JOB SPECIFICATION

JOB TITLE : Tape Recorder Repair Technician – Level 2

SECTOR : Engineering

SUB - SECTOR : Electronic Engineering

1994 June

The National Skill Standards and test was developed by:

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APPROVED BY THE TRIPARTITE NATIONAL SKILL TESTING BOARD.

June 1994

	JOB SPECIFICATION
1	**JOB TITLE: Tape Recorder Repair Technician (Radio cassette recorder)** **LEVEL: 2 (TWO)**
2	**JOB DESCRIPTION:** Tape Recorder Technician, L – 2 carries out preliminary checking procedures, dismantles recorder, tests and repairs mechanical malfunctions, tests and repairs AC and DC power supplies, tests and replaces control switches, aligns azimuth of records/play and erase heads, tests and repairs pre – amplifier and audio power amplifier sections.
3	**LIST OF TASK:** 1. Carrying out preliminary check and dismantling recorder. 2. Testing and repairing AC and DC power supply section. 3. Testing and repairing mechanical function. 4. Testing, replacing and adjusting reed, leaf and power switches. 5. Testing, replacing and alignment azimuth of record/play and erase heads. 6. Testing and repairing pre – amplifier section (including emphasis and de – emphasis). 7. Testing and repairing bias/oscillator section. 8. Testing and repairing audio power amplifier section. 9. Reassembling recorder. 10. Preparing bill.
4	**QUALIFYING NOTES (Entry Requirements, etc.)** - Physical requirements : should have no color blindness, high degree of manual dexterity. - Educational requirements : Able to read and understand Nepali and English electronic technical language. Also able to write and understand basic specifications and circuit diagrams.

TASK SPECIFICATION

5	**TASK TITLE : Carrying our preliminary check and dismantling recorder.** **TASK NO : 1 (ONE)** **JOB TITLE : Tape Recorder Repair Technician**
6	**TASK ELEMENTS** 1. Makes note of symptoms as described by the customer. 2. Examines the recorder for physical damage and notifies customer. 3. Completes a receipt for the recorder and estimates the finish time/date. 4. Collects necessary tools and equipments to complete the repair. 5. Tests, cleans and adjusts knobs, switches, handles for correct operation. 6. Examines the recorder to determine the correct dismantling procedure. 7. Removes only necessary screws, bolts, nuts, knobs to dismantle recorder. 8. Stores screws, bolts, nuts, knobs and case in a safe place.

TASK SPECIFICATION

7	**TASK PERFORMANCE REQUIREMENTS – TASK NO 1**
	
	- Pen and pencil
	- Fault report form
	- Receipt pad
	- Tape recorder repair technician **Standard tool kit**
	  - Screwdrivers – Philips and flat head of various sizes, precision screwdrivers set
	  - Tweezers
	  - Soldering iron of the correct rating, soldering lead and de – soldering pump/braid
	  - Power cord
	  - Pliers – Long nose, slide cutter, flat, combination
	  - Multimeter – analogue and/ or digital
	  - Cleaning rag and cleaning fluid
	  - Inspection mirror
	  - Small Allen key set
	  - Loudspeaker
	  - Drive transformer
	  - Complimentary pair transistors
	  - Heatsink and heat transfer compound or silicone grease

8	**TASK PERFORMANCE STANDARDS** Fault symptoms recorded on the fault report form accurately and neatly. Recorder examined for physical damage, customer notified and report completed clearly, Time/date estimated to within 6 hours. Necessary tools and equipment collected (see performance requirements for detailed list). Function of all knobs and control thoroughly tested (i.e. tested at least twice). Dismantling procedure determined. Only necessary screws/nuts/bolts/knobs removed. Rear cover removed without damage to it or ay internal connections/parts. Cover and removed parts stored in a safe place where in cannot be tampered with. Screw/nut/bolt/knob position noted if screws/nuts/bolts/knobs of different sizes are used.

9	10	**TASK TRAINING DATA**			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
1 **O** **N** **E**	1. 2. 3. 4. 6. & 7. 8.	Knows how to complete a fault report form. Knows how to complete a receipt and approximately how long faults take to repair. Knowledge of the tools required to performs various repairs. Knowledge of the correct functions of the facilities available on tape cassette recorders. Knowledge of procedure for dismantling tape cassette recorders. Knowledge of correct storage procedures.			Knows how to handle tools safely. Knows how to store items safely.

