



Ethiopian TVET-System



ELECTRONIC COMMUNICATION AND MULTIMEDIA EQUIPMENT SERVICING Level II

Based on May 2011 Occupational Standards

October, 2019



Module Title: Installing and Repairing Antenna and Satellite System

TTLM Code: EEL CMS2TTLM 1019 v1

This module includes the following Learning Guides

LG27: Prepare unit and workstation

LG Code: EELCMS2M08LO1LG27

LG28: Install satellite/ antenna system

LG Code: EEL CMS2 M08 LO2LG28

LG29: Adjust Satellite Dish/Antenna

LG Code: EEL BEC2 MO8 LO1LG29

LG30: Repair Dish Drive Mechanism

LG Code: EEL BEC2 MO5LO4LG30

LG31: Prepare product and work station for assembly

LG Code: EEL CMS2 M08 LO1- LG-31

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Instruction Sheet

LG27: Prepare unit and workstation

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Making Workplace ready in accordance with work / job requirements
- Making ready necessary tools, test instruments and PPE in line with job requirements
- Visually inspecting and checking Units for physical defects
- Finding service manuals and service information required for the job acquired at commencement of activities

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to:**

- Make Workplace ready in accordance with work / job requirements
- Make ready necessary tools, test instruments and PPE in line with job requirements
- Visually inspect and check Units for physical defects
- Find service manuals and service information required for the job acquired at commencement of activities

Learning Instructions:

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 6 and Sheet 6”.
5. Try to answer self-check, you can ask your trainer for correction. If you finished answering the Self-check, take correction or explanation from your trainer if it is not clear.
6. If you scored a satisfactory evaluation proceed to “Information Sheet 2”.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

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8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you Instructor for assistance if you have hard time understanding them.
9. Read the information written in the “Information **Sheets 3**”. Try to understand what are being discussed and ask you teacher for assistance if you have hard time understanding them.

Information Sheet-1	Make Workplace ready in accordance with work / job requirements
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1.1. Make Workplace ready in accordance with work / job requirements

A workplace is a location where someone works for his or her employer, a place of relationship between two parties, usually based on a contract where work is paid for, where one party, which may be a corporation, for profit, not-for-profit organization.

Job requirements are qualifications and skills necessary for a certain position, usually written in form of a list that contains the most important qualifications that a candidate must possess in order to be able to perform certain job duties.

The qualifications include:

- ✓ Work experience - types and amounts (years) of work experience
- ✓ Skills (soft skills and/or technical skills)
- ✓ Specific knowledge
- ✓ Education level and type
- ✓ Professional licenses, accreditations and certifications
- ✓ Personal qualities and attributes
- ✓ Languages
- ✓ Physical abilities



Information Sheet-2

Make ready necessary tools, test instruments and PPE

1.2. Make ready necessary *tools*, *test instruments* and *PPE* in line with job requirements

Necessary tools includes the those what we use for dish installation

- ✓ Open-end wrench, or open-ended spanner: used for loosening and tightening bolts and nuts during dish installation.
- ✓ The open-end wrench has a long, smooth shank providing the user with a better gripping surface.



Figure. Open-end wrench

A box end wrench surrounds the nut, bolt head, or stud on all sides. Box wrench openings are offset from the shank by 15 degrees to give more room for your knuckles or to give clearance over obstructions.



Figure. box end wrench

Figure. split-box wrench

Combination Wrench: The combination wrench has a box wrench and an open-end wrench on opposite sides of the same tool. The two ends are usually the same size.





Figure. combination wrench

The socket wrench consists of a round metal sleeve with a square opening in one end for insertion of a handle, and a 6- or 12-point wrench opening in the other.



a) Pocket Knife

Pocket knives are used for light cutting, removing insulation of coaxial cable, cutting string, and whittling. They are not suitable for heavy work.



The flat nose pliers have flat serrated jaws, a fixed pivot, and curved handles that may have insulated sleeves. These pliers are used to pull coaxial cable for in narrow place.



Fig. Long nose (needle nose) pliers.

a) Diagonal Cutting Pliers

The diagonal cutting pliers have a fixed pivot. The jaws are offset by about 15 degrees and are shaped to give enough knuckle clearance while making flush cuts. The diagonal cutting

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pliers are used for cutting small, light materials, such as wire, cotter pins, and similar materials.



Figure. Diagonal cutting pliers..

screwdriver

Sorted screw driver means different size and type in one set. A screwdriver is a device used to insert and tighten screws or to loosen and remove screws.



Fig. Sorted screw driver

Soldering Irons

Soldering Irons: - soldering irons are device that convert electrical energy to heat energy through systematical designed high resistive wire as heating elements. They are used to solder electronic circuits or connecting wires and other materials using soldering leads

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Fig. soldering iron

Multimeter

A multi-meter is a device which is used to measure several electrical quantities such as current, voltage, resistance, inductance, capacitance, circuits, and electrical frequency.



Blower

An air blower is a machine used for generating flow of air at substantial pressure. The air flow generated is used for different purposes such as small car cleaning blowers, vacuum cleaners, air conditions etc. Depending on the application requirement air flow and pressure may vary.



Pump/sucker

The desoldering pump is otherwise called the "solder sucker," it is designed with a spring-loaded plunger. Therefore, the desoldering pump is a device used in achieving the removal of solder from a printed circuit board. It is a type of device used for this purpose, and it is of two kinds, which are the plunger style and the bulb style. So, if perhaps you are interested in a quick, large job performing device, then it comes to a significant consideration.



Satellite finder

A **satellite finder** (or **sat finder**) is a satellite signal meter used to accurately point satellite dishes at communications satellites in geostationary orbit.

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Fig. Different types of satellite finder

Drill

A **drill** is a tool primarily used for making round holes or driving fasteners. It is fitted with a bit, either a drill or driver, depending on application, secured by a chuck. Some powered drills also include a hammer function.



Information Sheet-3

Make ready necessary tools, test instruments and PPE

1.3. Visually inspect and check Units for physical defects

- External visual inspection is a process of verifying the attributes of parts such as Device condition, part markings, and evidence of the device, Ports conditions, dimensions and surface quality. Visual inspection can be used for internal and external surface inspection of a variety of equipment types, including storage tanks, pressure vessels, piping, and other equipment.
- Visual Inspection, used in maintenance of facilities, mean inspection of equipment and structures using either or all of raw human senses such as vision, hearing, touch and smell and/or any non-specialized inspection equipment.
- **Visual Inspection**, or Visual Testing (VT), is the oldest and most basic method of inspection. It is the process of looking over a piece of equipment using the naked eye to look for flaws. It requires no equipment except the naked eye of a trained inspector.



Fig. Inspection using different methods



Information Sheet-4

Find service *manuals* and service *information* required

1.4. Find service *manuals* and service *information* required for the job acquired at commencement of activities

Factory service manuals (FSM) are the manuals provided by manufacturers which cover the servicing, maintenance and repair of their products. They were not originally offered to the public as they were developed for the dealerships so that their mechanics were able to fix their own products.

Many after-market manuals are available, with most of them referencing the FSM for topics such as torque specifications, dimensions and part numbers. The Manual usually contains all information required to assist service engineers with all work, repair and maintenance on their device. The repair documentation provides detailed information regarding repair procedures, installation instructions, circuits and diagrams and troubleshooting information.

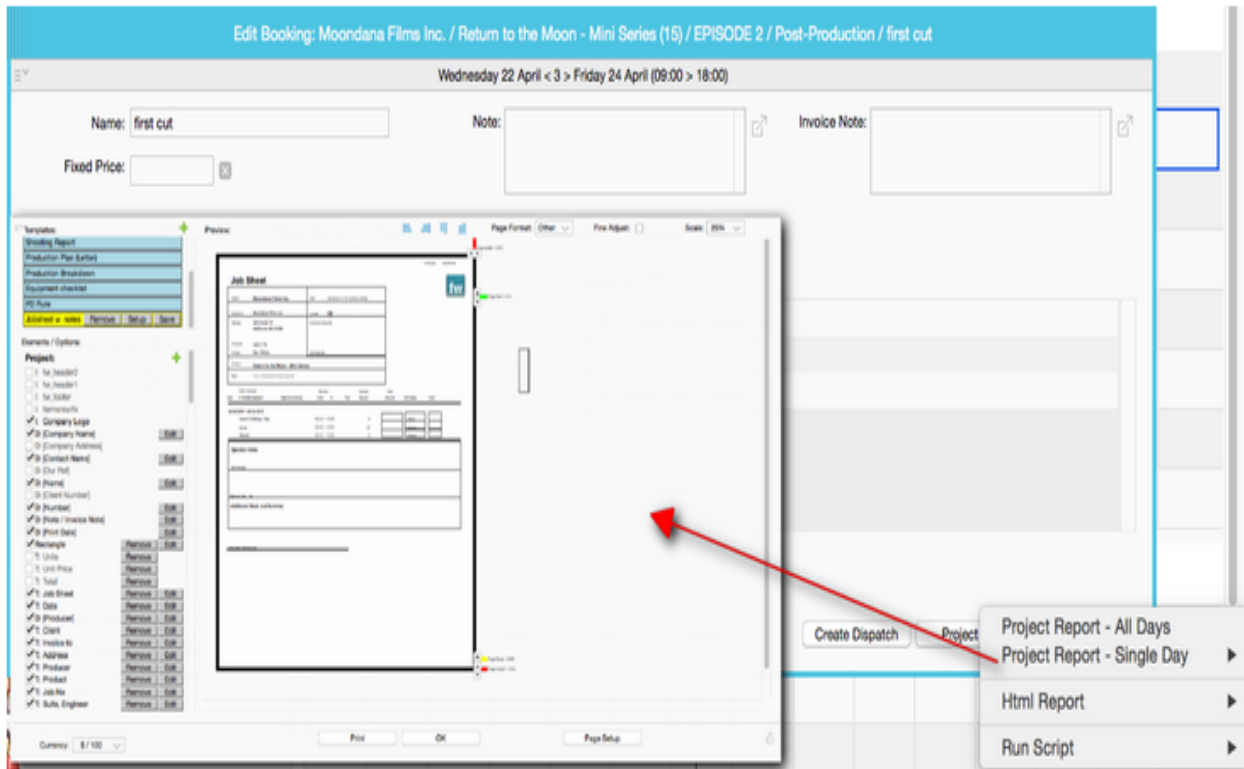
The purpose of service document is to aid in the troubleshooting and repair of the Satellite receiver and Antenna System. The intended audience is trained service technicians. All companies and service personnel using this document must have a signed non-disclosure agreement on file with the device producer Company. But here putting all document or all service manual is too hard, but let us see the content of service manual. Find specific service manual for more information

- Installation Instructions
- User Tips
- General Warning Information
- Set-Up
- Operation
- General Maintenance
- Information Trouble Shooting
- Part Specifications
- Warranty

Service information

- job report sheets

A job sheet is a document (usually just a page) containing instructions to help a worker do his job. It also contains details such as time it takes to perform a job and the materials needed or used for a job





DAILY ACTIVITY REPORT

DATE:
 NAME:
 TASK(S) PERFORMED:

#.

