

SITE OVERVIEW DOC

SITE OVERVIEW DOCUMENT OUTLINE

SAFETY AND ENVIRONMENT

OVERALL SITE INSTALLATION:

- Site Assignment & Description
- On Tower Installations
- Site main infrastructure
- Site equipment
- Electricity
- Lightning and Grounding

SITE OVERVIEW

- Site Layout
- Components
- Outdoor Equipment Cabinet
 - *List of Components*
 - *Cabinet Electromechanical Drawings*
- Tower Foundation
- Grounding
- Generator
- Tower Accessories

SITE SCHEMATICS

- Site Cabling Plan
- Cables Specification
- Cabinet electrical drawings
- Interconnection
- IP Address Mapping

TROUBLESHOOTING

MAINTENANCE ACTIVITIES

SITE EQUIPMENT DATA SHEETS

1. SCOPE

1.1. Identification

This document establishes the specification for the **AAAAAAAAAA** site in the Border Pass project **BBBBBBBBBB**, herein referred to as the “Site”.

This document includes the following:

- a. Understanding the project introduction chapter
- b. Site installations list
- c. Site components and accessories
- d. Site schematics
- e. Site cabling
- f. Equipment cabinet details
- g. Cabinet electrical interconnection
- h. Maintenance activities

2. INTRODUCTION

The Intelligence & Surveillance System consists of four (4) Radar Intelligence Site Systems, providing radar coverage around the UUUUUUUU region. These sites will provide radar and optical data that will be integrated into a unified presentation at the Command & Control System (CCS) and additional presentation at the headquarter center of QQQQQQQ.

The Surveillance System is comprised of the following sites:

- SITE #1
- SITE #2
- SITE #3
- SITE #4
- Headquarter Base Command and Control System (CCS)

Figure 2-1. System Layout

The system function is based on the connectivity between the sites to the central command & control and in addition the participation of the following sensors elements:

- Mobile independent investigation and detection measures assembled on special vehicles.
- Unmanned Air Vehicle (UAV) for longer ranged detection.
- Hovering machine to perform a wide variety of surveillance, intelligence, and border control support missions.

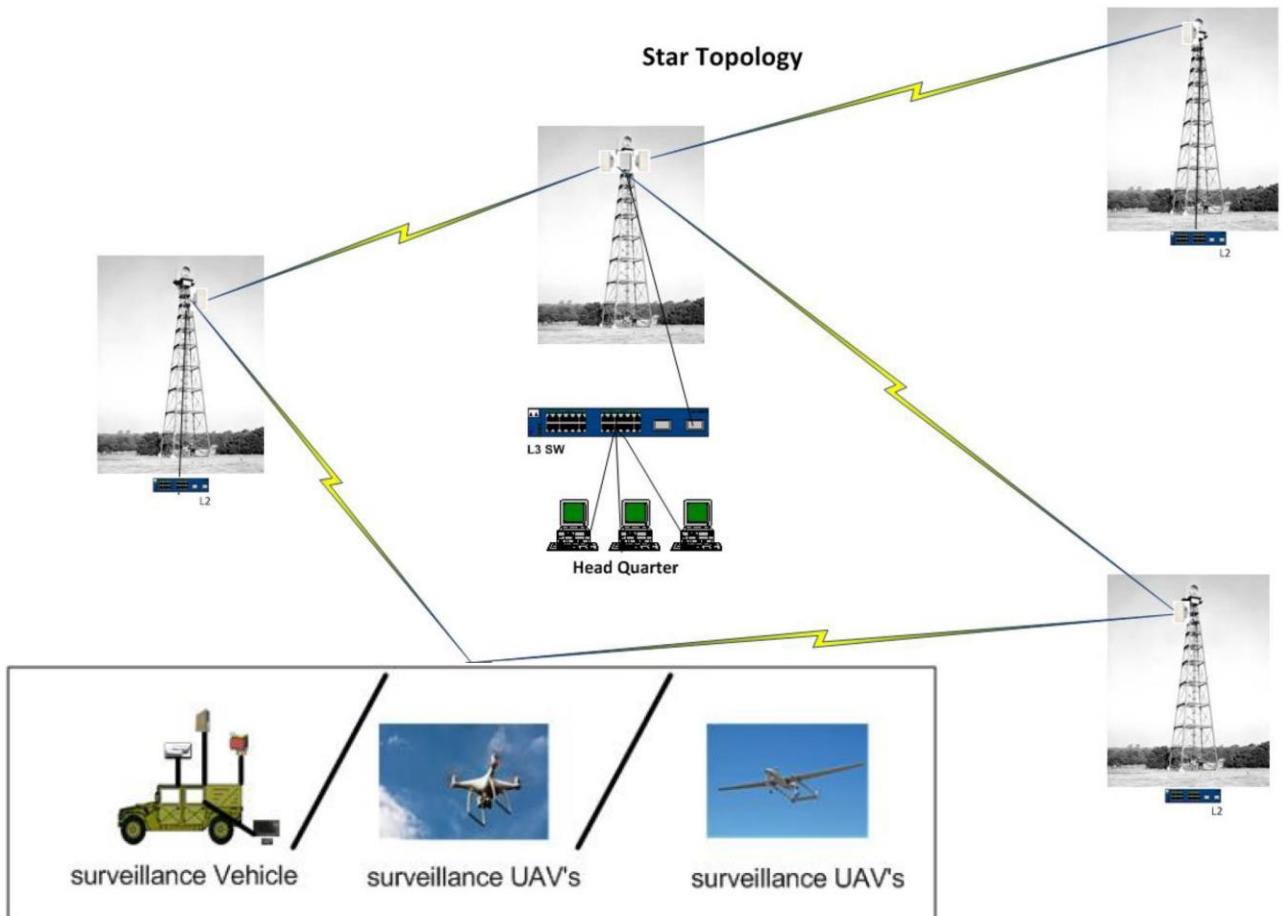


Figure 2-2. Networking Type – Star Topology

Typical site is composed of the following sub-systems:

- a. Radar type ELM2112 – V1/V5
- b. Electro Optical control subsystem – xxxxxxxx
- c. CCTV cameras

- d. Microwave Network xxxxxxxxxxxx Communication subsystem
- e. Outdoor cabinet containing the hardware to integrate and process site systems outputs
- f. Generator to be operated locally and remote-controlled operation
- g. Site environment sensors (fence and gate)

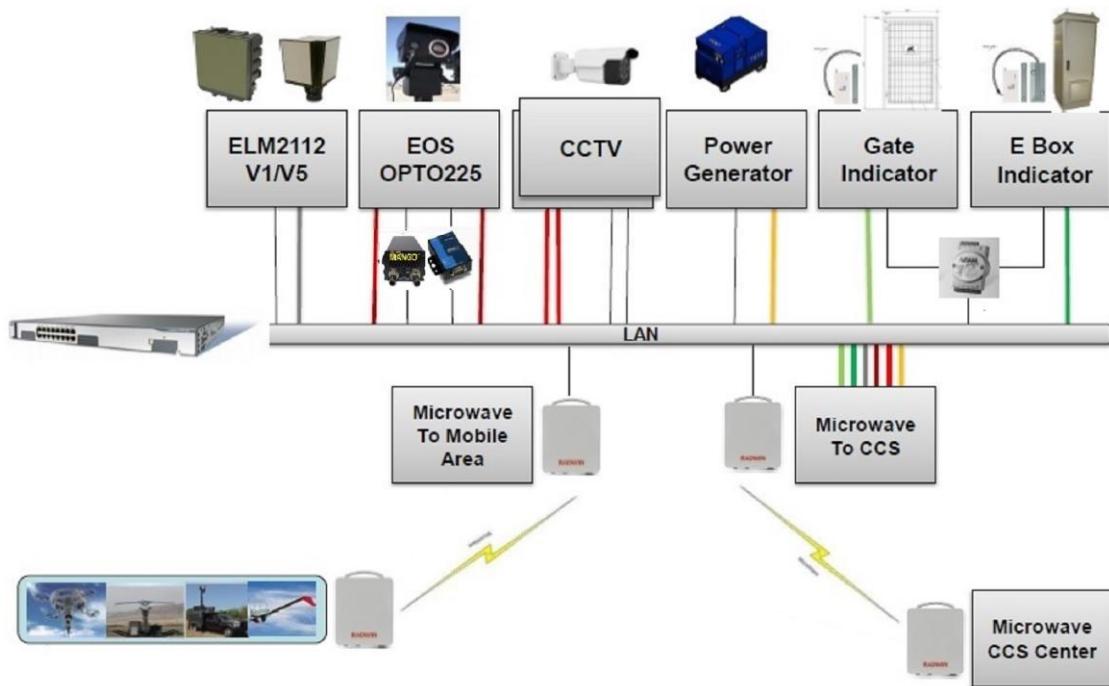


Figure 2-3. Radar Site Connectivity General Arrangement

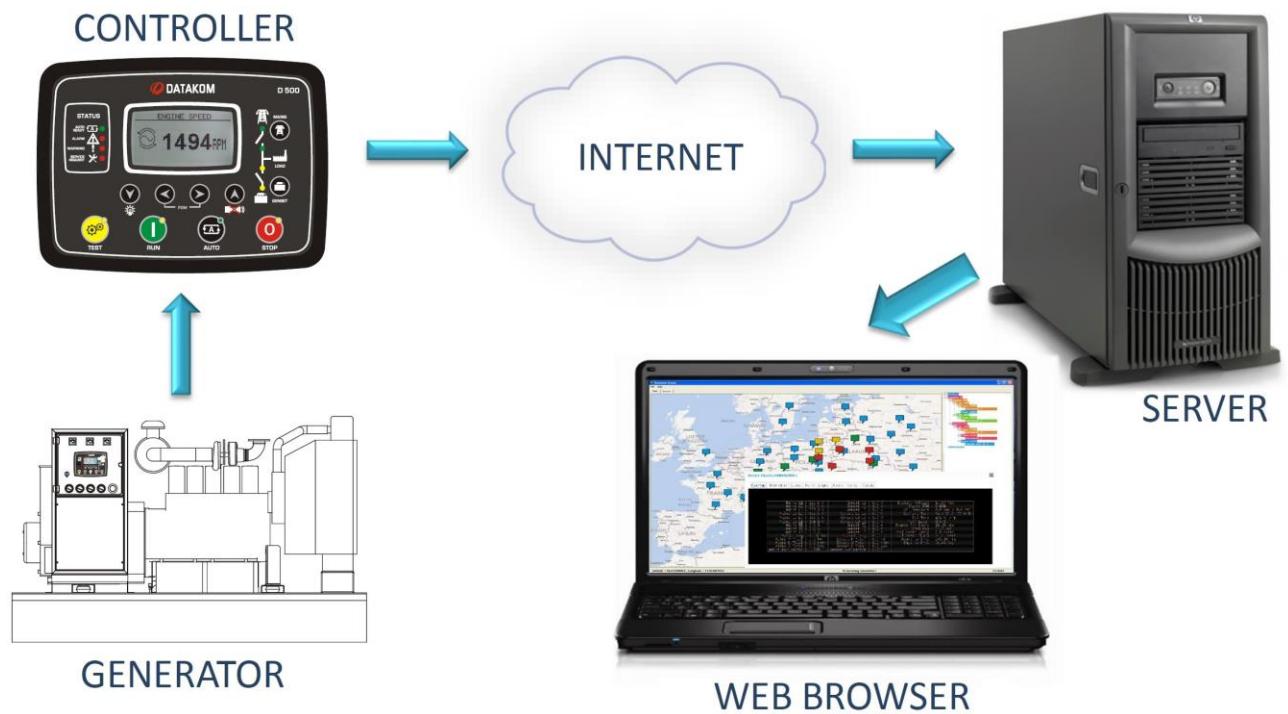


Figure 2-4. Power Generator Operation

3. BASIC SAFETY INSTRUCTIONS

3.1.General

3.2.Practices on sites

3.2.1. Requirements

3.2.2. Work Completion

3.2.3. Safety Discipline

3.3.Staying and Working in the Field

4. OVERALL SITE INSTALLATION

4.1.Site

Site number: 4

Site name: Radio Nacional

Date of establishment: 01\10\2017

Tower height: 54m

4.2.On Tower Installations

#	Item
1	Lightning Rod – 54m + 2.5m
2	Grounding cable from lightning rod to grounding system
3	Aviation Warning Light – 54m
4	Lifting arm with pulley – 54m
5	Observation camera Xxxxx 225 + Adapter – 54m
6	Equip1 V5+ Adapter – 53m
7	Service platform – 52.5m
8	Fdfdfdfd Antenna – 52m
9	Climbing Ladder – all along
10	Safety steel cable + adaptors and Accessories – all along
11	CCTV Cameras 3 units – 6m
12	LED Reflectors 100W (With volume detection Sensor) 2 units – 4m



