Intermediate Communication and Multimedia Equipment Servicing Level III

Based on May, 2011 V2 OS and Dec, 2020 V1 Curriculum

Module Title: Developing Servicing Procedures for Communication & Multimedia Equipment

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LG #29	LO #1 Plan and prepare servicing system

Instruction sheet

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

- planning and preparing OH&S policies and procedures
- Consulting appropriate personnel to ensure the programs for servicing
- Coordinating maintenance effectively with others involved in the work site
- Checking Programs to be developed for servicing and maintenance
- Identifying and detailing materials necessary to complete the work
- Identifying and detailing tools, equipment and testing instruments

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:

- plan and prepare OH&S policies and procedures
- Consult appropriate personnel to ensure the programs for servicing
- Coordinate maintenance effectively with others involved in the work site
- Check Programs to be developed for servicing and maintenance
- Identify and detail materials necessary to complete the work
- Identify and detail tools, equipment and testing instruments

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks ” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets 1’’
6. Perform “the Learning activity performance test” which is placed following “Operation sheets 1” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets 1”.

Information Sheet 1. Planning and preparing OHS policies and procedures

1.1. Planning and preparing OHS policies and procedures

Information regarding electrical safety, various examples, and realistic work scenarios, the student shall be able to identify and describe electrical hazards and precautions that should be taken to avoid injury in the workplace. Basically, electrical hazards can be categorized into three types. The first and most commonly recognized hazard is electrical shock. The second type of hazard is electrical burns and the third is the effects of blasts which include pressure impact, flying particles from vaporized conductors and first breath considerations.

- **Safe work practices**

Safe work practices and procedures are necessary to ensure that the workplace in the workshop is a safe as possible for yourself, your friends, resources (materials tools and equipment's). Safe work practices are design to ensure that OHS regulations are obey in the workplace. Safe work practices are ways of doing your work safely.

The main safe work practices you have to know are -

- Use personal protective equipment's as required
- Use tools and measuring instrument in correct handling and Applying method
- Use safe posture and movement
- Avoid getting tired by taking rest and rotating tasks
- Use hazardous/dangerous equipment's safely such as sharp knife, hot surfaces, and electrical appliances
- Handle hazardous substances safely
- Pay attention to safety signs
- Identify and remove or control hazards from your own work area

General safety rules:

- Read and follow the safety notices and other information that is posted.
- Observe and follow all safety instructions, signs, and operation procedures.
- Help your fellow employees when they ask for assistance or when needed for their safety.
- Never participate in “horseplay”. Horseplay that results in injury is often not covered by Workers’ Compensation.
- Clean up spills immediately.
- Report all unsafe conditions, hazards, or equipment immediately.
- Make sure other people are warned of the problem so that they may avoid it.
- Wear personal protective equipment as required to reduce injury potential.
- Use gloves, safety glasses, back support belts, etc., as necessary.
- Never use intoxicating beverages or controlled drugs before or during work.

Elements of Occupational Health and Safety (OHS)

Specific elements required in their health and safety program, the following basic items should be considered in each case:

- Individual responsibility.
- Health and safety rules.
- Correct work procedures.
- Reporting and investigating accidents/incidents.
- Emergency procedures.
- Medical and first aid.
- Workplace specific items.

Fig 1.1 rule of work place

Hazard is any source of potential damage, harm or adverse health effects on something or someone. "hazard identification is part of the process used to evaluate if any particular situation, item, thing, etc. may have the potential to cause harm. The term often used to describe the full process is risk assessment:

Hazard control responsibilities(OHS rules)

- Identify hazards and risk factors that have the potential to cause harm (hazard identification).
- Analyze and evaluate the risk associated with that hazard (risk analysis, and risk evaluation).
- Determine appropriate ways to eliminate the hazard, or control the risk when the hazard cannot be eliminated (risk control).

A common way to classify hazards by category:

- Biological – bacteria, viruses, insects, plants, birds, animals, and humans, etc.,
- Chemical – depends on the physical, chemical and toxic properties of the chemical,
- Ergonomic – repetitive movements, improper set up of workstation, etc.,
- Physical **–** radiation, magnetic fields, temperature extremes, pressure extremes (high pressure or vacuum), noise, etc.,
- Psychosocial – stress, violence, etc.,
- Safety **–** slipping/tripping hazards, inappropriate machine guarding, equipment malfunctions or breakdowns.

Hazard are controlled by the following methods

Task 1.Identify control options

- Collect, organize, and review information with workers to determine what types of hazards may be present and which workers may be exposed
- Review sources such as OSHA standards and guidance, industry consensus standard
- Investigate control measures used in other workplaces and determine whether they would be effective at your workplace.
- Get input from workers who may be able to suggest and evaluate solutions based on their knowledge of the facility, equipment, and work processes.

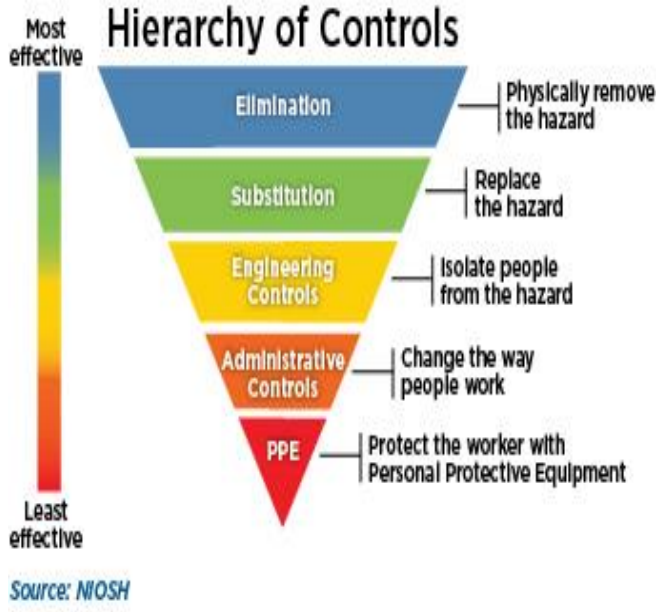


Fig 1.2 Hierarchy of hazard control

Task2.Select controls

- Use interim controls while you develop and implement longer-term solutions.
- Select controls according to a hierarchy that emphasizes engineering solutions (including elimination or substitution) first, followed by safe work practices, administrative controls, and finally personal protective equipment.
- Avoid selecting controls that may directly or indirectly introduce new hazards.
- Review and discuss control options with workers to ensure that controls are feasible and effective.
- Use a combination of control options when no single method fully protects workers.

Task3. Develop and update a hazard control plan

- List the hazards needing controls in order of priority.
- Assign responsibility for installing or implementing the controls to a specific person or persons with the power or ability to implement the controls.
- Establish a target completion date.
- Plan how you will track progress toward completion.
- Plan how you will verify the effectiveness of controls after they are installed or implemented.

Task4. Select controls to protect workers during non routine operations and emergencies

- Develop procedures to control hazards that may arise during non routine operations (e.g., removing machine guarding during maintenance and repair).
- Develop or modify plans to control hazards that may arise in emergency situations.
- Procure any equipment needed to control emergency-related hazards.
- Assign responsibilities for implementing the emergency plan.
- Conduct emergency drills to ensure that procedures and equipment provide adequate protection during emergency situation

Task5. Implement selected controls in the workplace

- Implement hazard control measures according to the priorities established in the hazard control plan.
- When resources are limited, implement measures on a "worst-first" basis, according to the hazard ranking priorities (risk) established during hazard identification and assessment.
- Promptly implement any measures that are easy and inexpensive—e.g., general housekeeping, removal of obvious tripping hazards such as electrical cords, basic lighting—regardless of the level of hazard they involve.

6. Follow up to confirm that controls are effectively

Verify implementation by asking the following questions:

- Have all control measures been implemented according to the hazard control plan?
- Have engineering controls been properly installed and tested?
- Have workers been appropriately trained so that they understand the controls,

- Conduct regular inspections to confirm that engineering controls are operating as designed.
- Evaluate control measures to determine if they are effective or need to be modified..
- Confirm that work practices, administrative controls, and personal protective equipment use policies are being followed.
- Conduct routine preventive maintenance of equipment, facilities, and controls to help prevent incidents due to equipment failure.

Self-check 1	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1._____ is design to ensure that OHS regulations are obey in the workplace (3 point).

A. work place B. Safe work practices.

C. workplace inspection d .all

2. _____ the first and most commonly recognized hazard is (3 point)

A. OH&S policies and procedures B. work place

C. waste material D. Electrical shock

3. _____ the main safe work practices you have to know are - (4 point)

A. Use personal protective equipment's as required

B. Use tools and measuring instrument in correct

C. Avoid getting tired by taking rest and rotating tasks

D. all

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Rating: _____

Answer Sheet

1._____

2. _____

3._____

Information Sheet 2.	Consulting appropriate personnel to ensure the programs for servicing

1.2. Consulting appropriate personnel

A consultant is someone in a role to help another person, team or organization to change, but who has no authority to make that change happen. There are many myths and misunderstandings about consulting, the most common of which is that consultants always provide expert advice to solve "problems". Actually, a consultant might use many different styles, approaches and methods, depending on the nature of the client and focus of the consulting project

A program is a plan of action that is developed in response to a community need, problem or issue. Programs are different from services, in that there is intentionality around change, with goals, objectives, outcomes and indicators to measure progress towards the desired end.

Why is consultation important?

Consultation is a legal requirement and an essential part of managing health and safety risks. A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely. Effective health and safety consultation also has other benefits: „

- Greater awareness and commitment – because workers who have been actively involved in how health and safety decisions are made will better understand the decisions. „
- Positive working relationships – because understanding the views of others leads to greater co-operation and trust. In situations where you share responsibility for health and safety with another person, the requirement to consult, co-operate and co-ordinate activities with other duty holders will help address any gaps in managing health and safety risks that often occur when: „

- there is a lack of understanding of how the activities of each person may add to the hazards and risks to which others may be exposed „
- duty holders assume that someone else is taking care of the health and safety matter „
- The person who takes action is not the best person to do so. The outcome of consulting, co-operating and co-ordinating activities with other duty holders is that you each understand how your activities may impact on health and safety and that the actions you each take to control risks are complementary

When to consult with workers

A person conducting a business or undertaking must consult with workers when: „

- identifying hazards and assessing risks arising from the work carried out or to be carried out „
- making decisions about ways to eliminate or minimise those risks „
- making decisions about the adequacy of facilities for the welfare of workers „
- proposing changes that may affect the health or safety of your workers, and „

making decisions about procedures for consulting with workers; resolving health or safety issues; monitoring health of your workers; monitoring the conditions at the workplace and providing information and training for your workers

what is effective consultation?

Consultation is a two-way process between you and your workers where you: „

- talk to each other about health and safety matters „
- listen to their concerns and raise your concerns „
- seek and share views and information, and „
- Consider what your workers say before you make decisions.

- Consultation requires that: „
- relevant work health and safety information is shared with workers „
- workers are given a reasonable opportunity to express their views and to raise health or safety issues „
- workers are given a reasonable opportunity to contribute to the decision-making process relating to the health and safety matter „
- the views of workers are taken into account, and
- „workers are advised of the outcome of any consultation in a timely manner.

4. How to consult with workers

Consultation with workers can be undertaken in various ways. It does not need to be a formal process and can be as simple as talking to them regularly and considering their views when making health and safety decisions.

To determine how best to consult, you should first discuss with your workers issues such as: „

- The duty to consult and the purpose of consultation „
- The range of work and associated health and safety issues at the workplace „
- The various ways for consultation to occur, including your workers' right to elect health and safety representative's „your workers' ideas about the most effective way to consult. You should work out methods that: „
- Meet your duty to consult „
- Ensure all workers can participate in consultation including any shift workers or mobile workers
- „Will best integrate with the way your business manages health and safety.

Roles of Consultants

Roles can range along a continuum from that of an expert who gives ongoing advice to that of a coach or facilitator who supports a person or group with ongoing reflective questions to bring out their own wisdom and apply it.

Thus, consultants can act in the role of (alphabetically):

- Coach – helping individuals to clarify and achieve a goal by helping them to bring out and apply their own wisdom.
- Collaborator/partner – working with another to benefit from the mutual relationship.
- Educator/trainer – helping others especially to develop new knowledge, skills and insights.
- Expert **–** providing specific information and expertise in specific areas.
- Facilitator – helping members of a group to clarify their desired goals and how they want to achieve them -- and then helping them to bring out and apply their own wisdom to achieve the goals
- Problem solver –helping others to clarify their problems and then helping them to "solve" them.
- Researcher – collecting, organizing, analyzing and reporting information for others

Types of Consultants

Technical consultants: Consults become highly knowledgeable about the company's products or applications so that they can assist users, employees, and clients with any issues they may have.

These consultants must possess skills in organization, teaching, and planning so that they can coordinate with departments to conduct training

Technical Consultants work in offices and work normal business hours. They receive lucrative salaries and good benefits. Senior professionals have the opportunity to make three times as much as entry-level employees.

