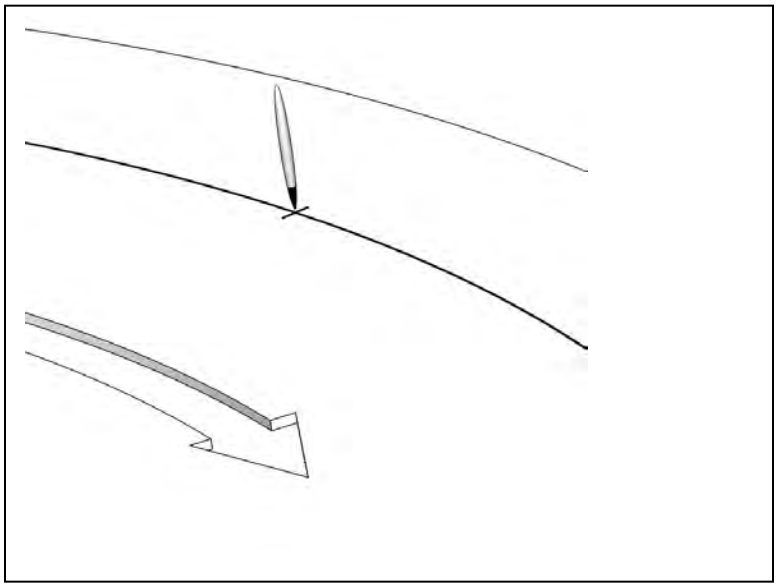
- With the compass method you won't need the full jig assembly. (pg 2 of 97-168704)



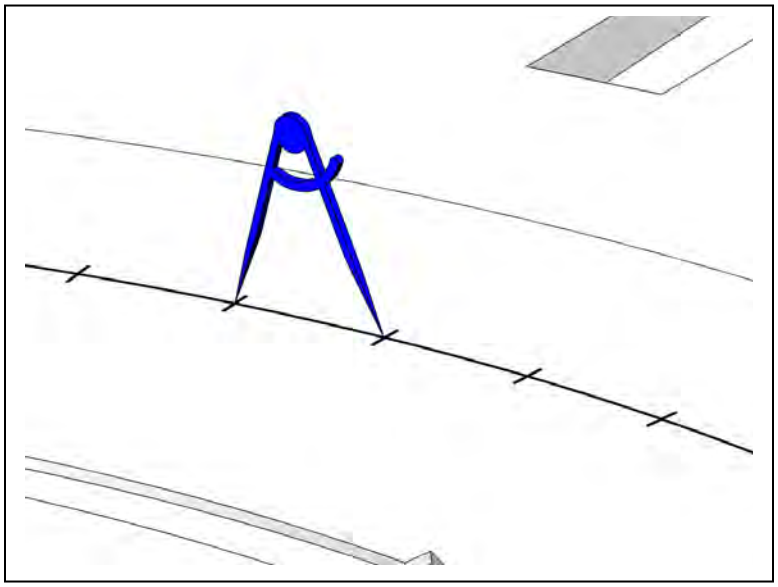
- Attach jig to 1/4-20 anchor as described in section 3.1. Now use marking jig to construct B.C.R. (bolt circle radius).



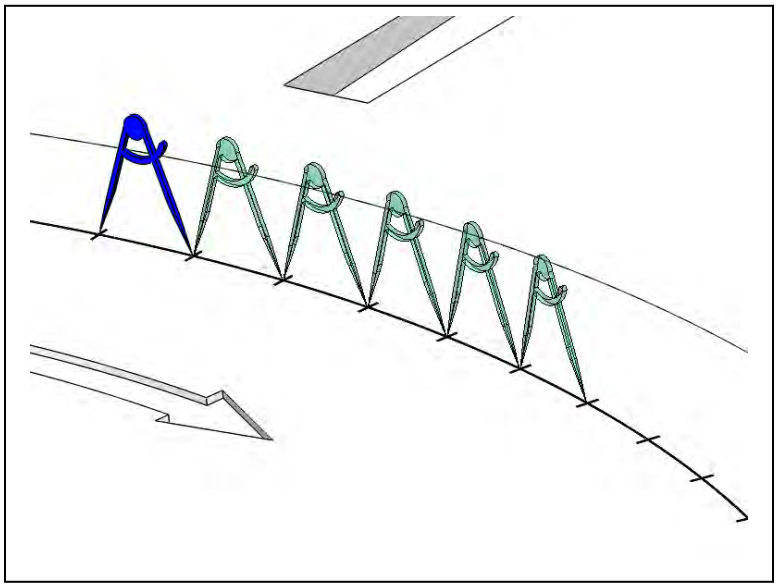
- Mark 1st hole, possibly where it crosses true north.



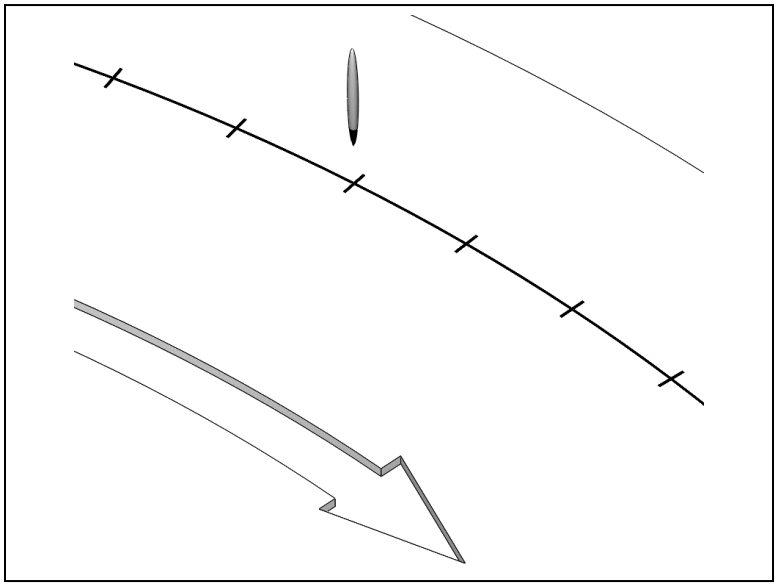
- Set compass at cord length of 6.827”. (see appendix)



- Carefully mark all 96 holes re-checking compass (chord length) every 24 holes

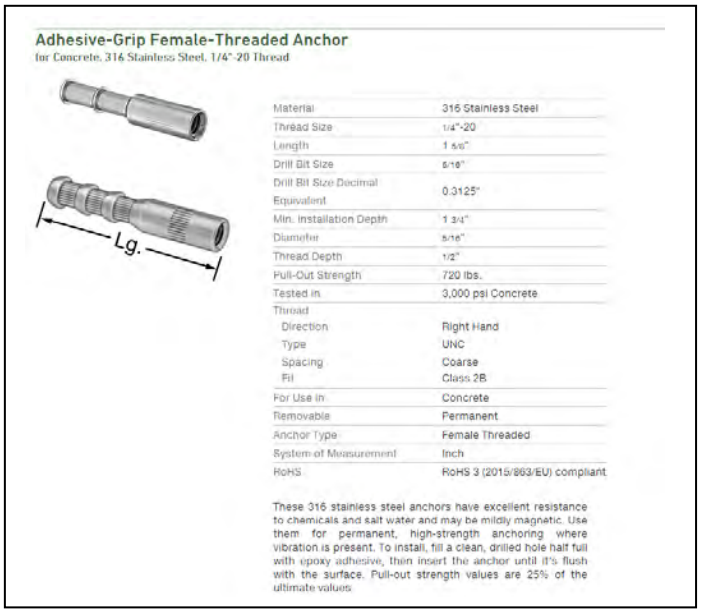


- Use marker to darken compass marks.



4. Appendix

4.1. Threaded Anchor

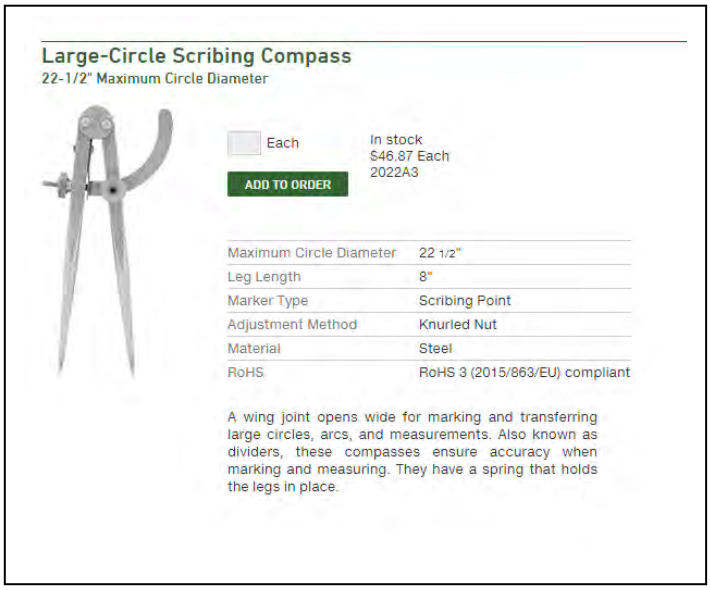


Adhesive-Grip Female-Threaded Anchor
for Concrete, 316 Stainless Steel, 1/4"-20 Thread

Material	316 Stainless Steel
Thread Size	1/4"-20
Length	1 5/8"
Drill Bit Size	5/16"
Drill Bit Size Decimal Equivalent	0.3125"
Min. Installation Depth	1 3/4"
Diameter	5/16"
Thread Depth	1/2"
Pull-Out Strength	720 lbs.
Tested in	3,000 psi Concrete
Thread	
Direction	Right Hand
Type	UNC
Spacing	Coarse
Fit	Class 2B
For Use in	Concrete
Removable	Permanent
Anchor Type	Female Threaded
System of Measurement	Inch
RoHS	RoHS 3 (2015/863/EU) compliant

These 316 stainless steel anchors have excellent resistance to chemicals and salt water and may be mildly magnetic. Use them for permanent, high-strength anchoring where vibration is present. To install, fill a clean, drilled hole half full with epoxy adhesive, then insert the anchor until it's flush with the surface. Pull-out strength values are 25% of the ultimate values.

4.2. Marking Compass



Large-Circle Scribing Compass
22-1/2" Maximum Circle Diameter

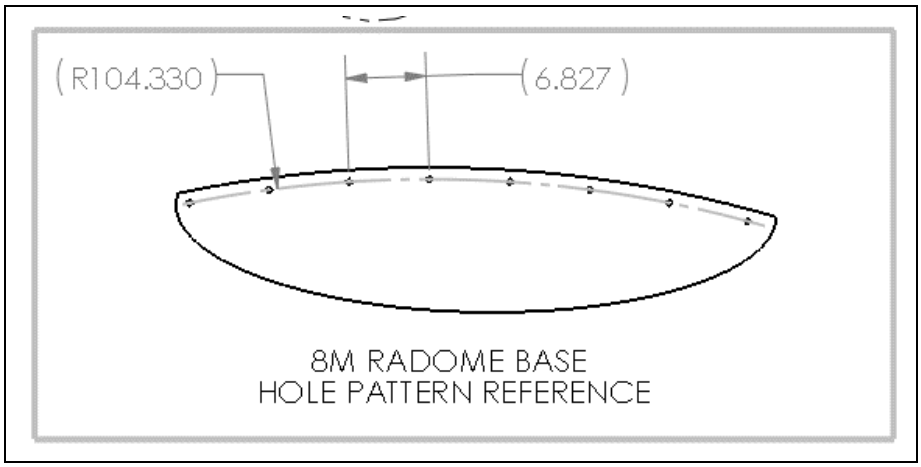
Each
ADD TO ORDER

In stock
$46.87 Each
2022A3

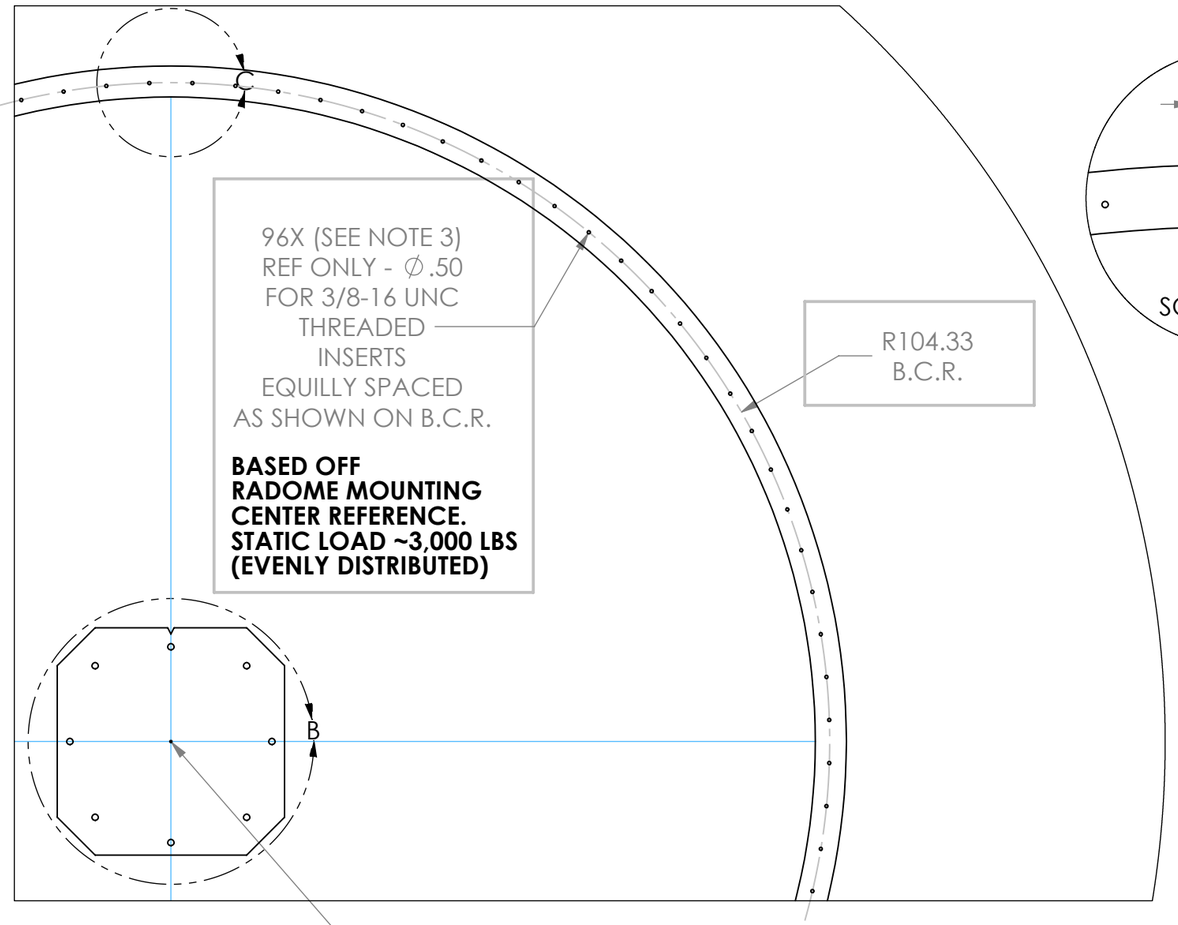
Maximum Circle Diameter	22 1/2"
Leg Length	8"
Marker Type	Scribing Point
Adjustment Method	Knurled Nut
Material	Steel
RoHS	RoHS 3 (2015/863/EU) compliant

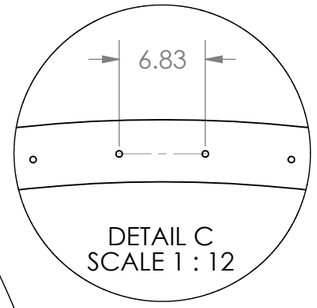
A wing joint opens wide for marking and transferring large circles, arcs, and measurements. Also known as dividers, these compasses ensure accuracy when marking and measuring. They have a spring that holds the legs in place.