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE:** Carrying out preliminary check and dismantling recorder. **TASK NO:** 1 (One)	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME: 1.** **2.** **3.** **4.**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Accurately make a note of symptoms as described by the customer? 2. Examine the recorder for physical damage, missing parts and notify customer of scratches and marks? 3. Complete a receipt for the recorder and estimate the finish time/date accurately? 4. Collect necessary tools and equipments to complete the repair and position them in a safe and convenient operation? 5. Replace, clean and adjusts knobs, switches, handles for correct operation? 6. Examine the recorder and determine the correct dismantling procedure? 7. Remove only necessary screws, bolts, nuts, knobs to dismantling recorder? 8. Store screws, bolts, nuts, knobs and case in a safe place?		

TASK SPECIFICATION

5	**TASK TITLE : Checking and repairing AC and DC power supply sections.** **TASK NO : 2 (Two)** **JOB TITLE: Tape Recorder Repair Technician**
6	**TASK ELEMENTS** 1. Locates transformer and power supply section of the recorder. 2. Checks section for physical faults, e.g. blown fuses, disconnected wires, burnt components. 3. Tests and replaces battery/mains switch, as necessary. 4. Tests continuity of transformer and replaces it if found to be faulty. 5. Connects power supply to the mains and tests input and output voltages – with and without load. 6. Tests and replaces rectifier diodes, as necessary. 7. Replaces blown fuses and re – connects disconnected wires, as necessary. 8. Tests and replaces capacitors, inductors and resistors, as necessary. 9. Tests and replaces regulator ICs/transistors/zener diodes, as necessary.

TASK SPECIFICATION

7

TASK PERFORMANCE REQUIREMENTS

- Standard tools kit
- Oscilloscope – if available
- 220V 50Hz isolated supply
- Dry cell or rechargeable batteries of correct size and quantity – e.g. 6 D Type 1.5V batteries or battery eliminator or correct rating
- **Standard workshop common spares** - Selection of fuses
  - Selection of interconnecting wire of various length and ratings
  - Rectifier and signal diodes – different ratings
  - Selection of resistors, capacitors (electrolytic, ceramic, polyester etc.) and inductors
  - Selection of regulating and audio ICs, signal and power transistors and zener diodes.
  - Mains transformer.
- Battery/mains switch

8

TASK PERFORMANCE STANDARDS

Transformer and power supply section of the recorder accurately identified. Section checked for physical fault, such as blown fuses, disconnected wires, burnt components, foreign bodies causing short circuits, etc. Battery, Mains switch tested and replaced if faulty. Continuity of transformer windings checked for short/open circuit. Input and output voltage of the transformer checked, on and off load, and compared to the recorder specification. Rectifier diodes checked using multimeter or oscilloscope for correct operation and replaces if faulty. Blown fuses replaced with correctly rated fuse (i.e. 1 Amp fuse replaced if faulty with a 1 Amp fuse). Disconnected/broken wires re – connected to the correct terminal securely. Capacitors, inductors and resistors tested and replaced with identical values for an as new condition, if faulty. Regulator ICs, power transistors and zener diodes tested and replaced with identical values for an as new condition, if faulty.

9	10	**TASK TRAINING DATA**			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
2	1.	Knowledge of power supply section and its identification.			
T	2.	Knows how to identify blown fuses, disconnected wires and burnt components.			
W					
O	3.1.	Knows how to test battery/mains switch.			
	3.2.	Knows how to remove and replace battery/mains switch.			
	4.1.	Knows how to identify primary and secondary windings and to test the continuity of a transformer.			
	4.2.	Knows how to replace the transformer.			
	5.1.	Knows how to test power supply with and without load.		Safety precautions followed for working with mains voltages.	
	5.2.	Knowledge of correct function of the power supply with and without load.			
	6.	Knowledge of diodes and knows how to check for their correct function using multi – meter.		Use data book.	

	7.	Knowledge of fuse ratings, knows how to change fuses and how to reconnect wires (by soldering, plugs or screw terminals).			
	8.1.	Knowledge of the correct function of capacitors, inductors and resistors.			
	8.2.	Knows how to test capacitors, inductors and resistors.		Use data book Use of color code tables	
	8.3.	Knows how to replace capacitors, inductors and resistors.			
	9.1.	Knowledge of the correct function of ICs, transistors and zener diodes.		Use data book	
	9.2.	Knows how to test ICs (in circuit) , transistors and zener diodes.			
	9.3.	Knows how to replace ICs, transistors and zener diodes			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE : Testing and repairing AC and Dc power supply section.** **TASK NO : 2 (two)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME: 1. 2. 3. 4.**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Locate transformer and power supply section of the recorder correctly? 2. Check and locate all physical faults, eg. Blown fuses, disconnected wires, burnt components? 3. Test and replace battery/mains switch correctly, as necessary? 4. Test continuity of transformer and replace it if found to be faulty? 5. Connect power supply to the mains safely and test the input and output voltages – with and without load? 6. Test and replace rectifier diodes, as necessary? 7. Replace blown fuses and re – connect disconnected wires, as necessary? 8. Test and replace capacitors, inductors and resistors, as necessary? 9. Test and replace regulator ICs/transistors/zener diodes, as necessary?		

