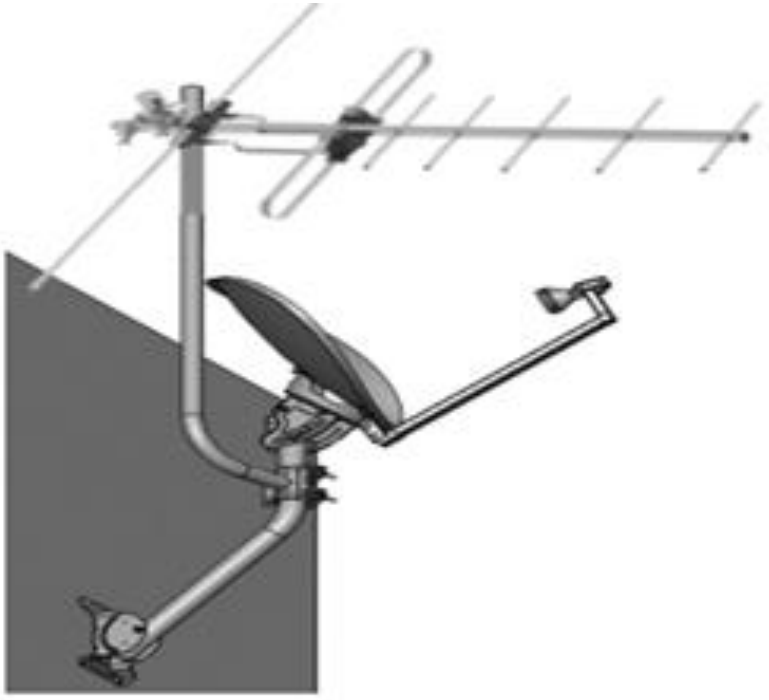
Building Electrical Installation

Level-II

Based on June 2022, Curriculum Version 1



Module Title: - Install Reception Antennae and Signal Distribution Equipment

Module code: EIS BEI2 M06 0322

Nominal duration: 60Hour

Prepared by: Ministry of Labour and Skill

August, 2022

Addis Ababa, Ethiopia

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MINISTRY OF LABOR AND SKILLS

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Acknowledgment

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Acronym

OHS occupational health and safety

LNB low noise blocker

WHS workplace safety

Introduction to the Module

In building electrical installation field; satellite dish installation unit of competence helps the trainees to complete modern house requirements in parallel with electrical system. The module covers the knowledge, skills and altitude of installation, positioning and securing of terrestrial and satellite arrays and dishes and associated amplifiers and the reticulation of cables and connection of multiple access outlets and associated equipment. It encompasses safe working practices, selection of antennae and distribution components, installation techniques, use of testing devices and following written and oral instruction and procedures.

This module covers the units:

- Reception antennae and signal distribution systems
- Reception antennae and signal distribution installation
- Reception antennae system Set up

Learning Objective of the Module

- Describe **Reception antennae and signal distribution systems**
- Install **Reception antennae and signal distribution systems**
- **Set up Reception antennae** system.

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of each unit
5. Read the identified reference book for Examples and exercise

Unit one: Reception antennae and signal distribution systems

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- OHS procedures.
- Safety hazards.
- nature and location of dish installation work
- sources of materials required for the work
- tools, equipment and testing devices

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

- Apply OHS procedure during antenna installation
- Identify Safety hazards
- Understand nature and location of work
- Describe sources of materials required for the work
- Identify tools, equipment and testing devices

1.1. OHS policies and procedures

OHS Policies and Procedures are a major part of protecting the safety, health and welfare of people engaged in work or employment. Having a clear set of OHS Policies and Procedures will make it clear to all concerned where the guidelines and boundaries are in relation to the operation of the business**.**

- **Definition of (OHS)**

Occupational safety and health (OSH) also commonly referred to as occupational health and safety (OHS) or workplace health and safety (WHS) is an area concerned with the safety, health and welfare of people engaged in work or employment. The goals of occupational safety and health programs include fostering a safe and healthy work environment. OSH may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment.

- **OHS requirements**

OHS requirements are legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of firefighting equipment, enterprise first aid, hazard control and hazardous materials and substances

1.2. Safety hazards

Anything (e.g. condition, situation, practice, behaviour) that has the potential to cause harm, including injury, disease, death, environmental, property and equipment damage. A hazard can be a thing or a situation. This is the process of examining each work area and work task for the purpose of identifying all the hazards which are "inherent in the job

1.3. Nature and location of dish installation work

- **Nature of installation work**

"Do-it-yourself" consumer can mount an antenna, run transmission line and pull in some kind of a signal. But only a professional can select and precisely install the correct antenna and assure his customers years of superior TV/FM reception

Back in the 1940s, TV antennas were actually manufactured by hand at the installation site. Each antenna was assembled, in customer's home. Channel Master eliminated this piece by piece, at

the time-consuming labour by introducing the first preassembled TV antenna, providing excellent reception in all areas and at reasonable prices.

Today medium-to-high gain, broadband antennas are essential for good reception. Even the most expensive colour TV or FM stereo receiver can't perform to full potential without the strong signals that only quality antenna system can provide. Advanced antenna theory and design is not included time-tested methods and procedures for properly installing TV and FM antennas. With this foundation of knowledge, you can build your reputation as a professional antenna installer– one who is capable of assuring his customers the finest performance from today's sophisticated TV and FM equipment.

