

Repair and Maintenance of Radio (AM & FM) and T.V. Receiver

Period of Training	:	6 Months, 24 Weeks (Effective Weeks 20)
Entry Qualification	:	10 th pass with age at least 14 yrs.
Terminal Competency	:	After completion, the participant would be able to maintain and repair of Radio & T.V. Receiver.

No. of Weeks	(Theory)	Practical Competencies
1,2	<ul style="list-style-type: none"> * Basic of Electricity –define DC, AC, practical measuring unit of voltage, current , Earthing types and importance. Electrical and personal safety. Importance of meter & multi meters. Types of meter, Explanation electrical measuring instrument. * Identification , Specification uses and maintenance of hand-tools 	<ul style="list-style-type: none"> * Demonstration of AC, DC voltage, demonstration on phase cycle ‘F’. measurement of AC, DC, voltage & current Testing of earth using test lamp and multi meter. Practice procedure for electrical and personal safety. * Demonstration and use of trade hand tools-screw drivers, pliers, tweezers, cutter, plier etc.. Simple fitting practice. Use of multi meter. (Analog & Digital), Ammeter, V-meter. Use of cell and battery in ckt.
3	<ul style="list-style-type: none"> * Basic concept of soldering. 	<ul style="list-style-type: none"> * Identification of conductor, Insulator, Semiconductor with specification, Practice of simple series & parallel ckt,. & mixed ckt. Verification of Ohm's law. Practice of soldering and desoldering.
4	<ul style="list-style-type: none"> * Classification of resistor with specification and use. Construction of resistor, color code. 	<ul style="list-style-type: none"> * Identification of resistors, color code practice. Experiment of PTC, NTC, VDR, LDR resistors. Test on and use of classified resistors carbon, W/W, WPOT, preset etc.
5	<ul style="list-style-type: none"> * Explanation of inductive reactance type, specification. Behavior with AC & DC. Impedance of coil concept. Self and mutual induction and their uses. Co-efficient of coupling. Explanation of Transformer- types, turns ratio. Type of cores to be used for LF, HF & VHF transformer. Defects of transformer. 	<ul style="list-style-type: none"> * Identification of assorted inductance, reactance, checking, testing rewinding up to specification . Demonstration on self and mutual induction. Identification of assorted transformer testing and rewinding up to a specification.
6	<ul style="list-style-type: none"> * Explanation of capacitance & capacitive, Reactance . 	<ul style="list-style-type: none"> * Identification and testing of different type of capacitors . Color code

7,8	<p>Classification of capacitor with specification, dielectric constants material used. Series and parallel connection. Color codes, application. Behavior of 'C' in A.C. & D.C.. Explanation of resonance equation. Series and parallel resonance ckt. Uses in electronic ckts.</p> <p>* Define semiconductor, Intrinsic and Extrinsic semiconductor. Definition of 'P' and 'N' type of semiconductor, development of PN junction. Barrier potential symbols. Explanation of Diode. Classification of diodes. Character of diodes. Zener Diodes. Diodes as Rectifier- Half Wave, Full Wave Bridge. What is a filter ckt. Type of filter Ckt. Explanation of Hi-pass, low-pass, Band Filters.</p>	<p>practice. Behavior of capacitors at different frequencies. Determination of resonance character for series and parallel ckt.</p> <p>* Demonstration on Barrier potential for Ge & Si. Filmon semi-conductor (PN junction). Testing of diodes. Characteristics of zener diodes. Half wave rectifier ckt. Full wave rectifier ckt. Bridge rectifier ckt. Demonstration on various filter ckt. Assembly, testing 'L', 'T' & PAI filters. Demonstration of H.P.,LP. And Band pass filter ckts.</p>
9	<p>* Explanation of Transistor, Types of Transistor. Tests of transistor. Symbols, Biasing of transistor, mode of application. Arrangement of transistor in a ckt. Condition for the use of transistor.</p>	<p>* Identification and testing of transistor to study ALPHA & BETA of a transistor / characteristics of a transistor. To study the function of a transistor as an amplifier.</p>
10	<p>* Explanation of Amplifier. Classification of Amplifier, Class A,B,C, A-B, A,F. amplifiers Wave length. Voltage amplifier. Power amplifier types push-pull, ICs amplifier. Biasing and coupling and preamplifier. PCB of amplifier. Voltage control, tone control, Bass control, Treble control, P.A. system.</p>	<p>* Demonstration, assembly and testing of a transistor, Amplifier in class-A,B,C, assembly, testing and frequency response of a singly stage AF-RF amplifier. Assembly and testing different type of amplifier. Fault location and servicing of amplifier. Study of voltage tone, Bass, Treble control circuit.</p>
11	<p>* Explanation of sound propagation, Importance of channel in sound system. Explanation of speakers & microphone.</p>	<p>* Demonstration of various microphones & speakers. Identification testing servicing of different types loud speakers.</p>
12	<p>* Define oscillator, Importance, application to electrical circuits. Type- AF, RF, Feed Back, Tank</p>	<p>* Demonstration on various oscillator. Assembly of AF, RF, oscillator testing & measuring the 'F' of</p>

