JOB SPECIFICATION

JOB TITLE : Radio Repair Technician L - 3

SECTOR : Electronics

SUB - SECTOR : Radio Receiver Service And Repair

1993 (2050 – 5 – 25)

JOB SPECIFICATION

ON

RADIO REPAIR TECHNICIAN (BROADCAST RECEIVER) L - 3

(SECTOR : Electronic Engineering , SUB - SECTOR : Broadcasting Receiver)

Submitted by:

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APPROVED BY THE TRIPARTITE NATIONAL SKILL TESTING BOARD

June, 1993.

JOB SPECIFICATION

1	**JOB TITLE:** Radio Repair Technician **LEVEL: 3**
2	**JOB DESCRIPTION:** Repairs, aligns and tests all types of domestic radio receiver (including electronically tuned) using circuit diagrams and manufactures specification. Uses common workshop equipment quickly and accurately.
3	**LIST OF TASK:** 1. Obtaining fault symptoms from the customers. 2. Dismantling the radio receiver. 3. Repairing mechanical faults (where applicable). 4. Detecting repairing replacing all faulty sections/components. 5. Adjusting and testing the radio receiver. 6. Reassembling and final testing of the radio receiver.
4	**QUALIFYING NOTES (Entry Requirements, etc.)** - Physical requirements: High degree of manual dexterity, no color blindness - Educational requirements: Able to read and understand circuit diagrams and manufacturers specification. Understand the operation of a domestic radio receiver.

TASK SPECIFICATION

5	**TASK NO : ONE** **Obtaining fault symptoms from the customer.** **JOB TITLE: Radio Repair Technician L - 3**
6	**TASK ELEMENTS** 1. Enquires as to the case history of the radio receiver. 2. Confirms the complaint with the customer. 3. Checks battery condition (if battery operated only) 4. Switches on radio receiver and replicates fault symptom. 5. Completes 'Fault Report 'form. 6. Informs the customer of the completion date and time. 7. Files ' Fault Report Form ' according to the workshop procedure.

TASK SPECIFICATION

7	**TASK PERFORMANCE REQUIREMENTS** - AC 220V\50Hz supply - Battery eliminator (variable low voltage supply) - Standard tools set Screwdrivers (Flat, Philips and precision) Box spanner set Trimmer tools Pliers (various types) Side cutter Wire strippers Tweezers Soldering iron (low and medium power) Desoldering pump Solder lead Flux Multimeter Magnifying glass Inspection mirror - Fault Report Form - Pen
8	**TASK PERFORMANCE STANDARDS** Deals with customer in a polite and efficient manner. Tunes radio accurately (if possible) and replicates the fault. Checks the function of all the ‘ user controls ‘ and reports any additional faults to the customer. Completes the Fault Report Form accurately and neatly. Makes an estimate of the completion time and date. Files the Fault Report Form according to the workshop procedure (eg. In the work pending file alphabetically).

9	**10**	**TASK TRAINING DATA**

TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
O		Make sure the testee knows :-			
N	2.	Technical vocabulary used.			
E	3.	How to test the battery condition using a multimeter.			
	4 a)	How to connect mains supply or the battery eliminator.		Battery insertion diagram	Hazards involved with mains electricity.
	4 b)	The tuning procedure and function of all the ‘ user controls ‘.			
	5.	How to complete the ‘ Fault Report Form ‘ accurately and neatly.		How to complete ‘ Fault Report Form’.	
	7.	How to file the ‘ Fault Report Form ‘ in the workshop.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE:** Obtaining fault symptoms from customer. **TASK NO:** ONE	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Enquire about the history of the radio receiver in a polite manner. 2. Confirm the complaint with the customer. 3. Check the condition of the battery. 4. Connect radio to power supply safely, replicate fault symptom and check all ‘ user control ‘ 5. Complete ‘ Fault Report Form ‘ accurately. 6. Inform the customer of the completion time and date. 7. File the ‘ Fault Report Form’ correctly.		

	TASK SPECIFICATION
5	**TASK NO:** 2 **Dismantling of the radio receiver.** **JOB TITLE:** Radio Repair Technician L - 3
6	**TASK ELEMENTS** 1. Cleans workplace. 2. Disconnects the receiver from the mains and/or removes batteries 3. Determines the dismantling procedure for the receiver. 4. Select tools required for dismantling. 5. Removes necessary knobs/screws/wires. 6. Removes rear cover and stores it in a safe place.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - 220V/50Hz supply - Battery eliminator - Standard tools set - Storage boxes
8	**TASK PERFORMANCE STANDARDS** Cleans workplace, disconnects power supply/removes batteries in correct and safe manner. Ascertains the dismantling procedure and selects required tools. Removes necessary knobs/screws/wires (noting position of long and short screws) and stores them safely. Carefully removes rear cover and any attached wires (noting position first) and stores this safely.

