INSTALLATION MANUAL FOR THE NTG-560 SOLID STATE TRANSMITTER / RECEIVER

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- Preface -

This instruction manual describes installation method of the NTG-560 Transmitter-Receiver. This manual describes radar system configuration with X-band Radar Antenna and NCD-2247-1B PC type radar monitor display as an example.

1. Selecting the installation position

1) Physical selection criteria

- Install the antenna at the center of the mast on the keel line.
- If the antenna cannot be installed at the above position for some reason, the amount of deviation must be minimized. And, reinforce the mount base and the platform and take precautions to protect the antenna from vibration and impact at the installation position.
- To avoid the radiating section coming in contact with other installed objects while it is rotating, ensure that there is at least 200 millimeters from the swing circle (turning radius) to other installed objects (Fig.1-1). The swing circle of the X-band Radar Antenna is as shown in Table 1-1.

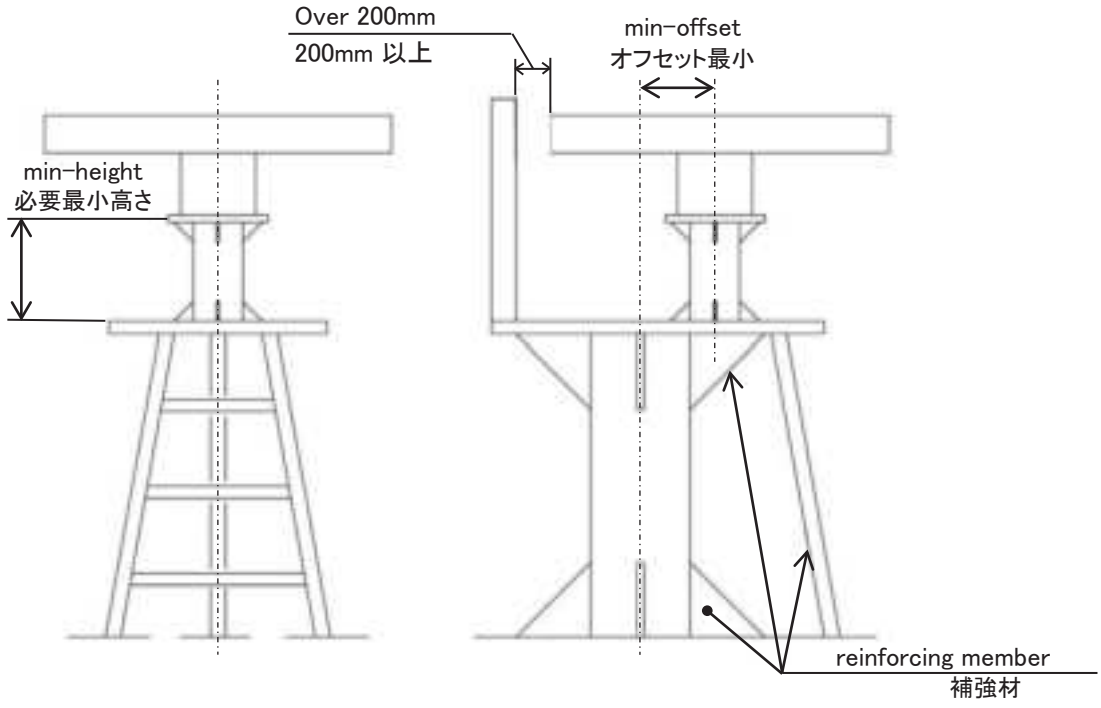


Fig.1-1 Installation of antenna

Table 1-1 Swing circle

Antenna	Swing circle
NKE-339 9ft Antenna	2825mm
NKE-402 18ft Antenna	5330mm

- Avoid having a rope or signal flag from winding around the radiating section thereby preventing it from rotating.

- Avoid the effects of dust and heat caused by smoke from a chimney.

- When determining the appropriate antenna height and installation location, take into consideration the reduction of vibration, the strength of the hull and the antenna mount base, and maintenance properties.

- Provide for maintenance space: platform, safety link, hand rail, steps, etc. The lower edge of a radar antenna should be a minimum of 500 mm above any safety rail.

- When installing the antenna, select a location where there are the fewest structural objects in the surrounding area so that the capability to drive the motor will not be depressed by the non-equability wind which is likely to rotate the antenna.

2) Electrical selection criteria

- The installation height of the antenna relates to the maximum detection distance. The higher is the better. (However, if it is too high, radio wave energy greatly attenuates above the antenna's vertical beam width (the point -3dB from the peak of the main lobe). As a result, it is difficult to detect a close-in target. Sea clutter also increases. Determine the installation height by taking into consideration the weight, maximum length of the cable, and maintenance after installation.

- If the installation height of the antenna is low, it is difficult to detect a long distance target. The ship's mast, derrick, and construction objects interfere with radiating beam causing the range that cannot be viewed on the radar display to increase.

  Generally, the lowest antenna installation position is supposed to be on the A-B line shown in Fig.1-2. In the case of the radar antenna, 2θ equals 20°. Specifically, the antenna position is normally elevated so that the building etc do not interfere with radiating beam. The inside of A point might be blind area due to antenna beam does not propagation. So, if near distance should be covered, antenna installation position must be considered carefully.

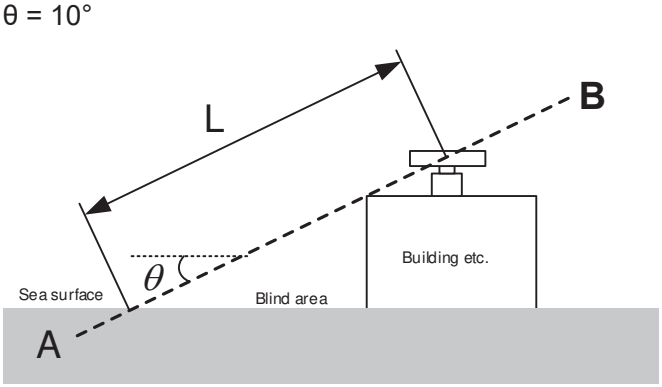


Fig.1-2 Antenna installation height vs Vertical beam width

- If it is considered that sufficient installation height cannot be provided when the antenna is installed directly on the roof of the building, use a mounting rack or radar mast (Fig.1-3). Normally, when the antenna installation height is less than 2 meters from the roof of the building, provide a mounting rack assembled at an angle frame to install the antenna. When the antenna installation height is 2 meters or higher from the roof of the building, provide a cylindrical radar mast to install the antenna. Consider the convenience of the service staff who take care of installation, maintenance, adjustment, and repair of the antenna by providing adequate footholds to the mounting rack and the radar mast.

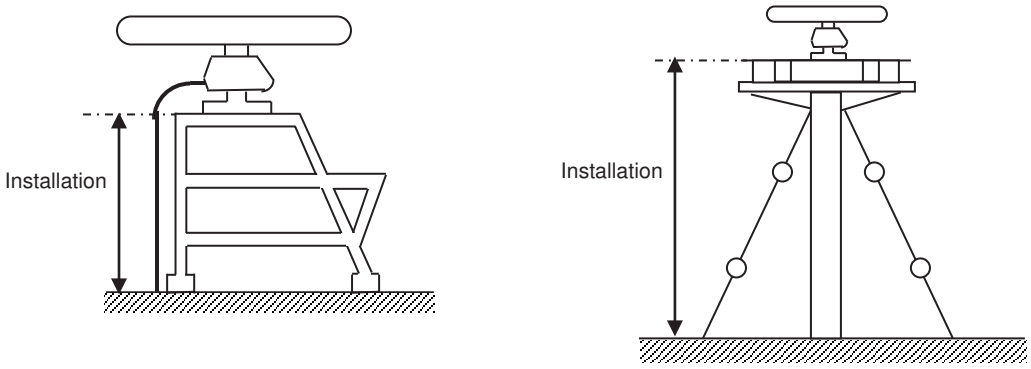


Fig.1-3 Mounting rack and mast for the antenna

- When installing the antenna, select a location where there are the fewest structural objects in the surrounding area so that false images which interfere with target detection will not be generated by signal reflection from other antennas, equipments, and cargos. Only as a guide, note that structural objects should not exist within the range of the vertical beam width (Fig.1-4).

  Vertical beam width of X-band Radar Antenna: Approx. 20° (±10.0° when the height of the radiating section is 0°).

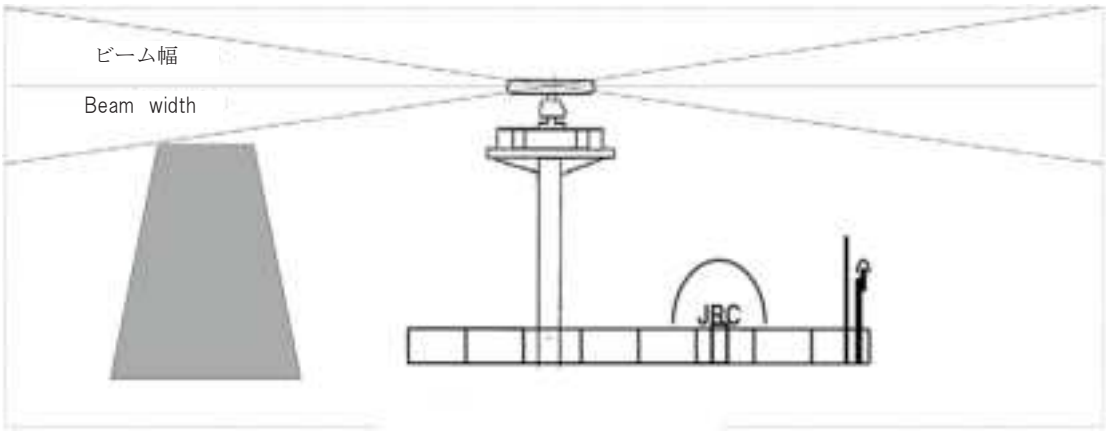


Fig.1-4 Antenna and the surrounding structural objects

- When installing two or more antennas, antennas in close proximity should have a minimum vertical elevation separation angle of 20 and a minimum vertical separation of 1m where possible, so that those antennas do not enter each other's vertical beam width range.

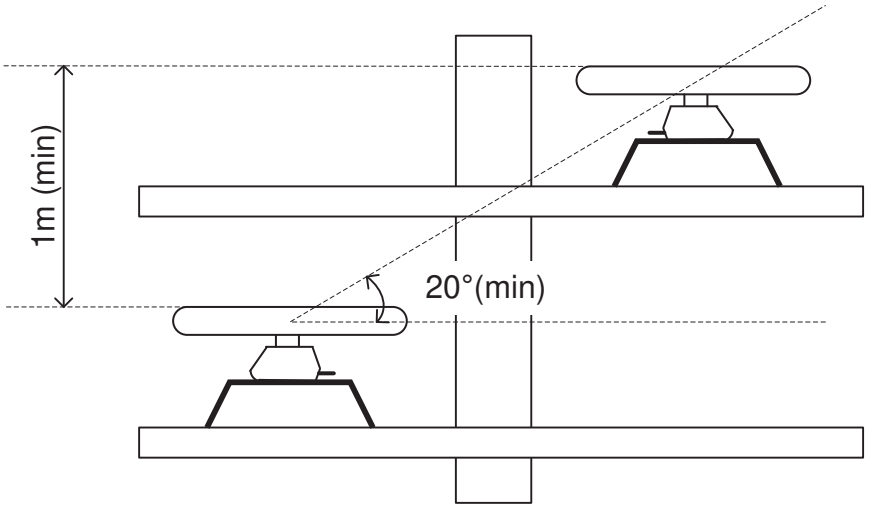


Fig.1-5 Installing two or more antennas

- To avoid interference with other equipment and to prevent radio noise from generating, do not place the VHF antenna, AIS/GPS antenna, and VSAT/INMARSAT's dome within the range of the vertical beam width.

* If there is a concern that structural objects existing within the vertical beam width may generate false images, equip the structural objects with a radio wave absorber. (There are two types of absorbers: broadband type having no specific resonant frequency and narrowband type which can absorb a band with a specific frequency. Use those where applicable.) Furthermore, it is effective to install a metal reflector, which reflects radio waves upwardly, between the antenna and a structural object so that the radar's radio wave will not directly come in contact with the structural object.
When the structural objects exist in the surrounding area of Antenna unit, the false echo may appear. The sector blank function is effective to reduce the signal reflection from the structural objects. Because of it can stop transmission. Therefore, it may reduce the false echo appearance.

Note: Because most radio wave absorbers have poor durability, some must be replaced every year. When installing a reflector, the area to the rear of the reflector becomes a blind sector. Therefore, minimize the size of the reflector.
When the sector blank function set to on, ensure a sufficient view field in the surveillance area.

* The above procedures for selecting an antenna installation position are described based on the radar's antenna. Comprehensively select the antenna position by considering other antennas' installation procedure manual, building tower mast structure, strength of the selected position, and vibration.

3) Confirmation during test run

If the antenna vibrates a lot during test run, try to reduce or prevent vibration by reinforcing the antenna mount base or using wire stays attached to the radar mast.

4) Others
   - The design of the mounting platform for the antenna should take into account the vibration requirements defined by IEC 60945.

