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DEPARTMENT OF PHYSICS

FACAULTY OF SCIENCE

SIX MONTHS REPORT ON STUDENT INDUSTRIAL WORK

EXPERIENCE SCHEME (SIWES)

AT

JORDAN FM USHAFA, FCT-ABUJA.

BY

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DEDICATION

I dedicate this SIWES report to God Almighty for His divine intervention, making the entire program a resounding success. I am grateful to my incredible family and friends for their unwavering support and compassion throughout my SIWES journey.

Additionally, I extend my heartfelt dedication to my lecturers for their continuous impartation of knowledge. I would also like to express my deepest respect and gratitude to the staff of the Jordan 93.9FM FCT-Abuja for their invaluable guidance in overcoming challenges during my SIWES training.

Thank you all for your contributions.

To God be the glory.

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Furthermore, I extend my sincere thanks and appreciation to all those who have made a positive impact on my development during this period. Your contributions, in various ways, have not gone unnoticed or unappreciated.

ABSTRACT

This report encompasses my six-month SIWES program at Jordan 93.9 FM FCT-Abuja. Within these pages, you will find comprehensive information regarding my experience at the Radio Station, including a detailed account of the tasks and responsibilities I undertook. It also covers the completion status of these tasks, the challenges I encountered, and the strategies employed to overcome them. Moreover, this report highlights the new knowledge and skills I acquired during the program, substantiated by tangible project outcomes.

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CHAPTER ONE

INTRODUCTION

1.0 Background of Student Industrial Work Experience Scheme (SIWES)

The Students Industrial Work Experience Scheme (SIWES) is a skill training programme designed to expose and prepare students of universities and other tertiary institutions for the industrial work situation they are likely to meet after graduation.

The Students Industrial Work Experience Scheme (SIWES) is the accepted training programme, which is part of the approved Minimum Academic Standard in the various degree programmes for all Nigerian Universities. The scheme is aimed at bridging the existing gap between theory and practice of Sciences, Agriculture, Medical Sciences (including Nursing), Engineering and Technology, Management, Information and Communication Technology, and other professional educational programmes in the Nigerian tertiary institutions. It is aimed at exposing students to machines and equipment, professional work methods, and ways of safeguarding the work areas and workers in industries, offices, laboratories, hospitals, and other organizations.

It is a cooperative industrial internship program that involves institutions of higher learning, industries, the Federal Government of Nigeria, the Industrial Training Fund (ITF), and the Nigerian Universities Commission (NUC).

1.1 Brief History SIWES

SIWES was founded in 1973 by ITF (Industrial Training Funds) to address the problem of tertiary institution graduates' lack of appropriate skills for employment in Nigerian industries. The Student Industrial Work Experience Scheme (SIWES) was founded to be a skill training programme to help expose and prepare students of universities, Polytechnics and colleges of education for the industrial work situation to be met after graduation.

This system facilitates the transfer from the classroom to the workplace and aids in the application of knowledge. The program allows students to become acquainted with and exposed to the

experience required in handling and operating equipment and machinery that are typically not available at their schools.

Prior to the establishment of this scheme, there was a rising concern and trend among industrialists that graduates from higher education institutions lacked appropriate practical experience for employment. Students who entered Nigerian universities to study science and technology were not previously trained in the practical aspects of their chosen fields. As a result of their lack of work experience, they had difficulty finding work.

As a result, employers believed that theoretical education in higher education was unresponsive to the needs of labor employers. Thousands of Nigerians faced this difficulty till 1973. The fund's main motivation for establishing and designing the scheme in 1973/74 was launched against this context.

The ITF (Industrial Training Fund) organization decided to aid all interested Nigerian students and created the SIWES program. The federal government officially approved and presented it in 1974. During its early years, the scheme was entirely supported by the ITF, but as the financial commitment became too much for the fund, it withdrew in 1978. The National Universities Commission (NUC) and the National Board for Technical Education (NBTE) were given control of the scheme by the federal government in 1979. The federal government handed over supervision and implementation of the scheme to ITF in November 1984. It was taken over by the Industrial Training Fund (ITF) in July 1985, with the federal government bearing entire responsibility for funding.

1.2 Location of SIWES Organization

The Industrial Training Fund (ITF) headquarter is situated in Miango Road Jos, Plateau State.