Figure 4-1. Site Tower General View



Figure 4-2. LED Reflectors 100W – 4m

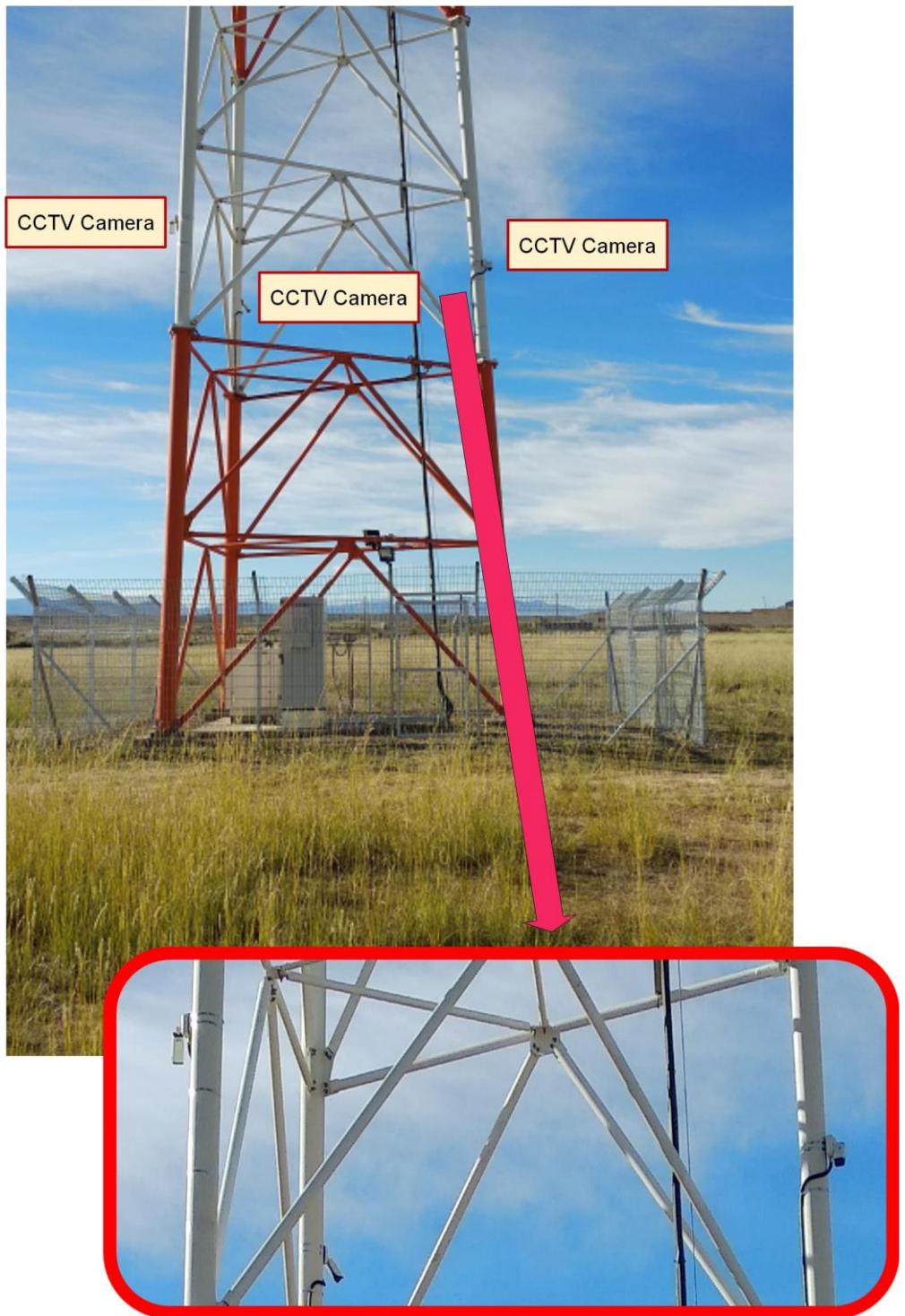


Figure 4-3. CCTV Installation on Tower



Figure 4-4. CCTV Cameras Installation – Closeup View

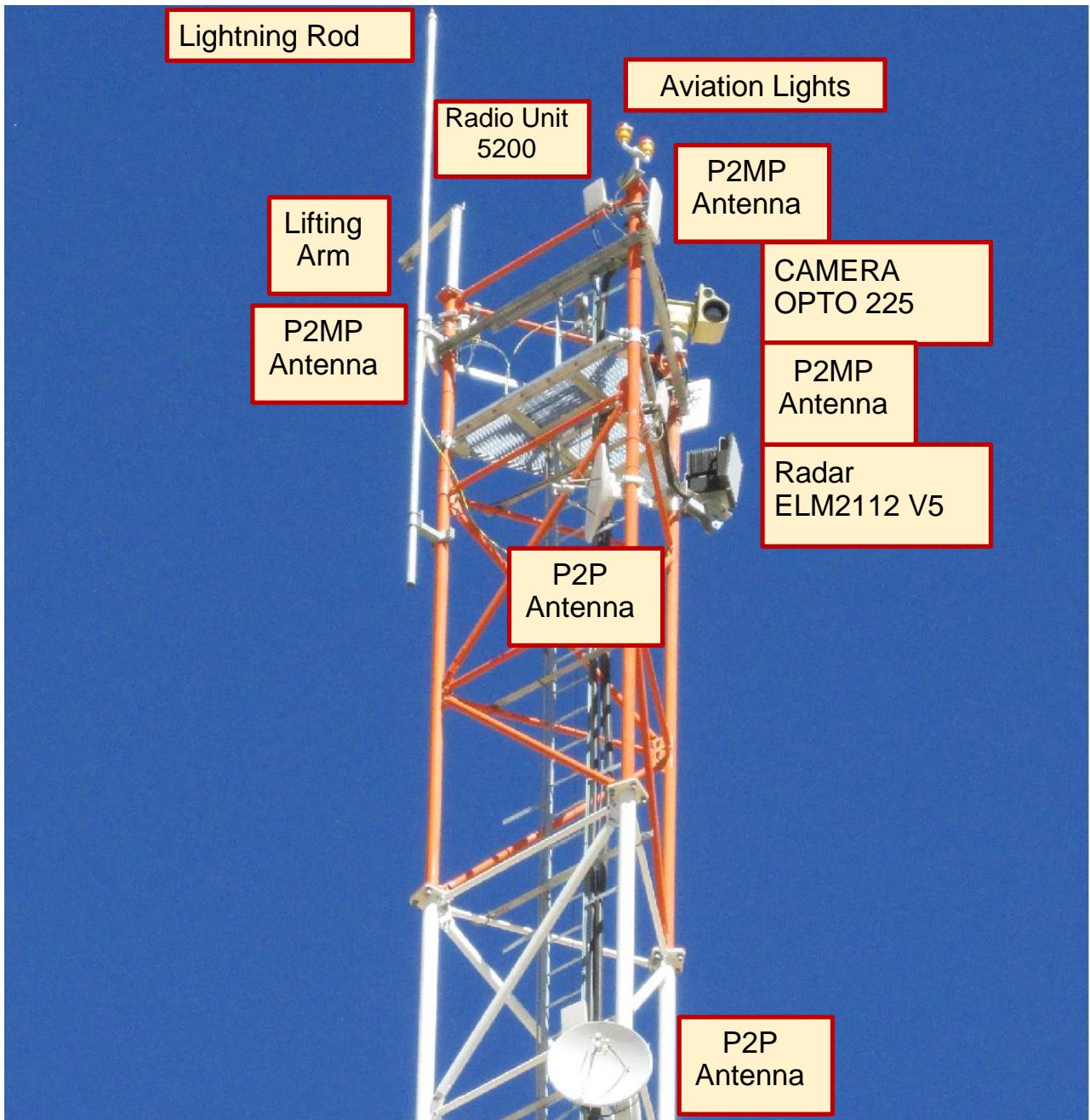


Figure 4-5. Tower Top Installation

Figure 4-6. Tower Top Installation – ccccccc and XXXXX225

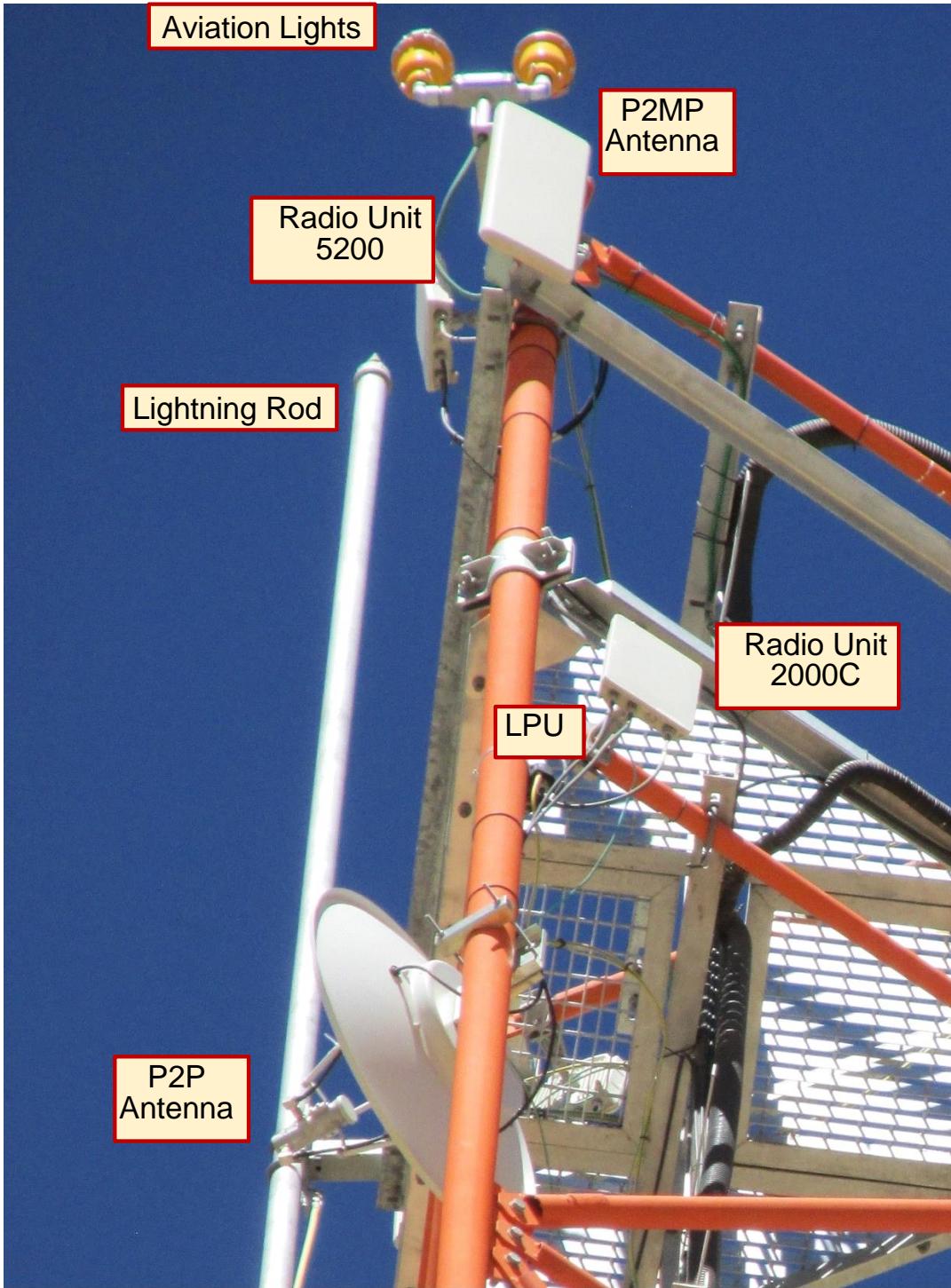


Figure 4-7. Tower Top Installation – Aviation Lights

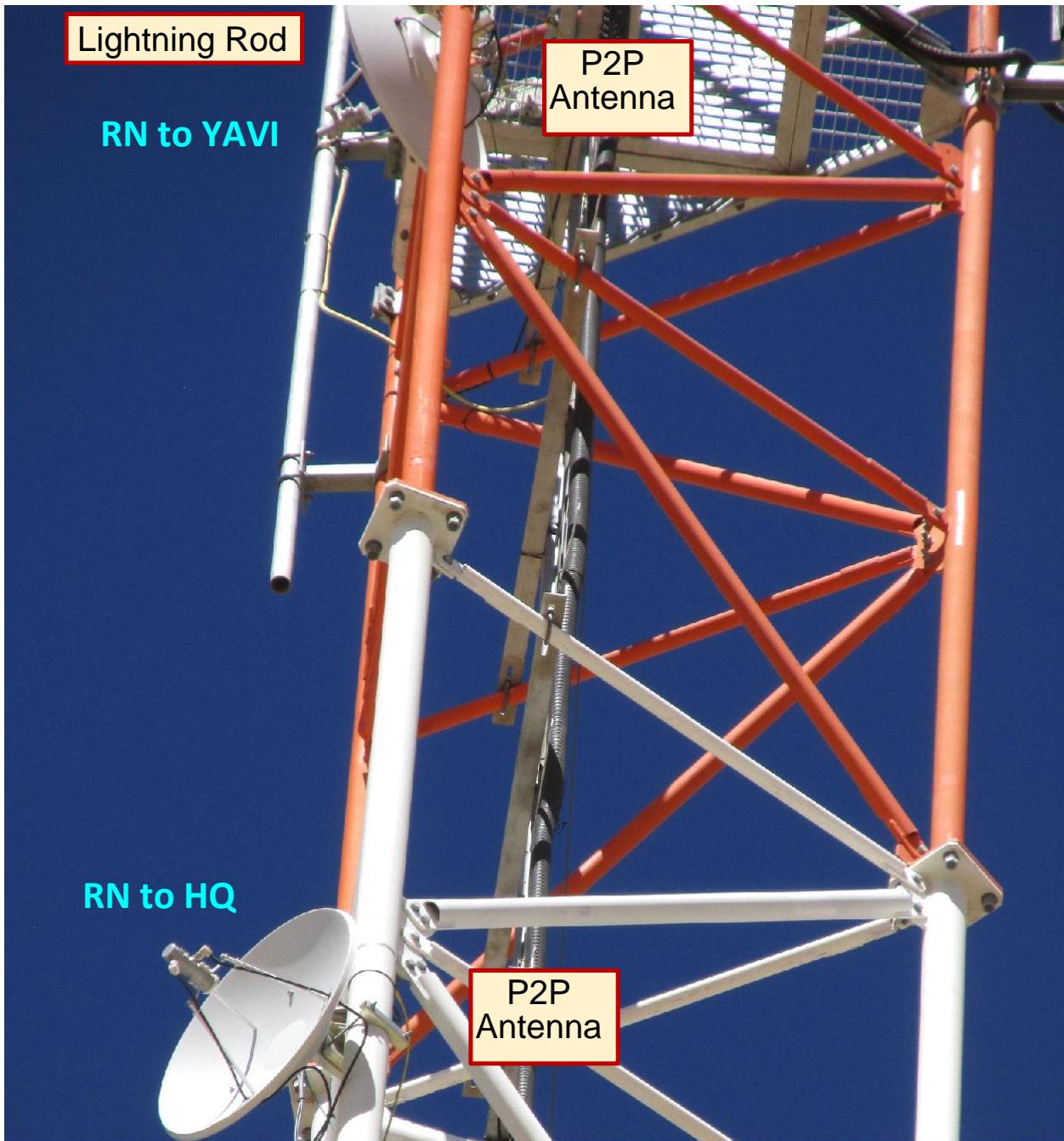


Figure 4-8. Tower Top Installation – FDFDFDFD Systems



Figure 4-9. Tower Top Installation – FDFDFDFD P2P RN to HQ Antenna

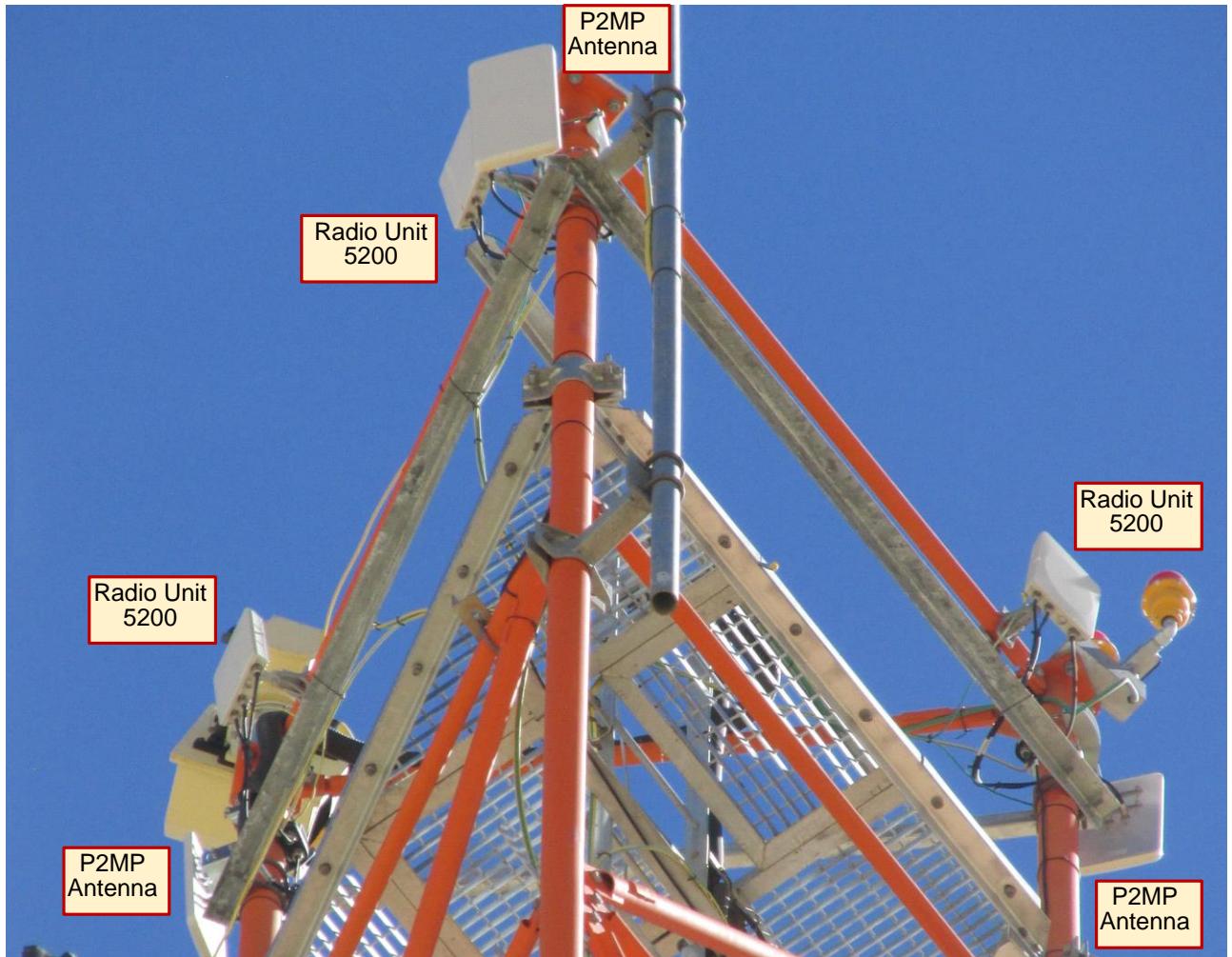


Figure 4-10. Tower Top Installation – FDFDFDFD P2MP Antennas Array

4.3. Site main infrastructure

#	Item
1	Site Fence + pedestrian Gate
2	Electricity pit
3	Grounding pit
4	Gravel toping
5	Underground pipes between electricity pit and equipment pad
6	Underground pipes between equipment pad and generator pad

4.4. Site equipment

#	Item
1	Gate Sensor
2	FG Wilson F9.5-1 Generator
3	Generator compact modular enclosure
4	Fuel tank
5	Main Switch box in the electricity pit
6	Outdoor Cabinet



Figure 4-11. Site Main Infrastructure

4.5.Electricity

#	Item	
1	Main Power: the electricity feeds come from underground connection between the site main switch and the old police station building located nearby the site.	
2	Backup Power: FG Wilson F9.5-1 Generator + Fuel tank	
3	Power connection size: 1*36A	
	Cables cross section:	
	i	Main feed 3*10 sq/mm XLPE N2XY between the site main electricity switch and the equipment cabinet
	ii	Generator feed 3*10 sq/mm XLPE N2XY, between the generator and the equipment cabinet
	iii	Generator battery charge 3*2.5 sq/mm XLPE N2XY, between the generator and the equipment cabinet
	iv	LED reflector 3*2.5 sq/mm XLPE N2XY, between reflectors and equipment cabinet.
	v	Aviation warning light 3*2.5 sq/mm XLPE N2XY between aviation warning light and equipment cabinet.

4.6.Lightning and Grounding

#	Item	
1	Lightning protection system includes:	
	1.1	5m Lightning arrestor 2" pole with bronze cone, will go up about 2.5m above the top of the tower
	1.2	Main grounding cable 1*95 sq/mm from lightning arrestor to foundation grounding
2	Foundation grounding system includes:	
	2.1	Foundation Bottom grounding ring made of hot deep galvanized strip 30*3 mm
	2.2	Foundation upper grounding ring made of hot deep galvanized strip 30*3 mm
	2.3	Connection strips and "pig tails" 3 hot deep galvanized strips 30*3 mm that connect between the rings and go up above the tower leg foundations
3	Site grounding	
	3.1	4 units of grounding electrodes, 3 meter each one in every corner of the site.
	3.2	Grounding pit for testing and controlling
	3.3	Copper wire 50 sq/mm to connect between the electrodes
	3.4	Grounding tails that connected to the site components:
	i	Equipment cabinet
	ii	Generator
	iii	Fuel tank
	iv	Electricity pit
	v	Fence poles (4 corners)
4	Communication Connection	
	The site is connected by microwave Fdfdfdf P2P (Point to Point) antennas and equipment, between the site and the HQ (Head Quarter command and control center), and between the RN site and YAVI site.	

#	Item
	Installation Details
	<u>RN->CCS</u> Link Distance: 2.17 Km <u>From RN to CCS:</u> Installation height: 46m Azimuth to CCS: 9.5 degrees Elevation angle to CCS: - 1 degrees <u>To CCS:</u> Installation height: 25m Azimuth to RN: 189.5 degrees Elevation angle to RN: + 1 degrees
	<u>RN->YAVI</u> Link Distance: 6.95 Km <u>From RN to YAVI:</u> Installation height: 50m Azimuth to YAVI: 98 degrees Elevation angle to YAVI: 0 degrees <u>From YAVI to RN:</u> Installation height: 21m Azimuth to RN: 278 degrees Elevation angle to RN: 0 degrees
	<u>RN P2MP:</u> Installation height: 52m Down Tilt: 4 degrees Sector 1 (107) Heading (Central Beam): 225 degrees Sector 2 (108) Heading (Central Beam): 315 degrees Sector 3 (109) Heading (Central Beam): 135 degrees

