

# Trainer's Guide

## Field Technician - Air conditioner



### Field Technician: Air conditioner

- SECTOR: ELECTRONICS
- SUB-SECTOR: CONSUMER ELECTRONICS
- OCCUPATION: AFTER SALES SERVICE
- REFERENCE ID: ELE/Q3102





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## Welcome Note

### Dear Trainer,

Welcome to this programme on RAC Service Assistant. This training programme has been developed in response to the growing demand for AC and refrigerator technicians. It is recommended that the participants should have passed at least up to the 8th standard. The primary job of the Technician is to be able to troubleshoot problems related to the AC and fridge. Many technicians in the industry may be able to troubleshoot problems with respect to the AC or fridge. But it is important for them to have a thorough conceptual understanding of the working principle of the AC or fridge. This will help them identify the root cause, and therefore take the corrective and more importantly preventive action. Keeping this in mind, a lot of time and emphasis is laid on concepts of refrigeration cycle and basics of electricity. Besides these, the procedure based content starting right from—how to transport and unpack the AC or fridge, how to install, how to provide a demo to the customer and how to troubleshoot—are covered in a step-by-step manner to help participants understand and learn.

There are a total of four theory tests and four practical tests; three of which are formative and one summative. The theory tests assess the knowledge of the participant while the practical tests assess the technical skill and behavioural skill. The details of these are captured in the Assessment Guide.

This manual is organized day-wise in line with the Session Plan. Notes are given for each session for both theory as well as practice sessions.

We hope that both you as well as your participants will gain from this training programme and will be able to help us take it to a higher level through your delivery.

All the best!



## Session Plan

<b>Program Name</b>	Field Technician: Air conditioner	
<b>Name of Client</b>	NSDC	
<b>Version No.</b>	1.0	Version Update Date 24/07/2012
<b>Pre-requisites to Training</b>	Minimum qualification - 8th pass	
<b>Training Outcomes</b>	<p>After completing this program, participants will be able to:</p> <ul style="list-style-type: none"> <li>◆ describe the RAC industry and its importance;</li> <li>◆ define the roles and competencies of an RAC service assistant;</li> <li>◆ identify the RAC components and their role in the refrigeration cycle;</li> <li>◆ use the tools required to carry our RAC repair and service work;</li> <li>◆ explain the operating principle of an RAC unit;</li> <li>◆ transport, install and commission the RAC unit;</li> <li>◆ service and troubleshoot the common problems in an RAC unit;</li> <li>◆ follow the safety rules;</li> <li>◆ maintain good customer relationship through effective work.</li> </ul>	

S.No.	Module	Session	Objectives	NOS Reference	Methodology	Tools	Time
<b>Day 1</b>							
1	Morning Energizer	Morning Energizer	◆ To energize the participants	Bridge Module	◆ Group participation	◆ Morning Energizer Booklet	10 mins
2	Icebreaker and Introduction	Icebreaker	◆ To introduce each other and build rapport with fellow participants and Trainer	Bridge Module	◆ Activity	◆ Interactive Game from Trainer's Guide	1 hr 50 mins
3	RAC Industry Overview	Theory	◆ Describe the RAC industry and its importance	Bridge Module	◆ Multimedia based learning ◆ Trainer led discussion	◆ Multimedia (K – Yan) ◆ Participant Handbook	5 hrs
<b>Day 2</b>							
1	Morning Energizer	Morning Energizer	◆ To energize the participants	Bridge Module	◆ Group participation	◆ Morning Energizer Booklet	10 mins
2	Recap	Recap	◆ To revise learning of previous day	Bridge Module	◆ Multimedia based learning ◆ Trainer led discussion	◆ Multimedia (K – Yan)	10 mins
3	Role and Competencies of an RAC Service Assistant	Theory	◆ Define your role as an RAC technician ◆ List the competencies needed to be an RAC technician	Bridge Module	◆ Trainer led discussion (inductive) ◆ Multimedia based learning ◆ Trainer led discussion	◆ Multimedia (K – Yan) ◆ Participant Handbook	3 hrs