1.3 Mandate of SIWES

I. Make a swift transition from school to work.

II. To provide the opportunities needed for students to apply their knowledge into work.

1.4 Benefits of SIWES

I. SIWES provides opportunities for student to blend the theoretical knowledge acquired from various fields with practical applications learned in the industries.
II. SIWES provides exposure for students to environment in which they may eventually work after graduation from school.
III. SIWES creates social bond between students from different fields of learning.
IV. SIWES provides students with firsthand information on how offices or companies are being run.
V. SIWES creates creativity in students.
VI. Students who partake in SIWES have a high tendency of being employed by same organizations after graduation.

1.5 Aims of SIWES

SIWES began in the year 1974 with the sole aim of making education relevant, bridging the gap between theory and practical in the fields of sciences, engineering and technology related disciplines.

1.6 Objectives of SIWES

The Industrial Training Fund's Policy Document No. 1 of 1973 which established SIWES outlined the objectives of the scheme as:

- Provide an avenue for students in institutions of higher learning to acquire industrial skills and experience in their respective courses of study.
- Prepare students for the industrial work situation they are likely to experience after graduation.
- Expose students to work methods and techniques of handling equipment and machinery that may not be available in their institutions.
- Make the transition from school to the world of work easier; and enhance students' networks for later job placements.

- Provide students with an opportunity to apply their knowledge to real work situations, thereby bridging the gap between theory and practice; and
- Enlist and strengthen Employers' involvement in the entire educational process; thereby preparing the students for employment in Industry and Commerce.

1.7 Duration of SIWES

One requirement for the Bachelor of Sciences or Engineering award is that students must complete at least 24 weeks of Industrial Training.

In most institutions, SIWES is done at the end of the first-semester examination of 300, 400, or 500 levels respectively. The time and duration are to be worked out jointly by each university, department, the SIWES unit, and the ITF.

1.8 Brief History of Jordan 93.9FM Abuja

Jordan 93.9FM Abuja was officially launched in the year 2018, it was a tiny revolution. The Radio Station which is barely 5years old was the first of its kind to create a niche for entrepreneurship and women empowerment. Jordan 93.9 FM has successfully and single handedly carved its own space in the airwaves. Listeners and subscribers can find it on the FM station 93.9.

1.9 Departments in the Organization

Below are the lists of department in Jordan 93.9FM

- Administrative Department
- Programs Department
- News and Current Affairs Department
- Engineering Department

- **Administrative Department**: The administrative department handles staff recruitment and deployment. It ensures regular training and development programs for staffs.

- **News and Current Affairs Department:** This department engages in news gathering, news processing, news sifting and packaging. It is the unit that generally creates content to be delivered to subscribers.

- **Programs Department:** This department ensure day to day running of programs in the organization, they engage in talent hunt, mobilization of artist and produce programs that entertain and educate viewers at large.

- **Engineering Department:** This department sees to the efficient transmission of broadcast signals to the audience. It maintains and ensures the better utilization of equipment in the organization.

CHAPTER TWO

FIELD WORK

2.0 RADIO BROADCASTING

Radio broadcasting is the transmission of audio (sound) by radio waves to radio receivers belonging to a public audience. In terrestrial radio broadcasting the radio waves are broadcast by a land-based radio station, while in satellite radio the radio waves are broadcast by a satellite in Earth orbit. To receive the content the listener must have a broadcast radio receiver.

2.1 TYPES OF RADIO BROADCASTING

Broadcasting by radio takes several forms. These include amplitude modulation and frequency modulation stations.

2.1.1 AMPLITUDE MODULATION

AM stations were the earliest broadcasting stations to be developed. AM refers to amplitude modulation, a mode of broadcasting radio waves by varying the amplitude of the carrier signal in response to the amplitude of the signal to be transmitted.

The signal is subject to interference from electrical storms (lightning) and other electromagnetic interference (EMI). One advantage of AM radio signal is that it can be detected (turned into sound) with simple equipment. If a signal is strong enough, not even a power source is needed; building an unpowered crystal radio receiver was a common childhood project in the early decades of AM broadcasting.