5. SITE OVERVIEW

5.1. Site Layout

Figure 5-1. Site topographic plan

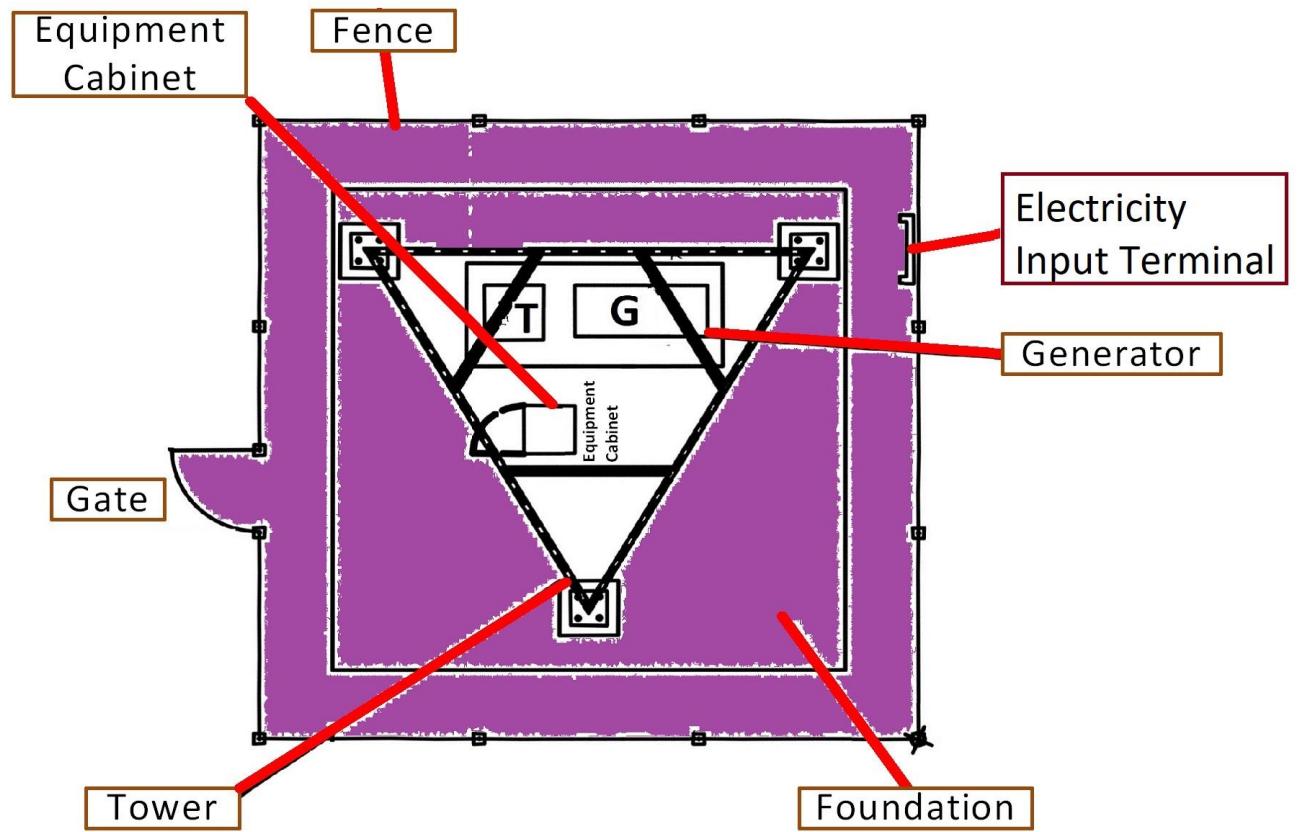


Figure 5-2. Site general layout

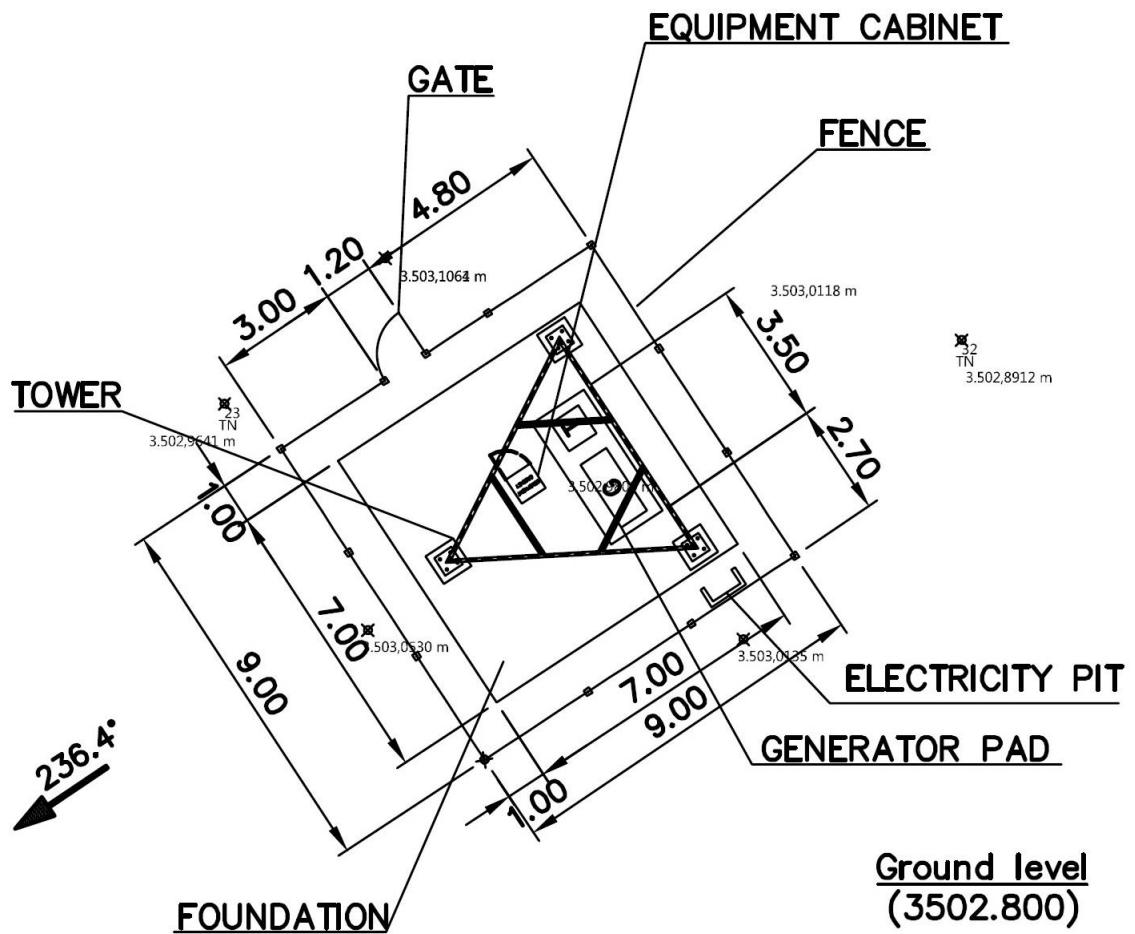


Figure 5-3. Site Outline Dimensions



Figure 5-4. Site pictorial view

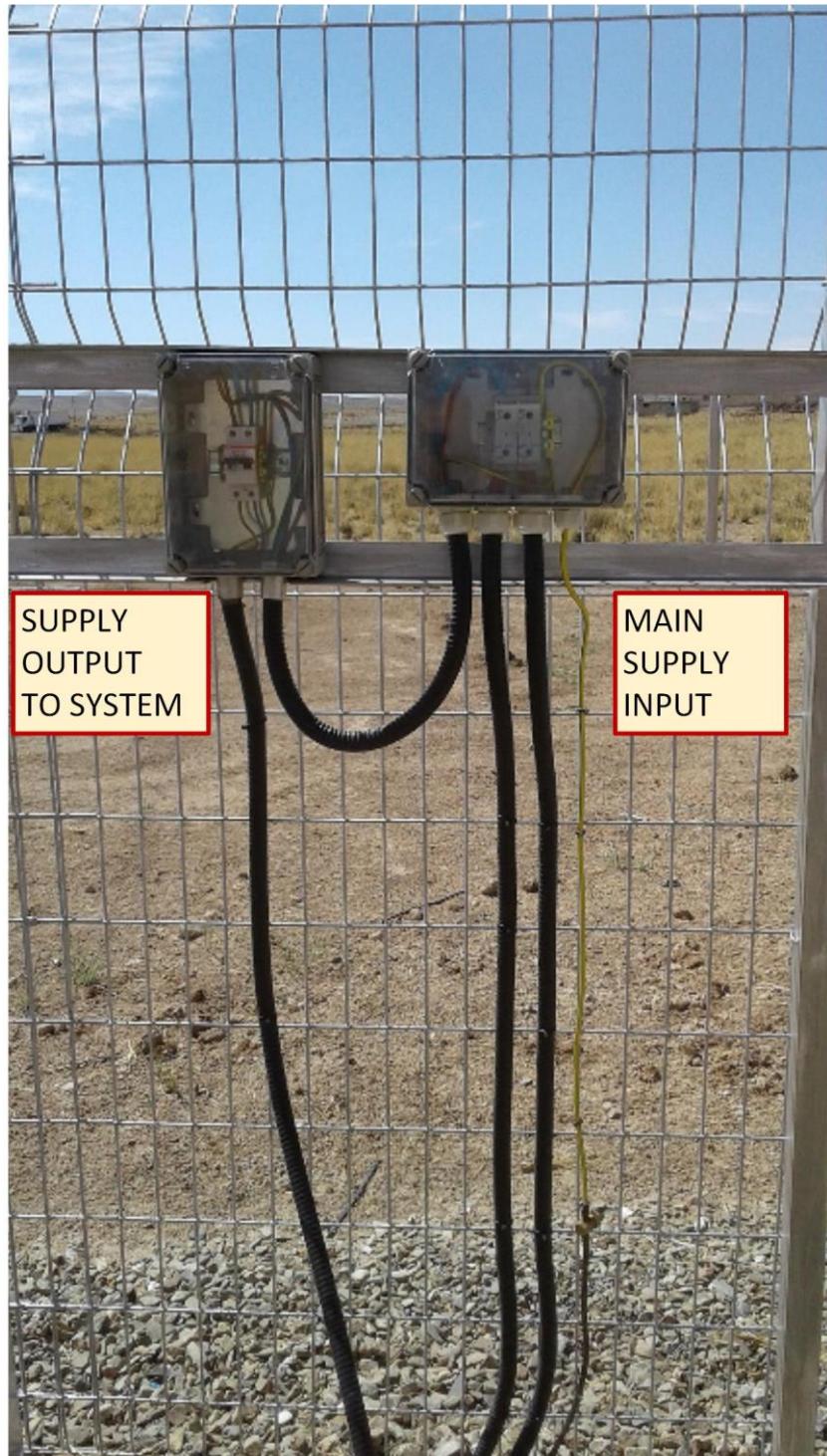


Figure 5-5. Site electricity peer general view

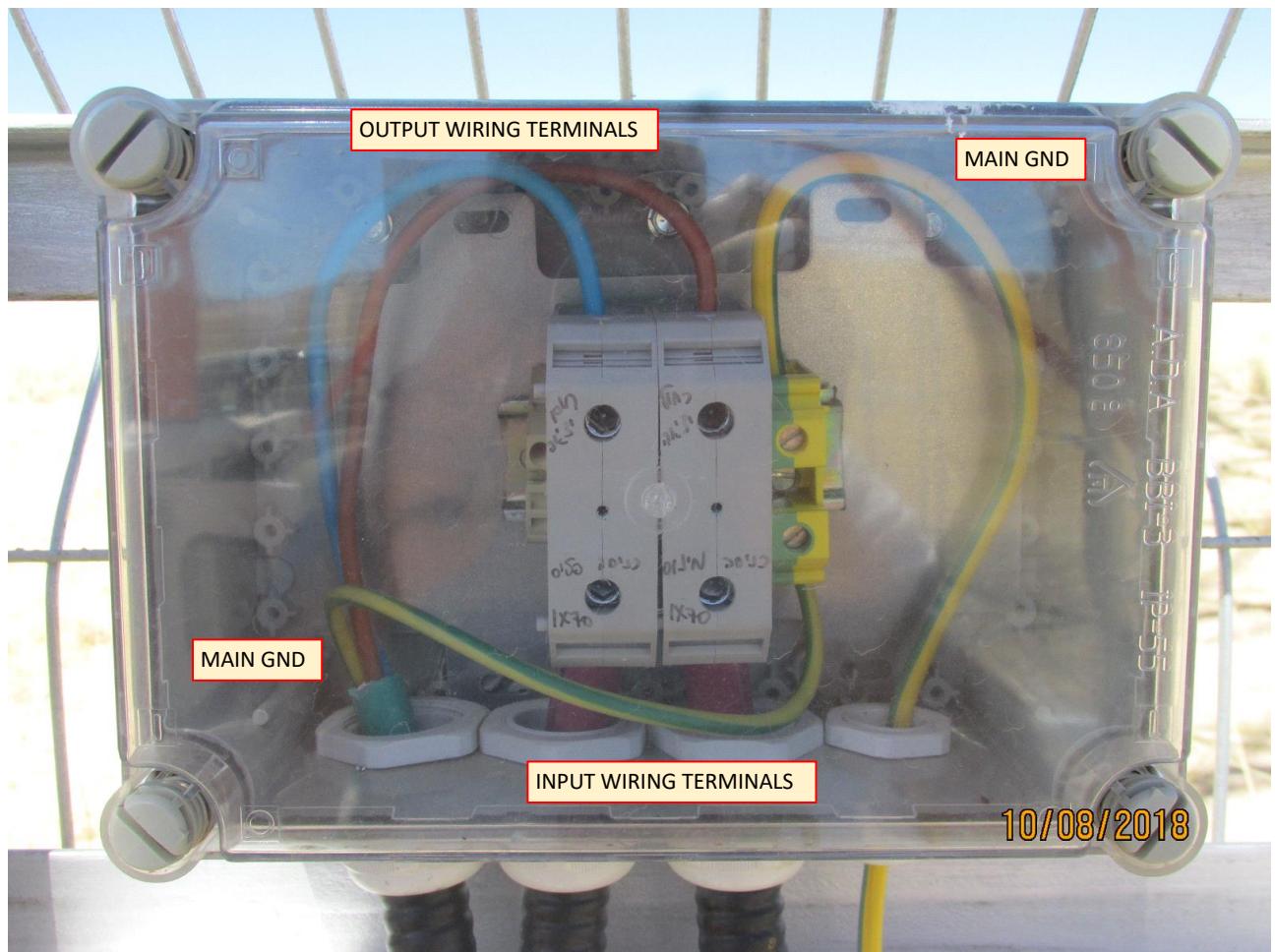


Figure 5-6. Main supply input terminal to site

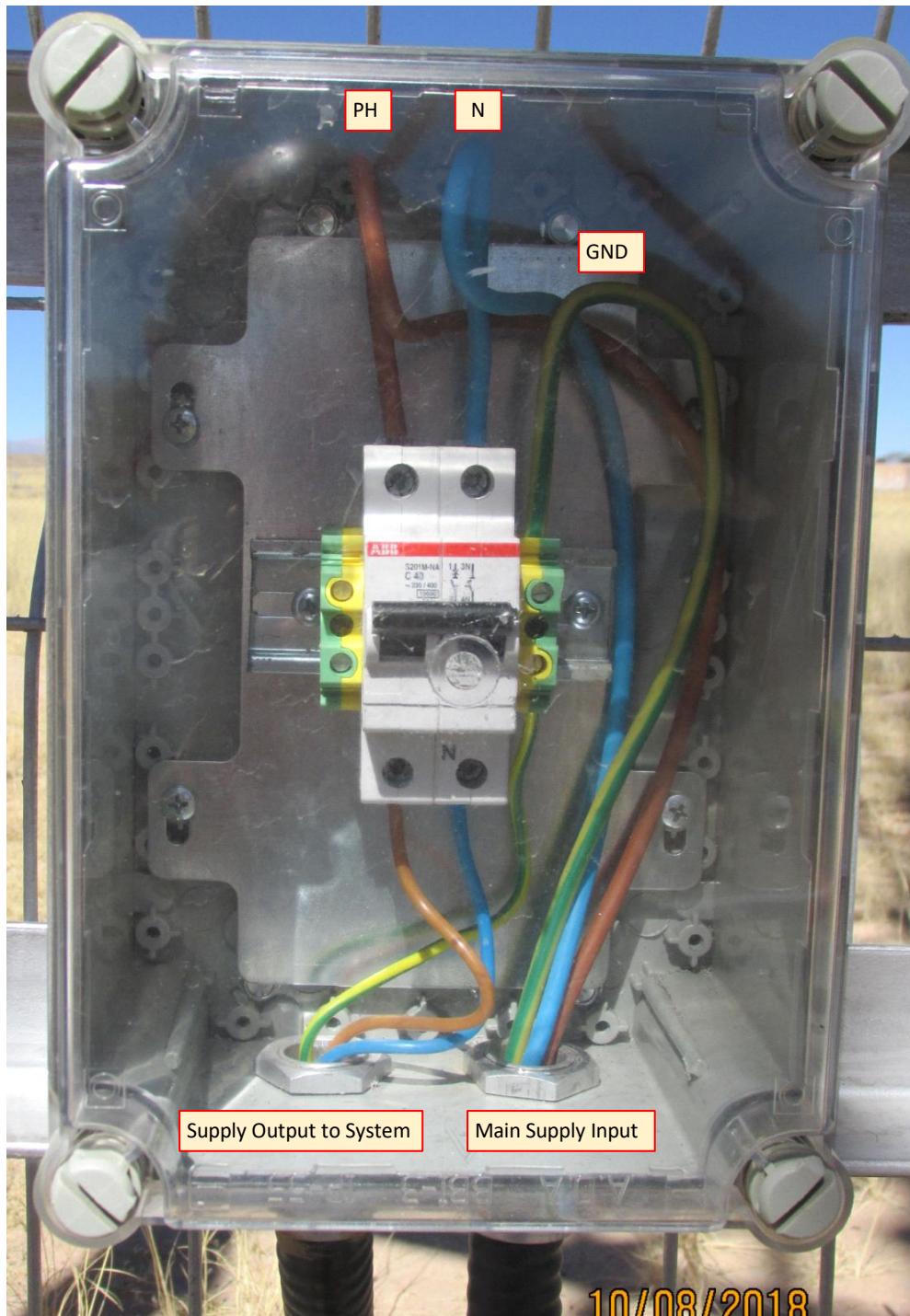


Figure 5-7. Main supply input circuit breaker to cabinet

5.2.Components

Figure 5-8. Tower elements

Figure 5-9. Tower top elements detail

5.3. Outdoor Equipment Cabinet

5.3.1. List of Components

1. Delta outdoor cabinet
2. Air conditioning unit Predator - PRT100
3. ABB 4 Pole breaker
4. ABB Circuit Breaker MCB S
5. ABB Circuit Breaker
6. Aviation warning light current controller Amdar AM24D
7. Asian Electron Wave Inverter
8. Backup Batteries 4 units TPL 100AH\12 volt each
9. Cisco Catalyst 3650 communication switch
10. Dc to Dc Quint PHC
11. Delta ORION Controller
12. Delta Rectifier DPR 2900
13. HP micro PC - HP 260 G
14. MeanWell 350W Single phase DC – DC Converter

5.3.2. Cabinet Electromechanical Drawings



Figure 5-10. System Equipment Cabinet



Figure 5-11. System Equipment Cabinet – Interior View



Figure 5-12. System Equipment Cabinet – Internal Upper View

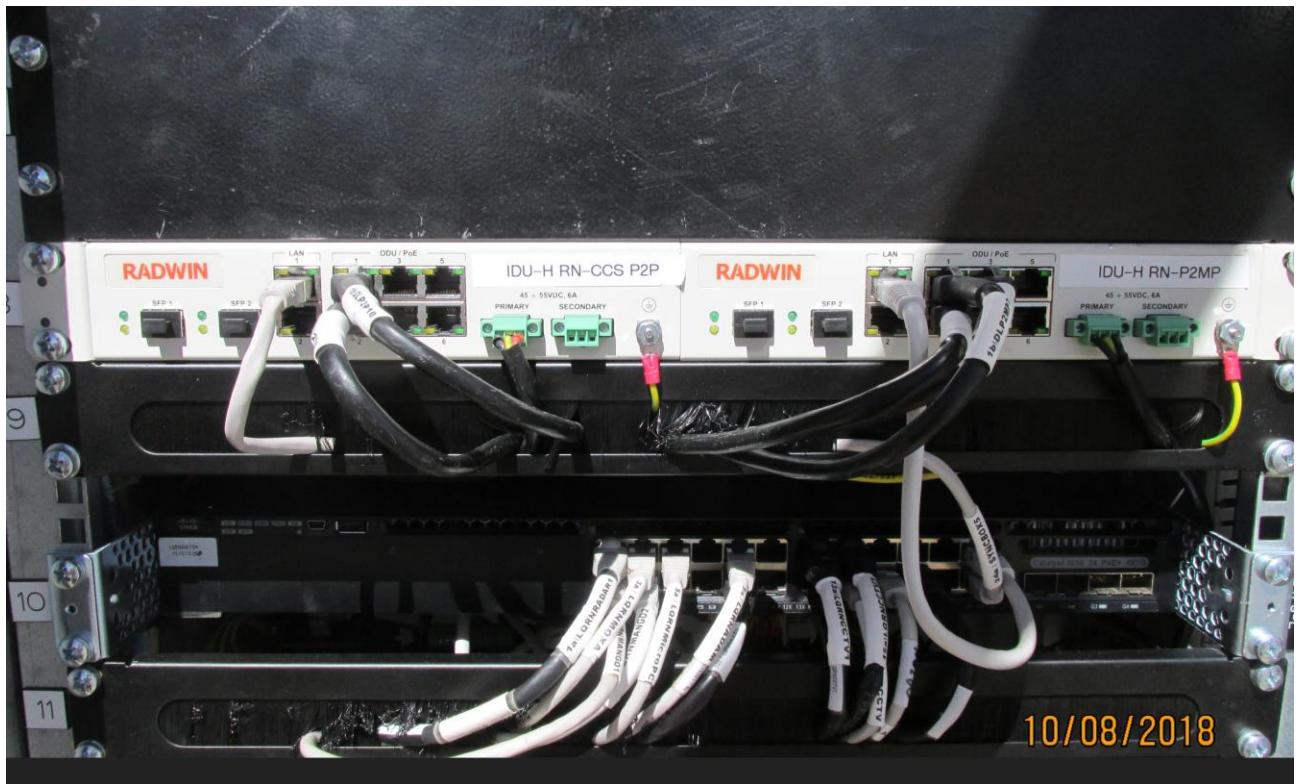


Figure 5-13. System Equipment Cabinet – Internal Central View



Figure 5-14. System Equipment Cabinet – Internal lower view

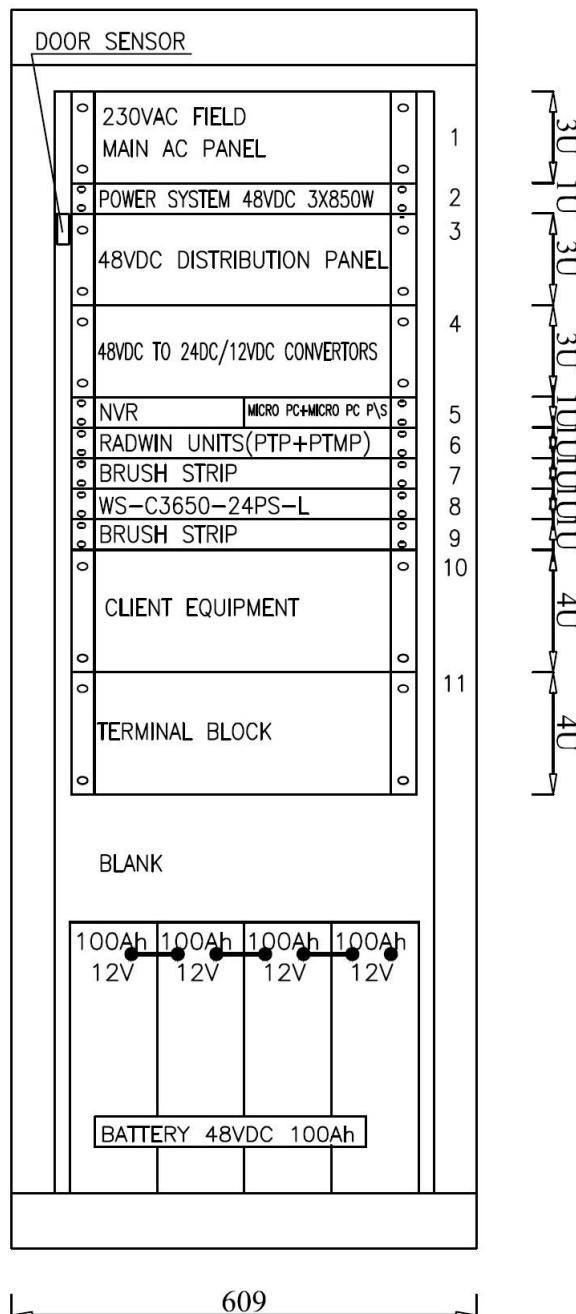
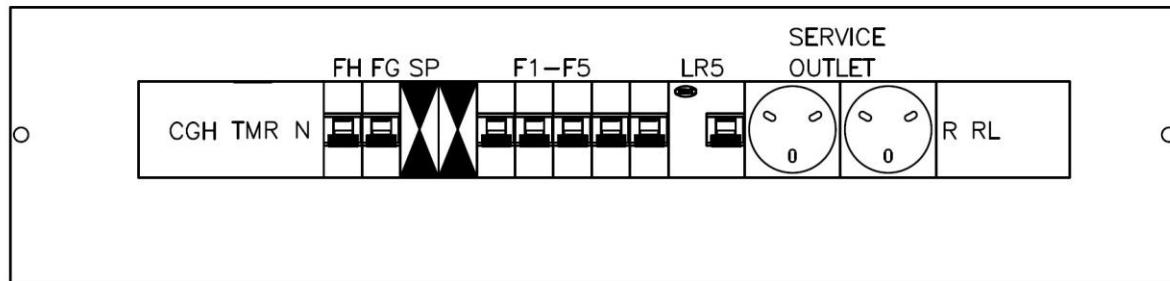


Figure 5-15. Outdoor Cabinet Panel View

MAIN AC 230 PANEL
FRONT VIEW



EQUIPMENT TAG	FUNCTION
CGH	CHANGEOVER CONTACTOR
TMR	CONTACTOR TIMER
FH	MAINS FEED
FG	GENERATOR FEED
SP	SURGE PROTECTION
F1	CONTROL+INTERNAL LIGHT FEED
F2	POWER SYSTEM FEED
F3	CABINET AIR CONDITION FEED
F4	LIGHT PROJECTOR+ GENERATOR CHARGER
F5	SERVICE OUTLET FEED
LR5	SERVICE OUTLET PROTECTION
R	AIR CONDITION CONTROL RELAY
RL	INTERNAL LIGHT CONTROL RELAY

MAIN AC 230 PANEL
FRONT VIEW—WITH NO PANEL

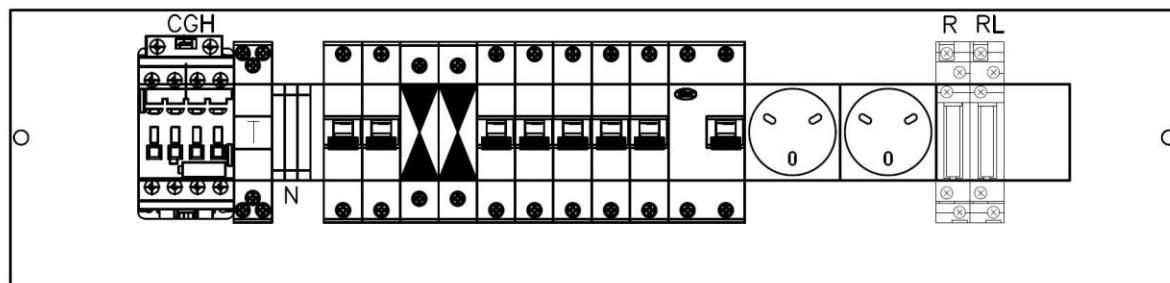
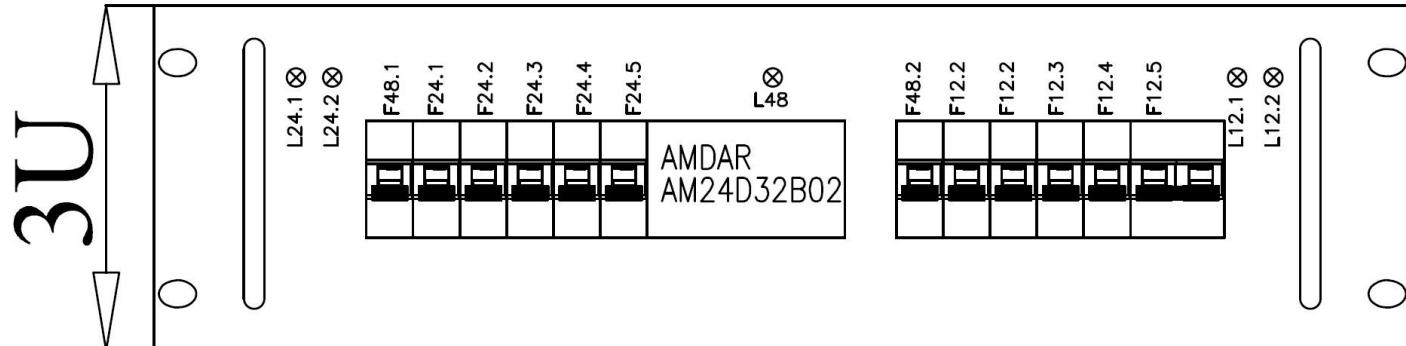


Figure 5-16. Cabinet Main AC Panel



19"

F48.1	48/24 CONVERTER 1+2 FEED
L48	48VDC PRESENCE
L24.1	CONERTER 1-24VDC PRESENCE
L24.2	CONERTER 2-24VDC PRESENCE
F24.1	RADAR V5
F24.2	OPTO225
F24.3	MOXA NPORT 5250
F24.4	ADAM
F24.5	AVATION WARNING LIGHT FEED
AMDAR	AVATION WARNING LIGHT LOW CURRENT RELAY
L12.1	CONERTER 3-12VDC PRESENCE
L12.2	CONERTER 4-12VDC PRESENCE
F12.1	MANGO 1
F12.2	MANGO 2
F12.3	NVR
F12.4	RESERVED
F12.5	RESERVED

Figure 5-17. Cabinet DC/DC Shelf Panel

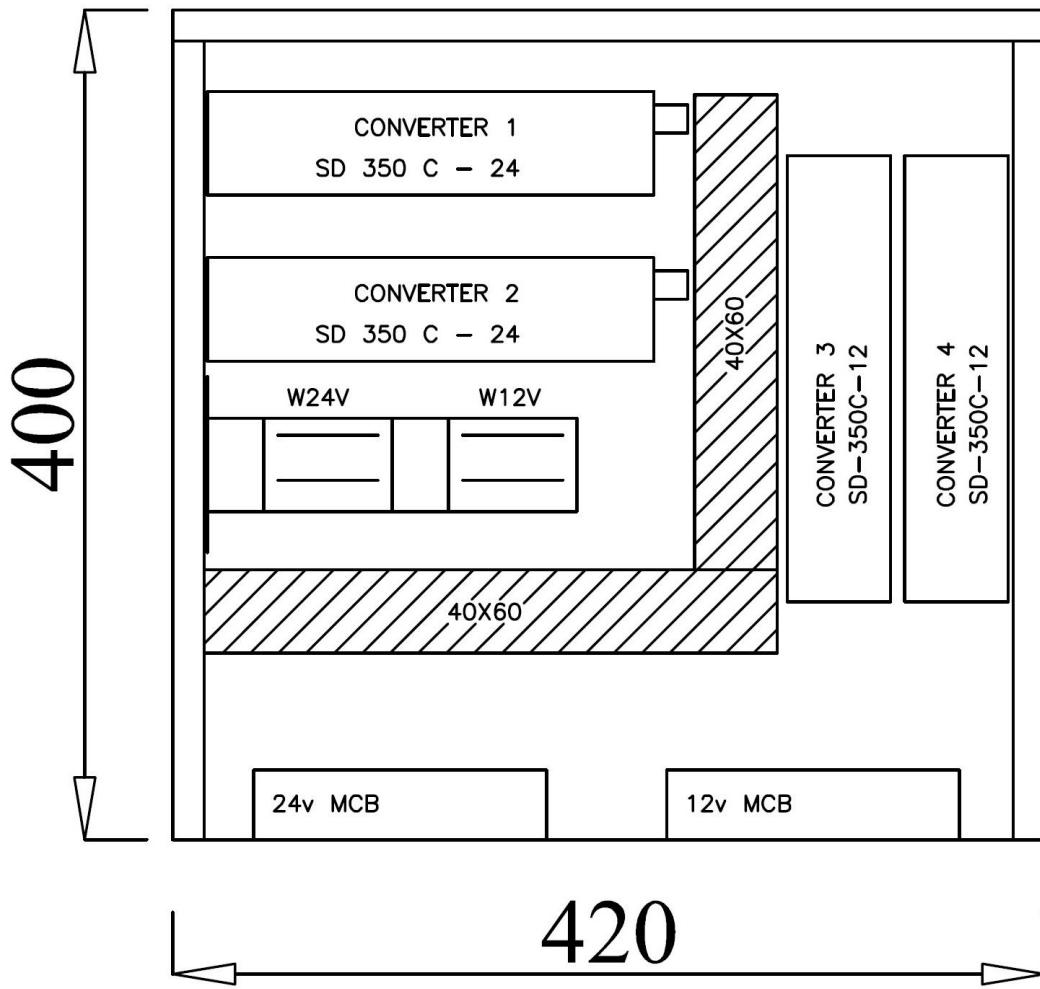


Figure 5-18. DC/DC Shelf Upper View

48VDC DISTRIBUTION PANEL FRONT VIEW



EQUIPMENT	FUNCTION
TAG	
F48.3	MICRO-PC P\S FEED
F48.4	WS-C3650-FEED A
F48.5	WS-C3650-FEED B
F48.6	P-T-P FEED
F48.7	AVATION WARNING LIGHT
F48.8	RESERVE
FBATT	BATTERY FEED

48VDC DISTRIBUTION PANEL FRONT VIEW—WITH NO PANEL

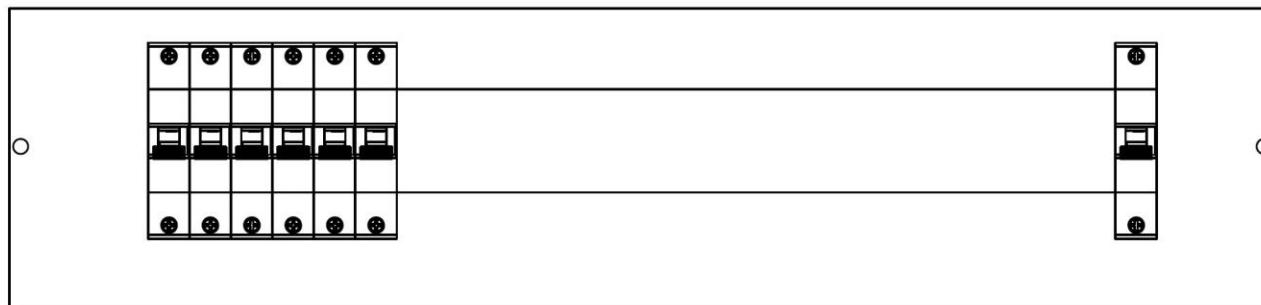
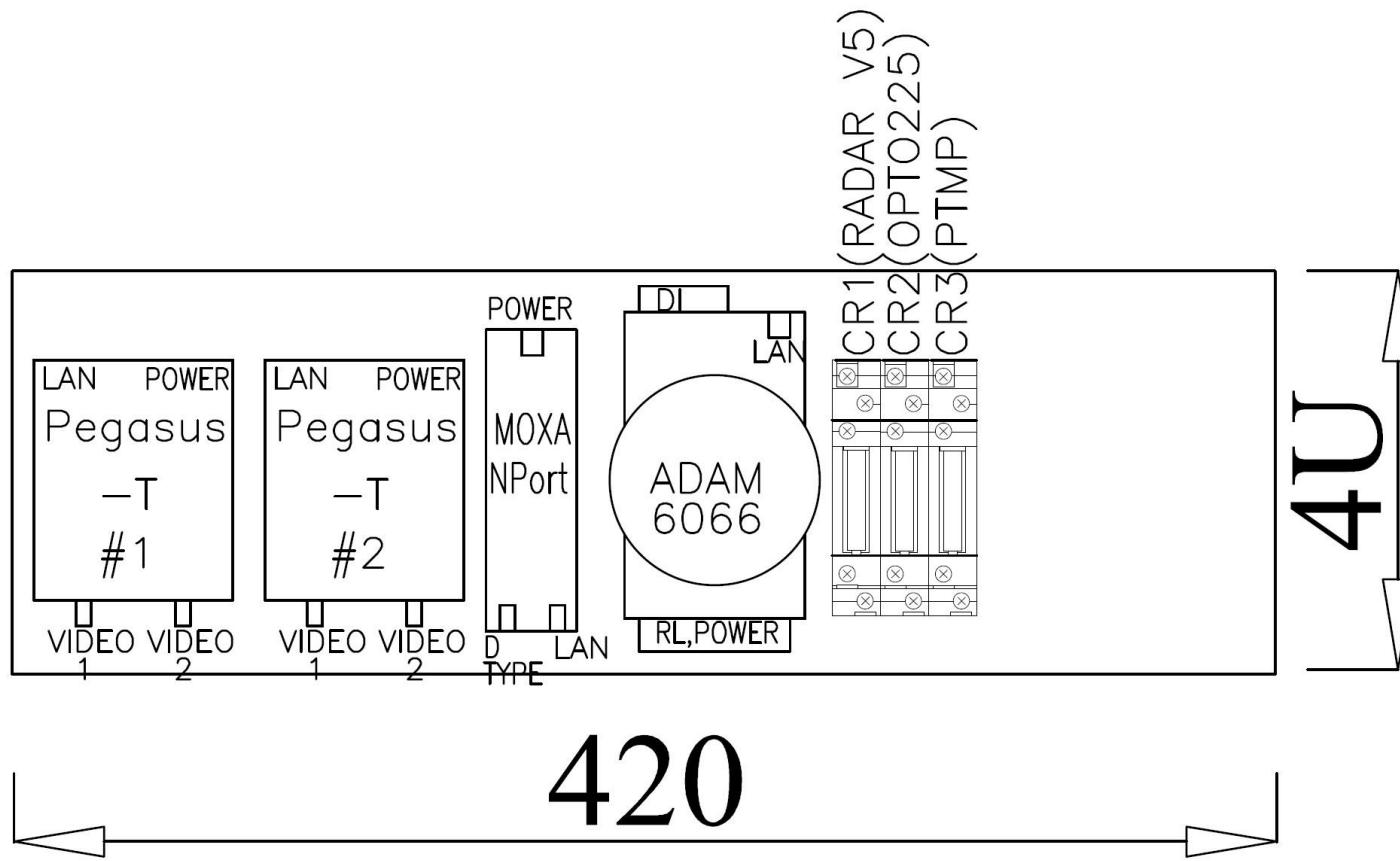