- **Directivity**

Directivity is the ability of an antenna to intercept signals from only one direction and reject those from other directions. Directivity indicates the antenna's ability to intercept signals arriving at its front and reject signals coming from the sides and rear. Generally, the more highly directive an antenna, the better it can reject signals from the sides and rear. The front-to-back ratio of an antenna can be helpful when attempting to determine its directivity Front-to-back ratio is expressed in decibels (dB) and can be found in the literature accompanying a new antenna. This ratio indicates an antenna's ability to reject signals coming from the rear (rear rejection). For example, an antenna with a front-to-back ratio of 25 dB will receive about 18 times more signal strength. From the front than from the back in most cases, an acceptably accurate estimate of an antenna's directivity can be made by comparing its specified front-to-back ratio with the relative sensitivity classifications listed in Table 1.1. The sensitivity classifications in Table 1.1 are intended only as general guidelines for evaluating directivity. Other factors, such as the antenna's beam width, can affect its directivity. Beam width is related to if two antennas have the same front-to-back ratio, the one with the highest overall gain will have the narrowest beam width and consequently, will be the most directive.

Table 1. 1 Typically sensitive classification

Area Designation	For VHF	For UHF
Deepest Fringe	100+ miles	60+ miles
Deep Fringe	100 miles	60 miles
Fringe	80 miles	45 miles
Near Fringe	60 miles	35 miles
Far Suburban	50 miles	35 miles
Suburban	45 miles	30 miles
Far Metropolitan	30 miles	25 miles
Metropolitan	25 miles	15 miles

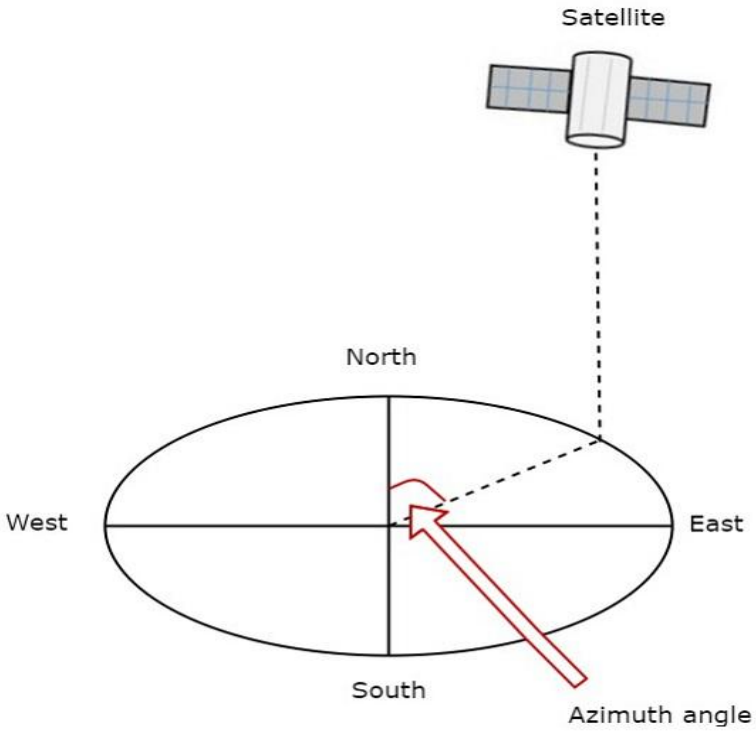


Figure 1. 1 location of antena

Signal Strength

Ideally an antenna should be mounted at the point where the signals are the strongest through of this is impractical or impossible also the antenna should be mounted where it can be easily serviced should repairs or adjustments be required in the future. So carefully "aiming"

(orienting) the antenna and adjusting its height often can overcome the problems created by installing it in a slightly weaker signal area in an area where there is a relatively short, unobstructed signal path between the installation and the transmitting towers, you can mount the antenna just about anywhere and receive sufficient signal. As you move deeper into the fringe areas however, there may be significant differences in signal strength at various points on the roof. This is where careful antenna selection, precise orienting, and accurate adjustment of the height become essential. The careful installer should be able to

Large trees can present reception problems and nearby high-voltage power lines can cause interference that cannot be completely eliminated. Consequently, the farther the antenna is from large trees and high-voltage Lines, the better the reception will be locate a spot where there is both a usable signal.

- **Walking the roof for optimum signal strength**

Walking the roof" is usually the best way to find the spot on the roof where the strongest signals are present. First, attach a small TV antenna to short mast (4-6 feet). Attach one end of a short transmission line to the antenna terminals. Attach the other end of the transmission line to the input jack of a field-strength meter.

Then walk to the most suitable mounting areas. Point the front of the test antenna in the general direction of the transmitter tower(s), slowly, rotate the antenna while carefully watching the field-strength meter. Most field strength meters are equipped with shoulder straps that free both of your hands for manipulating the antenna