9	10	TASK TRAINING DATA			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
T **W** **O**		Make sure the testee knows:-			Hazards involved with mains electricity.
	2.	How to disconnect power supply in a safe manner.			
	3.	The fittings of the radio receivers and how they may be dismantled.			
	4.	How to use the standard tools correctly.			
	5 a)	How to remove knobs without damage to them or the case.			
	b)	How to remove screws/nuts/bolts without damage.			
	c)	How to remove wires.			
	6.	How to store all removed items safely.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE:** Radio Technician (Broadcasting Receivers) **TASK NO:** TWO	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Clean the workplace. 2. Disconnect receiver from power supply/remove batteries correctly. 3. Determine correct dismantling procedure. 4. Select and use standard tools correctly. 5. Remove necessary knobs/screws/wires prior to removing rear case. 6. Carefully remove rear case with due regard to any attached wires. 7. Store knobs/screws/rear cover safely.		

	TASK SPECIFICATION
5	**TASK NO:** THREE **Repairing mechanical faults** **JOB TITLE :Radio Technician L - 3**
6	**TASK ELEMENTS** 1. Removes PCB's as necessary. ANTENNA 2. Checks/repairs antenna as necessary. 3. Notes antenna connections prior to removal. 4. Removes antenna. 5. Replaces antenna with correct/equivalent replacement. 6. Rechecks antenna connections. 7. Tests operation of antenna (if possible). TUNING POINTER MECHANISM 8. Determines reason for mechanism failure (eg. Old age, sharp edges). 9. Notes the original component positions and removes faulty component (s). 10. Replaces necessary parts (eg. Dial cords, dial tensioner). 11. Cleans and lubricates mechanical parts as necessary. 12. Aligns pointer. 13. Tunes radio to radio station of known frequency to verify pointer position.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - 220V/50Hz supply - Battery eliminator. - Standard tool set - Replacement parts (eg. Antenna, dial cord, pointer, gear wheels etc.) - Lubricant - Parts catalogue/data books
8	**TASK PERFORMANCE STANDARD** Able to remove/replace/repair antennas and all parts associated with the pointer mechanism. Removes only those items necessary to gain access to required part and does not cause any further faults by this action. Uses tools correctly and safely. Solder joints for ‘as new ‘condition. Aligns dial points accurately, lubricates and checks operation of pointer mechanism. Verifies all work is of the required standard.

9	10	TASK TRAINING DATA			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
T **H** **R** **E** **E**		Make sure the testee knows:-			
	1.	Removal procedure for PCBs.			
	2.	The correct mechanical operation of the antenna.		Knows correct appearance of the antenna system.	
	4.	How to use tools correctly to remove the antenna.			Knows how to use tools safely.
	5.	How to check the suitability of the replacement and how to fit it.			
	6.	How to check the continuity of the new connections.		Can use manufactures' specifications to look up replacement.	
	7.	How to test the operation of the antenna.			
	8 a).	How to determine the reason for the failure of the pointer mechanism.			Hazards due to sharp edges.
	8 b).	How to rectify the fault (eg. Remove sharp edges)			Can use tools safely.
	9.	How to dismantle the pointer mechanism.			Can line up marks accurately.
	10.	How to replace all parts of the tuning pointer mechanism.			
	11.	Quantity and quality of lubricant to be used.			Can read radio station frequency and wavelength from the scale.
	12.	How to align the pointer with the end of the scale.			
	13.	The frequency of the local radio station.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE:** Repairing mechanical faults **TASK NO : THREE**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Remove PCBs and wires as necessary without damage. 2. Determine antenna removal procedure. 3. Note antenna connections removal procedure. 4. Use tools correctly for antenna removal. 5. Select correct replacement and fit for 'as new 'condition. 6. Test continuity of antenna connections. 7. Test performance of new antenna. 8. Determine reason for tuning pointer mechanism failure. 9. Remove faulty component (s) without damage to other components. 10. Replace faulty components with suitable replacement. 11. Clean and lubricate mechanism.		