Figure 5-19. DC Distribution Panel



*Pegasus units will be installed on a plastic isolated sheet

Figure 5-20. Cabinet Client Equipment

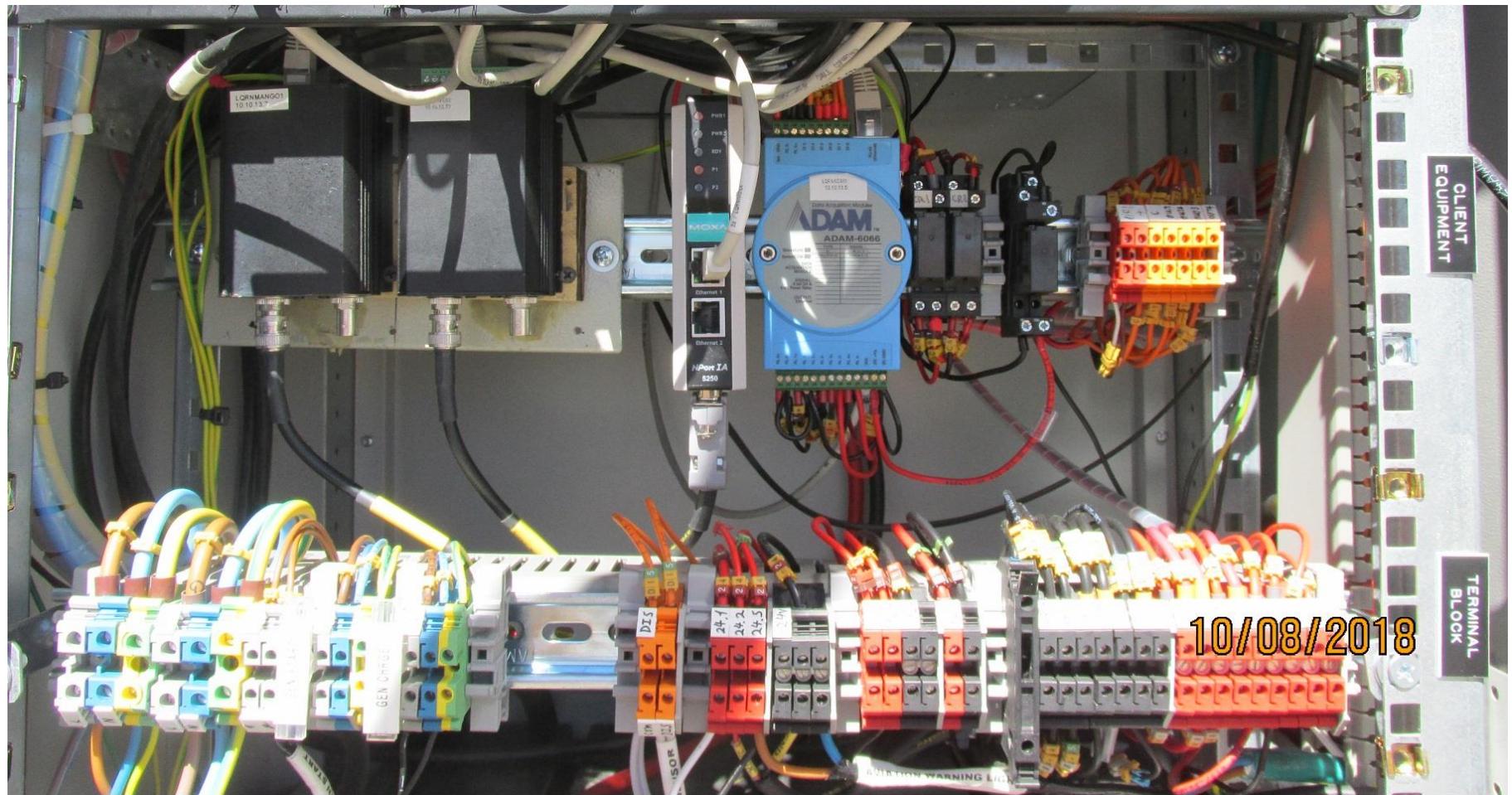
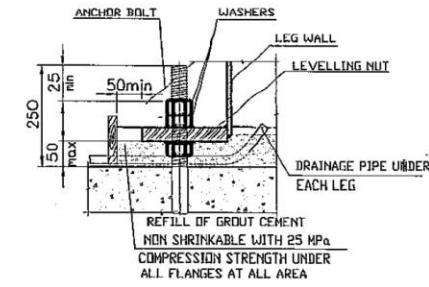
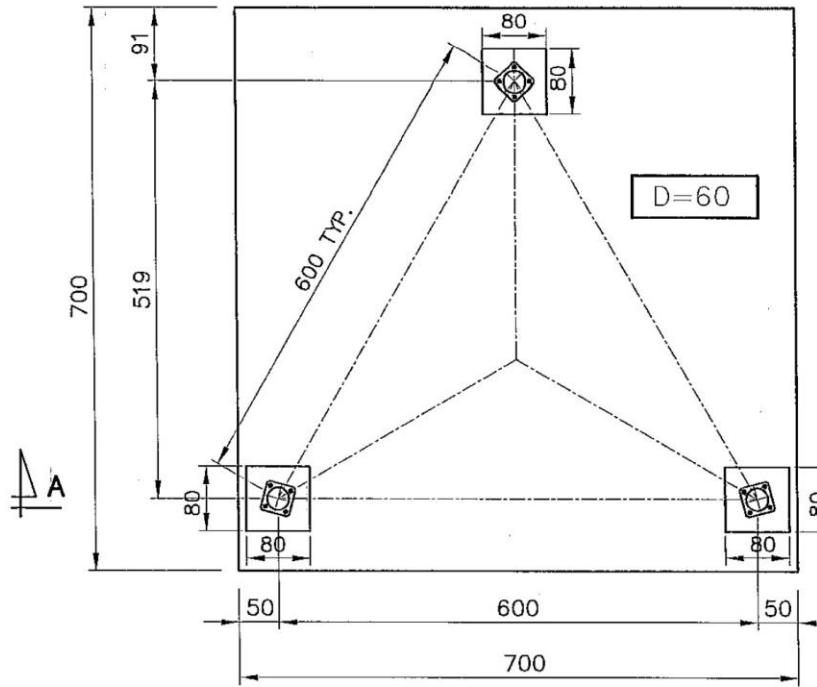


Figure 5-21. Cabinet Client Equipment - Pictorial

5.4.Tower Foundation



FLANGES CONNECTION TO ANCHOR BOLTS DETAIL

SCALE 1:10
ALL DIMENSIONS IN mm.

CONCRETE CASTING NOTES:

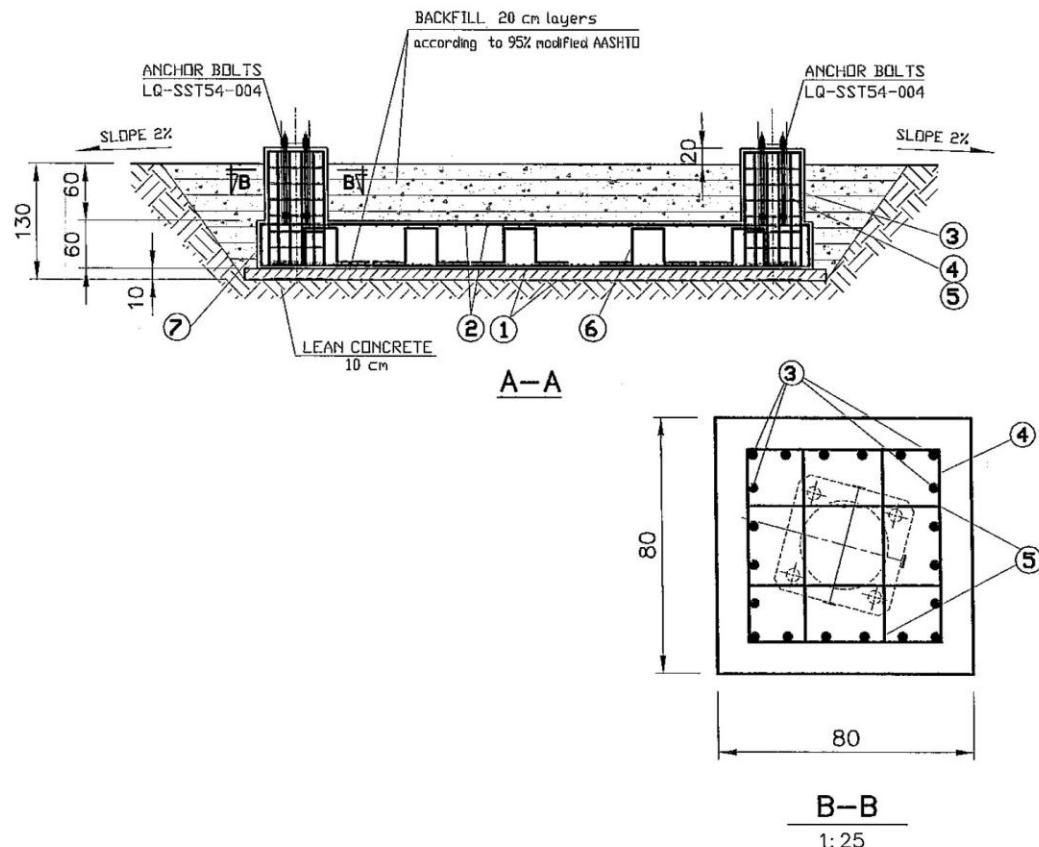
1. CONCRETE TYPE B-30. 5% SEDIMENTATION.
(AN EXAMINATION CERTIFICATE SHOULD BE PRODUCED BY AN AUTHORIZED INSTITUTE)
2. STEEL TYPE 6 ACCORDING TO CIRCS.
3. BOTTOM OF EXCAVATION SHOULD BE LEVELED.
4. THE FOUNDATION SHAPE AND DIMENSION SHOULD BE PRESERVED.
5. MINIMUM STEEL COVERING WILL BE - 5cm.
6. VIBRATING HAS TO BE PERFORMED ON THE FRESH CONCRETE.
7. CONCRETE CURING HAS TO BE DONE ACCORDING TO THE GENERAL SPECIFICATION FOR CONCRETE WORK.
8. ANCHOR BOLTS WILL BE SUPPLIED TO THE CONTRACTOR.
9. FOUNDATION CONSTRUCTION SHALL BE APPROVED BY THE DESIGNER.
10. ALL ANCHOR BOLTS PART OUTSIDE THE CONCRETE SHALL BE PROTECTED WHILE CASTING .

BOLTS NOTES:

11. EACH ANCHOR BOLT WILL BE SUPPLIED WITH 5 NUTS AND 2 WASHERS (60 NUTS AND 24 WASHERS)
12. STEEL TYPE ST-37
13. ANCHOR BOLTS TYPE SAE 1045, GALVANIZED.
14. THIS PLAN SHOULD BE READ WITH ALL RELEVANT SHEETS ATTACHED TO THIS PROJECT.

Figure 5-22. Tower Foundation - Upper View

FOUNDATION PLAN
54m HIGH TOWER



REINFORCEMENT STEEL LIST

REBAR NUMBER	REBAR DIAMETER	FORM	Q-TY	WEIGHT kg
①	horizontal TOP BAR Φ16@20; L=780	45 690 45	70	862
②	horizontal BOTTOM BAR Φ16@10; L=780	45 690 45	140	1723
③	V.BARS Φ16 L=190	65 125	60	180
④	STIRRUP REBARS Φ8@20; L=310	70 15 70	18	22
⑤	Φ8; L=100	15 70 15	72	28
⑥	SUPPORT BENCH Φ16; L=200	40 40 40	49	155
⑦	MIDDLE BAR Φ10; L=720	15 690 15	8	36
TOTAL				3006