4.3. Radome Reference Dimensions

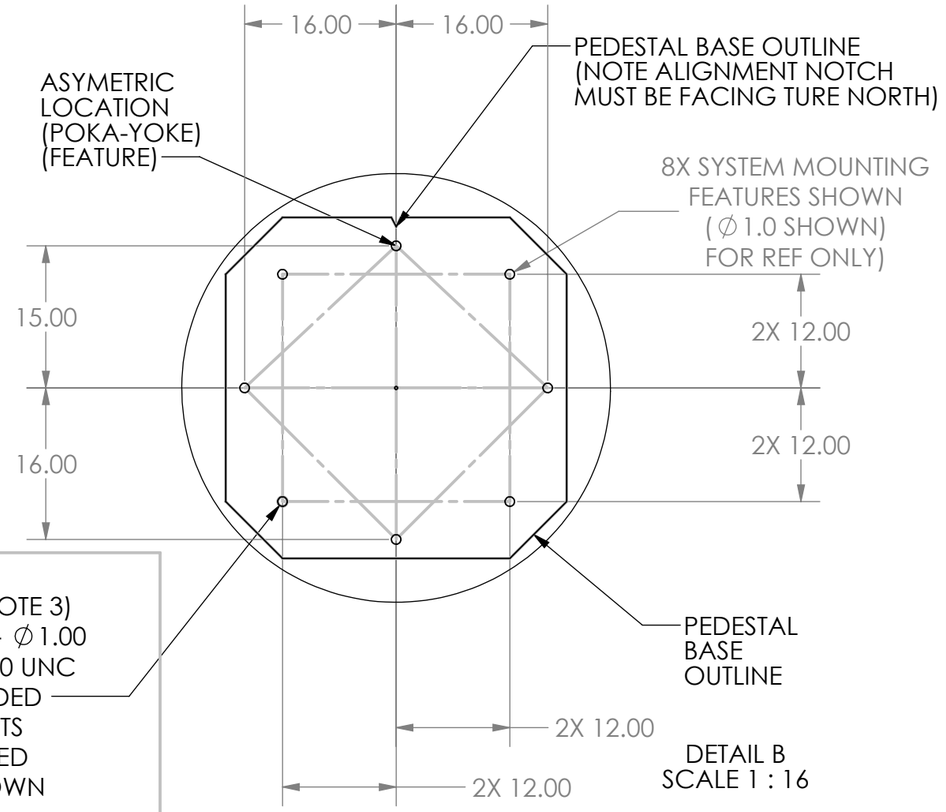


REVISION HISTORY				
REV	ECO	DATE	DESCRIPTION	BY





DETAIL C
SCALE 1 : 12



DETAIL B
SCALE 1 : 16

8X (SEE NOTE 3)
REF ONLY - ∅1.00
FOR 3/4-10 UNC
THREADED
INSERTS
SPACED
AS SHOWN

**BASED OFF
RADOME MOUNTING
CENTER REFERENCE.
STATIC LOAD ~5,000 LBS
VIA PEDESTAL BASE
OUTLINE SHOWN.**

SYSTEM PEDESTAL BASE MOUNTING PATTERN

Revision Date: 2019-08-28

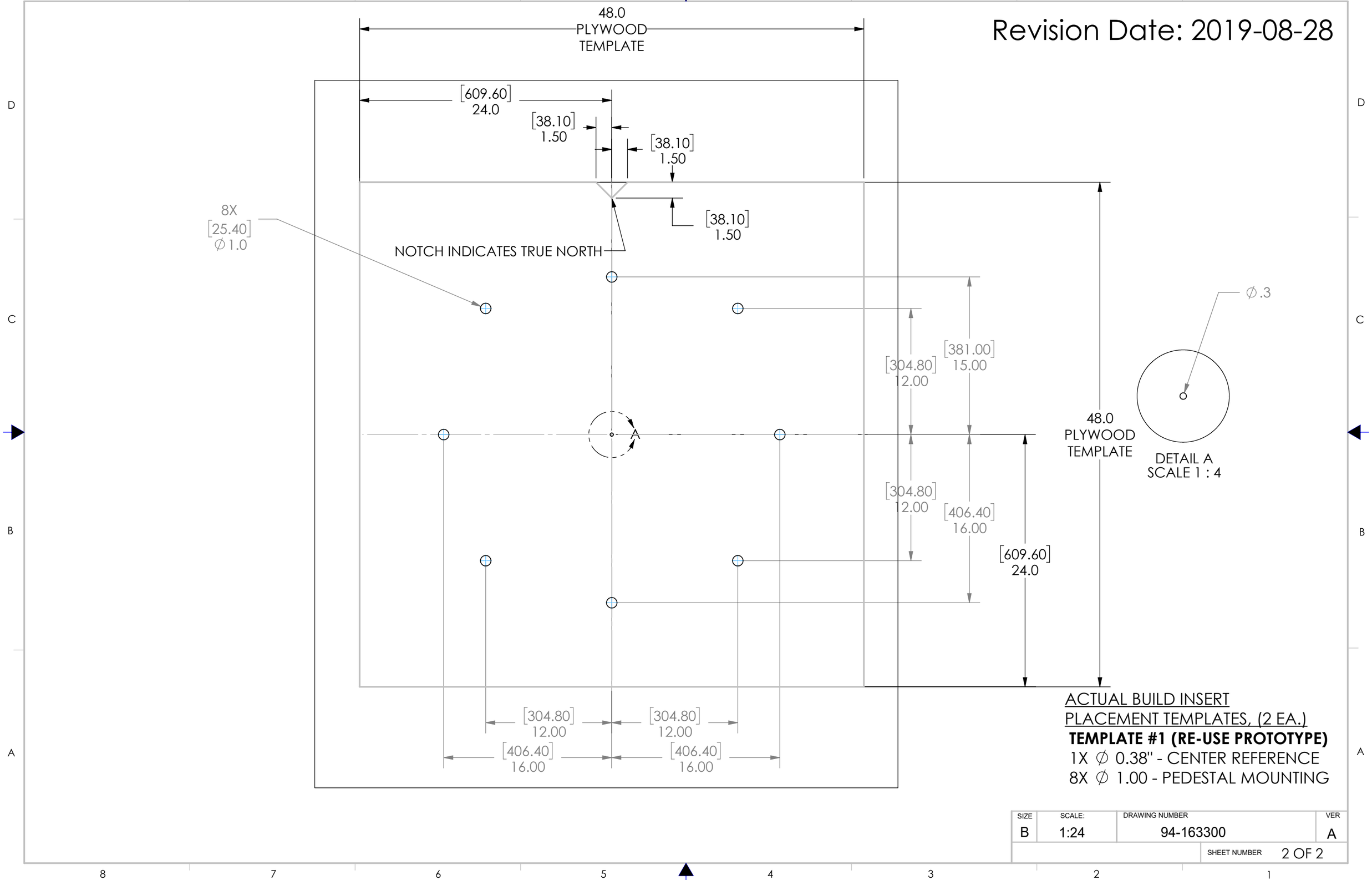
NOTES: UNLESS OTHERWISE SPECIFIED

1. MANUFACTURE PER SEATEL SPEC 122298.
2. REMOVE ALL BURRS AND SHARP EDGES.
3. THIS DOCUMENT SUMMARIZES SYSTEM MOUNTING LOCATION DETAILS; REFER TO ASSOCIATED CIVIL ENGINEERING DOCUMENTS FOR CONSTRUCTION DETAILS.
4. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH LOCAL BUILDING AND SAFETY CODES; CONTACT COBHAM ENGINEERING IN THE EVENT OF ANY QUESTIONS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5°	DESIGNER/ENGINEER: AMN	DRAWN BY: AMN	COBHAM Sea Tel, Inc., dba Cobham SATCOM, Concord Tel. 925-798-7979 Fax. 925-798-7986
	WEIGHT: N/A	DRAWN DATE: 08-02-18	
INSPECTION DIMENSIONS NOTED BY (X.X) SHALL HAVE FEATURE SIZE DIMENSIONS AND ASSOCIATED GD&T TOLERANCES INSPECTED	MATERIAL: CONCRETE PAD	APPROVED BY:	TITLE: SITE ARRANGEMENT, 8.0M RADOME PAD
INTERPRET TOLERANCING PER ASME Y14.5 - 2009	FINISH: N/A	APPROVED DATE:	
	SURFACE ROUGHNESS:	SIZE: B / SCALE: 1:24 / DRAWING NUMBER: 94-163300 / REV: A	
	3rd ANGLE PROJECTION	FIRST USED: TRACKER 6000	SHEET NUMBER: 1 OF 2

DOCUMENT N0. 99-148645-A

Revision Date: 2019-08-28



ACTUAL BUILD INSERT
PLACEMENT TEMPLATES, (2 EA.)

TEMPLATE #1 (RE-USE PROTOTYPE)

1X ∅ 0.38" - CENTER REFERENCE

8X ∅ 1.00 - PEDESTAL MOUNTING

SIZE	SCALE:	DRAWING NUMBER	VER
B	1:24	94-163300	A
		SHEET NUMBER 2 OF 2	

DOCUMENT N0. 99-149137-A

ORACLE BOM Explosion Report

Item Number: 62-168704

Description: 8M RADOME HOLE MARKING JIG

Item Revision: A.02 MCO-00049240

Date as of: 07/09/2020 11:46:54 AM PDT

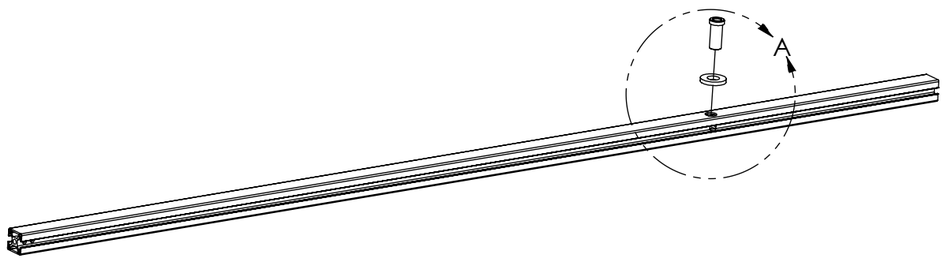
Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
0	REF	pcs	97-168704	A.01 MCO-00049240	8M RADOME HOLE MARKING JIG	
1	1	pcs	41-168691-A	01 MCO-00049205	ARM, LONG, 8M RADOME DRILL JIG, LEFT	
2	1	pcs	41-171246-A	01 MCO-00049205	ARM, LONG, 8M RADOME DRILL JIG, RIGHT	
3	1	pcs	41-171248-A	01 MCO-00049205	PIN PLATE, 8M RADOME DRILL JIG	
4	1	pcs	41-171249-A	01 MCO-00049205	CLAMP PLATE, 8M RADOME DRILL JIG	
5	1	pcs	41-207804-012	MCO-00047397	EXTRUSION, T-SLOT, SINGLE, 30MM X 30MM X 12IN, AL	
20	2	ea	41-207768-000	MCO-00047207	INSIDE CORNER BRACKET, 80/20, 3030, 2 HOLE	
21	1	pcs	41-171247-A	01 MCO-00049205	BRACKET MOD, 8M RADOME HOLE MARKING JIG	
30	5	ea	52-207184-000	MCO-00047375	NUT, 30mm T-SLOT, M6 W/SCREW, ZINC PLATED STEEL	
40	1	ea	41-207769-000	MCO-00047375	BUSHING, DRILL, .4375 IN I.D.	
41	1	ea	41-207771-000	MCO-00047375	ANCHOR, CONCRETE, 1/4-20 INT, 0.3125 IN OD, 316 SS	
50	1	ea	41-207770-000	MCO-00047375	SCREW, SOCKET HD, SHOULDER, 1/4-20 X 1.25, SS	
51	1	ea	53-207159-000	MCO-00047375	WASHER, FLAT, OVERSIZED, 5/8 ID X 1.375 OD, SS	
60	2	ea	119973-143	MCO-00024042	SCREW, SOCKET HD, M6 X 45, SS.	
68	2	ea	114580-250	MCO-00031530	WASHER, FLAT, M6, SS.	
		pcs	62-168704	A.02 MCO-00049240	8M RADOME HOLE MARKING JIG	

Created By: Mike Needham

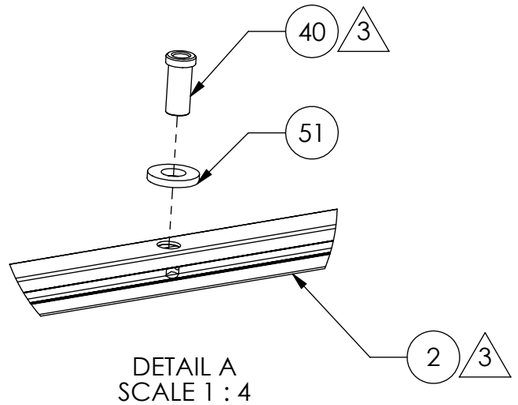
Create Time: 07/09/2020 11:47:16 AM PDT

PRINT THIS DRAWING ON 11" X 17" SIZE PAPER WHEN SEND IT ALONG WITH THE ASSEMBLY 62-168704

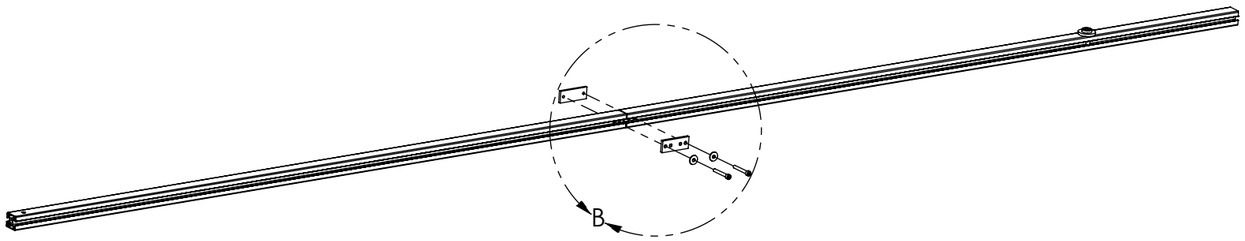
REVISION HISTORY				
REV	ECO	DATE	DESCRIPTION	BY
A01	35597	3/17/20	ADDED 1:1 TEMPLATE ON SHEET 3, CHANGED SHEET SIZE FROM "D" TO "B".	MS



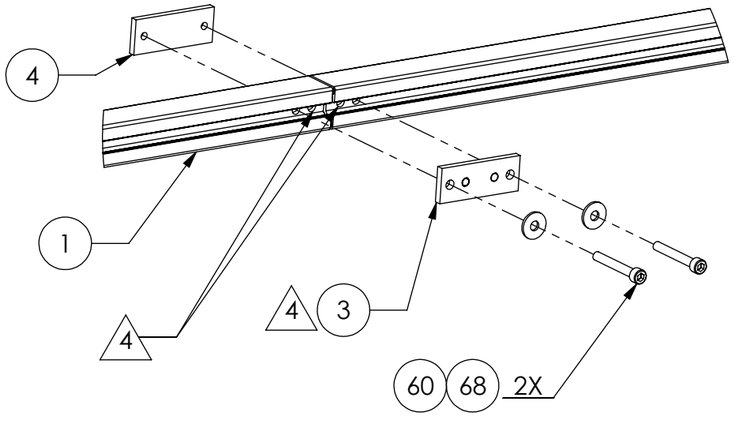
STEP-1



DETAIL A
SCALE 1 : 4



STEP-2



DETAIL B
SCALE 1 : 4

NOTES: UNLESS OTHERWISE SPECIFIED

1. MANUFACTURE PER SEATEL STANDARD 99-122298.
2. THIS DRAWING GOVERNS THE ASSEMBLY OF ALL VARIANTS OF THE PART NUMBER 62-168704, REGARDLESS OF ASSEMBLY OR DRAWING REVISION. SOME ITEMS SHOWN ON THIS DRAWING MAY NOT BE INCLUDED ON THE BILL OF MATERIAL, OR MAY APPEAR IN A DIFFERENT ORIENTATION THAN THE DRAWING DEPICTS FOR SOME VARIANTS. REFER TO THE BILL OF MATERIALS FOR THE VARIANT NUMBER SHOWN ON THE WORK ORDER.

△3 PRESS DRILL BUSHING (ITEM 40) INTO HOLE IN ITEM 2 AS SHOWN UNTIL BUSHING BOTTOMS OUT ON WASHER (ITEM 51). USE GREEN LOCTITE IF NEEDED TO SECURE DRILL BUSHING TO ITEM 2.

△4 M6 PINS PROTRUDING FROM ITEM 3 FIT INTO INDICATED HOLES OF ITEMS 1 & 2.

△5 DO NOT TIGHTEN HW UNTIL ITEM 21 IS IN CORRECT POSITION. TIGHTEN HW JUST ENOUGH TO ALLOW INDICATED ITEMS TO MOVE WITHOUT SLACK.

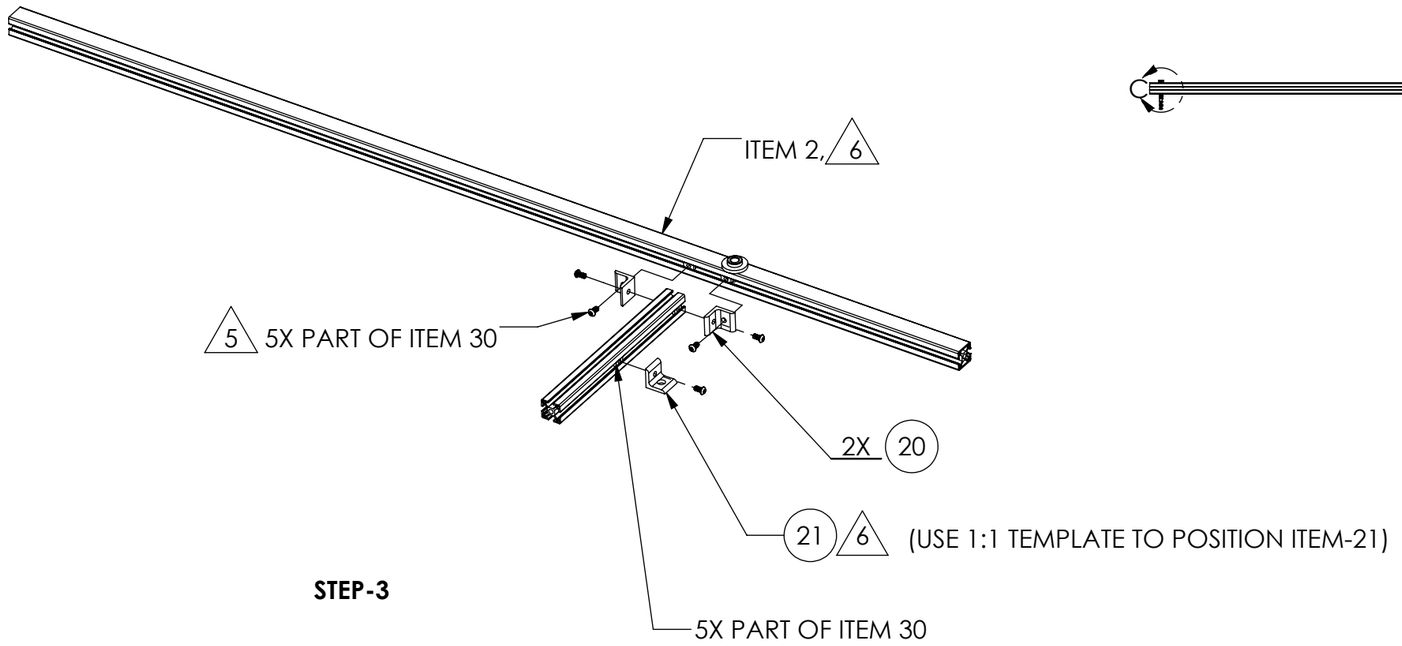
△6 NOTE ORIENTATION.

△7 POSITION ITEM 21 ON THIS RADIUS MEASURED FROM THE INDICATED FEATURE OF ITEM 1, THEN TIGHTEN HW AND CHECK THAT ITEM 21 HAS MAINTAINED POSITION.