	TASK SPECIFICATION
5	**TASK NO:** FOUR **Detecting, repairing and replacing all faulty components or sections.** **JOB TITLE: Radio repair technician, L – 3**
6	**TASK ELEMENTS** 1. Applies safety precautions pertinent to operating receiver without rear cover. 2. Cleans PCB's and associated components before starting work. 3. Makes preliminary visual checks for obvious faults. 4. Specifies the section or module that is most likely to be causing the fault. 5. Uses effective diagnostic/trouble shooting methods to locate the fault. 6. Specifies and replaces defective components/modules. 7. Verifies the effectiveness of the repair and makes adjustments of necessary.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - 220V/50Hz supply - Battery eliminator - Standard tool set - Replacement components - Oscilloscope - Signal injector
8	**TASK PERFORMANCE STANDARDS** Applies suitable precautions to prevent electric shock. Cleans PCB and associated components without allowing dust to enter potentialities or damage any other components. Identifies all types of components and their function in the radio receiver (eg resistor, capacitors, variable capacitors, inductors, transformers (signal, IF, driver, output and power), transistors, ICs, diodes, leds, switches, potentiometer, etc.). Recognizes overheated components and why the component has overheated. Knows how each section affects the overall performance of the receiver. Uses multimeter, oscilloscope and signal injector in trouble shooting. Finds out and confirms circuit voltages and waveforms. Removes all types of component without causing any damage. Avoids overheating components during soldering, avoids dry joints and verifies the effectiveness of the repairs.

9	10	TASK TRAINING DATA			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
F O U R		Make sure the testee knows:-			
	1. a)	How to avoid PCBs touching live wires.			Knows dangers of mains electricity.
	b)	Use of isolation transformer.			
	2.	Cleaning procedure for PCBs and associated components.			
	3.a)	Types of components used in radio receivers.			
	b)	How components should be attached to the boards.			
	c)	How to recognize overheated components.			
	4.a)	The function of all sections of the radio receiver.			
	b)	How the sections of the receiver affect the overall performance.			
	5.a)	How to use a multimeter oscilloscope and a signal injector.		Can read manufacturers specifications.	
	b)	The voltages and waveforms at various points in the circuit.			
	6.a)	How to use soldering iron and de- soldering pump.			
	b)	How to remove component without stressing PCB.		Can read color coding of components.	
	c)	The importance of the correct/equivalent replacements.	Addition of resistors and capacitors wired in series and parallel.		
	d)	How to replace components for an ‘ as new ‘ condition.		Read transistor/IC data books.	

	e)	How to ensure new components against: Over heating Static charge			
	f)	How to avoid dry joints.			
	7.	How to check the continuity of the replaced component (s).			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Detecting repairing and replacing all faulty sections or components.** **TASK NO:** FOUR	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Take precautions to avoid electric shock. 2. Clean PCB and associated components correctly. 3. Make a preliminary check for obvious faults and correct them. 4. Specify section/module causing the fault(s). 5. Use effective diagnostic/trouble shooting method to locate fault(s). 6. Replace defective components with suitable replacements for an ‘as new ‘condition without excessive use of solder or heat. 7. Verify the effectiveness of the repair(s).		

	TASK SPECIFICATION
5	**TASK NO: FIVE** **Adjusting and testing the radio receiver.** **JOB TITLE: Radio repair technician, L – 3**
6	**TASK ELEMENTS** 1. Checks and adjusts the power supply unit. 2. Checks and adjusts antenna matching/trimming. 3. Checks and adjusts RF amplifier gain. 4. Checks and aligns oscillator (s). 5. Checks and aligns IF stages and their selectivity. 6. Checks and adjusts demodulation sections. 7. Checks and adjusts audio pre and power amplifier section.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** – 220V/50Hz supply – Battery eliminator – Standard tool set – Oscilloscope – Manufacturer's specification for the radio being repaired.
8	**TASK PERFORMANCE STANDARDS** The testee must understand the detailed working of the radio receiver i.e. the function and operation of the following : a) antenna and matching circuit, b) band selection, c) RF amplifier, d) mixer and IF stages, e) demodulation stages, f) pre and power audio amplifier stages. The testee must be able to adjust and align these stages for optimum receiver performance i.e. read the manufacturers specification on selectivity and audio frequency response.