CONCRETE VOLUME (m³)
31.0

Figure 5-23. Tower Foundation - Side View

5.5.Grounding

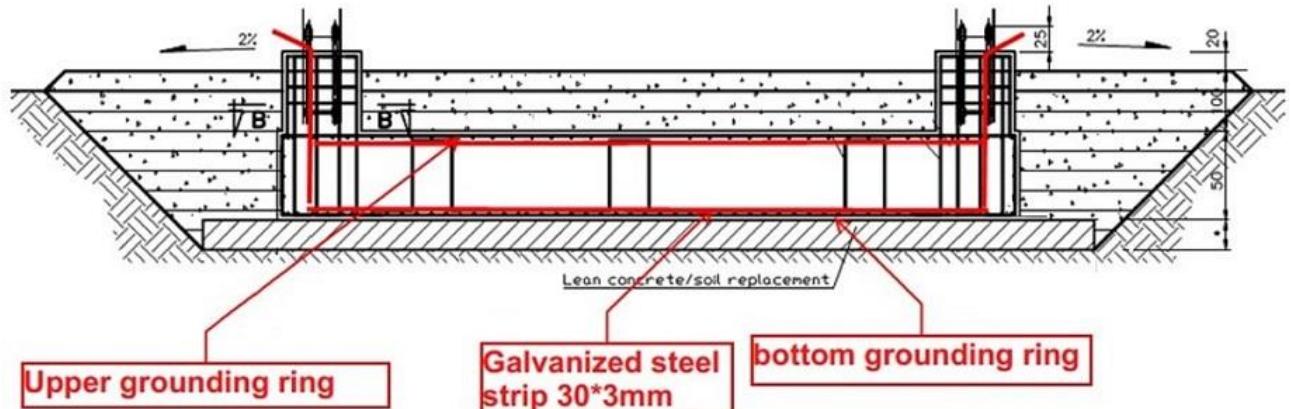


Figure 5-24. Principal Grounding of Tower - Side View

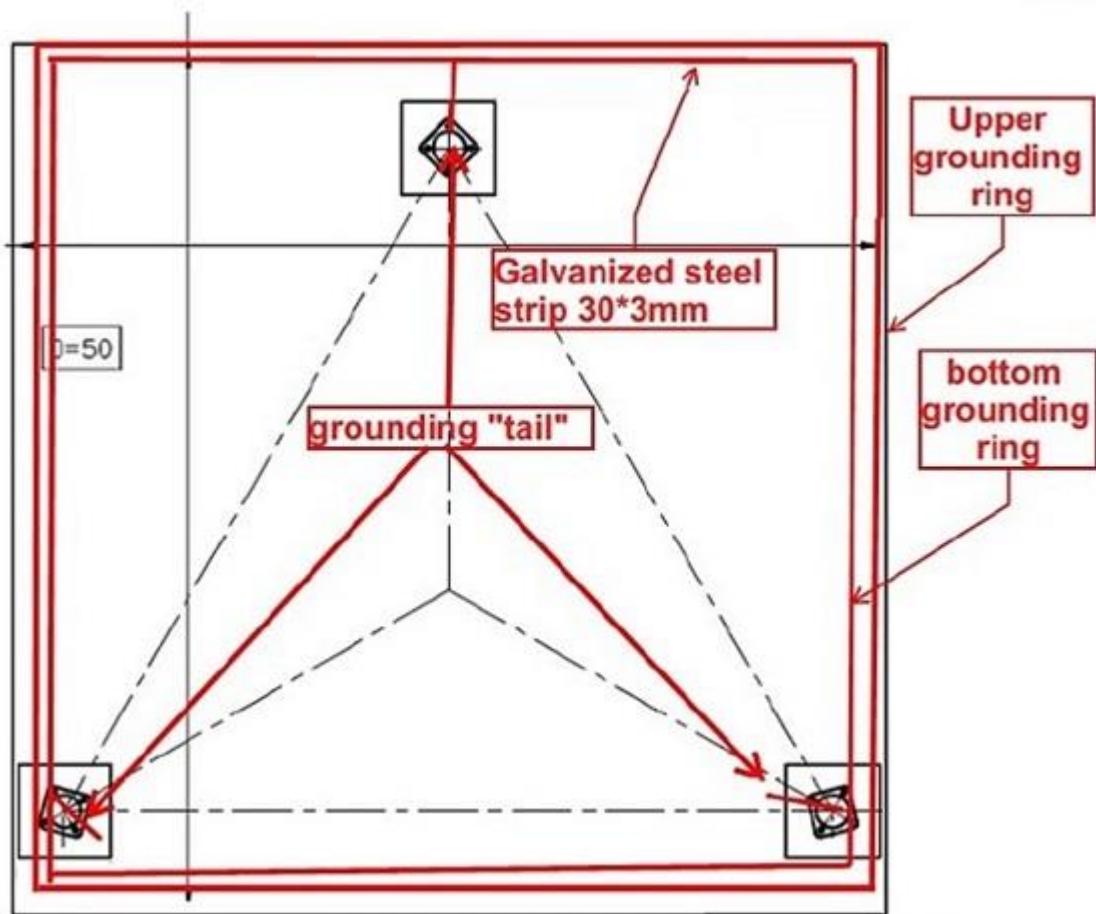


Figure 5-25. Principal Grounding of Tower - Upper View

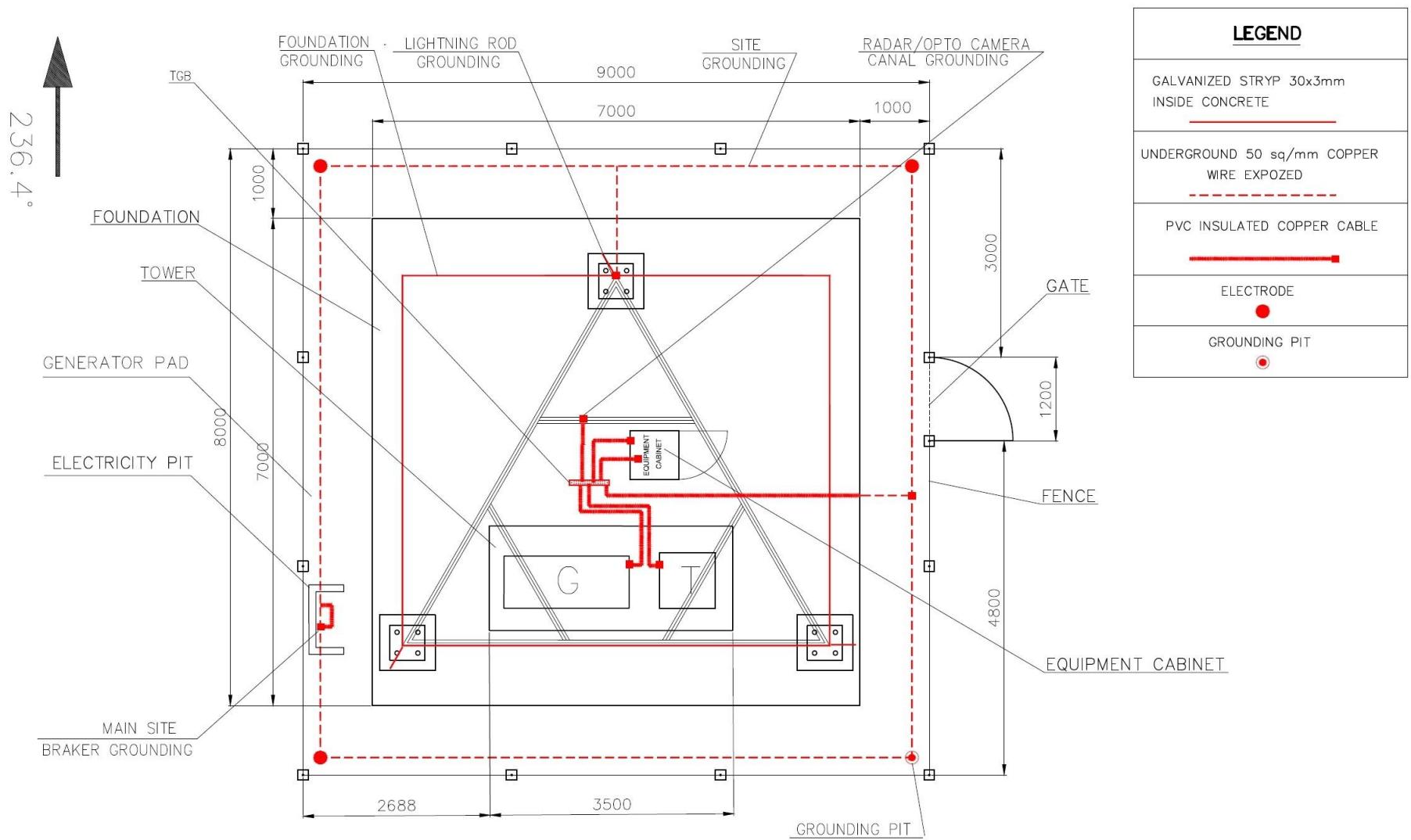


Figure 5-26. Site grounding



Figure 5-27. Site Grounding PIT



Figure 5-28. Main Circuit Breaker to Site Ground Connection



Figure 5-29. Site Fence Ground Connection

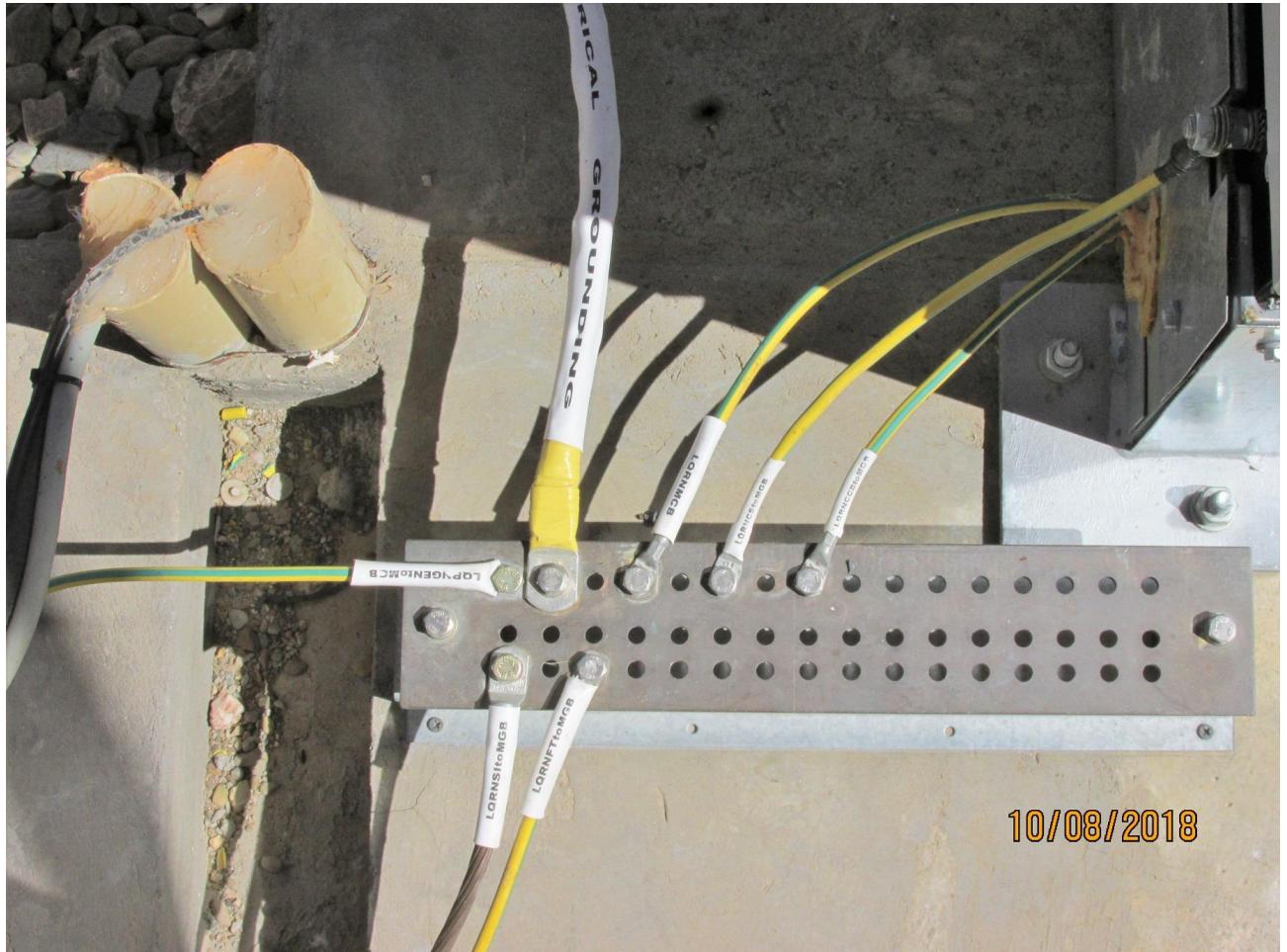


Figure 5-30. Main Ground Base - Connections



Figure 5-31. Tower Ground

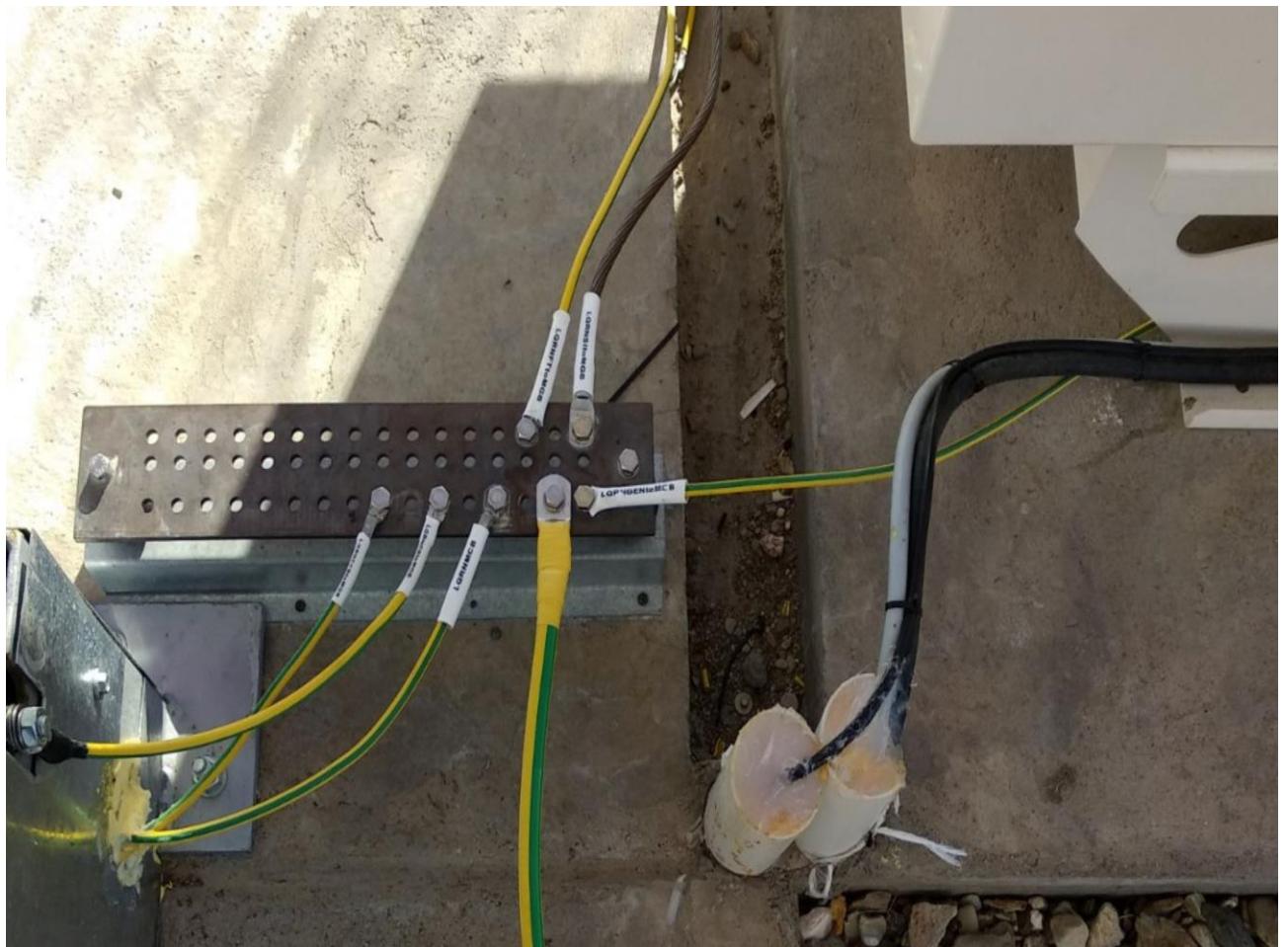


Figure 5-32. Generator Ground

5.6. Generator



Figure 5-33. Generator



Figure 5-34. Generator Enclosure

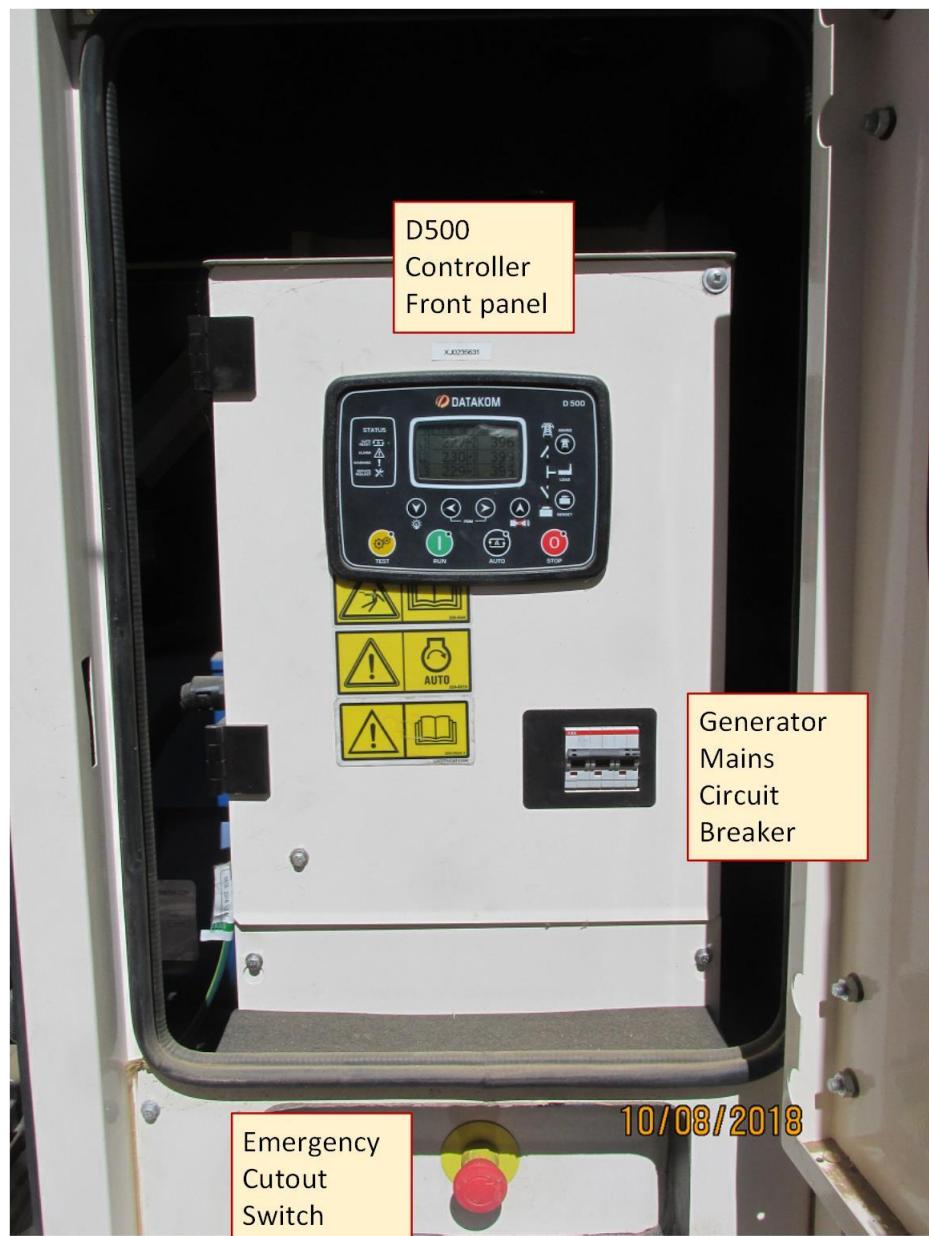


Figure 5-35. Generator Operation Panel – Front View

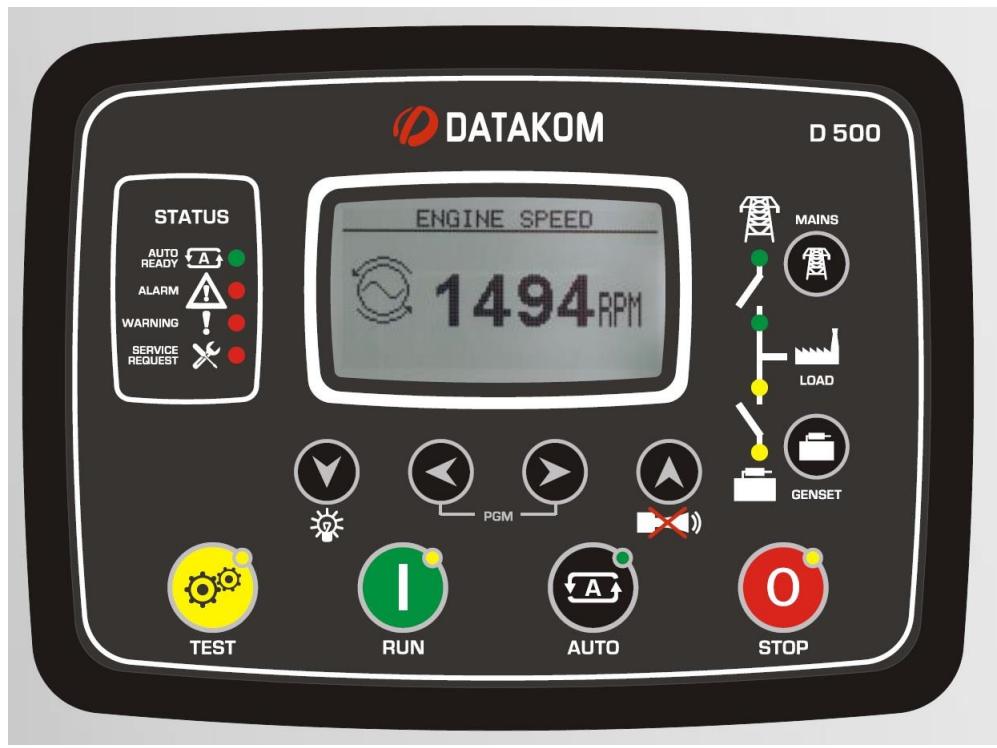
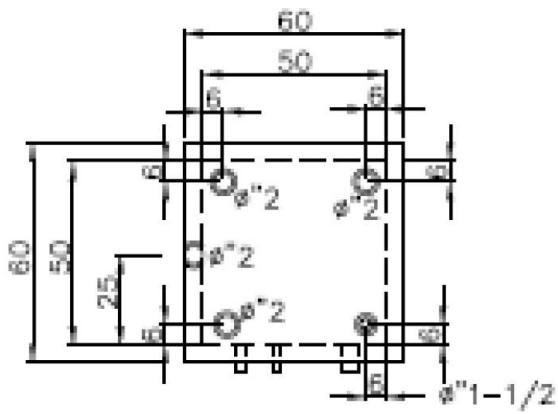


Figure 5-36. Generator operation panel – Web Based D500 Controller



FK-250 C – Fuel Tank	
Capacity	250 Liter
Dimension	1280 mm (Height) (Without Air Pipe)
	600 mm (Width)
	600 mm (Length)
Material thickness	3 mm

Figure 5-37. Generator fuel tank – isometric view



Air pipe for air circulation

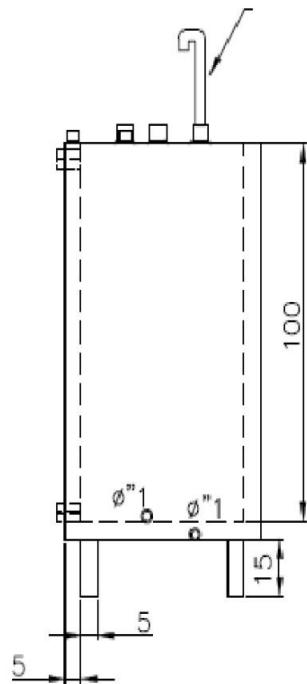
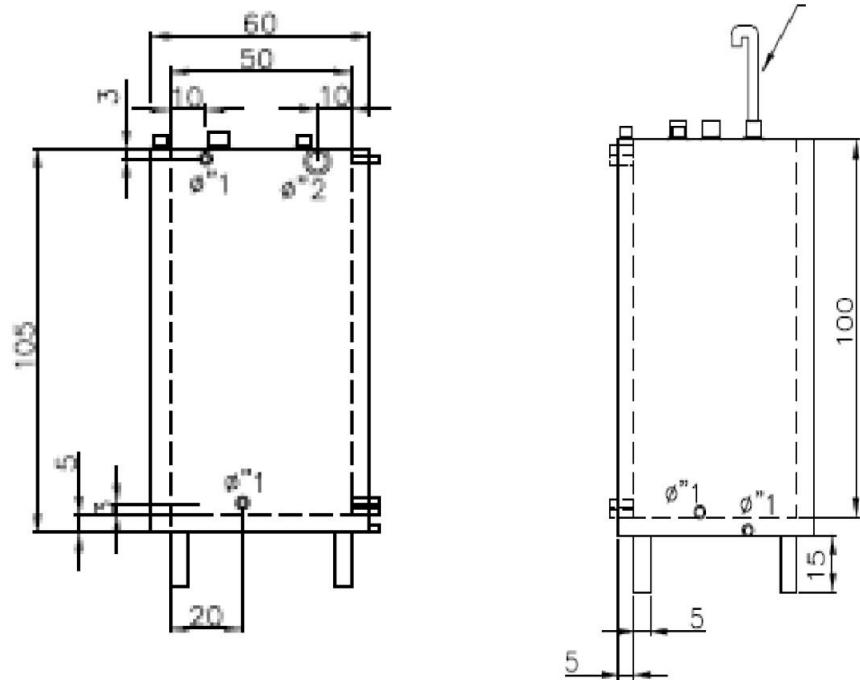