8. SECONDARY UNITS ARE IN MM.

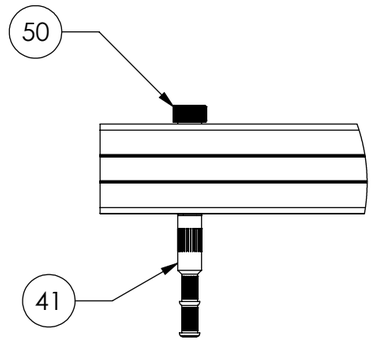
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5°	DESIGNER/ENGINEER: WK	DRAWN BY: WK	COBHAM Sea Tel, Inc., dba Cobham SATCOM, Concord Tel. 925-798-7979 Fax. 925-798-7986
	WEIGHT: 7.2 lbs	DRAWN DATE: 08/01/2019	
INSPECTION DIMENSIONS NOTED BY (X.X) SHALL HAVE FEATURE SIZE DIMENSIONS AND ASSOCIATED GD&T TOLERANCES INSPECTED	MATERIAL: N/A	APPROVED BY:	TITLE: 8M RADOME HOLE MARKING JIG
INTERPRET TOLERANCING PER ASME Y14.5 - 2009	FINISH: N/A	APPROVED DATE:	
	SURFACE ROUGHNESS:	SIZE: B SCALE: 1:12	DRAWING NUMBER: 97-168704 REV: A01
	3rd ANGLE PROJECTION	FIRST USED: First Used	SHEET NUMBER: 1 OF 3

DOCUMENT N0. 99-148645-A

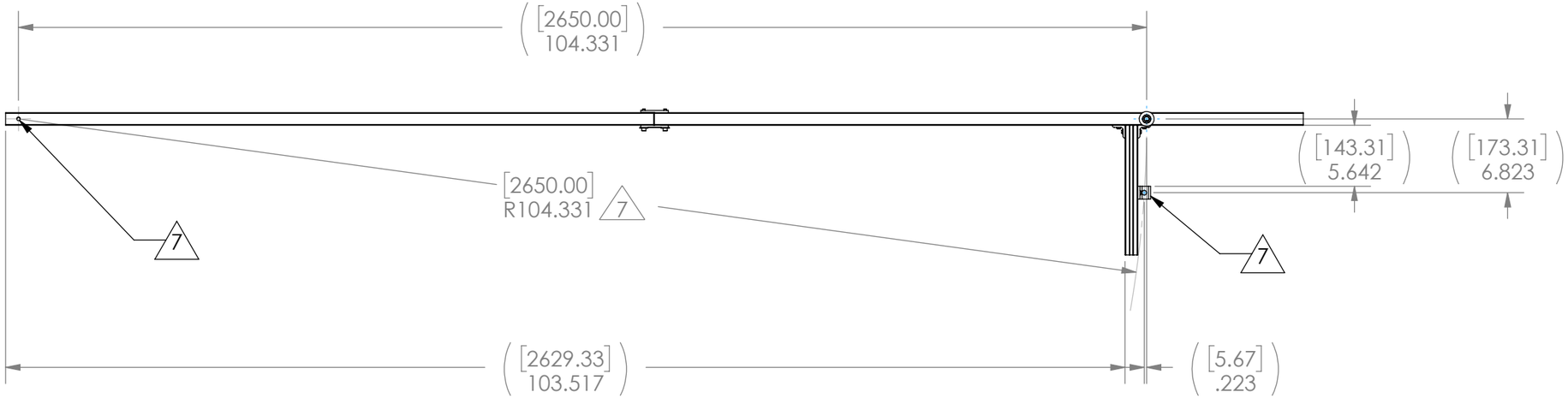


STEP-3

STEP-4



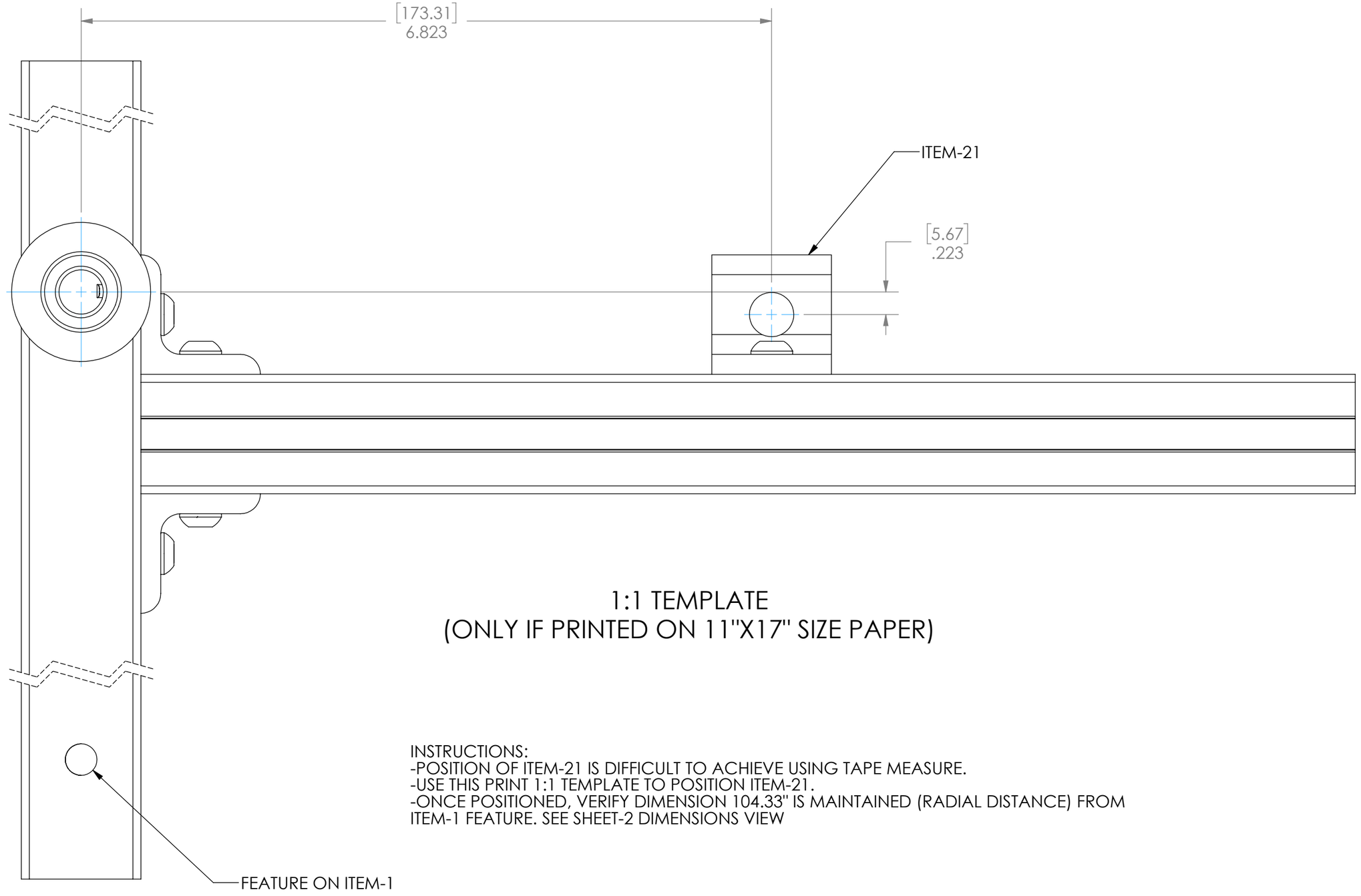
DETAIL C
SCALE 1:2



DIMENSIONS VIEW

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:12	97-168704	A01
		SHEET NUMBER 2 OF 3	

DOCUMENT N0. 99-149137-A



1:1 TEMPLATE
(ONLY IF PRINTED ON 11"X17" SIZE PAPER)

INSTRUCTIONS:
-POSITION OF ITEM-21 IS DIFFICULT TO ACHIEVE USING TAPE MEASURE.
-USE THIS PRINT 1:1 TEMPLATE TO POSITION ITEM-21.
-ONCE POSITIONED, VERIFY DIMENSION 104.33" IS MAINTAINED (RADIAL DISTANCE) FROM ITEM-1 FEATURE. SEE SHEET-2 DIMENSIONS VIEW

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:1	97-168704	A01
		SHEET NUMBER 3 OF 3	

DOCUMENT N0. 99-149137-A

ORACLE BOM Explosion Report

Item Number: 62-170734

Description: HARDWARE KIT, RADOME ASSY, 8.0M, T6000

Item Revision: A.02 MCO-00049343

Date as of: 07/09/2020 11:46:54 AM PDT

Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
10	1600	ft	45-207269-000	MCO-00048005	SEALING STRIP	
20	24	pcs	48-207473-000	MCO-00047857	WHITE, SILICONE, SEALANT, 300ML	
30	10	pcs	48-207284-000	MCO-00039790	LOCTITE 243 10ML;RETAINING COMPOUND	
50	1500	ea	51-207565-000	MCO-00047881	SCREW, HEX HD, M8 X 40, SS	
58	3000	pcs	53-207162-000	MCO-00047782	WASHER, M8 (24MM OD), SS	
59	1500	pcs	52-207176-000	MCO-00047782	NUT, M8, SS	
		pcs	62-170734	A.02 MCO-00049343	HARDWARE KIT, RADOME ASSY, 8.0M, T6000	

Created By: Mike Needham

Create Time: 07/09/2020 11:47:16 AM PDT

ORACLE BOM Explosion Report

Item Number: 62-164608
Description: MUTE DOOR SENSOR KIT
Item Revision: A MCO-00049343
Date as of: 07/09/2020 11:46:54 AM PDT

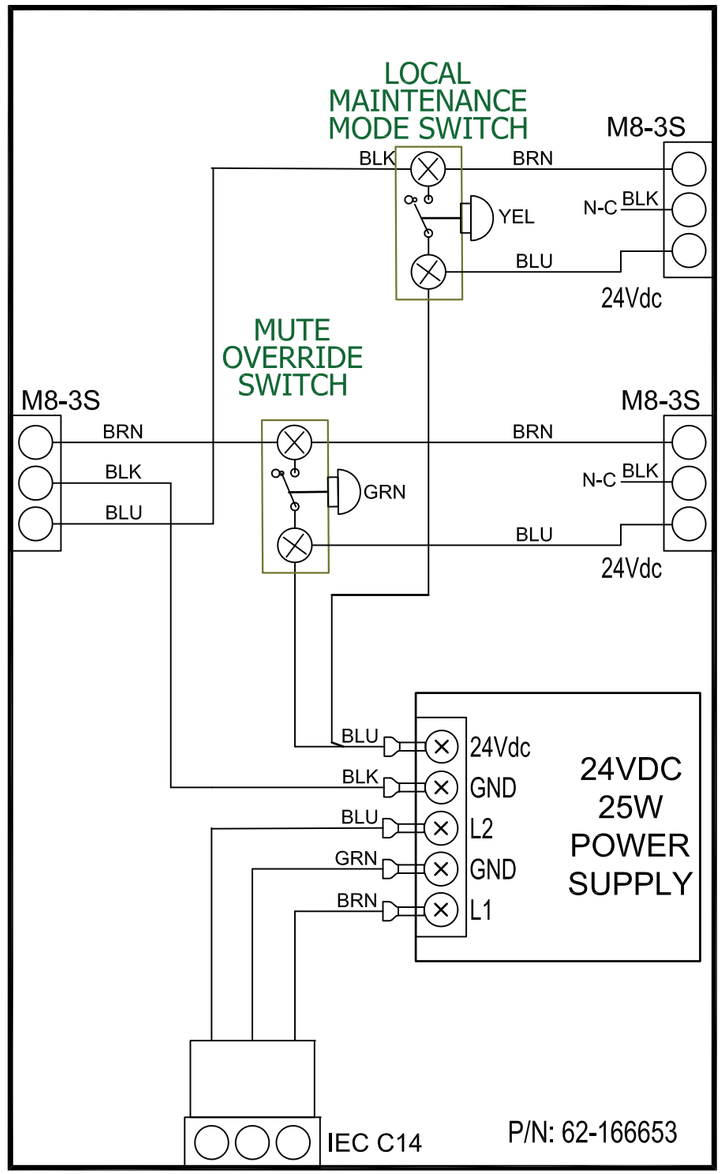
Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
0	1	pcs	93-164608	A MCO-00049343	SCHEMATIC, DOOR MUTE SENSOR CIRCUIT	
1	1	ea	33-207196-000	MCO-00029778	SWITCH, MAGETICALLY ACTUATED, SPST-NO	
2	150	in	32-207224-000	MCO-00045961	CABLE, 2 CONDUCTOR, (16/30) 18AWG TIN COPPER, 600V	
3	1	ea	31-207642-000	MCO-00031265	CONNECTOR, 2 PIN, IP67, 12" LEADS	
4	4	ea	31-207992-000	MCO-00047594	BUTT SPLICE, 18-22AWG HEATSHRINK, CLR W/ RED	
5	10	in	119526-3	MCO-00012114	HEAT SHRINK, 3/8 DIA, GLU-CORE	
6	1	ea	31-207786-010	MCO-00045961	FIELD CONNECTOR, M8-3P, SCREW TERMINALS	
		pcs	62-164608	A MCO-00049343	MUTE DOOR SENSOR KIT	

Created By: Mike Needham
Create Time: 07/09/2020 11:47:16 AM PDT

ASSEMBLY NOTES:

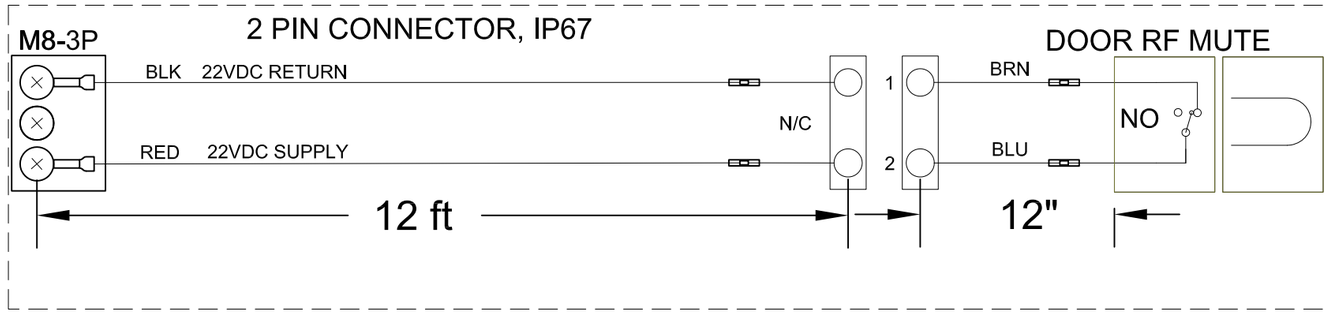
1. TERMINATE ALL WIRE WITH PIN TERMINALS BEFORE INSTALLING INTO TERMINAL BLOCKS USING TOOL 90143 FROM WEIDMULLER.
2. TERMINATE ALL WIRE WITH RIGHT ANGLE QUICK TERMINALS BEFORE CONNECTING TO SNAP IN OUTLET USING TOOL 118629 FROM MORRIS TOOLS CAT # 5448.
3. TERMINATE ALL WIRE WITH RING TERMINALS BEFORE CONNECTING TO CIRCUIT BREAKERS USING TOOL 30-502 FROM IDEAL.

VERSION HISTORY				
VER	DCO	DESCRIPTION	DATE	BY
A 01	N-A	MOVE TO PROTOTYPE	10/30/2019	JWM



DOOR MUTE SENSOR KIT

P/N: 62-164608



DRAWN BY:	JWM
DRAWN DATE:	10/30/2019
APPROVED BY:	
APPROVED DATE:	

COBHAM

Sea Tel, Inc., dba Cobham SATCOM, Concord
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: SCHEMATIC, DOOR MUTE SENSOR CIRCUIT

SIZE	SCALE:	DRAWING NUMBER	VER
B	N/A	93-164608-A	01

FIRST USED: GLOBALSTAR

SHEET NUMBER 1 OF 1

DOCUMENT NO. 99-148189-A

ORACLE BOM Explosion Report

Item Number: 62-165834

Description: REMOTE E STOP ASSY, IP66, SPST-NC

Item Revision: A.01 MCO-00049369

Date as of: 07/09/2020 11:46:54 AM PDT

Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
0	1	pcs	93-165834	A MCO-00049343	SCHEMATIC: MAINTENANCE MODE REMOTE CIRCUIT	
1	1	pcs	33-207259-000	MCO-00041254	E-STOP ENCLOSURE SUB ASSY, SPST-NC	
2	1	ea	109258-10	MCO-00047507	RELIEF, STRAIN	
3	1	ea	131302-1	MCO-00012114	LOCKNUT, CONDUIT, 1/2", SEALING	
4	15.2	ft	102105	MCO-00012597	CABLE 2 COND W/SHIELD 22 AWG	
5	4	ea	121899-22	MCO-00034863	WIRE PIN TERMINAL, CRIMP, 22 AWG, TRQS	
6	1	ea	31-207786-010	MCO-00045961	FIELD CONNECTOR, M8-3P, SCREW TERMINALS	
		pcs	62-165834	A.01 MCO-00049369	REMOTE E STOP ASSY, IP66, SPST-NC	

Created By: Mike Needham

Create Time: 07/09/2020 11:47:16 AM PDT

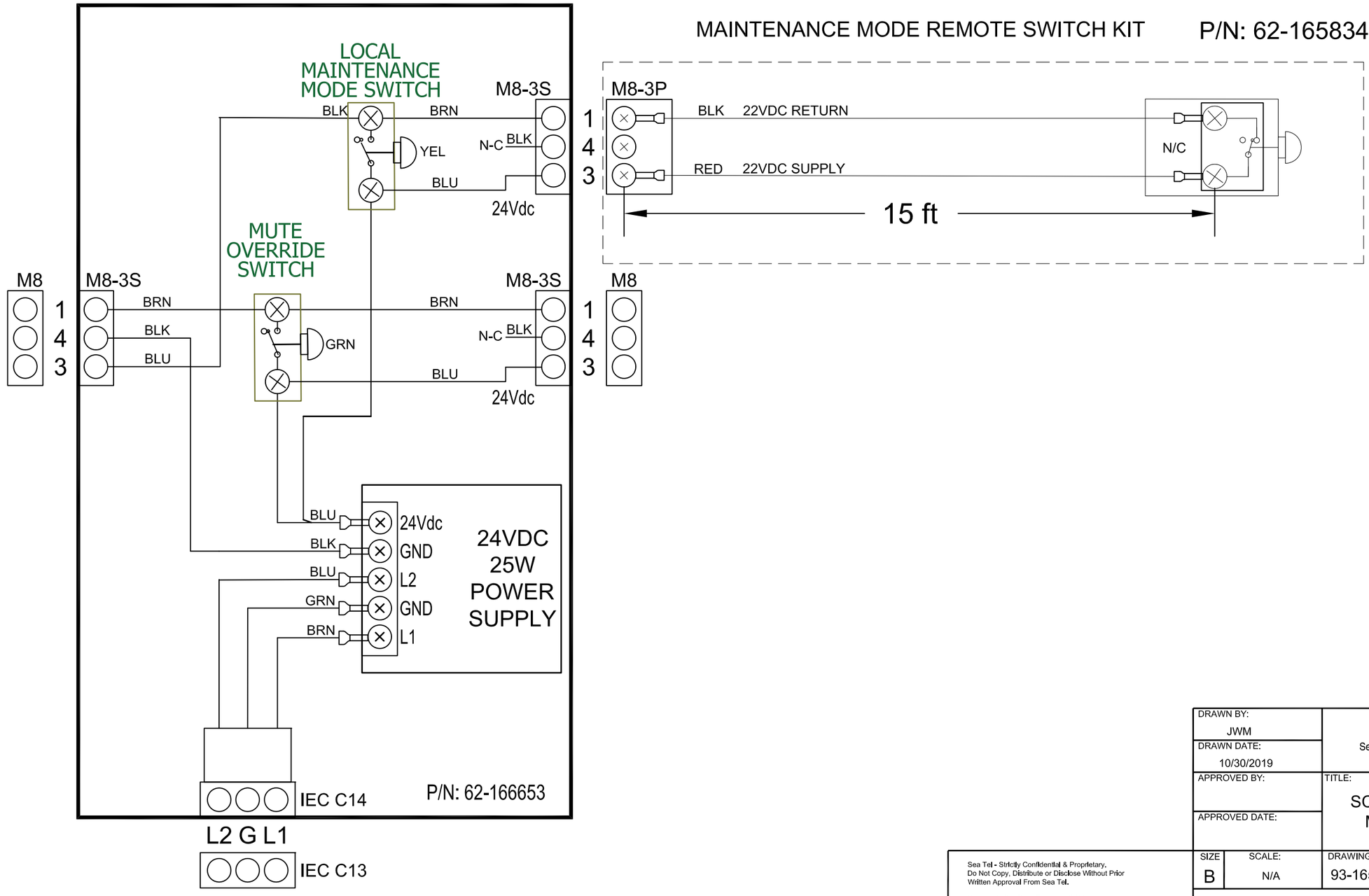
ASSEMBLY NOTES:

1. TERMINATE ALL WIRE WITH PIN TERMINALS BEFORE INSTALLING INTO TERMINAL BLOCKS USING TOOL 90143 FROM WEIDMULLER.
2. TERMINATE ALL WIRE WITH RIGHT ANGLE QUICK TERMINALS BEFORE CONNECTING TO SNAP IN OUTLET USING TOOL 118629 FROM MORRIS TOOLS CAT # 5448.
3. TERMINATE ALL WIRE WITH RING TERMINALS BEFORE CONNECTING TO CIRCUIT BREAKERS USING TOOL 30-502 FROM IDEAL.