Vibration

Frequency	2 to 13.2Hz 13.2 to 100Hz
Amplitude	+/-1mm +/-10%
Acceleration	7m/s^2 constant

   - All installations should facilitate protection of equipment, including cabling, from damage.
     The cables should be kept as short as possible to minimize attenuation of the signal.

   - Crossing of cables should be done at right angles(90°) to minimize magnetic field coupling.

   - Eliminating the interference on frequencies used for marine communications due to operation of the radar. All cables of the radar are to be run away from the cables of radio equipment. (ex. Radiotelephone. Communications receiver and direction finder, etc.) Especially inter-wiring cables between antenna unit and display unit of the radar should not be run parallel with the cables of radio equipment.

   - Cable should not be exposed sharp bends.

   - The grounding of equipment units should be carried out according to this manual.

5) After installation
   After you have completed the installation work, check and test the installation work with customer(s) and confirm with each other.

2. Installation procedure

1) Precautions for transporting and storing the antenna

- An antenna is a heavy load. Be very careful about handling it.
- Do not allow the antenna fall on its side while it is stored or being installed.
- Do not apply rope to the antenna in the way that squeezes or deforms the radiating section.
- When hoisting the antenna by a crane, do not hoist it by attaching a belt or a rope only to the antenna's radiating section as shown in Fig.2-1.
- When lifting the antenna（Fig.2-2）:

Wrap a cloth around the antenna's support section located at the bottom of the radiator, and then attach a belt to it to lift the antenna.

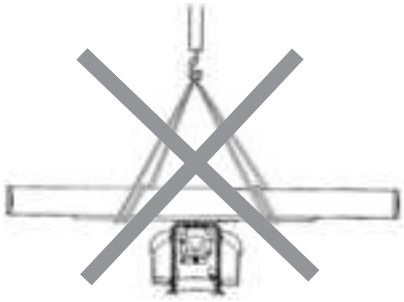


Fig.2-1 Improper way to hoist

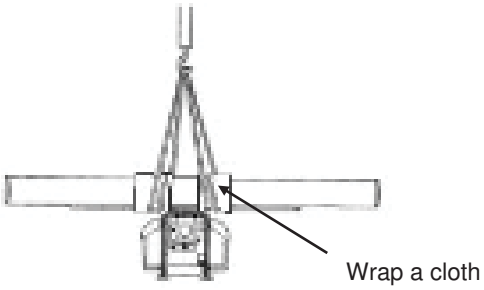


Fig.2-2 Lifting the Antenna

2) Installation procedures

a) Maintain a flat level surface on which to install the antenna.

- Use sufficiently thick steel material and reinforcement material for the antenna's installation surface (mount base) to reduce vibration and impact. Keep the mount base flat and smooth.

- If there is a partial gap between the mount base and the antenna chassis's legs, work on the installation surface so that it becomes flat and smooth. If a gap exists and the antenna is tightly clamped, the chassis will distort and become damaged by vibration.

b) Avoid using vibration-proof rubber and resin

- Do not insert an elastic body, such as vibration-proof rubber or resin, between the mount base and the antenna chassis' legs. If rubber or resin is inserted, the amplitude of vibration increases, resulting in the possibility of damage to the antenna. Furthermore, if installation bolts become loose due to deterioration of rubber or resin, the antenna may be damaged or fall from its mount.

3) Installation and clamping method

a) Installation direction

- Installation should be done so that the cable gland side is oriented accessibility by maintenance staffs.

b) Bolts, nuts and tightening torque to be used

- Use stainless steel bolts for the antenna and uniformly tighten all of the bolts using double nuts for each bolt so that the antenna will not become loose (Table 2-1).

- Although the length of the bolt will differ according to the thickness of the mount base, use a bolt long enough so that more than 4 millimeters of thread protrudes beyond the double nuts after the double nuts have been tightened.

Table 2-1 Length of antenna mounting bolts and tightening torque

Antenna Unit	Thickness of Mount Base (mm)	Bolt	Torque (N-m)
NKE-339 (9ft)	12	M10×55(mm) SUS304 ※1	40
NKE-402 (18ft)	15	M16X70(mm) SUS304 ※1※2	118

※1 Bolt length varies depending on thickness of mount base.
The length of the bolt must extend beyond the nut by at least four turns.
※2 18ft Antenna attachment with double nuts.

c) Use of washer and corrosion-resistant measures

- At the location where a bolt's head or nut comes in contact with the antenna chassis' legs and the mount base, insert a plain washer which fits the bolt; and, at the location where the nut comes in contact with the plain washer, insert a spring washer, and then securely tighten the nuts (Fig.2-3).

- To prevent corrosion due to the contacts between different metals, such as the antenna chassis' legs, installation surface, bolts, nuts, etc., cover the bolt's head and nuts with sealant (Fig.2-3).

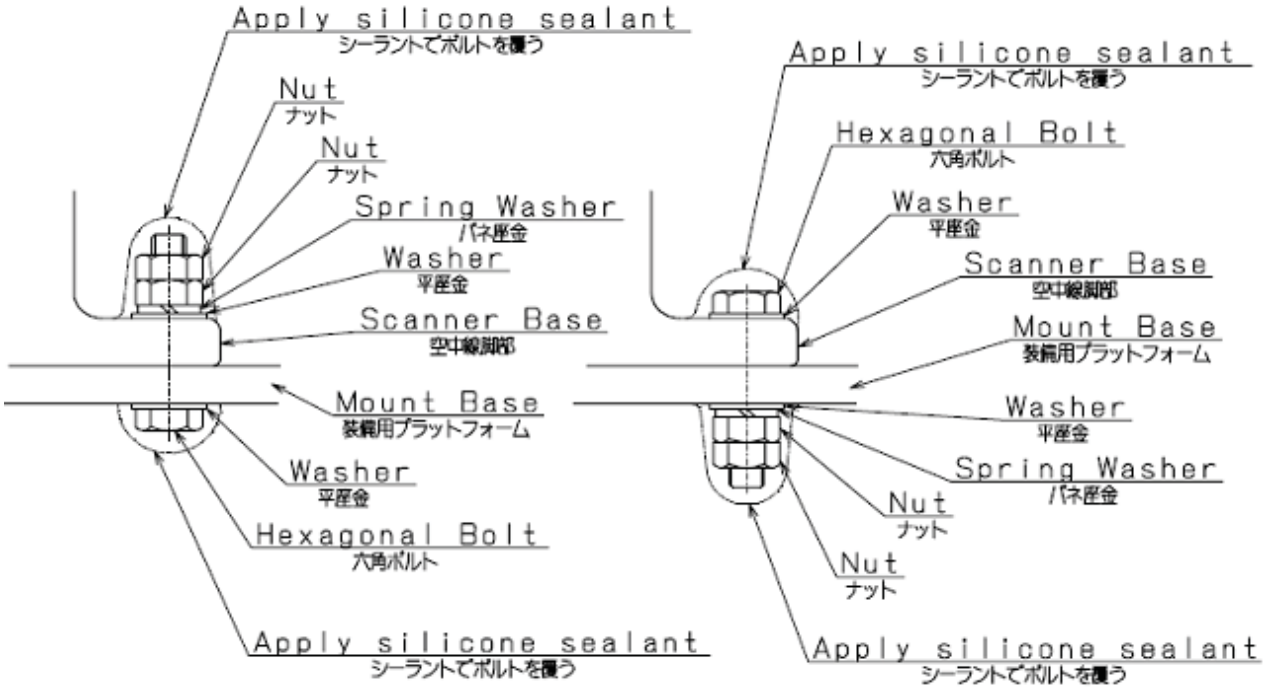


Fig.2-3 Use of washer and corrosion-resistant measures

d) Grounding and corrosion-resistant measures

- Ground the antenna chassis and the installation surface (hull) by using an earth line. Apply sealant to the connection portion of the earth line to prevent corrosion and damage by vibration (Fig.2-4).

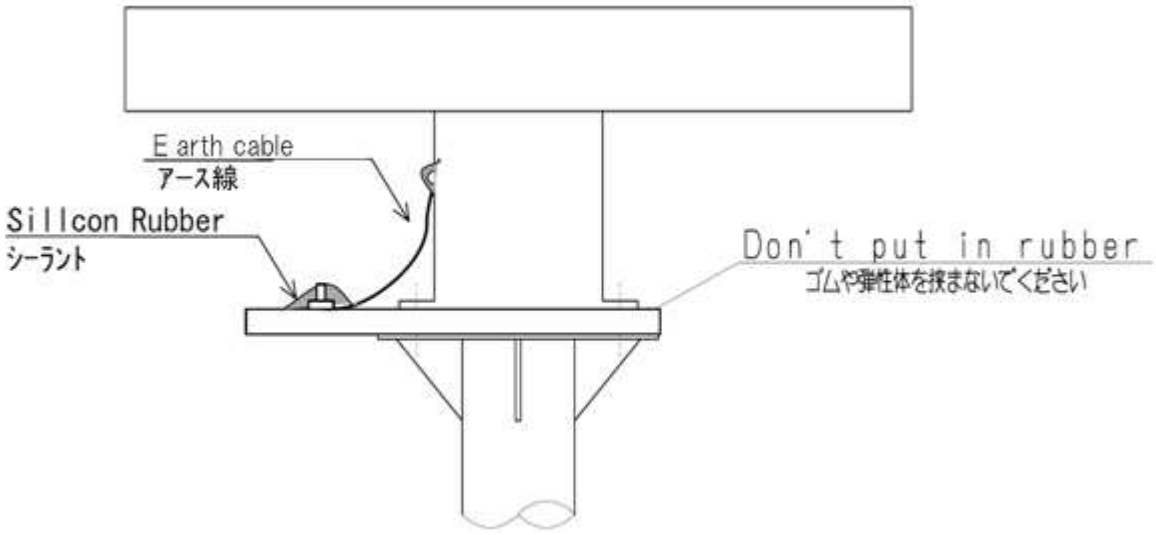


Fig.2-4 Grounding and corrosion-resistant measures

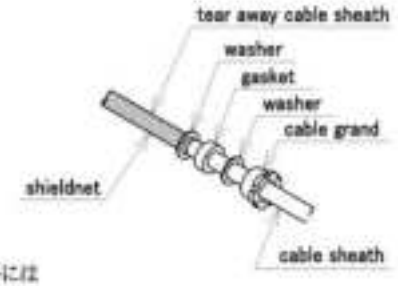
3. Connecting the installation cable

(1) NKE-339　9ft Antenna

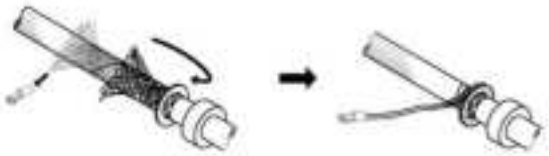
Instruction for Equipment

装備要領

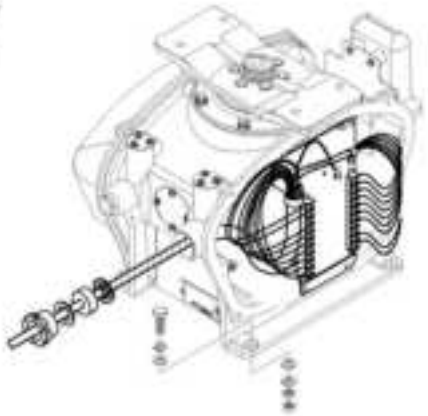
1. Put the cable into cablegrand, washers and gasket.
Tear away the cable sheath.
ケーブルをワッシャ、ガスケット、グランドに通し、
被覆を剥がす。



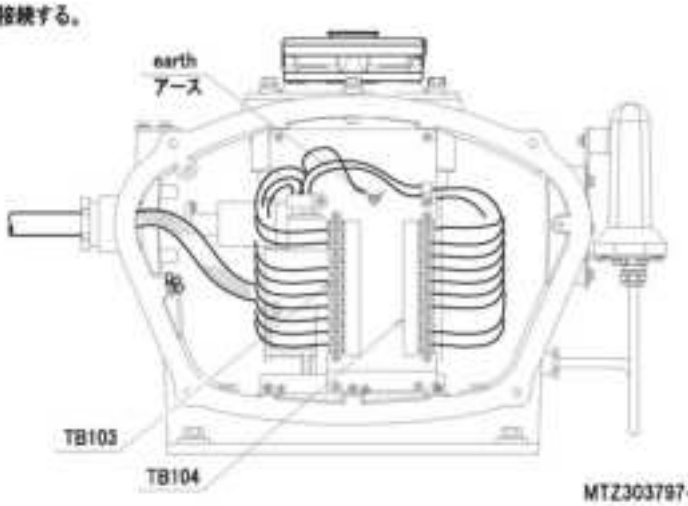
2. Unknit outer shieldnet and wrap it around a washer.
Connect a solderless terminal (for a ground) to a inner shildnet.
外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
丸型圧着端子(アース)を取付ける。