S.No.	Module	Session	Objectives	NOS Reference	Methodology	Tools	Time
4	Soft Skills - Discipline	Theory	<ul style="list-style-type: none"> <li>Practice discipline in your personal and professional life</li> </ul>	Professional Skills	<ul style="list-style-type: none"> <li>Facilitator led discussion</li> <li>Story telling</li> <li>Class room interactivities</li> </ul>	<ul style="list-style-type: none"> <li>Multimedia (K – Yan)</li> <li>Participant Handbook</li> <li>Game</li> </ul>	2 hrs 20 mins
5	Refrigeration Cycle	Theory	<ul style="list-style-type: none"> <li>Describe the refrigeration cycle Identify the RAC components and their role in refrigeration cycle</li> </ul>	ELE/N3101 KB 7 , KB 10 SB1	<ul style="list-style-type: none"> <li>Multimedia based learning</li> <li>Trainer led discussion</li> </ul>	<ul style="list-style-type: none"> <li>Multimedia (K – Yan)</li> <li>Participant Handbook</li> </ul>	1 hr 20 mins
<b>Day 3</b>							
1	Morning Energizer	Morning Energizer	<ul style="list-style-type: none"> <li>To energize the participants</li> </ul>	Bridge Module	<ul style="list-style-type: none"> <li>Group participation</li> </ul>	<ul style="list-style-type: none"> <li>Morning Energizer Booklet</li> </ul>	10 mins
2	Recap	Recap	<ul style="list-style-type: none"> <li>To revise learning of previous day</li> </ul>	Bridge Module	<ul style="list-style-type: none"> <li>Multimedia based learning</li> <li>Trainer led discussion</li> </ul>	<ul style="list-style-type: none"> <li>Multimedia (K – Yan)</li> </ul>	10 mins
3	Refrigeration Cycle Contd...	Theory	<ul style="list-style-type: none"> <li>Describe the refrigeration cycle Identify the RAC components and their role in refrigeration cycle</li> </ul>	ELE/N3101 KB7 , KB10 SB1	<ul style="list-style-type: none"> <li>Multimedia based learning</li> <li>Trainer led discussion</li> </ul>	<ul style="list-style-type: none"> <li>Multimedia (K – Yan)</li> <li>Participant Handbook</li> </ul>	6 hrs 40 mins

S.No.	Module	Session	Objectives	NOS Reference	Methodology	Tools	Time
3	Revision	Practice	<ul style="list-style-type: none"> <li>To revise learning of all the skills taught till date</li> <li>Clearing doubts of trainee</li> </ul>	Bridge Module	<ul style="list-style-type: none"> <li>Hands on practice</li> </ul>	<ul style="list-style-type: none"> <li>Participant Handbook</li> </ul>	5 hrs
<b>Day 41</b>							
1	Morning Energizer	Morning Energizer	<ul style="list-style-type: none"> <li>To energize the participants</li> </ul>	Bridge Module	<ul style="list-style-type: none"> <li>Group participation</li> </ul>	<ul style="list-style-type: none"> <li>Morning Energizer Booklet</li> </ul>	10 mins
2	Summative Evaluation	Theory	<ul style="list-style-type: none"> <li>To test the participants on the skills acquired during the training programme</li> </ul>	ELE/N3101 ELE/N3108 ELE/N3109 ELE/N9901	<ul style="list-style-type: none"> <li>Theory test 3</li> </ul>	<ul style="list-style-type: none"> <li>Assessment Guide</li> </ul>	3 hrs 10 mins
3	Discussion and Doubt Clarification	Practice	<ul style="list-style-type: none"> <li>To revise, clarify doubts with participants</li> </ul>	Bridge Module	<ul style="list-style-type: none"> <li>Discussion</li> </ul>	<ul style="list-style-type: none"> <li>Assessment Guide</li> </ul>	3 hrs 40 mins
<b>Day 42</b>							
1	Morning Energizer	Morning Energizer	<ul style="list-style-type: none"> <li>To energize the participants</li> </ul>	Bridge Module	<ul style="list-style-type: none"> <li>Group participation</li> </ul>	<ul style="list-style-type: none"> <li>Morning Energizer Booklet</li> </ul>	10 mins
2	Summative Evaluation	Practice	<ul style="list-style-type: none"> <li>To test the participants on the skills acquired during the training programme</li> </ul>	ELE/N3101 ELE/N3108 ELE/N3109 ELE/N9901	<ul style="list-style-type: none"> <li>Practical test 3</li> </ul>	<ul style="list-style-type: none"> <li>Assessment Guide</li> </ul>	6 hrs 50 mins





<b>Day - 16</b>	<b>Morning Energiser</b>	<b>10 minutes</b>
<b>16.1</b>		

<b>Notes for Facilitation</b>	Please refer to the “Morning Energisers” booklet. You may pick the energiser that is recommended for the day of the week.
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<b>Day - 16</b>	<b>Recap</b>	<b>10 minutes</b>
<b>16.2</b>		

<b>Say</b>	Good morning, everyone! Before we begin today’s sessions, let’s recap what we did yesterday.
<b>Ask</b>	<ul style="list-style-type: none"> <li>◆ How would you transport and unpack an AC?</li> <li>◆ How would you install a window AC?</li> </ul>
<b>Response</b>	<p><b>How to transport and unpack an AC</b></p> <p>The procedure of transporting and unpacking an AC can be divided in three main steps. These are:</p> <ol style="list-style-type: none"> <li>1. transportation of the air conditioner;</li> <li>2. unloading the unit;</li> <li>3. unpacking the unit.</li> </ol> <p><b>How to install a window AC</b></p> <p>Installation of window AC is done in two main steps. These are:</p> <ol style="list-style-type: none"> <li>1. installing and fitting the window AC frame;</li> <li>2. keeping the unit ready for the operation.</li> </ol>

<b>Day - 16</b>	<b>How to Install a Window AC (Practice)</b>	<b>3 hours</b>
<b>16.3</b>		