VERSION HISTORY

VER	DCO	DESCRIPTION	DATE	BY
A 01	N-A	MOVE TO PROTOTYPE	10/30/2019	JWM

MAINTENANCE MODE REMOTE SWITCH KIT P/N: 62-165834



DRAWN BY:	JWM
DRAWN DATE:	10/30/2019
APPROVED BY:	
APPROVED DATE:	

COBHAM

Sea Tel, Inc., dba Cobham SATCOM, Concord
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: SCHEMATIC, MAINTENANCE MODE REMOTE CIRCUIT

SIZE	SCALE:	DRAWING NUMBER	VER
B	N/A	93-165834-A	01

FIRST USED: GLOBALSTAR

SHEET NUMBER 1 OF 1

DOCUMENT NO. 99-148189-A

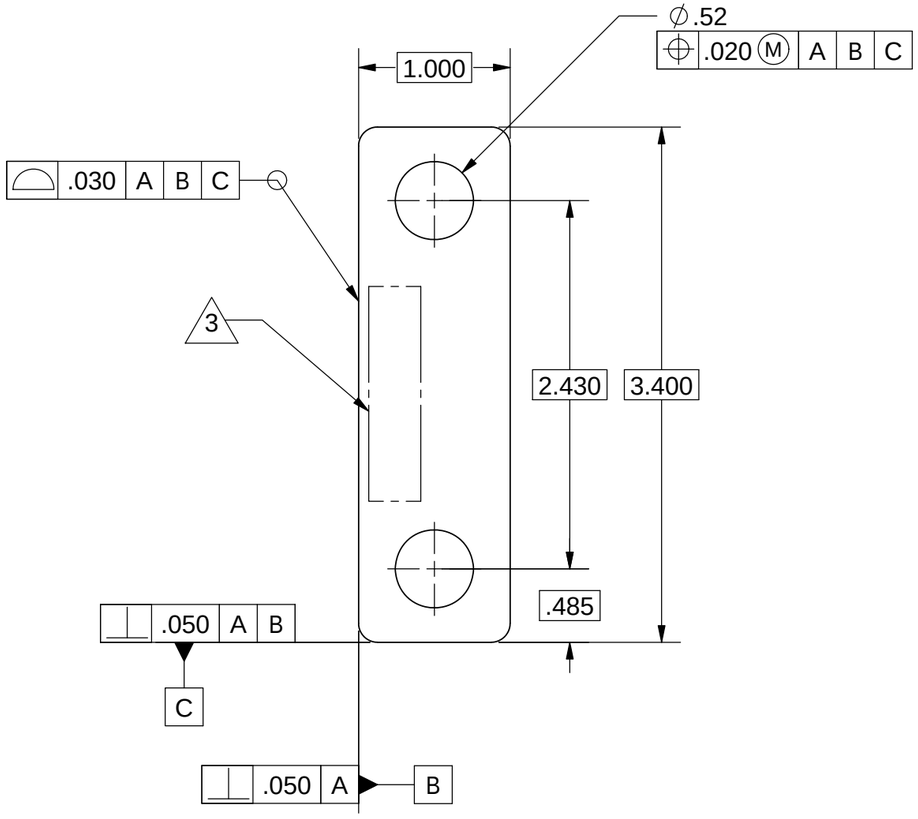
ORACLE BOM Explosion Report

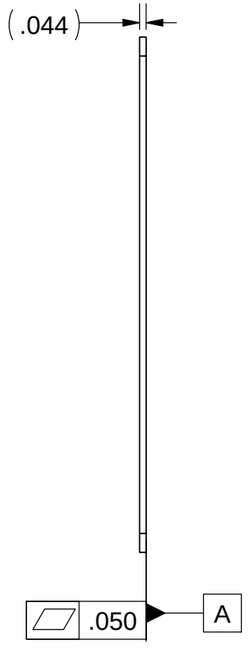
Item Number: 62-165842
Description: RADOME LIGHTING KIT, T6000
Item Revision: A MCO-00049343
Date as of: 07/09/2020 11:46:54 AM PDT

Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
1	6	ea	31-207930-000	MCO-00045323	VEHICLE LIGHT, LED, 12-24 VDC 900 LUMENS IP69K	
2	1	pcs	88-208025-000	MCO-00047693	POWER SUPPLY, 240W, MEANWELL 24V 10A LED DRVR	
3	1	pcs	33-207313-000	MCO-00047453	OUTLET / SW BOX, SINGL GANG, 4-1/2 THREADED OUTLET	
4	2	ea	109258-10	MCO-00047507	RELIEF, STRAIN	
5	1	ea	33-207312-000	MCO-00047453	SWITCH, TOGGLE, 2 POLE, 15A, 120/277VAC, IVORY	
6	1	ea	33-207314-000	MCO-00047453	TOGGLE COVER, WET LOCATION, GRAY, SNGL GANG	
7	1	ea	37-207166-180	MCO-00046144	POWER CORD, 10 AMP IEC C14 TO C13 AUTO-LOCK, 180"	
8	720	in	32-207224-000	MCO-00045961	CABLE, 2 CONDUCTOR, (16/30) 18AWG TIN COPPER, 600V	
9	1	ea	31-207642-002	MCO-00045324	CONNECTOR SOCKET, 4 PIN, IP67, 18AWG LEADS, 12"	
10	20	in	119526-3	MCO-00012114	HEAT SHRINK, 3/8 DIA, GLU-CORE	
11	4	in	119526-4	MCO-00012114	HEAT SHRINK, 1/2 DIA, GLU-CORE	
12	8	ea	31-207992-000	MCO-00047594	BUTT SPLICE, 18-22AWG HEATSHRINK, CLR W/ RED	
13	10	ea	31-207992-010	MCO-00047594	REDUCING BUTT SPLICE, 14/16-18/22 AWG HEATSHRINK,	
14	1	ea	110234-4	MCO-00012115	TERMINAL, RING INSULATED, 16-14AWG, #10, BLUE	
15	4	ea	121899-18	MCO-00012115	WIRE PIN TERMINAL, CRIMP, 18 AWG, RED	
		pcs	62-165842	A MCO-00049343	RADOME LIGHTING KIT, T6000	

Created By: Mike Needham
Create Time: 07/09/2020 11:47:16 AM PDT

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
01	00013239	8/3/15	∅.52 WAS ∅.430.	JPB





NOTES: UNLESS OTHERWISE SPECIFIED

1. MANUFACTURE PER SEATEL SPEC 122298.
2. REMOVE ALL BURRS AND SHARP EDGES.
3. IDENTIFY PER SEATEL SPECIFICATION 122930 APPROX WHERE SHOWN.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5 - 2009

DESIGNER/ENGINEER: J. BRUCE	DRAWN BY: JPB	Sea Tel COBHAM	
WEIGHT: 0.038	DRAWN DATE: 2/21/14	Tel. 925-798-7979 Fax. 925-798-7986	
MATERIAL: 304 S.S., .04" THK.	APPROVED BY:	TITLE: STRAP, RADOME, 80.8	
FINISH: N/A	APPROVED DATE:		
SURFACE ROUGHNESS:	SIZE: B / SCALE: 1:1	DRAWING NUMBER: 119918	REV: 01
3rd ANGLE PROJECTION	FIRST USED: 80.8 RADOME	SHEET NUMBER: 1 OF 1	

ORACLE BOM Explosion Report

Item Number: 62-156979
Description: KIT, SNOW ROPE ASSEMBLY
Item Revision: A MCO-00049240
Date as of: 07/09/2020 11:46:54 AM PDT

Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
0	1		97-156979-A	A DCO-00023211	SNOW ROPE INSTALLATION INSTRUCTIONS	
1	1	pcs	41-207543-025	MCO-00046181	ROPE, 0.25 IN X 100 FT, POLYESTER, WHITE	
2	2	ea	134254	MCO-00012114	BAR, RUBBER	
		pcs	62-156979	A MCO-00049240	KIT, SNOW ROPE ASSEMBLY	

Created By: Mike Needham
Create Time: 07/09/2020 11:47:16 AM PDT

File: 97-156979-A - Tracker 4000 Installation Notes - SNOW ROPE

The most important thing we build is trust

DATE: Friday, October 13th, 2017

AUTHOR: Adrian Nicholas Rev: Released

SNOW ROPE INSTALLATION

SUMMARY: System operation is expected to generate enough heat to prevent snow settling, on the radome, however during periods of unusually heavy snow and/or inoperation, enough snow may accumulate to impact system performance, hence the need for a snow rope.

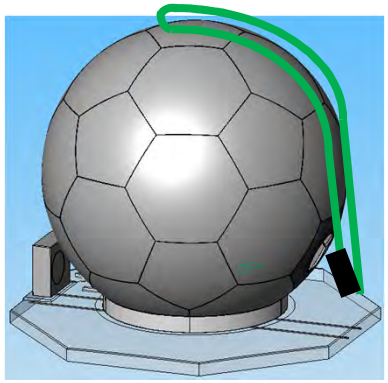
Solution is simply a clothes line, looped around the lightning diverter. A clothes line is thin enough to get under most of the snow, to loosen it, and should be durable, as they are intended to be left out in all weathers.

INITIAL INSTALLATION: Cobham snow rope assembly 62-156979 includes a rope and a pair of rubber blocks with enough weight to carry the rope over the top of the radome, (resilient weights protect the radome surface from damage).

SERVICE REPLACEMENT: We recommend replacing the snow rope at the first signs of visible wear.
Provided the rope is unbroken, you may use the existing rope to pull the new rope over the top, otherwise, weighting of the line is necessary to help carry it over the top of the radome*.
*Weights used must be either be resilient, or padded, to protect the radome from damage.

Fig 1: End weighted with resilient blocks, to prevent radome damage.

Fig 2: Installation overview.

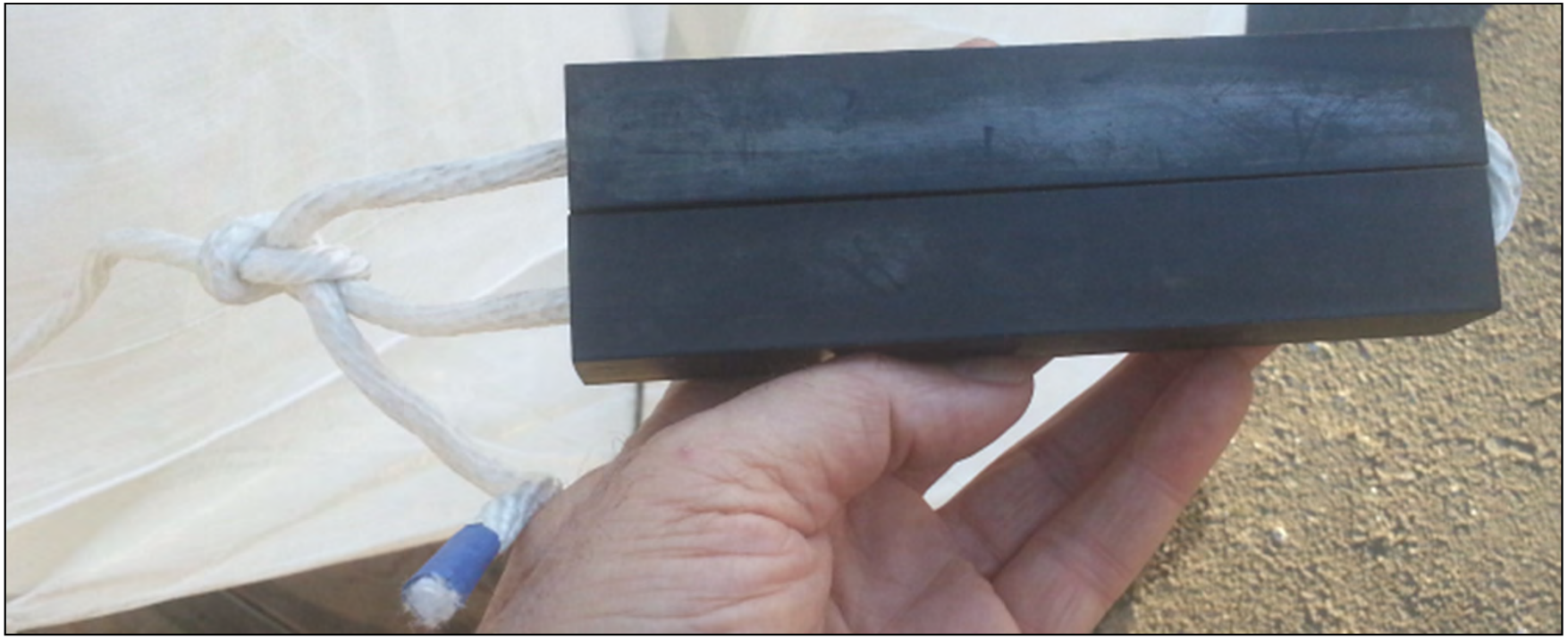


SNOW ROPE INSTALLATION

SNOW ROPE INSTALL

A. Pass rope end through rubber blocks and knot securely, using a bowline. (http://www.animatedknots.com/bowline/#ScrollPoint)

Fig 3: Weighted end, close-up.



SNOW ROPE INSTALLATION

B. BEING CAREFUL NOT TO GET ENTANGLED IN THE LIGHTNING DIVERTER
Throw rope over top of radome then, looping rope around lightning diverter post, bring ends together, (at about waist height).
Thrown end is A, other part is B…which must be long enough to go up to the top AND BACK AGAIN.

Fig 4: Weighted end thrown over.

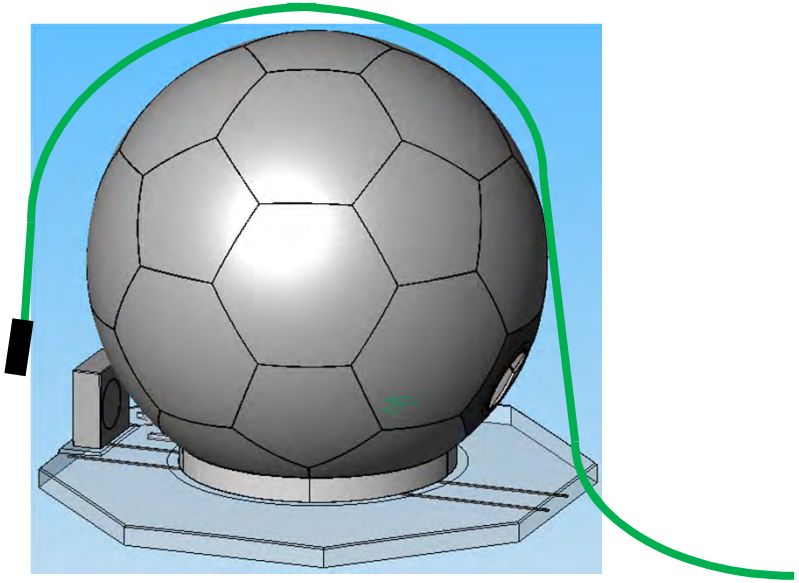
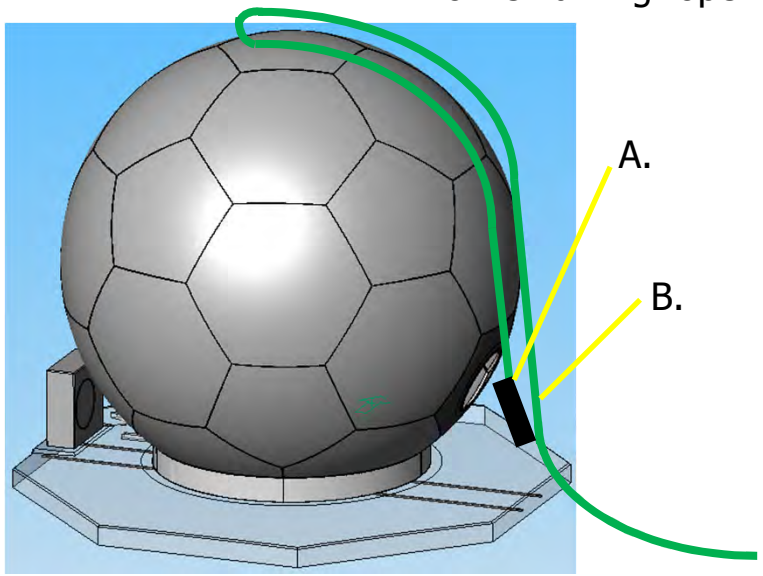


Fig 5: Weighted end brought back to middle of remaining rope.



SNOW ROPE INSTALLATION

C. Tie loop in roughly the middle of B.

Fig 5: Loop location.

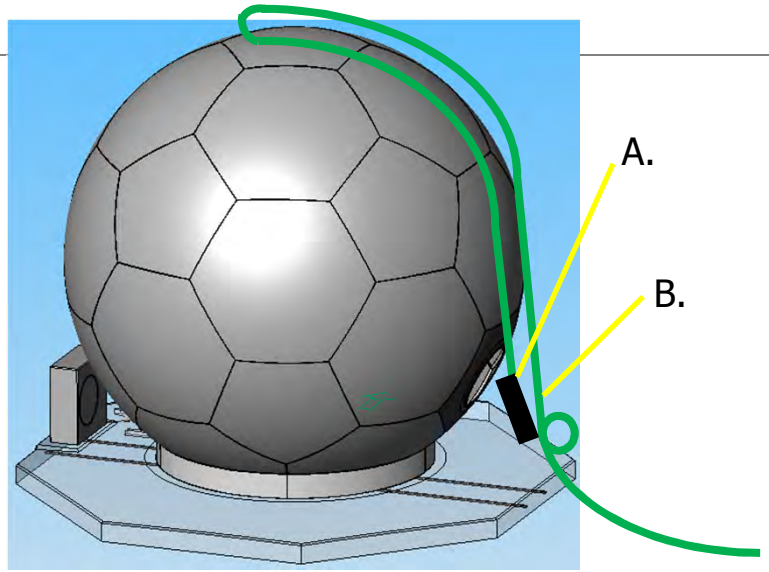


Fig 6a: Loop step 1

Fig 6b: Loop step 2

Fig 6c: Loop step 3

Fig 6d: Loop step 4

SNOW ROPE INSTALLATION

D. Feed rope end through loop then, BEING SURE TO KEEP AN EXTRA LINE DOWN AT GROUND LEVEL, pull loop up to the radome top so it is snug against the lightning arrestor rod.

Fig 7a: Feeding weighted rope end through loop.