NAME	JOB TITLE	HOURS		HOURLY RATE		NOTE
		REG	OT	REG	OT	

Notes:

SUPERVISOR		DATE
------------	--	------

Tired of working with reports manually? Status.net is a modern solution to share regular reports and gather insights automatically.

Status.net collects data regularly with scheduled auto reminders. Run powerful reports with export and print features.

• job order

A work order is usually a task or a job for a customer, that can be scheduled or assigned to someone. Such an order may be from a customer request or created internally within the organization. Work orders may also be created as follow ups to Inspections or Audits. A work order may be for products or services.



Maintenance Work Order Form

Client/Worksite Details	
Client Name:	Client Phone Numb:
Client Address:	Client Email:
Order Details	
Date Issued:	Work Order Number:
Issued By:	Work Performed by:
Description of Work Required:	
Material Required:	
Completion Information	
Date Completed:	Time Required:
Materials Used:	
Remarks:	
EMPLOYEE SIGNATURE: Date: SUPERVISOR SIGNATURE:	



Job order form of agreement

SECTION 00500 JOB ORDER CONTRACT

A. EFFECTIVE DATE:

This CONTRACT is entered into by and between the Owner and the Job Order Contractor as Contract No. _____, and shall be effective as of _____, 20____.

B. OWNER:

MARICOPA COUNTY
c/o Facilities Management Department
401 West Jefferson Street
Phoenix, Arizona 85003

C. JOB ORDER CONTRACTOR:

Office: (____); Fax: (____); E-Mail: (_____).

D. RECITALS:

The scope of work and specifications for a broad range of services will be identified in individual Task Orders which will be issued by the Owner from time to time. See EXHIBIT D hereto.

NOW THEREFORE, intending to be legally bound and for valuable consideration, the receipt and sufficiency of which are acknowledged, the Owner and Job Order Contractor agree as follows:

E. AGREEMENT:

Article I. THE CONTRACT

- 1.1 The Task Order and other Contract Documents explained in Section 7.1 below and the definitions which are contained Section 00700, Exhibit A, govern this Job Order Contract.

Article II. THE WORK

- 2.1 The Job Order Contractor shall execute the entire Work described by each Task Order, including work which is reasonably inferable and necessary to produce the results intended by the Contract and the Task Order.

Article III. CONTRACT TIME

- 3.1 The Job Order Contractor shall have access to the area of the Work effective from the date of the Notice to Proceed for the assigned Task and shall achieve Substantial Completion and Final Completion of the Work no later than the performance period specified in each Task Order

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Job ORDER REQUEST FORM
HCCS – MAINTENANCE DEPARTMENT
West Loop Center
FAX NO. 713-718-7932

Requester Name: _____ Date: _____

Department: _____ Telephone: _____

Location: _____ Urgent:
Yes _____ No _____
Room: _____

Description of Work Order Requested:

-----Maintenance Use Only-----

✓ **How to Write an Order Application Form for a Teaching Job**

It's important that you know how to write an order application for a teaching job if that's the career path you've chosen. You might have to scan through additional order form templates after this one, but we do have a couple of tips on how to write one. Be sure to keep these in mind: The manner of your application and the words must be polite and formal. Include your capabilities and skills to impress your future employers. Unlike a product order form, your application form should be direct and concise.

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- customer index

The Customer Satisfaction Index (CSI) is an economic indicator that measures the satisfaction of consumers across the economy. CSI data is used by researchers, corporations, government agencies, market analysts and investors, industry trade associations, and consumers.

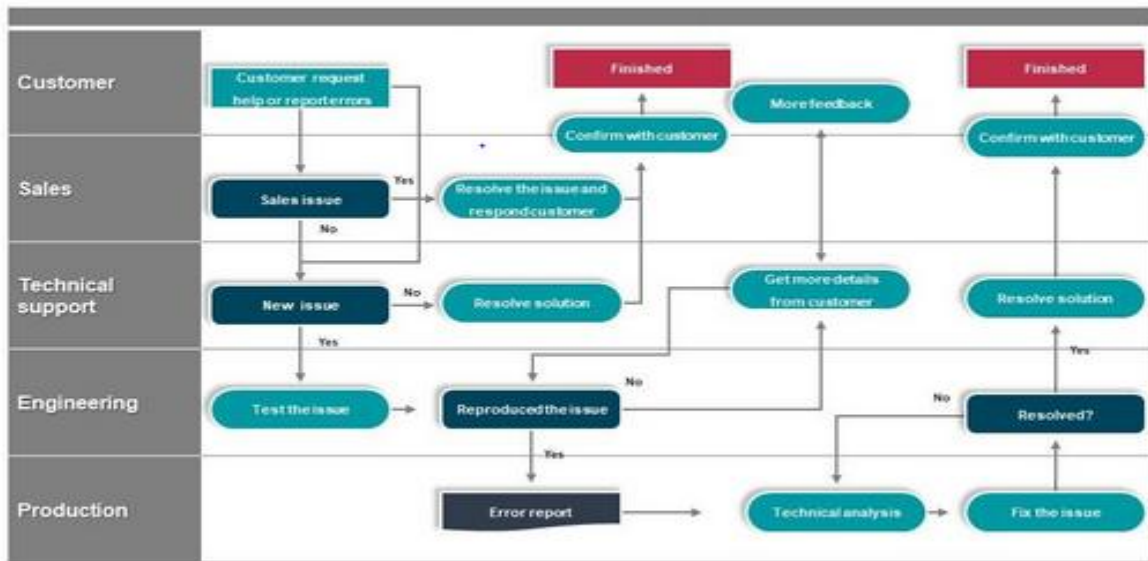
CSI uses existing customer satisfaction drivers / attributes and applies a hierarchical approach to measure the relationships between the items



• service flowchart

The concept of service flow chart also known as process flow chart or process flow diagram constitutes a picture of the separate steps of a process in a sequential order. The flowcharting process can be considered as a tool useful for developing an understanding of how a process is done. It can be useful in any phase of business or even in personal life for that matter. The type of process can be anything, such as manufacturing processes, administrative services, project plans, etc. But it is most useful in services and is plotted regularly in services.

Customer Service Process Flow Chart Example



This slide is 100% editable. Adapt it to your needs and capture your audience's attention.

• Stock and inventory record

- ✓ A stock record is a detailed listing of securities held by a brokerage firm on behalf of customers. The stock record displays the names of the real and beneficial owners, amounts and locations of all securities held by the firm.
- ✓ Inventory record is to identify and quantify all records created or maintained by your department or office. The records inventory is used to collect information about your



records including type, date range, format, volume, storage location, and applicable records series information

1. Agency		2. Division/Section		3. Location of Records													
4. Records Series Title																	
5. Records Series Description. Include contents (e.g. contracts, reports, applications, correspondence), purpose, and form numbers.																	
6. ☐ Original File ☐ Duplicate File		7. If duplicate, list location of original file.															
8. STORAGE MEDIA (Check all that apply) ☐ Paper ☐ Microfilm (not COM) ☐ Computer Output Microfilm (COM) ☐ Electronic (Tapes, Disks) ☐ Other, including: ☐ Photographs ☐ Computer Cards ☐ X-Rays ☐ Slides ☐ _____			9. DATA PRIVACY CLASSIFICATIONS ☐ Public ☐ Private ☐ Confidential ☐ Nonpublic ☐ Protected Nonpublic Statute Number or Date of Temporary Classification _____ _____ _____ _____														
10. RETENTION REQUIREMENTS		YEARS	CITATION	11. RECOMMENDED RETENTION PERIODS													
A. Federal Law				A. Agency Office													
B. State Law				B. Agency Storage													
C. Statute of Limitations				C. State Records Center (State Agencies Only)													
D. Audit Period				D. Total Retention (A + B + C)													
E. Administrative Needs																	
12. A vital record is essential to the continuation or resumption of your operations after a disaster. Are any documents in this records series considered vital? ☐ Yes ☐ No If yes, which documents are vital and why?																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="height: 30px; vertical-align: top;">13. VOLUME (See Chart) →</td> <td colspan="2" rowspan="5" style="vertical-align: top; padding: 5px;"> VOLUME CHART TO DETERMINE CUBIC FEET Letter Size Drawer = 1.5 3X5 Card 12" Row = 0.1 Legal Size Drawer = 2.0 4X6 Card 12" Row = 0.2 Shelving 4' Letter = 2.3 5X8 Card 12" Row = 0.3 Shelving 4' Legal = 3.0 Printouts 12" Stack = 1.25 Records Center Box = 1.0 Transfer Case = 2.5 (12" X 15" X 10") (24" X 16" X 11") </td> </tr> <tr> <td style="height: 30px; vertical-align: top;">Office</td> <td style="height: 30px; vertical-align: top;">Storage</td> </tr> <tr> <td style="height: 30px; vertical-align: top;">Cubic Feet</td> <td style="height: 30px; vertical-align: top;">Cubic Feet</td> </tr> <tr> <td style="height: 30px; vertical-align: top;">Inclusive Dates</td> <td style="height: 30px; vertical-align: top;">Inclusive Dates</td> </tr> <tr> <td style="height: 30px; vertical-align: top;"></td> <td style="height: 30px; vertical-align: top;"></td> </tr> </table>						13. VOLUME (See Chart) →		VOLUME CHART TO DETERMINE CUBIC FEET Letter Size Drawer = 1.5 3X5 Card 12" Row = 0.1 Legal Size Drawer = 2.0 4X6 Card 12" Row = 0.2 Shelving 4' Letter = 2.3 5X8 Card 12" Row = 0.3 Shelving 4' Legal = 3.0 Printouts 12" Stack = 1.25 Records Center Box = 1.0 Transfer Case = 2.5 (12" X 15" X 10") (24" X 16" X 11")		Office	Storage	Cubic Feet	Cubic Feet	Inclusive Dates	Inclusive Dates		
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Office	Storage																
Cubic Feet	Cubic Feet																
Inclusive Dates	Inclusive Dates																
14. Inventory Completed By (Print Name)		Title	Date	Phone													



- **requisition slips (for acquisition of parts)**

A requisition, in procurement, is a request for goods or services made by an employee to the person or department in a company that is responsible for purchasing. If the request is approved, that entity will submit a purchase order (PO) to a supplier for the goods or service.