AM transmissions cannot be ionospherically propagated during the day due to strong absorption in the D-layer of the ionosphere. In a crowded channel environment, this means that the power of regional channels which share a frequency must be reduced at night or directionally beamed in order to avoid interference, which reduces the potential nighttime audience. Some stations have frequencies unshared with other stations in North America; these are called clear-channel stations. Many of them can be heard across much of the country at night. During the night, absorption

largely disappears and permits signals to travel to much more distant locations via ionospheric reflections. However, fading of the signal can be severe at night.

As well as on the medium wave bands, amplitude modulation (AM) is also used on the shortwave and long wave bands. Shortwave is used largely for national broadcasters, international propaganda, or religious broadcasting organizations. Shortwave transmissions can have international or inter-continental range depending on atmospheric conditions. [21] Long-wave AM broadcasting occurs in Europe, Asia, and Africa. The ground wave propagation at these frequencies is little affected by daily changes in the ionosphere, so broadcasters need not reduce power at night to avoid interference with other transmitters

2.1.2 FREQUENCY MODULATION

FM refers to frequency modulation, and occurs on VHF airwaves in the frequency range of 88 to 108 MHz almost everywhere.

Edwin Howard Armstrong invented wide-band FM radio in the early 1930s to overcome the problem of radio-frequency interference (RFI), which plagued AM radio reception. At the same time, greater fidelity was made possible by spacing stations further apart in the radio frequency spectrum. Instead of 10KHz apart, as on the AM band in the US, FM channels are 200 kHz (0.2 MHz) apart. In other countries, greater spacing is sometimes mandatory, such as in New Zealand, which uses 700 kHz spacing (previously 800 kHz). The improved fidelity made available was far in advance of the audio equipment of the 1940s, but wide interchange spacing was chosen to take advantage of the noise-suppressing feature of wideband FM.

Bandwidth of 200 kHz is not needed to accommodate an audio signal — 20 kHz to 30 kHz is all that is necessary for a narrowband FM signal. The 200 KHz bandwidth allowed room for ±75 kHz signal deviation from the assigned frequency, plus guard bands to reduce or eliminate adjacent channel interference. The larger bandwidth allows for broadcasting a 15 KHz bandwidth audio signal plus a 38 kHz stereo "subcarrier"—a piggyback signal that rides on the main signal. Additional unused capacity is used by some broadcasters to transmit utility functions such as background music for public areas, GPS auxiliary signals, or financial market data.

The AM radio problem of interference at night was addressed in a different way. At the time FM was set up, the available frequencies were far higher in the spectrum than those used for AM radio - by a factor of approximately 100. Using these frequencies meant that even at far higher power, the range of a given FM signal was much shorter; thus its market was more local than for AM radio. The reception range at night is the same as in the daytime. All FM broadcast transmissions are line-of-sight, and ionospheric bounce is not viable. The much larger bandwidths, compared to AM and SSB, are more susceptible to phase dispersion. Propagation speeds (celerities) are fastest in the ionosphere at the lowest sideband frequency. The celerity difference between the highest and lowest sidebands is quite apparent to the listener. Such distortion occurs up to frequencies of approximately 50 MHz Higher frequencies do not reflect from the ionosphere, nor from storm clouds. Moon reflections have been used in some experiments, but require impractical power levels.

2.2 BASIC COMPONENTS OF A RADIO HOUSE

2.2.1 RADIO STUDIO

The radio studio is an enclosed room where all programs are been aired. There are two studios in a radio house; the **Recording Studio** where off air activities are carried out and the **On-Air** studio where live programs are been aired. Gadgets such as microphones, loud speaker, computer, radio monitor, playback machines, sound card, and bell are all found in the radio studio. In order to prevent echo or any form of interference, the walls of the studio are padded with acoustic foams.

Figure 1: On Air Studio

2.2.2 MICROPHONE

A microphone also classified as input transducer is a sound sensor that converts sounds into electrical signal. It produces an electric analogue output signal that s proportional to the acoustic sound waves.

Figure 2: Microphone

2.2.3 COMPUTER

The computer is an electronic device which is capable of receiving information in a particular form and performing a sequence of operations in accordance with a predetermined but variable set of procedures (program) to produce a result or output. The computer in a radio house is used for purposes such as sourcing for news, program design, recording and editing jingles and many more.

Figure 3: Computer Set

2.2.4 MASTER CONTROL ROOM (MCR)

The master control room is where the on air signals are controlled. Facilities at the MCR include the character generator, matrix switcher, VTRs, distribution amplifiers, monitors and the patch panel. The MCR output feeds the transmitter.