The responsibilities of a Technical Consultant include:

- Conducting training sessions and seminars
- Reporting on daily responsibilities and tasks
- Resolving client issues

- Testing products and applications
- Documenting processes and application instructions
- Supporting and troubleshooting software issues
- Attending meetings, sessions and other company events
- Generating innovate ideas

Management Consultants: they help leaders and managers to be more productive in the practices of planning, organizing, leading and coordinating resources in the organization. For example, they can help with practices in strategic planning, financial management and personnel management. They might work in an expert role while training others about best practices and then in a facilitator role when supporting others to apply those practices.

Organizational Development Consultants: they help organizations to improve performance in a significant portion of the organization or in the entire organization itself. They might use a wide variety of approaches, for example, training about best practices in accomplishing successful change, facilitating groups of leaders to plan the change, and informal coaching conversations to maintain momentum during the change.

Consultation compliance	Yes /No	Chapter in Code
Do I have one or more consultation arrangements in place after consultation with my workers?		4
Do the consultation arrangements include workers other than my employees such as contractors or labour hire workers who are part of my workforce?		4, 5
Do I use my consultation mechanism when I: ■ identify hazards and assess risks? ■ make decisions to control risks? ■ make decisions about welfare facilities? ■ propose changes to the work, including purchasing new or used plant or new substances or materials? ■ develop and review safety policies and procedures?		2
When I consult with my workers on these issues do I: ■ Inform them of what I intend to do (eg purchase a new piece of equipment)? ■ Share relevant information about the issue with them? ■ Give them a reasonable opportunity to respond? ■ Discuss any of their safety concerns? ■ Take into account the views they express? ■ Advise them of my decision and the reasons for it?		3

If workers are represented by a health and safety representative, do I: ■ Include the representative in all health and safety consultations?		4
■ Make myself available for the representative to raise and discuss health and safety matters with me?		
Do I consult other duty holders who share responsibility for a health and safety matter with me? ■ Do I co-operate and co-ordinate activities with them?		5

Fig 1.2 consultant compliance

Compliance is conforming to a rule, such as a specification, policy, standard or law. Regulatory compliance describes the goal that organizations aspire to achieve in their efforts to ensure that they are aware of and take steps to comply with relevant laws, policies, and regulations

Typical steps to achieve regulatory compliance include the following:

Identify applicable regulations. Determine which laws and compliance regulations apply to the company's industry and operations. These include federal, state and municipal rules.

Determine requirements. Identify the requirements in each regulation that are relevant to the organization, and consider plans on how to implement these mandates.

Document compliance processes. Clearly document compliance processes, with specific instructions for each role involved in maintaining compliance. This information will be useful during regulatory audits.

Monitor changes, and determine whether they apply. Compliance requirements are updated constantly. Changes must be monitored to determine if they are relevant to the company. If they are, implement updated procedures, and train the appropriate staff on these update

Self-check 2.	Multiple Choose

Name: _____ Date:_____

Time Start: _____ Time Finish_____

1._____which one is guide organizations to improve performance in a significant portion of the organization or in the entire organization itself (2 point)

A. Technical Consultants C. Organizational Development Consultants

B. Management Consultants D. None

2. _____ is consultants must possess skills in organization, teaching, and planning so that they can coordinate with departments to conduct training (2 point)

A. Management Consultants C.Organizational Development Consultants

B. Technical Consultants D. All

3._____is helping members of a group to clarify their desired goals and how they want to achieve them (2 point)

A. Problem solver B. Coach B.Collaborator D. Facilitator

Note: Satisfactory rating - 3 and above unsatisfactory - below (3 points)

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

Score = _____

Rating: _____

Answer Sheet

1._____

2. _____

3._____

Information Sheet 3.	Coordinating maintenance effectively

1.3. Coordinating maintenance effectively

Coordination is the function of management which ensures that different departments and groups work in sync. Therefore, there is unity of action among the employees, groups, and departments.

It also brings harmony in carrying out the different tasks and activities to achieve the organization's objectives efficiently. Coordination is an important aspect of any group effort. When an individual is working, there is no need for coordination Therefore, we can say that the coordination function is an orderly arrangement of efforts providing unity of action in pursuance of a common goal. In an organization, all the departments must operate a part of a cohesive unit to optimize performance.

Coordination implies synchronization of various efforts of different departments to reduce conflict. Multiple departments usually perform the work for which an organization exists.

The co-ordination of activities requires duty holders to work together so that each person can meet their duty of care effectively without leaving any gaps in health and safety protection. You should plan and organize activities together with the other duty holders. This will include making sure that the measures you each put in place work effectively together to control the risks. You should: „

- identify when and how each control measure is to be implemented
- „ ensure control measures complement each other.
- Co-ordination of activities may include the scheduling of work activities so that each duty holder carries out their work separately.
- It may require work to be arranged in a way that will allow for necessary precautions to be in place or pre-conditions met before particular work is done.

Where work is not effectively co-ordinate, the parties should consult further to determine what should be changed

Therefore, coordination is not a separate function of management because management is successful only if it can achieve harmony between different employees and departments.

Here are some **important features of coordination**:

- It is relevant for group efforts and not for individual efforts.
- Coordination involves an orderly pattern of group efforts.
- It is a continuous and dynamic process.
- Continuous because it is achieved through the performance of different functions.
- Also, it is dynamic since functions can change according to the stage of work
- Most organizations have some sort of coordination in place.

This involves fixing the time and manner in which the various functions are performed in the organization.

This allows individuals to integrate with the overall process.

Effective Maintenance Management Practices

“Effectiveness Maintenance”, the objectives of a good maintenance function are to:

- Support operations by keeping production equipment in good condition so that production targets can be met
- Maintain the plant facilities by keeping the plant site and its, utilities, and grounds in a functional, attractive state
- Conduct engineering projects like equipment modifications, construction, installation, and relocation
- Develop a program to carry out its services
- Organize itself to support the equipment maintenance needs of production while conducting essential engineering projects
- Execute its programs while utilizing its resources productively
- Anticipate and prepare for future work
- Achieve continued improvement by evaluating performance, taking corrective actions, and measuring progress
- Prepare for future changes by anticipating needs and organizing flexibly

Best maintenance practices include the following points

- Inventory Control also known as stock control, refers to the process of managing a company's warehouse inventory levels.
- Computerized Maintenance Management Systems: a software package that maintains a computer database of information about an organization's
- Preventive Maintenance: regularly performed on a piece of equipment to lessen the likelihood of it failing. It is performed while the equipment is still working
- Predictive Maintenance: a technique that uses data analysis tools and techniques to detect defects in equipment and processes so you can fix them before they result in failure
- Planning and scheduling: the process of **planning** primarily deals with selecting the appropriate policies and procedures in order to achieve the objectives of the project. **Scheduling** converts the project action plans for scope, time cost and quality into an operating timetable
- Work Flow**: refers** to a series of activities or tasks that need to be completed sequentially or in parallel to achieve a business outcome.
- Financial Control :the procedures, policies, and means by which an organization monitors and controls the direction, allocation, and usage of its financial resources
- Continuous Improvement: is the ongoing improvement of products, services or processes through incremental and breakthrough improvements.

Self-check 3	Written test

Name: _____Date:_____

Time Start: _____ Time Finish_____

Directions: Give short answer for the following questions

1_____regularly perform on a piece of equipment to lessen the likelihood of it failing.

A. Preventive Maintenance B. Predictive Maintenance

C. Continuous Improvement D. Work Flow

2_____ a series of activities or tasks that need to be completed sequentially or in parallel to achieve a business outcome

A. Planning and scheduling B. Inventory Control

C. Work Flow D. Predictive Maintenance

3_____ is the function of management which ensures that different departments and groups work in sync

A. Coordination B. Inventory Control

C. Predictive Maintenance D. Technical manger

Note: Satisfactory rating 2. 5 and above unsatisfactory - below 2.5 points

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

Answer Sheet

1._____

2._____

3._____

Score = _____

Rating: _____

Information 4	Checking Programs to be developed for servicing and maintenance

1.4. Checking Programs to be developed for servicing and maintenance

A maintenance management program is essential in assuring all, installations, and service operations are performed in accordance with acceptable safety and health standards.

The maintenance management system provides for direct management participation as well as the maintenance department's providing planned preventive maintenance and adequate response to unscheduled events that occur. Too often, maintenance management is limited in scope to the response to breakdowns and equipment failures. This type of reactive management leads to direct and indirect expenses that is unnecessary and can be controlled.

Key elements of the program – The key elements that make up an effective maintenance management program are outlined below. These elements offer a basic guideline. Other specific programs may also be necessary to achieve a well-managed system for your operation.

- Management commitment– A strong management policy establishing leadership and support for the maintenance program is the first essential part in establishing the program. Management must communicate its sincere support through an aggressive communication of the policy and procedure to all employees.
- Budget– A maintenance program needs adequate budget to provide the parts and services required to make the program work. A budget process should be established and adequate resources directed at maintenance. The maintenance department is often overlooked during budgeting. Then it becomes extremely difficult to finance the needed services from current operating funds.
- Management review – Management participation continues through the process of review and audit of the program. It becomes a vital part of the follow-up and remedial actions.
- Ability**–** Managers, supervisors, and technicians should be selected who have the ability to lead and direct the program. Leadership skills, communication skills, and the ability to function within the formal and informal organization structure are

important elements in the maintenance management program. This means placing the proper people in the proper function. Management must be aware of the skills and abilities and recognize that the skill, experience, and expertise may not be sufficient for all services and repairs.

- Skill and training– The maintenance management program provides for testing to determine skill levels. Employees should be assigned duties that are commensurate with demonstrated skills. The program also provides adequate training on how to cope with new facilities and equipment or to upgrade the technical ability of the employees. The skill level assessment provides a basis for determining what level of outside services is required. These outside services may be contractors providing service, suppliers, trade associations, conferences, and publications.
- Facilities inspection– A thorough facilities inspection is a key element in identifying the scope of the maintenance management program. This inspection lists the various life safety equipment, building services equipment, production and process equipment, and industrial equipment that should be included in the maintenance program. After the initial inspection for identification, then periodic inspection tours should include top management representatives.
- Maintenance audit– An audit is the indicator of success for the program. An audit will show the real success in terms of continued operation, reduced maintenance costs, reduced downtime, and increased production.
- Preventive maintenance– The purpose of preventive maintenance is to prevent catastrophic equipment failures and to improve productivity by reducing unplanned downtime and equipment damage. The preventive maintenance portion of the program has four major functions:

Computerized Maintenance Management Systems

Successful maintenance practices depend a great deal on a robust information system. This involves having a CMMS program that is capable, well supported, and fairly easy to use.

Modules should be consistent with industry standards. These areas included: equipment data management, work-order control, preventive maintenance, inventory control, documentation control, and system security, ease of use, reports, user configuration and metrics.

Preventive Maintenance

PM is often defined as “those timed or meter-based service activities used to extend the life of equipment and identify potential problems through inspection and early detection.”

PM may include work performed on selected equipment through service contracts, inspections, cleaning activities, testing, lubrication efforts, and scheduled shutdown service. The most significant activity to occur in PM is inspection, which should lead to early detection and correction.

PM is a major component in moving from reactive to proactive through early detection and early correction.

Predictive Maintenance

A sound description of PDM is “the application of technologies and early detection processes to monitor and detect changes in condition to allow more precise intervention.”

PDM may include vibration analysis, shock pulse methods, analysis, oil analysis, electrical surge comparisons, coolant analysis, wear particle analysis, and performance trending.

Planning and Scheduling

Planning is devising a process for doing, making or arranging maintenance work. It involves preparing job plans and other resources to enable the craftsperson to perform the work quicker and more efficiently. It often deals with the “what” and “how”.

Scheduling is creating a schedule for when the work is to be performed. Where planning dealt with the “what” and “how”, scheduling deals with the “when” and “who.”

The lack of organized processes and standardized procedures can significantly restrict a maintenance operation from meeting its objectives of servicing the needs of the organization.

The majority of maintenance work can be planned and, for the most part, should be. Increasing productivity or value-added work of maintenance personnel depends a great deal on properly planned activities.

Work Flow

The work order is an integral part of an effective maintenance operation. It serves to:

- Identify work
- Request work
- Prioritize work
- Schedule work
- Activate work
- Track work
- Analyze work

The importance of this paper or electronic document is to allow us to control and monitor work activities. One of the most significant purposes is to analyze work that has been performed to identify costs, losses, and trending of problems.

Financial Control

This practice area deals with the fiscal control procedures of the maintenance organization. It may include budget control, contractor cost monitoring, and overall labor and material cost control.

It may also include monitoring and affecting decisions on asset repair/replacement.

Operational Involvement

It is becoming rarer to find organizations that have not broadened their level of operator involvement in basic care type activities. The logic includes having operators assume some basic responsibilities such as routine cleaning, lubrication tasks, adjusting/tightening, inspections, and minor repair/replacement.

This may be in the form of Total Productive Maintenance or some other structured process to encourage ownership, involvement and improve equipment reliability.

Staffing and Development

To support the “new” maintenance organization, jobs will have to be redefined to improve efficiency and effectiveness. Traditional views of restrictive job requirements and duties will have to be replaced with more flexibility and higher levels of skills.