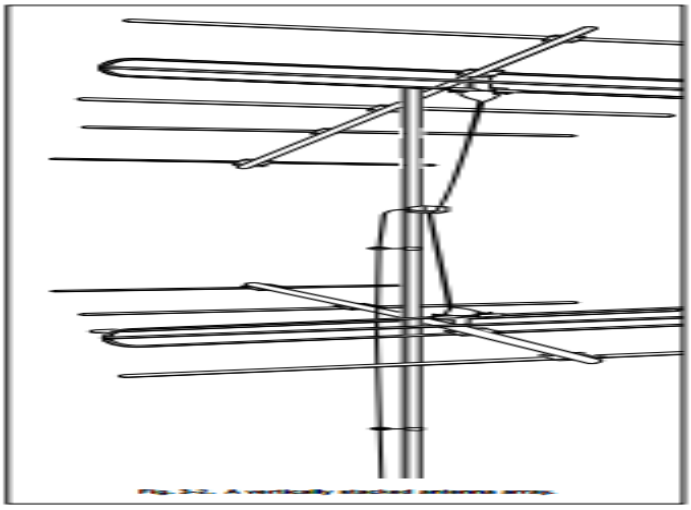


Figure 1. 2 Roof antenna

❖ **Using a field-strength meter**

A small, battery-powered portable TV is helpful for determining general reception quality. However, there is no better way to determine actual signal strength than to use a field-strength meter it is one of the best investments you can make. The meter will save you so much time and trouble that it will quickly pay for itself

1.4. Sources of materials required for antennae installation work

❖ **Concepts of local resources**

The term local resources (or community resources similar term) are assets in a community that help meet certain needs for those around them.

❖ **Types of local resources**

The type of these local resources can be;

It can be a person- Residents can be empowered to realize and use their abilities to build and transform the community.

It can be a physical structure or place- a school, hospital, church, library, recreation center, and social club.

It can be a community service- that makes life better for some or all community members - public transportation, early childhood education center, community recycling facilities, cultural organization.

It can be a business- that provides jobs and supports the local economy.

❖ **Tools, equipment and testing devices**

In the antenna installation the following tools, equipment and testing devices are very important and mandatory.

➢ **Tools**

- Combination plier: it is the most common electrical hand tools used for different purpose. It can also use for dish installation.
- Knife: a good quality electrician's penknife is mainly used to remove the sheath from the various types of cables and flexible cords
- Screwdrivers: There are a wide variety of types and sizes of screwdriver, some of which have very specialized uses, e.g. tamper proof fixings
- Wrench : Wrench is the most important tools in antenna installation with different size

➢ **Equipment**

Dish antenna installation need special equipment such as ladder and personal protective equipment (PPE). PPE includes protective eyewear, insulated gloves, hard hats, aprons and breathing protection. Most forms of PPE are not relevant to minimizing electrical risks in workplaces, except in relation to energized electrical work. Administrative controls and PPE do nothing to change the hazard itself. They rely on people behaving as expected and require a high level of supervision

➢ **Testing device**

Satellite finder: a satellite finder meter is a specialized device designed to help you position your satellite dish to receive the strongest signal for best television reception. It's easy to adjust your own satellite dish.

This article describes a satellite finder that we can build ourselves to assist with aligning the satellite TV dish without having to take our receiver outside. We are proposing a signal strength measurement meter which will greatly help in optimizing the dish antenna alignment precisely, once after the satellite is located.



Figure 1. 3 SAT finder

Self-check-1

❖ Part-I Matching

Instruction: select the correct answer for the given choice. You have given 1 Minute for each question. Each question carries 2 Point.

_____1.the potential to cause harm, including injury	A. Hazards
_____2. The ability of an antenna to intercept signals from Only one direction	B. safety C. field strength meter
_____3. The unit of front back ratio	D. decibels (dB)
_____4. A small, battery-powered portable TV	E. Directivity
_____5. Occupational health and safety	F. OHS

❖ Part-II Choose the best alternative and write on the provided space

You have given 1 Minute for each question. Each question carries 2 Point.

1. The best way to find the strongest signal spot location is
   A. antenna gain B. Directivity C. walking the roof D. mounting on the roof
2. The ratio indicates an antenna's ability to reject signals coming from the rear (Rear rejection) is called
   A. Distance ratio C. Directivity ration
   B. front-to-back ratio D. strengthen ratio
3. _____is mainly used to remove the sheath from the various types of cables and flexible cords.
   A. good quality electrician's penknife B. pliers C. screw drivers D. wrenches
4. A specialized device designed to help you position your satellite dish to receive the strongest signal for best television reception is called
   A. Multi meter B. LNB C. SAT finder meter D. continuity tester
5. One of the following is categorized under personal protective equipment
   A. Combination plier B. Safety shoes C. Helmet D. B&C

Unit Two: Reception antennae and signal distribution installation

This unit to provide you the necessary information regarding the following content coverage and topics:

- **OHS risk control measures**
- **Optimum location for an antenna installation**
- **Assembling and installing TV antennas**
  - types of transmission line
  - Characteristic of impedance attenuation, band width.
  - *Installing accessories straight and square in the required locations*
- **Terminating Cables and conductors with accessories**
- **Carrying out antenna installation**

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

- Apply OHS risk control measures
- Select Optimum location for an antenna installation
- Assemble and install TV antennas
- Terminate Cables and conductors with accessories
- Carry out antenna installation

2.1. OHS risk control measures

❖ **Risk Control**

Taking actions to eliminate health and safety risks so far as is reasonably practicable. Where risks cannot be eliminated, then implementation of control measures is required, to minimize risks as far as is reasonably practicable.

