AutoHaul™

Project No: AUASFP88

COMMISSIONING - AC - NIU II Pre-Installation Inspection

|  |  |
| --- | --- |
| Locomotive: | %LOCONAME% |
|  |  |
| Date Commenced: | %STARTDATE% |

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# Introduction

## Overview

Rio Tinto Iron Ore (RTIO) operates a heavy-haul railway in the Pilbara region of Western Australia designed to move iron ore from mines located 300 to 500 km inland to ports for shipping overseas.

The AutoHaul® Project is concerned with the introduction of a system to automatically drive trains on the mainline. This includes trainborne, control centre, and wayside systems to control and monitor locomotives and ensure the safe movement of driverless trains, both in driver attended and driverless mode of operation.

## Purpose

The purpose of this document is to describe the tests to be performed prior to any AutoHaul installation commencing on an AC NIU II Series locomotive. The tests aim to identify any existing issues with locomotive equipment that may be affected by the installation works. The requirement for this document is described in [1].

## Definitions, Acronyms and Abbreviations

Table 1‑1 Abbreviations and Acronyms

| Abbreviation/Acronym | Definition |
| --- | --- |
| AC | Alternating Current |
| ASTS | Ansaldo STS |
| ATP | Automatic Train Protection |
| ATS | Automatic Train Supervision |
| CDU | Computer Display Unit |
| DLC | Direct Locomotive Control |
| ECP | Electronically Controlled Pneumatic (Braking) |
| EOT | End of Train |
| GE | General Electric |
| LCS | Locomotive Control System |
| NIU | Network Interface Unit |
| RTIO | Rio Tinto Iron Ore |
| RTRD | Rio Tinto Rail Division |

## References

Unless otherwise specified, each document reference is to the latest approved revision.

1. AutoHaul On Board Installation Testing and Commissioning Plan - 90000277.P06.EN
2. Epic and FastBrake Full Brake Test - RTIO-AM-0143924

# Test Overview

## Location

The pre-installation inspections and tests will be completed in the 8-Mile Yard, on 86rd and 87rd, in the workshop, and on the in-go tracks.

## Responsibilities

The tests will be completed by the AutoHaul commissioning team personnel, with the assistance of drivers for movement testing where required.

The commissioning engineer is responsible for checking over the completion of all tests and deciding if any issues require rectification before commencement of installation.

The Client representative will review the documentation following completion and raise any existing issues to RTRD if required.

## Locomotive Setup

The locomotive must be setup in the following condition before commencing the commissioning tests:

* All intercar connectors connected to the termination connectors;
* Air brakes set to lead/cut-in; and
* ATP cut-out.

## Resources

The following resources are required for the commissioning testing:

* Commissioning laptop with software:
  + NIU Client;
  + WLANA.
* 15W light test box;
* FieldFox RF Test Kit;
* Megger tester; and
* Multimeter
* Digital Wheel measuring tool
* Bit Lab cab code generator & frame
* DLC Tower with Software version 1.9
* CDU flash card with Leader application

# Test Equipment Records

Record the details of all test equipment used in the tests.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1: Test Equipment Records** | | | | | | |
| **Item** | **Description** | **Make** | **Model** | **Serial Number** | **Calibration Due Date** | **Inputted By** |
|  | **Text** | **Text** | **Text** | **Text** | **Text** | **UserSignature** |
| Record the details of all test equipment used in the tests. | | | | | | |
| 1. |  |  |  |  |  |  |
| 2. |  |  |  |  |  |  |
| 3. |  |  |  |  |  |  |
| 4. |  |  |  |  |  |  |
| 5. |  |  |  |  |  |  |
| 6. |  |  |  |  |  |  |
| 7. |  |  |  |  |  |  |
| 8. |  |  |  |  |  |  |

# Transponder Register

Transponders must be recorded whenever placed and removed on track. Transponders must be removed before the end of each shift.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2: Transponder Register** | | | | | | | | | |
| **Item** | **Date** | **Transponder**  **Description** | **Installation Details Location** | **Installation Details Name** | **Installation Details Time** | **Installation Details Signature** | **Removal Details Name** | **Removal Details Time** | **Removal Details Signature** |
|  | **Text** | **Text** | **Text** | **Text** | **Text** | **UserSignature** | **Text** | **Text** | **UserSignature** |
| Transponders must be recorded whenever placed and removed on track. Transponders must be removed before the end of each shift. | | | | | | | | | |
| 1. |  |  |  |  |  |  |  |  |  |
| 2. |  |  |  |  |  |  |  |  |  |
| 3. |  |  |  |  |  |  |  |  |  |
| 4. |  |  |  |  |  |  |  |  |  |
| 5. |  |  |  |  |  |  |  |  |  |
| 6. |  |  |  |  |  |  |  |  |  |
| 7. |  |  |  |  |  |  |  |  |  |