2.2.5 TRANSMISSON ROOM

The transmitting room is the heart of the broadcasting station. It is a room where the signal will be radiated in form of electromagnetic waves with the help of the antenna. The transmitting room consists of the radio transmitter, voltage regulator, uninterrupted power supply, dummy load and air conditioners.

2.2.6 UNINTERRUPTED POWER SOURCE (UPS)

Uninterrupted power source is an electrical device that provides emergency power to a load when the input power source or mains power fails. A UPS differs from an auxiliary or emergency power system or a standby generator in that it will provide near instantaneous protection from input power interruptions, by supplying energy stored batteries. The on-battery run-time of most uninterrupted power sources is relatively low (only a few minutes) but sufficient to start a standby power source or properly short down the protected device.

Figure 4: UPS

2.2.6 AIR CONDITIONERS

An appliance or system used to control generally the temperature of a place. It is typically used to maintain a relatively cool atmosphere in a warm condition. Air conditioners are highly recommended in radio houses especially in the transmission room to prevent the transmitter from overheating.

Figure 5: Air conditioner

2.2.7 TRANSMITTER

In electronics and telecommunications, a **radio transmitter** or just **transmitter** is an electronic device which produces radio waves with an antenna. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna. When excited by this alternating current, the antenna radiates radio waves.

Transmitters are necessary component parts of all electronic devices that communicate by radio, such as radio and television broadcasting stations, cell phones, walkie-talkies, wireless computer networks, Bluetooth enabled devices, garage door openers, two-way radios in aircraft, ships, spacecraft, radar sets and navigational beacons.

Figure 6: Transmitter

2.2.8 MAST

Radio masts and towers are typically tall structures designed to support antennas for telecommunications and broadcasting. There are two main types: guyed and self-supporting structures. They are among the tallest human-made structures.

Figure 7: Mast

2.2.9 HEADSET

A headset is a hardware device that connects to a telephone or computer, allowing the user to talk and listen while keeping their hands free. Headsets are commonly used in technical support and customer service centers and allow the employee to talk to a customer while typing information into a computer. They are also commonly used by computer gamers, allowing them to hear and talk with others, while using the keyboard and mouse to play the game.

Figure 8: Headset

2.2.10 CONSOLE MIXER

A mixing console or mixing desk is an electronic device for mixing audio signals, used in sound recording and reproduction and sound reinforcement systems. Inputs to the console include microphones, signals from electric or electronic instruments, or recorded sounds. Mixers may control analog or digital signals. The modified signals are summed to produce the combined output signals, which can then be broadcast, amplified through a sound reinforcement system or recorded.

Mixing consoles are used for applications including recording studios, public address systems, sound reinforcement systems, nightclubs, broadcasting, and post-production. A typical, simple application combines signals from microphones on stage into an amplifier that drives one set of loudspeakers for the audience. A mixing console is also known as an audio mixer, audio console, mixing desk, sound mixer, soundboard, or simply as a board or mixer.

Figure 9: Console Mixer

2.2.11 LOUDSPEAKERS

A loudspeaker is an electroacoustic transducer which converts an electrical audio into a corresponding sound.

Figure 10: Loudspeaker

2.2.12 STUDIO SOUND CARD

The sound card is a computer component that translates digital audio signals to analogue ones and analogue signals to digital. The use of sound card provides better sound quality than the built in

audio hardware and allows the use of multiple devices at once. In the recording studio, all microphones are fed to the sound card.

Figure 11: Sound Card

2.2.13 POWER PLANT

The power plant consists of a 500KVA step down transformer, two generators with same output. The transformer and generator work alternatively by means of automatic changeover system. The system automatically **turns on** the generator when there is power failure from the national grid and **turn off** the generator when power is restored.

Figure 12: 500KVA Generator and Transformer

2.3 TECHNICAL EXPERIENCE GAINED

2.3.1 WORKING IN THE RECORDING STUDIO

The recording studio is a place in the radio house where off air activities are carried out. Programs are been recorded, edited and copied to the on air studio for broadcast. In the recording studio, we create jingles of any capacity, record adverts for clients, record messages for clients, record short dramas and many more.