➢ **Risk Assessment**:

Risk assessment is defined as the process of assessing the risks associated with each of the hazards identified so the nature of the risk can be understood

➢ Responsibilities of Effective risk management**:**

Effective risk management requires the commitment to WHS from managers and Officer as well as the input and involvement of workers

➢ **Risk Assessment Procedure**

- Identify factors that may be contributing to the risk,
- Review health and safety information that is reasonably available and relevant to the particular hazard,
- Evaluation of how severe the harm could be.
- Evaluation of how a hazard may cause harm..
- Determining the likelihood of harm occurring.
- Identify the actions necessary to eliminate or control the risk;
- Identify records that it is necessary to keep to ensure that the risks are eliminated or controlled.

➢ **The hierarchy of risk control is to be applied as follows:**

- Elimination: change the work practices so that electrical equipment is no longer required to be used.
- Substitution: replace corded electrical equipment with cordless equipment to minimize the risk of electrocution during operation be implemented
- Engineering Control – install Residual Current Devices (RCDs) to reduce the risk of electric shock

- Administration -develops Safe Work Method Statement (SWMS) and provides Instruction and training in safe work methods and use of equipment

2.2. Optimum location for an antenna installation

❖ **Location of antenna**

➢ **Signal**

- In electronics, a **signal** is an electric current or electromagnetic field used to convey data from one place to another. More complex signals consist of an alternating-current (AC) or electromagnetic carrier that contains one or more data streams
- Signal means information and processing means operation. It means how information in the form of signal is operated or modified to get desired signal and how system process these signal any information generated in this world is a signal.
- It could be a image, an analog voice signal or digital signal of processor.

❖ **Follow the following steps to test and dial in your antenna for optimal signal quality**

- Disconnect the antennas RG6 coaxial cable from your television or tuner.
- Attach the antennas "F" connector to the socket on your antenna signal meter marked "Antenna
- Connect your television to the socket on your antenna signal meter marked "TV".
- Turn your antenna signal meter ON, and tune-in the lowest broadcast channel for your area.
- Slowly rotate your antenna 360 degrees and stop at the highest antenna signal strength (usually indicated by LEDs).
- Use a compass to read the direction of the highest antenna signal and record the result.
- Continue this pattern (steps 4 and 5) for each channel recording each result.
- Use your compass readings to calculate an average for optimal signal strength if you do not have a rotor and point your antenna in that direction. If you have a rotor, create a list of optimal directions for each channel

❖ **Signal Distribution**.

Radio Frequency (RF) signals which can carry TV and Radio signals can be distributed around a building to serve a number of users. One method of distributing RF signals within a building are fixed cables

The most important element of a TV antenna system is the antenna and a close second is the signal distribution system. The distribution system transports the TV signal from the antenna to the TV. This includes the coaxial cable, signal amplifiers, signal splitters, etc…

Anything that's in line between the TV antenna and the TV is considered to be part of the antenna distribution system.

- **Signal Amplifiers**

No matter what coaxial cable is in use there will be signal loss as the TV signal travels the coaxial cable to the TV. So signal amplifier is used to strength the weaken signal. The amount of signal amplification required is in direct relationship to the length of the coaxial cable from the antenna to the TV and if a signal splitter (divider) will be in line. At this point I suggest you visit the article titled "TV Antenna Preamplifier's and Distribution Amplifiers". At this link you can learn when to use a preamplifier or distribution amplifier. You will **a**lso find a chart that will help determine which amplifier is best for your particular TV antenna system. In many cases if the antenna will supply a single TV without the use of a signal splitter with a coaxial cable length from the antenna to the TV of 50 feet or less signal amplification will usually not be needed. However, in weak signal areas using a preamplifier is almost always a benefit.



Figure 2. 1 Distribution Amplifier

- **Signal splitter**

Many times there is more than one TV in the household that will be connected to the TV antenna. To distribute the signal to multiple locations requires the use of a signal splitter. A signal splitter is a device with one coax cable input and multiple coax cable outputs. You will find available 2 way, 3 way, 4 way, 6 way and 8 way signal splitters. The number determines the amount of coax cable outputs the splitter will have in the picture to the left is a 3 way signal splitter. The 3 way splitter consists of one input and three outputs. When using a signal splitter

you will like need a signal amplifier. The system should be kept balanced. In other words, if you have six locations where you want TV signals to be available don't install a 2 way splitter and run one output of that 2 way splitter to another 2 way splitter and so on. Never daisy chain signal splitters. It is best to install home run coax cable lines from one signal splitter to each TV. This method may be a little more work but it will pay off in performance.



Figure 2. 2 signal splitter

- **Location:**

There are three types of TV antennas you can choose from: indoor antennas, outdoor antennas and loft antennas. All have different methods of installation with pros and cons. We recommend you choose a TV antenna depending on your location. Opt for an indoor antenna if you live close to a transmitter in a good signal area. A loft or outdoor TV antenna works better in weaker signal areas.

2.3. Assembling and installing TV antennas

- **Types of transmission line**

- **Coaxial Cable**

A transmission line that consists of a tube of electrically conducting material surrounding a central conductor held in place by insulators and that is used to transmit telegraph, telephone, television, and Internet signals called also coaxial cable.

Always uses high grade solid copper wire coax cable. Many of the coax cables offered on the market have a copper clad center wire. Copper clad is a steel wire coated with copper and it's not as efficient as a solid copper wire. You can determine if wire is solid copper or copper clad by placing a magnet onto the end of the wire. If the wire is attracted to the magnet its copper clad. If the wire isn't attracted to the magnet it's solid copper

There are three basics sizes of coax cable in use for TV reception. The smallest and least efficient is RG 59 a better choice is RG 6 and the ultimate is RG 11. Frankly, RG 11 is very hard to work with, it's stiff, expensive and the benefits are minimal over RG 6 cable. All in all RG 6 solid copper coax cable is likely the best choice for most applications

- **Coaxial cable construction includes 4 parts:**

- Inner conductor.
- Outer conductor, typically a shield
- Dielectric material to separate the inner and outer conductors.
- Jacket.