3. Equip the scannerunit with bolts and washers.
ボルト、ワッシャを用いて、空中線を装備する。

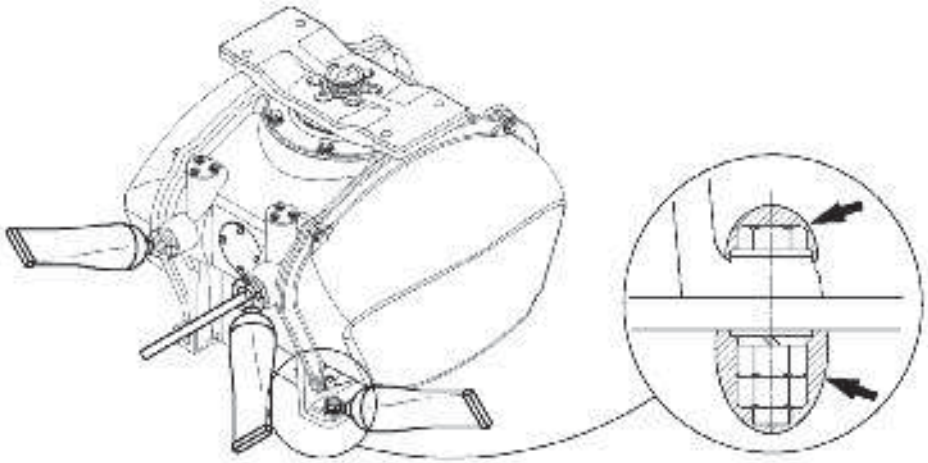


4. Clump the cable, connect terminals .
ケーブルを各部でクランプし、端子を接続する。

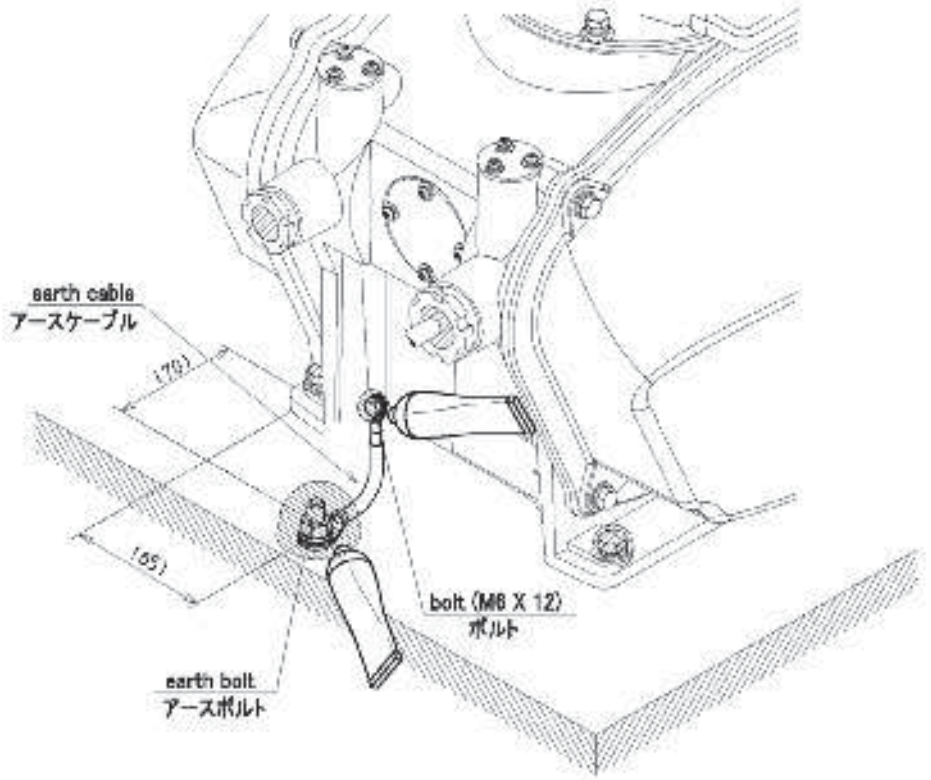


MTZ303797-1/2

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



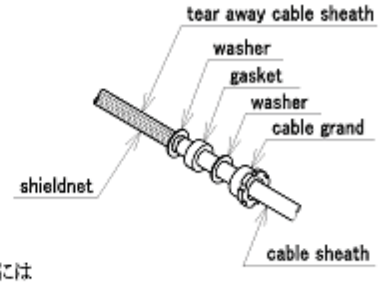
6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



(2) NKE-402 18ft Antenna

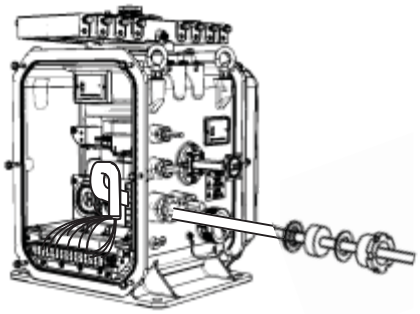
Instruction for Equipment
装備要領

1. Put the cable into cablegrand, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。

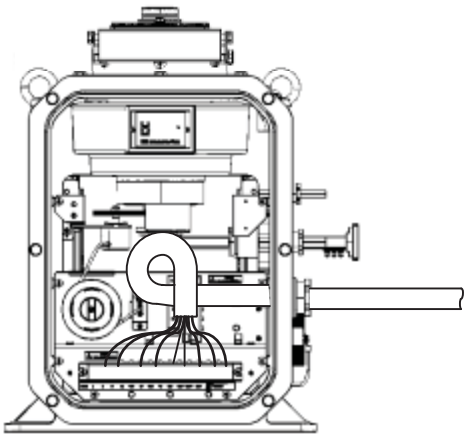


2. Unknit outer shieldnet and wrap it around a washer.
   Connect a solderless terminal (for a ground) to a inner shildnet.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。

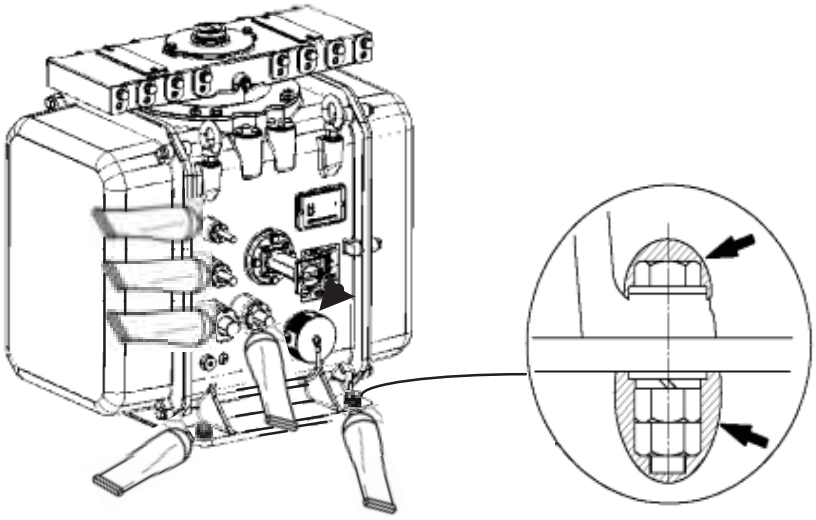
3. Equip the scannerunit with bolts and washers.
   ボルト、ワッシャを用いて、空中線を装備する。



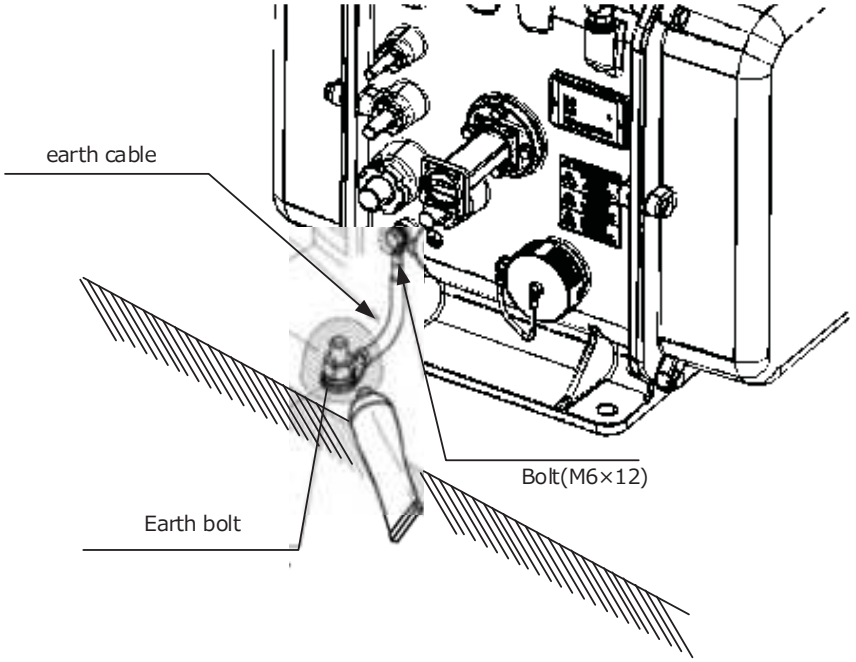
4. Clump the cable, connect terminals .
   ケーブルを各部でクランプし、端子を接続する



5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。

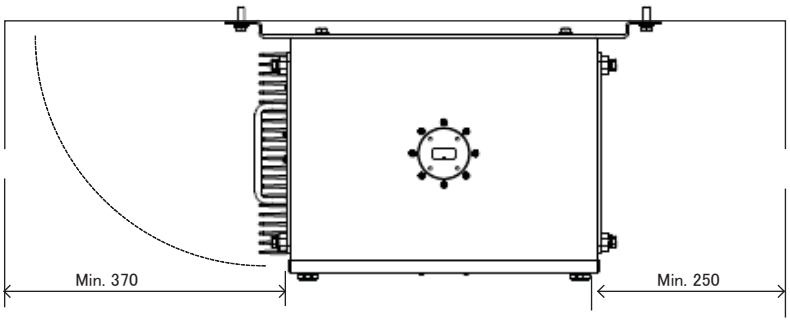


6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



4. Installation of Solid State Transmitter / Receiver (NTG-560)

The mounting place of NTG-560 Solid State Transmitter-Receiver is shown below. It is required to secure a space for equipment and maintenance.



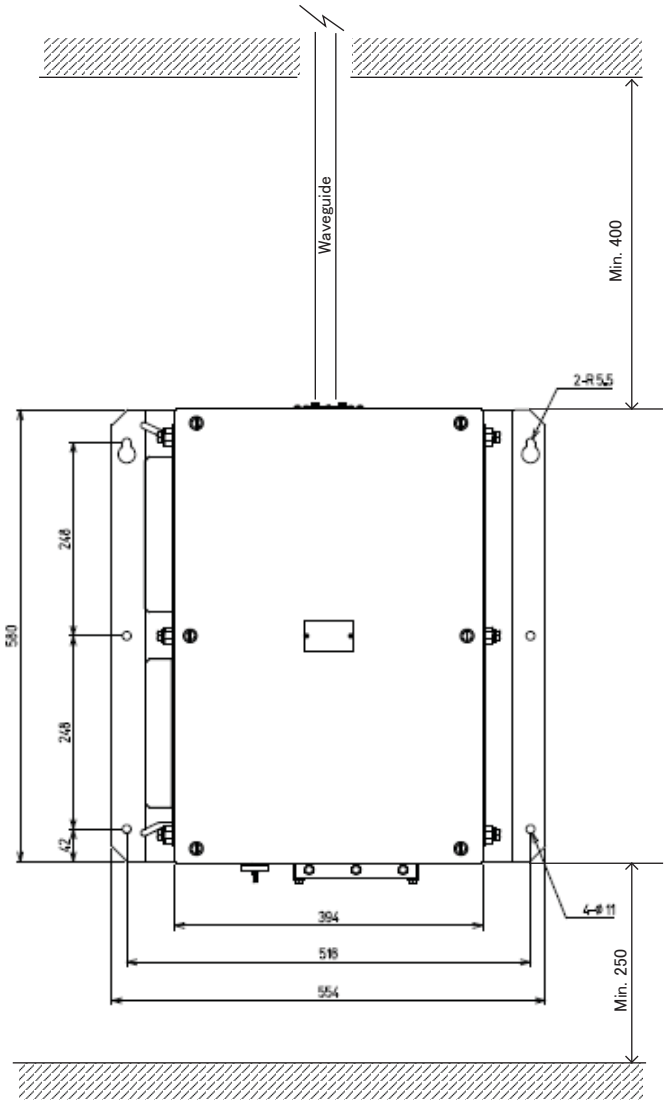


Fig.4-1 NTG-560 Installation (Space for Mounting Place)

5. Solid State Transmitter-Receiver(NTG-560) Wiring

Table 5-1 Connect Terminal of NTG-560

Terminal No.	Connect	Cable
Waveguide flange(UG-51/U)	X-band 9ft Antenna	WRJ-9 Waveguide
P1	DC Power Supply (DC 48V)	Power Cable
P2 Not Used for this System	External Equipment (ex. Radar Data Processor)	RE-422 cable or equivalent
P3 Not Used for this System	External Equipment (ex. Radar Data Processor)	14-core shield composite cable(2695110056).
P4	X-band Radar Antenna	14-core shield composite cable(2695110056) or equivalent
RJ-45JJ	NCD-2247—1B Radar Control/Monitoring PC	LAN cable Cat.6a
Optical Communication Board (AGM-741 daughter board)	NCE-5584-1B IQ Data Recording PC	Optical Cable 2C
Earth Point	Earth line	IV-5.5 or equivalent