13	<p>ckts. Oscillator use in Radio & TV Receiver .</p> <p>* Define modulation, Type of modulation – AM & FM, application Bandwidth mode, definition and importance of demodulation.</p>	<p>oscillations. Fault finding and servicing of oscillator.</p> <p>* Study of AM and FM modulation electromagnetic waves. Study of transmitting and receiving Antenna.</p>
14,15	<p>* Full explanation of radio receiver, super hetrodyne. Principle ‘ Frequency changing’. Block Diagram of a radio receiver. Explanation of frequency range, Explanation of frequency range, Explanation of tuning section./ RF section, Mixer stage, IF generation . RF amplifier, A.F.C.- type of transistor used. Specification of Antenna & Oscillator coil with type of “ Gang Condensers”. Study of “ band” Switches. Used connection condition for better selectivity and sensitivity.</p>	<p>* Demonstration on a multiband radio receiver . Study of a radio ckts. Identification of RF, IF, AF stage. Study of assorted ‘ Band switches.’ Practice on ‘ Dial threading’. Study of all section circuits of R/Rs for both PNP/NPN. Antenna & Oscillation for alignments. Study of different band switches finding and servicing of all stage checking of selectivity & sensitivity.</p>
16	<p>* Preparation of servicing chart for fault finding of different stages in radio receiver . Explanation of oscilloscope, importance, applications.</p>	<p>* Servicing practices on many type of radio receiver. Fault finding by meter/ by signal traces/ by scope . Testing of voltage in different stages. Demonstration of a CRO Exam of ‘X’ & ‘Y’ axes controller. Measurement of D.C/A.C. Voltage frequency etc. Used ‘Scope’ in test & Fault location.</p>
17	<p>* Basic Concept of -</p> <ul style="list-style-type: none"> - Number System - Binary and Hex - Gate Circuit - Register - Counter - Seven segment drives - Memory - Digital IC’s - Remote control 	<p>* Building blocks in various gates and combination of gates. Assembly and test of gate ckts. For a desired drive with digital ckts.</p>
18	<p>* Explain of TV system, B/W, Block diagrams for receiver, scanning system, frame , raster, picture elements. Composite video signal aspect ratio.</p>	<p>* Demonstration on a B/W TV. Identification of-</p> <ul style="list-style-type: none"> - Different Controls - Tuner, testing and replacement - Wave trap ckt. Tracing & Testing