Figure 5-38. Generator fuel tank – outlines

5.7.Tower Accessories

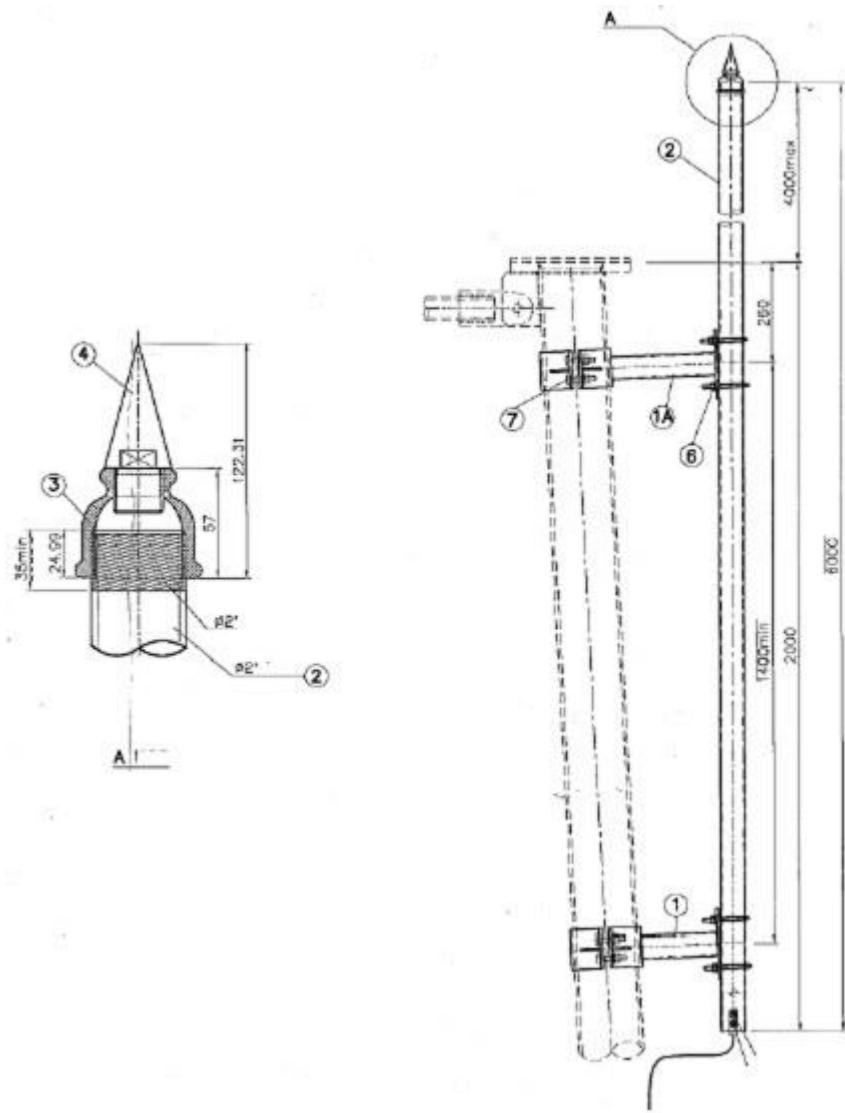


Figure 5-39. Lightning Arrestor – Generic Schematics

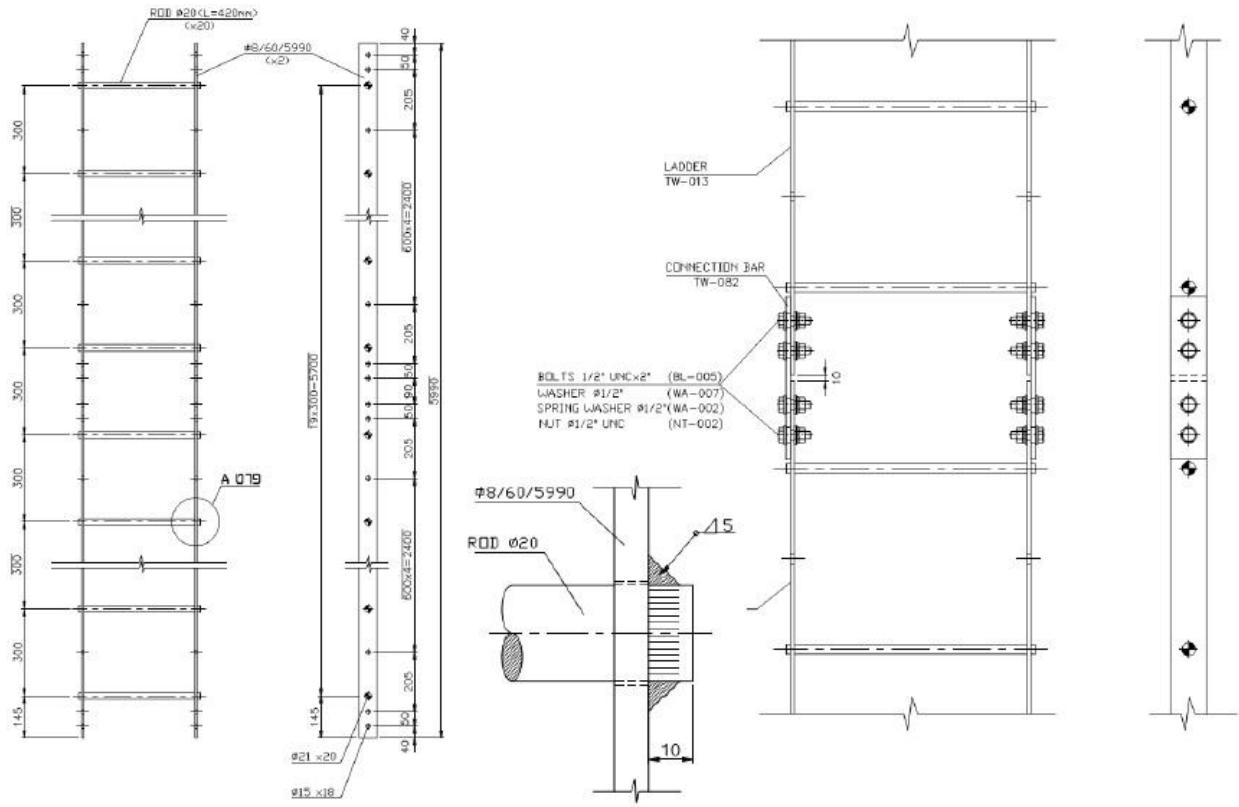


Figure 5-40. Climbing Ladder– Generic Schematics

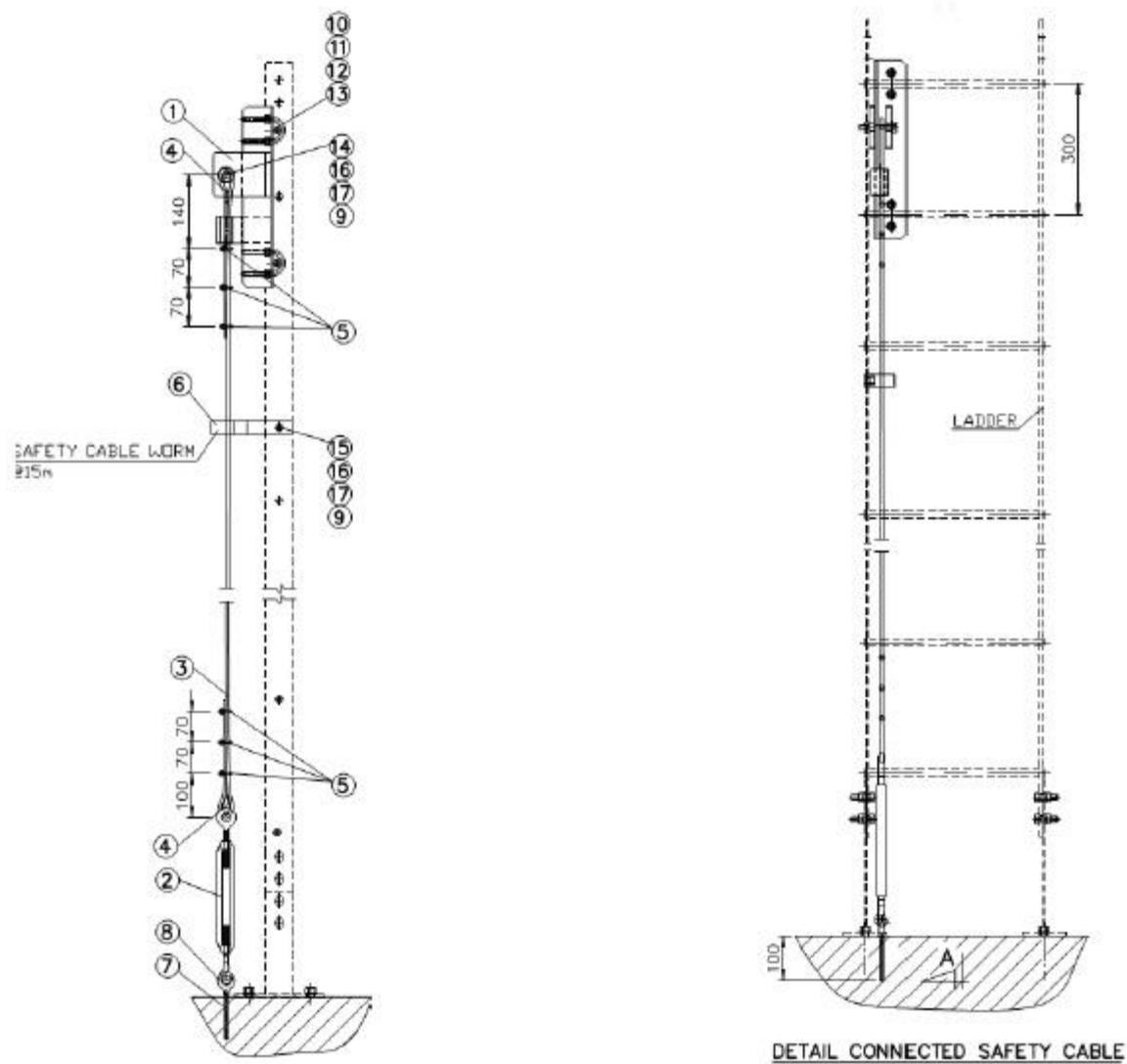


Figure 5-41. Climber Safety Kit – Generic Schematics



Figure 5-42. Aviation warning light

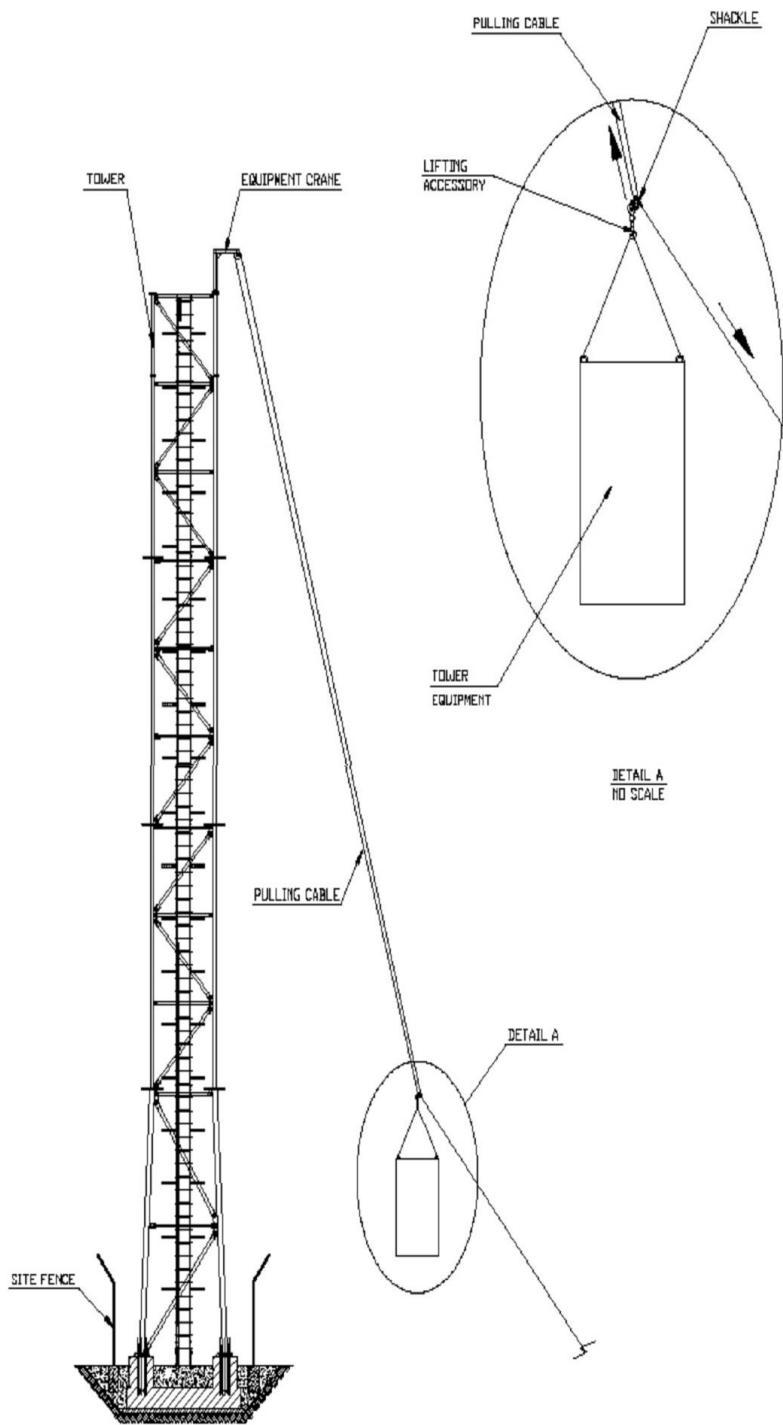


Figure 5-43. Equipment Lifting Device – Generic Illustration

6. SITE SCHEMATICS

6.1. Site Cabling Plan

Name	Cable Description	Cable Type
<i>Electricity Cables (LQPSXXX)</i>		
LQRNAWL	electricity cable between AWL and equipment cabinet	N2XY XLPE 3*2.5
LQRNREF	electricity cable between 100W Reflectors and equipment cabinet	N2XY XLPE 3*1.5
LQRNMCB	electricity cable between main circuit breaker and equipment cabinet	N2XY XLPE 3*10
LQRNGEN	electricity cable between generator and equipment cabinet	N2XY XLPE 3*10
LQRNGBAT	electricity cable between generator battery and equipment cabinet	N2XY XLPE 3*2.5
<i>Grounding Cables (LQPSXXtoXX)</i>		
LQRNFOUtoSI	grounding connection between the foundation grounding and the site grounding	50 sq\mm exposed copper cable
LQRNSItoMGB	grounding connection between the site grounding and the MGB	50 sq\mm exposed copper cable
LQRNLRtoFOU	grounding connection between the lightning rod and foundation grounding	95 mm PVC insulated copper cable
LQRNFTtoSI	grounding connection between the fuel tank and the MGB	50 sq\mm exposed copper

Name	Cable Description	Cable Type
		cable
LQRNGENtoSI	grounding connection between the generator and the MGB	50 sq\mm exposed copper cable
LQRNMCBtoSI	grounding connection between the main circuit braker and the site grounding	50 sq\mm exposed copper cable
LQRNCCBtoMGB	grounding connection between the cabinet circuit braker and the MGB	16 mm PVC insulated copper cable
LQRNCBtoMGB	grounding connection between the cabinet body and the MGB	50 sq\mm exposed copper cable
LQRNCStoMGB	grounding connection between the cabinet stand and the MGB	16 mm PVC insulated copper cable
Communication Cables (LQPSCOMXXX)		
LQPSCOMGS	ication cable between gate sensor and equipment cabinet	Communication cable 2*0.75
LQPSCOMGEN	Control cable between the generator and the equipment cabinet	Communication cable 12*1.5
Electricity and Communications Cables		
LQRNXXXXX	connection between XXXXX camera and equipment cabinet	
LQRNRADAR1	connection between Radar1 and equipment cabinet	
DLDL9	connection between Fdfdfdfd antenna and equipment cabinet	ODU-IDU w\RJ45 connectors

Name	Cable Description	Cable Type
DLDL10	connection between Fdfdfdfd antenna and equipment cabinet	ODU-IDU w\RJ45 connectors
DLP2M7	connection between Fdfdfdfd Point To Multi Point antenna and equipment cabinet	ODU-IDU w\RJ45 connectors
DLP2M8	connection between Fdfdfdfd Point To Multi Point antenna and equipment cabinet	ODU-IDU w\RJ45 connectors
DLP2M9	connection between Fdfdfdfd Point To Multi Point antenna and equipment cabinet	ODU-IDU w\RJ45 connectors
LQRNCCTV1	connection between CCTV camera 1 and equipment cabinet	FTP cable CAT. 5E exterior
LQRNCCTV2	connection between CCTV camera 2 and equipment cabinet	FTP cable CAT. 5E exterior
LQRNCCTV3	connection between CCTV camera 3 and equipment cabinet	FTP cable CAT. 5E exterior