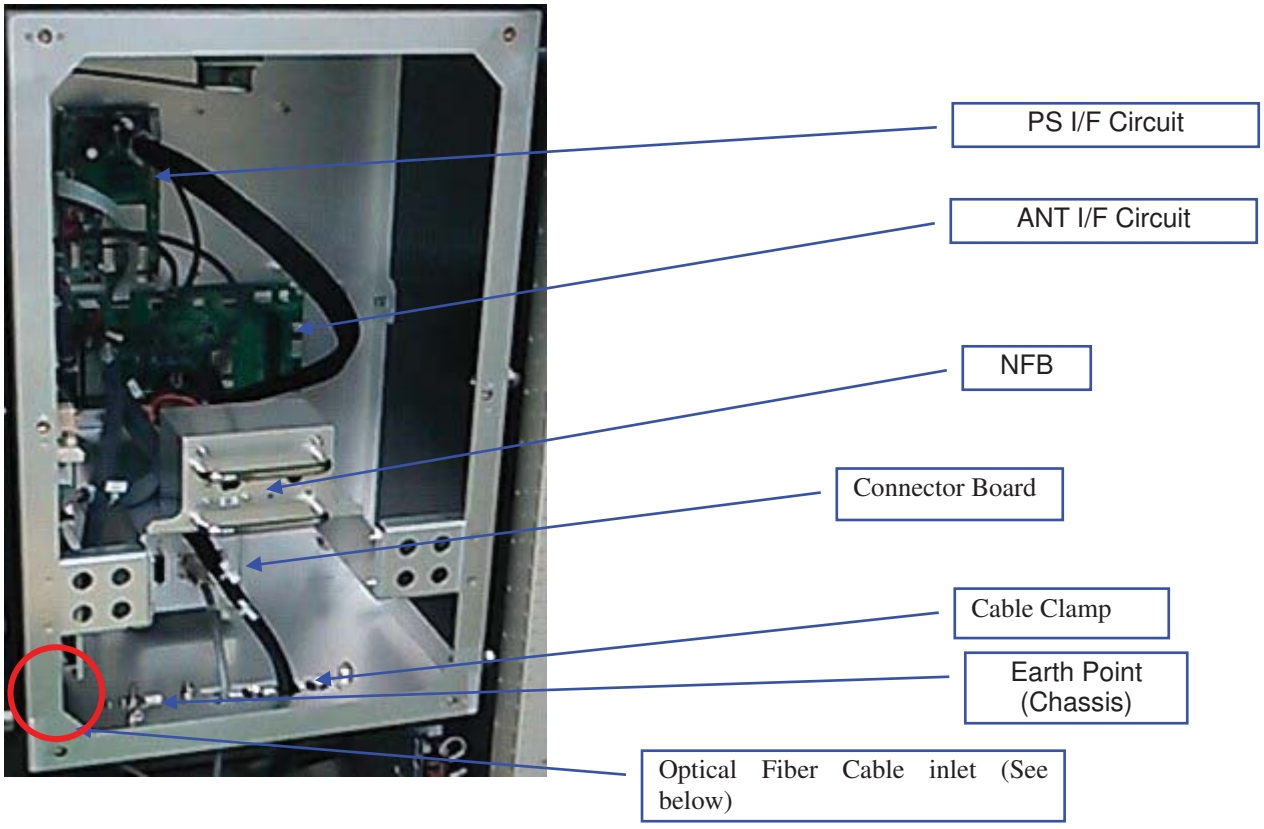


Fig.5-1 Inside View of NTG-560

Table 5-1 Signal Layout of each Terminal

Table 5-1 (1) P1

Pin No.	Pin Name	In/Out	Description
1	+48V	In	+48V
2	+48V RTN	In	+48V Return
3	GND		Ground

Table 5-1 (2) P2

Pin No.	Pin Name	In/Out	Description
1	MNT-TX-P	Out	Maintenance Port RS-422 output-P
2	MNT-TX-N	Out	Maintenance Port RS-422 output-N
3	MNT-RX-P	In	Maintenance Port RS-422 input-P
4	MNT-RX-N	In	Maintenance Port RS-422 input-N
5	MNT E	In/Out	Shield (Ground)
6	NC	-	Reserved
7	NC	-	Reserved
8	NC	-	Reserved
9	NC	-	

Table 5-1 (3) P3

Pin No.	Pin Name	In/Out	Description
1	VD	Out	Radar Video Signal
2	VD_E	Out	Radar Video Signal Return
3	TRIG	Out	Radar Trigger Signal
4	TRIG_E	Out	Radar Trigger Signal Return
5	BP	Out	Antenna Bearing Pulse Signal
6	BPE	Out	Antenna Bearing Pulse Signal
7	BZ	Out	Bearing Reference Signal
8	BZE	Out	Bearing Reference Signal Return
9	NMEA_P	In/Out	Control/Monitoring Signal(RS-485)-P
10	NMEA_N	In/Out	Control/Monitoring Signal(RS-485)-N
11	NMEA_E	In/Out	Return
12	NC	-	Reserved
13	NC	-	Reserved
14	NC	-	Reserved
15	SHIELD	-	

Table 5-1 (4) P4

Pin No.	Pin Name	In/Out	Description
1	SAF SW-	In	Antenna Safety Switch Return
2	SAF SW+	In	Antenna Safety Switch Signal
3	ΦZ	In	Antenna Bearing Pulse (ΦZ-Phase)
4	ΦZE	In	Return
5	ΦA	In	Antenna Bearing Pulse (ΦA-Phase)
6	ΦAE	In	Return
7	ΦB	In	Antenna Bearing Pulse (ΦB-Phase)
8	ΦAE	In	Return
9	NC	-	Reserved
10	NC	-	Reserved
11	NC	-	Reserved

12	+12V ISO	Out	+12V Antenna Encoder Power
13	+12V RET	Out	Return
14	NC	-	Reserved
15	SHIELD		

Fig. 5-2 Waveguide Flange (UG-51U) of NTG-560

6. Installation Cable and Waveguide

6.1 CM14CXVBTBTV(2695110056)

This is composite cable of 14 wires with shielded coaxial cable. This cable is using between Antenna and TRX. Also, equivalent cable can be used which is provided by customer.

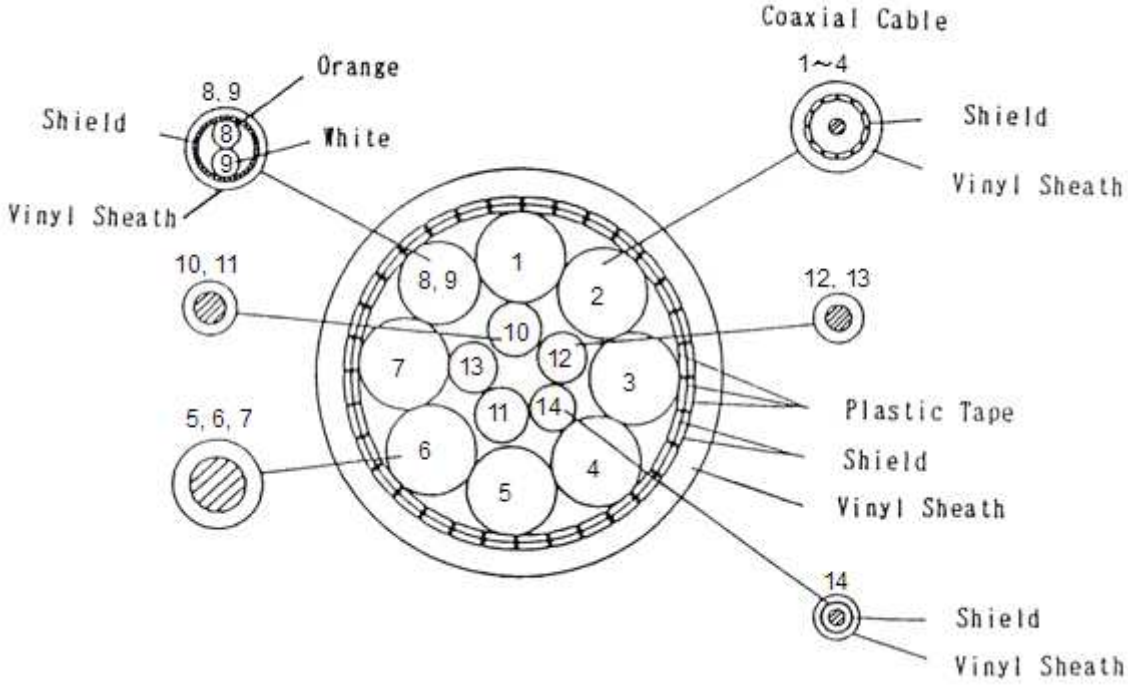


Fig.6-1 CM14CXVBTBTV(2695110056) Component

Table 6-1 CM14CXVBTBTV(2695110056) material

Core (No.)	Cross Section (m2)	No. of wire / φ	Color	Remarks
1	0.5	19 / 0.18	Black 1	Coaxial Cable
2	0.5	19 / 0.18	Black 2	Coaxial Cable
3	0.5	19 / 0.18	Black 3	Coaxial Cable
4	0.5	19 / 0.18	Black 4	Coaxial Cable
5	5.5	35 / 0.45	Yellow	
6	5.5	35 / 0.45	Green	
7	5.5	35 / 0.45	Brown	
8	0.3	12 / 0.18	White	Twisted pair cable with Shield sheath white
9	0.3	12 / 0.18	Orange	
10	2	37 / 0.26	Red	
11	2	37 / 0.26	Blue	
12	1.25	50 / 0.18	Black	
13	1.25	50 / 0.18	Purple	
14	0.5	1 / 0.18	Gray	Shield wire

Max. diameter: 23.0mm

6.2 Waveguide and Cable Installation

(1) NTG-560 with 9ft Antenna NKE-339

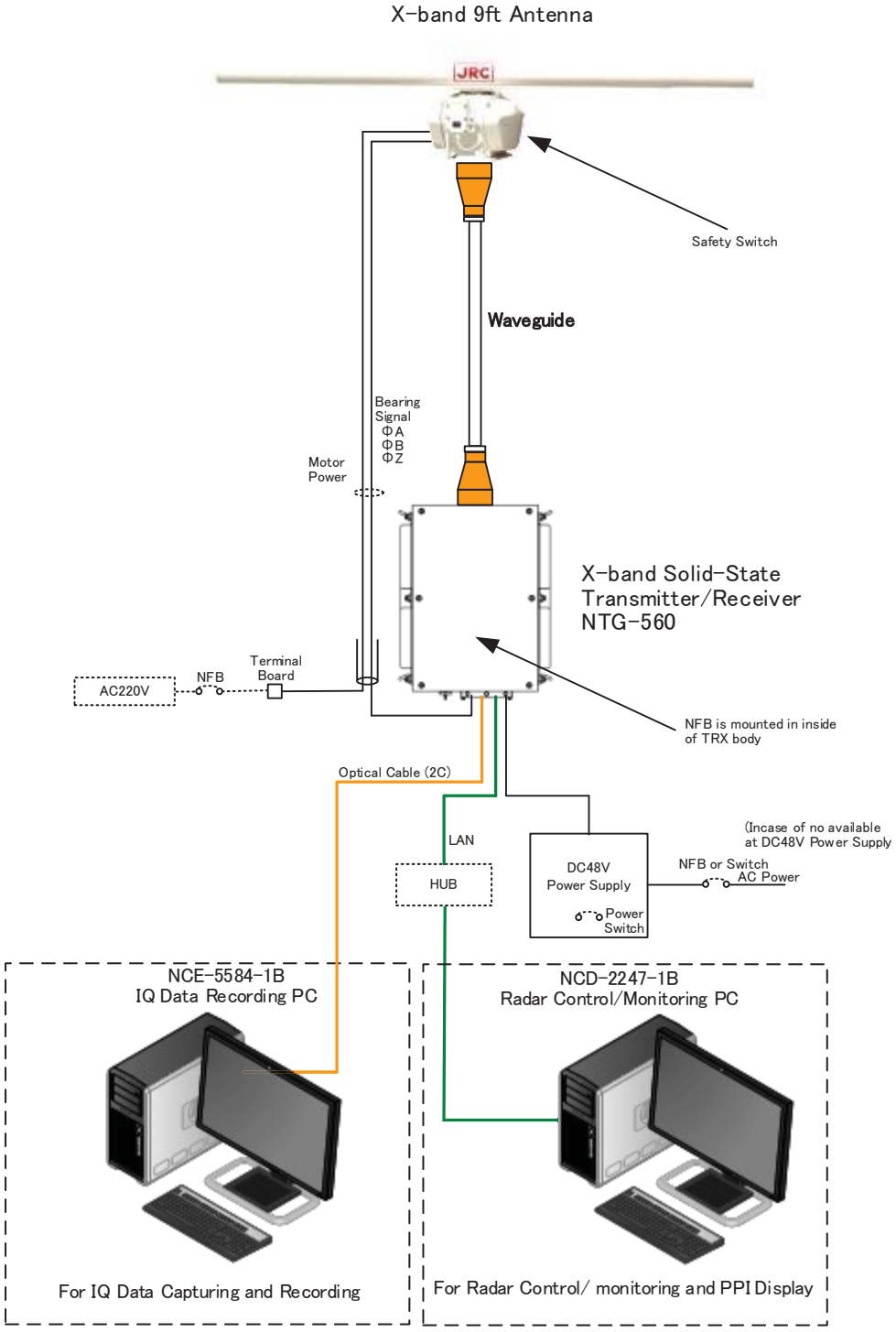


Fig.6-2 Waveguide and Cable Installation Diagram for NTG-560 with peripheral equipment