Electronic devices such as computer set, studio sound card, studio microphones are highly recommended in the studio to make recording possible. The essence of the microphone is to collect audio signal, the sound card filters the signal collected by the microphone and is fed into the computer where more work is done to produce a desired output.

The software we use in editing our work is called **adobe audition.** Adobe audition is used for recording, creating jingle, music, voice note or anything recordable (audio). The software has features such as effect, filter, parametric equalizer, modulation and many more. An important feature of adobe audition is the **multitrack** effect; this effect combines a voice note with an instrumental hence producing unified sound. All finished work from the recording studio are copied via a removable gadget and taken to the on air studio for live broadcast at designated time.

2.3.2 WORKING IN THE ON AIR STUDIO

The on air studio is a place where live programs are anchored. This is because the output from the on air studio is fed directly to the transmitter and anything that reaches the transmitter is already on air. Gadgets in this studio includes but not limited to computer set, audio console mixer, sound card, microphone, headset, loudspeaker, bell, UPS, telephone or handset. On air personnel makes use of the headset to receive feedback (listening to what they are presenting).

The software used in the on air studio is known as **jazler.** Jazler is one important tool in radio automation; jazler is embedded with tools that enable a radio station function 24hours without having anyone to monitor it. To avoid echo of sound in the studio, the walls are well padded with wood and acoustic foam.

2.3.3 WORKING IN THE ENGINEERING ROOM

The engineering room is stationed very close to the transmission room; devices such as live streaming system, Wi-Fi, set of engineering tools are all found in the engineering room. The duties of the engineer include but not limited to turning on and shorting down the radio station, handling both minor and major technical cases that might arise while on air, monitoring the transmitter, monitoring live streaming, running routine maintenance on generators, servicing of computer hardware and software, managing of stations online community, renewing all necessary subscription etc.

Here we learn how to install computer sets, software installation, trouble shooting, fault finding along conductors, safety measures while working in the engineering room, replacement of worn out or bad electrical fittings such as lighting bulbs, sockets, lighting points, fuses, switches, breakers etc.

2.3.4 WORKING IN THE POWER HOUSE

The powerhouse is situated some few meters away from the station, any danger emanating from the power house remains there and not necessary affecting the entire building. These consist of a 500KVA step down transformer planted by the side, two standby generators with same rating enclosed in a well-ventilated house. These are the two major power sources for the radio station; the generator serves as an alternative source of power with the national grid as major. The generator resumes as soon as the national grid fails.

The transformer oil which serves both as a lubricant and coolant is replaced once in six month, this exercise is done by AEDC staff themselves. Any other maintenance that involves the transformer is done by them as this is a highly sensitive job that needs proper guidelines.

Routine check on the generator is done by the engineer, this include; checking engine oil level via dip stick, checking water level in the radiator, checking firmness of battery terminals, checking fuel level (diesel). Servicing the generator includes replacing engine oil with new, changing both oil and gas filters. This is done once in every three or six months depending on the quality of oil used.

2.3.5 ELECTRICAL TOOLING SYSTEM

Electricians rely on their tools for areas like safety, accuracy, craftsmanship, and comfort. Generally, you will see your electrician with an electrical tool kit. Assembling and maintaining this tool kit with the proper tools and gear is a key responsibility for an electrician. Every job you go to can require different electrical components and making sure you have the right tools in your kit is essential.

Figure 13: Electrical tool box

Here are some common tools you will find in an electrician's belt:

1. Pliers: Pliers are important for electricians who regularly work with and cut wire. The most commonly used pliers used by an electrician can include needle-nose pliers, side-cutting pliers, and reaming pliers.

2. Screwdrivers: Electricians will always have a variety of screwdrivers for loosening and fastening various pieces of hardware. Many professionals will carry adaptable screwdrivers with interchangeable bits so they're never stuck without the electrical hand tools they need.

3. Tape Measure: When electricians work with wiring, it's important to know the lengths of pieces you are cutting and stripping. A simple retractable tape measure will get most jobs in the field done, but there are advanced tape measures on the market that will make the process easier.

4. Electric Drill: Electricians will use an electric drill to help them install new lighting fixtures or disassemble installed hardware to access wiring and other electrical components. This tool is used often since installing lighting fixtures or accessing electrical wiring is a common task asked of an electrician.