6.2.Cables Specification

6.2.1. Xxxs 24VDC Input Cable

6.2.2. Xxxxxx Ethernet Cable

6.2.3. XXXXX Main System External Cable

6.2.4. XXXXX Cabinet Internal Cable

7. CABINET ELECTRICAL DRAWINGS

7.1. Interconnection

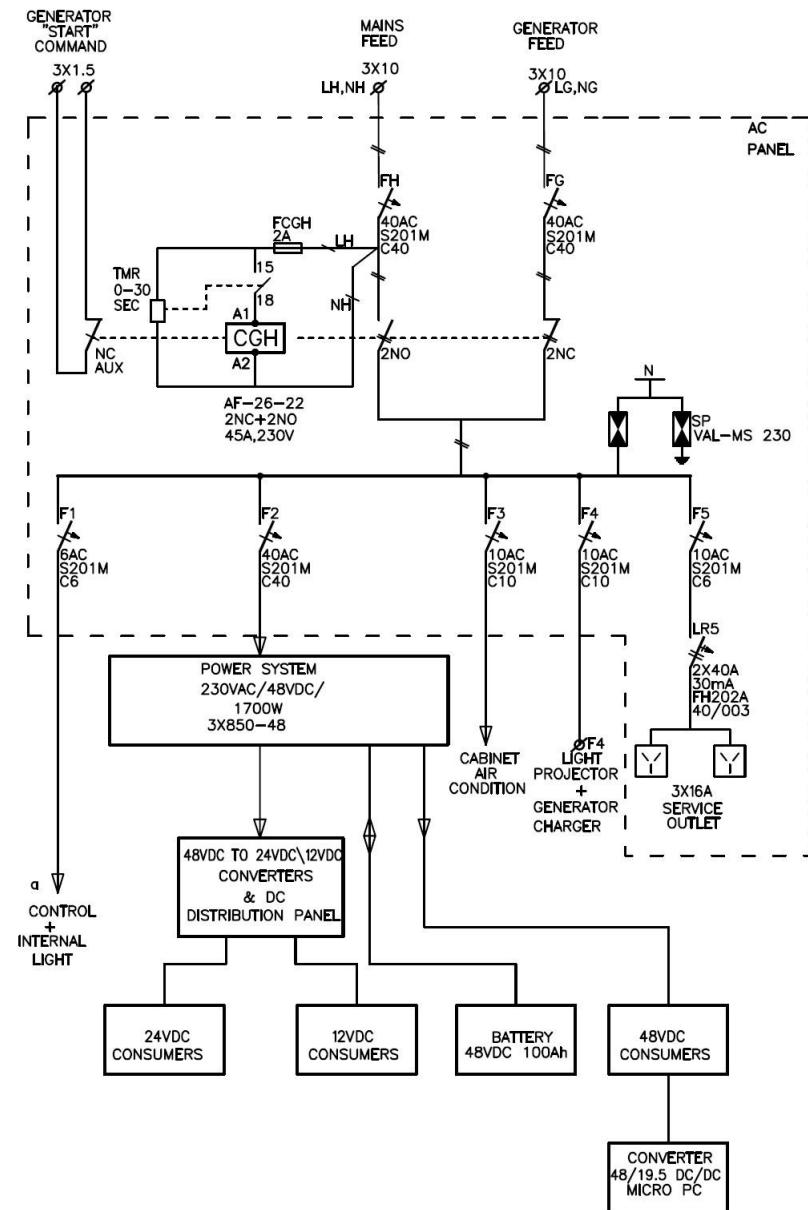


Figure 7-1. Cabinet Electrical Diagram

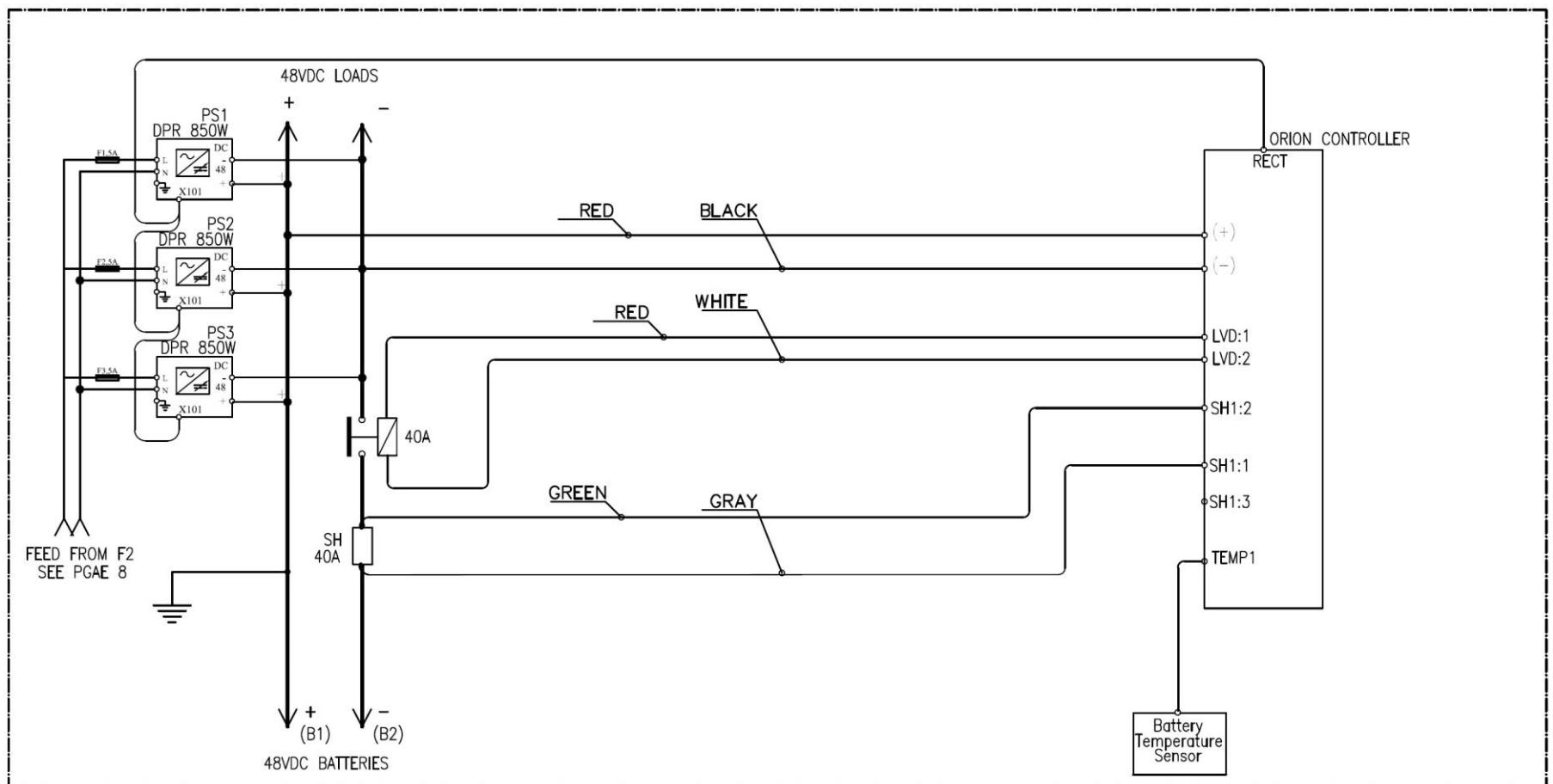


Figure 7-2. AC/DC Shelf Electrical Diagram

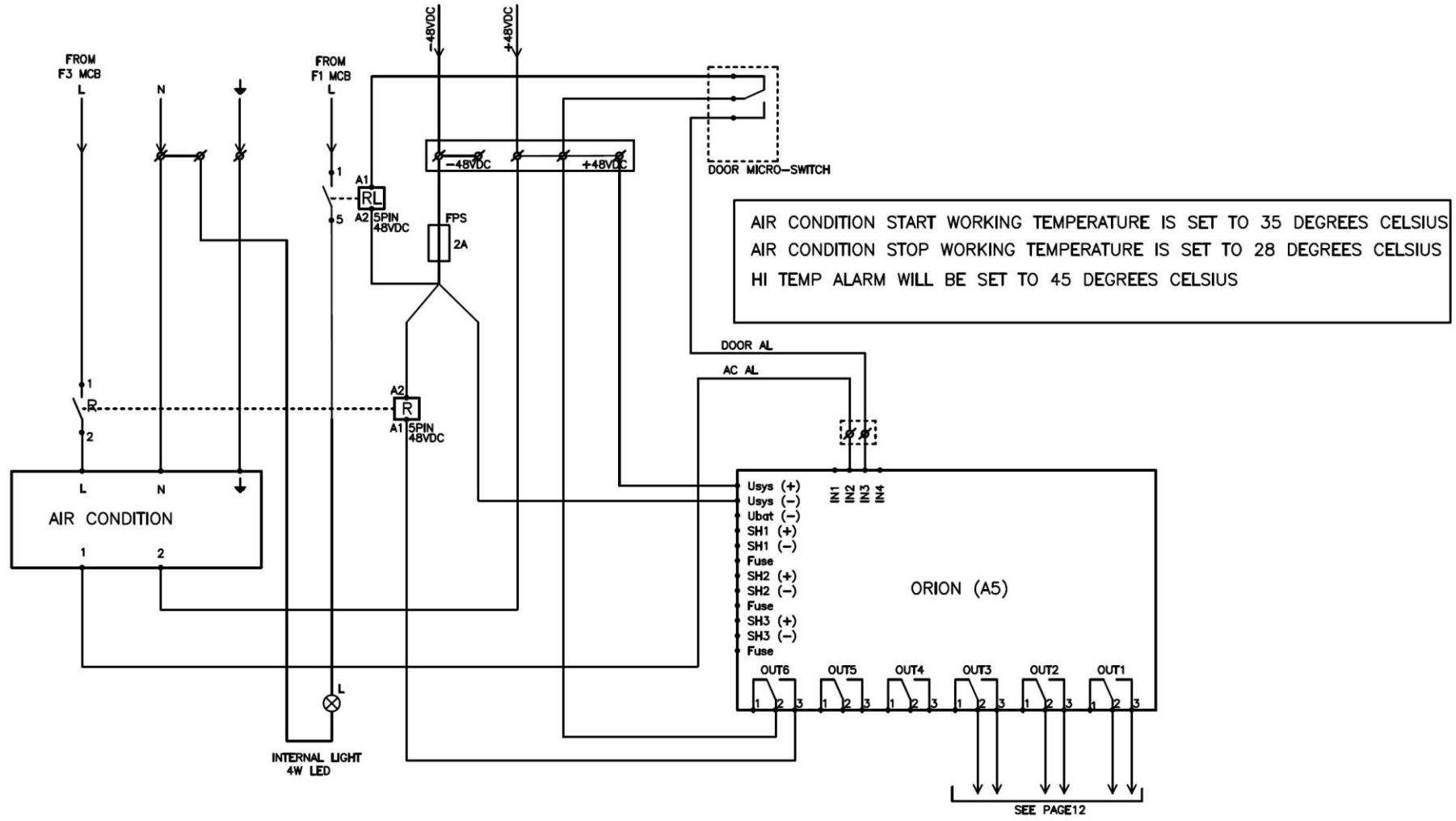


Figure 7-3. Cabinet Control Diagram

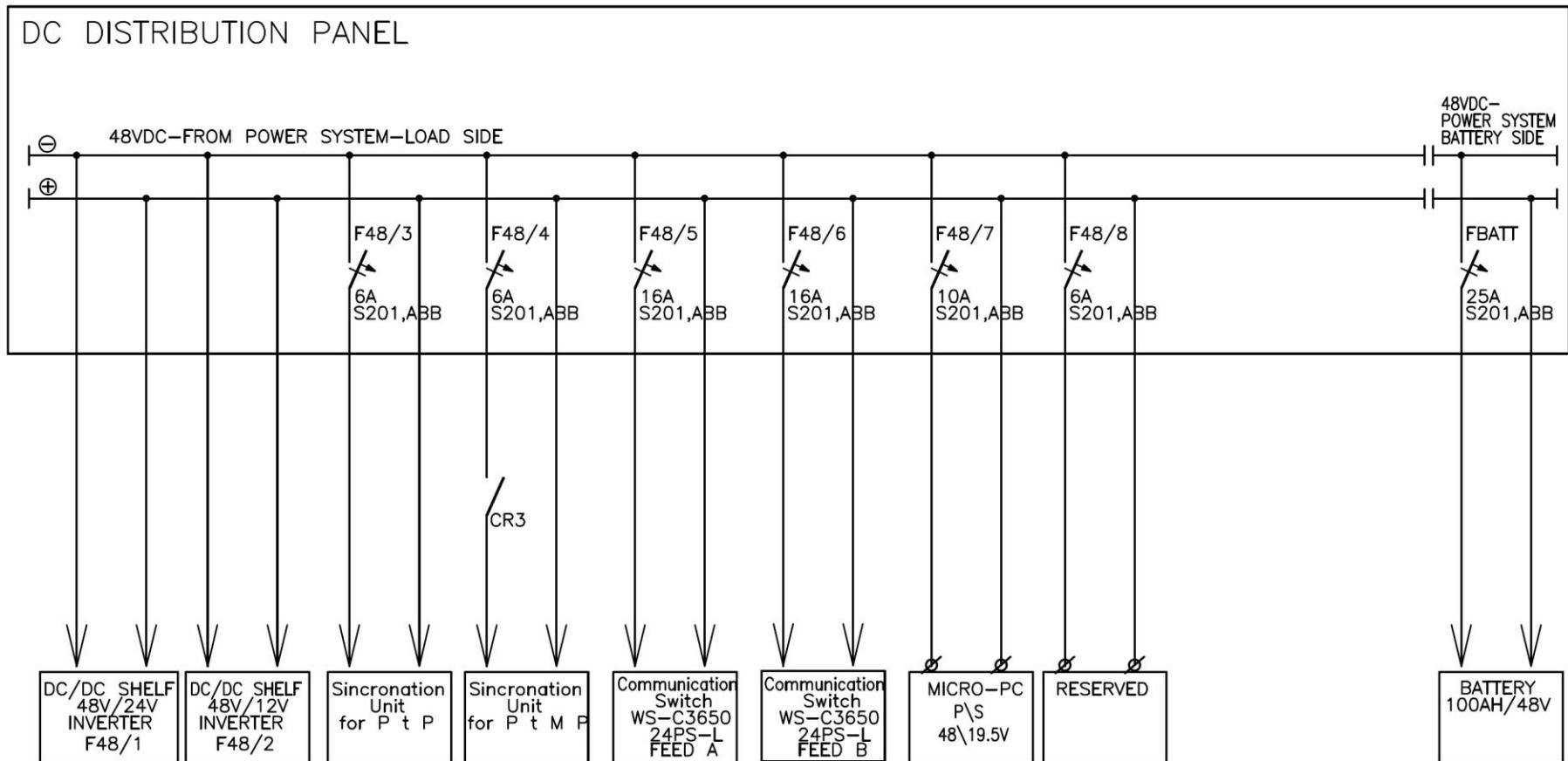


Figure 7-4. Cabinet 48VDC Feed

ORION
CONTROLLER

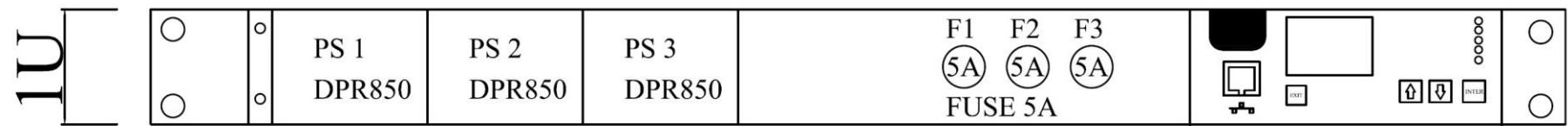


Figure 7-5. 48VDC Power System Shelf Panel

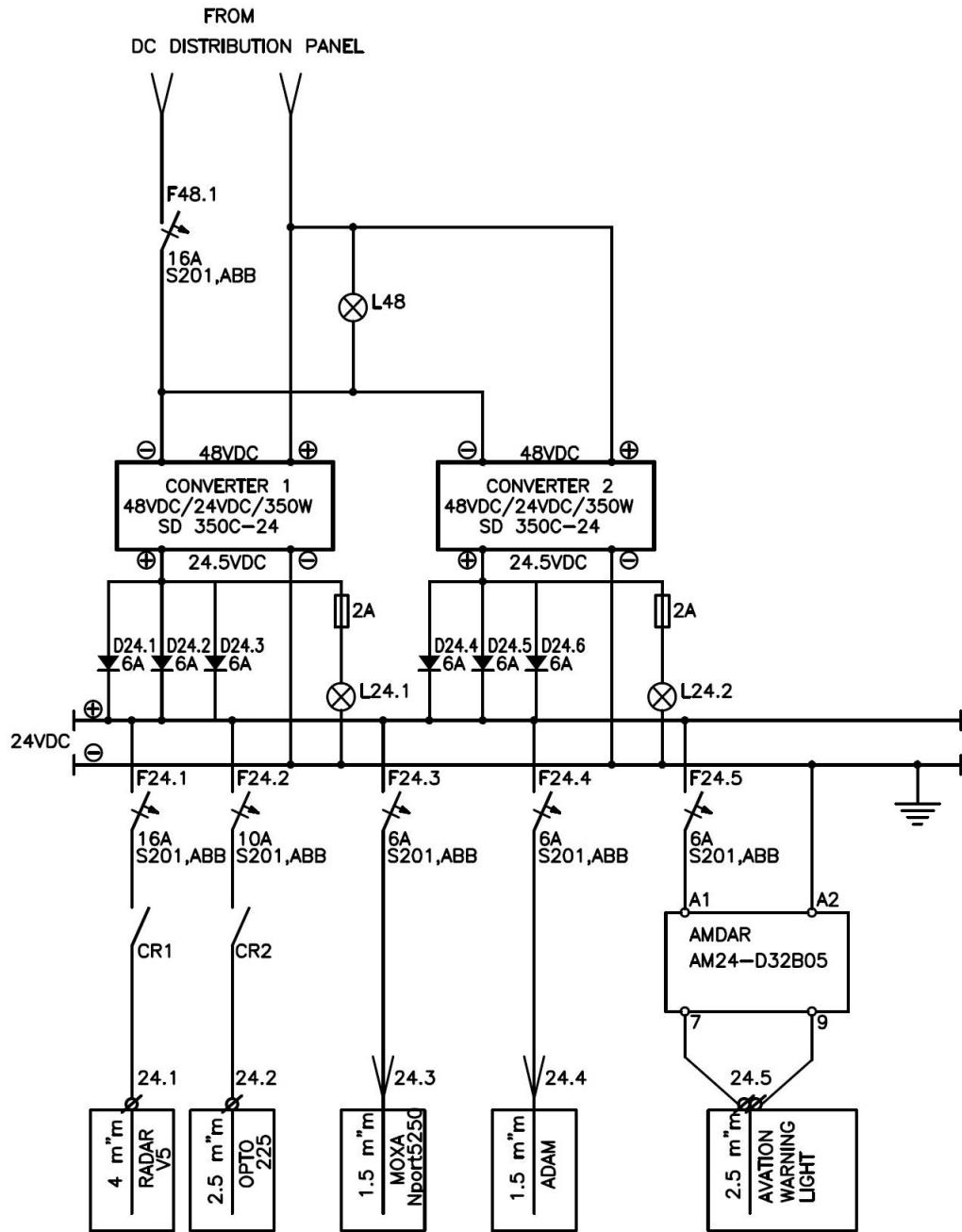


Figure 7-6. Cabinet 24VDC Supply Diagram

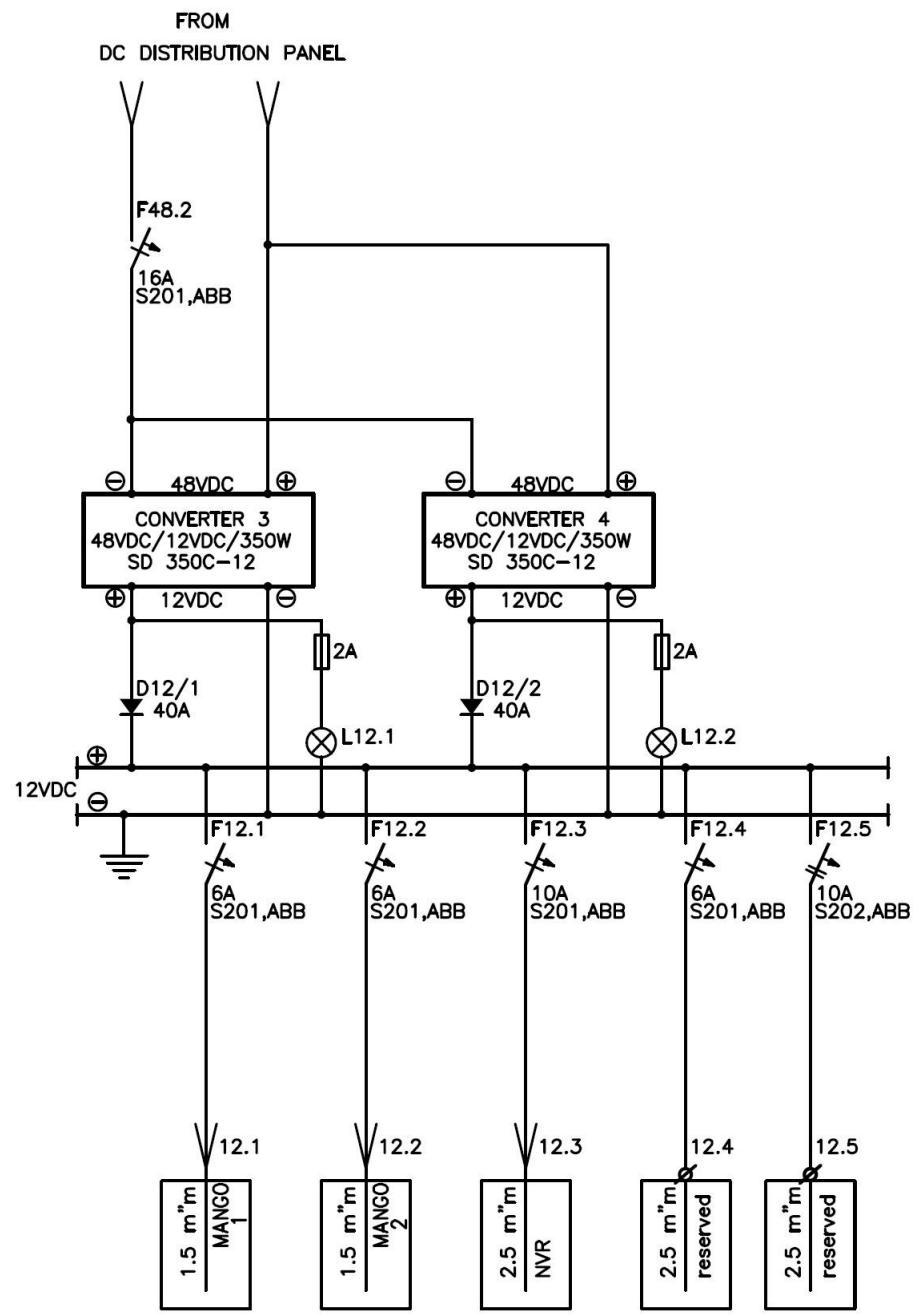


Figure 7-7. Cabinet 12VDC supply diagram

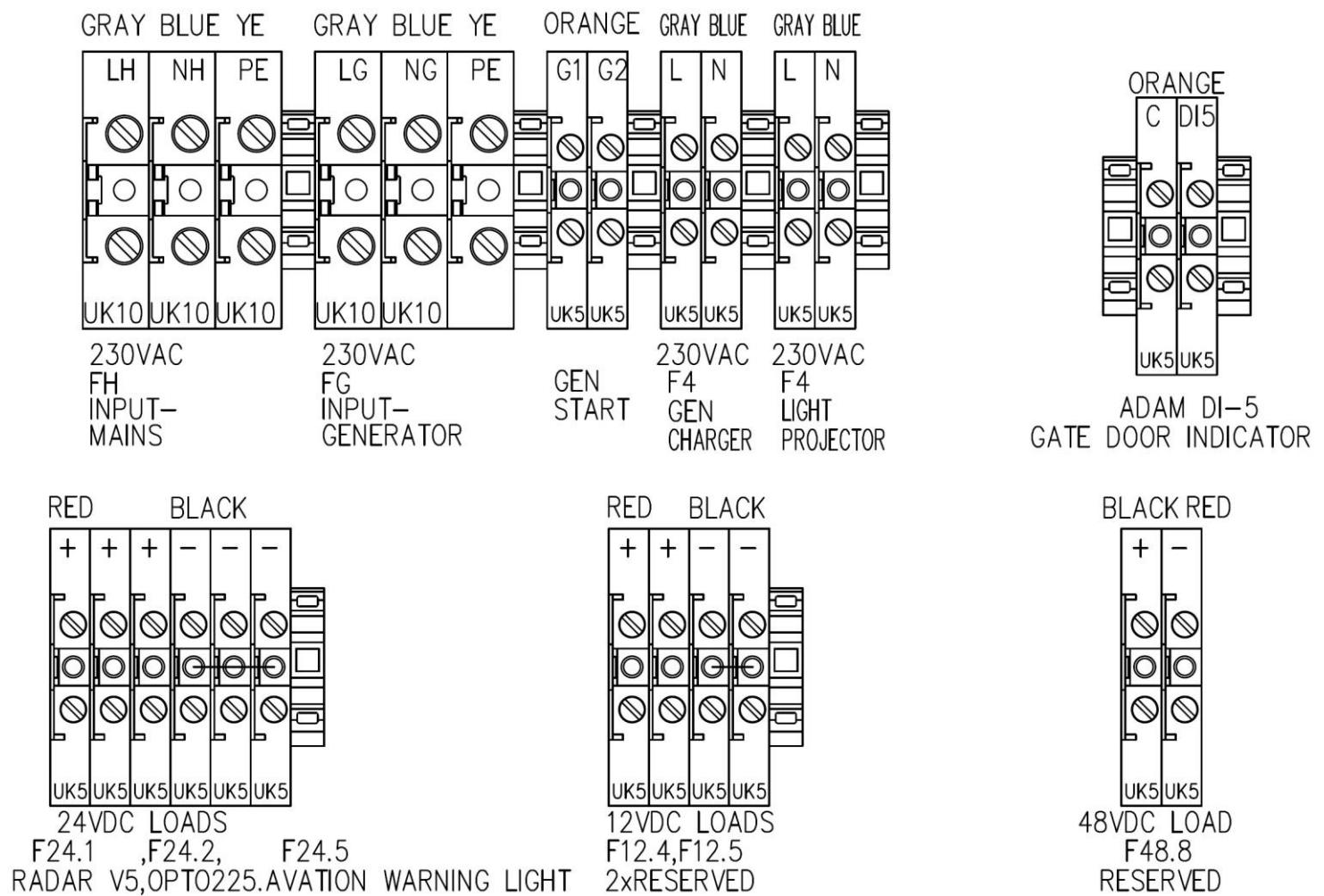


Figure 7-8. Cabinet Terminal Block

7.2. IP Address Mapping

Figure 7-9. Cabinet IP mapping

8. TROUBLESHOOTING

8.1. Site start operation with ADAM module procedure

8.1.1. Purpose

Each site DC supply is controlled and monitored with mobile devices by Peer-to-Peer control ability with use of ADAM 6066 module.

ADAM 6066 is a 6-ch Digital Input and 6-ch Power Relay Modbus TCP Module installed in the Client shelf of the cabinet.

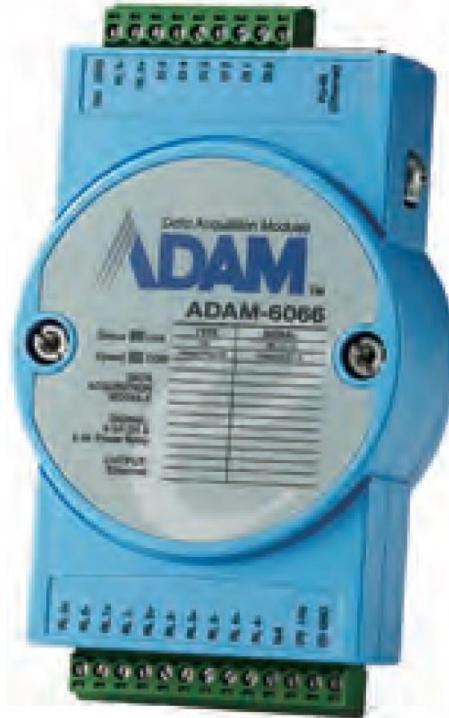


Figure 8-1. ADAM control unit – pictorial view

In the site – the ADAM device controls and monitors the Sensors Voltage status, the current status on each sensor (channel) of I/O module.

Value of digital I/O modules can be "0" (OFF) or "1" (ON).

Electrical connection of the ADAM module in the cabinet is illustrated in Figure 8-2.

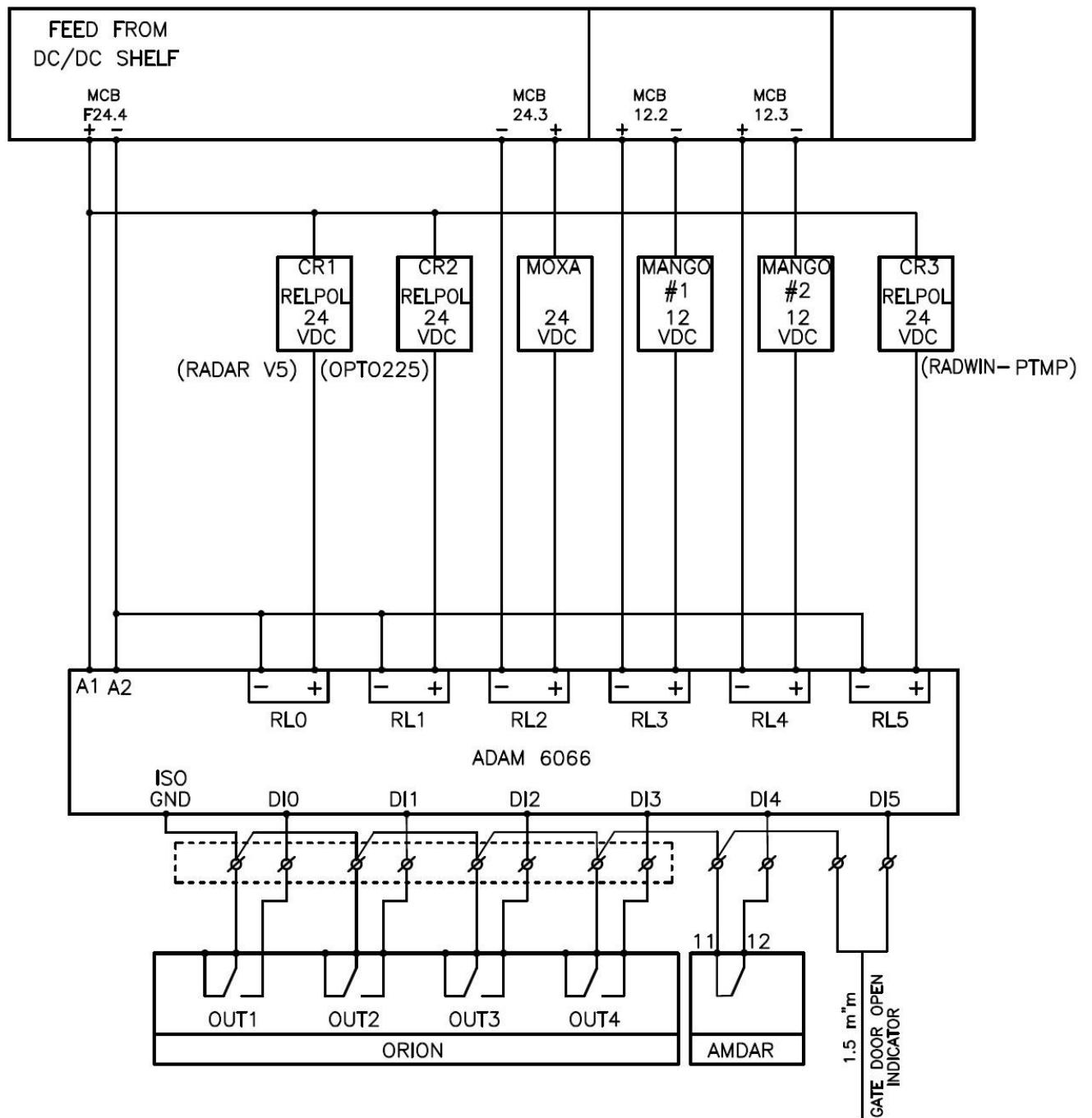


Figure 8-2. ADAM Control Circuitry

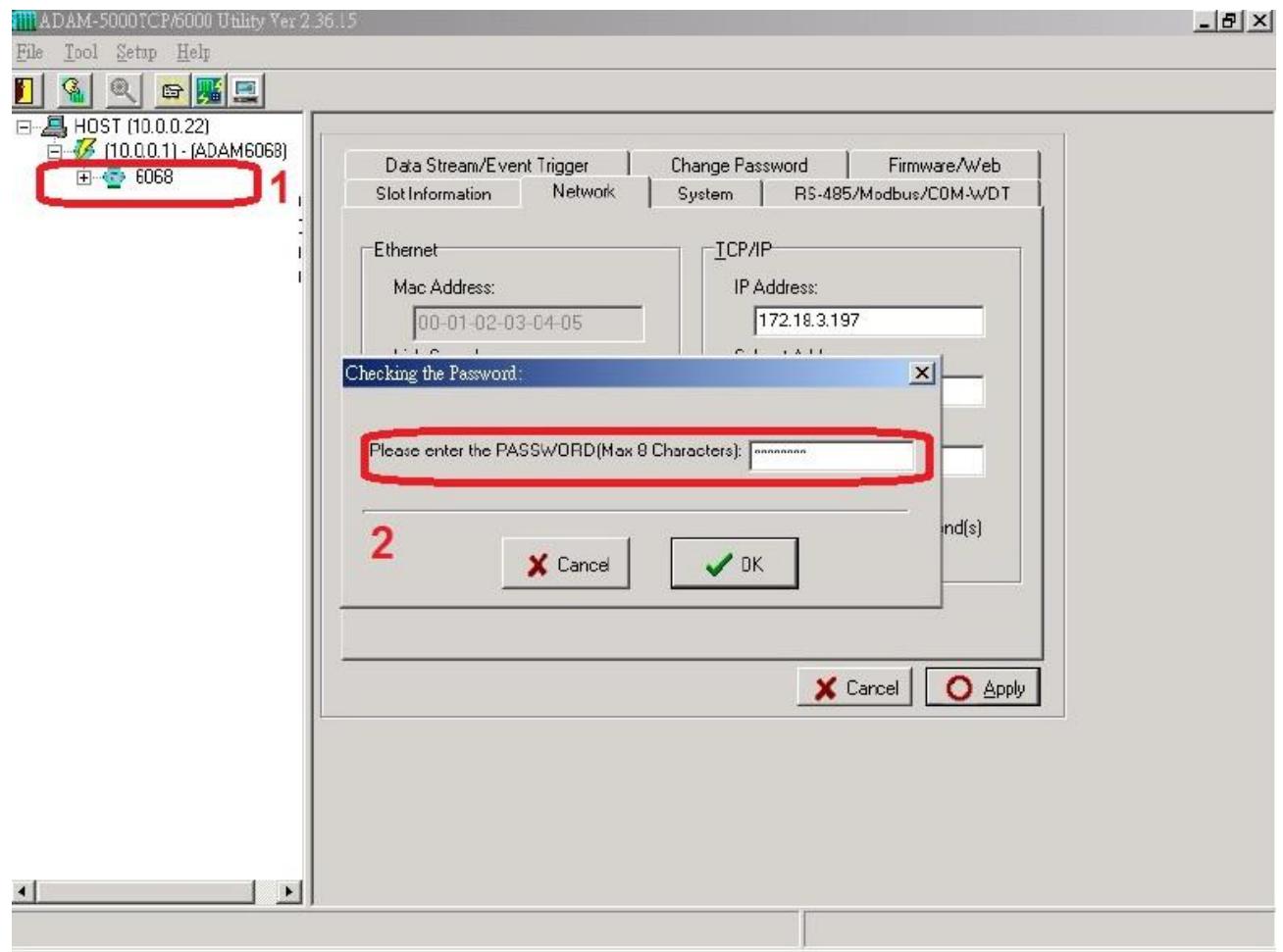
8.1.2. ADAM Operation on Site

Required equipment:

Item	Description
Monitor	With VGA Connection
Keyboard	USB Connection
Mouse	USB Connection

- a. Verify all necessary circuit breakers are switched ON: such as Micro Computer, ADAM, Radar's, Camera, Moxa, Mango etc. (refer to Figure 7-9)
- b. Connect Monitor, keyboard and the Mouse to cabinet Microcomputer
- c. Turn on microcomputer
- d. Click on Adam Icon (located on Desktop):  ADAM-5000TCP-6000 Utility

Verify the following display:

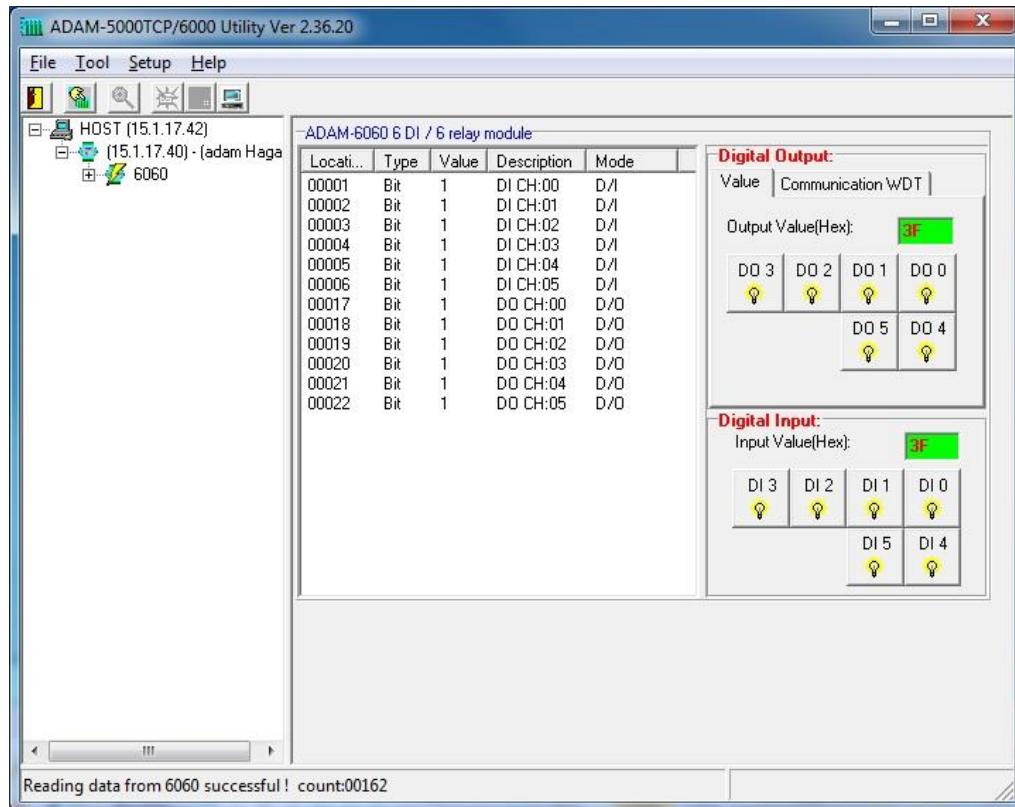


NOTE

The default password of ADAM is "00000000".

- e. Choose Adam device (1) and insert password (2)

Verify the following display:



Each site sensors are displayed in its own partition, the RADIO NACIONAL site is allocated As follows:

Item	Device
DO 0	Radar
DO 1	XXXXX Camera
DO 2	Moxa
DO 3	Mango1
DO 4	Mango2
DO 5	Fdfdfdfd PTMP

Display indicators legend:

1. **Low Byte Value** – for all the sensors
 - Yellow lamp - Voltage **ON**
 - White lamp - Voltage **OFF**
2. **High Byte Value** - other equipment in the site is allocated as follows:

Item	Device
DI 0	Cabinet Door open/close
DI 1	No AC feed
DI 2	High Temp
DI 3	Low DC Voltage
DI 4	Aviation Warning Light
DI 5	Gate Door open

8.2. Generator Troubleshooting Guide

Below is a basic list of most often encountered troubles. More detailed investigation may be required in some cases.