(2) NTG-560 with 18ft Antenna NKE-402

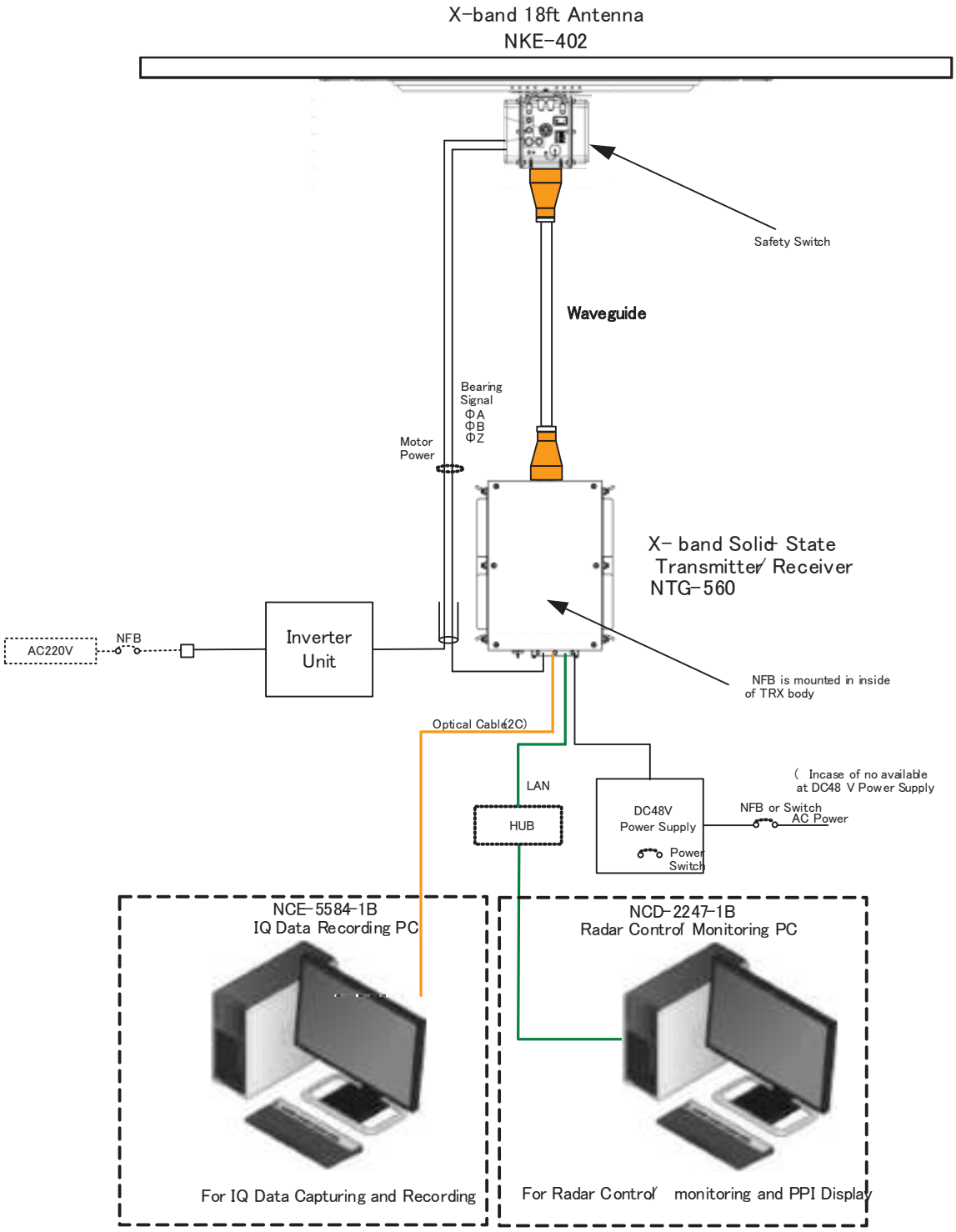


Fig.6-3 Waveguide and Cable Installation Diagram for NTG-560 with peripheral equipment

Table 6-2 Waveguide Materials List (for Example)

(No.)	WAVEGUIDE	Flange A	Flange B	Remarks
①	Tapered Transit Waveguide	(Flat): UG-51/U	(Flat) : UG-39/U	
②	Flexible Waveguide ANDREW Model :Elliptical Waveguide Type : EW85 Frequency Range : 7.7-9.8GHz	(Choke) : No.185BC	(Choke) : No.185BC	
③	Tapered Transit Waveguide	(Flat): UG-39/U	(Choke) : UG-52B/U	

Notes:

For detailed assembling method, please contact waveguide manufacturer(s) including required special tools and materials

APPENDIX

Drawing

OUTLINE DRAWING

NTG-560 X-BAND SOLID STATE TRANSMITTER-RECEIVER

NKE-339 X-BAND RADAR 9FT ANTENNA

NKE-402 X-BAND RADAR 18FT ANTENNA

BLOCK DIAGRAM

NTG-560 X-BAND SOLID STATE TRANSMITTER-RECEIVER

NKE-339 X-BAND RADAR 9FT ANTENNA

NKE-402 X-BAND RADAR 18FT ANTENNA

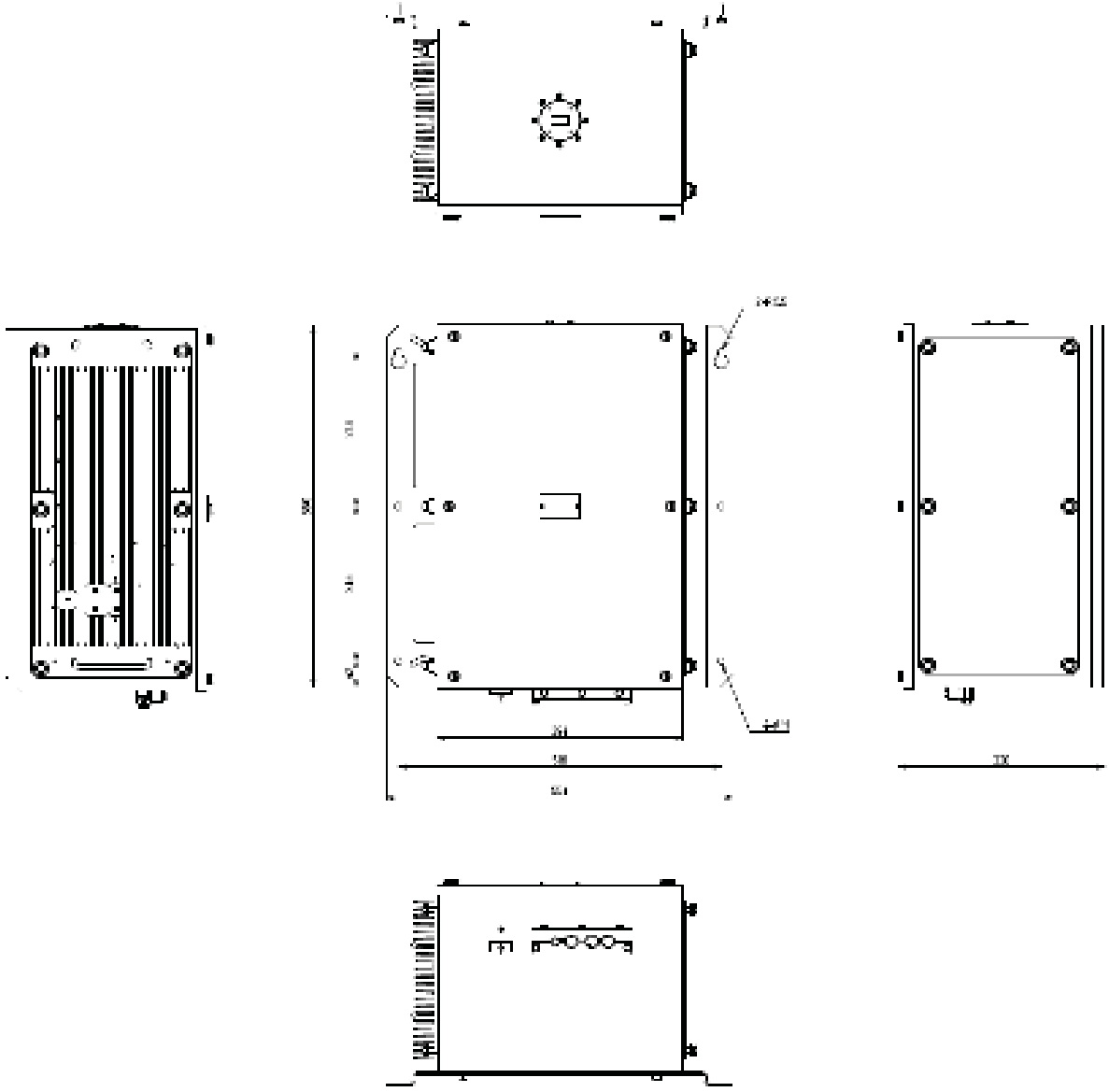
WIRING DIAGRAM

INTERCONNECTION FOR NTG-560 X-BAND SOLID STATE TRANSMITTER-RECEIVER AND NKE-339 9FT ANTENNA (REFERENCE)

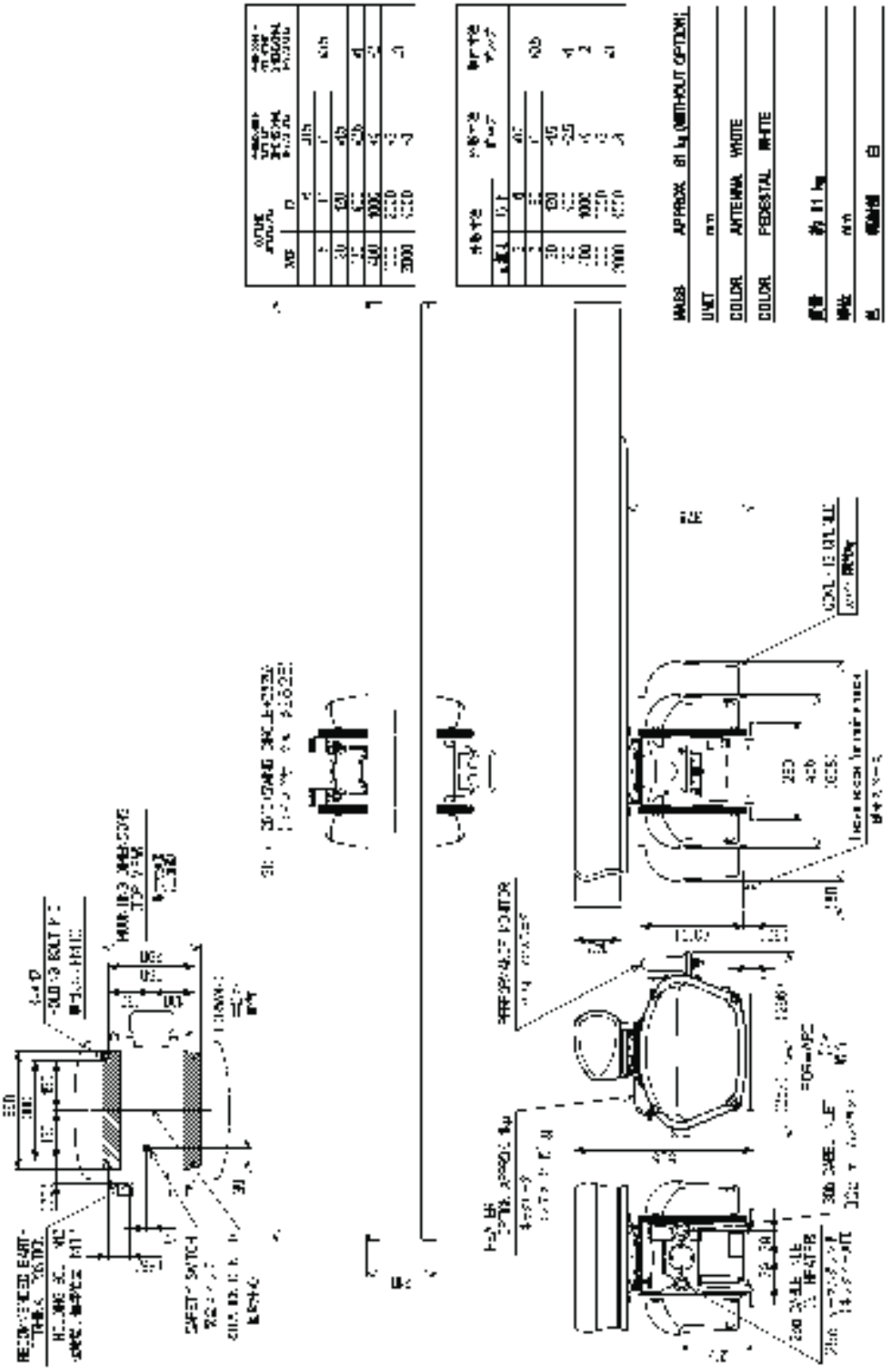
INTERCONNECTION FOR NTG-560 X-BAND SOLID STATE TRANSMITTER-RECEIVER AND NKE-402 18FT ANTENNA