Document generated by a user department or storeroom-personnel to notify the purchasing department of items it needs to order, their quantity, and the timeframe. It may also contain the authorization to proceed with the purchase. Also called purchase request or requisition

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Purchase Requisition			
From Department To Purchase Department		No. Date	
Please arrange to purchase the following materials which is required on for utilization against Production Order No. /for Stock.			
Particulars of Materials	Code No.	Unit of Quantity	Quantity
			Signature
(To be filled in by the Purchase Department) Purchase Order No. Supplier			

- supplier index

Instruction Sheet	LG28: Install satellite/ antenna system
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- *Determining location of satellite / antenna for good reception*
- *Assembling and fixing petals/arms of the dish and LNB unit*
- *Tightening firmly dish/antenna with stand after optional signal obtained*
- *Connecting/disconnecting signal finder between LNB and satellite /antenna receiver to tune until the system obtain maximum output*
- *Performing operational check according to manual*
- *Determining azimuth and elevation using service manual*

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to:**

- *Determine location of satellite / antenna for good reception*
- *Assemble and fixe petals/arms of the dish and LNB unit*
- *Tighten firmly dish/antenna with stand after optional signal obtained*
- *Connect/disconnect signal finder between LNB and satellite /antenna receiver to tune until the system obtain maximum output*
- *Perform operational check according to manual*
- *Determine azimuth and elevation using service manual*

Learning Instructions:

Learning Instructions:

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15. Submit your accomplished Self-check. This will form part of your training portfolio.
16. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you Instructor for assistance if you have hard time understanding them.
Ask from your teacher for correction (key answers) if any.
17. Read the information written in the “Information **Sheets 3**”. Try to understand what are being discussed and ask you teacher for assistance if you have hard time understanding them.

Information sheet-1	determine location of satellite / antenna for good reception
----------------------------	---

2.1. determine location of satellite / antenna for good reception

Dear Trainees! we are going to align a satellite dish using a satellite finder analog or digital type.

1. Find out our location and the satellite's
2. Choose the optimum location
3. Align the satellite dish on a provisional basis
4. Select the proper configuration for the satellite
5. Set up the analyzer to take measurements
6. adjustment and polarization
7. Test signal quality

Conduct a site survey with the customer to identify a suitable location for the antenna. The first and most important consideration when choosing a prospective site is whether the site can provide an acceptable LOS to the satellite. Choose a site where the antenna will be able to receive the strongest signal available. A clear, unobstructed view of the sky is necessary for proper transmission. Also, consider obstructions that may occur in the future, such as construction in the area or the growth of trees.

When orienting a TV satellite dish, it's very useful to know in advance the required azimuth and elevation, since the operation is not easy. A misalignment of one degree is enough to completely lose the signal. Trying to find a satellite simply by blindly and randomly



moving the antenna has very little chances of succeeding. Just looking at the neighbor's satellite antenna to see its orientation is of very little help.

Location calculator:- There are many different types of tools to calculate antenna's location.

Example :-

1. **Dish Alignment Calculator using Google Maps:** - It is the most practical and compact than competitors and you do not need a fast internet connection to use it. TrackingSat detects the city where you are and shows latitude, longitude and magnetic declination of the dish site. You can calculate at once the azimuth, azimuth magnetic, elevation and LNB skew from your city
2. **Inclinometer:** - is an instrument used for measuring angles of slope (or tilt), elevation, or depression of an object with respect to gravity's direction. It is also known as a *tilt indicator* or *tilt sensor*



Fig. a) magnetic compass b) analog inclinometer integrated device c) digital inclinometer

- A *tilt sensor* can measure the tilting in often two axes of a reference plane in two axes. In contrast, a full motion would use at least three axes and often additional sensors. One way to measure tilt angle with reference to the earth's ground plane, is to use an accelerometer. Typical applications can be found in the industry and in game controllers
3. **Mobile application of Smart phone location calculator:** - There are several applications that can be downloaded from Google Play store and installed onto android smart phone and used to locate best signal reception location by the help of GPS locator integrated into the device.

Mobile tool can be very handy to calculate the exact bearing (azimuth and elevation) of an antenna for a given location (defined by its latitude and longitude), when this antenna is pointing to a geo-stationary satellite located at a given longitude. All geostationary satellites are located at the same height of 35'800 km, so this parameter is hardcoded in the calculator. The earth radius of 6'370 km is also treated as a constant and hard coded.

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Receiver location:	Longitude:		◦ (Decimal format, positive = East, negative = West)
	Latitude:		◦ (Decimal format, positive = North, negative = South)
Satellite location:	Longitude:		◦ (Decimal format, positive = East, negative = West)
Antenna bearing:	Azimuth:		◦ (Decimal format, 0° = North, 90° = East, 180° = South, 270° = West)
	Elevation:		◦ (Decimal format, 0° = Horizontal, 90° = Vertical)

To use this calculator, just enter the required coordinates and hit "calculate bearing". The "get current location" button will try to obtain your current coordinates from your browser: it only works if relocation is supported and enabled in your browser, and works better with devices equipped with a GPS.

Self-check 1	Written test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (2 point each)

- Why dish antenna location is selected?
 A) To accept technology B) To protect theft crime
 C) to receive strong signal D) all
- Which of the following is necessary to receive strong signal?
 A) Obstructed sky B) unobstructed
 C) rainy whether D) none
- Which of the following instrument is not used to select best location?
 A) Inclinator B) Finder
 C) signal calculator apps D) micrometer
-



Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6 points

You can ask your teacher for the copy of the correct answers.

Answer sheet

Score _____

Rating _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-2

Assemble and fix petals/arms of the dish and LNB unit

2.2. Assemble and fix petals/arms of the dish and LNB unit

To make assembling activity the following accessories are necessary

Dish Antenna Assembly

Item	Part	Description	Quantity	Comments
1	Bolt	M8 x 35	1	LNBF Arm Braces to LNBF Arm
2	Bolt	M6 x 35	2	LNBF Clamp to LNBF Arm
3	Hex Nut	M6	2	LNBF Clamp
4	Round Head Phillips Bolt	M6 x 25	2	LNBF Clamp
5	Bolt	M8 x 15	4	LNBF Braces to Reflector, LNBF Arm Bracket
6	Flange Nut	M8	22	
7	Carriage Bolt	M8 x 16	8	Reflector, Angle Bracket
8	U-Bolt	M8	2	
9	Bolt	M8 x 75	2	Mast Supports, Base
10	Concrete Anchor Bolt	M8 x 60	4	Expansion bolts



11	Elevation Adjust Bolt	M8	1	
12	Bolt	M6 x 12	2	Bracket pivot
13	Flange Nut	M6	4	
14	Dish Reflector	1.2M	1	
15	Reflector Mount Bracket	1		
16	Mast Reflector Bracket	1		
17	LNBF Arm Bracket	1		On bottom of reflector to attach LNBF Arm
18	Mast/J-pipe		1	
19	Mast Support (Left)		1	
20	Mast Support (Right)		1	
21	Mast Base Bracket		1	
22	LNBF Arm	1		LNBF Clamp on one end , Reflector on other
23	LNBF Arm Brace	2		
24	LNBF Clamp (Top)	1		
25	Flat Washer	M8	8	
26	LNBF Clamp (Bottom)	1		

Assemble Universal Mount

1. Pre drill holes in mounting surface using base (21) as a template
2. Attach base to mounting surface with 2 anchor bolts (8)
3. Install mount arm/pipe (18) into base (21)
4. Insert and loosely tighten both mast/pipe support legs (20), using nut (7), screw (19)



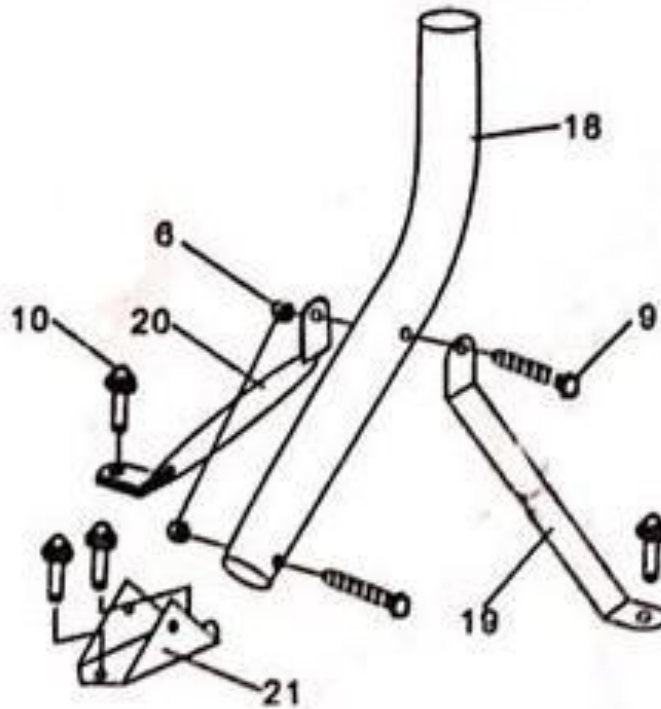


Fig. antenna's stand

Assemble LNBF Feed Support Arm

1. Assemble top and bottom LNBF holder/mount/clamp (12 and 13) with 2 screws (1)
2. Attach bottom LNBF holder (12) to LNBF feed arm (11) with screw (2)
3. Insert plastic plug (14) into top of LNBF feed arm

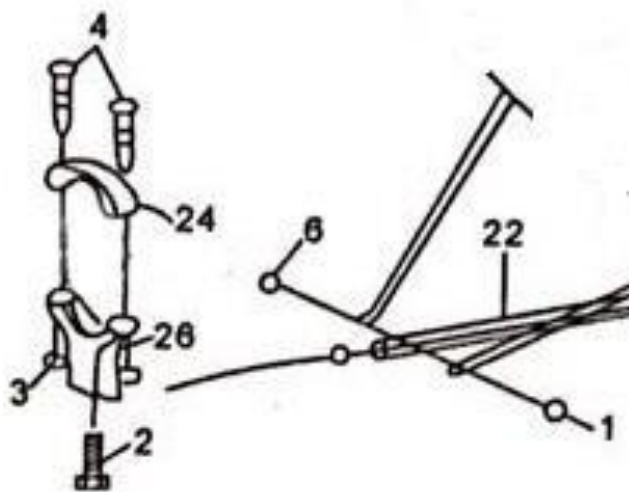


Fig. a) stand supporter



b). LNB holder

Attach LNBF feed arm (11) to reflector bracket/mount (10) with 2 nuts (5) and 2 screws (3).