5. Level: When installing light fixtures, finding precise points for placement is key. A standard level helps electricians make sure that fixtures, screws, and other installations are where they need to be. Some levels are magnetized for convenience and more accurate readings.

6. Wire Strippers: Wire strippers are essential for professional electricians who frequently have to strip the plastic coating on wires to expose the copper and make customized connections with other wiring or components. There are many wire stripper types and most electricians have various versions ready to use at their next job.

7. Fish Tape: Fish tape is used to run wiring between different electrical components through conduit piping. Fish tape is kept in a retractable coil and can be fed through installed conduit piping. Once the end of the fish tape appears on the opposite side, wiring can be hooked to the tape and the tape can be retracted.

8. Voltage Tester: Electrical work cannot safely begin until power has been cut off in certain parts of the property. A handheld voltage tester allows electricians to test to see if outlets are active and when power has been properly restored for the homeowner.

9. Reaming Bit: To install new or replace old conduits, you connect different segments of piping together to create a wiring route between electrical components. A reaming bit attaches to an electric drill, which widens the opening on one end of the piping and allows it to connect to another segment of piping and complete a secure conduit.

10. Conduit Bender: When determining a wiring route, most electricians plan to run wiring along the corner of the wall in the area they are working. Conduit benders allow electricians to curve conduit piping so electricians can use these routes and make sure that the conduits remain out of the way.

11. Flashlights: As an electrician, sooner or later you'll have no other option than to work in the dark. Many electricians will be prepared for such a circumstance by carrying flashlights or other work lights in their truck.

2. Insulated Gloves: Electrocution is death or severe injury by electrical shock. Due to this possibility on any given job site, electricians need to take precautions. Electricians should have insulated gloves on them for every job.

13. Safety Glasses: Electricians on their first job or ones that have been working their entire lives should have a pair of safety glasses on hand at every job site. Whether they are inspecting wiring or using power tools, protecting your eyes should be a priority.

14. Circuit Finders: It can be sometimes difficult to know which outlets are connected to which circuit in a house. Electricians now use circuit finders that incorporate two main components: a handheld digital transmitter and small receivers that plug into outlets around the home. It will indicate which circuit which outlet belongs to.

2.3.6 GENERAL SAFETY MEASURES

To prevent hazards, injuries and loss of lives, we learnt some safety measures to be observed while in the radio station, these precautions includes;

- Always put on cover shoes (safety booth for engineering students).
- Don't touch any gadget until permitted to
- The studio is the shrine of the station and out of bound for SIWES students unless on special permit by head of programs and stations engineer.
- The transmission room is the heart of the station and out of bound for SIWES students unless on special permit by stations engineer.
- Use proper tools for a designated job.
- Use proper safety kits such as gloves before visiting the power house.
- Ensure you are supervised when carrying out a particular task.

2.3.7 EARTHING SYSTEM AS A SAFETY MEASURE

An **Earthing system** or **Grounding system** connects specific parts of an electric power system with the ground, typically the earth's conductive surface, for safety and functional purposes. The choice of earthing system can affect the safety and electromagnetic compatibility of the installation. Regulations for earthing systems vary among countries, though most follow the recommendations of the International Electro-technical Commission (IEC). Regulations may identify special cases for earthing in mines, in patient care areas, or in hazardous areas of industrial plants.

In addition to electric power systems, other systems may require grounding for safety or function. Tall structures may have lightning rods as part of a system to protect them from lightning strikes. Telegraph lines may use the Earth as one conductor of a circuit, saving the cost of installation of a return wire over a long circuit. Radio antennas may require particular grounding for operation, as well as to control static electricity and provide lightning protection.

System earthing serves a purpose of electrical safety throughout the system that is not caused by an electrical fault. Its main purpose is to prevent static buildup and to protect against power surges caused by nearby lightning strikes or switching. Static buildup, as induced by friction for example, such as when wind blows onto a radio mast, is dissipated to the Earth. In the event of a surge, a lightning arrester, a surge arrester or a SPD will divert the excess current to the Earth before it reaches an appliance.

System earthing also allows for equipotential bonding to all metal works to prevent potential differences between them. Having earth as a common reference point also keeps the electrical system's potential difference limited to the supply voltage.

