



Australian Government

AURRTX004 Diagnose and repair marine inboard transmissions

Release: 1

AURRTX004 Diagnose and repair marine inboard transmissions

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to diagnose and repair faults in the inboard transmissions of marine vessels. It involves preparing for the task, selecting the correct diagnostic procedure, carrying out the diagnosis and the repair, performing post-repair testing, and completing workplace processes and documentation.

It applies to those working in the marine service and repair industry.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Competency Field

Marine

Unit Sector

Technical - Transmission

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.

Elements Elements describe the essential outcomes.	Performance Criteria Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Prepare to diagnose and repair transmission	1.1 Job requirements are determined from workplace instructions 1.2 Diagnostic information is sourced and interpreted 1.3 Diagnostic options are analysed and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed 1.5 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose transmission	2.1 Diagnostic tests are carried out according to workplace procedures and safety requirements 2.2 Faults are identified from diagnostic test results and causes of faults are determined 2.3 Diagnosis findings, including recommendations for necessary repairs or adjustments, are reported according to workplace procedures
3. Dismantle transmission	3.1 Tools, equipment and materials are selected and checked 3.2 Transmission is dismantled as required according to workplace procedures and safety and environmental requirements 3.3 Transmission is cleaned and components arranged for inspection according to workplace procedures and safety and environmental requirements 3.4 Transmission components are measured and compared with manufacturer specifications 3.5 Final repair recommendations are made and reported according to workplace procedures
4. Repair and reassemble transmission	4.1 Repair information is sourced and interpreted 4.2 Repair options are analysed and those most appropriate to the circumstances are selected 4.3 Repairs and component replacements and adjustments are carried out according to manufacturer specifications, workplace procedures and safety and environmental requirements, and without causing damage to components or systems 4.4 Transmission is reassembled according to manufacturer specifications, workplace procedures and safety requirements 4.5 Post-repair testing is carried out according to workplace procedures to confirm fault rectification, and any further problems detected as having been introduced during the repair process are rectified

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
5. Complete work processes	5.1 Final inspection is made to ensure work is to workplace expectations and vessel or transmission is presented ready for use or stored according to workplace procedures 5.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 5.3 Tools and equipment are checked and stored according to workplace procedures 5.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance and are not explicit in the performance criteria.

Skills	Description
Learning skills to:	locate appropriate sources of information efficiently.
Reading skills to:	interpret information from manufacturer and workshop literature when seeking transmission specifications and procedures.
Writing skills to:	legibly and accurately fill out workplace documentation when reporting diagnostic findings, making repair recommendations, and recording parts and material used.
Oral communication skills to:	- clarify instructions - report diagnostic findings and make repair recommendations.
Numeracy skills to:	measure transmission components and use basic mathematical operations, including addition, subtraction, multiplication and division, to calculate distances, areas, tolerances and deviations from manufacturer specifications.
Planning and organising skills to:	plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed within workplace timeframes.
Technology skills to:	use precision measuring equipment, such as micrometers and dial gauge indicators.

Range of Conditions

This section specifies work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Safety requirements</i> must include:	• work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for: • working with inboard propeller drive systems and rotating shafts • working near hot exhaust systems • working in restricted spaces • using manual and mechanical lifting equipment.
<i>Environmental requirements</i> must include:	• procedures for trapping, storing and disposing of fluids released from transmissions.

Unit Mapping Information

Equivalent to AURRTX3004 Diagnose and repair marine inboard transmissions

Links

Companion Volume implementation guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURRTX004 Diagnose and repair marine inboard transmissions

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Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standards defined in this unit's elements, performance criteria, range of conditions and foundation skills:

- diagnose and repair a fault in two different marine inboard transmissions.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to diagnosing and repairing inboard transmissions, including procedures for:
 - working with inboard propeller drive systems and rotating shafts
 - working near hot exhaust systems
 - working in restricted spaces
 - using manual and mechanical lifting equipment
- environmental requirements, including procedures for trapping, storing and disposing of fluids released from transmissions
- operating principles of inboard transmissions and associated components, including:
 - gear types
 - gear ratios and torque reduction and multiplication
 - simple gear trains
 - compound gear trains
 - lubricant types
- application, purpose and operation of inboard transmissions and components, including:
 - power flows
 - V-drive transmissions
 - in-line transmissions

- step-up transmissions
- hydraulic transmissions
- counter shaft transmissions
- planetary gear transmissions
- mechanical dog clutch transmissions
- cone clutch transmissions
- methods of matching propeller to transmission gear ratio, engine output and boat performance
- diagnostic testing procedures for inboard transmissions, including procedures for analysing:
 - gear selection problems
 - drive problems
 - abnormal system noise
- removal procedures for inboard transmissions
- dismantling procedures for inboard transmissions, including procedures for:
 - measuring clearances and tolerances
 - inspecting components
- repair procedures for inboard transmissions, including procedures for replacing:
 - gearshift mechanisms
 - bearing and seals, including oil replacement
 - gears and transmission shafts
- assembly procedures for inboard transmissions, including:
 - shimming bearings and gears
 - adjusting preloads
- installation procedures, including procedures for aligning engines
- post-repair testing procedures for inboard transmissions, including procedures for water testing.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the inboard transmissions in marine vessels that they have worked on, e.g. repair orders.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- marine repair workplace or simulated workplace
- workplace instructions
- manufacturer transmission specifications
- two different marine inboard transmissions with faults
- diagnostic equipment for marine inboard transmissions
- tools, equipment and materials appropriate for dismantling, repairing, reassembling and adjusting marine inboard transmissions.

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