	TASK SPECIFICATION
5	**TASK TITLE: Testing, and repairing mechanical function** **JOB TITLE : Tape recorder Repair Technician** **TASK NO : 3 (three)**
6	**TASK ELEMENTS** 1. Tests the operation of play, record, pause, fast forward (cue), rewind (review), counter and stop/eject buttons. 2. Checks DC motor for proper operation. 3. Checks for the correct speed of the motor and adjusts/replaces, if necessary. 4. Examines tape mechanism chassis for correct dismantling procedure. 5. Removes necessary screws, nuts, bolts and wire connectors and stores them safely. 6. Dismantles tape mechanism chassis. 7. Repairs, replaces and lubricates necessary parts for smooth operation. 8. Examines and replaces loose and broken drive belts. 9. Checks main capstan, pinch wheel/ roll, pulleys, gear wheels and clutch for bearing play and damage. 10. Replaces main capstan, pinch wheel/ roll, pulleys, clutch and gear wheels, where necessary. 11. Re – assembles tape mechanism and re – tests for correct operation.

	TASK SPECIFICATION
7	**TASK PERFORMANCE REQUIREMENTS – TASK NO 3** – Standard tool kit. – Oscilloscope – if available – 220 V 50 Hz isolated supply – Standard workshop spares – Standard test tape – Lubricants – Selection of drive belts – various lengths and cross – sectional size
8	**TASK PERFORMANCE STANDARDS** Operation of play, record, pause, fast forward (cue), rewind (review) and stop/ eject controls thoroughly tested. Operation and speed of DC motor checked using test tape and frequency counter/ oscilloscope. DC motor replaced of faulty. Speed of motor adjusted to within limit. Tape mechanism examined for broken and/or loose parts. Tape mechanism dismantled as required and screws/ nuts/ bolts stored safely. Loose parts tightened to specified torque. Broken parts replaced as necessary with suitable replacement. Tape mechanism lubricated with the specified quantity and type of lubricant. Tape mechanism re – assembled accurately and re – tested for correct operation. Main capstan, pinch wheel, pulleys, clutch and gear wheel bearings checked for excess wear and tear. Main capstan, pinch wheel/ roll, pulleys, clutch and gear wheel replaced if found out of manufactures tolerance. Tape mechanism replaced and final test conducted for correct operation.

9	10	**TASK TRAINING DATA**			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
3 **T** **H** **R** **E** **E**	1.	Knowledge of the correct function of play, record, pause, fast forward (cue), rewind (review) and stop/eject buttons.			
	2.	Knowledge of the correct operation and testing the DC motor.			
	3.	Knowledge of the correct speed of the DC motor and its adjustment.			
	4. & 6.	Knowledge of the tape mechanism and knows how to dismantle it.			Safe use of tools and equipments.
	5.	Knows how to store screws, nuts, bolts and connectors correctly.			Safe storage procedures.
	7.1	Knows how to repair and replace parts of the tape mechanism.			Hazards of lubricants and how to store them.
	7.2	Knowledge of the types of lubricants used and the quantities required.			

	8.	Knowledge of the function of the drive belts, how to test it for excess wear and how to replace them.			
	9.1	Knowledge of the main capstan, pinch wheel, pulleys, clutch and gear wheels.			
	9.2	Knows how to check for bearing wear in the main capstan, pinch wheel, pulleys, clutch and gear wheels bearings.			Safe use of tools and equipment.
	10.1	Knows how to replace the main capstan, pinch wheel, pulleys, clutch and gear wheels bearings.			Safe use of tools and equipment.
	10.2	Knows how to replace tape mechanism and test for its correct and smooth operation.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Testing and repairing mechanical function.** **TASK NO: 3 (three)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME: 1.** **2.** **3.** **4.**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Thoroughly test the operation of play, record, pause, fast forward (cue), rewind, (review), - counter and stop/eject buttons? 2. Check DC motor for proper operation, i.e. motor operates when it should? 3. Check for the correct speed of the motor and adjusts within limit/replace as necessary? 4. Examine tape mechanism chassis for correct dismantling procedure? 5. Remove necessary screws, nuts, bolts and wire connectors and stores them safely? 6. Dismantle tape mechanism chassis correctly? 7. Repair, replace and lubricate necessary parts for full and correct operation? 8. Examine and replace loose and broken drive belts, ensuring they are not twisted or over – stretched? 9. Check main capstan, pinch wheel, pulleys, gear wheels and clutch for bearing play and damage? 10. Replace main capstan, pinch wheel, pulleys, clutch and gear wheels, where necessary? 11. Re – assemble tape mechanism and re – tests for correct and smooth operation?		