Assemble Satellite Dish and Mount

1. Attach satellite dish reflector (14) to satellite reflector bracket/mount (15) with 4 nuts (6) and screws (7)

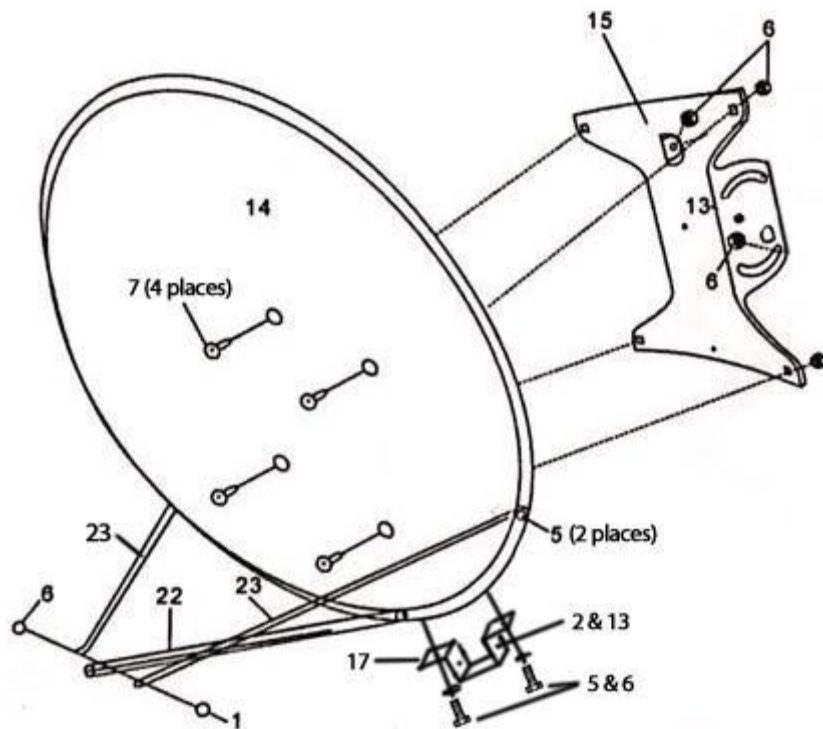
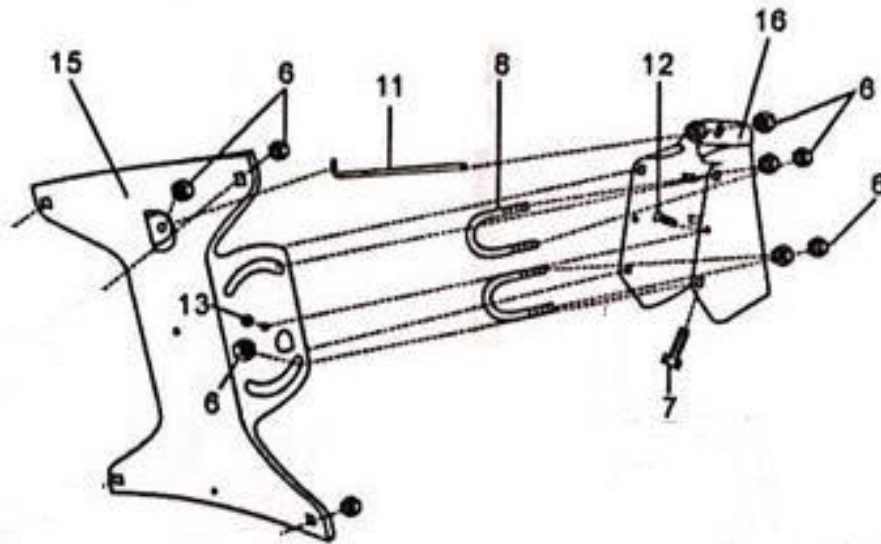


Fig. dish assembling and Tighten all pieces

Assemble Mast/Pipe Mount and Clamp

- Loosely assemble 2 u-bolts (8) through the pipe mount (16) using 4 nuts (6)
- Mount the pipe mount assembly (16) into the satellite reflector bracket (15) using 4 bolts (4) with their heads on the inside and 4 nuts (5) on the outside.
- Mount the dish assembly on the mast/pipe, orient and then tighten all screws/nuts.



Install LNBF

1. Take care to align LNBF so that it is positioned correctly (not rotated and so that it is facing dish).
2. Mount with F-connectors facing downwards.
3. Do not over tighten LNB clamp.
4. Use high quality compression connector on coaxial cable.
5. Attach and tighten coaxial cable to LNBF – take care not to overstress F-connector.
6. Route coaxial cable along the LNB feed arm and use the cable clip or cable ties to attach to the arm.



Fig. Assembling LNB

Satellite Dish Alignment Instructions

1. Write down desired the azimuth and elevation to point the dish
2. Using a magnetic/electronic compass to determine the azimuth direction
3. Adjust the azimuth – making sure the U-bolts are loosened first, then tighten when in place at the correct azimuth.
4. Using a protractor determine the elevation

5. Adjust the elevation with the long elevation adjustment bolt and its nut at the top of the mast clamp – making sure the elevation bolts/nuts are loosened first



Fig. Assembling and alignment of dish

**Self-check 2****Written test**

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (2 point each)

1. Which of the following hand tool is not necessary for dish installation?
A) Wrench B) Ladder
C) drill D) DVD
2. Which of the following is not a part of dish accessory?
A) Dish Stand B) LNB
C) Coaxial Cable D) Finder E) all
3. Which of the following device is used to indicate the signal strength during dish installation?
A) Receiver B) finder
C) Dish D) TV E) all

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

Answer sheet**Score** _____**Rating** _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-3

Tighten firmly Dish/antenna with stand after optional signal obtained

2.3. Tighten firmly Dish/antenna with stand after optional signal obtained

- Tightening is the process of bolting and fitting all the above assembled connections/ bolts and connected antenna..

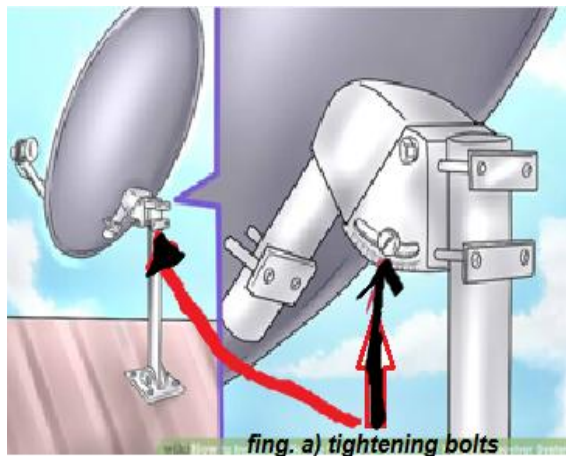


Fig. Tightening loosely connected bolts and nuts



Fig. tightening and connection to base or wall

Self-check 3	Written test
--------------	--------------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (1 point each)

4. Why tightening is made after installation?
 - A) To avoid miss alignment
 - B) To disconnect coaxial cable
 - C) To Bore the hole
 - D) To select place
5. Which of the following tool can help to tight dish or its accessory?



- B) meter C) Side cutter D) finder Screw driver B) multi
6. Which of the following device is used to indicate the signal strength during dish installation?
- B) Multimeter B) Signal meter
- C) TV set D) Dish E) all

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

Answer sheet

Score _____
Rating _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-4	determine location of satellite / antenna for good reception
----------------------------	---

2.4. Connect/disconnect signal finder between LNB and satellite /antenna receiver to tune until the system obtain maximum output

- **Connect the satellite tuner/finder.** Using long coaxial cable on your satellite, plug in the satellite tuner. A satellite finder detects power over the entire spectrum of the LNBF. It gives an indication of the total power received from all transponders on the

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satellite. When using a satellite finder, there is a danger of aligning the antenna with the wrong satellite. During an actual installation, it is important to verify with a receiver that the correct satellite was selected.

How to connect:

1. Connect a jumper cable from the LNB to the “Satellite” port on the digital SATFINDER.
2. Connect the cable from your satellite receiver to the “Receiver” port on the digital SATFINDER



Fig. Finder connection

Self-check – 4

Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (3 point each)



1. What is the direct role of finder during dish installation?
A) To measure voltage B) to measure Resistance C) to measure signal strength D) Sound E) all
2. Most of the time, why we install dish antenna outdoor?
A) To receive strong signal B) To avoid obstruction C) to keep setting direction D) all E) non
3. Which of the following order of connection is correct?
A) Receiver → finder → Dish
B) Finder → TV → dish
C) Dish → Receiver → finder
D) Finder → Dish → TV

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

Answer sheet

Score _____
Rating _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-5

Perform operational check according to manual



2.5. Perform operational check according to manual

While aligning your dish, you can measure your signal strength by using either the indicator built in to your satellite receiver's software or a signal level meter.

- Signal strength updates every few seconds, so there will be some delay from when you move the dish and when the change registers on the TV screen.
 - If you can't see the screen, have someone watch it for you during the moving process so you can ensure the best-possible signal.
1. Switch the satellite receiver on, the digital SATFINDER will turn on by itself.
 2. Set your dish to the proper azimuth and elevation settings.(The information should be supplied with your satellite dish).
 3. Adjust the knob until the signal strength display at 0%(the critical point).
 4. Peak the signal by slowly moving the azimuth and elevation of your dish. The higher values, the better signal. If the digital SATFINDER's reading becomes full scale, you can adjust the "ATT" to reduce the incoming signal to a lower level. Continue to move the dish until you have the highest possible meter reading and the highest possible buzzer pitch.
 5. Remove the jumper cable and digital SATFINDER, and reconnect the LNB/LNBF to your receiver.

IMPORTANT NOTES:

- To avoid a continuous full scale reading, do not use the digital SATFINDER directly in front of the dish.
- When using a LNB with gain higher than 60dB, insert a 5dB attenuator between the LNB/LNBF and the digital SATFINDER.
- In case no satellite receiver is at hand a 13-18V DC power supply with F-connector can be connected on the "Receiver" side of the digital SATFINDER to power the SATFINDER.

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Input frequency	950-2150MHz	Input impedance	75Ohm , F-connector	Operating range	(LNB gain) 52 -60dB
Input level min.	40dBm	Output impedance	75Ohm , F -Connector		
Input level max.	10dBm	Power supply	DC 13-18V		

- Under the following test condition: LNB gain =55dB, the carrier C/N=15dB.
- Insert a 5dB attenuator when operating with LNB gain =60 ~ 65dB.

Note:

- ✓ All specifications cited in this leaflet are subject to change without notice.



Self-check – 5	Written test
----------------	--------------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (2 point each)

- _____ Operation check is performing

A) _____ Maintenance of the circuit

B)Purchase C) Measuring signal strength D) all
- Most of the time, why we install dish antenna outdoor?

B) To receive strong signal B)

To avoid obstruction C) to keep setting direction D) all E) non
- Which of the following order of connection is correct?

E) Receiver →finder → Dish

F) Finder →TV → dish

G) Dish →Receiver → finder

H) Finder → Dish → TV

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

Answer sheet

Score _____
Rating _____

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Name: _____

Date: _____

Short Answer Questions

Information sheet-6

Determine azimuth and elevation using service manual

2.6. Determine azimuth and elevation using service manual

The hardware inside your antenna is quite complex. The antenna must point in a certain direction, ascertained by a pinpoint in the sky where azimuth and elevation meet. When a satellite antenna moves to the left or right, that is the azimuth, or X-axis, plane of view. When the machine moves on the Y-axis, this is where elevation comes into play.