People will perform successfully if they are capable, have well defined job roles, know what is expected of them, have the skills and knowledge as well as the tools and resources to perform, and receive feedback and rewards for good performance.

Training and skill development is a key component as it enables people to meet the expectations that face in their changing jobs.

Continuous Improvement

Continuous improvement is best described as constantly striving for better ways to do things. It is creating discomfort with the status quo and striving toward excellence through small, incremental change.

This often involves comparing one’s operation to others to find those better ways. This is referred to as benchmarking.

It also involves auditing and monitoring one’s activities to reduce the possibility of slippage and not following standards. Reliability’s greatest enemy is variation. Finding a consistent process to follow but continuing to look for ways to improve the process is one of the ways good companies become great companies.

Self-check 4.	Choose

Name: _____Date:_____

Time Start: _____Time Finish_____

Directions: Give short answer for the following questions

1. Write at least four key elements of the maintenance program with explanation (10 points)

Note: Satisfactory rating 5 and above unsatisfactory – below 5 points

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

Answer Sheet

1._____

Score = _____

Rating: _____

Information Sheet 5.	Identifying and detailing materials to complete the work

1.5 Identifying and detailing materials necessary to complete the work

Consumer electronics repair technicians use electrical equipment to diagnose malfunctions and test functionality of consumer electronics such as TVs, video and audio systems and digital cameras. They read manufacturers' instructions and conduct the necessary repairs or replacements

1. **Soldering materials** are those that are used to solder/assemble electronic components to the PCB. main soldering material are:
   - Solder ware-for hand soldering
   - Solder past used for SMD soldering
   - Solder Bar-soldering of BGA packages or IC
   - Flux –used for automatic and and soldering

2. PCB chemical: they are vast number of chemical used in the electronic industry

Most of them are solder mask, flux cleaner, contact cleaner, heat sink compound Cleaning chemical-Used to clean the PCB and PCB assembly

- Conformal coating –used to coat the PCB assembly for protection against harsh environment and condition
- Thermal management chemicals –used to control the temperature of the certain electronic components assembled on the PCB (e.g. processor)
- Contact lubricant –used to greasing with electrical properties

- Resin used to protect ad insulate electrical and electronic components from harsh Personality ttype and challenge environment

3. PCB repairing material

The electronic industry is not a zero-defect industry .often defects are found during manufacturing and even after sale. there defects are needs to be repaired. For this several PCB repairing material are needed. Major of them are;

- Circuit conductive pen
- Circuit overcoat pen
- Flux pen and dispenser
- Disordering wire

4. Electronic material for ESD protection electronic discharge is a common problem in the electronic industry.

Different types of material are needed for ESD protestation

- ESD clothing , hand glove finger cots
- Ground material
- Wrist strip and heal strip
- ESD foot wear(shoes)
- Chemicals for ESD protection

Self-check 5	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

Directions: choose the correct answer from the following alternative

1. Which one of the following material is different from others

   A. Solder ware-for hand soldering C. Flux

   B. Circuit conductive pen D. Solder past used for SMD soldering

2. PCB repairing material are

   A. Circuit conductive pen B. Circuit overcoat pen

   C. Disordering wire D. All

3._____used to control the temperature of the certain electronic components assembled on the PCB

   A. Conformal coating B. Thermal management chemicals

   C. Resin D. Contact lubricant

Note: Satisfactory rating – 2.5 and above unsatisfactory - below 2.5 points

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

Answer Sheet

1._____

2._____

3._____

Score = _____

Rating: _____

Information sheet 6.	Identifying and detailing tools, equipment and testing instruments

1.6 Identifying and detailing tools, equipment and testing instruments

Hand tools are used by every shop in Facilities Management

- **Screwdrivers** are hand tools specifically designed to insert and tighten, or to loosen and remove screws.

A screwdriver comprises a head or tip, which engages with a screw, a mechanism to apply force by rotating the tip, and some way to position and support the screwdriver, the tip of which is shaped in to fit a particular type of screw.

- **Slotted Screwdriver** is used to drive or fasten negative slotted screws.
- **Phillips Screwdriver** – used to drive or fasten positive slotted screws.

It is a screwdriver that could take greater torque and could provide tighter

6.1. (a) flat screw drive 6.2.(b). philips screwdrive

PLIERSIs used to cut and shape electric conductors and to grip a variety of objects has caused many types of pliers to be developed

- **Diagonal-cutting pliers** used for cutting wire
- **Needle-nose pliers** are used to make loop ends on wire for connection to terminal screws

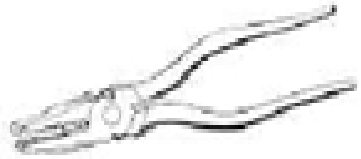


Fig 6.2. (a) Diagonal plier's fig6.2. (b).Diagonal-cutting fig 6.2.(c) needle-nose player

- **Soldering iron or soldering gun**

30-40 watts: used in fixing electronic components in the circuit boards and splicing wires with small diameter

60-100watts: used in fixing large components such as heat sink and transformers in circuit boards, on for bigger diameter wire splicing

- **Disordering tool** is used in removing soldered wires and components on printed Circuit boards for troubleshooting and repair purposes

Fig .6.3 (a) soldering iron

Fig 6.3(b) sucker

Electronic Components

- **Passive device:** device or components which do not require external source to their operation
  - ✓ **Resistors-** a two terminal passive component that oppose the flow of current (reduce the flow of current) and the same time lowers the voltage levels in a circuit
  - ✓ **Capacitor** – a two terminal passive component that is used to store energy. it can be used in a circuit as smoothing ,coupling and bypass component

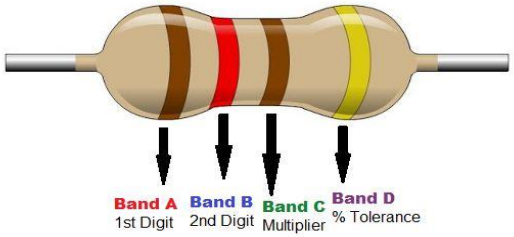


Fig 6.4 (a) resistor *fig 6.4(b) capacitor*

- **Active devices-**device or components which requires external source to their operation
  - ✓ **Diode –** a two terminal PN junction device that allows the flow of current only in one direction

TYPE (BASIC)	SYMBOL/PICTURE	FUNCTION
RECTIFIER DIODES		Rectifier Circuits of Power Supply Units
ZENER DIODES		Voltage Regulator in Power Supply Units
LED – Light Emitting Diode		Calculator Displays, TV, Mobile Phone Displays

Fig 6.5) diode

- ✓ **Transistor** – Three terminal active components that are used mainly in boosting or amplifying electrical signal, both AF and RF ranges.

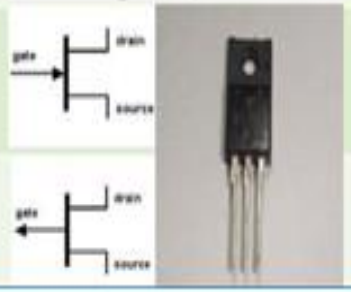
TYPE (BASIC)		SYMBOL/PICTURE	FUNCTION
BIPOLAR JUNCTION TRANSISTORS (BJT) – current controlled device	NPN		Voltage Regulation Audio Frequency Amplification,
	PNP		
FIELD EFFECT TRANSISTORS (FET) – voltage controlled device	N-channel		Audio and Radio Frequency Amplification,
	P-Channel		

Fig 6.6 transistor

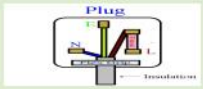
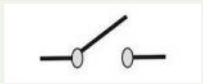
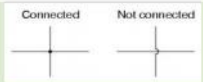
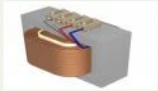
COMPONENTS	SYMBOL/PICTURE	FUNCTION
FUSE	 	Limit the amount of current that can be drawn by an electric circuit by opening (blowing or melting) when the current exceeds a preset limit.
BULB	 	Serve as the Load. It turns the electrical energy into light.
POWER CORD/PLUG		Temporarily connects an appliance or an equipment to the mains electricity supply via wall socket or an extension cord
SWITCHES	 	Necessary to turn the electrical circuit "on" or "off"
CONNECTING WIRES	 	To create a complete circuit path through which current flow from the source going to the circuit load.
TRANSFORMER	 	Protection of appliance and equipment connected to AC power supplies. It can change the electrical voltage or current from one level to another

Fig 6.7 electronic component

- **Testing instruments** are key to any electronics design, development, Production and maintenance activity

Electronic equipment can develop failures, or it may not work properly when it is built. In order to discover whether a circuit is working, and then where the problem is located, it is necessary to use various forms of test equipment

✓ **Digital multimeter –** This is the most versatile kind of testing device. It is used to measure current, voltage, resistance, and various other parameters of a circuit. Digital multimeters can also be used to test continuity between two points in an electronic circuit.

Required features (minimum) can measure up to 50 VDC

- can measure up to 250 VAC
- measures resistance or continuity
- desirable features
- can measure entry level current to approximately 250 Mill-ampere
- can measure dc and ac current up to 10 amperes

✓ **Analog multimetter**

Advantage: low cost

Disadvantage: difficult to read measured value

Digital multimeter

Advantage: easy to read measured value more accurate reading

Disadvantage: high cost need to start at highest range

Fig 6.7 digital multimeter

fig 6.8 analog multimeter

Self-check 6	Choose

Name: _____Date:_____

Time Start: _____Time Finish_____

1_____Which one is different from others (2 points)

A. disordering tool C. Switch

B. pliers' D. screwdriver

2_____ device or components which do not require external source to their operation3 points ()

A. IC

B. Capacitor

C. Transistor

D. diode

Note: Satisfactory rating – 2.5 and above unsatisfactory - below 2.5 points

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

Answer Sheet

1._____

2._____

Score = _____

Rating: _____

Operation 1.	Identifying and detailing tools, equipment and testing instruments

Purpose: To Identify and detail tools, equipment and testing instruments

Equipment, Tools, & Materials:- digital multimeter, oscilloscope, signal generator, screwdrivers, diode, transistor, capacitor ,resistor ,Soldering tool disordering tool etc…

Procedures:

1. Identify and detail the tools
2. Identify and detail the equipments
3. Identify and detail testing instruments
4. Clean working area
5. Use all the above procedures

Precaution: Upon performing the arranging of tools, materials and test instruments for implementing of servicing system, assure that you will be handle with

Quality Criteria:

In the practical work area, prepares & place the required tools, materials, and test instruments.

Ensures the safety requirements and procedure

LG #30	LO #2 implement servicing system

Instruction sheet

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

- Ascertaining and detailing normal function of consumer electronics products
- Detailing Circuits isolation and testing procedure
- Implementing Servicing system on trial basis
- Detailing Response to unplanned events or conditions
- Detailing Approval to implement contingencies
- Implementing Consumer electronic products and associated circuit
- Identifying and organizing maintenance technique

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:

- Ascertaining and detailing normal function of consumer electronics products
- Detailing Circuits isolation and testing procedure
- Implementing Servicing system on trial basis
- Detailing Response to unplanned events or conditions
- Detailing Approval to implement contingencies
- Implementing Consumer electronic products and associated circuit
- Identifying and organizing maintenance technique

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets 1’’
6. Perform “the Learning activity performance test” which is placed following “Operation sheets 1” ,
7. If your performance is satisfactory proceed to the next learning guide,

- If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets 1”.

Information Sheet 1	Ascertaining and detailing normal function of consumer electronics products

2.1 Ascertaining and detailing normal function of consumer electronics products

Consumer products, also referred to as final goods, are products that are bought by individuals or households for personal use. In other words, consumer products are goods that are bought for consumption by the average consumer. From a marketing perspective, there are four types of consumer products, each with different marketing consideration

Consumer electronics products are: monitors, televisions, computers (mainframe, desktop and laptop computers); and cell phones they re depend on electric currents or electromagnetic fields in order to work properly

The term Product is mostly used as a need-satisfying entity. It represents solution to customers, problems. the product remains mere raw material or at the best an intermediate till it is not bought or consumed. Hence mostly they comprise of both tangible and intangible benefits. It may be anything that can be offered to a market to satisfy a want or need and include physical goods, services, experiences, events, places, properties, organization, information and ideas. In most of the cases products are made up a combination of physical elements and series. It is observed that consumers buy products or services that they require to fulfill their needs. The products could range from tooth brush, chocolates, cars, movie tickets to life insurance at various stages of our life. The decision to make a purchase is hence dependent not only on the tangible

The components of the product include core product, associated features, brand name, logo, package and label. The Core Product It is the basic element of the product.

For example if we take Dove Soap, the fragrance of the soap, the moisturizing ability, the pristine white colour, the brand name, the price, the positioning as luxury soap all have gone into the marketing of product personality. The core component is the soap, the generic constituent, as in the case of any other bathing soap, the only difference being the other components are superimposed on this basic component to develop the total personality of Dove

It is observed that the total product personality is dependent on basic constituent of the product. If the product is substandard the other elements associated like features, package, label, differentiation, positioning, branding will not be of any use. Hence focus on the core product is essential.