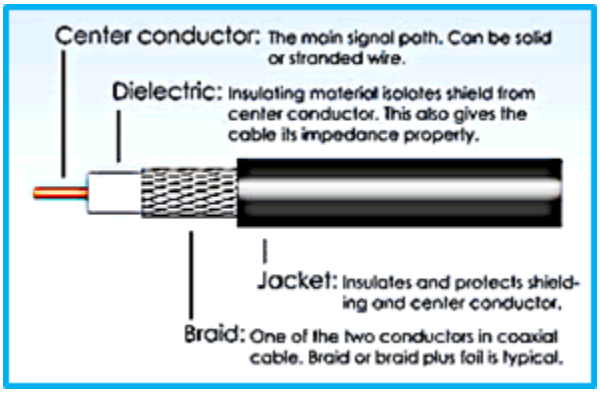


Figure 2. 3 Coaxial cable

2.4. Characteristic of impedance attenuation, band width.

Antenna impedance relates the voltage to the current at the input to the antenna. This is extremely important as we will see.

Let's say an antenna has an impedance of 50 ohms. This means that if a sinusoidal voltage is applied at the antenna terminals with an amplitude of 1 Volt, then the current will have an amplitude of 1/50 = 0.02 Amps. Since the impedance is a real number, the voltage is in-phase with the current.

Hence, antenna impedance is a simple concept. Impedance relates the voltage and current at the input to the antenna. The real part of the antenna impedance represents power that is either radiated away or absorbed within the antenna. The imaginary part of the impedance represents

power that is stored in the near field of the antenna. This is non-radiated power. An antenna with a real input impedance (zero imaginary part) is said to be resonant. Note that the impedance of an antenna will vary with frequency.

While simple, we will now explain why this is important, considering both the low frequency and high frequency cases.

Bandwidth is another fundamental antenna parameter. Bandwidth describes the range of frequencies over which the antenna can properly radiate or receive energy. Often, the desired bandwidth is one of the determining parameters used to decide upon an antenna. For instance, many antenna types have very narrow bandwidths and cannot be used for wideband operation.

- **Installing accessories straight and square in the required locations**

Parts of satellite dish

Dish: The largest part of the satellite is the round, bowl-shaped dish. The parabolic shape of the dish is designed to capture radio waves sent from a satellite and reflect them out onto a single point. The single point is the device that juts out in the center of the dish and is known as a feed horn.

LNB: A low-noise block down converter (LNB) 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.



Figure 2. 4 LNB

- **Installing procedure**

Part 1. Gather information and materials

1. Locate the TV satellite direction and ensure that there is a clear, all year, unobstructed line of sight to the satellite
2. Identify a suitable external location to install the satellite dish and terrestrial antenna.
3. Choose the ideal location in the home for the TV receiver.
4. Measure all cable runs and purchase source cable, cable clips, connectors, dish and antenna fixings.
5. Unpack and assemble the dish and antenna
6. Install the dish and antenna system to a solid stable surface, install grounding system, run. Cables to TV receiver location and align dish and antenna
7. Connect all cables and power to TV receiver and TV and power on to test.

Part 2. Choose an installation position

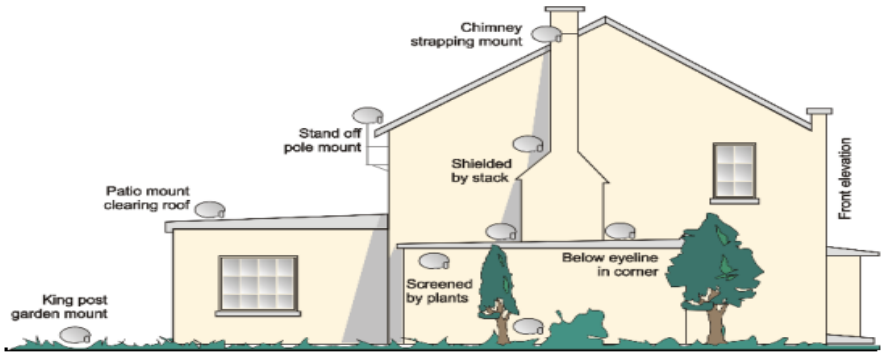


Figure 2. 5 location of antenna

- The dish and antenna can be co-located on the same bracket if a position can be found on the building or at the chosen mount location allowing both signals to be received.
- The antenna can be mounted above the dish using the supplied J pole (mast) and bracket or below the dish to the Dish J Pole using the supplied bracket

Part 3. Choose a mounting option

- The dish mount can be mounted on brick, cinder block, and wood, pole on the building side or flat surface.
- The dish mount can also be fitted on the roof; however, care should be exercised, and roof and siding installations should only be attempted by qualified professionals