You will adjust the dish as follows to set the azimuth, elevation, and skew:

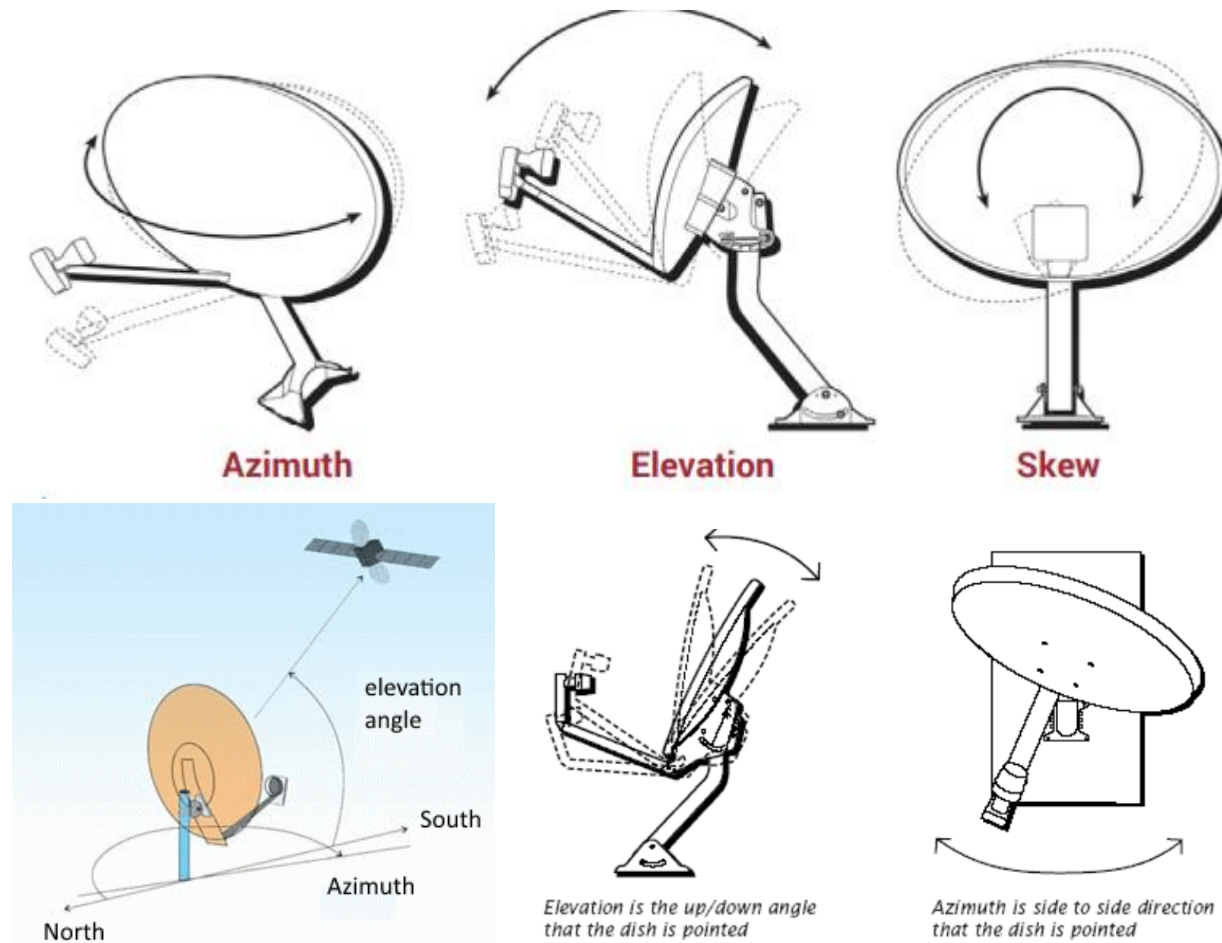


Fig. angle adjustment

The is by rotating the system on a 360° axis to scan the sky and find the exact elevation and azimuth of the satellite with the strongest signal. The system must be checked turning as shown in the above figure. By gathering information using satellite finder we can scan and see from which direction can be received the strongest RF signal.

The antenna Azimuth and elevation be adjusted according the signal intensity and signal quality which are showed in the meter. Stop to adjust the antenna when signal quality to be max value (attention: when you start to adjust the antenna, please set the signal intensity to be max value)



Self-check – 6

Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (1 point each)

1.

What is azimuth angle?



- A) Horizontal B) Vertical
- C) Measuring device D) all
2. Which of the following device is
signal reflector?
3. Receiver B) LNB
- C) **Dish** D) all E) non
- B) Tuning is the process of
_____ adjusting?
- A) Turning of dish
B) Selection of Location
C) **Scanning** of quality signal
D) Cleaning of receiver

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

Answer sheet

Score _____
Rating _____

Name: _____

Date: _____

Short Answer Questions



Instruction Sheet	LG29: Adjust Satellite Dish/Antenna
--------------------------	--

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Connect Signal strength meter/finder
- Adjust Azimuth and elevation angles
- Adjust satellite dish and antenna for good reception
- Check Low noise block (LNB), antenna direction, Azimuth and elevation angles

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, you will be able to –

- Connecting Signal strength meter/finder
- Adjusting Azimuth and elevation angles and satellite dish and antenna for good reception
- Checking Low noise block (LNB), antenna direction, Azimuth and elevation angles

Learning Instructions:

18. Read the specific objectives of this Learning Guide.
19. Follow the instructions described in number.
20. Read the information written in the information “Sheet ----, Sheet ---, and Sheet --”.
21. Accomplish the information “Sheet ---, Sheet ----, in page ”.

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22. Try to answer self-check, you can ask your trainer for correction. If you finished answering the Self-check, take correction or explanation from your trainer if it is not clear.
23. If you scored a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, discuss with your trainer for further instructions or go back to learning **operation sheet-----**.
24. Submit your accomplished Self-check. This will form part of your training portfolio.
25. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you Instructor for assistance if you have hard time understanding them.
26. Accomplish the “Self-check 2” in page **-----**.
Ask from your teacher for correction (key answers) if any.
27. Read the information written in the “Information **Sheets 3**”. Try to understand what are being discussed and ask you teacher for assistance if you have hard time understanding them.
28. Accomplish the “**Self-check -----**” in page **-----**.
29. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (To get the key answer only after you finished answering the Self-check 3).
30. If you scored a satisfactory evaluation proceed to “Operation Sheet 1” in page **-----**, however, if your rating is unsatisfactory, see your teacher for further instructions or go back to **Learning Activity #1**.
31. Read the “**Operation Sheet 1**” and try to understand the procedures discussed.



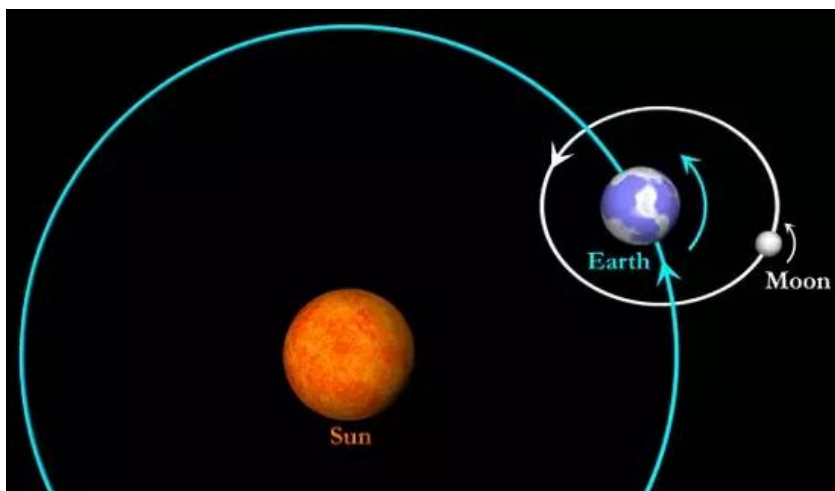
Information sheet- 1	Identify Satellite or antenna direction using operating manual
-------------------------	--

Introduction

What is a satellite?

A satellite is a body that orbits around another body in space. There are two different types of satellites

1.Natural Satellites : Moon that orbits around our Earth is a natural satellite. Earth is a natural satellite since it orbits the star, The Sun.



2.Artificial Satellites (man made): Artificial satellites are man made satellites which has been intentionally put into desired orbits. Based upon the orbit into which satellites are put into, these can be classified into four,

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- ✓ Low Earth orbit [180-2000 Km]
- ✓ Medium Earth orbit[2000-35786 Km]
- ✓ Geosynchronous orbit[35786 Km]
- ✓ High Earth orbit[>35786 Km]

Based upon applications , Satellites can be classified as :

- Communication satellite
- Astronomy Satellite
- Atmospheric studies satellite
- Navigation satellite
- Reconnaissance satellite
- Remote sensing satellite
- Search and Rescue satellite
- Weather satellite

N.B, This topic is discussing about for communication satellite

Communication satellites in space to well communicate. They receive and transmit radio information from one place on the planet to another place on the planet. For example:

Telephone Television, Radio Broadcasting,Internet Access and Military

Antenna:- is an array of conductors (elements) electrically connected to the interface between radio waves propagating through space and electric currents moving in metal conductors, used with a transmitter or receiver. In transmission, a radio transmitter supplies an electric current to the antenna's terminals, and the antenna radiates the energy from the current as electromagnetic waves (radio waves). In reception, an antenna intercepts some of the power of a radio wave in order to produce an electric current at its terminals, that is applied to a receiver to be amplified. Antennas are essential components of all radio equipment.

Adjust the Satellite Dish

The satellite finder attaches between the satellite LNB, which is a low-noise block down converter, and the satellite dish. This down converter sends the signal received from the

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satellite to the indoor satellite receiver box. The dish sends a signal through a coaxial cable to the LNB and passes through the satellite finder first. With the satellite finder in line, move the dish in small increments until you locate the strongest signal to the satellite receiver. Use small increments so you do not go right past the sweet spot.

Determining Signal Strength

It is important to determine the strongest signal before bolting down the satellite dish. After finding and adjusting the dish for optimum signal, check again to make sure. To do this, move the dish very slightly, and then move it back to the previous position. Watch the finder to make sure the signal returns to the same strength; if it does, bolt the dish down, making sure not to move it. Perform this check every time you reposition the dish, after a storm, or when reception is not clear. Many things can affect a satellite signal,

including trees, debris, or even new homes in the area.

The installation requires to

- ✓ Use hand tools
- ✓ Determine water pipes, electrical wiring or gas lines are



Fig.(3.1a) Analog soiled signal finder meter



| Fig.(3.1b) Digital signal finder meter

- close to the installation area
- ✓ Route coaxial cable through walls and under floors
- ✓ Use a compass, protractor and carpenter's level
- ✓ Use a ladder to climb structures
- ✓ Know your local, provincial and national grounding codes

3.1 Identify Satellite or antenna direction using operating manual

Direction is information about how to do, make, or use something (instructions) that you give to someone about how to find a particular place.

Key points to remember when installing your Shaw Direct System:

- ✓ Do not drill any holes until you've confirmed the best location for the dish.