	TASK SPECIFICATION
5	**TASK TITLE: Testing, replacing and adjusting reed, leaf and power switches**. **JOB TITLE:** Tape Recorder Repair Technician **TASK NO: 4 (Four)**
6	**TASK ELEMENTS** 1. Checks reed, leaf and power switches. 2. Locates switch causing the fault. 3. Dismantles the faulty switch. 4. Selects a replacement switch of the correct type, rating and size. 5. Installs replacement switch and attaches connecting wires correctly. 6. Adjusts the switch to ensure correct operation. 7. Re – test recorder.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - Standard tool kit - 220V 50Hz isolated supply - Standard workshop spares - Reed, leaf and power switches, as required.
8	**TASK PERFORMANCE STANDARDS** Reed, leaf and power switches checked and tested using multimeter. Defective switch located, connections noted and switch removed. Switch specification matched to suitable replacement. Switch re-installed for as new condition. Switch position adjusted ensuring that actuation occurs at the correct time. Recorder re-tested to verify correct function.+

9	10	**TASK TRAINING DATA**			
TASK No.	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
4 **F** **O** **U** **R**	1.1 1.2 2. 3. 4. 5. 6. 7.	Knowledge of the correct operation of reed, leaf and power switches. Knowledge of the purpose or reed, leaf and power switches. Knows how to test reed, leaf and power switches using a multi – meter. Knows how to dismantle and remove reed, leaf and power switches. Knowledge of selecting equivalent tables and switch specifications. Knows how to install reed, leaf and power switches and how to connect wires without damaging the switch. Knowledge of adjustment procedure for reed and leaf switches. Knowledge of the correct operation of reed, leaf and power switches.			Safe use of multi – meter. Safe use of tools. Safe use if tools.

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Testing, replacing and adjusting reed, leaf and power switches.** **TASK NO : 4 (Four)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME: 1.** **2.** **3.** **4.**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Check reed, leaf and power switches? 2. Locate switch causing the fault? 3. Dismantle the faulty switch? 4. Select a replacement switch of the correct type, rating and size? 5. Install replacement switch of the correct type, rating and size? 6. Adjust the switch to ensure correct operation? 7. Re – test recorder?		

TASK SPECIFICATION

5	**TASK TITLE: Testing , aligning and replacing record/play and erase heads**. **TASK NO: 5 (five)** **JOB TITLE: Tape Recorder Repair Technician**
6	**TASK ELEMENTS** 1. Test the function of record/play and erase heads? 2. Align azimuth or record/play head correctly? 3. Align azimuth of erase head correctly? 4. Re- test recorder to ensure correct operation? 5. Examine heads for excess physical wear? 6. Examine wire connections, tests continuity and heads resistance correctly? 7. Read head serial/model number and read manufactures specifications to determine a suitable replacement? 8. Select a compatible replacement head? 9. Remove wire connections from faulty head and note the connections pattern? 10. Remove head mounting screws without damaging the chasis? 11. Replace new head correctly? 12. Solder wires to replaces head in correct pattern for an ‘as new’ condition? 13. Align azimuth or record/play or erase head correctly? 14. Re – sets recorder to ensure correct operation?

TASK SPECIFICATION

7	**TASK PERFORMANCE REQUIREMENTS** – Standard tool kit. – Oscilloscope – if available – 220V 50Hz isolated supply – Standard workshop spares – Record/play head, as required – Erase head, as required – Test tape – Mounting screws, bolts, nuts, washers, as required – Manufacturers specification
8	**TASK PERFORMANCE STANDARDS** Function of record/play head thoroughly tested, i.e. frequency response during play and record within manufacturers tolerance, mounting security, physical wear within manufacturers tolerance, etc. Record/play head azimuth aligned correctly (azimuth within manufacturers tolerance). Erase head aligned within manufacturers tolerance. Connection to record/play head noted. Record/play head and/or erase head specification determined from model/serial number and manufacturers specifications. Suitable compatible replacement determined and mounted. Connecting wires re – connected in correct pattern – head must not be damaged in any way by heat or mishandling. Head aligned as previously described. Head operation re – tested for correct operation.