WAVEGUIDE CATALOGUE

Outline Drawing of NTG-560 X-Band Solid State Transmitter-Receiver

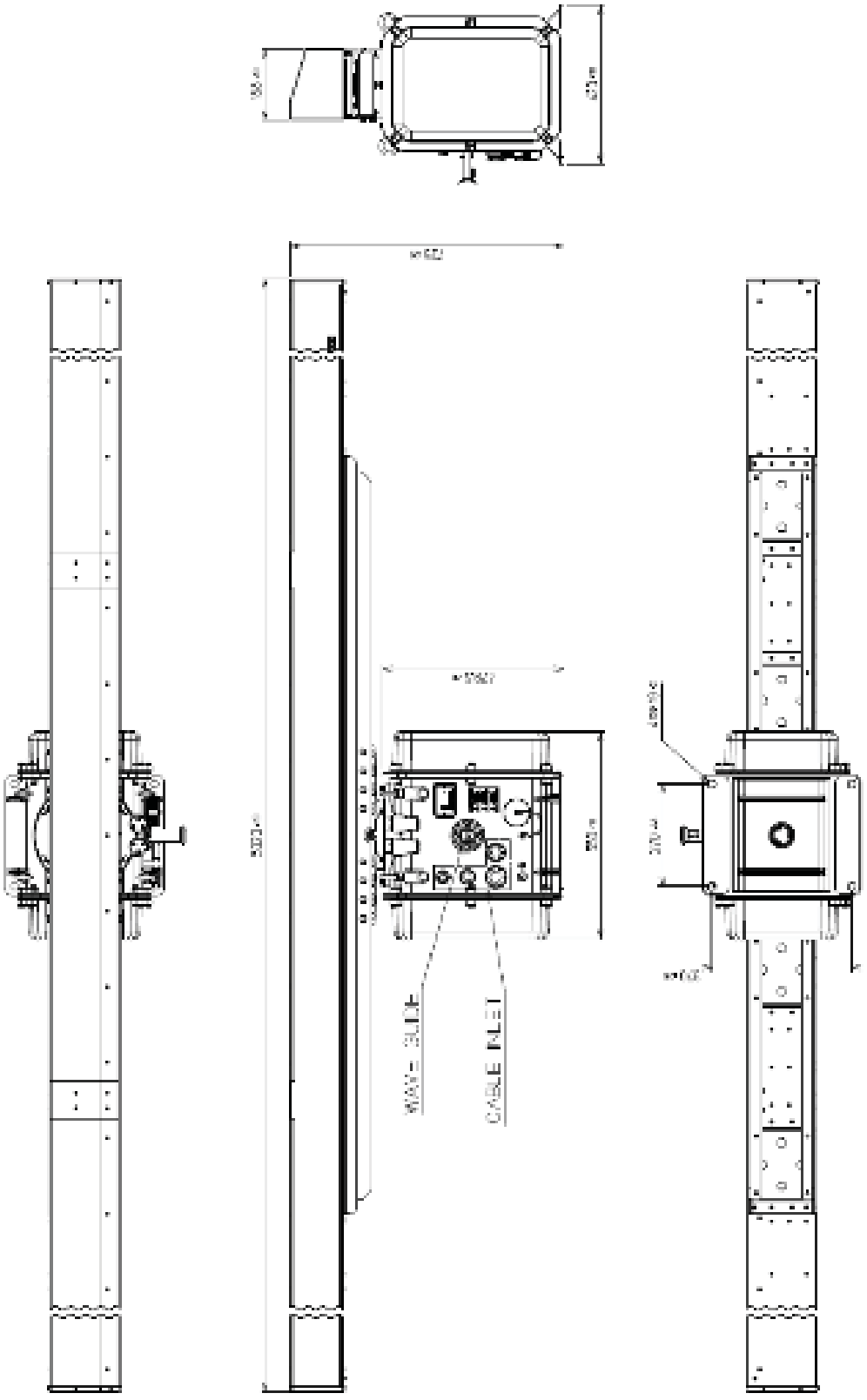


Outline Drawing of NKE-339 X-band Radar 9ft Antenna

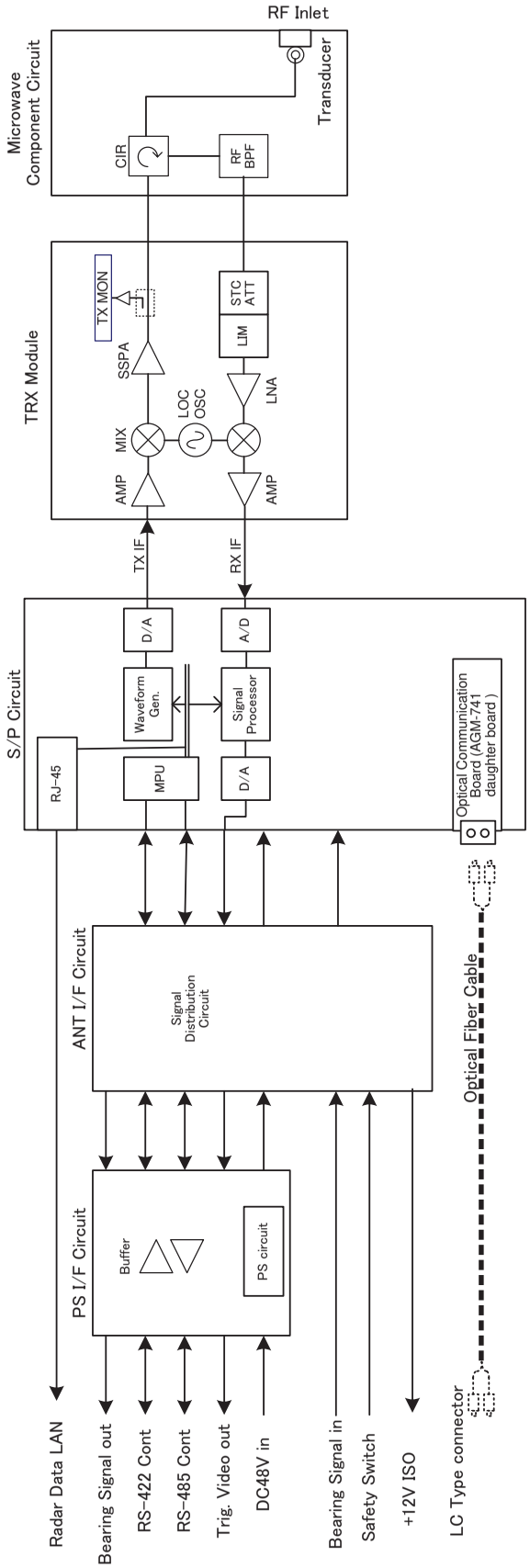


Note: Performance Monitor does not included in this system.

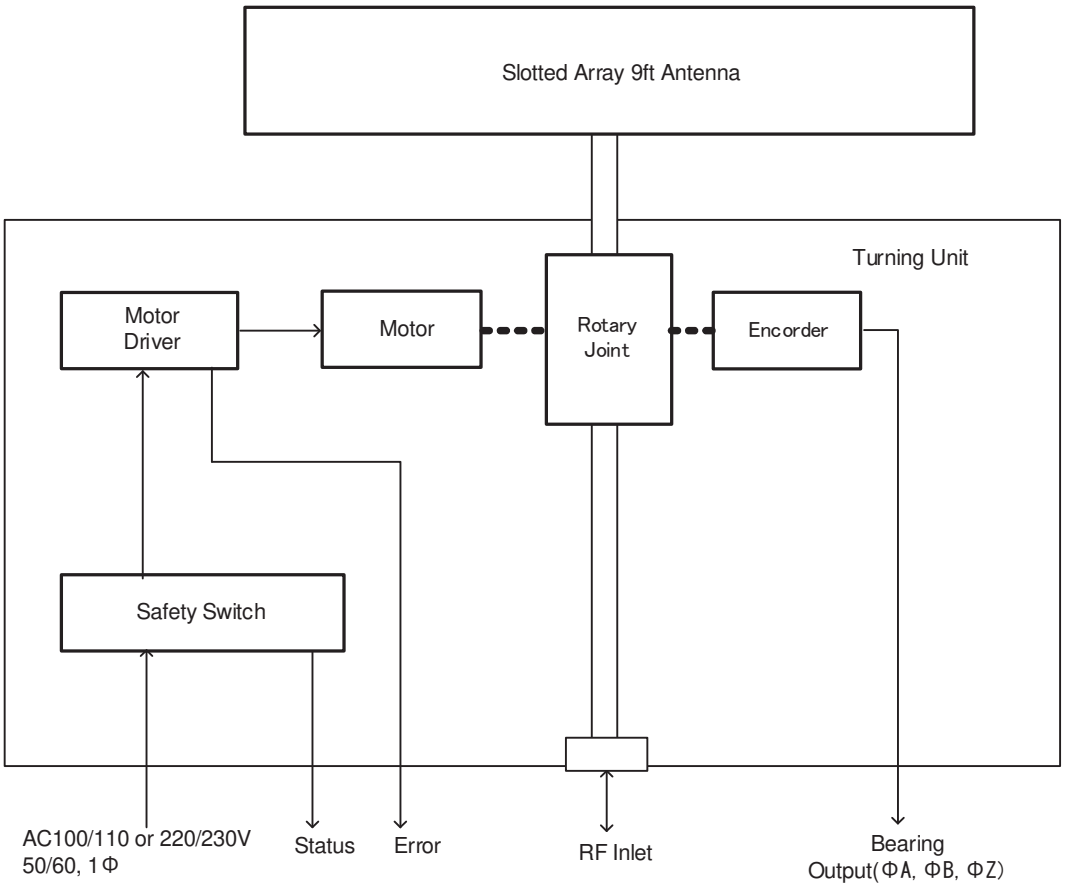
Outline Drawing of NKE-402 X-band Radar 18ft Antenna



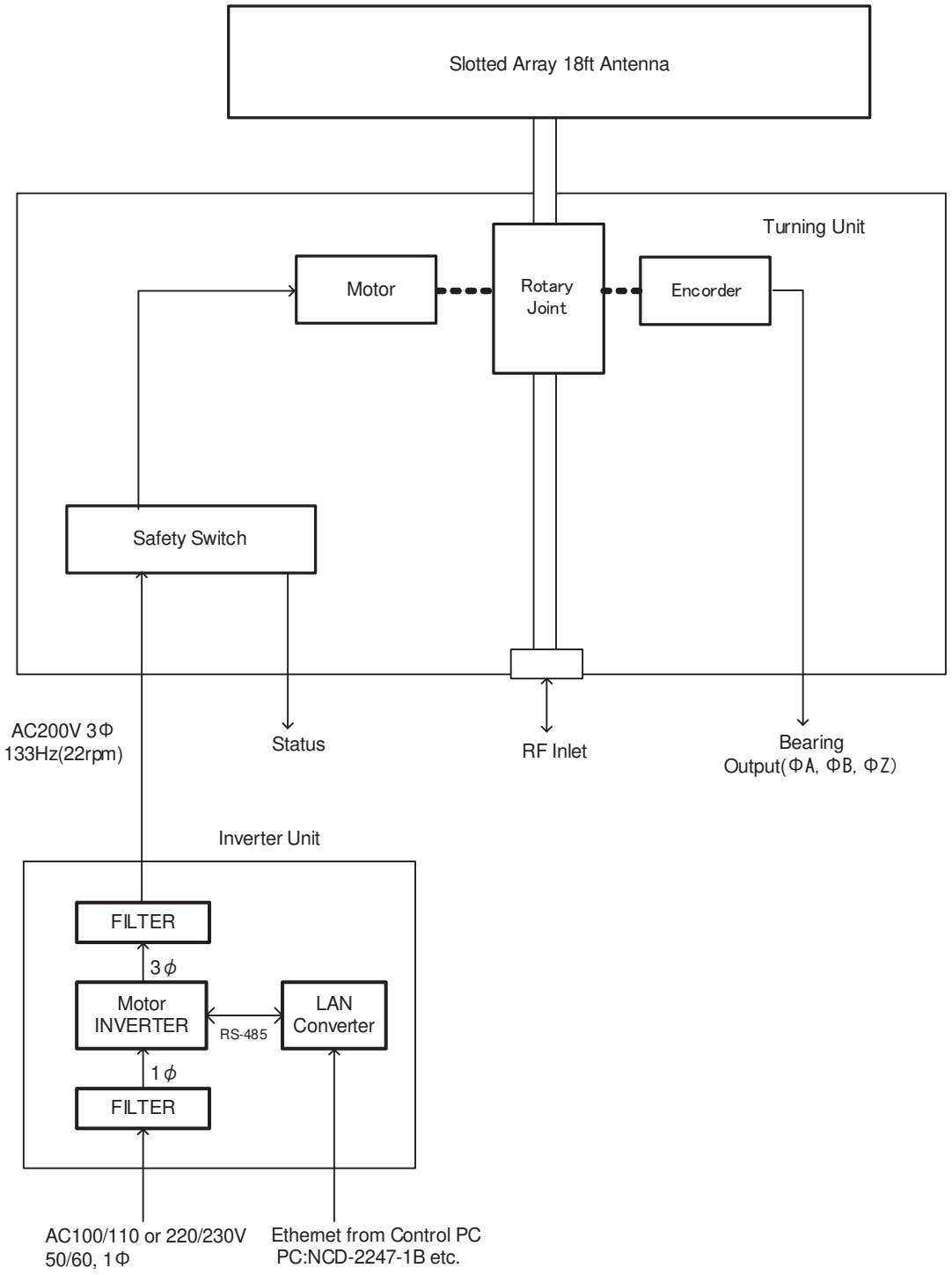
Block Diagram of NTG-560 X-Band Solid State Transmitter-Receiver