2.3.7.1 CLASS OF EARTHING

- Equipment Earthing: Equipment earthing serves a purpose of electrical safety in an electrical fault. Its main purpose is to prevent equipment damage and the risk of an electric shock. This type of earthing is not an earth connection, technically speaking. When current flows from a line conductor to an earth wire, as is the case when a line conductor makes contact with an earthed surface in a Class I appliance, an automatic disconnection of supply (ADS) device such as a circuit breaker or a RCD will automatically open the circuit to clear the fault.

- Functional Earthing: Functional earthing serves a purpose other than electrical safety. Example purposes include electromagnetic interference (EMI) filtering in an EMI filter, and the use of the Earth as a return path in a single-wire earth return distribution system.
- System Earthing: System earthing serves a purpose of electrical safety throughout the system that is not caused by an electrical fault. Its main purpose is to prevent static buildup and to protect against power surges caused by nearby lightning strikes or switching. Static buildup, as induced by friction for example, such as when wind blows onto a radio mast, is dissipated to the Earth. In the event of a surge, a lightning arrester, a surge arrester or a SPD will divert the excess current to the Earth before it reaches an appliance.

2.3.8 WIRE COLOR CODING AS A SAFETY MEASURE

Wiring for AC and DC power distribution branch circuit are color coded for identification of individual wires. In some jurisdictions all wire colors are specified in legal documents, only a few conductor colors are so codified. In that case, local custom dictates the optional wire colors. Most of Europe abides by International Electro-technical Commission (IEC) wiring color codes for AC branch circuits. These are listed in the table below.

The older color codes in the table reflect the previous style which did not account for proper phase rotation. The protective ground wire (listed as green - yellow) is green with yellow stripe.

AC Power Circuit Wiring Color Codes According IEC

S/N	FUNCTION	LABEL	COLOR (IEC) CODES	OLD UK COLOR CODES
1	Protective earth	PE	Green – yellow	Green – yellow
2	Neutral	N	Blue	Black
3	Line, Single phase	L	Brown	Red
4	Line, 3 phase	L1	Brown	Red
5	Line, 3 phase	L2	Black	Yellow
6	Line, 3 phase	L3	Grey	Blue

2.3.10 CLASSIFICATION OF ELECTRIC CABLES

1. ACCORDING TO VOLTAGE

An electric cable is measured in volts and depending on these, they are categorized into one group or another:

- **Low voltage cables (up to 750 V):** in a variety of applications, and with thermoplastic and thermoset coatings. They are designed and built according to harmonized standards.
- **Low Voltage cables (up to 1,000 V):** (also called (0.6/1 kV) the cables in this section are used for industrial power installations in various fields (general industry, public installations, infrastructures, etc.).
- **Medium Voltage cables:** from 1 kV to 36 kV. They are used to distribute electricity from electrical substations to transformer stations.

- **High Voltage cables:** from 36 kV. They are used to transport electricity from the generating plants to the electrical substations.

2. ACCORDING TO THEIR USE

(Low voltage cables)

- **Cables for electric panels:** Flexible cables for wiring electric cabinets. These electric cables are especially suitable for domestic use, for installation in public places and for internal wiring of electrical cabinets, switch boxes and small electrical appliances.

- **Power cables:** Energy cables for industrial facilities and public places**. It is common to find power cables in applications for power transmission in all types of low voltage connections, for industrial use and for variable frequency drive (VFD).**

- **Armored cables:** Cables with aluminum or steel reinforcement for installations with risk of mechanical aggression. It is also common to find armored cables in places where rodents are present, as well as in installations in premises with a risk of fire and explosion (ATEX).

- **Rubber cables:** The use of extra flexible rubber cables is very varied. We can find rubber cables in fixed industrial installations as well as in mobile service. Welding cables should have a rubber sheath, which allows high currents to be transmitted between the welding generator and the electrode.

- **Fire resistant cables:** These cables are specially designed to transmit electrical energy in the extreme conditions that occur during a prolonged fire, guaranteeing supply to emergency equipment such as signaling, smoke extractors, acoustic alarms, water pumps, etc. Their use is recommended in emergency circuits in places with public concurrence.

- **Control cables:** Installations should be extremely flexible, as they are mainly designed for small household appliances, for the interconnection of machine parts used for manufacturing, for signaling and control systems, for the connection of motors or frequency converters, for signal transmission where the voltage induced by an external electromagnetic field may affect the control cables for fixed or mobile transmitted signal or for power supply connections to avoid generating electromagnetic fields.