The Associated Features

The Product includes several associated features besides the core ingredient. In the example of Dove soap the fragrance of the soap, the moisturizing ability, the pristine white colour etc are its associated features. The total product personality is mostly enhanced through the associated features. Further, these also aid in distinguishing the product from its competitors.

The Brand Name

A brand is defined as a name, term, symbol, design or a combination of them which is intended to identify the goods and services of one seller and to differentiate them from those of competitors. A trade mark is a brand with legal protection, thus ensuring its exclusive use by one seller. In the current age consumers do not just pick products but they pick brands. The brand image is developed through advertising and other promotional measures to remain etched in the consumers‟ minds. T

The Logo

It is the brand mark/symbol and an essential aspect of the product, extending its support to the brand effectively. Symbols and pictures ensure product/brand identification and recall with their importance being enhanced in rural markets where brands are mostly recognized by their picture in the logo. The Package It is another important component of the total product personality, particularly in packaged consumer products. The package performs three essential roles: Ensures protection to the product Provides information about the product Increases aesthetics and sales appeal.

The Label

It is the part and parcel of a package. It provides written information about the product helping the buyer to understand the nature of the product, its distinctive features, its composition, its performance. The components discussed above make a preliminary impact on the consumer.

PRODUCT LEVELS

Core Benefit (Product) : This is the basic level that represents the heart of the product with a focus on the purpose for which the product is intended. For instance a car is purchased for its convenience, the ease at which one can go or the speed at which one can travel around relatively fast

Generic Product: It is the unbranded and undifferentiated commodity.

Unbranded pulses, rice, wheat flour are some of the examples of generic product.

Branded Product: The branded products get an identity through a name. It belongs to a specific company and the marketer separates this product from the rest.

The differentiated product: All the branded products are supposed to be differentiated products, but in certain cases where the brand name alone has not earned enough distinction the case may be different. Here the marketer tries to differentiated his product from the clutter created by competitor products by highlighting some of the special attributes/features /qualities his brand is endowed with..

The customized product: When the product is modified to suit to the requirements/specifications of the individual customer, he is being offered a customized product.

The augmented product: The augmented product aims to enhance the value of the product/offer through voluntary improvements. These improvements may be neither suggested by the customer nor expected by him. The manufacturer/marketer adds the feature/benefit on his own. The needs of the customer are identified through market research surveys and the insights thus obtained are used to add new features/functions to the product.

The Potential Product: The potential product is the „future" product inclusive of the advancement and refinement that is possible under the existing technological, economic, competitive conditions prevailing in that category

FACTORS INFLUENCING PRODUCT MIX

1. **Market demand**: The demand of the product determines whether the product should be manufactured or its production discontinued. New products are introduced in the market after the need of the product is identified.

2. **Cost of product:** The Company can develop products which are low in costs and produce those products. Nirma, washing powder, a low priced product was launched to counter Surf which was priced high.

3. **Quantity of production**: The Company can add more items on its product line in case the production of the new product is to be made on large scale.

4. **Advertising and distribution factors**: An organization does not incur any additional efforts to advertise or distribute when the company adds one or more products to its product line.

5. **Use of residuals**: In case the by-products can be developed or utilized; a company should produce such products. Sugar manufacturing companies can also use molasses.

5. Competitor's action: In order to meet the competition/market a firm may decide to include or eliminate a product.

6. **Full utilization of marketing capacity**: The Company can start to produce another product to utilize the capacity completely if the existing marketing resources are not being utilized.

7. Goodwill of the company: When the company has good reputation in the market, new product can be launched without much difficulty.

Self-check 1	Choose

Name: _____Date:_____

Time Start: _____

Time Finish_____

1. what is the unbranded and undifferentiated commodity product

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Generic Product1

Score = _____

Answer Sheet

1._____

Information sheet 2.	Detailing Circuits isolation and testing procedure

2.1 Circuits isolation

Electrical equipments can be isolated using opto couplers , isolating transformers or any other device which isolates two electrical circuits from one another.

Electrical isolation is required to prevent damage to either electrical circuit when one of them is under fault conditions. It is also done to isolate high voltage and low voltage circuits. Types of isolation are

- Obtain permission to start work (a Permit may be required in some situations)
- Identify the source(s) of supply using an approved voltage indicator or test lamp.
- Prove that the approved voltage indicator or test lamp is functioning **correctly**.
- **Isolate** the supply(s)
- Secure the **isolate**

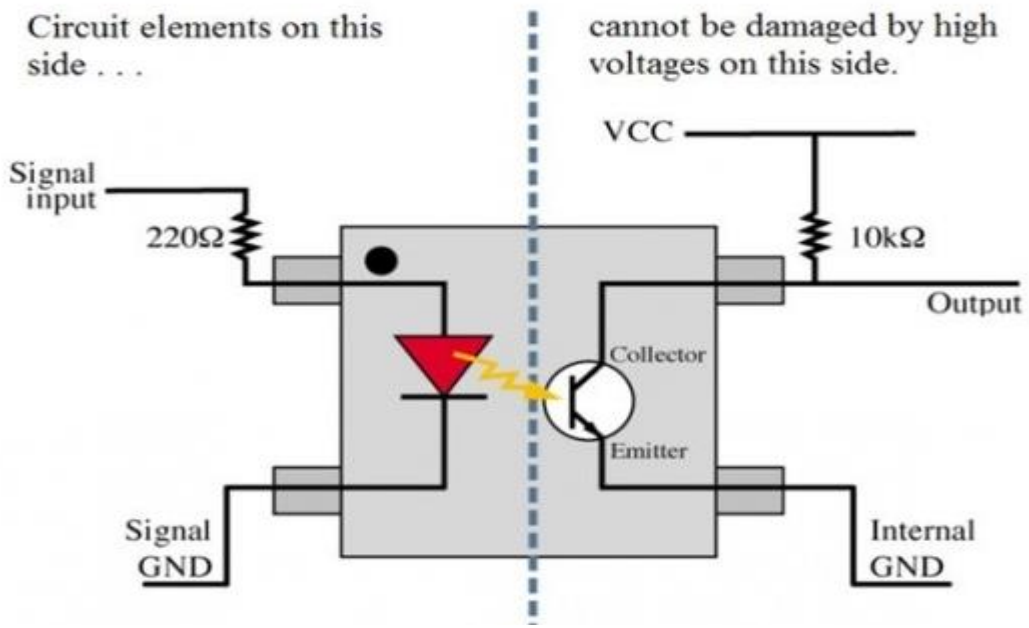


Fig 2.1 isolation circuit

An optocoupler is shown in the above circuit which isolates the low voltage and high voltage sides. Let us assume that the signal input on left side is connected to a micro controller and on the right side we have a BJT connected to VCC = 24 v. Here, we know that a typical micro-controller can handle a maximum of 5 volts. So, we cannot interface the base of the BJT with the micro-controller directly because if the collector and base regions are shorted due to some fault, the micro-controller will have 24 volts on its interfaced pins which damages the micro-controller

There are lots of such applications of electrical isolation. From simple circuits like the one above to complicated circuits or electrical equipments, electrical isolation provides better safety and cheaper replacement cost.

Largely isolation will prevent shock hazards. With no common reference and each device floating you cannot build up a harmful voltage difference between two independent systems to get a shock.

Isolation will help prevent ground loops. This is a shock hazard and a electromagnetic (RF Interference) issue.

Isolation is very important in medical instruments like machines where you have electrodes attached to you and the machine. You don't want stray currents to flow from one electrode to another and to another ground point in the room where you might touch and get stray currents directed through your body.

Isolation of Electrical equipment is nothing but disconnecting electrical Equipment from Electrical Energy…This enables Hazard free maintenance or troubleshooting of equipment

Steps to perform circuit isolation

- Ensure that there is a 'Permit to Work' in place.
- Check with the duty holder/ authorized person that it is acceptable to isolate the circuit/ equipment.
- Identify the type of supply system.
- Locate and identify the circuit/ equipment to be isolated including any alternative sources.
- Fit appropriate lock off device and locks.
- Person carrying out works to retain key.
- Fit warning label for isolation and identified work. Issue permit to work.
- Isolate circuit / equipment by(switching off circuit-breakers &withdrawing fuse).
- Identify suitable means of isolation.
- Verify the circuit/equipment is functional.
- If the circuit is not operational, dead testing may be required to verify the circuit.
- Verify the circuit/equipment is isolated. Use the approved voltage indicator device to verify circuit is dead.
- Re-check the approved voltage indicator device is still functional
- Circuit/equipment should be safe to carry out the work.

- Always remain vigilant and recheck with voltage indicating device when moving away and returning to the circuit/equipment.

Testing procedure

- Test procedure will normally start with the specification of the product and test that the specified features are actually delivered.
- This testing may be a repeat of part of the overall functional test procedure carried out by Design engineer.
- Handover should be used as an opportunity for the designer to demonstrate the prototype to the client, ticking off as many of the Incoming test procedure items as possible, and covering the remainder verbally.
- - Its aim is to prove that the design meets the specification.
- Overall tests are usually good for this objective.
- The correct test procedure is attempting to isolate any faults in the design.
- This requires testing by section and thorough characterization of the design rather than just meet spec/miss spec results

There are four basic types of "testing “procedure

Visual Inspection Its simple, it’s cheap, and everyone should do it.

- Having a skilled person inspect the PCBs will find most of the faults.
- For one or two units in the manufacturing run the visual should be pretty exhaustive, checking every component against the equivalent on the production sample and questioning even if the logo on an IC looks different.
- Visual inspection for the bulk of the manufacturing run is a quick process looking for orientation, solder defects and ensuring the correct parts are in the correct place.

Operational Test (Sometimes called Go/No go) with appropriate firmware, powering up a board will test a fair amount of circuitry even without a test jig.

- The response can be compared to the production sample.

Test Jig This is a standard test method.

- A Jig is made that plugs into the PCB to be tested, and exercises the inputs and outputs.
- Often the test is more functional than parametric - that is, it does not attempt to test if an output can deliver full power for instance.
- A test jig finds most faults, and finds them quickly.
- Test jigs are normally not expensive in unit cost, so it is possible to make one for the client as well as one or more for the manufacturer.

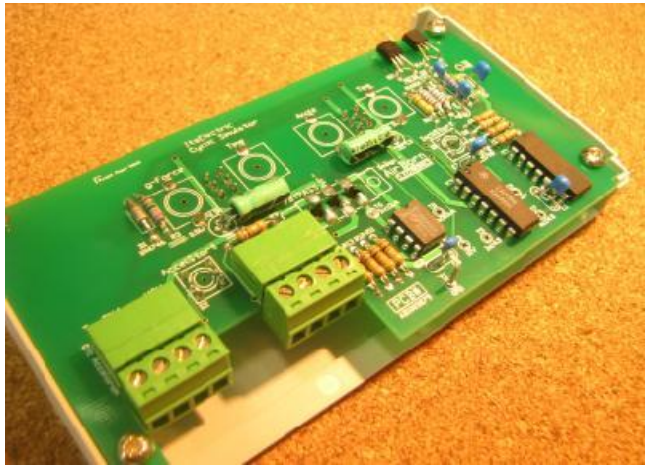


Fig 2.2 *PCB*

- However, test jigs are quite expensive in terms of engineering time to develop.
- Given current technology and the sorts of example boards on the AirBorn website, it is our rough estimate that a test jig will cost 8-12% of the cost that it took to develop the original PCB.
- Test jigs are normally not factored into the development cost.
- Two different test jigs are shown here - the one above is an older type, hand built (but works just as well).
- The one to the right is built on a circuit board - so more than one could be made easily.

Automated Test Equipment (ATE) This is the best test method. ATE will have pin drivers that can exercise inputs and load outputs to do parametric testing in addition to functional testing.

- ATE will also be made to probe connections inside the circuit under test using a bed of nails.
- ATE is not cheap, and jigs and the programming for the equipment are an ongoing cost, but it is superior to a plain functional test.
- It is really quite difficult for a fault to get past a well constructed ATE test.

Self-check 2	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1._____which one of the following is not circuit isolation

A. Verify the circuit/equipment is functional

B. Identify the type of supply system

C. Fit appropriate lock off device and locks

D. proves that the design meets the specification.

2_____ will normally start with the specification of the product and test that the specified features are actually delivered

A. Test procedure C. circuit isolation

B. Periodic mainantence D. Planned maintenance

3_____ is the best test method

A. Operational Test C. Automated Test Equipment (ATE

B. Visual Inspection D. Test Jig

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Answer Sheet

1._____

2._____

3. _____

Score = _____

Rating: _____

Information sheet 3	Implementing Servicing system on trial basis

2.3 Implementing Servicing system on trial basis

Servicing system Mainly associated with the hardware parts of the equipment.

It Includes:

- **Checkup** general function of something's condition/verify their normal operation
- **Repairs** means to rectify, fix the problem either in the hardware or soft ware. It may also include replacement of a component that is faulty. It is an essential part of troubleshooting .In finding or analyzing the faults, it can be decided which hardware or software can be repaired.
- **Updating of all physical components** perform by regular cleaning (time, money can be saved with these cleaning utilities, along with increase efficiency, low maintenance and easy to operate

Service manuals are check OS the manuals provided by manufacturers, which cover the servicing, maintenance and repair of their products. They were not originally offer to the public as they were developing for the dealerships so that their mechanics were able to fix their own products.