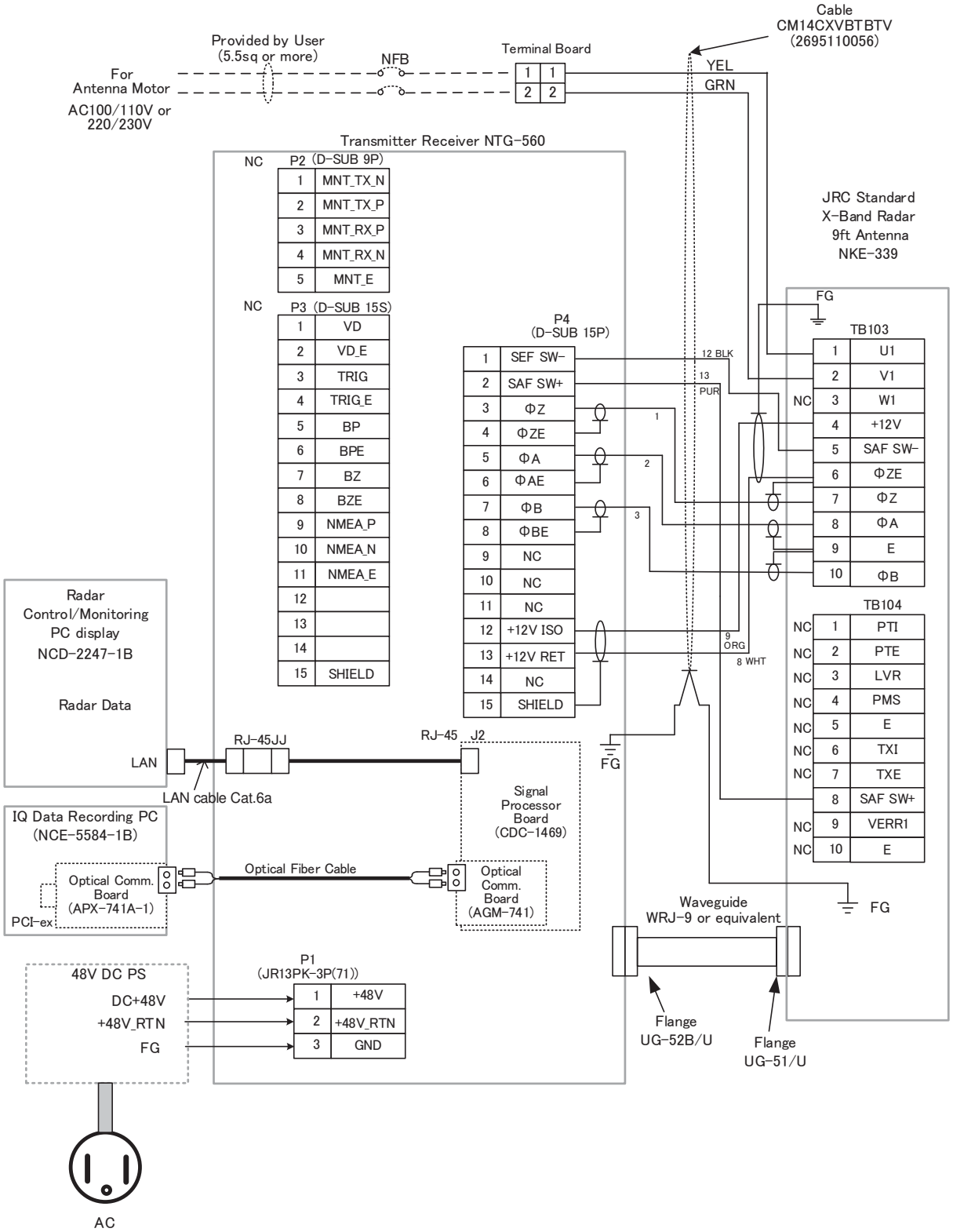
Block Diagram of NKE-339 X-band Radar 9ft Antenna



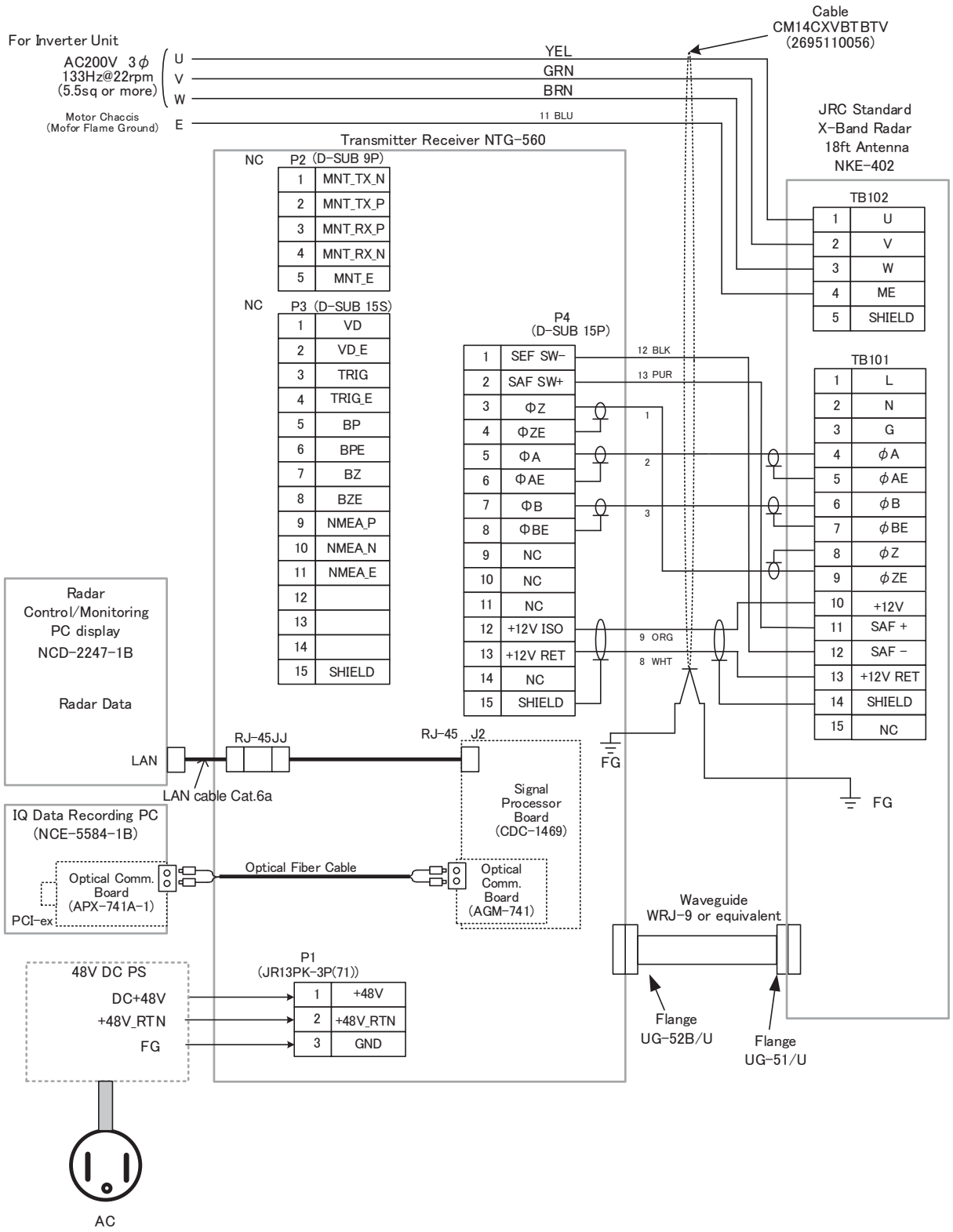
Block Diagram of NKE-402 X-band Radar 18ft Antenna



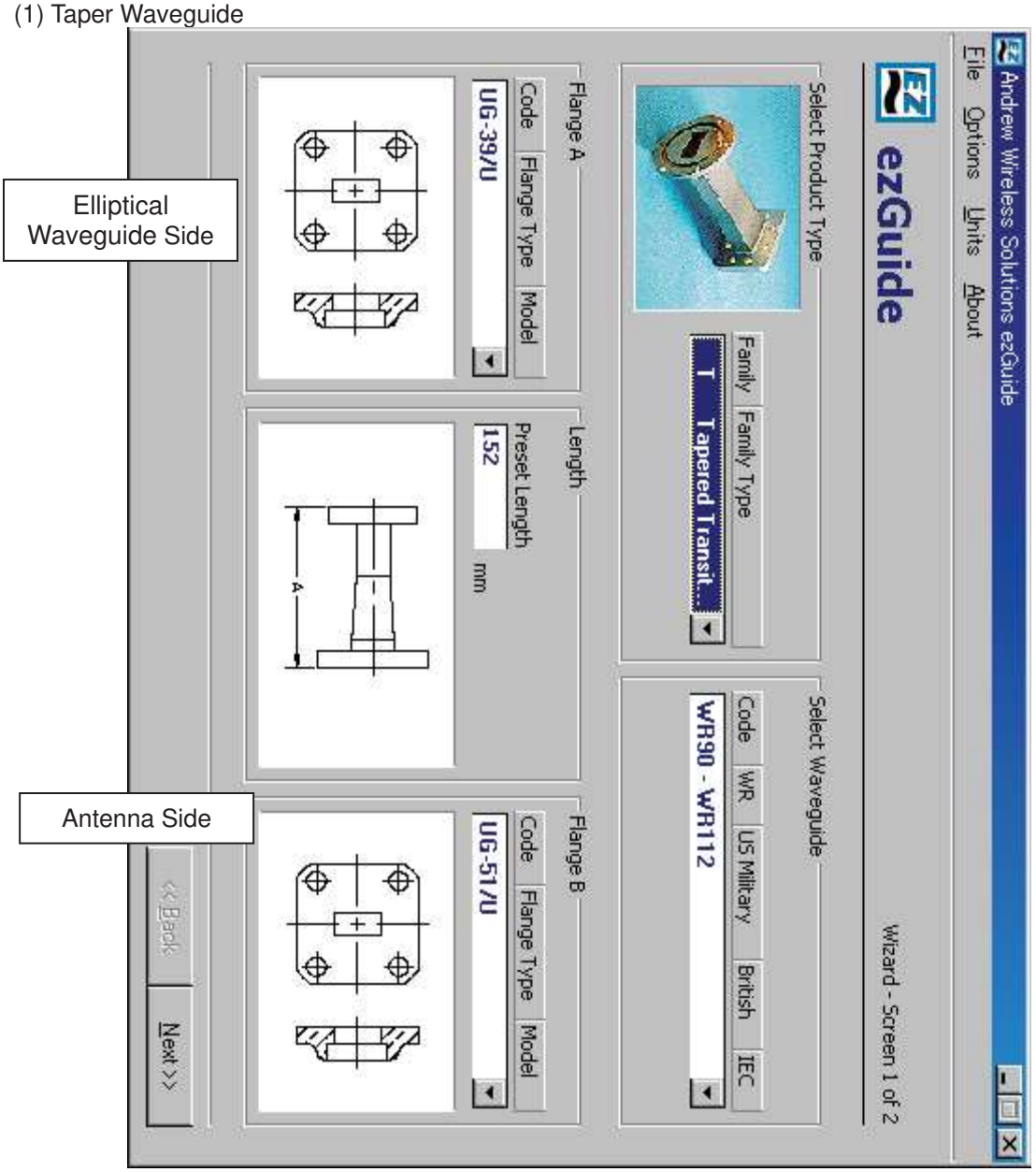
Interconnection for NTG-560 X-Band Solid State Transmitter / Receiver and NKE-339 9ft Antenna (Reference)
(Confirm the antenna motor power before installation)



Interconnection for NTG-560 X-Band Solid State Transmitter / Receiver and NKE-402 18ft Antenna
(Confirm the antenna motor power before installation)



Waveguide Catalogue
(1) Taper Waveguide



Elliptical Waveguide Side

Antenna Side

(2) Elliptical Waveguide

Elliptical Waveguide
Types EW85

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	EW85
Standard Waveguide, Fire Retardant Non-Halogenated Jacket	35409-17**
Electrical	
Max. Frequency Range, GHz*	7.7-9.8
•TEn Mode Cutoff Frequency, GHz	6.46
Group Delay at 9.2 GHz, ns/100 ft (ns/100 m)	142 (465)
Peak Power Rating at 9.2 GHz, kW	38.9
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	8 (200)
H Plane	19 (480)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	8 (200)
H Plane	19 (480)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.29 x 0.88 (32.8 x 22.4)
Weight, pounds per foot (kg/m)	0.33 (0.50)

* Actual usable range is limited by the connecting rectangular waveguide.
** UL® listed Type CATVR.