9	10	TASK TRAINING DATA			
TASK No. 1	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
5	1, 4 & 14	Knowledge of the correct function of record/play and erase heads.			Safe use of tools and equipment.
F	2.	Knows how to align azimuth of record/play head.		.	Safe use of tools and equipment.
I					
V	3.	Knows how to align azimuth of erase head.			Safe use of multi – meter.
E					
	5.	Knowledge of head wear characteristics and how to recognize them.			Safe use of tools and equipment
	6.1	Knowledge of connections to record/play and erase heads.			Safe use of tools and equipment
	6.2	Knows how to measure continuity and resistance.			Safe use of tools and equipment
	7.	Knows how to read serial/model numbers and manufactures specifications.			Safe use of tools and equipment

	8.	Knowledge of equivalent record/play and erase head specifications			
	9.1	Knows how to remove head connections without damaging head or wires.			
	9.2	Knowledge of connections to head terminals.			
	10.	Knows how to remove record/play and erase heads.			
	11.	Knows how to replace record/play and erase heads.			
	12.1	Knows how to solder wires to head terminals.			
	12.2	Knowledge of the effects of excess heating while soldering to head terminals.			
	13.	Knows how to align azimuth of the record/play and erase heads.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Radio Technician (Broadcasting Receivers) .** **TASK NO : 5 (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. Test the function of record/play and erase heads? 2. Align azimuth or record/play head correctly? 3. Align azimuth of erase head correctly? 4. Re- test recorder to ensure correct operation? 5. Examine heads for excess physical wear? 6. Examine wire connections, tests continuity and heads resistance correctly? 7. Read head serial/model number and read manufactures specifications to determine a suitable replacement? 8. Select a compatible replacement head? 9. Remove wire connections from faulty head and note the connections pattern? 10. Remove head mounting screws without damaging the chasis? 11. Replace new head correctly? 12. Solder wires to replaces head in correct pattern for an 'as new' condition? 13. Align azimuth or record/play or erase head correctly? 14. Re – test recorder to ensure correct operation?		

TASK SPECIFICATION	
5	**TASK TITLE : Testing and repairing pre – amplifier section (including emphasis and de – emphasis)** **TASK NO: 6** **JOB TITLE:** Tape Recorder Repair Technician
6	**TASK ELEMENTS** 1. Tests Pre – amplifier sections. 2 Removes the pre – amplifier PCB. 3 Examines the pre – amplifier section for obvious physical faults. 4 Removes short – circuits, reconnects loose wires, removes and replaces faulty components. 5 Re – tests pre - amplifier. 6 Follows a logical ‘ Trouble-shooting’ routine to locate faults within the pre-amplifier section. 7 Removes faulty components(s) and selects suitable replacement(s). 8 Replaces component(s). 9 Re-tests pre-amplifier. 10 Re-fixes and reconnects pre-amplifier PCB. 11 Performs a final test of the pre-amplifier.

TASK SPECIFICATION

7	**TASK PERFORMANCE REQUIREMENTS** - Standard tool kit - Oscilloscope – if available - 220V 50Hz isolated supply - Standard workshop spares - Signal injector - Circuit diagram-if available
8	**TASK PERFORMANCE STANDARDS** Pre-amplifier tested and results compared to manufacturers' specification. Faults noted. Pre-amplifier PCB removed carefully without straining connectors and connecting wires. Screws, nuts, bolts stored correctly. PCB examined for obvious physical faults, such as short circuits, missing components, burnt components, broken or loose wires. Physical faults rectified for an as new condition. Pre-amplifier thoroughly re-tested. Faults noted. Logical ' Trouble shooting' technique used to locate the fault(s) , i.e. signal applied to the input and tracked through the circuit until the fault is located. Faulty components identified correctly and removed without damaging it, the PCB or other components nearby. Specification of the faulty component determined by color code or identification number and suitable compatible replacement component selected. Replacement component fixed correctly for an as new condition. Pre-amplifier circuit re-tested for correct operation and PCB re-fixed to its original position – all connecting wires returned to their original route. Components and wires must not be trapped by the PCB. Pre-amplifier then re-tested for correct operation.

9	10	**TASK TRAINING DATA**			
TASK No. 1	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
6 **S** **I** **X**	1.	Knowledge of the function and operation of the pre-amplifier.			
	2.	Knows how to remove pre-amplifier PCB.			
	3.	Knowledge of the normal appearance of common electrical components, eg. Resistors, capacitors, inductors, fuses, transistors, diodes, ICs,		Use of color code.	
	4.	Knows how to identify and test blown fuses, disconnected wires and burnt components and how to replace them.			Safe use of testing instruments.
	5.	Knows how to test the pre-amplifier circuit.			
	6.	Knows how to test the stages of the pre-amplifier in a logical sequence (trouble-shooting)			
	7.1	Knows how to remove electrical components without damaging other components or the PCB.			Safe use of soldering iron.
	7.2.	Knows how to read serial/model numbers to determine component specification.		Use of color code.	