<b>Resources to be Used</b>	<ul style="list-style-type: none"> <li>◆ Measuring tape</li> <li>◆ Air conditioner</li> <li>◆ Wooden frame</li> <li>◆ Gauge</li> <li>◆ Participant Handbook</li> </ul>
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<b>Note for Facilitation</b>	<ul style="list-style-type: none"> <li>◆ Refer to the notes given for this topic on Day 15.</li> </ul>
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<b>Day - 16</b>	<b>How to Install a Split AC (Theory)</b>	<b>2 hours 20 minutes</b>
<b>16.4</b>		

<b>Resources to be Used</b>	<ul style="list-style-type: none"> <li>◆ Multimedia Content</li> <li>◆ Participant Handbook</li> </ul>
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<b>Do</b>	Show the procedure of installing split AC from the multimedia content.
<b>Notes for Facilitation</b>	After each screen check if the students have understood the procedure of installing a split AC.
<b>Ask</b>	Explain the procedure of installing a split AC.
<b>Response</b>	<p><b>Look for answers like:</b></p> <p>The installation of split AC is done in three main steps. These are:</p> <ol style="list-style-type: none"> <li>1. installation of the indoor unit of a split AC;</li> <li>2. installation of the outdoor unit of a split AC;</li> <li>3. making the unit ready for operation.</li> </ol>
<b>Say</b>	Now let us see what we may have missed.
<b>Do</b>	Show the summary slide.
<b>Notes for Facilitation</b>	Appreciate the students if they have explained the entire procedure.
<b>Say</b>	Now let us take a small test.
<b>Do</b>	Show the test slide and ask the given questions.

<b>Notes for Facilitation</b>	Encourage all participants to answer.
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<b>Day - 16</b>	<b>How to Install a Split AC (Practice)</b>	<b>1 hour 20 minutes</b>
<b>16.5</b>		

<b>Resources to be Used</b>	<ul style="list-style-type: none"> <li>◆ Drill machine</li> <li>◆ Spirit level</li> <li>◆ Plastic anchors</li> <li>◆ Screw driver</li> <li>◆ Wrenches</li> <li>◆ Gauge manifold set</li> <li>◆ Nitrogen gas cylinder</li> <li>◆ Participant Handbook</li> </ul>
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<b>Notes for Facilitation</b>	<p>Take the trainees to the workshop.</p> <p>Explain and demonstrate the procedure of installing a split AC.</p> <p>After the demonstration of the procedure check with participants if they have understood the instructions so far.</p>
<b>Say</b>	<p><b>Installing the indoor unit</b></p> <p>Identify the location where the indoor unit has to be installed. Then fix the metal plate as per the norms of the manufacturer. Set the indoor unit to the mounting plate by securing the unit on it.</p> <p><b>Installing the outdoor unit</b></p> <p>Place the outdoor unit on strongly mounted brackets. Ensure that sufficient space is provided at the back as well as front of the unit for the hot air to be ejected by suction or discharging the hot air from the unit.</p> <p><b>Interconnecting cables and pipes</b></p> <p>Interconnect the refrigerant pipes by connecting it to the indoor and outdoor units by brazing or by flare nuts to the valves.</p>

<p style="text-align: center;"><b>Say</b></p>	<p><b>Vacuumsing and charging</b></p> <ol style="list-style-type: none"> <li>1. Attach the vacuum pump to the condensing unit charging line valve.</li> <li>2. Start the vacuum pump and check for charging line vacuum by holding the vacuum for at least 15 minutes. If found okay, open the unit valve to evacuate or vacuumise the system.</li> <li>3. Complete the condensing unit mounting by tightening the bolts to the brackets.</li> <li>4. Check the vacuum with a proper vacuum gauge up to 29 inch of PSIG.</li> <li>5. Start charging the unit by opening the gas cylinder valve to the minimum and keeping the cylinder upside down initially to allow the liquid to enter the system and breaking the vacuum.</li> <li>6. Start the unit and slowly open the cylinder valve as well as the unit charging valve to charge the system with gas by keeping the cylinder in upright position and complete the charging.</li> </ol> <p>Ensure that there isn't any gas leakage.</p> <p><b>Testing</b></p> <ul style="list-style-type: none"> <li>◆ Switch on the unit and check the evaporator coil for cooling as well as the outdoor unit for hot air ejection.</li> <li>◆ Check the suction line for return gas.</li> <li>◆ Check the temperature and current drawn by the unit after pull down time.</li> <li>◆ Check the back pressure of the unit before disconnecting the gas cylinder and closing the unit valve.</li> </ul> <p><b>Check drain pipes</b></p> <p>Check the drain pipes which should have a U-trap to avoid insects and foreign particles.</p>
<p style="text-align: center;"><b>Do</b></p>	<p>Ask the participants to reinstall the split AC.</p>
<p style="text-align: center;"><b>Notes for Facilitation</b></p>	<p>Demonstrate each step of installing a split AC. Make sure that the participants have understood the procedure. Clear their doubts, if any.</p>



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