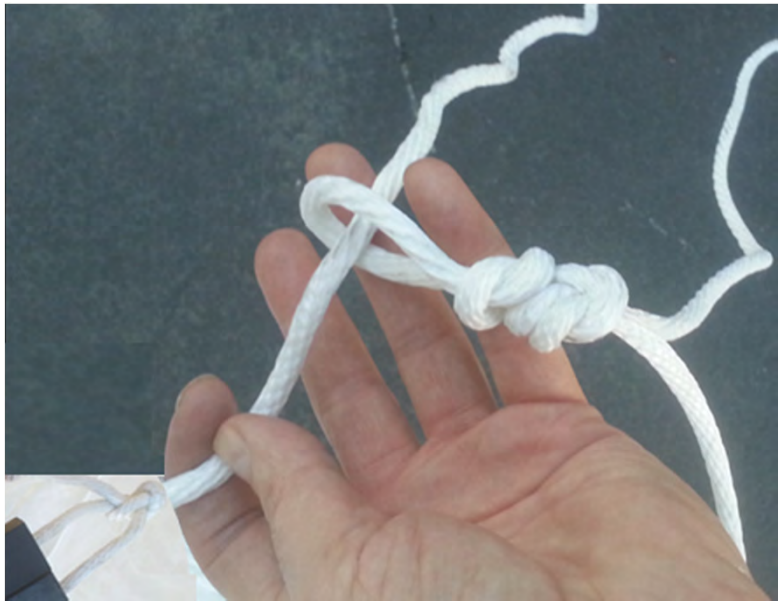
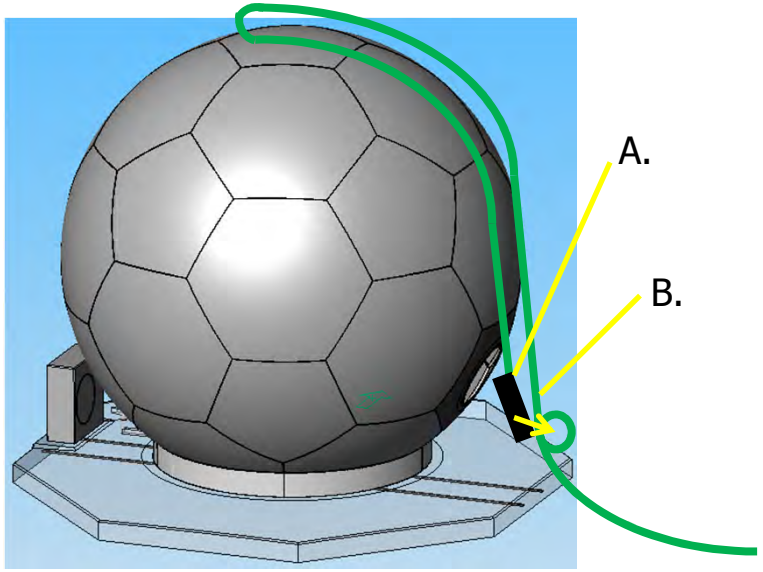


Fig 7b: Feeding weighted rope end through loop.



SNOW ROPE INSTALLATION

E. Neatly bundle looped A and the remaining B ropes together.

Fig 8: Loop shown pulled to top.

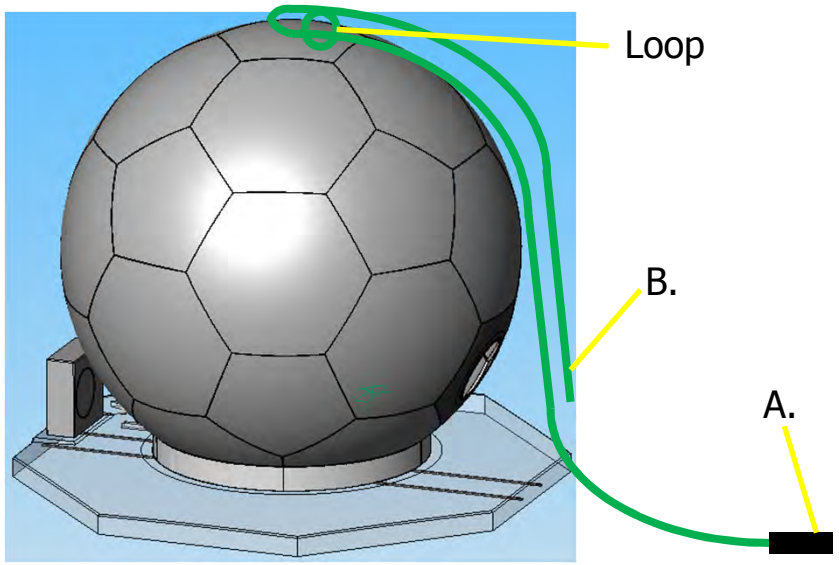
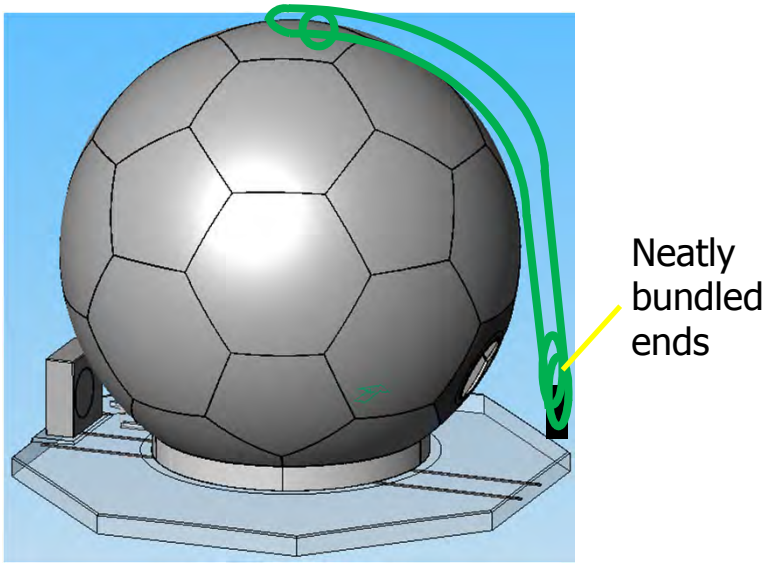


Fig 9: Neatly bundle ends.



F. SERVICE REPLACEMENT

We strongly recommend replacing the rope before it breaks, at the first signs of wear, by using the existing rope to pull a new one around the lightning diverter.

ROPE ONLY: 41-207543-025 - ROPE, 0.25 IN X 100 FT, POLYESTER, WHITE

ROPE KIT: 62-156979 – KIT, SNOW ROPE ASSEMBLY
(INCLUDES RESILIENT WEIGHTS)

ORACLE BOM Explosion Report

Item Number: 62-171768

Description: KIT, OBSTRUCTION LIGHT AND LIGHTNING DIVERTER

Item Revision: A.03 MCO-00049240

Date as of: 07/09/2020 11:46:54 AM PDT

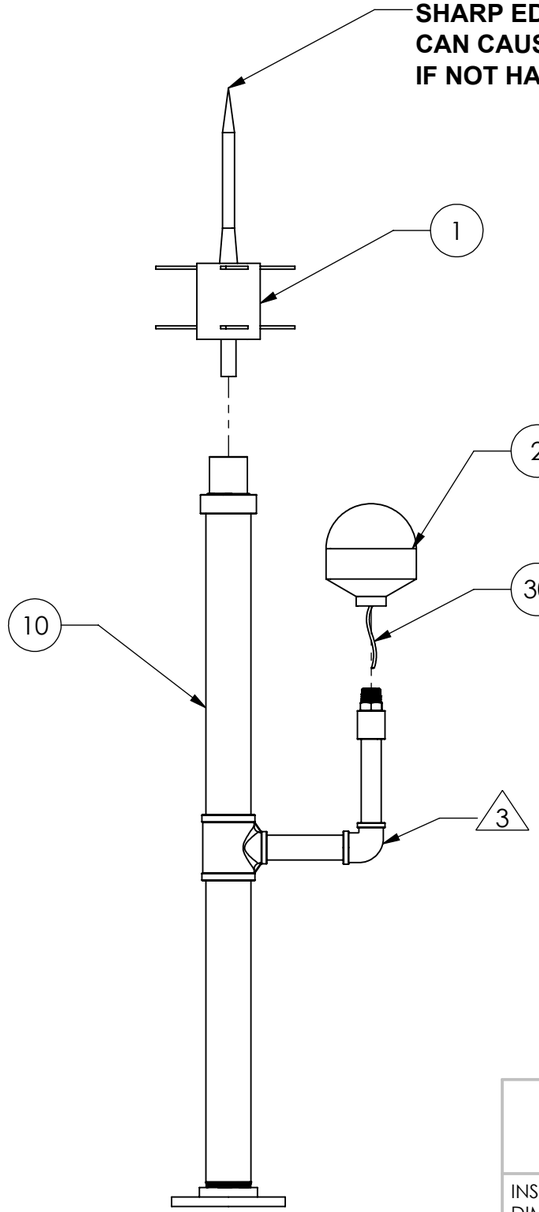
Find Num	Qty	Inventory Unit (LN6)	Number	Rev	Description / Title	BOM Notes
0	REF	ea	97-171768	A MCO-00049240	ASSY DRAWING, HAZARD LIGHT & LIGHTNING DIVERTER	
1	1	ea	41-207819-000	MCO-00047855	LIGHTNING ROD	
2	1	pcs	31-207994-000	MCO-00047639	OBSTRUCTION LIGHT, RED LED, FL810, 110-240VAC	
10	1	ea	62-172045	A.03 ECO-00036603	TUBING ASSY, LIGHTNING PROTECTION, T6000	
30	40	ft	32-207230-000	MCO-00047659	CABLE, 2 COND,18 AWG, .75MM, BRN/BLU, PVC	
31	120	ft	32-207229-000	MCO-00047659	WIRE, 2 AWG, 600V, ULTRA FLEXIBLE, BLK EDPM JACKET	
40	REF	ea	48-207483-000	MCO-00046423	LUBRICANT, ELETRICAL CONTACT, CONDUCTIVE	
41	6	ea	31-207995-000	MCO-00047654	CABLE LUG, COMPRESSION, 2 AWG, 1 3/8 HOLE	
42	4	ea	121899-18	MCO-00012115	WIRE PIN TERMINAL, CRIMP, 18 AWG, RED	
43	90	ea	45-207281-000	MCO-00047796	LOOP CLAMP, 1/2" ID, 13/32" MOUNTING HOLE DIA.	
50	4	ea	114586-626	MCO-00037691	SCREW, HEX HD, 3/8-16 x 1-1/2, SS.	
58	8	ea	114580-032	MCO-00012113	WASHER, FLAT, 3/8, SS. (1 OD X 13/32 ID)	
59	4	ea	114583-031	MCO-00012113	NUT, HEX, 3/8-16, SS.	
60	90	ea	51-207565-000	MCO-00047881	SCREW, HEX HD, M8 X 40, SS	
68	180	ea	131552-160	MCO-00012114	WASHER, FENDER, M8, 18-8 SS. (24MM OD)	
69	90	ea	120089-410	MCO-00012113	NUT, HEX, M8, SS.	
		pcs	62-171768	A.03 MCO-00049240	KIT, OBSTRUCTION LIGHT AND LIGHTNING DIVERTER	

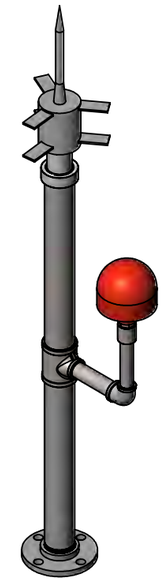
Created By: Mike Needham

Create Time: 07/09/2020 11:47:16 AM PDT

CONDUCTIVE LUBRICANT, 48-207483-000 (ITEM-40 OF BOM 62-171768) SHOULD BE APPLIED BETWEEN ALL THREADS

REVISION HISTORY				
REV	ECO	DATE	DESCRIPTION	BY
XXXX	XXXX	XXXXX	DESCRIPTION	XXXX





NOTES:
-SEE DRAWING SHEET 2,3 &4 FOR WIRING INSTRUCTIONS
-USE PULL WIRE THAT CAME ALONG WITH TUBING ASSEMBLY (ITEM-10) TO ROUTE OBSTURCTION LIGHT CABLE.

NOTES: UNLESS OTHERWISE SPECIFIED

1. MANUFACTURE PER SEATEL STANDARD 99-122298.
2. THIS DRAWING GOVERNS THE ASSEMBLY OF ALL VARIANTS OF THE PART NUMBER 62-171768, REGARDLESS OF ASSEMBLY OR DRAWING REVISION. SOME ITEMS SHOWN ON THIS DRAWING MAY NOT BE INCLUDED ON THE BILL OF MATERIAL, OR MAY APPEAR IN A DIFFERENT ORIENTATION THAN THE DRAWING DEPICTS FOR SOME VARIANTS. REFER TO THE BILL OF MATERIALS FOR THE VARIANT NUMBER SHOWN ON THE WORK ORDER.
3. CHECK ELBOW IS FACING UPWARDS BEFORE MOUNTING LIGHT (ITEM-2)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5°

INSPECTION DIMENSIONS NOTED BY (X.X) SHALL HAVE FEATURE SIZE DIMENSIONS AND ASSOCIATED GD&T TOLERANCES INSPECTED

INTERPRET TOLERANCING PER ASME Y14.5 - 2009

DESIGNER/ENGINEER: MS	DRAWN BY: MS	COBHAM	
WEIGHT: 26.0 lbs	DRAWN DATE: 03/11/2020	Sea Tel, Inc., dba Cobham SATCOM, Concord Tel. 925-798-7979 Fax. 925-798-7986	
MATERIAL: N/A	APPROVED BY:	TITLE: ASSY DWG, HAZARD LIGHT AND LIGHTNING DIVERTER	
FINISH: N/A	APPROVED DATE:		
SURFACE ROUGHNESS:	SIZE: B	SCALE: 1:8	DRAWING NUMBER: 97-171768 REV: A
3rd ANGLE PROJECTION	FIRST USED: T6000		SHEET NUMBER: 1 OF 4

DOCUMENT N0. 99-148645-A

Unpacking, Installation, Wiring & Setup

Unpacking

Unpack all hardware and inspect for damage. If there is any damage, please contact your Avlite Office. Retain original packing material for possible future use in shipping.

Installation & Wiring

Before proceeding with installation or service, make sure the following conditions are met:

- Ensure the tower or mast is grounded (NO RF HAZARD)
- Check the mast lighting circuit is not faulty
- Ensure power lines are not 'live' (NO ELECTRICAL HAZARD)
- Avoid touching live circuits!
- Avoid touching any component or any part of the circuitry while the unit is operating. Do not change components or make adjustments inside the unit with power on.

Open the Obstruction Light as described. Guide the cable through the cable gland and mount the bottom half of the Obstruction Light on a mounting pole using the inner thread.

NOTE:

- Make sure the mounting pole is vertically aligned to guarantee the required beam pattern of the obstruction light
- Make sure the light's beam pattern is not disturbed by any nearby obstacles

Shorten the cable and close/seal the cable gland.

With the unit open, observe the rear of the PCB mounted in the top half of the Obstruction Light for terminal blocks and switch settings.

NOTE: Use cable in compliance with the effective local electrical code. The cable outer diameter should be between 5mm and 10mm.

NOTE: There is no requirement to terminate the relay and/or the serial communication if not used.

OPENING & CLOSING THE LIGHT HEAD

- Remove the locking screw
- In order to open the unit, the top half of the unit should be turned anti-clockwise with respect to the bottom half. The top half will turn approximately 20mm over a positive "click" before separating from the bottom half. Attention should be paid to the restriction caused by the internal cabling which is secured by a cable gland.
- The unit is closed by reversing the above procedure, ensuring the black rubber O-ring remains in place.

Figure 1. Obstruction Light

AC POWER CONNECTION (BLACK TERMINAL)

The unit is designed to operate from a nominal AC voltage from 110VAC-240VAC.

Wired as follows (according to Australian Standard):

- L1 (brown) = Line/Active
- L2 (blue) = Neutral

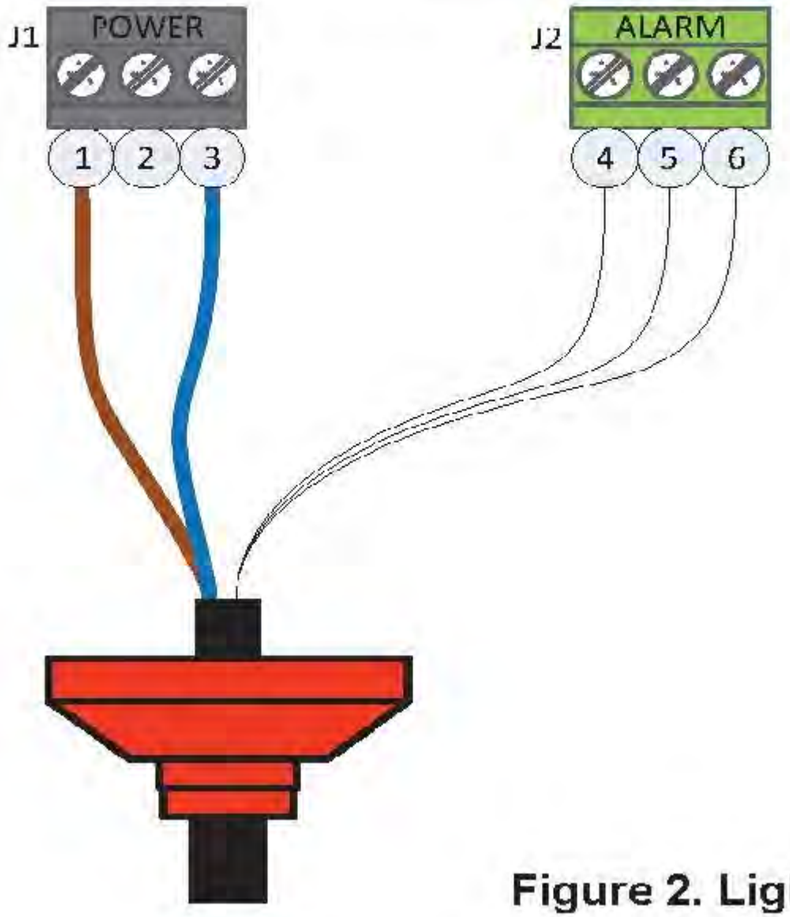
For location details of the terminals please refer to Figure 3.