	7.3	Knowledge of equivalent tables and electronic component specifications.		Use of equivalent data book.	
	8.	Knows how to replace electronic components without damaging other components or the PCB.			Safe use of soldering iron/de-soldering pump
	9. & 11.	Knows how to test the pre-amplifier.		Follows circuit diagram, if available	
	10.	Knows how to re-fix the pre-amplifier PCB and reconnect all connecting wires and plugs.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Testing and repairing pre-amplifier section (including emphasis and de-emphasis)** . **TASK NO: 6 (six)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME: 1.** **2.** **3.** **4.**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	<u>DID THE CANDIDATE?</u> 1 Tests the pre – amplifier sections correctly?. 2 Remove the pre – amplifier PCB without damaging any other parts? 3 Examine the pre – amplifier section for obvious physical faults? 4 Remove short – circuits, reconnects loose wires, removes and replaces faulty components? 5 Re – tests pre – amplifier correctly? 6 Follow a logical ‘ Trouble-shooting’ routine to locate faults within the pre-amplifier section? 7 Remove faulty components(s) and selects suitable replacement(s)? 8 Replace component(s) for an ‘as new’ condition? 9 Re-test pre-amplifier correctly? 10 Re-fix and reconnects pre-amplifier PCB securely? 11 Perform a final test of the pre-amplifier?		

	TASK SPECIFICATION
5	**TASK TITLE : Testing and repairing pre – amplifier section (including emphasis and de – emphasis)** **TASK NO: 6** **JOB TITLE:** Tape Recorder Repair Technician
6	**TASK ELEMENTS** 1. Tests bias/oscillator section. 2. Removes the bias/oscillator section PCB. 3. Examines the bias/oscillator section for obvious physical faults. 4. Removes short-circuits, reconnects loose wires, removes and replaces faulty components. 5. Re-tests bias/oscillator section. 6. Follows a logical ‘ Trouble-shooting’ routine to locate faults within the bias/oscillator section. 7. Removes faulty components(s) and selects suitable replacements(s). 8. Replaces component(s). 9. Re-tests bias/oscillator section. 10. Re-fixes and reconnects bias/oscillator section PCB. 11. Performs a final test of the bias/oscillator section.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - Standard tool kit - Oscilloscope – if available - 220V 50Hz isolated supply - Standard workshop spares - Circuit diagram-if available
8	**TASK PERFORMANCE STANDARDS** Bias/oscillator section tested and results compared to manufacturers' specification. Faults noted. Bias/oscillator section PCB removed carefully without straining connectors and connecting wires. Screws, nuts, bolts stored correctly. PCB examined for obvious physical faults, such as short circuits, missing components, burnt components, broken or loose wires. Physical faults rectified for an as new condition. Bias/oscillator section thoroughly re-tested. Fault noted. Logical ' Trouble shooting ' technique used to located the fault(s), i.e. signal applied to the input and tracked through the circuit until the fault is located. Faulty components identified correctly and removed without damaging it, the PCB or other components nearby. Specification of the faulty component determined by color code of other identification number and suitable compatible replacement component selected. Replaced component fixed correctly operation and PCB re-fixed to its original position – all connecting wires should be returned to their original route. Components and wires must not be trapped by the PCB. Bias/oscillator section then re-tested for correct operation.

9	10	TASK TRAINING DATA			
TASK No. 1	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
7 **S** **E** **V** **E** **N**	1.	Knowledge of the function and correct operation of the bias/oscillator section.			
	2.	Knows how to remove bias/oscillator section PCB.			
	3.	Knowledge of the normal appearance of common electrical components, eg. Resistors, capacitors, inductors, fuses, transistors, diodes, ICs., etc.			
	4.	Knows how to identify blown fuses, disconnected wires and burnt components.			
	5.	Knows how to test the bias/oscillator section circuit.			
	6.	Knows how to test the stage of the bias/oscillator section in a logical sequence (trouble – shooting)			
	7.1	Knows how to remove electronics components without damaging other components or the PCB.			Safe use of soldering iron.
	7.2	Knows how to read serial/model numbers/color codes to determine component specification.			

	7.3	Knowledge of selecting equivalent electronic components.		Use of data book.	
	8.	Knows how to replace electronic components without damaging other components or the PCB.			
	9. &11.	Knows how to test the bias/oscillator section.			
	10.	Knows how to re-fix the bias/oscillator section PCB and reconnect all connecting wires and plugs			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Testing and repairing bias/oscillator section.** **TASK NO: 7 (seven)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:1:** **2:** **3:** **4:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Tests bias/oscillator section thoroughly? 2. Remove the bias/oscillator section PCB without damage to it or surrounding components? 3. Examine the bias/oscillator section and locate obvious physical faults? 4. Remove short-circuits, reconnect loose wires, remove and replace faulty components? 5. Re-test bias/oscillator section for correct operation? 6. Follow a logical ‘ Trouble-shooting’ routine and locate faults within the bias/oscillator section? 7. Remove faulty components(s) and selects suitable replacements(s)? 8. Replace component(s)? 9. Re-tests bias/oscillator section for correct operation? 10. Re-fix and reconnect bias/oscillator section PCB securely and correctly? 11. Perform a final test of the bias/oscillator section?		