- ✓ Make sure the installation of the dish conforms to local electrical and building codes, zoning requirements and other applicable laws and regulations. For possible periodic removal of snow, choose a site that is easily accessible.
- ✓ Ensure there are no visible obstructions between the dish and your line of sight to the satellites. Keep in mind that trees will grow up and outward and may eventually block the signal.
- ✓ The maximum allowable length for the RG-6 coaxial cable connecting the receiver to your dish is 150 feet. Consult Shaw Direct if the cable will exceed this length.
- ✓ Use only RG-6 grade coaxial cable. Using lower grade RG-59 coaxial cable may result in excessive signal loss and poor reception

3.2. Check and adjust satellite dish /antenna Azimuth angle using compass

Azimuth is the direction of a celestial object, measured clockwise around the observer's horizon from north. So an object due north has an azimuth of 0° , one due east 90° , south 180° and west 270° . Azimuth and altitude are usually used together to give the direction of an object in the topocentric coordinate system.



Fig. 3.2.1 azimuth direction

Return to your dish, and call to your helper to ensure you can hear each other. Look at the mount for your dish, and you'll see markings for its angle of elevation. Loosen those bolts with a socket wrench, and adjust the bracket to the approximately correct elevation. Tighten the bolts again.

Step 2

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Refer to your notes for the correct azimuth, then use a compass to locate the correct bearing. Turn the dish physically in a slow arc, until it's pointed in approximately the right direction. Ask your helper to shout when the signal-strength indicator begins to move.

Step 3

Turn the dish in one direction, just a degree at a time, and wait for your helper to respond after each movement. Repeat, until the signal strength peaks and then begins to fade again.

Step 4

Move the dish slowly back in the other direction, until your partner tells you the signal has once again peaked. Tighten the bolts on the mount to finalize the azimuth.

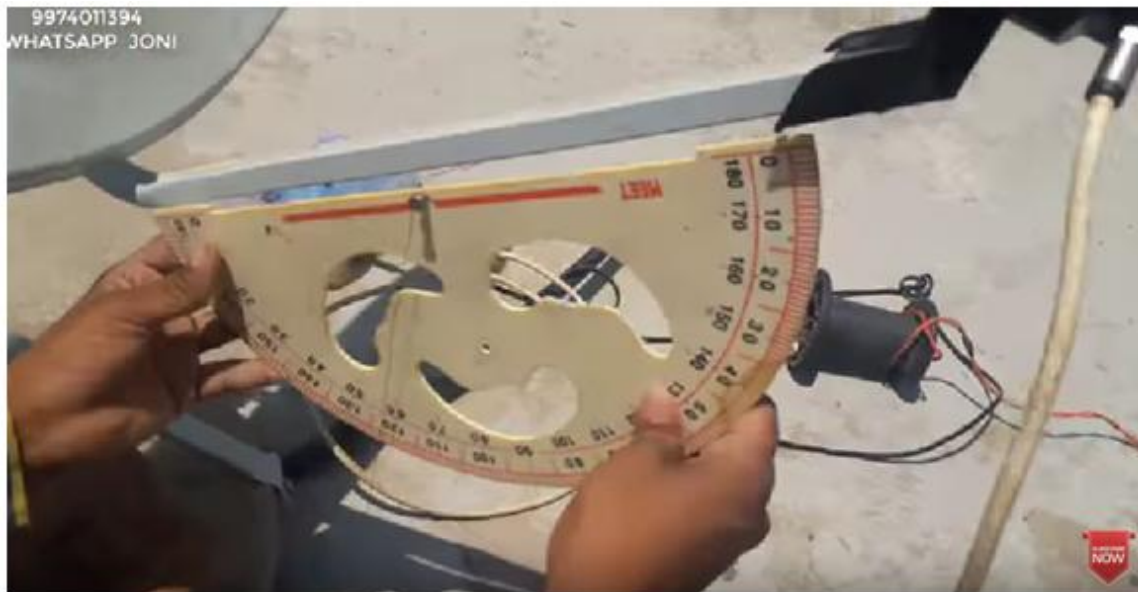


Fig.3.3.2 adjust Azimuth angle using compass

Adjust the azimuth of your satellite dish.

The azimuth refers to the rotation of the whole satellite dish around a vertical axis (the mast). It is the horizontal (side-to-side) angle. To adjust the azimuth of your satellite dish:

1. Use your compass to determine which direction is west.
2. Rotate your satellite dish slowly from the west towards the east, while monitoring the broadcast signal level on the signal meter of the Dish Pointing menu.
3. Rotate your satellite dish towards the east once you see the broadcast signal start to increase. When the broadcast signal starts to decrease again, rotate your satellite dish back towards the west until the signal meter has reached the highest signal level.

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4. Tighten the support sleeve nuts completely and ensure your satellite dish can no longer move.

3.3. Check and adjust elevation is using inclinometer and elevation meter

- Elevations are usually measured in meters or feet. They can be shown on maps by contour lines, which connect points with the same elevation; by bands of color; or by numbers giving the exact elevations of particular points on the Earth's surface. Maps that show elevations are called topographic maps.

Elevation Adjustment insert the 3/8" Carriage head bolts in the elevation adjustment area. Insert a lock nut on each bolt. Tighten just enough to hold in place.

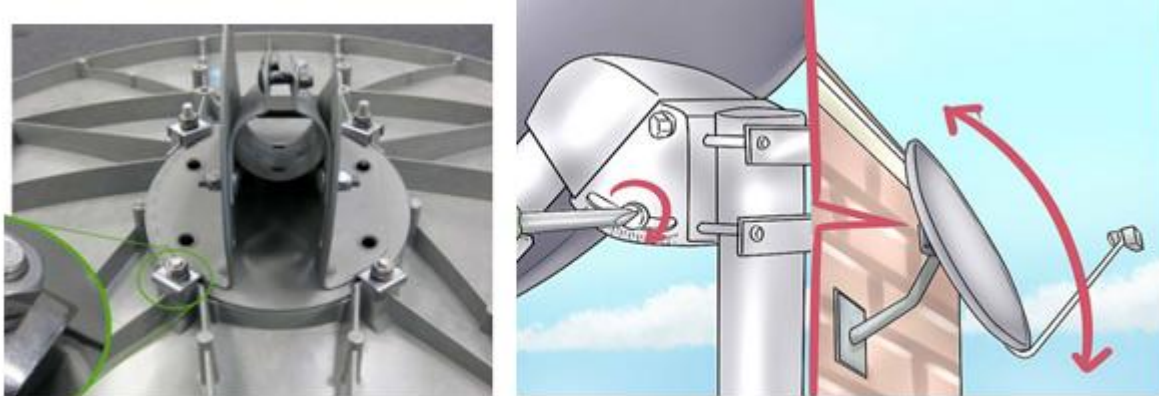


Fig.3.3 elevation adjustment

- An inclinometer or clinometers, is an instrument used for measuring angles of slope/tilt and elevation/depression of an object with respect to gravity. An electronic inclinometer is able to read angles to very precise degrees. When placed against a solid object, the inclinometer compares the angle of the object to the gyroscope, and displays the result on an electronic readout. A mercury inclinometer works in a similar way.



Fig.3.3.1 different type of inclinometer

3.4. Check satellite dish / antenna for normal operation

3.5. Adjust or checked support for proper position and feed horn for normal operation

- ✓ Check the azimuth, elevation and skew settings for the location that you recorded
- ✓ Check that the dish skew is set to the skew setting listed for your area. The skew alignment mark is



3.6 Check LNB for functionality in accordance with operational manual

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LNB (low-noise block downconverter):- is the receiving device mounted on satellite dishes used for satellite TV reception, which collects the radio waves from the dish and converts them to a signal which is sent through a cable to the receiver inside the building.

There are various types of LNBs including:

- ✓ Single
- ✓ Twin
- ✓ Quad / Quattro
- ✓ Octo

Each of them has a certain number of outputs: Single - 1, Twin – 2, Quad – 4, Octo – 8, which are all equal to a single LNB, all that varies is the usage. Quattro LNB's is different from these, as it includes four different outputs and can be used only with multiswitches. If more than 8 independent outputs are required, Multiswitches can be more cost effective capable of supplying between 8-32 independent rooms or Properties, Suitable for Large Dwelling, Hotel or Housing Block.



Fig. 3.6 type of LNB

The steps to check a satellite LNB.

After observing its physical conditions, you should test it with a satellite signal meter following a few given steps.



1. First of all, disconnect the power of satellite TV receiver or Satcom modem and then check the LNB. You should replace it if the casing which encloses LNB is damaged.
2. Check the joints, if they are loose, screw them, or if they are corroded, you will have to replace it with a new one.
3. Now check the LNB using satellite signal meter. Unscrew it from LNB's signal output jack and screw one of its fly-lead into the input socket into the digital satellite signal meter which is powered with a battery. Further, screw the other end into the output jack on the Low Noise Block.
4. Now, read the signals in the meter. If there are no or low signal, LNB needs to be changed.

3.7 Check maximum interception for normal operation



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Instruction Sheet	LG Code: EEL BEC2 MO5LO4LG30
Self Check #1	Written Test

Name: _____ Date: _____

Starting Time: _____ Finished time: _____

Instructions: Read the question carefully and select the best answer. If you have any clarification, please ask your teacher for further explanation.

I. Give Short answer (3 points each)

1. What is a satellite finder (or sat finder)?
2. Write the difference between Analog satellite finder and Digital satellite finder?
3. _____ Wh

at is Universal LNB?

Note: Satisfactory rating – 4.5 points Unsatisfactory - below 4.5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Part I

1. _____

2. _____

3. _____



This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Servo Motor Drive Mechanism
- Check the supply power to the motor.
- Check sensor/limit switch.
- Coaxial Cable, Termination, Continuity test
- Replacing defective parts

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Installing, terminating and testing coaxial cable.
- Replacing defective parts of satellite and antenna system.

32. Read the specific objectives of this Learning Guide.
33. Follow the instructions described in number.
34. Read the information written in the information “Sheet ----, Sheet ---, and Sheet --”.
35. Accomplish the information “Sheet ---, Sheet ----, in page ”.
36. Try to answer self-check, you can ask your trainer for correction. If you finished answering the Self-check, take correction or explanation from your trainer if it is not clear.
37. If you scored a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, discuss with your trainer for further instructions or go back to learning operation sheet-----.
38. Submit your accomplished Self-check. This will form part of your training portfolio.
39. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you Instructor for assistance if you have hard time understanding them.
40. Accomplish the “Self-check 2” in page .
Ask from your teacher for correction (key answers) if any.

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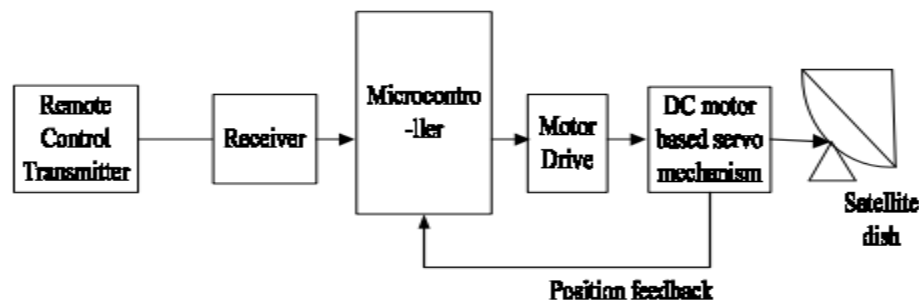
41. Read the information written in the “Information **Sheets 3**”. Try to understand what are being discussed and ask your teacher for assistance if you have hard time understanding them.
42. Accomplish the “**Self-check -----**” in page **_____**.
43. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (To get the key answer only after you finished answering the Self-check 3).
44. If you scored a satisfactory evaluation proceed to “Operation Sheet 1” in page **_____**, however, if your rating is unsatisfactory, see your teacher for further instructions or go back to **Learning Activity #1**.
45. Read the “**Operation Sheet 1**” and try to understand the procedures discussed.