REFERENCE: AVLITE
(UNIVERSAL AC LOW INTENSITY OBSTRUCTION
LIGHT INSTALLATION AND SERVICE MANUAL)

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:12	97-171768	A
		SHEET NUMBER 2 OF 4	

DOCUMENT NO. 99-149137-A

Universal AC Low Intensity Obstruction Light
Single Light Fixture



NO.	CONNECTOR	SIGNAL
1	110-240VAC	L1 - LINE
2	110-240VAC	NC
3	110-240VAC	L2 - NEUT
4	ALARM	COMM
5	ALARM	NO
6	ALARM	NC

Figure 2. Light wiring diagram and pinning

REFERENCE: AVLITE
(UNIVERSAL AC LOW INTENSITY OBSTRUCTION LIGHT INSTALLATION AND SERVICE MANUAL)

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:12	97-171768	A
		SHEET NUMBER 3 OF 4	

DOCUMENT N0. 99-149137-A

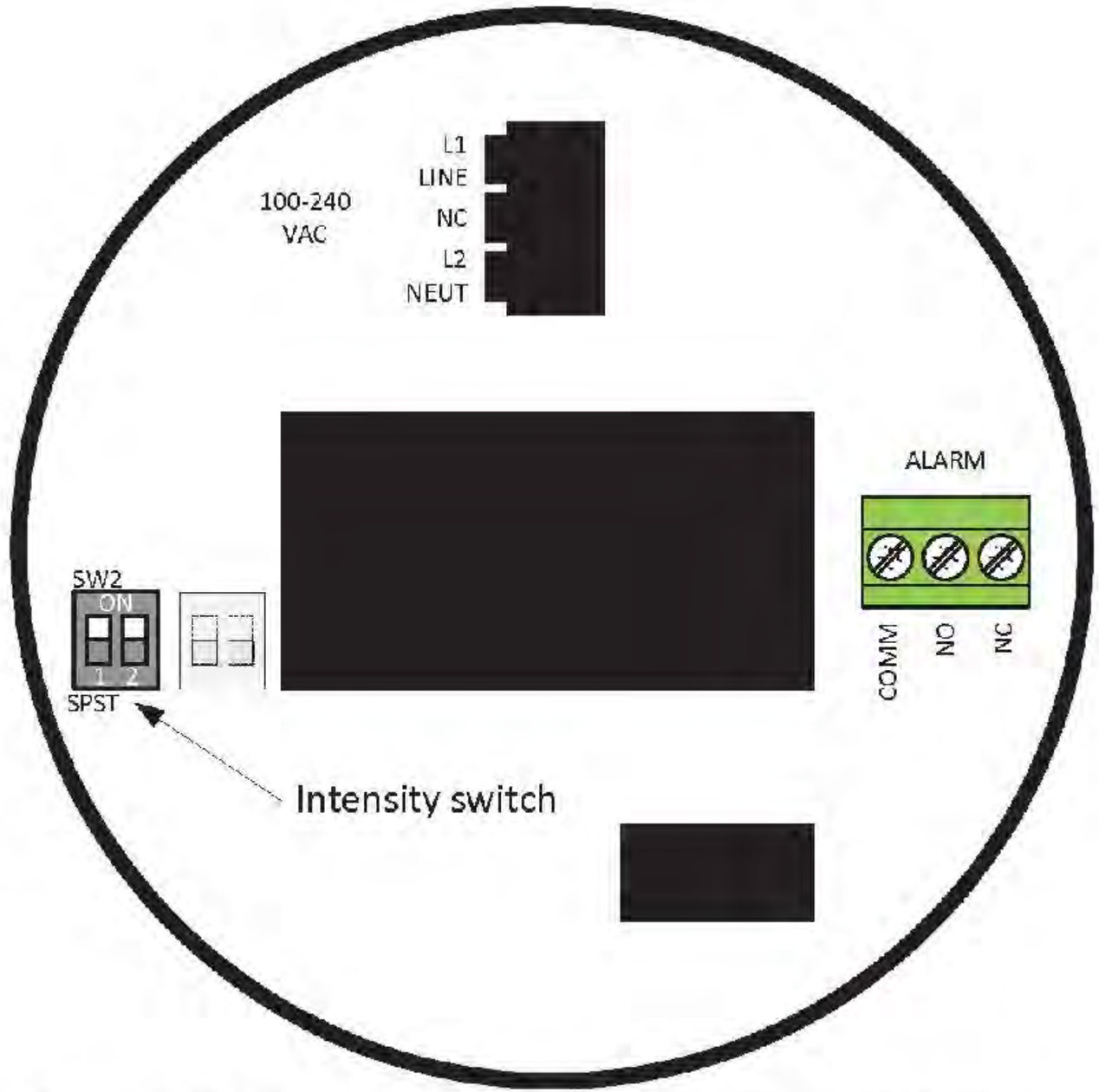


Figure 3. AC Obstruction Light PCB with terminals and DIP switches

REFERENCE: AVLITE
(UNIVERSAL AC LOW INTENSITY OBSTRUCTION
LIGHT INSTALLATION AND SERVICE MANUAL)

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:12	97-171768	A
		SHEET NUMBER 4 OF 4	

DOCUMENT N0. 99-149137-A

Quality Management System

Procedure, Test, Product, Tracker 6000 Site Test

Document number:	99-169239
Version:	A
Author(s):	Bee Vang
Document classification:	Engineering
Date:	5-11-2020

This document is applicable for:
Sea Tel, Inc., doing business as Cobham SATCOM

Approval Routing	
Position	**Approving Authority (Electronic Signature)**
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System Design Engineering Manager	Hoang, Huelam
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Version History				
Ver.	**DCO**	**Description of Change**	**Author**	**Date**
A	00033339	Initial release	B. Vang J. Martin H. Hoang	06/17/2020

1.1. Purpose

To provide the required procedure for certifying the Tracker 6000 antenna system at the installation site.

1.2. Scope

This test procedure is use to validate the Tracker 6000 antenna system after the system has been built and integrated at the installation site. It is not intended to be a step-by-step instruction to guide the individual on how to connect, setup, and test the product. The Technician or Engineer using this procedure to validate the antenna should have knowledge of the antenna system, basic PC communication, and use of test equipment.

1.3. Definitions

AZ: Azimuth
CL: Cross Level
EL: Elevation
REL: Relative Azimuth
ICU: Integrated Control Unit
IMA: Integrated Marine Antenna
ADE: Above Deck Equipment
BDE: Below Deck Equipment
RX: Receive
TX: Transmit
RTU: Remote Terminal Unit
GUI: Graphical User Interface
BUC: Block Up Converter
LNB: Low-Noise Block Downconverter
M&C: Monitor and Control
RHCP: Right Hand Circular Polarization
LHCP: Left Hand Circular Polarization
GTS: Gateway Transceiver Subsystem

1.4. Responsibilities

Field Technician or Engineer: Personnel tasked to test functionality of product utilizing this test procedure. Maintain test results in accordance with Cobham documentation retention policies and ensure availability of those results to Cobham staff upon verbal or written request.

1.5. Safety

All work to be completed by trained Cobham personnel or authorized dealer in accordance with all local, state, and federal regulations.

PPE (Personal Protection Equipment): Safety glasses and steel toe work boots are required.

To avoid injuries, it is important to be aware of the risks present when handling and testing an antenna from inside the dome. There is a risk of the antenna injuring the operator, as the antenna moves, so the operator must be aware of the position of the antenna at all time while inside the dome.

1.7 Training

All personnel involved in execution of this procedure/process shall be retrain and certified as deemed necessary by Cobham.

1.8 References

System Block Diagram: 92-162776

Schematic: 93-164211

1.9 Equipment / Programs Required

CL_Global_Star_Friction Test
EL_Global_Star_Friction Test
AZ Friction Torque Test
csvgain_3dB10dB
DacRemP
FileLogger.exe
CLTrimCal.xlsx
Microsoft Excel
Windows PC
Spectrum Analyzer (must be able to generate CSV file)
Signal Generator
Power Meter
Ethernet cable
Coax test cables

1. TEST INFORMATION

Tested By: Click or tap here to enter text. **Date:**

Antenna Serial Number: Click or tap here to enter text.

2. RADOME LIGHT VERIFICATION

2.1 Turn on the light switch and verify that all dome lights come on. ☐

3. SYETEM ERROR VERIFICATION

3.1 Set the static IP V4 address on the PC to be within the same IP address range as the antenna.

- Default IP: 10.1.1.100

3.2 If the Radome door switch is installed onto the door, press down onto the Mute Override Mode switch button at the safety circuit interface assembly towards the base of the antenna. This will allow the antenna to boot up while the door is open.

If the Radome door switch has not been installed onto the Radome door, close the door switch, by pressing the tabs together and keeping the tabs together by applying a piece of tape around the tabs.

Ensure that the E-stop is in the up position.

3.3 Energize the antenna pedestal and allow the antenna to initialize.

3.4 Open a telnet session (10.1.1.100 port 2003), and enter the Username and Password.

- Username: Dealer
- Password: seatel3

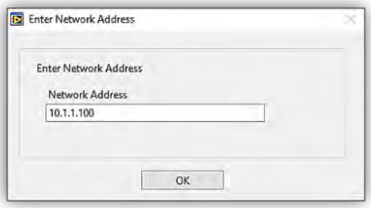
3.5 After the system completes initialization, issue CLI command, SHOW ERROR ALL and verify that there are no system errors besides the errors listed below. ☐

- Error 1031: AGC Below Threshold
- Error 1003: AGC Below Noise Threshold

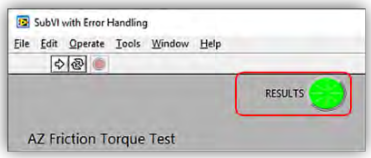
3.6 Issue command, SET INTERFACE NETWORK WEB ENABLE ON to access the antenna GUI and SAVE.

4. AZIMUTH FRICTION TORQUE TEST

4.1 In the IMA GUI; from the Position Antenna Page, target AZ to 0 and EL to 90.
4.2 From the Reflector Page, turn DishScan off.
4.3 Turn tracking off by clicking on Tracking Off at the upper left hand corner of the GUI.
4.4 From the telnet session, issue command, SET ANTENNA PATH_DELTA -240 0 0 10 .2.
4.5 Close the telnet session.
4.6 Open program (**AZ_Torque**).
4.7 Enter the IP address of the antenna system, click OK, and allow test to run.



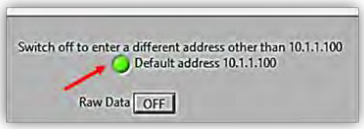
4.8 Verify that the system passes test (LED turns green).



4.9 Copy and paste the test plot below. ..... ☐

5. CROSS-LEVEL FRICTION TORQUE TEST

5.1 Open the **CL_Global_Star_Friction Test** program.
5.2 If the IP address of the antenna system is the default IP address (10.1.1.100), select the arrow [→] to start test.
5.3 If the IP address of the antenna system is not the default IP address, click on the green LED, and then click on the arrow.
5.4 Enter the IP address of the antenna system and allow the test to run.



5.5 Verify that the system passes test (LED turns green); copy and paste the test plot below. ..... ☐

6. ELEVATION FRICTION TORQUE TEST

6.1 Open the **EL_Global_Star_Friction Test** program.
6.2 If the IP address of the antenna system is the default IP address (10.1.1.100), select the arrow [→] to start test.
6.3 If the IP address of the antenna system is not the default IP address, click on the green LED, and then click on the arrow.
6.4 Enter the IP address of the antenna system and allow the test to run.
6.5 Verify that the system passes test (LED turns green); copy and paste the test plot below. ..... ☐

7. BUC M&C TEST

7.1 Set the static IP V4 address on the PC to be within the same IP address range as the BUC.

- Default LHCP BUC IP: 192.168.1.21
- Default RHCP BUC IP: 192.168.1.22

7.2 Log onto the BUC GUI, by entering the BUC IP onto the web browser.

- Password: 1234

7.3 Verify that the LHCP BUC (192.168.1.21) GUI can be access. ☐

7.4 Verify that the RHCP BUC (192.168.1.22) GUI can be access. ☐

8. CLIMATE MONITOR M&C TEST

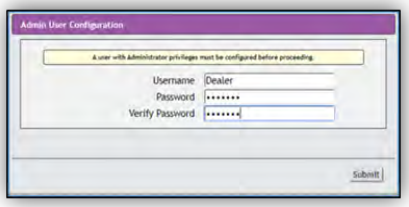
8.1 Ensure that the static IP address on the test PC is set to be within the same IP address range as the climate monitor IP address.

- Default IP: 192.168.1.25

8.2 Launch a web browser and enter in the device IP address onto the address bar.

8.3 Username and Password

- UN: Dealer
- PW: seatel3

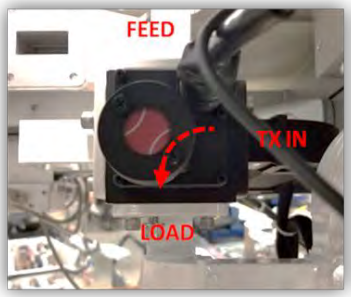


8.4 Ensure that the climate monitor web page can be access and verify that the WG15 internal temperature, humidity, and dew point are display on the GUI. ☐

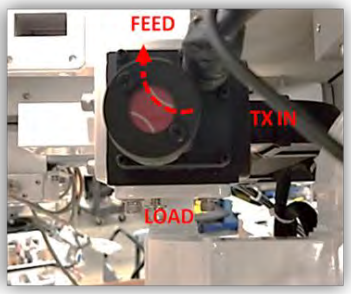
8.5 Verify that the WG15 detects the two sensors and the sensors internal temperature, airflow, humidity, and dew point are display on the GUI. ☐

9. DOOR SWITCH TEST

9.1 Reopen a telnet session, issue command, SET ANTENNA TX_LOAD OFF.
9.2 Open the Radome door switch, if the door switch has not been installed onto the door. If the door switch is installed onto the Radome door, depress the Mute Override Mode switch button at the safety circuit interface assembly.
9.3 Issue command, SHOW ERROR ALL.
9.4 Verify that the antenna system flags error "Open Door Detected". ☐
9.5 Verify that Safe mode is engaged. ☐
9.6 Verify that the baseball switches are in the Load position. ☐
SHOW STATUS SYSTEM BASE_BALL_SWITCH
⇨ Response: BB1/R LOAD = ON, BB2/L LOAD = ON



LOAD POSITION



NORMAL POSITION

9.7 Close the Radome door switch, or press down onto the Mute Override Mode switch button at the safety circuit interface assembly.
9.8 Verify that the "Open Door Detected" and "Safe mode engaged" errors clear. ☐

10. MAINTENANCE MODE SWITCH TEST

10.1 Drive the antenna down to 20° in EL.
10.2 Issue command, SET ANTENNA TX_LOAD OFF.
10.3 Push down the Maintenance Mode E-stop.

10.4 Verify that the antenna no longer moves (Park positon). ☐
10.5 Move the antenna by hand and verify that the antenna can move freely without any resistances from the motors. ☐
10.6 Verify that the baseball switches are in the Load position. ☐
o SHOW STATUS SYSTEM BASE_BALL_SWITCH
⇨ Response: BB1/R LOAD = ON, BB2/L LOAD = ON
10.7 Verify that the antenna system flags the "Maintenance Mode engaged" Error. ☐
10.8 Pull up the Maintenance Mode E-stop and reboot the antenna by issuing command, REBOOT.
10.9 Verify that the antenna initializes and operates normally. ☐
10.10 Verify that the antenna system clears the "Maintenance Mode engaged" Error. ☐

11. TRANSMIT GAIN CALIBRATION AND COMBINED POWER SENSOR CHECK

✎ ***Note**: Since the BUC is* 

, the iBUC R manual needs to be used for TX power configuration and Monitoring.

Configuring ALC/AGC:
IBUC R offer two methods of ensuring consistent signal levels: automatic level control (ALC) and automatic gain control (AGC).

ALC:
When enabled, the Automatic Level Control (ALC) circuitry in the IBUC monitors output levels and adjusts the gain to maintain a consistent output for input signal variations. If a signal level is consistently below the predetermined target level, the ALC will cause the gain to be increased until the target level is reached. If a signal level exceeds the target level, the ALC will decrease the gain.

To enable ALC:
With the Gain Mode set to "Open" and the Tx Input and Tx Output Thresholds set, monitor the Tx Output level in order to determine a baseline setting.

When the Tx Output Level reading is equal to the level that you want to maintain, enable ALC by using any of the M&C interfaces.

The IBUC will now continuously self-monitor, increasing or decreasing the gain in order to maintain a constant signal at the level you defined.

AGC:
When enabled, the Automatic Gain Control (AGC) circuitry in the IBUC maintains the gain constant and equal to the target gain that was established when AGC was enabled.

Gain control settings can drift with time or temperature changes. You can reset the Gain Control function (when reset, the Gain Control returns to mid-range or 0.0).

Terrasat units enable you to offset the target by using the attenuation control without having to first disable the ALC or AGC.

Example: Set the output power level to 51.5 dBm and enable ALC. From this point forward, the ALC algorithm will maintain the output level at 51.5 dBm.

If you want to change the output level to 52 dBm, reduce the attenuation by 0.5 dB. The target level will be updated automatically.

✎ ***Note**: The Tx Output Level is "captured" when ALC is enabled.*

In the TX Cfg tab ENTER the iBUC R Input Power and Output power level as below,

TX Input threshold level Low	=	-30 dBm
TX Input threshold level High	=	5dBm
TX Output threshold level Low	=	30.5 dBm
TX Output threshold level High	=	54.0 dBm

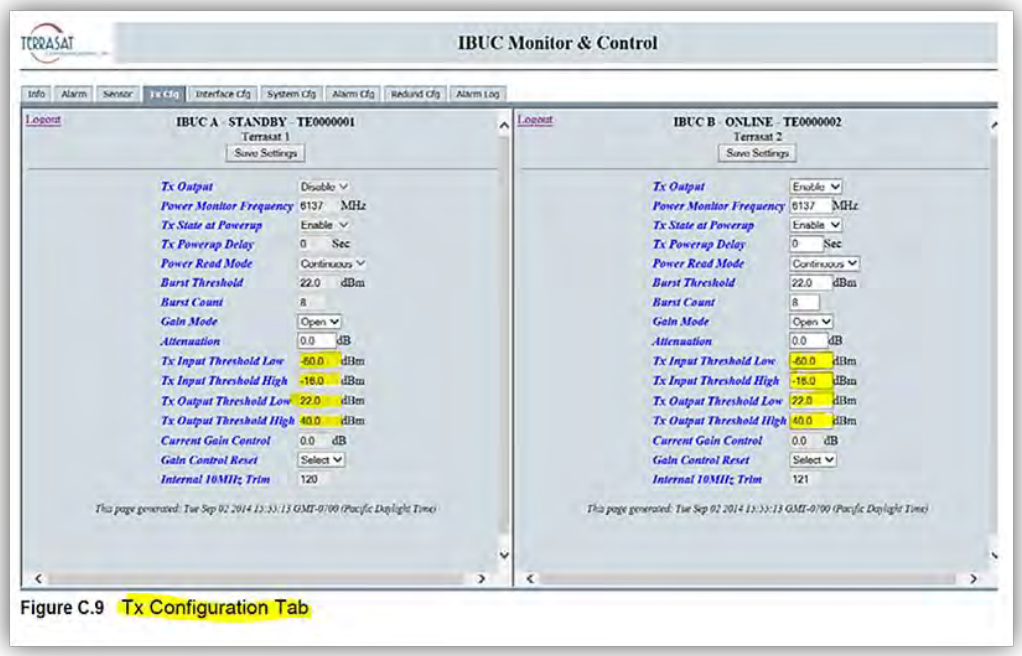
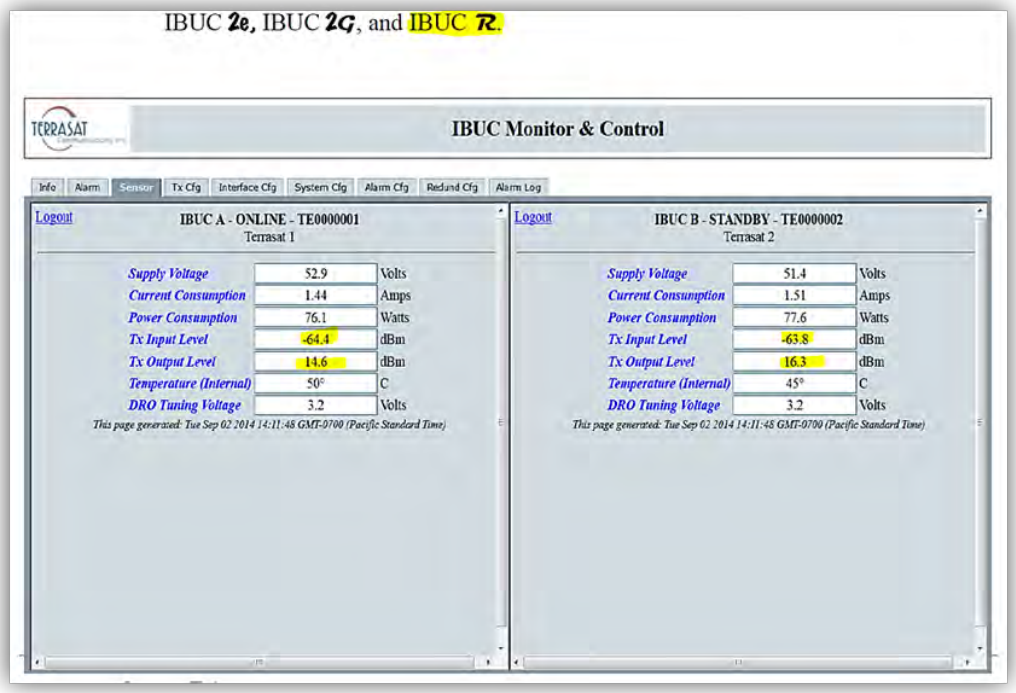