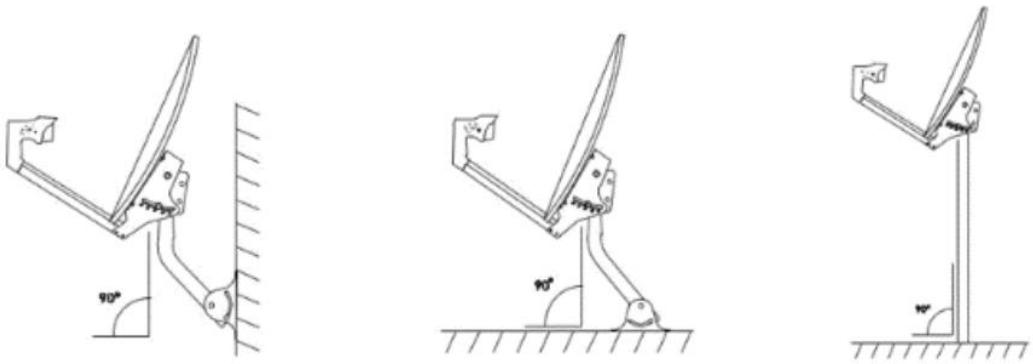


Figure 2. 6 Different mounting option

Part 4: Assemble the dish and TV antenna

❖ **Assembling of TV antenna**

- Unpack the terrestrial antenna and fold out the 2 rear elements as shown and tighten in place using. The fitted wing nuts.
- Fold out the 2 inner looped elements as shown and tighten in place using the fitted wing nuts
- Using the TV Tower location setting detail recorded earlier, fit the antenna to the toothed clamp in the correct orientation and slide the clamp onto the antenna mast pole.

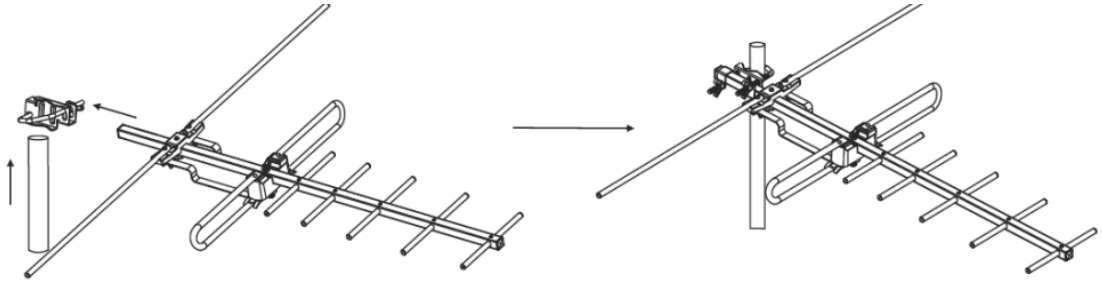
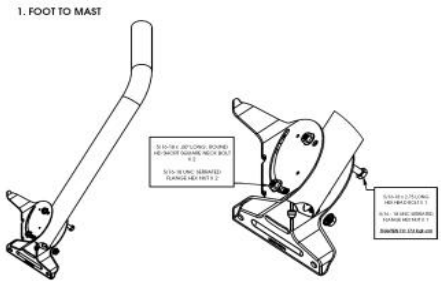


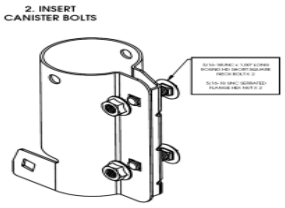
Figure 2. 7 Assembling of TV antenna

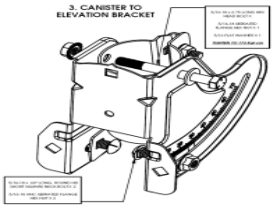
❖ **Dish assembling procedure**

1. Unpack the dish parts and fasteners, some bolts should be fitted only finger tight until final installation takes place.
2. If the Dish J Pole and foot/wall fitting is being used, assemble the Dish J Pole to the foot/wall mast using the short bolts into the slotted adjustment channel. Fit the long bolt through the tube and the pivot holes. Fit the nuts and finger tighten as further calibration is required for vertical adjustment during mounting

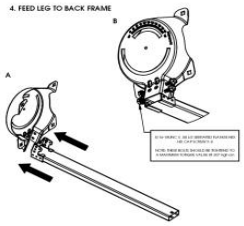


3. Insert the 2 short canister tightening bolts into the canister clamping edge, fit the nuts and finger tighten as further calibration is required for azimuth adjustment during alignment.
4. Place the canister into the elevation bracket and fit the long bolt through the tube and the pivot holes of the elevation bracket.
5. Fit the 2 small bolts into the slotted elevation adjustment channel and into the canister holes Fit the nuts and finger tighten as further calibration is required for elevation adjustment during align



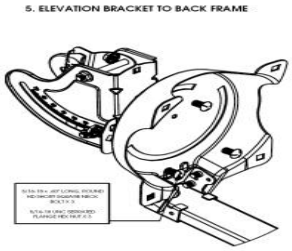


6. Fit the LNB feed arm to the back frame and secure using the 4 short screws. These can be fully. Tightened as they are not required for later adjustment

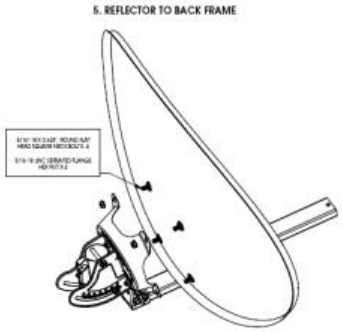


7. Fit the back frame to the elevation bracket using the 3 short bolts. Fit the nuts and finger tightens as further calibration is required for skew adjustment during alignment. The bolt

heads should be inside the back frame to allow access to the nuts after the reflector has been fitted



8. Fit the reflector to the back frame using the 4 short bolts. Fit the nuts - these can be fully tightened as. They are not required for later adjustment



9. Fit the LNB into the feed arm by pushing it fully in and fit the short bolt. Fit the nut and fully tighten as this is not required for later adjustment.