<p>20</p>	<p>Resolution , flickring, contrast, brightness, video signal , sound signal , channels, bands. Explanation and data preparation for</p> <ul style="list-style-type: none"> - Turners: (1) Mechanical (2) Electronic (3) Filter ckt. SWAF - Video I.F. with staggered tuned -Video Amplifier and picture tube - Sweep section EHT -Sound Section -Power Supply <p>TV Antenna- YAGI & Feeder cables 'C' band antenna C.C.T.V. Preparation of servicing chart.</p> <ul style="list-style-type: none"> * Explanation of color TV. Functional block diagram. Expl. of Description and test points of: - V.H.F. - A.G.C. - Video amplifier - Synchronization and sweep ckt. - matrix -picture tube -sound system - Power supply <p>Preparation of servicing chart/data sheet fault finding- step by step. Balancing of white paper.</p> <ul style="list-style-type: none"> * Development of fault flow, data charts, replacement charts. Test point charts- Showing voltage and signals for both B & W and CTV. <p>Types of switches, cables, connection etc.</p>	<ul style="list-style-type: none"> - Video IF circuit trading and testing - video Amplifier ckt. Tracing and testing - picture tube ckt. Tracing and testing - sweep ckt. Tracing and testing - Horizontal ckt. - E.H.T. - F.M. sound section tracing & testing - power supply - SMPS - S.T.R. - Installation <p>* Demonstration on C.T.V. Identification & use of diff. controls. Identification, study & test points of:</p> <ul style="list-style-type: none"> - tuner - V.I.F. - Sync. Ckt. - Sweep ckt. - picture tube - sound section - power supply <p>Fault finding, Adjustment of white color. Repairing of Remote control</p> <ul style="list-style-type: none"> * Preparation of servicing charts, Use of test instruments for fault finding as per chats.
<p>21</p>	<ul style="list-style-type: none"> * Revision and test. 	

LIST OF TOOLS AND EQUIPMENTS FOR THE TRADE OF MECHANIC RADIO & T.V. (BATCH OF 20 TRAINEES.)

S.No.	Description	QTY.
01	Digital Multimeter (3 ¹ / ₂)	20
02	Long Nose insulated plier 15 cms	20
03	Diagonal cutter 15 cms insulated	20
04	End cutting nipper insulated 15 cms	20
05	Tweezer 10 cms insulated	20
06	Soldering iron 25 W	20
07	Combination plier 15 cms insulated	20
08	Neon glow tester	20
09	Knob screw driver insulated 10 cms	20
10	Screw Driver set of 6	20
11	Watch maker screw driver set	20
12	Knife with disposable blades	20
13	Wire stripper	20
14	Desoldering pump	20

Work Shop Tools

01	Adjustable spanner/ slide wrench (15-20)	8
02	Allen key	1 set
03	Work benches 120 x400x75 cms	4
04	Rubber mat- 180x45x2.5 cms	3
05	Rubber gloves pair	1 set
06	Steel ruler 30 cms	8
07	Scriber 15 to 20 cms	4
08	Center punch 10 cms	4
09	Hammer cross pean- 110 cms with handle	2
10	Hammer ball pean -220 cm with handle	2
11	Spanner – double ended metric system (6 mm to 19mm by 1.6 mm)	4 sets
12	Spanner single ended (6mm to 25mm by 1.6mm)	2 sets
13	Box Spanner set of 4-15mm	1 sets
14	Mallet 8 oz	2
15	Gimlet	2
16	Saw tenon 25 cms	2
17	Chisel wood, 15 cms set of 6mm to 25 mm	2 sets
18	Chisel cold flat 10 mm	2 nos.
19	Hand shears metal cutting 25 cms	2 nos.
20	Ratchet brace drill 10 m	2 nos.
21	Soldering iron 35 W	8 nos.
22	Soldering iron 10 W	2 nos.

23	Electric PCB drill	1 nos.
24.	PCB Hand Drill	4 nos.
25	Drill bits (1mm to 4mm)	44
26	Battery storage lead acid	2 nos.
27	Hydro meter	2 nos.
28	Files (Different Types)	Each one
29	Rhestats assorted values and ratings	8 nos.
30	Variable resistance assorted/potential meter (HT)	20 nos
31	Crimping Tool (RJ- 45)	2 nos.
32	Loud Speaker	16 nos.