	TASK SPECIFICATION
5	**TASK TITLE : Testing and repairing pre – amplifier section (including emphasis and de – emphasis)** **TASK NO: 6** **JOB TITLE: Tape Recorder Repair Technician**
6	**TASK ELEMENTS** 1. Tests audio power amplifier section. 2. Removes signal leads from the loudspeaker, noting polarity. 3. Tests loudspeaker operation. 4. Replaces faulty loudspeaker with a suitable replacement and connects signal leads correctly. 5. Removes the audio power amplifier PCB. 6. Examines the audio power amplifier section for obvious physical faults. 7. Removes short-circuits, reconnects loose wires, removes and replaces faulty components. 8. Re- tests audio power amplifier. 9. Follows a logical ‘ Trouble shooting ‘ routine to locate faults within the audio power amplifier section. 10. Removes faulty components(s) and selects suitable replacements(s). 11. Replaces component(s). 12. Re-tests audio power amplifier. 13. Re-fixes and reconnects audio power amplifier PCB. 14. Performs a final test of the audio power amplifier.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - Standard tool kit - Oscilloscope – if available - 220V 50Hz isolated supply - Standard workshop spares - Signal injector - Circuit diagram-if available
8	**TASK PERFORMANCE STANDARDS** Audio power amplifier tested and results compared to manufacturers' specification. Faults noted. Loudspeaker connections noted. Physical condition of the loudspeaker checked and then tested for its correct operation. Suitable replacement loudspeaker selected and mounted securely. Connecting wires re-connected with original polarity. Audio power amplifier PCB removed carefully without straining connectors and connecting wires. Screws, nuts, bolts stored correctly. PCB examined for obvious physical faults, such as short circuits, missing components, burnt components, broken or loose wires. Physical faults rectified for an as new condition. Audio power amplifier thoroughly re-tested. Faults noted. Logical ' Trouble shooing ' technique used to locate the fault(s), i.e. signal applied to the input and tracked through the circuit until the fault is located. Faulty components identified correctly and removed without damaging it, the PCB or other components nearby. Specification of the faulty component determined by color code or identification number and suitable compatible replacement component selected. Replaced component fized correctly for an ' as new ' condition. Audio power amplifier circuit retested for correct operation and PCB re-fixed to its original route. Components and wires must not be trapped by the PCB. Audio power amplifier then re-tested for correct operation.

9	10	TASK TRAINING DATA			
TASK No. 1	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
8 **E** **I** **G** **H** **T**	1. 2. 3. 4.1 4.2 5. 6.1 6.2 8. 9. 10.1 10.2	Knowledge of the function and operation of the audio power amplifier. Knowledge of the loudspeaker polarity. Knowledge of the operation of a loudspeaker and how to test for it. Knows how to interpret loudspeaker section. Knowledge of selecting equivalent loudspeaker. Knows how to remove audio power amplifier PCB. Knowledge of the normal appearance of common electrical components, eg. Resistors, capacitors, inductors, fuses, transistors, diodes, ICs, etc. Knows how to identify blown fuses, disconnected wires and burnt components and how to replace them. Knows how to test the audio power amplifier circuit. Knows how to test the stages of the audio power amplifier in a logical sequence (trouble – shooting) Knows how to remove electronics components without damaging other components or the PCB. Knows how to find equivalent values (numbers/color codes)			

		to determine component specification.		Use of data book.	
	10.3	Knowledge of selecting equivalent electronic components.			
	11.	Knows how to replace electronics components without damaging other components or the PCB.			
	12 & 14	Knows how to test the power amplifier.			
	13.	Knows how to re-fix the power amplifier PCB and reconnect all connecting wires and plugs.			

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Testing and repairing bias/oscillator section.** **TASK NO : 7 (seven)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:1:** **2:** **3:** **4:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. Tests audio power amplifier section thoroughly and correctly? 2. Removes signal leads from the loudspeaker, noting correct polarity? 3. Tests loudspeaker operation correctly? 4. Replace faulty loudspeaker with a suitable replacement and connect signal leads correctly? 5. Removes the audio power amplifier PCB without damaging it or surrounding components? 6. Examine the audio power amplifier section and locate obvious physical faults? 7. Remove short-circuits, reconnect loose wires, remove and replace faulty components? 8. Re- tests audio power amplifier for correct operation? 9. Follows a logical ‘ Trouble shooting ‘ routine to locate faults within the audio power amplifier section? 10. Remove faulty components(s) and selects suitable replacements(s)? 11. Replace component(s)? 12. Re-test audio power amplifier for correct operation? 13. Re-fix and reconnect audio power amplifier PCB? 14. Perform a final test of the audio power amplifier?		