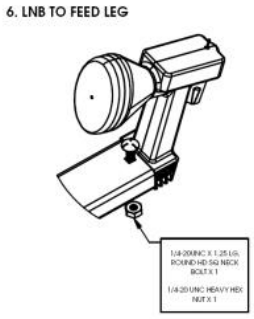


Figure 2. 8 Fit the LNB

10. If wall or floor mounted and the Dish J Pole is being used drop the canister over the end of the Dish J Pole but do not tighten as further calibration is required for azimuth adjustment during alignment. If the dish is fitted to a pole in the ground or other alternative fitting, then the canister will drop onto that installed pole



Figure 2. 9 Assembled dish

11. If the terrestrial antenna is being co-located with the dish, fit the antenna mast clamp to the Dish J pole so it sits either to the left or right of the main Dish J pole, as required, and finger tighten the nuts on the mast clamp. Fit the terrestrial antenna to the end of the mast and finger tighten to prevent it sliding down the mast. The terrestrial antenna will need to be fitted either in its vertical or horizontal mode depending on the information recorded earlier

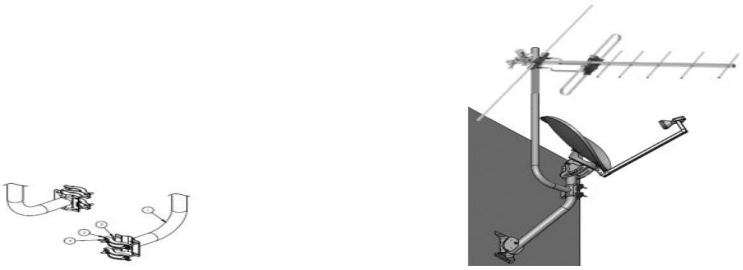


Figure 2. 10 Assembling step

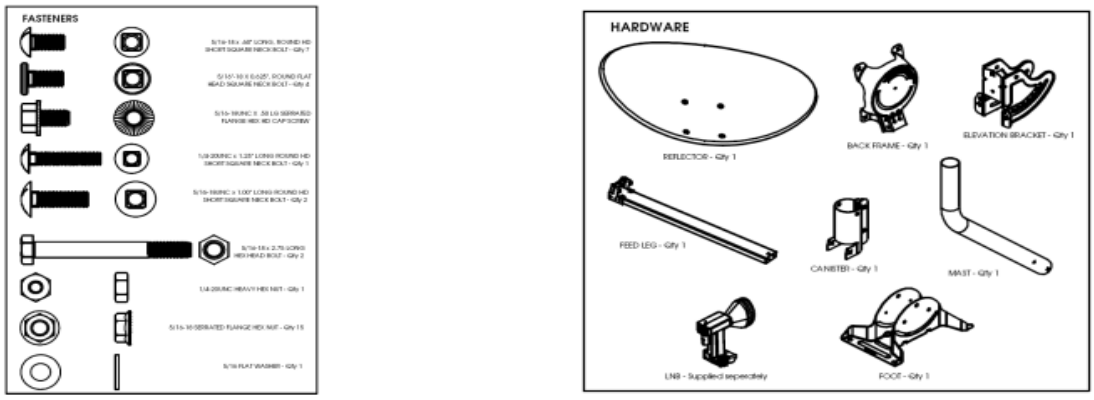


Figure 2. 11 Assembling accsscories

2.5. Terminate Cables and conductors with accessories

These instructions will show you how to properly terminate a RG-6 cable with a BNC coaxial compression connector, and verify that the cable is working properly.

❖ Coaxial Cable

RG-59 Generally not recommended anymore for CATV or Satellite. Smaller 22 AWG center conductor with 40% braiding, thinner in diameter than RG-6. Loses 80-90% of a signal every 50ft.

RG-6 is recommended by CATV and Satellite. 18 AWG center conductor with 60% braiding. Loses about 50% of the signal every 100ft.

RG-6 Quad is double shielded with two layers of foil and braiding with a 18 AWG center conductor. Use when extra protection from outside interference in needed. Loses about 50% of the signal every 100ft.

❖ Coaxial Connector Types

Typical coaxial cable connectors used for CATV, satellite and video applications are called "F" connectors. Available in a compression, one-piece crimp, push-on, and a twist-on style. For security applications, BNC style connectors are used. They are available in crimp or

compression style.

Twist on are the easiest to use but can be pulled off the end of the cable. Crimp On have been the standard connector used for many years. Push On are a great alternative and really stay on the end of the cable and require no extra tools to install. Compression connectors add a watertight seal and are recommended by satellite and CATV providers.

The connectors are available for RG-59, RG-6 and RG-6 Quad coaxial cables. Make sure to match the connector to the type of coaxial cable you're installing.