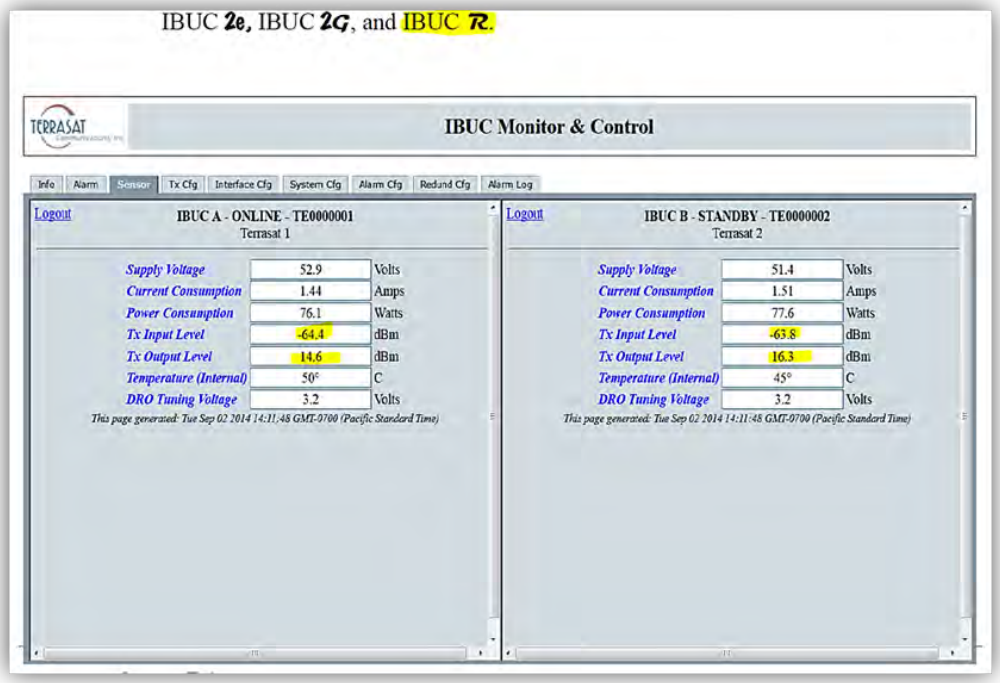
Figure C.9 Tx Configuration Tab



Here is the example Table for RF line up using the previous measured data for IF loss to get about ~68 dBW output power.

The row highlighted in Green color is the recommend setting to get the ~ 68.0 dBW output power.

The ALC/AGC is to maintain a constant (fixed Gain) for temperature and frequency variation after initial setting.
The BUC output power level can be lower or increase by the Modem for about 5.6 dB, OR it can be Increase/Decrease by adjusting the Attenuation setting of the BUC.



GCU TXIF Output Power (dBm) RHCP, Adjust Range 5.62 dB	Cable Loss GCU to Arrester (dB)	Signal Level @ Arrester Input (dBm)	IF Loss from Point A to BUC Input (dB)	Input Power Level to BUC N-Connector	Attenuation setting in BUC, Default 0 (dB)	BUC Gain (dB)	BUC Output Power PSAT (dBm)	Wave Guide, Filter, OMT, and Ant Gain Total (dB)	EiRP (dBW), add -30 dB conversion to dBW
0 dBm	-3.4 dB	**-3.4 dBm**	-4.5 dB	-7.9 dBm	0 dB	61 dB	53.1 dBm	46.5	**69.6 dBW**
0 dBm	**-3.4 dB**	**-3.4 dBm**	**-4.5 dB**	**-7.9 dBm**	**-1 dB**	**61 dB**	**52.1 dBm**	**46.5**	**68.6 dBW**
0 dBm	-3.4 dB	**-3.4 dBm**	-4.5 dB	-7.9 dBm	-2 dB	61 dB	51.1 dBm	46.5	**67.6 dBW**
0 dBm	-3.4 dB	**-3.4 dBm**	-4.5 dB	-7.9 dBm	-3 dB	61 dB	50.1 dBm	46.5	**66.6 dBW**
Can also adjust TXIF power level here					Fine tune in 0.1 dB Step				

11.1 Verify that the baseball switches are in the Load Position before conducting test (see images below). ..... ☐

- o SET ANTENNA TX_LOAD ALL
- o SHOW STATUS SYSTEM BASE_BALL_SWITCH
  - ⇨ Response: BB1/R LOAD = ON, BB2/L LOAD = ON

11.2 Coaxial connection from the antenna to the ICC rack (indoor cable demark point).

11.3 Configure the Signal Generator to 900 MHz CW and 0dBm power.

11.4 Set the Power Meter to 900MHz (with no offset) and calibrate the Power Meter.

11.5 Allow the Signal Generator to warm up for one hour before conducting test. ..... ☐

11.6 Verify that the BUC has been active for a minimum of 15 minutes. ..... ☐

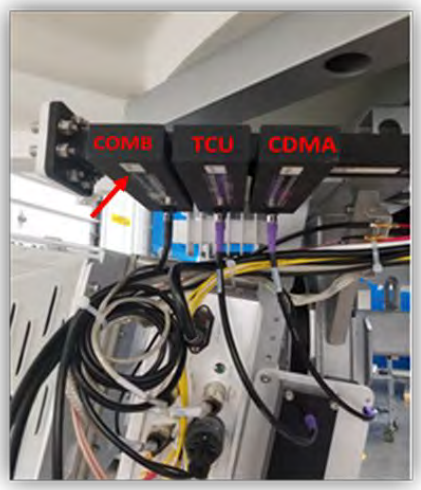
11.7 Connect the Power Meter to the Signal Generator and measure the output power of the signal generator.

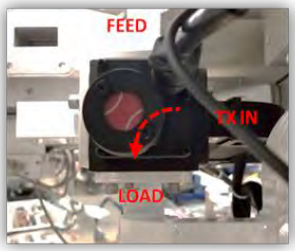
11.8 Adjust the Signal Generator power level until the Power Meter reading = 0dBm.

11.9 Connect the Signal Generator to the ICC rack RHCP TX port.

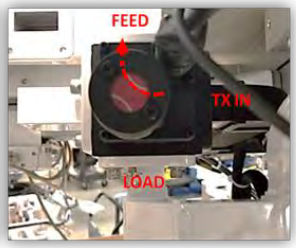
11.10 Set the Power Meter frequency to 5150MHz and calibrate the Power Meter.

11.11 Add the RHCP COMB cross guide coupler offset value into the power meter. (Label is on the COMB coupler as shown below.)





LOAD POSITION



NORMAL POSITION

11.12 Turn the antenna tracking off to prevent the antenna from going into search.

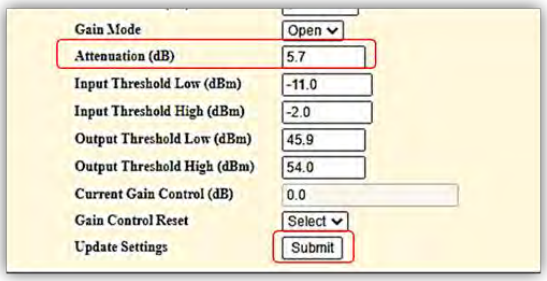
11.13 Target the antenna to AZ 0 degrees and EL 90 degrees.

11.14 Take the Power Meter up to the antenna hub and connect it to the RHCP COMB port of the test cross guide coupler. (See image above for the COMB port.)

11.15 Turn the Signal Generator RF on.

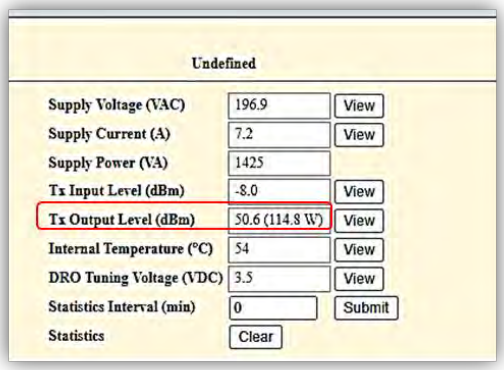
11.16 Log onto the RHCP BUC; select the [Tx Cfg] tab.

11.17 Adjust the BUC attenuation via its web page until the power meter reading = 50.5 ± 0.1dBm (or 10.5 ± 0.1dBm with no Power Meter offset). ..... ☐



11.18 In the RHCP BUC GUI, select the [Sensor] tab.

11.19 Verify that the BUC Tx Output Level is 50.5 ± 0.5dBm. ☐



11.20 Reattach the RHCP COMB sample coax cable to the RHCP COMB port of the cross guide coupler. ☐

11.21 Open the Chrome web browser and log onto the RTU GUI, by typing 192.168.1.11/gs.html onto the address bar.

11.22 Select RHCP COMBINED and verify that the RHCP COMB power sensor reading = 50.5 ±0.5dBm. ☐

11.23 If the RHCP COMB reading does not meet spec, the COMB INTERNAL and CABLE values will need to be adjusted slightly, so that the power meter reading meets spec. …N/A ☐

- To make change to the COMB INTERNAL and CABLE values, select the [INTERNAL] or [CABLE] button and make the change to the value.
- Record down the new value(s) below.

New Internal Value: Click or tap here to enter text.
New Cable Value: Click or tap here to enter text.

RHCP CDMA POWER SENSOR CHECK:

11.24 Select RHCP CDMA and verify that the RHCP CDMA power sensor reading = 50.5 ± 0.5dBm. ☐

11.25 If the RHCP CDMA reading does not meet spec, the CDMA INTERNAL and CABLE values will need to be adjusted slightly, so that the power meter reading meets spec. …N/A ☐

- To make change to the CDMA INTERNAL and CABLE values, select the [INTERNAL] or [CABLE] button and make the change to the value.
- Record down the new value(s) below.

New Internal Value: Click or tap here to enter text.
New Cable Value: Click or tap here to enter text.

RHCP TCU POWER SENSOR CHECK:

11.26 Set the Power Meter frequency to 5091.5MHz and calibrate the Power Meter.
11.27 Add the TCU cross guide coupler offset value into the power meter. (Label is on the TCU coupler.)
11.28 Connect the Power Meter to the RHCP TCU port of the test cross guide coupler.
11.29 Change the frequency of the signal generator to 841.5MHz and turn RF on.
11.30 Record the power meter reading. (Reading = 50 ± 1dBm)

Power Meter Reading: Click or tap here to enter text.

11.31 Reattach the RHCP TCU sample coax cable to the RHCP TCU port of the cross guide coupler.
11.32 From the RTU GUI, select RHCP TCU and verify that the RHCP TCU power sensor reading = the recorded Power Meter reading (from step 11.30) ± 0.2dBm..... ☐
11.33 If the RHCP TCU reading does not meet spec, the TCU INTERNAL and CABLE values will need to be adjusted slightly, so that the power meter reading meets spec. ..... N/A ☐

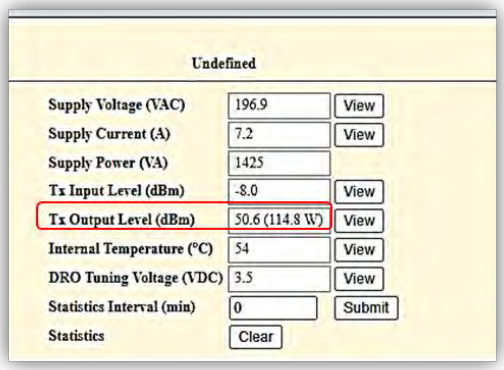
- To make change to the TCU INTERNAL and CABLE values, select the [INTERNAL] or [CABLE] button and make the change to the value.
- Record down the new value(s) below.

  New Internal Value: Click or tap here to enter text.
  New Cable Value: Click or tap here to enter text.

11.34 Turn the signal generator RF to off.

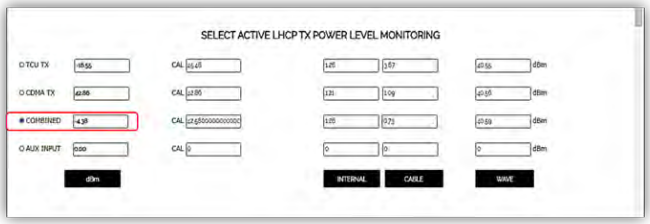
LHCP TRANSMIT GAIN CALIBRATION & COMBINED POWER SENSOR CHECK:

11.35 Configure the Signal Generator to 900 MHz CW and 0dBm power.
11.36 Connect the Signal Generator to the ICC rack LHCP TX port.
11.37 Set the Power Meter frequency to 5.150GHz and calibrate the power meter.
11.38 Add the LHCP COMB cross guide coupler offset value into the power meter. (Label is on the COMB coupler as shown below.)
11.39 Take the Power Meter up to the antenna hub and connect it to the LHCP COMB port of the test cross guide coupler. (See image above for the COMB port.)
11.40 Turn the Signal Generator RF on.
11.41 Log onto the LHCP BUC; select the [Tx Cfg] tab.
11.42 Adjust the BUC attenuation via its web page until the power meter reading = 50.5 ± 0.1dBm (or 10.5 ± 0.1dBm with no Power Meter offset). ..... ☐
11.43 In the LHCP BUC GUI, select the [Sensor] tab.
11.44 Verify that the BUC Tx Output Level is 50.5 ± 0.5dBm. ..... ☐



11.45 Reattach the LHCP COMB sample coax cable to the LHCP COMB port of the cross guide coupler. ☐

11.46 In the RTU GUI, select LHCP COMBINED and verify that the LHCP COMB power sensor reading = 50.5 ± 0.5dBm. ☐



11.47 If the LHCP COMB reading does not meet spec, the COMB INTERNAL and CABLE values will need to be adjusted slightly, so that the power meter reading meets spec. … N/A ☐

- To make change to the COMB INTERNAL and CABLE values, select the [INTERNAL] or [CABLE] button and make the change to the value.
- Record down the new value(s) below.

New Internal Value: Click or tap here to enter text.
New Cable Value: Click or tap here to enter text.

LHCP CDMA POWER SENSOR CHECK:

11.48 Select LHCP CDMA and verify that the LHCP CDMA power sensor reading = 50.5 ± 0.5dBm. ☐

11.49 If the LHCP CDMA reading does not meet spec, the CDMA INTERNAL and CABLE values will need to be adjusted slightly, so that the power meter reading meets spec. … N/A ☐

- To make change to the CDMA INTERNAL and CABLE values, select the [INTERNAL] or [CABLE] button and make the change to the value.
- Record down the new value(s) below.

New Internal Value: Click or tap here to enter text.
New Cable Value: Click or tap here to enter text.

LHCP TCU POWER SENSOR CHECK:

11.50 Set the Power Meter frequency to 5091.5MHz and calibrate the Power Meter.

11.51 Add the TCU cross guide coupler offset value into the power meter. (Label is on the TCU coupler.)

11.52 Connect the Power Meter to the RHCP TCU port of the test cross guide coupler.

11.53 Change the frequency of the signal generator to 841.5MHz and turn RF on.

11.54 Record the power meter reading. (Reading = 50 ± 1dBm)

Power Meter Reading: Click or tap here to enter text.

11.55 Reattach the LHCP TCU sample coax cable to the LHCP TCU port of the cross guide coupler.

11.56 From the RTU GUI, select LHCP TCU and verify that the LHCP TCU power sensor reading = the recorded Power Meter reading (from step 11.54) ±0.2dBm. ☐

11.57 If the RHCP TCU reading does not meet spec, the TCU INTERNAL and CABLE values will need to be adjusted slightly, so that the power meter reading meets spec. ..... N/A ☐

- To make change to the TCU INTERNAL and CABLE values, select the [INTERNAL] or [CABLE] button and make the change to the value.
- Record down the new value(s) below.

New Internal Value: Click or tap here to enter text.
New Cable Value: Click or tap here to enter text.

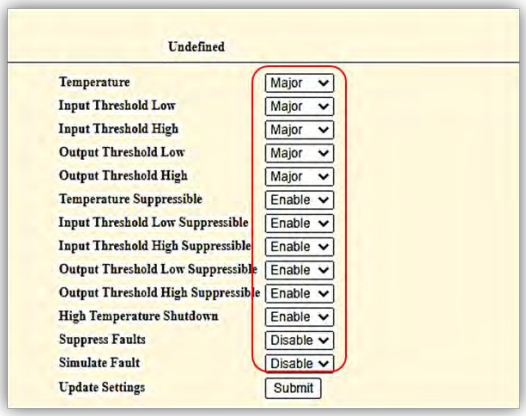
11.58 Turn the signal generator RF to off.

LHCP & RHCP BUC SETUP:

11.59 Select the [Tx Cfg] tab.
11.60 Set the parameters as below and submit.

- Input Threshold Low (dBm) = -11.0
- Input Threshold High (dBm) = -2.0
- Output Threshold Low (dBm) = 35.0
- Output Threshold High (dBm) = 54.0

11.61 Select the [Alarm Cfg] tab.
11.62 Set the parameters as below and submit.



12. RECEIVE RF ALIGNMENT

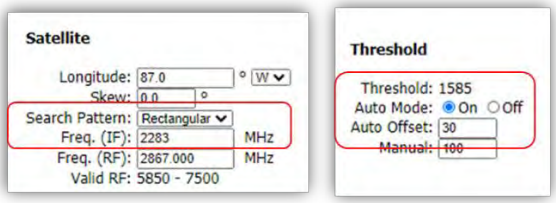
12.1 Configure the Signal Generator to 6.975GHz CW and -25dBm power.
12.2 Set the Power Meter to 6.975GHz (with no offset) and calibrate the Power Meter.
12.3 Allow the Signal Generator to warm up for one hour before conducting test. ☐
12.4 Verify that the LNBs have been active for a minimum of 15 minutes. ☐
12.5 Connect the Signal Generator along with the test coax cable to the Power Meter and measure the output power of the signal generator.
12.6 Adjust the Signal Generator power level until the Power Meter reading = -25dBm.
12.7 Connect the test coax cable from the Signal Generator to the LNB coupler at the antenna and turn the Signal Generator RF on.
12.8 Attenuate the input of the line amps (at the base of pedestal) by adding Fixed Attenuators (SMA Male to SMA Female) until the reading at the ICC rack = -10 ± 0.5dBm.