LO4:Repair Dish Drive Mechanism

Motor Driven Satellite dishes: Configured with a stepper motor. These can be controlled from the sky and moved to a suitable position according to a satellite position.

A dish that is mounted on a pole and driven by a stepper motor or a servo can be controlled and rotated to face any satellite position in the sky. Motor-driven dishes are popular with enthusiasts.

BLOCKDIAGRAM OF THE SYSTEM



4.1 .Supply power to motor is checked by voltmeter and power connector cable checked by ohmmeter

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- ✓ When an electric motor fails to start, runs intermittently, runs hot, or continually trips its overcurrent device, there may be a variety of causes. Sometimes the trouble lies within the power supply, including branch circuit conductors or motor controller. Another possibility is that the driven load is jammed, binding or mismatched. If the motor itself has developed a fault, the fault may be a burnt wire or connection, a winding failure including insulation deterioration, or a deteriorating bearing.



- ✓ The basic procedure is to measure the start-up and running current for any motor while it is connected to a load. Compare the reading to documented or nameplate specifications. As motors age, the current drawn generally rises because winding insulation resistance drops. Excess current causes heat, which must be dissipated. Insulation degradation accelerates until there's an avalanche event, causing motor burn out.

4.2. Defective power connector cable is repaired /replaced according to the specification



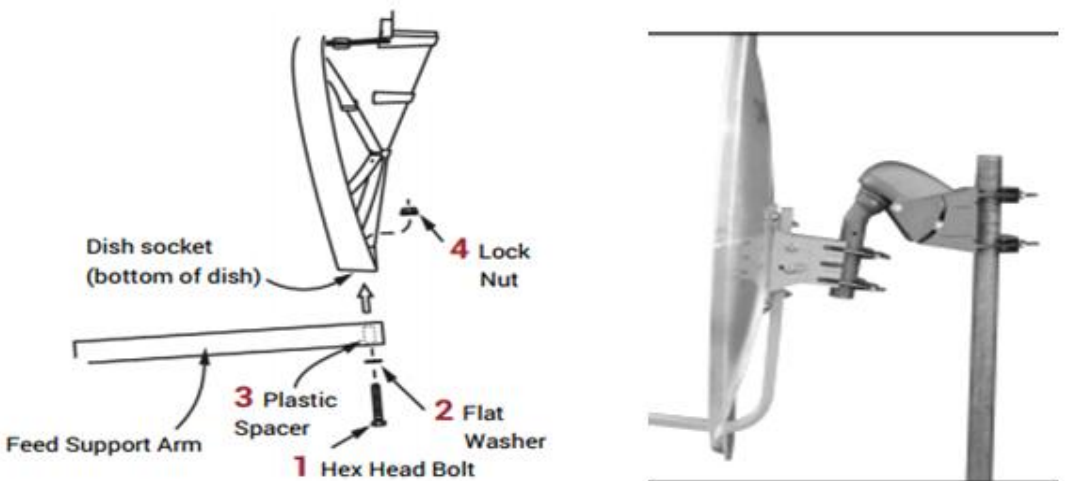
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4.3. Mechanical arm is checked for normal operation

Attach the Satellite Feed Support Arm to the 60cm Elliptical Dish Attach the Satellite Feed Support Arm to the 60 cm Elliptical Dish using the remaining hex head bolt(1), flat

washer (2), plastic spacer(3), and lock nut(4), as shown in fig below Ensure the slot at the opposite end is on the underside of the feed support arm. Tighten fully.

Do not attach the LNB to the Satellite Feed Support Arm.



4.4. Defective mechanical arm and gear are repaired /replaced according to the manufacturer's specification/service manual

Diagnostic Testing – Activities that involve using test equipment to assess the condition of equipment after unusual events, such as equipment failure/ repair/replacement or when equipment deterioration is suspected. These activities are not predictable and cannot be scheduled because they are required after a forced outage. Each office must budget for these events. Some examples are governor troubleshooting, unit balancing, and vibration testing.

Servicing the Gears: Gears translate the motor's power into torque that turns a can. This requires a feed gear at the edge of the can and at least one other larger gear inside the appliance. To check and replace gears:

Step 1: Inspect the feed gear and clean or replace if worn or broken.

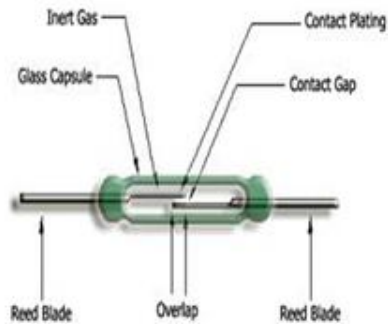
Step 2: Check internal gears by opening the appliance case and carefully removing gears. Teeth may be missing or warped, or the gears may simply need lubrication with a white lubricant. If the gears need to be replaced, make sure the replacement gears match exactly in every measure, including width, circumference, and number of teeth.

Step 3: If a replacement to a broken gear cannot be found, consider using a plastic or metal glue, as required, to repair the break. When done, carefully reassemble the gears and case, then test the appliance.



4.5.Sensor/limit switch is checked using ohmmeter and defective sensor/limit switch repaired /replaced according to the specification

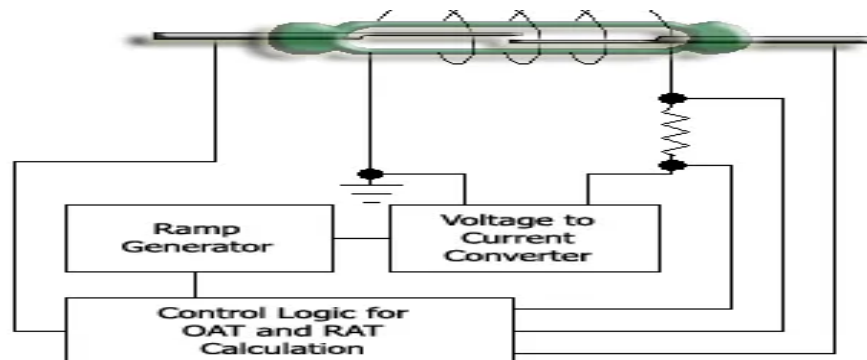
The reed switch is an electrical switch operated by an applied magnetic field. It consists of a pair of contacts on ferrous metal reeds in an airtight glass envelope. A reed sensor uses magnetic fields to open or close a switch. Unlike solid state, or other mechanical switches, a reed sensor consumes zero power as it operates based on the flux of the magnetic field . Reed switches respond to both magnetic poles(North and South).



Reed Switch



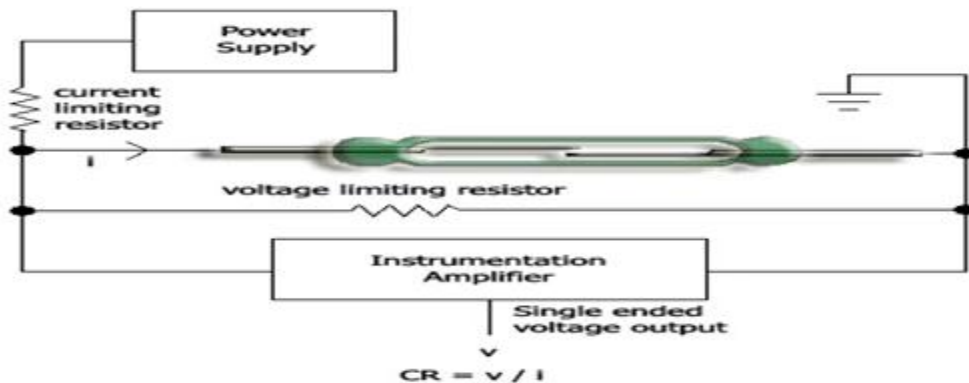
The current in the coil is then increased to the point where the reed switch operates, and then multiplied by the number of turns in the coil to give Operate AT. Contact resistance is measured across the contacts by forcing 10 mA test current and 100 mV, after giving 25% AT more than the Operate AT, which is known as Over-drive. Release AT is measured by decreasing the coil current from the Over-drive AT. Dynamic Contact Resistance is measured up to the switching frequency limit. All the measurements are carried out for 10 cycles.



Circuit for measurement of Ampere-Turn



Operate AT and release AT are calculated by measuring the voltage developed across a reference resistor, finding out the current through it, and multiplying the value by the number of turns of the test coil. Suitable compensations may be incorporated to cancel out the earth's magnetic field. The test coil may be of 5000 or 10000 turns to minimize positional errors.



The benefits for selecting a reed switch for an application include:

- ✓ Sealed unit so can be used for liquid / fluid level monitoring and measuring
- ✓ No wearing parts, so can open and close in the billions of operations
- ✓ Low current, Low voltage switch activation
- ✓ Zero Power consumption operation
- ✓ Rated for hazardous environments



4.6. Motor winding is checked using ohmmeter

Stepper motor repair

Stepper motors are a brushless DC electric motor that uses magnetism to partition a full rotation into a number of equal steps. They provide a motion-control positioning system for small applications such as 3D printing, packaging machinery and on small axis CNC machining.

Step 1: Unplug the appliance, open it up, and find the fault on the motor.

Step 2: Place one continuity tester probe to one side of the wire and the second probe on the other side of the wire. If the continuity light doesn't illuminate, the wire is blown and must be replaced.

Step 3: Attach a continuity tester or multimeter across the two wires on the field coil winding. If the circuit is open, replace the motor as a unit. You can get one of the exact size and rating from an appliance-parts store.

Step 4: Always check the bearings for wear that will cause the shaft to wobble. Remove the rotor to check for damage or excessive wear.

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4.7. Faulty motor winding is repaired /replaced according to the manufacturer's specification

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electrical repair, rewinding, and testing.

- ✓ Providing a quality assurance program and warranty
- ✓ Replacing all broken and worn parts per OEM specifications
- ✓ Conducting stator core tests both before and after winding removal to check for stator core damage
- ✓ Repairing or replacing defective stator core laminations
- ✓ Calibrating all test equipment and measuring devices at least once yearly to the national standard to ensure accuracy
- ✓ Recording winding resistance and room temperature before and after repair to ensure that the resistance measured is within spec and balanced on all three phases
- ✓ Carrying out insulation resistance test, surge comparison tests, high-potential tests, nominal, and no-load testing
- ✓ Regulating power supply to ensure good power quality at the appropriate rated voltage for motor tests

Self Check #1	Written Test
---------------	--------------

Name: _____ Date: _____

Time Start: _____ Time Finish: _____

Instruction: Answer all the questions provided correctly, if you have some clarification regarding the test just raise your hand and ask the assistance of the teacher.