Problem	Possible Solution
The genset operates while AC mains are OK or continues to operate after AC mains are OK:	<ol style="list-style-type: none">1 Check engine body grounding.2 AC mains voltages may be outside programmed limits, measure the phase voltages.3 Check the AC voltage readings on the screen.4 Upper and lower limits of the mains voltages may be too tight. Check the parameters Mains5 Voltage Low Limit and Mains Voltage High Limit. Standard values are 170/270 volts.6 The hysteresis voltage may be given to excessive. The standard value is 8 volts.
AC voltages or frequency displayed on the unit are not correct	<ol style="list-style-type: none">1 Check engine body grounding, it is necessary.2 The error margin of the unit is +/- 2 volts.3 If there are faulty measurements only when the engine is running, there may be a faulty charging alternator or voltage regulator on the engine. Disconnect the charging alternator connection of the engine and check if the error is removed.4 If there are faulty measurements only when mains are present, then the battery charger may be failed. Turn off the rectifier fuse and check again.
KW and cosΦ readings are faulty although the Amp readings are correct	Current transformers are not connected to the correct inputs or some of the CTs are connected with reverse

Problem	Possible Solution
	<p>polarity.</p> <p>Determine the correct connections of each individual CT in order to obtain correct KW and cosΦ for the related phase, and then connect all CTs.</p>
WARNING	
<i>Short circuit outputs of unused Current Transformers!</i>	
<p>When the AC mains fails the unit energizes the fuel solenoid but does not start and OIL PRESSURE EXISTS! message is displayed:</p> <p>The unit is not supplied with battery (-) voltage at the oil pressure input.</p>	<ol style="list-style-type: none"> 1 Oil pressure switch not connected. 2 Oil pressure switch connection wire cut. 3 Oil pressure switch faulty. 4 Oil pressure switch closes too lately. If oil pressure switch closes, the unit will start. Optionally oil pressure switch may be replaced
<p>The engine does not run after the first start attempts, then the unit does not start again and OIL PRESSURE EXISTS! message is displayed</p>	<p>The oil pressure switch closes very lately. As the unit senses an oil pressure, it does not start. When oil pressure switch closes the unit will start. Optionally the oil pressure switch may be replaced.</p>

Problem	Possible Solution
When the AC mains fails, the engine starts to run but the unit gives START FAIL alarm and then the engine stops	<p>The generator phase voltages are not connected to the unit.</p> <p>Measure the AC voltage between terminals GEN L1-L2-L3 and Generator Neutral at the rear of the unit while the engine is running.</p> <p>A fuse protecting the generator phases may be failed.</p> <p>A misconnection may be occurred. If everything is OK,</p> <p>turn all the fuses off, and then turn all the fuses on, starting from the DC supply fuse.</p> <p>Then test the unit again.</p>
The unit is late to remove engine cranking	<ol style="list-style-type: none"> 1 The generator voltage rises lately. Also, the generator remnant voltage is below 15 volts. The unit removes starting with the generator frequency, and needs at least 15 volts to measure the frequency 2 The unit is also able to cut cranking from charge alternator voltage and oil pressure input.
The unit is inoperative	<p>Measure the DC-supply voltage between terminals BAT+ and BAT- at the rear of the unit. If OK, turn all fuses off, then turn all the fuses on, starting from the DC supply fuse. Then test the unit again.</p> <p>Measure the DC-supply voltage between terminals BAT+ and BAT- at the rear of the unit. If OK, turn all fuses off, then turn all the fuses on, starting from the DC supply fuse. Then test the unit again.</p>

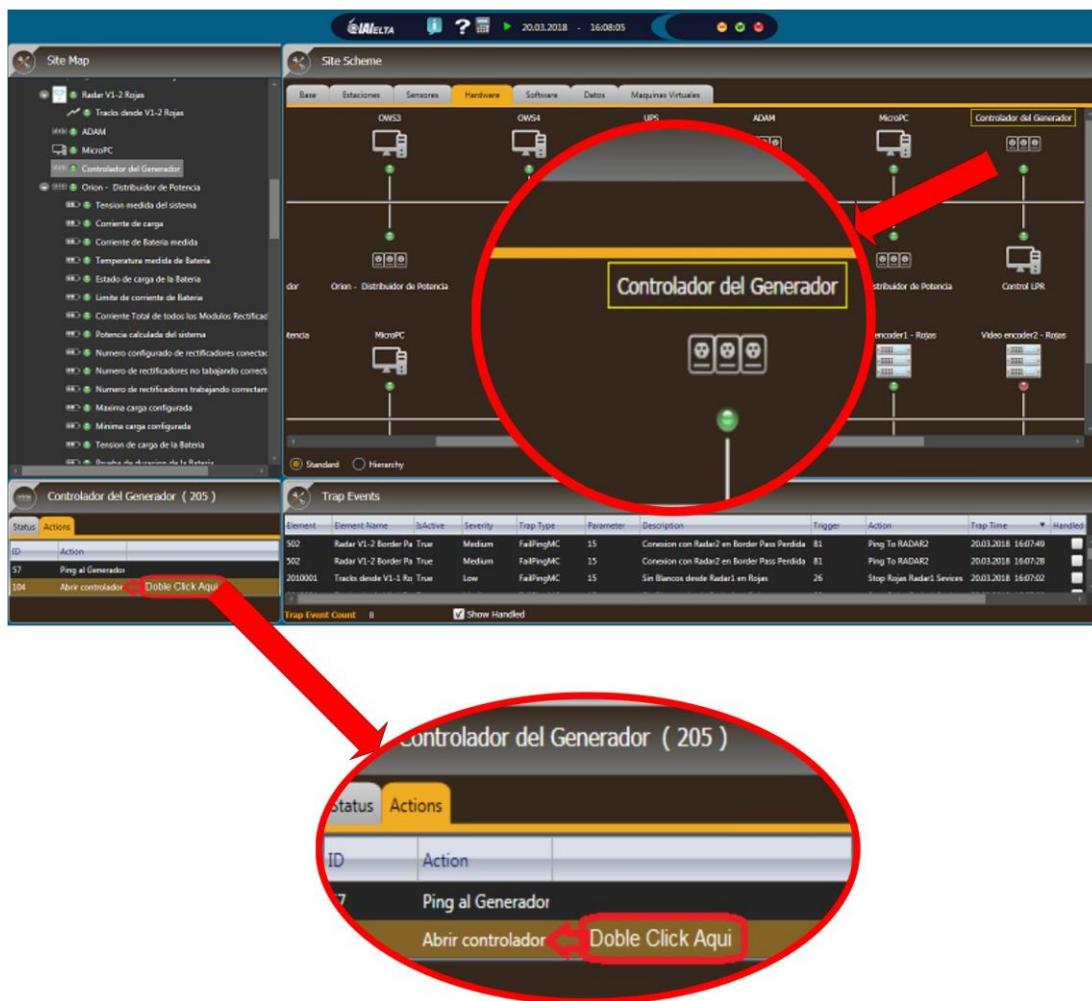
Problem	Possible Solution
Programming mode cannot be entered	The program lock input disables programming mode entry. Disconnect the program lock input from battery negative before modification. Do not forget to make this connection again to prevent unauthorized program modifications.
Some program parameters are skipped	These parameters are reserved for factory setting and cannot be modified.
AUTO led flashes and the genset does not run when mains fail	<p>The unit is in Weekly Schedule OFF time.</p> <p>Please check date and time setting of the unit.</p> <p>Please check also Weekly Schedule program parameters.</p>
The genset runs but does not take the load	<ol style="list-style-type: none"> 1 Check that the genset Yellow led is on steadily. Adjust genset voltage and frequency limits if necessary. 2 Check that the digital output-8 is configured as "Genset Contactor" 3 Check "Genset Contactor Timer" program parameter. 4 Check that a Genset Loading Inhibit input signal is not active 5 Check input functions. If an input is configured as "Genset Loading Inhibit" then check the signal is not present at this input.

8.3. Generator Alarms

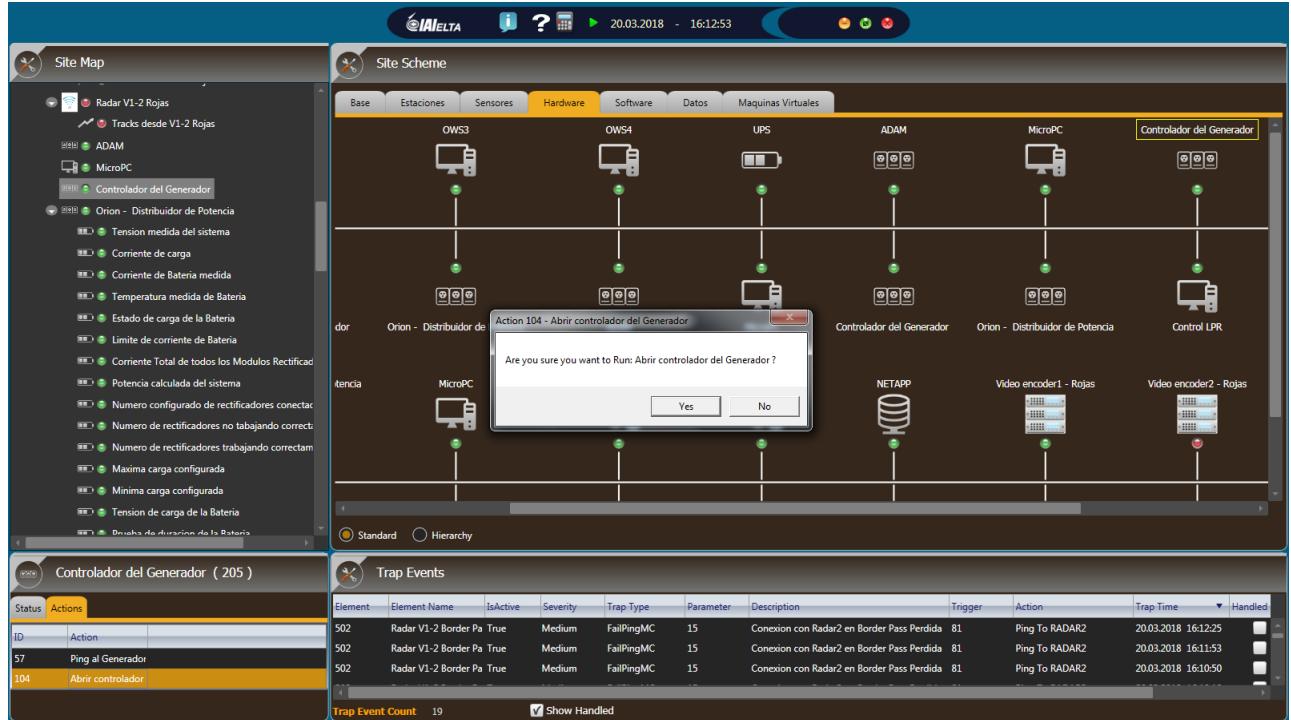
Readout of faults and alarms are accessible in the AMS application when the specified Generator icon is selected. This action should be activated in the event of System Fault message in the operation screen display.

The process is to be executed as follows:

- a. Go to the site AMS application and select the **HARDWARE** tab followed by keying the **Generator Controller** icon. Verify the opening screen:



- b. Confirm the function to open the next screen:

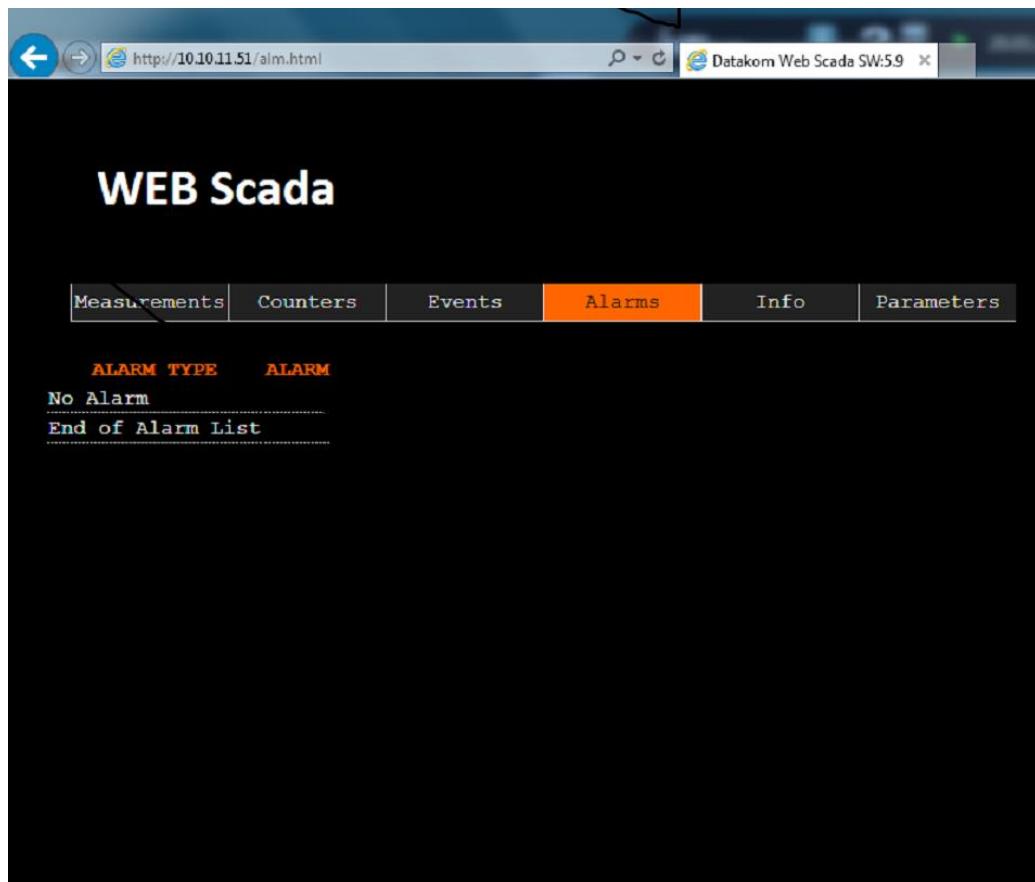


c. Main screen opens:

The screenshot shows the Datakom Web Scada SW:5.9 interface. At the top, there's a browser header with the URL <http://10.10.11.51/>. Below it is a graphical representation of a power system with components like a generator, switchgear, and load. The main title is "WEB Scada".

Measurements	Counters	Events	Alarms	Info	Parameters
MAIN					
L1 Volt	0 V	L1 Volt	0 V	Speed	0 Rpm
L2 Volt	0 V	L2 Volt	0 V	Run Hours	000091.7 h
L3 Volt	0 V	L3 Volt	0 V	Fuel Level	--- %
L12 Volt	0 V	L12 Volt	0 V	Engine Temp	154.4 °F
L23 Volt	0 V	L23 Volt	0 V	L31 Volt	68 °C
L31 Volt	0 V	L31 Volt	0 V	L1 Amps	--- °F
L1 Amps	0 A	L1 Amps	0 A	L2 Amps	--- °C
L2 Amps	0 A	L2 Amps	0 A	L3 Amps	133.4 Psi
L3 Amps	0 A	L3 Amps	0 A	Tot kW	9.2 Bar
Tot kW	0 kW	Tot kW	0 kW	Tot kVAR	--- °F
Tot kVAR	0 kVAR	Tot kVAR	0 kVAR	Tot kVA	--- °C
Tot kVA	0 kVA	Tot kVA	0 kVA	PowFactor	13.4 Vdc
PowFactor	1.00 ind	PowFactor	1.00 ind	Frequency	Charge Inp
Frequency	0.0 Hz	Frequency	0.0 Hz		0.0 Vdc

d. Go to ALARMS screen display:



8.3.1. Shutdown Alarms

These are the most important fault conditions and cause:

- The **ALARM** led to turn on steadily,
- The genset contactor to be released immediately,
- The engine to be stopped immediately,
- The **Alarm digital** output to operate.

Name	Description
GENSET LOW / HIGH FREQUENCY	<p>Set if the generator frequency is outside programmed limits.</p> <p>Another high frequency shutdown limit which is 12% above the high limit is always monitored and stops the engine immediately.</p>
GENSET LOW / HIGH RPM	<p>Set if the generator rpm is outside programmed limits.</p> <p>The high rpm overshoot limit is always monitored and stops the engine immediately.</p>
GENSET LOW / HIGH VOLTAGE	<p>Set if any of the generator phase voltages goes outside programmed limits for Voltage Fail Timer. This fault will be monitored with delay after the engine is running.</p>
LOW / HIGH BATTERY VOLTAGE	<p>Set if the genset battery voltage is outside programmed limits. Low and high limits are separately programmable. The detection delay is also programmable.</p>
FAIL TO START	<p>Set if the engine is not running after programmed number of start attempts.</p>
LOW CHARGE VOLTAGE	<p>Set if the charge alternator voltage is below the programmed limit. This fault will be monitored with delay after the engine is running.</p>
J1939 ECU FAIL	<p>Set if no information has been received during 3 seconds from the ECU of the electronic engine. This fault condition is only controlled when fuel is on.</p>

Name	Description
VOLTAGE UNBALANCE	Set if any of the generator phase voltages differs from the average by more than Voltage Unbalance Limit. This fault will be monitored delay after the engine is running.
CURRENT UNBALANCE	Set if any of the generator phase currents differs from the average by more than Voltage Unbalance Limit. This fault will be monitored with delay after the engine is running.
OVERTCURRENT	Set if at least one of the genset phase currents goes over the Overcurrent Limit for the period allowed by the IDMT curve setting. If currents go below the limit before expiration of the timer then no alarm will be set
PICKUP SIGNAL LOST	Set if the rpm measured from the magnetic pickup input falls below the Crank Cut RPM level during Loss of Speed Signal Timer.
SERVICE REQUEST	Set if at least one of the service counters has expired.

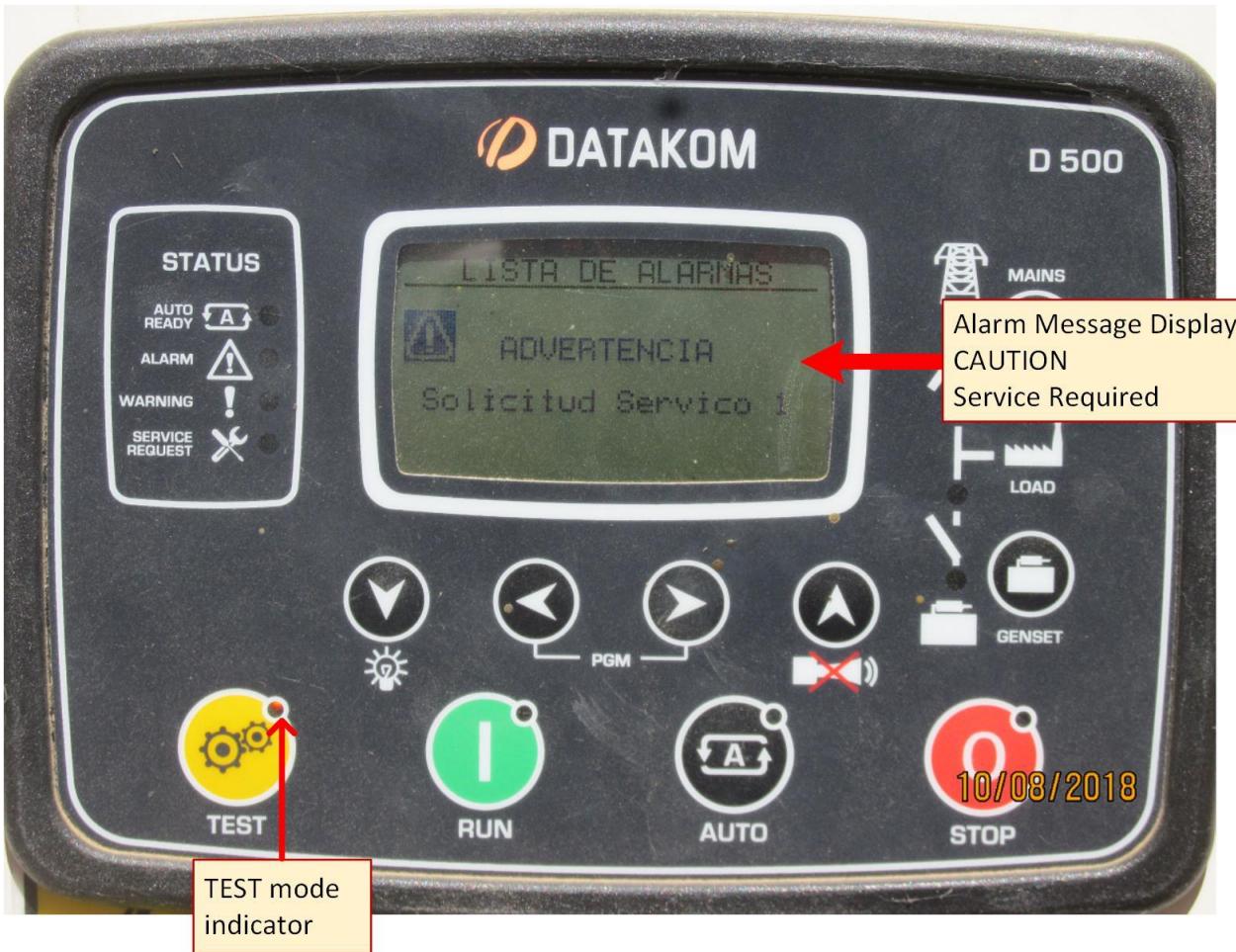


Figure 8-3. Example of Alarm Message on LCD Display

8.3.2. Non-Visual Warnings

These warnings are not announced at the device front panel; however, they appear in event logs, transferred to the Scada

Name	Description
FUEL THEFT	<p>Engine is not running:</p> <p>If the fuel level measured from the sender input falls by 20% or more in one hour, then Fuel Theft warning occurs (the detection delay is 10 sec, not adjustable).</p> <p>Engine is running:</p> <p>If the fuel level measured from the sender input falls by 2x "<i>hourly fuel consumption percentage</i>" or more, then Fuel Theft warning occurs.</p>
FUEL FILLING	If the fuel level measured from the sender input is increased by 20% or more in one hour, then Fuel Filling non-visual warning occurs (the detection delay is 10 seconds, not adjustable).
MAINTENANCE DONE	Sent when the periodic maintenance counters are manually reset.

9. SITE INFRASTRUCTURE MAINTENANCE ACTIVITIES

9.1. Generator Set Preventive Maintenance – Weekly Activity

Perform an operational check on the generator set by starting and running it for 5 minutes.

The generator should be activated once a week - with load.

For a load output – it can be made of connect 2 electric kettles or a large electric oven.

NOTE

The above instructions do not replace the maintenance instructions specified in the original documentation of the manufacturer as defined in the document "FG Wilson Generator Set Operator & Maintenance Instruction Manual" chapter 9.

9.2. Tower Metal Parts – Semiannual Inspection

9.2.1. General

General, each metal part, should be checked for galvanized damage, including the fence.

If there are any damages please follow the next step:

1. Brush the area.
2. Clean it well
3. Paint it with the galvanized paint.

9.2.2. Cleaning and greasing

In case of rust spots, use any rich zinc spray good quality such as OKS 2511-500ml or equivalent no need for cleaning spray

All metal parts in the site are to be visually check every six months.

Every time this procedure is carried out - go over the following steps:

1. Look for rust in the metal parts, clean and paint them.
2. Grease the entire moving parts (specially the lifting system).

9.2.3. Tower paint

Use white epoxy paint RAL 9003 for paint correction or equivalent.

Use orange epoxy paint RAL 9010 for paint correction can or equivalent.

List of materials for filling infrastructure maintenance requirements is specified as follows:

Item	Purpose
OKS 2511-500ml	Zinc spray
RAL 9003	Tower white paint
RAL 9010	Tower orange paint

9.3. Outdoor Cabinet Cleaning – Quarterly Maintenance Activity

Special process is to be carried out every 3 months to clean the cabinet interior of the Foundation using a vacuum cleaner.

Check visually cabinet stand for perfection exterior condition.

9.4. Radars – Quarterly Maintenance Activity

9.4.1. Visual Inspection

Visual inspection of the antennas Radom surface for perfection and of the component in the tower position.



High-Altitude work precautions must be observed; only certified climbers are allowed to perform High-Altitude work.

Perform the routine Visual/Mechanical Inspection Procedure A procedure as specified in the “**V5 Maintenance Manual**” (ELTA document NO. 1030A932-001) chapter 1.4.1.

9.4.2. Radar Position Validation

Perform the routine Radar Position Validation procedure as specified in the “**V5 Maintenance Manual**” (ELTA document NO. 1030A932-001) chapter 6.7.



Changing Radar position/orientation in azimuth or in elevation may affect the detection performance of the Radar and/or cause false position of targets on the map, unless corrected properly.

9.5.Operation of the lifting device in the tower

1. Put a climbing harness
2. Connect the harness to the end of the gear rope
3. Climb carefully on the ladder
4. When you reach the top of the tower make sure that the winch drop is attached to the tower and that no screws are missing or loose.
5. Check that the roller is properly connected
6. Thread the rope end through the pulley and release it downward to the bottom of the tower.
7. Pull the other end to you and throw it down through the outside of the tower.
8. The device is ready for lifting

9.6.Reports to ELTA Forms

In case of failure during maintenance / operation of the system, the event must be reported in the ELTA form: "**Site-Failure Report**" as specified in the appendix A.

10. SITE EQUIPMENT DATA SHEETS

Equipment Manufacturer	RO	RN	YV	BP	HQ
ADAM 6066	V	V	V	V	X
AMDAR AM24D	V	V	V	X	X
Asian Electron Wave Inverter	X	X	X	v	X
AVIATION WARNING LIGHT	V	V	V	X	X
Battery TPL 100AH	v	x	v	v	v
Battery TPL 159AH	x	v	x	x	x

Equipment Manufacturer	RO	RN	YV	BP	HQ
BOSCH divar ip 3000	X	X	X	v	x
Bullet antena-III DS	X	X	X	X	V
Cabinet Air Conditioner	V	V	V	X	X
Cisco Catalyst 2960X	X	X	X	V	X
Cisco Catalyst 3650	V	V	V	X	V
D-500 DATA COM Controller	V	V	V	V	X
DC to DC Quint PHC	V	V	V	V	X
Delta ORION Controller	V	V	V	V	X
Delta OutD Cabinet	V	V	V	V	X
Delta Rectifier DPR 2900	X	V	X	X	X
Delta Rectifier DPR 850B	V	X	V	V	X
DHI-NVR2116HS-S2	V	V	V	X	X
Dual Pol Dish ANT-9721-5158	V	V	V	V	V
Dual Pol Flat ANT	X	V	V	X	X
ELECTRIC CBL Specification	V	V	V	X	X
FG Wilson Gen F22-1	X	V	X	X	X
FG Wilson Gen F9.5-1	V	X	V	V	X
FK 250-C	V	V	V	V	X
Generator Enclosures	V	V	V	V	X
GRND Specification	V	V	V	X	X
HP Micro Pc	V	V	V	V	X
IDU-H switch -7301-2006	X	V	V	X	V
Indoor DC POE 10-60VDC-9921-2059	V	X	X	V	X
MW 350W Single DC-DC Converter	V	V	V	V	X
Pegasus-T datasheet-v2	V	V	V	X	X
Moxa Nport IA 5250	V	V	V	X	X
PTZ	V	V	V	V	X
Generator Set Operator and Maintenance Instruction Manual	V	V	V	V	X
fdfdfdfd 5000 User Manual	V	V	V	V	X
RW2000 mn 2-2	V	V	V	V	X