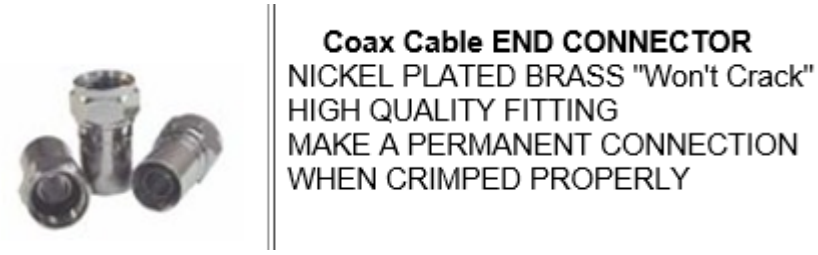


Figure 2. 12 coaxial cable connector

2.6. Carrying out antenna installation

1. Before the dish is installed into its final location, ensure that it is possible to route the cable from the dish location into the building where the TV receiver is located, drilling holes where necessary

2. Depending on the final location of the dish and antenna, mount the wall / floor / pole to the chosen solid surface using suitable screws.

3. Slide the dish canister off the Dish J Pole and set the dish assembly aside taking care not to damage any of the component parts.

4. Fix the wall / floor / pole mount to its final location, using a level or plumb line to adjust the Dish J Pole so that, when the wall / floor / pole mount is fixed to the surface, the vertical part of the mast behind the dish is as close to vertical as possible. Tighten the wall / floor / pole fixing bolts according to the supplier recommendations

Self -check-2

Part 1. Matching

Instruction: select the correct answer for the given choice. You have given 1 Minute for each question. Each question carries 2 Point.

A	B.
___1. Designed to capture radio waves sent from a satellite and reflect them out onto a single point	A. **Signal splitter** B. LNB
___2. Used to strength the weaken signal	C. Amplifier
___3. A device with one coaxial cable input and multiple coaxial cable outputs	D. dielectric E. dish bowl
___4. Material to separate the inner and outer conductor	F. jacket
___5. A low-noise block down converter	

Part II multiple choice

1. The hierarchy of risk control is to be applied by changing the work practices is

   A. Elimination C. Substitution

   B. Engineering Control D. Engineering Control

2. The signal distribution system consists

   A. Coaxial cable, B. signal amplifiers C. Signal splitters D. All

3. _____is the most common transmission material from dish antenna to TV receiver.

A. Flexible twin cable B, coaxial cable C. cat 6 cable D. all except B

III: short Answer writing

Instruction: write short answer for the given question. You are provided 4 minute for each question.

1. Write the four parts of coaxial cables (4pts)
2. Write the main components of dish signal distributor (4Pts)
3. Write the function of LNB (2pts)

Operation sheet 2.1: test and dial antenna for optimal signal quality

- **Operation title: Testing signal strength**
- **Purpose:** To test the antenna signal quality
- **Instruction:** Using procedure below and given testing device test the signal quality and adjust the antenna for optimal position.

1. Disconnect the antennas RG6 coaxial cable from your television or tuner.
2. Attach the antennas "F" connector to the socket on your antenna signal meter marked "Antenna
3. Connect your television to the socket on your antenna signal meter marked "TV".
4. Turn your antenna signal meter ON, and tune-in the lowest broadcast channel for your area.
5. Slowly rotate your antenna 360 degrees and stop at the highest antenna signal strength (usually indicated by LEDs).
6. Use a compass to read the direction of the highest antenna signal and record the result.
7. Continue this pattern (steps 4 and 5) for each channel recording each result.
8. Use your compass readings to calculate an average for optimal signal strength if you do not have a rotor and point your antenna in that direction. If you have a rotor, create a list of optimal directions for each channel

- **Required Tools :**
    1. TV
    2. Receiver
    3. Dish with its LNB
    4. SAT finder
    5. Coaxial cable
    6. Combination plier and adjustable wrench

Lap Test- Carrying out antenna installation

Task1 .Gather information and materials

Task2. Choose an installation position

Task3. Choose a mounting option

Task4. Assemble the dish and TV antenna

Task5. Install the Dish Mount

Unit Three: Reception antennae system Setup

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

- **Antenna adjustment and optimization**
- **functionality test**

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

- **Adjust and optimize receiving antenna**
- **Conduct functionality test**

3.1. Antenna adjustment and optimization

The low noise block (LNB) down-converter used for satellite reception (digital or analogue) does not just receive a single channel; it receives the complete range from all transponders that are operating on a particular satellite. Together with the high gain a modern LNB feeds a lot of RF energy to the receiver when the dish is correctly aligned.

Our digital satellite finder measures the amount of RF energy over a wide frequency range by summing the power from all transponders and producing Received Signal Strength Indicator (RSSI) output, by means of proportionate DC voltage for display.



Figure 3. 1 Satellite finder and dish configuration

3.2. Signal testing procedure with Satellite Finder

1. Connect one end of the coaxial cable to the barrel connector on the satellite dish's low noise block downconverter (LNB) and the other end to the satellite finder meter. The St
2. Loosen the nuts that allow the dish to be adjusted both along the horizontal (azimuth) and vertical (elevation) planes.
3. Move the dish from side to side along the horizontal plane until you determine the position at which the satellite finder meter displays maximum signal strength.
4. Raise and lower the dish along the vertical plane until you determine the elevation at which the satellite finder meter displays maximum signal strength
5. Tighten the nuts to lock your satellite dish into place.
6. Disconnect the coaxial cable from the LNB on the satellite dish

Reference

- https://www.youtube.com/watch?v=XOdPJDSTvjM
- Electrical installation designs _2nd_edition
- guidelines for electrical wiring in residential buildings
- Ethiopian Building code standard (EBCS)

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