Using maintenance manual to make repairs or do maintenance on equipment can make the job much easier and more efficient. Most manuals are self-explanatory, but here are some tips on getting more out of yours.

When we use the service manual, the following steps will be following

Step1. Make sure you have the right manual in front of you.

Step2. Look for specific sections detailing the type of service or repair you are going to perform**.**

Step3 .Read the section, which describes the task you are undertaking before you actually start. This will help you understand what is involved and what tools you'll need to have on hand.

Step4 **.**Follow instructions carefully when performing any maintenance until you are familiar with the procedure**.**

Step5. Look for specific warnings.

Step6 .Look for references to specific tools, gauges, or other specialized equipment required performing your maintenance or repair.

Step7. Isolate and Replace the defective component of SMPS DVD player

Step8.Check the normal operation of the player

Improvement mechanisms

Principle 1 – Improvements are based on small changes, not only on major paradigm shifts or new inventions

This concept is important, because large changes often feel frightening and destabilizing to organizations. By approaching change in small, incremental steps, the continuous improvement model reduces the fear factor and increases speed to improvement. When following this principle, the organization does not need to wait for a strategic shift or a new product release to begin to advance.

Principle 2 – Employee ideas are valuable

The continuous improvement model relies greatly on employees, not only top management, to identify opportunities for improvement. This bottom-up improvement is effective because employees are closest to the problems, and thus better equipped to solve them.

Principle 3 – Incremental improvements are typically inexpensive to implement

Employees tend to focus on small changes that can be accomplished without a lot of expense. In fact, many ideas from employees involve eliminating processes, rather than adding them, which is an excellent way to be sure that every activity adds some

Principle 4 – Employees take ownership and are involved in improvement

Getting people to change the way they've always done things is hard. Do you know what makes it easier? Rolling out changes that originated from the front lines. When people come up with the ideas to improve their own work, they intrinsically see the value of the changes. Knowing that improvements come from their peers inspires faith in the necessity of the changes much more so than does a decree from senior leadership who has never actually done the process in question..

Principle 5 – Improvement is reflective

Constant feedback is an important aspect of the continuous improvement model. Open communication during every phase of executing an improvement is critical to both the final results of the improvement and to the maintenance of employee engagement. Admittedly, this is tough to pull off in a traditional improvement culture. Coaches don't have the visibility they need to keep up with everyone doing the improvement work, senior leaders can't engage without a major time commitment, meetings are tough to schedule, and communication gets buried in inbox

Principle 6 – Improvement is measurable and potentially repeatable

Self-check 3	Choose

Name: _____Date:_____

Time Start: _____Time Finish_____

1_____ is showing all significant components, parts, or tasks (and their ?

Interconnections) of a circuit, device, flow and process

A. Service manuals *C.* Schematic diagram

B. Circuit diagram D. Specification

2_____ is to determine whether the components of a system are operating properly

A. Repair C. Maintenance

B. Check-up D. None

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Answer Sheet

1._____

2._____

Score = _____

Rating: _____

Information sheet 4	Detailing response to unplanned events or conditions

4.1 unplanned events or conditions

Unplanned Event means an unplanned outage of one or more of the units due to sudden, unanticipated failure or accident within the unit site

In order to know how to respond to unplanned events or conditions, one must first start in assessing or analyzing the situation. The first response should not be making an action right away, but thinking of the situation and possible solutions.

After fully understanding the situation and listing down possible solutions, it's time to take action by trying all possible means to cope with the changes or unexpected events.

If working on a project, it's helpful to create a list of planned vs unplanned events so you can also think of safety measures on how to prevent the unplanned ones even before starting on the project.

The difference between planned and unplanned change is exactly what it sounds like. Planned change is something you choose, such as implementing a new strategic direction or system reorganization. Examples of unplanned change in an organization include unexpected developments such as a new product's failure, a key executive quitting or a public relations disaster

Four steps are recommended for strategic planning when you are trying to anticipate unplanned events and their potential impact.

Step 1 – Anticipate Unplanned Events

An important strategic planning step in this type of environment is to anticipate as many of the potential events as you can. This applies even if you cannot control all of the possible occurrences that could derail the strategic plan’s implementation. We have shared a few Brain zooming strategic thinking exercises previously to help accomplish this exploration including:

Step 2– Identify High-Impact Unplanned Events

How then do you prepare to prioritize and perform strategic planning while recognizing all the potential events you have identified? You can prioritize the list by having individuals rate each event for its potential maximum magnitude and the probability of each event actually happening. Multiplying the two answers for each possible event provides a quick sense of the potential relative magnitude across all the events.

Step 3 – Plan the first few Steps

Next, identify the first several tactics you would pursue if each event were to happen. You do not need to outline a complete strategic plan for each event. Instead, concentrate on detailing the first three tactics you would want to have ready to go should the event surface.

Step 4 – Prioritize the most aapplicable ttactics

Finally, look across the events and the initial tactics you identified for each. What are the common actions within the first few steps for multiple events? This look offers a sense of the highest-impact, most flexible moves you can make when events start to change.

Example Potential unplanned events during the construction phase include:

- Traffic accidents
- Fires
- Damage to third-party assets

Self-check 4	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

Directions: Give short answer for the following questions

1. Write the four steps recommend for strategic planning when you are trying to anticipate unplanned events and their potential impact(10 points)

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Answer Sheet

1._____

Information sheet 5	Detailing approval to implement contingencies

2.5 Detailing approval to implement contingencies

Detailing are:-extended treatment of or attention to particular item part considered or requiring to be considered separately from the wholeContingency planning is part of a cycle in which the identification and regular monitoring of risks, vulnerabilities and capacities informs the planning and implementation of measures to mitigate the risks and prepare to respond.

Risk mitigation includes all actions to reduce the severity, probability of occurrence of, or exposure to, a given hazard and therefore lessen its impact.

Preparedness refers to all actions to increase knowledge and capacity to anticipate, respond to and recover from the impact of one or more events.

Readiness is the outcome of preparedness actions – it refers to the outcome of planning, allocation of resources, training, exercising and organizing to build, sustain and improve operation

The following are the key steps in contingency planning:

- Note where there are resources that can be used in an emergency.
- Also, note where in your contingency plan these resources might be applied.
- Identify dates that if missed will negatively impact your plan, for example getting approval from a group or committee that only meets every now and then.
- Know your contingency plan.
- Check for any weak links and strengthen them. Identify any slack that you can find in it.
- See if you can find points in your plan where alternative routes can be taken, and think through each one's scenario to add flexibility to your plan.

- Use your experience to help you see patterns in your project's ebb and flow of activity to sharpen your plan.

Fig contingence plan

How to Create a Business Contingency Plan

A contingency plan is a plan, and like any plan, it requires a great deal of research and brainstorming. And like any good plan, there are steps to take to make sure you're doing it right

Identify and Prioritize Resources: Research your company and list its crucial resources, such as teams, tools, facilities, etc., then prioritize that list from most important to least important.

What Are the Key Risks? Figure out where you're vulnerable by meeting with teams, executives and every other department in the organization to get a full picture of what events could compromise your resources; hire an outside consultant, if necessary.

Draft a Contingency Plan: If you can, write a contingency plan for each risk that you identified in the above steps, but start with what's most critical to the life of your organization. As time permits you can create a plan for everything on your list. Whatever the plan, the thought behind each should be the steps necessary to resume normal operation of the company, thinking about communications, people's responsibilities, timelines, etc.

Share the Plan: When you've written the contingency plan and it's been approved, the next step is to make sure everyone in the organization has a copy. A contingency plan, no matter how thorough, is not effective if it hasn't been properly communicated.

Revisit the Plan: A contingency plan isn't chiseled in stone. It must be revisited, revised and maintained to reflect changes to the organization. As new employees, technologies and resources enter the picture, the contingency plan must be updated to handle them.

Self-check 5	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

Directions: Give short answer for the following questions

1. Write the step of contingence plane and explain each(10 point)

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Answer Sheet

1._____

Information sheet 6	Implementing Consumer electronic products and associated circuit

2.6 Implementing Consumer electronic products and associated circuit device

The purpose of system Implementation (**Consumer** electronic products) making the new system available to a prepared set of users (the deployment)

Prepare for System Implementation, where all steps needed in advance of actually deploying the application are performed, including preparation of both the production environment and the Consumer communities.

Consumer electronics

The functioning of electronic consumer goods such as TVs, radios, cameras and other audio and video equipment.

Electronics

The functioning of electronic circuit boards, processors, chips, and computer hardware and software, including programming and applications. Apply this knowledge to ensure electronic equipment runs smoothly.

Skills

Repair equipment on site

Identify malfunctions and repair or replace multi-media, audio-visual and computer systems, hardware and equipment on site.

Replace defect components

Remove defective parts and replace them with functioning components.

Maintain equipment

Regularly inspect and perform all required activities to maintain the equipment in functional order prior or after its use.

 set up consumer electronics

Connect electronic devices, such as TVs, audio and video equipment and cellular phone ,to the electricity network and perform electrical bonding to avoid dangerous potential differences. Test the installation for proper functioning.

- Create solutions to problems

Solve problems which arise in planning, prioritizing, organizing, directing/facilitating action and evaluating performance. Use systematic processes of collecting, analyzing, and synthesizing information to evaluate current practice and generate new understandings about practice.

- Provide customer follow-up services

Register, follow-up, solve and respond to customer requests, complaints and after-sales services.

- Apply company policies

Apply the principles and rules that govern the activities and processes of an organization.

- Provide customer information related to repairs

Inform customers about necessary repairs or replacements, discuss products, services and costs, include accurate technical information.

- Use repair manuals

Apply the information, such as periodic maintenance charts, step by step repair instructions, troubleshooting information and overhaul procedures to perform routine maintenance and repairs.

- Maintain customer service

Keep the highest possible customer service and make sure that the customer service is at all times performed in a professional way. Help customers or participants feel at ease and support special requirement

There are different kinds of audio-video systems and products such as, Television, DVD player and Public address system.

Television

Television is an electronics device that used to transmit and receive both audio and video signals from the space. Tele is a Greek word means distance or at a distance. Vision is a Latin word means seeing or something seen. So television means seeing

from the distance. The purpose of a television system is to extend the sense of sight beyond its natural limits. TV system is a method of transmitting and receiving visual information associated with sound by means of radio broad casting.

Television system consists of both transmitter and receiver.

There are two types of TV:

a. Cathode ray tube

b. Flat

Fig 5.1 Cathode ray tube (CRT

Fig 5.2 Flat (LED & LCD

DVD Player is a device that plays DVD discs /CD produced under both the DVD video and DVD audio.

- **An amplifier** is a device, which takes low level input signal from microphones and amplifies to a high level output signal to the desired output power, which will be delivered to the loud speakers at the output stage by suitable connection

Fig 5.3 overview of DVD Player

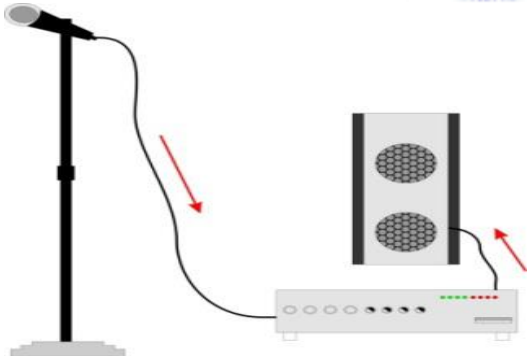


Fig 5.4PAS

Cellular phones

Mobile phone is a handheld device that allows you to make and receive telephone calls while you move around a wide geographical area. A mobile phone also supports several other functions, such as text messaging, email and internet access,& photo etc… there are different kinds of cellular phone

Fig 5.*5 Bar Phone*

Fig 5.6 Touch screen Phone

Implement servicing system and process

During the servicing of equipment some or all of the following steps are followed. The type of equipment decides which of these are not required. The step includes

- ✓ Cleaning
- ✓ Alignment
- ✓ Lubrication
- ✓ Balancing
- ✓ Replacement

- **Implement consumer electronic products used for**
  - ➢ Improving operation and maintenance of electronic equipment can result in numerous benefits, including:

A. Reduced energy consumption.
B. Reduced resource use.
C. Increased recycling rates.
D. Keeping viable equipment out of the waste stream.
E. Reduced demand for new electronic products.
F. Maximizing product life and lifecycle environmental and cost benefits

Isolate & test circuits using specified procedures

- **The major steps of implement consumer electronic products repair**

Three major steps are observed in most electronic system repair procedures:

- ✓ Evaluation of trouble symptoms, with preliminary diagnosis of equipment, malfunction.
- ✓ Testing of logical conclusions.
- ✓ Repair of defect and verification of normal operation

Self-check 6	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

Directions: choose short answer form the following questions

1_____ is applying the principles and rules that govern the activities and processes of an organization.