	TASK SPECIFICATION
5	**TASK TITLE : Testing and repairing pre – amplifier section (including emphasis and de – emphasis)** **TASK NO: 6** **JOB TITLE: Tape Recorder Repair Technician**
6	**TASK ELEMENTS** 1. Re-fixes PCB's and tape mechanism. 2. Re-fixes rear cover. 3. Re-fixes screws, nuts, bolts, knobs and handle. 4. Performs a final operation test. 5. Cleans recorder and stores it in a safe place.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS** - Standard tool kit - 220V 50Hz isolated supply
8	**TASK PERFORMANCE STANDARDS** PCB and tape mechanism returned to their original positions and inter-connecting wires routed to their original positions. Security of all internal components checked. Rear cover re-fixed – without trapping any internal wires or other components. Screws, nuts, bolts and knobs returned to their original positions and tightened to the recommended torque. Final thorough function test performed. Recorder cleaned using a non-abrasive, non-corrosive method. Recorder stored until customer returns.

9	10	TASK TRAINING DATA			
TASK No. 1	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
9 **N** **I** **N** **E**	1. Knows how to re-fix all PCBs and the tape mechanism. 2. Knows how to re-fix rear cover without damaging it or forcing it. 3. Knows the correct tightening torque for screws, nuts, bolts etc. 4. Knows the correct function of the tape cassette reorder features. 5. Knowledge of cleaning fluids and their effect on different types of plastic and metal.				

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Reassembling recorder.** **TASK NO : 9 (nine)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:1:** **2:** **3:** **4:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	<u>DID THE CANDIDATE?</u> 1. Re-fix PCB's and tape mechanism correctly and securely? 2. Re-fix rear cover correctly, without trapping wires or straining the case? 3. Re-fix screws, nuts, bolts, knobs and handle? 4. Perform a final operation test on all functions? 5. Clean recorder and store it in a safe place?		

TASK SPECIFICATION	
5	**TASK TITLE : Preparing bill** **TASK NO : 10 (ten)** **JOB TITLE: Tape Recorder Repair Technician**
6	**TASK ELEMENTS** 1. Lists replaced parts. 2. Calculates the cost of the replaced parts. 3. Lists and calculates labour charge. 4. Prepares the bill. 5. Files the bill and report as per the workshop procedure. 6. Reports to the customer verbally/in writing about the faults detected and rectified.

TASK SPECIFICATION	
7	**TASK PERFORMANCE REQUIREMENTS – TASK NO 10** – Parts catalogue and current price list – Current labour charge rates – Time sheet for the job in question – Bill pad – Pen and/or pencil – Fault report sheet
8	**TASK PERFORMANCE STANDARDS** Accurate and neat bill prepared detailing the parts replaced, the cost of the replacement parts, the length of time spent on the job and the labour charge. Fault report sheet completed with all the above information. Faults explained to the customer in laymen's terms.

9	10	**TASK TRAINING DATA**			
TASK No. 1	**T.E. No.**	**TECHNICAL KNOWLEDGE**	**APPLIED CALCULATION**	**GRAPHIC INLFORMATION**	**SAFETY AND HYGIENE**
10 **T** **E** **N**	1. 2. 3. 4. 5. 6.	Knowledge of price of parts and how to refer to a catalogue. Knows how to prepare a bill. Knowledge of the workshop filing procedure. Knows how to explain the faults detected and rectified in layman's terms.	Knows how to perform simple mathematical operations like : +, - , x & ÷, manually and with a calculator. Knows how to calculate labor charge.		

TASK PERFORMANCE TEST (SKILL ASSESSMENT)			
11	**TASK TITLE: Testing and repairing bias/oscillator section.** **TASK NO : 10 (ten)**	**LOCATION OF TEST:** **CANDIDATE'S NAME:** **EVALUATOR'S NAME:1:** **2:** **3:** **4:**	
12	**TEST FACTORS AND ITEMS**	**STANDARD MET**	**STANDARD NOT MET (COMMENT)**
	DID THE CANDIDATE? 1. List replaced parts accurately? 2. Calculate the cost of the replaced parts accurately? 3. List and calculate labour charge accurately? 4. Prepare the bill neatly and accurately? 5. File the bill and report as per the workshop procedure? 6. Report to the customer verbally/in writing about the faults detected and rectified?		