13. INITIAL ANTENNA TRIM

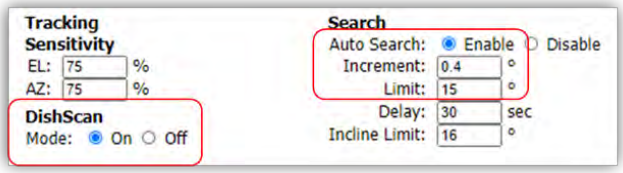
13.1 From the telnet session, ensure that the time source is set for GPS and the GPS ID is set for RMC.

- SHOW INTERFACE TIME SOURCE
  - ⇨ Response: GPS
- SHOW INTERFACE GPS GPS_ID
  - ⇨ Response: RMC

13.2 In the IMA GUI, select the Position Antenna page. Set the Search Pattern to Rectangular, Frequency IF to 2283, Auto Mode On, and Auto Offset to 30.



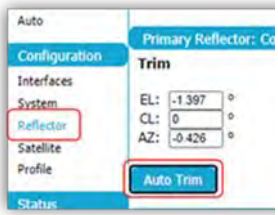
13.3 Select the Reflector page, Enable Auto Search, set the Increment to 0.4, Limit to 15, and ensure DishScan is on.



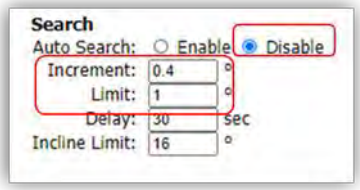
13.4 Ensure Tracking in On.

13.5 From the telnet session, issue command, SET ANTENNA SUN_TARGET and allow the antenna to search and track onto the sun for 3-5minutes. ☐

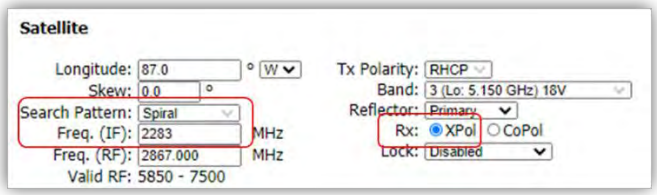
13.6 In the Reflector page, select the [Auto Trim] button. ☐



13.7 Set the Limit to 1 and Disable Auto Search. ☐

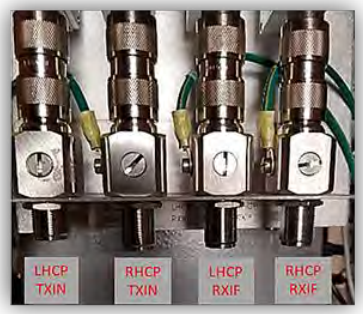


13.8 Set the Search Pattern to Spiral, RX to XPOL, and then select the [Save] button..... ☐

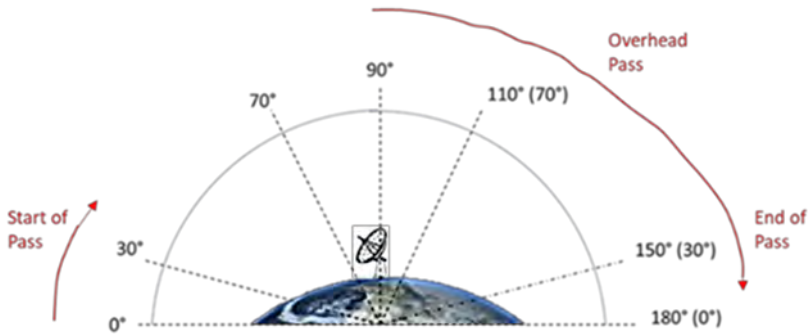


14. SATELLITE ACQUISITION WITH TLE & CL TRIM

14.1 Connect the Spectrum Analyzer to the LHCP RXIF OUT port of the IFL interface assembly at the base of the antenna.



✎ ***Important Note:*** *The satellite pass used for this test must not be an EL pass of less than 60° and greater than 78° (no overhead satellite pass).*



14.2 Contact Globalstar for satellite schedule passes. Use the scheduler to determine satellite passes with an EL pass between 60° and 78°. The satellite TLE can be found https://www.tle.info/ or https://www.celestrak.com/NORAD/elements/active.txt

14.3 Open **FileLogger.exe**:

14.3.1 Open a command window and change the directory to where FileLogger.exe is located.

14.3.2 At the command prompt type, FileLogger.exe Antenna IP address.

Example: C:\FileLogger>FileLogger.exe 10.1.1.100

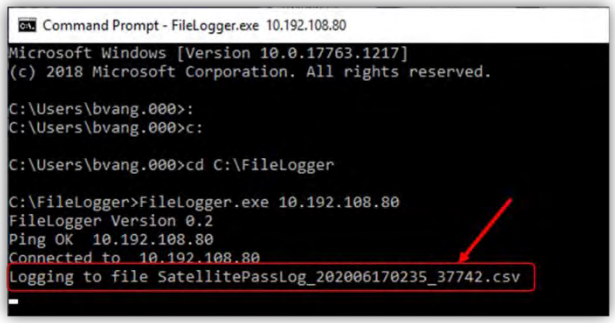
14.4 From the telnet session, issue command, SET SATELLITE TLE (copy and paste the first TLE line here).

14.5 Issue command, SET SATELLITE TLE (copy and paste the second TLE line here).

Example:

SET SATELLITE TLE 1 25874U 99041C 20161.42982561 -.00000114 +00000-0 -13484-2 0 9996
SET SATELLITE TLE 2 25874 051.9427 043.1682 0012580 065.2455 105.6825 11.25670607916360

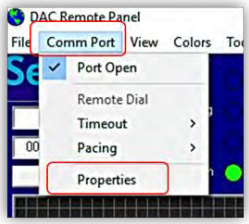
14.6 As soon as the TLE command executes, FileLogger.exe will start data log.



14.7 The antenna system will automatically target the satellite.

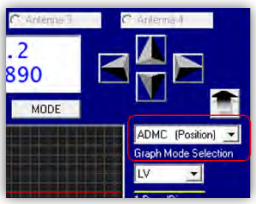
14.8 Open DacRemP and monitor the signal level.

14.9 Select Comport, and then Properties.



14.10 Select TCP/IP; enter in the IP address of the antenna system; set the port number to 2000 or 2001, and then click [OK].

14.11 Use ADMC to monitor and display the AGC level.



14.12 Select [Clear] and [Center All].

14.13 Observe the signal level (4th trace down). During the entire satellite pass, ensure that the signal level in DacRemP does not fluctuate by more than 2dB, or the data will be invalid. If the signal level fluctuates by more than 2dB, repeat steps 14.2 to 14.13.

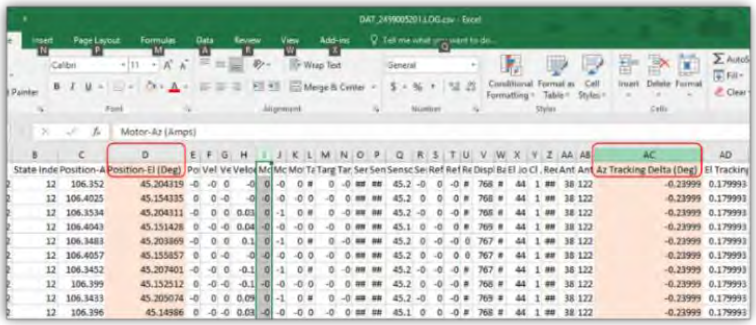
- 1 division = 1dB in DacRemP

14.14 Allow the antenna system to track the satellite for a complete pass.

14.15 Exit the FileLogger.exe window to stop the data log.

14.16 Open the CSV file and locate the POSITION EL (Deg) and AZ TRACKING DELTA (Deg) Columns.

✎ ***Note:*** *The data log file will be stored in the same directory as FileLogger.exe.*



14.17 Note down the EL Positions and AZ Tracking Delta values in EL positions:

- o Low EL Position at the start of pass (30±2°)
- o High EL Position (Highest EL positon of the pass - between 60° and 78°)
- o Low EL Position at the end of pass (30±2°)

14.18 Open Excel program **CLTrimCal.xlsx**.

14.19 Enter the Low EL Position (start of pass) and AZ Tracking Delta value into B2/C2.

14.20 Enter the Highest EL Position and AZ Tracking Delta value into B3/C3.

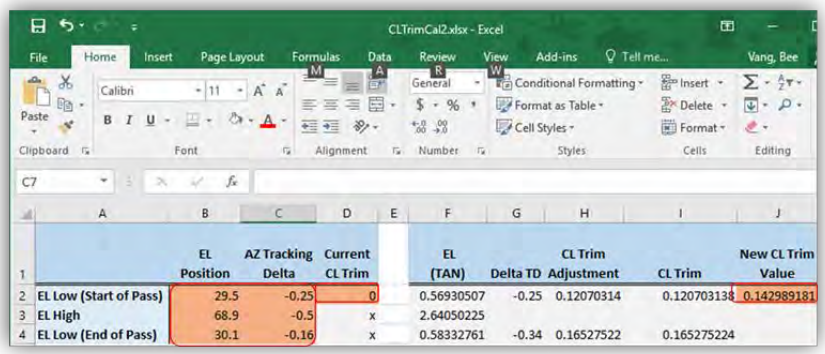
14.21 Enter the Low EL position (end of pass) and AZ Tracking Delta value into B4/C4.

14.22 If the antenna has a CL Trim value, enter the CL Trim value into D2.

✎ ***Note:*** *To determine if there is a CL Trim value stored in the antenna system, issue command, SHOW SYSTEM PRIMARY_REFLECTOR TRIM CL.*

14.23 For a new antenna installation, there will be no CL Trim value. Enter 0 into D2.

14.24 The calculated CL Trim value is to the right as shown below.



14.25 Record the New CL Trim value.

CL TRIM: Click or tap here to enter text.

14.26 Set the CL Trim by issuing command, SET SYSTEM PRIMARY_REFLECTOR TRIM CL X.XX.
- Example: SET SYSTEM PRIMARY_REFLECTOR TRIM CL -0.15.

14.27 SAVE and REBOOT.

15. ANTENNA AZ & EL TRIM

15.1 Open the IMA GUI, enable Auto Search, ensure DishScan and Tracking are on.
15.2 Set the IF frequency to 2283MHz.
15.3 From the telnet session, issue command, SET ANTENNA SUN_TARGET and allow the antenna to search and track onto the sun for 3-5minutes. ☐
15.4 In the IMA, GUI, Disable Auto Search. ☐
15.5 Select the [Auto Trim] button. ☐
15.6 Record the new EL and AZ Trim values. ☐

EL TRIM: Click or tap here to enter text.

AZ TRIM: Click or tap here to enter text.

16. ANTENNA BEAMWIDTH TEST

16.1 Determine the satellite used for test.
16.2 From the telnet session, issue command, SET SATELLITE TLE (copy and paste the first TLE line here).
16.3 Issue command, SET SATELLITE TLE (copy and paste the second TLE line here).

Example:

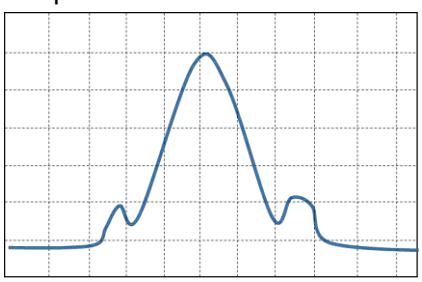
SET SATELLITE TLE 1 1 25874U 99041C 20161.42982561 -.00000114 +00000-0 -13484-2 0 9996
SET SATELLITE TLE 2 2 25874 051.9427 043.1682 0012580 065.2455 105.6825 11.25670607916360

16.4 The antenna system will automatically target the satellite.
16.5 Allow the antenna system to track and peak onto the satellite.
16.6 Obtain a beacon receive signal.
16.7 Adjust the beacon signal to the center frequency.
16.8 Set the spectrum analyzer to the following:
- RBW: 1 kHz
- VBW: 30 Hz
- Sweep Time: 10 sec.
- Span: 0 kHz
- Scale/Div. to 5 dB
- Adjust the REF Level to place the trace near the top of the display.

16.9 Allow the trace to run to the center of the analyzer display and ensure that the signal is stable before proceeding.

Note: *The horizontal sweep needs to occur below **30°** in Elevation.*

16.10 Issue command, SET ANTENNA PATTERN_SCAN HORIZONTAL 3 1.
16.11 Press Single Sweep at the spectrum Analyzer and allow the spectrum analyzer sweep to complete.



16.12 From the IMA GUI, record the EL reading at the time of the horizontal sweep. ☐

Current EL reading: Click or tap here to enter text.

16.13 Save the CSV file as **HORZ-Sweep**.

16.14 Re-target the antenna (issue command: SET SYSTEM RETARGET) and allow the antenna to peak onto the satellite.

16.15 At the spectrum analyzer, press Last Span and adjust the beacon signal to the center frequency if require, then press Zero Span.

16.16 Ensure that all Spectrum Analyzer parameter settings from step 14.9 are set.

16.17 Allow the trace to run to the center of the analyzer display and ensure that the signal is stable before proceeding.

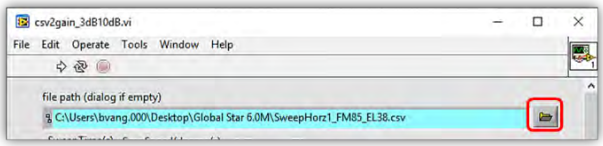
Note: *The vertical sweep needs to occur below* ***60°*** *in Elevation.*

16.18 Issue command, SET ANTENNA PATTERN_SCAN VERTICAL 3 1.

16.19 Press Single Sweep at the spectrum Analyzer and allow the spectrum analyzer sweep to complete.

16.20 Save the CSV file as **VERT-Sweep**.

16.21 Open the **csvgain_3dB10dB** program, and load the HORZ-Sweep CSV file by clicking onto the folder icon.

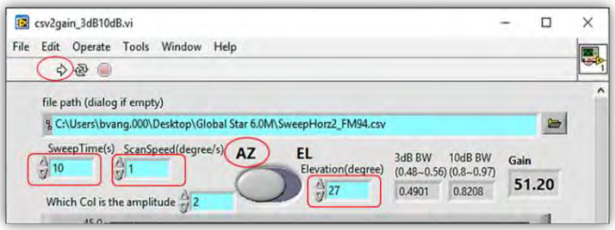


16.22 Set the Spectrum Analyzer sweep time to 10.

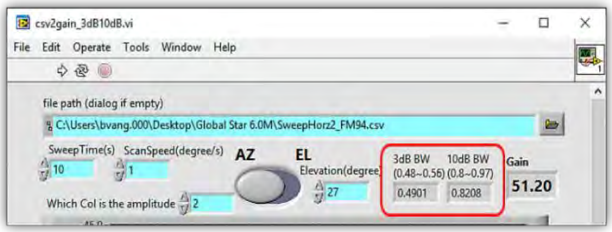
16.23 Set the scan speed to 1.

16.24 Select AZ; and enter in the EL reading (reading recorded in step 15.12).

16.25 Click on run (Arrow).



16.26 Ensure readings meet specification. ☐



16.27 Copy and paste plot below.

16.28 Load the VERT-Sweep CSV file.

16.29 Set the Spectrum Analyzer sweep time to 10.

16.30 Set the scan speed to 1.

16.31 Select EL; and leave the EL reading as is.

16.32 Click on run (Arrow).

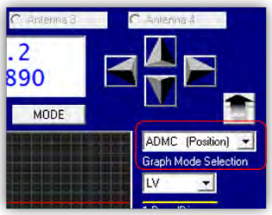
16.33 Ensure readings meet specification. ☐

16.34 Copy and paste plot below.

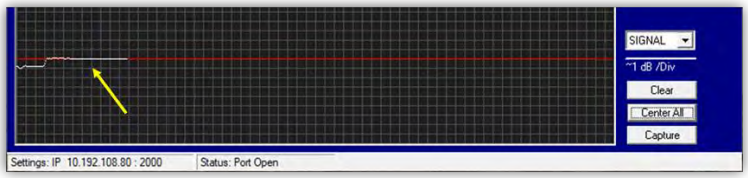
- If tests pass, provide the CSV files along with this test documentation to Cobham.
- If the measurements do not meet specifications, repeat tests. If test fails, contact Cobham support and provide the CSV file to Cobham. Cobham will review the data and provide further instructions or actions if required.

17. FOUR QUAD TRACKING TEST

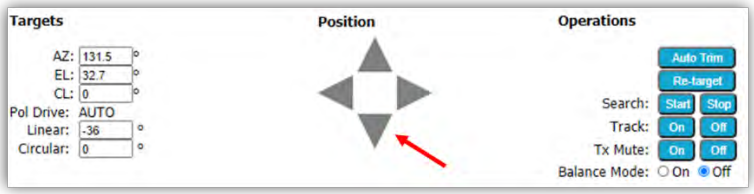
17.1 Determine the satellite used for test.
17.2 From the telnet session, issue command, SET SATELLITE TLE (copy and paste the first TLE line here).
17.3 Issue command, SET SATELLITE TLE (copy and paste the second TLE line here).
17.4 Allow the antenna to track the satellite for 1 minute.
17.5 Open DacRemP.
17.6 Use ADMC to monitor and display the AZ, EL, REL and AGC level.



17.7 Select [Clear] and [Center All].
17.8 Observe the signal level (4th trace down) and verify that the signal level is peak and stable.



17.9 In the IMA GUI, from the Position Antenna Page, step EL Down by clicking on the down arrow until the signal in DacRemP drops approximately 2 divisions as shown below.



17.10 Verify that the AGC trace returns to peak signal level. ☐
17.11 Repeat test for EL Up (Up arrow), AZ Down (Left arrow), and AZ Up (Right arrow).
17.12 Verify that during each test, the AGC trace returns to peak signal level.
17.13 Verify that test passes; copy and paste the test plot below ☐

18. FULL PASS TRACKING TEST

Note: *If Program Track is unavailable at the installation site, test is not required.*

Program Track Mode: ..... **N/A** ☐

18.1 Start the ACU/GCU Service and ensure that the antenna can track the satellite for an entire satellite pass without any issues. ..... ☐

19. TEST DATA

19.1 Issue command, SET INTERFACE NETWORK WEB ENABLE OFF to disable the antenna GUI; SAVE. ..... ☐

19.2 Provide data below along with this test documentation to Cobham. ..... ☐

- ☑ HORZ-Sweep CSV file
- ☑ VERT-Sweep CSV file