A. Company policies B. Customer service C. Repair manuals D. B&C

2_____Inform customers about necessary repairs or replacements discuss products, services and costs, include accurate technical information.

A. Trainees. B. company policies C.Customer information D. Employee

3. Implementing consumer electronic products is used for_____

A. Reduced energy consumption B. Increased resource use C. Reduced recycling rates D. all

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Answer Sheet

1._____

2._____

3._____

Score = _____

Operation Sheet 1	Implementing Consumer electronic products and associated circuit

Purpose: To Implementing Consumer electronic products and associated circuit

Step1. Follows OHS and safety procedure.

Step2. Unplug the receiver and open the housing.

Step3. Prepare the right tools for the work

Step4.Inspect the receiver for obvious problems identification

Step5.Check the receiver using 3S (sound, smell and sight) and T (touch) technique to Identify the defects

Step6.Signal tracing and Signal injection method is used to identify the defective stage

Step7.Isolate and Replace the defection component of power supply section of the receiver

Step8.Check for the normal operation of the radio receiver

Information sheet 7	Identifying and organizing maintenance technique

2.7 Identifying and organizing maintenance technique

The most important skills for an electronic maintenance technician needs in order to be successful in the workplace

Clearance

- Acquired secret clearance and account.
- Issued a secret clearance in order to work with crypto logical equipment.
- Worked as a specialized mechanical technician primarily to repair and maintain route clearance
- Received security clearance necessary for the ability to repair air data systems on military aircraft.

Technical knowledge

- Applied skills and technical knowledge of electronic principles in determining malfunctions and restoring equipment to normal operations.
- Provided technical guidance and assistance to lower-grade technicians and provided assistance to engineers based on technical knowledge and experience.
- Applied advanced technical knowledge of electronic principles in determining equipment malfunctions, and applies skill in restoring equipment operations.
- Performed individual duties based on acquired technical knowledge using schematics, circuit/wiring diagrams and other planning documentation.

Electrical systems

- Researched information to solve unusual electronics problems by analysis and tests on various electronic and electrical systems.
- Provided support for facility maintenance including electrical systems, mechanical systems, and cooling tower maintenance.
- Installed and repaired electrical systems, apparatuses and electrical and electronic components of machinery and equipment

Technical guidance

- Provided technical guidance to Army commanders on equipment capabilities and employment.
- Supervised and provided technical guidance to lower level technicians.
- Performed supervision of lower grade colleagues and provided technical guidance to assist them in the accomplishment of their duties.
- Obtained technical guidance, as required, from supervisor or higher-level technician

Test equipment

- Conducted fault analysis on extensive networks and complex electronic systems; utilized test equipment and diagnostic software to verify operational solutions.
- Incorporated and trained personnel on a previously unused piece of test equipment giving the company increased capabilities.
- Utilized diagnostic test equipment to identify malfunctioning component and replaced as necessary.
- Utilized sophisticated test equipment and complex schematics to correct system malfunctions

Facility

- Documented the test stand as installed in the test facility using AutoCad.
- Inspected the fire safety equipment in the facility and checked them for their condition.
- Developed and maintained a PM schedule for equipment throughout the facility

Level technicians

Received orders from lead tech III, relayed and implemented orders with lower level tech.

Maintenance is coordinate by maintenance planning

Identify the problem

- The need for maintenance can be triggered by a failure, a noisy bearing or an oil leak. Once identified, the problem must be reported to the maintenance department. This is normally done through a work request so that planning and scheduling can take place.

Plan the maintenance task

- 'Planning' involves deciding on what exactly needs to be done, determining priority, and defining the sequence of activities and skills required. Ensure that all the resources, material, labor, contract services, specialist equipment, tools and information are available. There may even be a need for outside contractors, items to be purchased or work permits to be obtained, all of which must be arranged in advance.
- A maintenance planning function is a critical tool for reducing downtime and maximizing the value of preventive maintenance. The maintenance planner must therefore have the technical skills and equipment knowledge to do this planning.

Schedule the work

- ‘Scheduling’ involves deciding when to do the work. This will depend on the priority level of the task, and the availability of both the resources and the equipment to be repaired. Many organizations schedule maintenance for a specific period during the working week or month. Weekend maintenance is never desirable because, in many cases, suppliers are not available and personnel are expensive.
- The legal requirements with regard to statutory inspections are generally quite rigid, so try and devise a 52-week maintenance plan at the beginning of each year. Review this plan periodically to improve the accuracy and quality of the information. Communicate the preventive and corrective maintenance requirements to production so that they fully understand the need for the maintenance window.

Allocate the task to specific people

- Although this will depend on organizational arrangements, consider the following:
- Allocate your maintenance personnel to specific areas or pieces of equipment
- Ensure the allocated person has the skills to perform the task
- Be very clear about the type of work that will be allocated to outside contractors
- Where necessary, undertake hazard analyses to identify risks and formulate action plans to control access to high-risk areas; your plans should include hot work permits, confined space permits and lockout procedures.
- Ensure the work is executed properly
- It is usually the responsibility of the maintenance supervisor to confirm that the maintenance work meets the required quality standards, usually through selected planned job observations.
- The planner (or, in some instances, a maintenance scheduler) should monitor outstanding schedules or work requests to ensure that the planned work was actually done.

Analyze the problem and decide how to prevent it from happening again

- Analyze the root cause of major failures and take corrective action to prevent recurrence. Corrective action could include training, a change to the preventive maintenance program or equipment redesign. Breakdown or failure of the management process is often overlooked in a major failure. In those cases, corrective action may be a systems upgrade.

Procedures and work instructions hierarchy of these terms and how to efficiently categorize the workings of a management system within them. Simply put:

A **process** states what needs to be done and why

A **procedure** states how the process needs to be done

A **work instruction** explains how to carry out the procedure.

Consider a process as a high level, strategic method of control, in effect a summary of objectives, specifications, and broad resources needed. The procedure adds more specifics such as responsibilities, specific tools, methods, and measurement. And a work instruction is a step-by-step guideline to implement the process and procedure, often segmented in some way to focus those who are doing the actual work.

Process

A process is any activity or set of activities that use resources to transform inputs into outputs. The ISO 9001 standard is based on a process approach. (Establishing effective and efficient processes that are consistently followed and improved upon is the basis for most management standards.)

Processes must have defined (and hopefully measurable) objective(s), input(s), output(s), activities, and resources. These key elements should be present when defining a process:

Inputs/Resources:

Specified requirements (needs), for example:

What information do you need to start work?

Where does that information come from?

Activities:

Interrelated or interacting activities that use resources needed to achieve a specific output

All of the operations, activities, and sub-processes carried out to produce the desired result, for example:

What are the basic jobs carried out in your department?

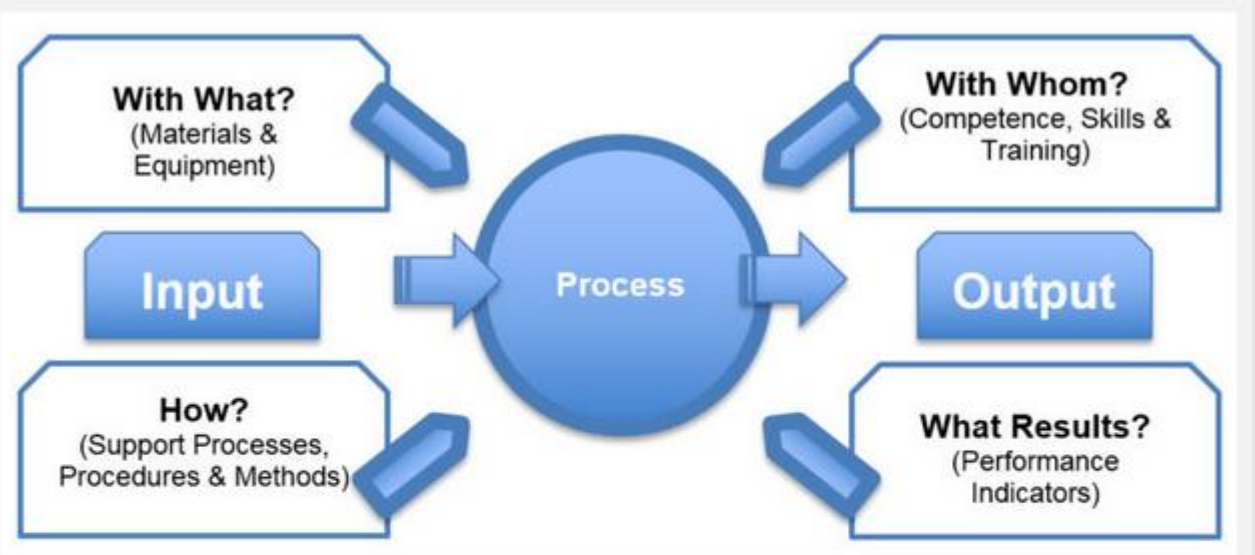
Can you explain to me your operations here?

Outputs:

Satisfying requirements (results), for example:

Who receives the result of your work?

How do you know if you've done your job correctly? (met objectives)



One way to visualize a process is as a trans-formative "machine" into which both requirements and resources are fed. The work is done and then received as a satisfactory result. The effectiveness of the process is measured in its ability to achieve the desired results. The efficiency of the process is measured in the ratio of results achieved to the resources used.

Procedure

A procedure is a uniform method that outlines how to perform a process, such as how you control your suppliers. It typically contains elements such as:

- Why the procedure is required
- What needs to be accomplished and how it will be executed
- Who performs what action
- Where the inputs come from and where the outputs go
- Any locational requirements (i.e. where an activity is performed)

- The criteria (requirements) they must meet
- Tools, information or other resources required
- Terminology, definitions, explanations, etc.

While requirements and supporting processes are often cited in the ISO 9001:2015 standard, the mandate for creating specific procedures has been removed and replaced with the term “Documented information” However, that does not lessen the need for, or effectiveness of, formally specifying procedures. Procedures are used when there is a definite operation that should be followed on a consistent basis. (There may be times when a procedure is not necessary. For example, if it doesn’t matter how new employees are recruited, just that there is a means for doing so, then a process could be written for that ***without*** a procedure.)

Procedure Example: Contract Review An example procedure is one that might be important for mission-critical, high liability industries like aerospace, medical devices or automotive could outline a formal process used for communicating with customers and reviewing information from the customer, including customer feedback. Click the above illustration for an example of how this type of procedure might be constructed using one of our procedure templates.

Work Instruction

A work instruction describes how to perform a task within a process, which is a more detailed portion of the procedure such as “Completing a PO” or “Ordering supplies.” The reasons for work instructions are both organizational and explanatory:

1. There are times more detail is needed than that which is described in the procedures. Many organizations include work instructions to detail specific tasks referenced in a procedure, aid in training and to reduce mistakes since the step-by-step instructions needed for accomplishing something may be missing from more generally drafted procedures.
2. However, this functional division between procedure and work instruction can be a good organizational tool – if there is an advantage to dividing up procedure(s) into many “sub-procedures” that are related, but cover different aspects.

A work instruction will often repeat many of the elements of a procedure to help describe where it fits into the process such as:

- Purpose
- Definitions
- Responsibility
- Requirements
- Tools and information

But at its core, a work instruction contains the step-by-step detail that is not advantageous to put into a procedure because it requires such a limited scope.

Work Instruction Example: Fabrication A welding-based fabrication assembly set of work instructions might contain step-by-step instructions for completing a final fabrication including cutting, drilling and welding the finished part including inspection, inventory management, etc. Click on the above drawing for an example of how to construct a work instruction using one of our templates.

Fig 2.1work instruction

Self-check 7	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1_____ Obtain technical guidance, as required, from supervisor or higher-level technician

A. Technical Guidance C. Preventative Maintenance

B. Facility D. Level Technicians

2_____ provided support for facility maintenance including electrical systems, mechanical systems, and cooling tower maintenance

A. Level technicians C. Clearance

B. Technical knowledge D. Systems

3_____is explains how to carry out the procedure

A .procedure C. safety procedure

C. Work instruction D. process

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Rating: _____

Answer Sheet

1._____

2. _____

3._____

Operation 1.	Implementing Consumer electronic products and associated circuit

Purpose: To Implement Consumer electronic products and associated circuit

Procedure:-

Step1. Follow safety procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools

Step4 Uninstall all physical components starting from power connections.

Step5. Clean dust from the components

Step6. Perform a visual check or electronic check as required

Step7. Reinstall all components carefully and properly

Step8. Check for loose wiring or crack cables.

Step9. Check if any jumper is missing, if required replace it with a new one.

Step10. Check for physical damages of peripherals/components and replace them if needed.

Step11. Tighten all internal and external connections.

Step12. Switch on the power supply and observe the result

Precautions:-

You should not forget to wear your PPEs.