9	10	TASK TRAINING DATA			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
F **I** **V** **E**		Make sure the testee knows:-			
	1. a)	The function and operation of all power supply components.	Read ripple voltage from an oscilloscope.		Hazards involved with mains electricity.
	b)	How to measure the ripple voltage.			
	c)	How to adjust power supply.			
	2. a)	The function and operation of the antenna matching circuits.			
	b)	How to adjusts the antenna matching circuits for optimum receiver performance i.e. the receivers ability to receive local and distant stations.			
	3.a)	The function and operation of the RF amplifier and its effect on the overall receiver performance.			
	b)	How to adjust the gain and band width of the RF amplifier.		Knowledge of how to measure the band width using an oscilloscope.	
	4. a)	The correct frequency of the local oscillator.			
	b)	How to adjust the local oscillator frequency.			
	5. a)	The function and operation of the IF stages and their effect on the overall receiver performance.			
	b)	How to align the IF stages for optimum receiver selectivity and gain.			
	6. a)	The function and operation of the demodulation stages and their			

		effect on the overall receive performance.			
	b)	How to adjust the demodulation stages for optimum sound reproduction.			
	7. a)	The function and operation of the pre and power audio amplifiers.			
	b)	How to measure and adjusts the gain and frequency response of the pre amplifier.		Read manufacturer specification.	
	c)	How to measure and adjust the gain and frequency response of the pre amplifier.		Read manufacturer specification.	
				Read manufacturer specification	

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Adjusting and testing the radio receiver.** **TASK NO:** FIVE	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Correctly check and adjust the power supply unit to within the manufacturers' specifications. 2. Correctly check and adjust the antenna matching circuits to within the manufacturers' specifications. 3. Correctly check and adjusts the RF gain to within the manufacturers' specification. 4. Correctly check and align the oscillator to within the manufacturers' specification. 5. Correctly check and align the IF stages to within the manufacturers' specification. 6. Correctly check and adjusts the demodulation sections to within the manufacturers' specification. 7. Correctly check and adjusts the audio pre and power amplifier to within the manufacturers' specification.		

	TASK SPECIFICATION
5	**TASK NO: SIX** **Reassembling and final testing of radio receiver.** **JOB TITLE: Radio repair technician, L – 3**
6	**TASK ELEMENTS** 1. Returns PCB's and other components to their original positions. 2. Verifies that all components are secure. 3. Replaces real cover. 4. Replaces all knobs/wires/screws correctly. 5. Verifies receiver functions correctly (including all 'user controls'). 6. Disconnects power supply. 7. Cleans receiver case. 8. Completes 'Fault Report' form. 9. Prepares bill. 10. Stores receiver and bill safely for customers return. 11. Completes job within specified time. 12. Returns all tools to a specified place.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** – 220V/50Hz supply – Battery eliminator – Standard tool set – Cleaning agents – Cleaning rags – Fault Report Form – Bill pad – Calculator – Pen
8	**TASK PERFORMANCE STANDARDS** The testees must return the PCBs and other components to their original positions and verify their security. Testee must reassemble the radio receiver without strain on any internal or external components or damage screw heads or threads. They must confirm the correct function of all the ‘ user controls ‘ i.e. no extra crackles, pops or whistles induced by these controls. The testee must clean the case of the radio receiver without excessive use of cleaning agents that could damage other components eg speaker, pots etc. They must complete the fault report form and file this as per the workshop procedure and prepare the bill accurately and neatly. They must then clean and return all the tools to their original storage place.

9	10	TASK TRAINING DATA			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
S **I** **X**	1. 2. 3. & 4. 5. 6. 7. 8. 9. 10. 12.	Make sure the testee knows:- The correct location of the PCBs other components. How to verify PCB/component security. The reassembly procedure. The correct function of all ‘ user control ‘ i.e. volume, tone, tuning, fine tuning etc. How to disconnect the mains or battery supply correctly. The correct cleaning agents to use. How to complete and file the ‘ Fault Report Form ‘. How to prepare bills including knowledge of any taxes. How to store the receiver and the bill safely until the customer returns. How to care for tools and equipment.	Basic mathematics + - * / and %	How to use the calculator	Hazards involved with mains electricity.

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Reassembling and final testing of radio receiver.** **TASK NO :** SIX	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Correctly return all PCBs and other components to their original positions. 2. Verify all PCB/components are secure. 3. Correctly replace rear cover. 4. Correctly replace all knobs/wires/screws. 5. Correctly verify the function of all the ‘ user controls ‘. 6. Correctly disconnect the power supply. 7. Clean receiver case. 8. Complete the ‘ Fault Report Form ‘ correctly and neatly. 9. Prepare the bill accurately. 10. Store the receiver and the bill safely awaiting the customers return. 11. Complete the job within the specified time. 12. Clean and return all tools and equipment to their original place.		