Equipment

01	Multi Meter analog	4 nos.
02	Digital millimeter	8 nos.
03	Power supply +5 V & +-12 V DC	8 nos.
04	Variable DC power supply 0-30 V	4 nos.
05	Function generator 3/10Mhz	4 nos.
06	Signal generator	2 nos.
07	Service Oscillator	2 nos.
08	20/30 Mhz C.R.O.	6 nos.
09	Digital storage oscilloscope – 60 Mhz	1 nos.
10	Signal generator AM/FM	2 nos.
11	AF distortion meter	1 nos.
12	Basic electronics trainer	3 nos.
13	Digital Electronics Trainer	3 nos.
14	Linear IC trainer	3 nos.
15	Microprocessor based IC Tester	1 nos.
16	Constant voltage transformer	4 nos.
17	Coil winding m/c (manual)	1 nos.
18	Frequency modulator	2 nos.
19	Strain gauge with load cell	2 nos.
20	Regulated power supply 0-30 V	4 nos.
21	Signal Tracer	2 nos.
22	Pattern Generator (Color)	2 nos.
23	B/W TV Trainer Kit	1 nos.
24	CTV Trainer Kit	1 nos.

Mobile Repairing

<u>Name</u>	:-	Mobile Repairing
<u>Entry Qualification</u>	:-	8th pass with age at least 14 yrs.
<u>Duration</u>	:-	12 Weeks
<u>Terminal Competency</u>	:-	Candidate will be able to repair 2G and 3G Mobile Sets.

Contents:-

S.No.	Practical Competencies	Underpinning Knowledge (Theory)
1	i) Electrical and Personal safety, danger and Preventions.	Practice Procedures for safety and health hazards measures.
2	i) Identify various components ii) Identify various tools and equipments	Knowledge of Basic Electricity and Basic electronics. Basic idea of signal , signal transmission, signal receiving.
3	i) Block diagram of mobile set and function of each block. ii) Identify various keys and their uses. iii) Identify various components used in mobiles set and their function.	Introduction to various types of mobiles handsets, their description features, how to use these features.
4	Replace faulty pars with new parts of mobile phone that can be done without use of soldering	Fault finding and trouble shooting
5	Test the battery and battery charger with multimeter	Identify the components used in cell phone
6	Testing of Mic, Speaker and vibrator	Function of Mic, speaker and vibrator
7	Soldering and de soldering of various SMD components and select suitable temperature for use	SMD soldering methods.
8	Soldering and de soldering of BGA Ics.	Identify BGA Ics
9	Check track continuity and use jumpers for track problems	Identify various blocks and their functions.
10	Apply proper flux and cleaning the cell phone	Use of various solders, flux and cleaning agents.
11	Test and rectify the problems in antenna and antenna switch	Use of antenna and antenna switch.
12	Identify the fault and test the display interface circuits.	Functions of display, CPU, memory
13	Try to Unlock and lock various function	Various locks used in cell phone
14	Identify the faults of Network section and voice section and rectify them.	Function of the IF section, COBBA section and PA section. Complete knowledge of Block Diagram, circuit diagram, i.e. Power section On/Off circuit Net section

		Charging Section Software Section
15	Rectify the faults related to SIM and SIM connector	SIM and SIM related problems of GSM & CDMA phones.
16	Rectify the faults in camera and camera interface circuits	Use of computer for cell phone servicing-cell phone software
17	Identify and rectify the faults in Bluetooth circuits Use of anti-static mats	Camera phones its constructional details and working . Bluetooth and other wireless circuits
18	Complete hardware and software knowledge of PDA and multimedia handsets. Window based handsets.	Knowledge of downloading of add-on software, ring tones, wall papers, themes etc on non- multimedia and multimedia handsets, window based handsets.

List of Tools / Resources (for a batch of 20 students) :-

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| 1. | Soldering station 6V/10W | - | 10 nos. |
| 2. | SMD rework station | - | 10 nos. |
| 3. | Twisers (assorted size and shapes) | - | 10 nos. |
| 4. | PVC clamp | - | 10 nos. |
| 5. | Magnifying Lens with illumination | - | 05 nos. |
| 6. | BGA Soldering Kit | - | 10 nos. |
| 7. | Multi meter (Digital) | - | 04 nos. |
| 8. | Anti- Static Pad | | |
| 9. | Screw Drivers (assorted size and shapes) | | |
| 10. | Computer with flashing unit | - | 05 nos. |
| 11. | Software compatible with different types of Handsets | | |