Quality criteria:-

- Set each tools on safe areas
- The project must be functional
- Finish on time

Operation 2.	Identifying and detailing tools, equipment and testing instruments

Purpose: To Identify and detail tools, equipment and testing instruments

Equipment, Tools, & Materials:- digital multimeter, oscilloscope, signal generator, screwdrivers, diode, transistor, capacitor ,resistor ,Soldering tool disordering tool etc…

Procedures:

1. Identify and detail the tools
2. Identify and detail the equipments
3. Identify and detail testing instruments
4. Clean working area
5. Use all the above procedures

Precaution: Upon performing the arranging of tools, materials and test instruments for implementing of servicing system, assure that you will be handle with

Quality Criteria:

In the practical work area, prepares & place the required tools, materials, and test instruments.

Ensures the safety requirements and procedure

L #31	LO #3- Evaluating and documenting servicing system

Instruction sheet

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

- Making Adjustments to return apparatus and associated circuit to normal operation
- Rectifying or replacing faulty component(s) without damage
- Undertaking On-going checks the quality of the work
- Testing Consumer electronic products to ensure safety of the installation
- Servicing Consumer electronic products and associated circuits

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:

- Make Adjustments to return apparatus and associated circuit to normal operation
- Rectify or replace faulty component(s) without damage
- Undertake On-going checks the quality of the work
- Test Consumer electronic products to ensure safety of the installation
- Service Consumer electronic products and associated circuits

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.

2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them

3. Accomplish the “Self-checks” which are placed following all information sheets.

4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the shelf-checks.

5. If you earned a satisfactory evaluation proceed to “Operation sheets

6.Perform “the Learning activity performance test” which is placed following “Operation sheets ” ,

7.If your performance is satisfactory proceed to the next learning guide,

8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1	Making Adjustments to return apparatus and associated circuit to normal operation

3.1 Making adjustments to return apparatus and associated circuit to normal operation

For quality assurance, with respect to instruments and other equipment the following requirements should be met:

- Apparatus used for generation of data, and for controlling environmental factors relevant to the study should be suitably located and of appropriate design and adequate capacity.
- The apparatus used should be periodically inspected, cleaned, maintained, and calibrated according to Standard Operating Procedures. Records of procedures should be maintained.

Apparatus and methods to adjust the lateral clearance between upper and lower blades of shearing machines are described. An example apparatus includes a first blade opposite a second blade and movably coupled to a frame of the shear press via a ram, wherein the first and second blades are to receive a strip material. A lateral clearance adjustor slidably coupled to the ram shifts the first blade laterally relative to the second blade. A sensor determines a clearance position and a first drive member moves the lateral clearance adjustor from an initial position to the clearance position. A second drive member operatively coupled to the ram drives the first blade toward the second blade to shear the strip material.

An apparatus comprising: a circuit having a pulse train output; an adjusting circuit having an input, a control input, and an output, said adjusting circuit input coupled to said pulse train output; a real-time clock having an input, a plurality of set inputs, and a plurality of counter outputs, said real-time clock input coupled to said adjusting circuit output, and said plurality of counter outputs producing a usable tangible result for a user; and a proportional integral derivative time processor having a first output and a

second output, said first output operatively coupled to said adjusting circuit control input, and said second output operatively coupled to said plurality of set inputs.

2. The apparatus of claim 1 wherein said adjusting circuit control input can leave said pulse train unaltered.

3. The apparatus of claim 2 wherein said adjusting circuit control input can remove one or more pulses from said pulse train.

4. The apparatus of claim 3 wherein said adjusting circuit control input can add one or more pulses to said pulse train.

5. The apparatus of claim 4 wherein said pulse train output is a 32768 Hz pulse train output.

Self-check 3.1	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1. Write the use of Apparatus method

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Answer Sheet

Score = _____

Information sheet 2	Rectifying or replacing faulty component(s) without damage

3.2 Rectifying or replacing faulty component(s) without damage

There are several other factors to take into consideration when deciding whether to repair or replace a piece of equipment:

Ongoing maintenance costs over the remaining life of the equipment

The impact any repair would have on productivity and quality

Costs incurred from the equipment downtime

Health, safety, and environmental costs that come with equipment breakdown

Training costs for a new piece of equipment

- Disposal costs
- Installation costs

Damage requiring service

Unplug the set from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- When the power cord or plug is damaged or frayed.
- If liquid has been spilled or objects have fallen into the set.
- If the set has been exposed to rain or water.
- If the set has been subject to excessive shock by being dropped, or the cabinet has been damaged.
- If the set does not operate normally when following the operating instructions. Adjust only those controls that are specified in the operating instructions.

- Improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the set to normal operation
- When the set exhibits a distinct change in performance – this indicates a need for service

Rectify or replace faulty components without damage

Once the cause of equipment has been identified, action is to be taken to address this cause of failure.

This is carried out by replacing or repairing the components which were responsible for the failure of the equipment.

Test consumer electronic products to ensure safety

The main components used in electronics are of two general types: passive (e.g. resistors and capacitors) and active (e.g. transistors and integrated circuits). The main difference between active and passive components is that active ones require to be powered in some way to make them work. Active components can also be used to amplify signals

Electrical Safety

- Never use electrical tools on damp ground or around water
- Never place an antenna near power lines
- Keep a safe distance from pad mounted transformers
- Never insert anything (especially metal) into an electrical appliance (such as a toaster)
- Do not overload electrical outlets with too many electrical plugs. Buy one surge protector with many outlets instead of 'daisy-chaining' smaller power splitters
- Wear rubber gloves and rubber boots when working near electrical components.
- Inspect tools and appliances for wear and damage prior to use
- Use electrical tape for power cord management, do not use staples
- Always use the correct size fuse; never use a fuse with a larger amperage allowance than the original
- When working near power lines, use ladders made of wood instead of metal

- If you have a bad feeling about some work concerning electricity, stay away!
- Know where breakers and electrical boxes are in case of an emergency
- Label circuit breakers clearly
- Do not use electrical outlets or cords with exposed wiring
- Do not touch a person or electrical apparatus in the event of an electrical accident. Always disconnect the current first.

Main steps of problem solving process. .

Recognize that a problem exists

In order to recognize that a problem exists, you must have some "knowledge" of the situation, the job, the equipment, the product.

Analyze the problem

- Determine the “degree of deviation” from the standard.
- Will the problem get worse if left unattended?
- Is the problem worth the time and effort?
- Are you 100% sure that you know the cause of the problem?
- Gather as many facts about the situation as possible

Identify possible causes (solutions)

By the time you reach step 3, you should know what the problem is and what the problem looks like. Now it's time to think about what may be causing the problem. Here's where being a creative thinker helps.

Evaluate the possible causes

Before discussing this step of problem-solving, we're going to do another short activity.

Questions:

- Did you get them all?
- How did you go about solving this puzzle?
- Did you eliminate duplicates first?
- Did you go through and solve the easiest ones first, then go back and solve the harder ones?

Develop an action plan and take the correct action

At this point in the problem solving process, there should be only 2 – 3 possible

Causes that stand out as the most probable solutions to the problem.

Verify that the problem has been corrected

Confirming or checking the accuracy of: the state of being confirmed or having the accuracy of checked product.

Self-check 2	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

2. List the main steps of problem solving process(10 points)

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Answer Sheet

1._____

Operation sheet 2.

Purpose: - To Rectifying **or** replacing faulty component(s) without damage

Procedure:-

Step1. Follow safety procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools

Step4. Uninstall the appliance/ system product

Step4. Diagnose faults and defects of consumer electronic products and systems

Step5. Re install the appliance/ system product

Step6. Maintain/repair consumer electronic products

Step6. Test the product

Precautions:-

You should not forget to wear your PPEs.

Quality criteria:-

- Set each tools on safe areas
- The project must be functional
- You should have finish on you work time

Information sheet 3.	Undertaking On-going checks the quality of the work

3.3 Undertaking On-going checks the quality of the work

Work quality is the value of work delivered by an individual, team or organization. This can include the quality of task completion, interactions and deliverables. Work quality is a common consideration in managing the performance of programs, projects, vendors and individuals.

The following are common types of work quality.

In order to create a great service climate and deliver excellent service quality, these three key components are needed i.e.

Service strategy With a service strategy, the service provider can decide the service parameters, build the service value chain and design the internal service platform.

The stronger each of these elements are - the better and more robust the service strategy will be.

Various studies have proven that an effective service delivery platform built on a solid service value chain concept greatly affects customer quality.

When managers ensure that service constantly is communicated as a strategic imperative, employees are likely to perceive service to be important.

As a result, their behaviors towards customers are likely to reflect their orientation towards service excellence.

Service Performance

Research highlights that training, empowerment and rewards are the three most significant factors, which determine the level of performance and, in turn, lead to delivery of service strategy and excellent service quality.

Training

Training of service employees has long been identified as the most important factor behind higher service quality. For years, studies have proved that there is a strong correlation between the number of employee training hours and the degree of service quality.

To make it a success, the employer should focus on more than the basic service-specific competencies. The main emphasis should rather be on training of service management and other soft skills such as social skills, attitude and language abilities.

This will enhance the overall capabilities of service employees and improve the overall performance of the service system

Empowerment

Empowerment means providing employees with enough autonomy to allow them to handle unforeseen situations and challenges and let them be more self-sufficient in their work.

Empowerment has five dimensions:

Meaning: the extent to which the employee experiences a task as personally meaningful

Competence: the extent to which the individual feels confident about their ability to perform the task

Self-determination: the degree of influence the individual has over how to perform the job

Strategic autonomy: the degree of influence an individual has on the content of the job

Impact: the degree of influence an individual has on their direct work environment

Empowerment motivates employees to greater service performance and creates a greater sense of accomplishment or satisfaction in their jobs by reducing dependency and encouraging teamwork.

Rewards

Service employees should be properly rewarded for their work. The term reward should in this context be understood as a broad term referring to more than just monetary reward. Contrary to common perceptions, monetary rewards play a much smaller role in aligning performance with the service organization's value and goals compared to non-monetary rewards. For both types of goals, it is of high importance that the goals are realistic and achievable and that the employee has been involved in the goal-setting process.

The intangible nature of services means that performance can be difficult to measure. Therefore employees must be trusted to monitor their own performance. Performance appraisals should include input from employees as well as customers and the appraisal results must be used in determining training needs.

Customer Results

As detailed above service quality is centered on the perception and experience of the customer. Hence, measuring and tracking customer results are ways to provide feedback to the service delivery chain and to increase the value of each customer relationship.

To make this successful it is of high importance that the service provider and the customer organization are aligned on the purpose, objective and goal of the service exchange.

Check the quality of the work

On-going checks of the quality of the work are undertaken in accordance with established procedures Consumer electronic products and associated circuits are tested to ensure safety of the installation Consumer electronic products and associated circuits are serviced in accordance with established procedures

A work order is a document that provides all the information about a maintenance task and outlines a process for completing that task. Work orders can include details on who authorized the job, the scope, which it's assigned to, and what is expected.

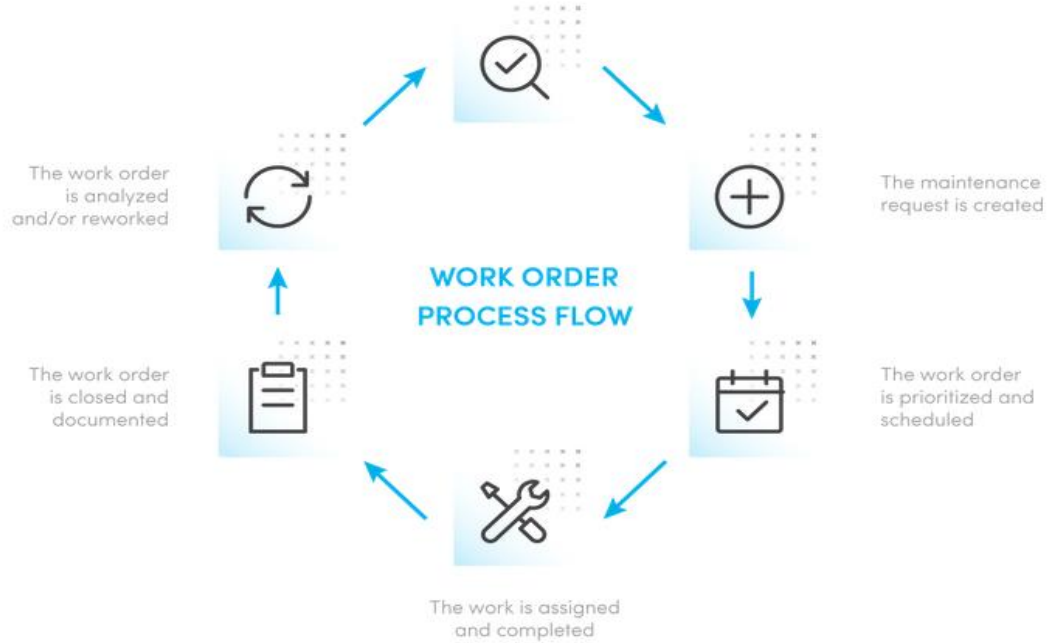


Fig3.1.The work order process

Every maintenance work order has a lifecycle with three main phases — creation, completion, and recording. These phases can be broken down into several steps. Understanding each step and having a solid work order process ensures tasks don't get stuck in one phase and turn into backlog.