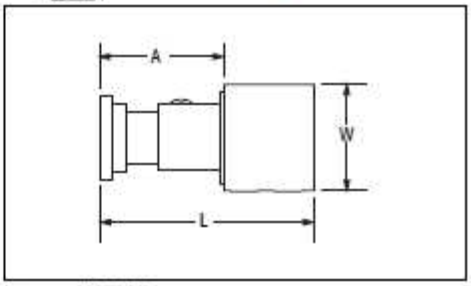
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
7.7	4.32 (14.20)	1.17	54.4
7.9	4.01 (13.10)	1.26	57.6
8.1	3.78 (12.40)	1.34	60.3
8.3	3.59 (11.80)	1.40	62.8
8.5	3.45 (11.31)	1.46	65.6
8.7	3.33 (10.92)	1.52	67.6
8.9	3.23 (10.59)	1.56	69.4
9.1	3.14 (10.31)	1.61	71.0
9.3	3.07 (10.07)	1.64	72.4
9.5	3.01 (9.86)	1.68	73.8
9.7	2.95 (9.68)	1.71	75.0
9.8	2.93 (9.60)	1.72	75.6

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 185BC				
	4.75 (121)	2.1 (52)	3.5 (89)	2.0 (0.9)

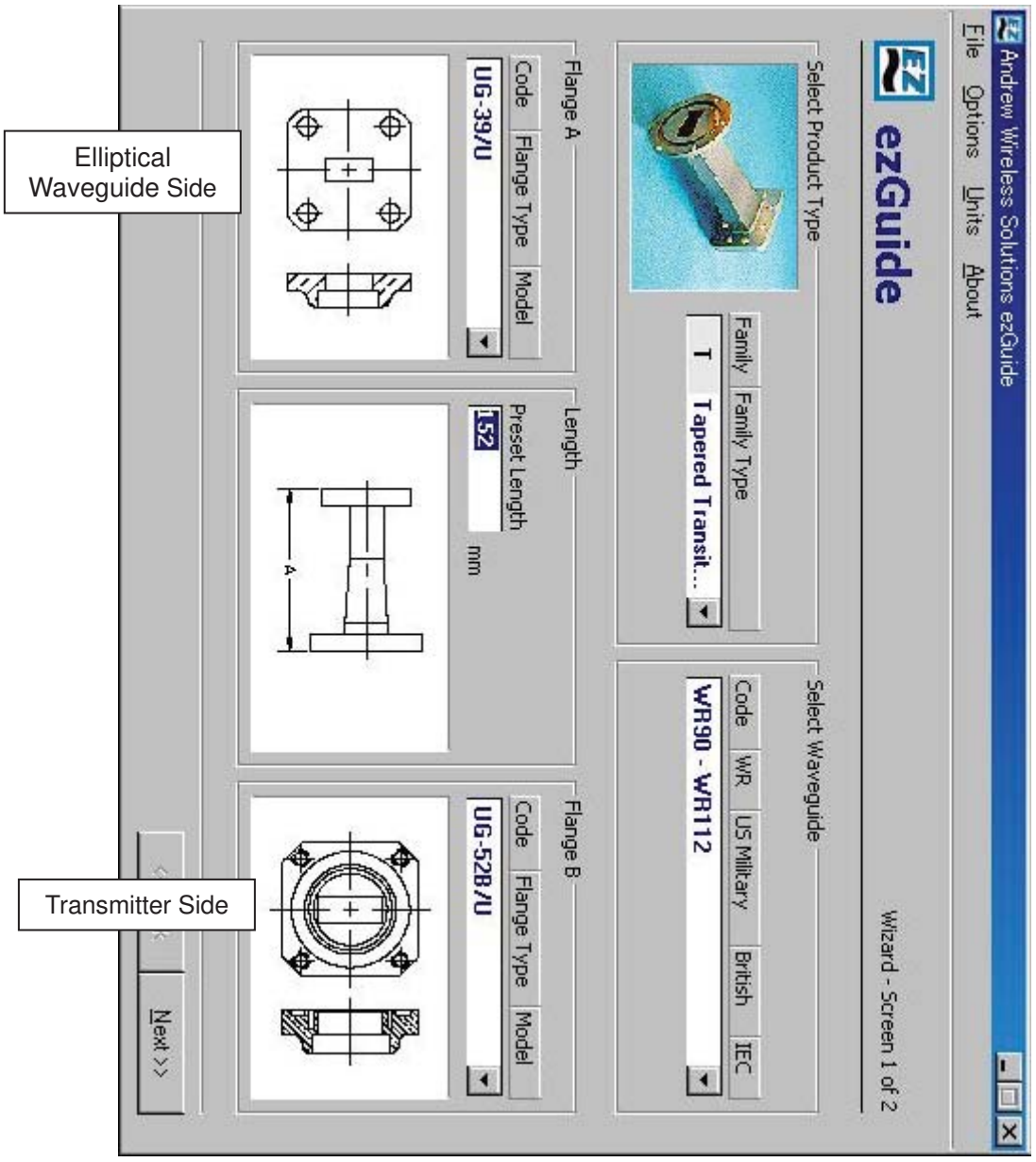


Connector Material: Brass

ANDREW.

Customer Service Center - Call toll-free from: • U.S.A., Canada and Mexico 1-800-255-1479

(3)Taper Waveguide



Elliptical Waveguide Side

Transmitter Side

Maximum Permissible Exposure(MPE) Calculation

(1) NTG-560 with NKE-339 (9ft Slotted Array Antenna)

Maximum Permissible Exposure(MPE) Calculation

FCC regulation 1.1310 Radiofrequency radiation exposure limits.(Frequency: 1,500 to 10,000MHz)

Limits for Occupational/Controlled Exposure(mW/cm^2)=5.00

Limits for General Population/Uncontrolled Exposure(mW/cm^2)=1.00

NTG-560 Performance Characteristics

Antenna gain(dB)= 31 Assumed 9feet Slotted Array Antenna

Output Average Power(W)= 25.601 (dBm)= 44.083

Frequency(MHz) = 9410

Cable Loss(dB) = 1 Assumed 10m Waveguide Lengh

Calculated EIRP mW) = 25601000 74.083 (dBm)

Power Density(SmW/cm^2)=$EIRP/4\cdot\pi\cdot r^2$

(r=cm)

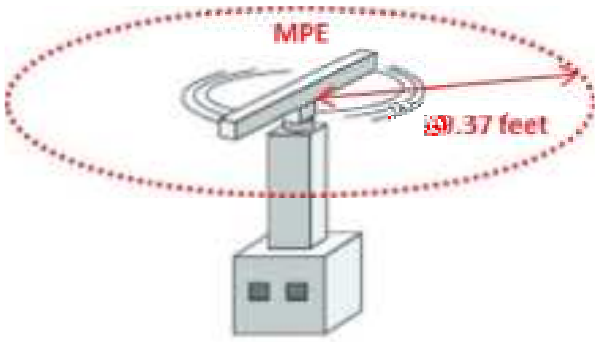
EIRP mW	Distance cm	Distance Feet	Power Density (S) mW/cm^2	
25601000.0	1500	49.21	0.90545	
25601000.0	1430	46.92	0.99627	General population
25601000.0	1400	45.93	1.03942	
25601000.0	1350	44.29	1.11784	
25601000.0	1300	42.65	1.20548	
25601000.0	1250	41.01	1.30385	
25601000.0	1200	39.37	1.41477	
25601000.0	1150	37.73	1.54046	
25601000.0	1100	36.09	1.68369	
25601000.0	1050	34.45	1.84786	
25601000.0	1000	32.81	2.03726	
25601000.0	950	31.17	2.25736	
25601000.0	900	29.53	2.51514	
25601000.0	850	27.89	2.81974	
25601000.0	800	26.25	3.18322	
25601000.0	750	24.61	3.62180	
25601000.0	700	22.97	4.15768	
25601000.0	640	21.00	4.97379	Occupational
25601000.0	600	19.69	5.65906	
25601000.0	550	18.04	6.73475	
25601000.0	500	16.40	8.14905	

25601000.0	450	14.76	10.06056
25601000.0	400	13.12	12.73290
25601000.0	350	11.48	16.63072
25601000.0	300	9.84	22.63626
25601000.0	250	8.20	32.59621
25601000.0	200	6.56	50.93158
25601000.0	150	4.92	90.54503
25601000.0	100	3.28	203.72633
25601000.0	50	1.64	814.90531

Conclusion:

Frequency (MHz)	General population Limit Minimum Distance(feet)	Occupational Limit Minimum Distance(feet)
1,500-10,000	46.92	21.00

The NTG-560 is radar system for operating at the land based services.
The radiating structure for the radar is typically mounted as following diagram.
The radar system will statify the requirements of RF exposure per CFR rule.



Typical Installation of radar system

(2) NTG-560 with NKE-402 (18ft Slotted Array Antenna)

Maximum Permissible Exposure(MPE) Calculation

FCC regulation 1.1310 Radiofrequency radiation exposure limits.(Frequency: 1,500 to 10,000MHz)

Limits for Occupational/Controlled Exposure(mW/cm^2)=5.00

Limits for General Population/Uncontrolled Exposure(mW/cm^2)=1.00

NTG-560 Performance Characteristics

Antenna gain(dB)= 34 Assumed 18feet Slotted Array Antenna

Output Average Power(W)= 25.601 (dBm)= 44.083

Frequency(MHz) = 9410

Cable Loss(dB) = 1 Assumed 10m Waveguide Lengh

Calculated EIRP mW) = 51080711 77.083 (dBm)

Power Density(SmW/cm^2)=$EIRP/4\cdot\pi\cdot r^2$

(r=cm)

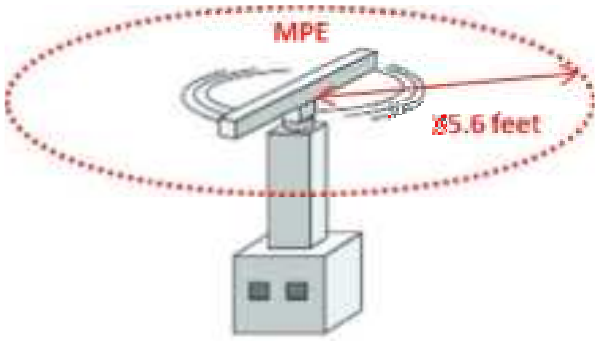
EIRP mW	Distance cm	Distance Feet	Power Density (S) mW/cm^2	
51080710.5	2200	72.18	0.83985	
51080710.5	2150	70.54	0.87937	
51080710.5	2100	68.90	0.92174	
51080710.5	2050	67.26	0.96725	
51080710.5	2020	66.27	0.99620	General population
51080710.5	1950	63.98	1.06900	
51080710.5	1900	62.34	1.12600	
51080710.5	1850	60.70	1.18769	
51080710.5	1800	59.06	1.25459	
51080710.5	1750	57.41	1.32731	
51080710.5	1700	55.77	1.40653	
51080710.5	1650	54.13	1.49307	
51080710.5	1600	52.49	1.58784	
51080710.5	1550	50.85	1.69194	
51080710.5	1500	49.21	1.80661	
51080710.5	1450	47.57	1.93335	
51080710.5	1400	45.93	2.07392	
51080710.5	1350	44.29	2.23038	
51080710.5	1300	42.65	2.40525	
51080710.5	1250	41.01	2.60152	
51080710.5	1200	39.37	2.82283	
51080710.5	1150	37.73	3.07363	
51080710.5	1100	36.09	3.35940	

51080710.5	1050	34.45	3.68696	
51080710.5	1000	32.81	4.06487	
51080710.5	950	31.17	4.50402	
51080710.5	905	29.69	4.96307	Occupational
51080710.5	850	27.89	5.62612	
51080710.5	800	26.25	6.35137	
51080710.5	750	24.61	7.22644	

Conclusion:

Frequency (MHz)	General population Limit Minimum Distance(feet)	Occupational Limit Minimum Distance(feet)
1,500–10,000	66.27	29.69

The NTG-560 is radar system for operating at the land based services.
The radiating structure for the radar is typically mounted as following diagram.
The radar system will statify the requirements of RF exposure per CFR rule.



Typical Installation of radar system