Part I. Give Short answer for the following

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1. What is Motor-driven dish? (3 points)
2. What are the possible root causes in satellite dish receiver? (4 points)

Note: Satisfactory rating – 3.5 points Unsatisfactory - below 3.5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

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Scored Points

Part I

4. _____

5. _____



Instruction Sheet	LG31: Prepare product and work station for assembly
--------------------------	--

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Visually inspecting External part of satellite receiver
- Opening satellite case according to manual
- Freeing from dust Internal part of satellite receiver using blower
- Tightening or re-soldering loose connection with cold solder if appropriate
- Cleaning and lubricating moving parts and head of magnetic tape path
- Cleaning mechanical parts using appropriate cleaning materials

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to:**

- Visually inspect External part of satellite receiver
- Open satellite case according to manual
- Free from dust Internal part of satellite receiver using blower
- Tighten or re-solder correctly and firmly loose connection with cold solder if appropriate
- Clean and lubricate moving parts and head of magnetic tape path using appropriate materials and tools in accordance with manufacturer's specifications
- Clean mechanical parts using appropriate cleaning materials

Learning Instructions:

Learning Instructions:

46. Read the specific objectives of this Learning Guide.
47. Follow the instructions described in number 3 to 20.
48. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3 and Sheet 4".
49. Accomplish the information "Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 6 and Sheet 6".
50. Try to answer self-check, you can ask your trainer for correction. If you finished answering the Self-check, take correction or explanation from your trainer if it is not clear.



51. If you scored a satisfactory evaluation proceed to “Information Sheet 2”. Submit your accomplished Self-check 2. This will form part of your training portfolio.
52. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you Instructor for assistance if you have hard time understanding them.
53. Accomplish the “Self-check 2” in page____
Ask from your teacher for correction (key answers) if any.
54. Read the information written in the “Information Sheets 3. Try to understand what are being discussed and ask you teacher for assistance if you have hard time understanding them.
55. Accomplish the “Self-check 3” in page ---.
56. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (To get the key answer only after you finished answering the Self-check 3).
57. If you scored a satisfactory evaluation proceed to “Operation Sheet 1” in page_____



Information sheet	Visually inspect External part of satellite receiver
--------------------------	---

5.1 Visually inspect External part of satellite receiver

- External visual inspection is a process of verifying the attributes of parts such as Device condition, part markings, and evidence of the device, Ports conditions, dimensions and surface quality.
- Visual Inspection, used in maintenance of facilities, mean inspection of equipment and structures using either or all of raw human senses such as vision, hearing, touch and smell and/or any non-specialized inspection equipment.
- Visual **inspection** is, most generally, an organized formal evaluation. In engineering inspection involves the measurements, tests. The results are usually compared to specified requirements and standards for determining whether the service, the products and the activity is in line with the required targets.
- **Visual Inspection**, or Visual Testing (VT), is the oldest and most basic method of inspection. It is the process of looking over a piece of equipment using the naked eye to look for flaws. It requires no equipment except the naked eye of a trained inspector.
- Visual inspection can be used for internal and external surface inspection of a variety of equipment types, including storage tanks, pressure vessels, piping, and other equipment.

Inspect visually Physical parts

- ✓ *Accessories of the device*
- ✓ *Buttons of the device*
- ✓ *Cover of the device*

Identify whether there is

- ✓ *Dust and dirt*

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- ✓ Loose connection and Disconnection and
- ✓ Study and Identify all external parts



Fig. Hardware Device of satellite receiver and its ports



Self-check 1	Written test
---------------------	---------------------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (2 point each)

- B) _____ is a process of
verifying the attributes.
- A) _____
dismantling C) installation D) Cleaning B) **Inspection**
5. Which of the following activity
does not need instrument?
- B) **Visual inspection** B)
Measuring C) cleaning D) tightening
6. Which of the following connects
dish and receiver?
- B) Inclinator
C) Finder
D) signal calculator apps
E) **Coaxial** cable

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Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6 points

You can ask your teacher for the copy of the correct answers.

Answer sheet

Score _____

Rating _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-2

Open satellite case according to manual

5.2 Open satellite case according to manual

Important Safety Instructions

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean external part only with dry cloth.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the





provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Opening procedure

1. Switch off power
2. Disconnect power plugs
3. Disconnect AV or DV output
4. Disconnect coaxial cable
5. Remove USB
6. Open the screws using appropriate tools
7. Remove the cover or case of the top

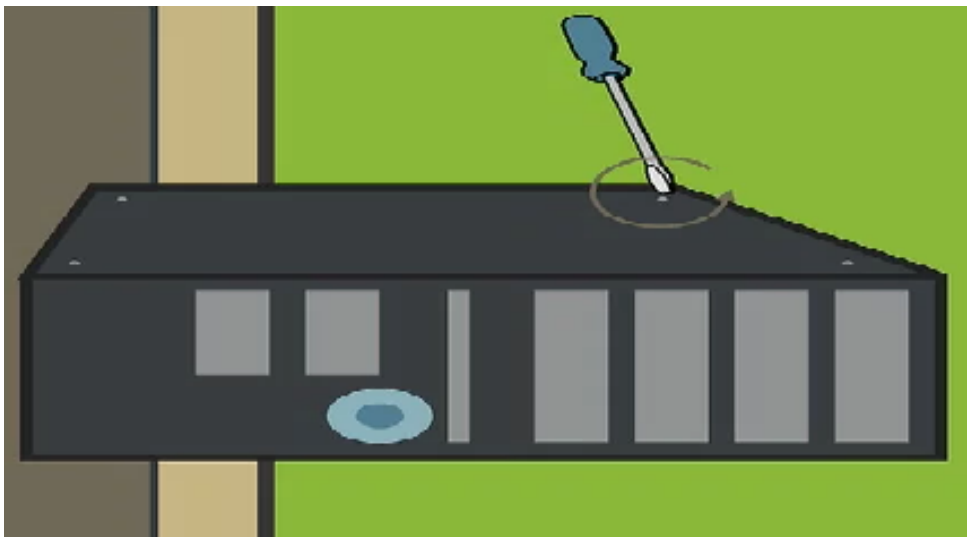


Fig. opening procedure

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Fig. opened receiver for cleaning

Self-check 2	Written test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Match the following questions? (2 point each)

1. Unscrewing

A) cleaning

C)

Instruction provided with device

B) installing

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- D) outlet C) unplugging Disconnecting device from socket
- E) Disassembling the device
- D) opening E) loosening screw
- F) service manual

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6 points

You can ask your teacher for the copy of the correct answers.

Answer sheet

Score _____

Rating _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-3	Free from dust Internal part of satellite receiver using blower
----------------------------	--

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5.3 Free from dust Internal part of satellite receiver using blower

Cleaning

- Use blower to clean or
- Use appropriate brush if necessary

Spray compressed air onto the circuit board. The circuit board will most likely be green, with squiggly, silver lines on it. Spray compressed air in short bursts onto the board, keeping the canister upright and the nozzle a few inches away from the circuit board. This will also give you an opportunity to look for grime and corrosion that may require more extensive cleaning.

Grime and corrosion that is especially large or is building up near a heat generator or on top of circuit pathways should be removed





Self-check 1	Written test
---------------------	---------------------

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (2 point each)

- F) _____ is a cleaning method used to remove dust from circuit.
- B) compressed air **C) dusting** D) all E) B & C **Inspection** B)
2. Which of the following activity does not need instrument?
- C) Measuring C) cleaning D) tightening **Visual inspection** B)
7. Which of the following connects dish and receiver?
- F) Inclinator
G) Finder
H) signal calculator apps
I) **Coaxial** cable

Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

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Answer sheet

Score _____

Rating _____

Name: _____

Date: _____

Short Answer Questions

Information sheet-4

Tighten or re-solder firmly loose connection

5.4 Tighten or re-solder correctly and firmly loose connection with cold solder if appropriate

- Tight the connectors if there is loose connection due to blowing of brushing
- Study parts and their position and function
- Ask if there is unclear





Information sheet-5	Clean and lubricate moving parts and head of magnetic tape
----------------------------	---

5.5 Clean and lubricate moving parts and head of magnetic tape path using appropriate materials and tools in accordance with manufacturer's specifications

Preservation of magnetic audiotape comprises techniques for handling, cleaning and storage of magnetic audiotapes in an archival repository. Multiple types of magnetic media exist but are mainly in the form of open reels or enclosed cassettes.

Although digitization of materials on fragile magnetic media in library and information science is a common practice, there remains a need for conserving the actual physical magnetic tape and playback equipment as artifacts.



Fig. a) Magnetic tape cleaning



b) Magnetic tape



Information sheet-6	Clean mechanical parts using appropriate cleaning materials
----------------------------	--

5.6 Clean mechanical parts using appropriate cleaning materials

Cleaning Electronics with Isopropyl Alcohol

Chemicals are found throughout the electronic assembly and repair process, but no solvent is more common than isopropyl alcohol. It is universally used for cleaning and as a main constituent of fluxes, but how much do you really know about isopropyl alcohol?

Isopropyl alcohol is also referred to as IPA, isopropanol, 2-propanol, and even rubbing alcohol (more on that later). It dissolves a wide range of polar and non-polar soils, is it is often used to dissolve and remove light oils, fingerprints, cutting fluids, flux residues, carbon deposits, and mold release. It is also readily miscible in water, so can be used as a drying agent as well.

For electronic printed circuit board (PCB) assembly, you will find isopropyl alcohol being used to clean flux residues from recently soldered circuit boards or in PCB repair and rework. IPA is also used to remove solder paste or adhesive from SMT stencils.

Maintenance cleaning with isopropyl alcohol is common for removing caked-on and burnt-on flux from SMT reflow ovens, wave soldering fingers, selective soldering nozzles, pallets, and anywhere else flux tends to collect in automated soldering processes.

Dear trainees take care! When a solvent is not compatible with a substrate, it may cause crazing (micro-cracks), soften the material, or in the case of seals or gaskets, cause them to swell, shrink, or become brittle. The following figure shows an example how to use circuit electronics cleaner.

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Fig. how to use circuit electronics cleaner



**Self-check 6****Written test**

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I. Choose the best answer for the following questions? (2 point each)

1. What is the most commonly used cleaning chemical for electronics circuit?
Grease B) Cotton
3. **C) isopropanol** D) Brush
2. What will happen if you used incompatible cleaning chemical?
D) crazing B) Measuring
C) shiny and clean D) tightening



Note: Satisfactory rating 3 and 6 points

Unsatisfactory below 3 and 6points

You can ask you teacher for the copy of the correct answers.

Answer sheet

Score _____

Rating _____

Name: _____

Date: _____

Short Answer Questions



Reference

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