Step 1: The task is identified

Maintenance tasks fall into two groups, planned maintenance and unplanned maintenance. Planned maintenance encompasses all the jobs you know of ahead of time, like routine inspections, and unplanned maintenance includes all the tasks you can't foresee, like an unexpected breakdown.

Step 2: The maintenance request is created

The details of the job are put together and submitted to the maintenance team for further action. For example, when a machine breaks down, an operator creates a work request and submits it to maintenance. If a task is planned, a work order is created and triggered at the proper time.

Step 3: The work order is prioritized and scheduled

Some jobs are more time-sensitive than others. A burnt-out light bulb doesn't need to be fixed immediately, but a broken conveyor belt might. That's why you need to prioritize every work order that hits your desk.

After prioritizing, it's time to schedule. Work orders can be scheduled based on a set deadline, planned maintenance triggers, or dedicated blocks of time. Setting a deadline keeps everyone accountable and informed so nothing falls through the cracks.

Step 4: The work is assigned and completed

It's time to turn those words on a page into action. The work order is assigned to a technician, who completes the task. This can be a five-minute check of equipment, or it can be a complex repair job that takes several days.

Step 5: The work order is closed and documented

Once all the terms of the work order are completed, it can be closed. Managers may need to sign off on the work order for compliance requirements. Once closed, the work order is filed away. A properly organized work order log is crucial for building asset histories, reviewing past solutions, preparing for audits, and more.

Step 6: The work order is analyzed and/or reworked

Closed work orders contain valuable information. They can provide insight into your processes and systems that can be used to fine-tune your operation. Having a work order log also allows technicians to quickly spot any missed steps or alternate solutions if an issue flares up again.

What information makes up a great work order?

- **Asset**: What piece of equipment needs work?

- **Description of issue**: What's the problem? What did you hear, see, smell, or feel at the time of failure or leading up to it?
- **Scope of work**: What work is required to get the job done? What skills are needed?
- **Parts and tools required**: Are there any parts that need to be replaced or special tools that need to be used?
- **Health and safety notes**: What safety procedures and equipment are needed? Have there been any accidents or near-misses while working on a similar issue or asset?
- **Date requested**: When was the work order created and submitted?
- **Requester name/department/contact**: Who created and submitted the work order?
- **Expected completion date**: When should this work order be completed?
- **Actual completion date**: When was the work order completed and closed?
- **Expected hours of work**: How many hours should it take to complete the work order?
- **Actual hours of work**: How many hours did it take to complete the work order?
- **Task checklist**: Is there a step-by-step guide to completing the required work?
- **Priority**: How important is this work order? High, medium, or low?
- **Assigned to**: Who will be doing the work? Is more than one person required? Is an outside contractor required?
- **Associated documents**: Are there resources that can help the work order be completed more efficiently, like manuals, diagrams, videos, asset history, purchase orders, or images?

The following are the attributes of the maintenance work order header

Attribute	Description
Work Order Number	Unique identifier of a work order.. During creation of the work order, a unique number is automatically assigned from the numbering scheme defined in the plant parameters (Work Order Prefix, Work Order Starting Number). You can also manually enter a work order number during creation. Once a work order is created, the work order number can't be updated
Status	Represents the status of the maintenance work order during its life cycle. The valid values are: Unreleased, Released, On Hold, Completed, Closed, and Canceled. **Note:** You can update a work order to the Released status only if a work definition is selected or at least one operation is manually defined.
Start Date	The start date and time of the maintenance work order. You can update this date to reschedule the work order prior to release. **Note:** Either the Start or Completion date is required to Release a work order. Once released, the value will be the same for each date.
Completion Date	The completion date and time of the maintenance work order.
Description	The description of the maintenance work order. The value may be defaulted from the work definition or a maintenance program, but you can edit it.
Priority	The execution priority of the maintenance work order.

Asset	The asset associated with the maintenance work order.
Asset Description	The description of the asset associated with the maintenance work order.
Item	The item associated with the asset being maintained.
Serial Number	The serial number of the item associated with the asset being maintained.
Work Definition Name	The name of the work definition that must be performed for the work order. It can't be updated after the work order is released. The work definition is exploded to determine the operation, resource, and material requirements in the work order.
Work Definition Date	The work definition date represents the effective date used to derive the work definition version. The date can be updated to a past date, allowing for previous versions of a work definition to be used in work order.
Work Definition Version	Represents the version of the work definition. The version is derived and displayed based on the work definition name and date specified.
Maintenance Program	The maintenance program name used as the basis for generating the work order. Contextual information about the program is marked with an orange triangle. Hover over the triangle and click on the icon that appears to view details about the maintenance program forecast used to create the work order. These details include the source work requirement, work definitions included, forecast method details, and work definition merge or suppress results
Suggested Start Date	Represents the maintenance program forecast due date.

Type	The type of the maintenance work order. The valid values are Corrective and Preventive.
Subtype	The subtype of the maintenance work order. The valid values are Condition based, Emergency, Planned, Reactive, Safety, and Under warranty.
Work Method	The work method is unique for maintenance work orders and isn't displayed.
Closed Date	The date when the work order is closed.
Default Supply Type	Controls how the materials are supplied to the work orders. The valid values are: Based on Work Definition, Push, Assembly Pull, Operation Pull, Bulk, and Supplier.
Released Date	The date on which the work order is released.
Firm	Manually updated indicator that can be used for work order planning. When checked, you must not schedule the work order.
Contract manufacturing	Indicates a contract manufacturing work order. This attribute is read-only.
Attachments	The attachments in the maintenance work order. It can be of file, text, or URL type.
Project Number	The number of the project. This is applicable only for project-specific work orders.
Task Number	The number of the task. This is applicable only for project-specific work orders.
Expenditure Item Date	The date of the expenditure item. This is applicable only for project-specific work orders.
Expenditure Type	A classification of cost that you assign to each expenditure item. Expenditure types are grouped into cost groups and revenue groups. This is applicable only for project-specific work orders.
Contract Number	The number of the contract/award used to fund the sponsored project. This is applicable only for project-specific work orders.

A permit-to-work (PTW) system is a formal written system designed to control. Certain types of work that are identified as potentially hazardous. This is identified as potentially hazardous. It is also a means of communication between site/installation management, plant supervisors and operators and those who carry out the hazardous work. Essential features of permit-to-work systems are:

■ Clear identification of who may authorize particular jobs (and any limits to their authority) and who is responsible for specifying the necessary precautions

■ Training and instruction in the issue, use and closure of permits

■ monitoring and auditing to ensure that the system works as intended

■ Clear identification of the types of work considered hazardous

■ Clear and standardized identification of tasks, risk assessments, permitted task duration and supplemental or simultaneous activity and control measures.

When are permit-to-work systems required?

14 Permit-to-work systems should be considered whenever it is intended to carry out work which may adversely affect the safety of personnel, plant or the environment. However, permit-to-work systems should not be applied to all activities, as experience has shown that their overall effectiveness may be weakened. Permits-to-work are not normally required for controlling general visitors to site or routine maintenance tasks in non-hazardous areas.

Permit-to-work systems are normally considered most appropriate to:

■ Non-production work (eg maintenance, repair, inspection, testing, alteration, construction, dismantling, adaptation, modification, cleaning etc)

■ Non-routine operations

■ jobs where two or more individuals or groups need to co-ordinate activities to complete the job safely

■ jobs where there is a transfer of work and responsibilities from one group to others

Self-check 3	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1._____ is the extent to which the individual feels confident about their ability to perform the tas

A. Competence C. Strategic autonomy

B. Self-determination D. Service strategy

2._____ the value of work delivered by an individual, team or organization

A. Customer result C. Work quality

B. Empowerment D. Self-determination.

3._____one of the following is not the common types of work quality

A. Service strategy. C. Customer result

B. Training. D. Service performance

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Answer Sheet

1._____

2. _____

3._____

Information sheet 4	Testing Consumer electronic products to ensure safety of the installation

3.4 Testing Consumer electronic products to ensure safety of the installation

Consumer reports currently tests about consumer electronic products every year, in a dozen or so categories. We cover everything from TVs to cell phones, computers, digital cameras, and newer emerging categories. No one conducts hands-on tests of as many products as we do.

Models Test

- We decide which product categories to test based on current trends.
- Our experienced product specialists consider market data to help them select specific models, with a focus on representative brands, price ranges, and important features.
- They also contact manufacturers to make sure products will still be available when our ratings are published.
- We also provide information on the services integral to the use of electronic products, including cell-phone carriers, internet service providers, cable and satellite TV providers, and computer tech support.

When we Test

- For our most popular categories, we produce new ratings almost every month, and we update our ratings of other types of products several times a year.
- We also test innovative, high-interest products — such as the latest Apple iPhone — individually as soon as they are available.

- When time is of the essence, we occasionally buy a new product directly from the manufacturer before it is released to stores, but we always test a retail model when it becomes available to validate the results on the pre-retail sample.

Where we Test

- We conduct our tests in designed for the demands of specific products.
- For example, TVs are tested in rooms with controlled lighting and a video distribution system that feeds various signal sources to the sets
- We evaluate audio products in environments that simulate a typical living room setting and in an anechoic (echo-free) chamber that isolates the sound produced by a device.
- Cameras and camcorders are tested in studios designed to simulate the wide range of shooting environments and lighting that you'll encounter in normal use

How we Test

- Products are tested by engineers and technicians with years and sometimes decades of expertise in their field.
- They work with the products for several weeks, putting them through a battery of objective tests using scientific measurements
- We test products against existing industry or government standards and develop our own benchmarks when we encounter new technologies or issues that require further testing.
- All models within a category go through exactly the same tests, side by side, so they're judged on a level playing field and test results can be compared.
- Testers focus on a product's primary function (evaluating image quality for TVs and cameras, for example) and some secondary functions, too (sound quality for TVs or photos shot with a cell-phone camera).

- We use a product as any consumer would. For example, we assess how long a laptop computer's battery will last when running everyday applications, such as word processing and photo editing, or how quickly a digital camera can shoot photos at a fast-moving soccer game.

Self-check 4	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1. _____Product categories to test based on current trends is indicate.

   a) Model test c)Where we test

   b) When we test d)How we test

1. _____ is evaluate audio products in environments that simulate a typical living room setting and in an anechoic (echo-free) chamber that isolates the sound produced by a device

   a) When we test c) How we test

   b) Where we test. D) Model test

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Answer Sheet

1._____

2. _____

3._____

Information sheet 5	Servicing Consumer electronic products and associated circuits

3.5 Servicing Consumer electronic products and associated circuits

Servicing consumer electronic products provides a thorough grounding in the electronics and electrical principles required by service engineers servicing home entertainment equipment such as TVs, CD and DVD machines, as well as commercial equipment including PCs.

Consumer electronics repair technicians use electrical equipment to diagnose malfunctions and test functionality of consumer electronics such as TVs, video and audio systems and digital cameras. They read manufacturers' instructions and conduct the necessary repairs or replacements.

Skills

Repair equipment on site

Identify malfunctions and repair or replace multi-media, audio-visual and computer systems, hardware and equipment on site.

Replace defect components

Remove defective parts and replace them with functioning components.

Maintain equipment

Regularly inspect and perform all required activities to maintain the equipment in functional order prior or after its use.

Set up consumer electronics

Connect electronic devices, such as TVs, audio and video equipment and cameras, to the electricity network and perform electrical bonding to avoid dangerous potential differences. Test the installation for proper functioning.

Create solutions to problems

Solve problems which arise in planning, prioritizing, organizing, directing/facilitating action and evaluating performance. Use systematic processes of collecting, analyzing, and synthesizing information to evaluate current practice and generate new understandings about practice.

Provide customer follow-up services

Register, follow-up, solve and respond to customer requests, complaints and after-sales services.

Apply company policies

Apply the principles and rules that govern the activities and processes of an organization.

Provide customer information related to repairs

Inform customers about necessary repairs or replacements, discuss products, services and costs, and include accurate technical information.

Use repair manuals

Apply the information, such as periodic maintenance charts, step by step repair instructions, troubleshooting information and overhaul procedures to perform routine maintenance and repairs.

Maintain customer service

Keep the highest possible customer service and make sure that the customer service is at all times performed in a professional way. Help customers or participants feel at ease and support special requirements.

Self-check 5	Choose

Name: _____Date:_____

Time Start: _____ Time Finish_____

1. Write at least four requirements for servicing consumer electronic products and associated circuits (10 points)

Note: Satisfactory rating - 5 and above unsatisfactory - below 5 points

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

Score = _____

Answer Sheet

1._____

Operation sheet 3.

Purpose: - To Service Consumer electronic products and associated circuits

Procedure:-

Step1. Follow safety procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools

Step4. Uninstall the appliance/ system product

Step4. Diagnose faults and defects of consumer electronic products and systems

Step5. Re install the appliance/ system product

Step6. Maintain/repair consumer electronic products

Step6. Test the product

Precautions:-

You should not forget to wear your PPEs.

Quality criteria:-

- Set each tools on safe areas
- The project must be functional
- You should have finish on you work time

LAP ATEST 3:

Name----------date----------

Time start---------- time finished----------

Task 1: Service Consumer electronic products and associated circuits

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