- **Special cables:** There is a wide variety of electric cables for special installations such as: temporary light garland installations at trade fairs; connections for overhead cranes, hoists and lifts; applications in submerged pumps and drinking water areas such as aquariums, purification systems and drinking water fountains or in swimming pools for lighting, purification and cleaning systems.

2.3.11 ARMORED CABLE

The armored cable is a common cable with an extra protective layer to keep it away from unwanted cut or damage. The armor increases cable life thus improves the performance, reliability, and safety of the cable core. The cable with an outside layer or layers of armor wired or tapes to provide tensile strength during the cable laying operation, and protection while resting underground. Care should be taken that the cables shall not be bent to a radius less than the minimum specified by the manufacturer.

PARTS OF THE ARMORED CABLE

Armor: Is steel in the form of wires or tapes enforced to the outside of cables. If the application of a single layer of armor wire is called a Single armor cable, then the application of double layer armor is called a double armor cable

Armor Wire: Zinc coated mild or high tensile steel wire or aluminum of different gauges for the protection of and also to provide tensile strength for the cables.

Armor Tape: Steel tape applied for the protection of cable intended for direct burial on land.

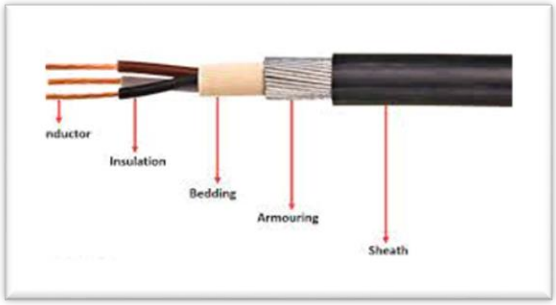

Figure 14 :Armor Cable

When to use Armored Cable?

When transmitting power in harsh environments, cable protection is necessary for safe and reliable operation.

CHAPTER THREE

CHALLENGES, CONCLUSION AND RECOMMENDATION

CHALLENGES FACED DURING SIWES

Some of the challenges faced during this exercise includes but not limited to:

- We find it quite difficult to adapt to the environment seeing that we are neither staff nor client in the organization.
- Too many restrictions also posed as a challenge during this exercise, we are students on attachment and are curious to learn some basic principles of operation in the organization but too many restrictions almost made it impossible to learn something tangible.
- Economic factor also became a big challenge during this exercise, the price of diesel become relatively high that the organization could operate the usual hours it is supposed. Only important programs were aired using the generator whenever the national grid fails.
- Mobility also posed as a challenge, many came from distant places and are not mobile. These often make it difficult to report to office on time and are sometimes asked to return home for late coming.

4.1 CONCLUSION

My twenty four weeks of serving in a radio house has exposed me to knowledge in various fields, something I cannot learn within the four walls of a class room.

I have gained knowledge in the programs and news departments; where content are being sought, edited and disseminated to audience all over the globe.

Relevant to my field is the engineering department that always keeps equipment in check so as to have a smooth running without obstructions along the line. I have been able to understand how audio signals are converted to radio waves by the transmitter and launched into space via antenna to be received by radio wave receivers in various homes and offices respectively.

4.2 RECOMMENDATION

Although the Student Industrial Work Experience Scheme (SIWES) is a vital program for students practice what has been in class rooms outside the classroom. However there are certain recommendations that will cause an improvement in the program if adopted.

- SIWES should liaise with various organizations on the need to accept students on attachment; some of wish may become their employees tomorrow. This is necessary because students get rejection mails from organizations relevant to their discipline pushing to accept offers from others that are almost irrelevant to their discipline. They end up not learning much thereby defeating the sole aim of the program.
- Organizations should also note that SIWES is a very vital program; it is part of the basic requirements needed for a student to graduate and as such should be taken seriously. They should give the students listening ears as some are curious to learn and report any one found misbehaving to the school authority for proper discipline.

It is on this note that I recommend all students of tertiary institutions to partake in the SIWES program.

REFERENCES

- SIWES Introduction, History, Aims & Objectives in Nigeria (n.d.) retrieved from **https://siwesbeginner.com/siwes-introduction**