# Safety Precautions

The tests throughout this procedure have been assessed into the following two risk categories:

**LOW RISK – DRIVER NOT REQUIRED**

A driver is not required, however, the following safety precautions must be observed:

1. Handbrake must be applied;
2. Wheel chocks to be in place on driver side wheel 2;
3. Reverser must be removed from control stand;
4. No operation of the throttle;
5. Gen Field CB off;
6. Engine control switch to be in isolated position (except for starting the locomotive or if required for a test);
7. Brake handles only to be operated by competent tester;

**HIGH RISK – DRIVER REQUIRED**

1. A driver is required to be present while this test is performed.
2. ETM only to be connected/removed by the driver or by qualified and competent testers.
3. Visual Inspections & Auxiliary Checks (LOW RISK – DRIVER NOT REQUIRED)

| **Table 3: Visual Inspections & Auxiliary Checks** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | | **Signature** | **Notes** |
|  |  | **Text** | | **UserSignature** |  |
| Perform a visual inspection of the microwave, remove it and place it in the toilet. | No damage to microwave and safely place in the toilet compartment. |  | |  |  |
| Perform a visual inspection of the equipment in the **Cab**.  If any issues are noticed take a photo and include this with this document. | All components are present.  No damage, abnormalities, defects, or out-of-service tags. |  | |  | If items are missing leave a note “not fitted” |
| First Aid Kit |  | |
| Fire Extinguisher |  | |
| Long Hood tool box - Crow Bar in Canvas Carrier |  | |
| Long Hood tool box - Jumper Cable |  | |
| Dump Device |  | |
| Broom |  | |
| Brake Handle Lockout Bracket |  | |
| Train Walk Bag |  | |
| Green Bag |  | |
| Toilet Rolls x 2 |  | |
| Hand Towel Roll x 1 |  | |
| Hand Towel Tissue x 1 |  | |
| Long Hood tool box - Tool Box (sealed) |  | |
| Torch |  | |
| Perform a visual inspection of the equipment in the **Alcove**.  If any issues are noticed take a photo and include this with this document. | All components are present, all connectors are fitted, terminals covers all in, blanking plate is installed if not use, equipment earth is installed if applicable,  No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| ESW |  | |
| PTP |  | |
| Event Recorder |  | |
| Trainline Modem |  | |
| 15V Power Supply |  | |
| ATP Cardfile (VCU,RCE, RCU TX and LID) |  | |
| TMC |  | |
| DCV8 |  | |
| EMC Filter |  | |
| GPS |  | |
| DCV3 |  | |
| DCV4 |  | |
| DCV5 |  | |
| Bit Lab Filter |  | |
| Train Walk Radio Charger |  | |
| Satellite Phone Modem  (Note serial number) |  | |
| Event Recorder USB Download Port |  | |
| ATP Isolation Switch |  | |
| Perform a visual inspection of the equipment in the **Overhead Console**.  If any issues are noticed take a photo and include this with this document. | All components are present.  No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| R120 DGPS Receiver |  | |
| 8002CS Recorder |  | |
| 2 Way Antenna Splitter |  | |
| Voice Radio 1 |  | |
| Voice Radio 2 |  | |
| DCV 6 |  | |
| DCV 7 |  | |
| Triple Filter |  | |
| Voice Radio 2 High Pass Filter |  | |
| Perform a visual inspection of the equipment in the **Engine Control Panel**.  If any issues are noticed take a photo and include this with this document. | All components are present.  No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| Inspect and test the **Driver Side Window**. | No damage, abnormalities or defects. |  | |  |  |
| Window opens, closes and latches correctly. |  | |
| Blind opens, closes and latches correctly. |  | |
| Inspect and test the **Observer Side Window**. | No damage, abnormalities or defects. |  | |  |  |
| Window opens, closes and latches correctly. |  | |
| Blind opens, closes and latches correctly. |  | |
| Inspect and test the **Front Window**. | No damage, abnormalities or defects. |  | |  |  |
| Driver side blind opens, closes and latches correctly. |  | |
| Observer side blind opens, closes and latches correctly. |  | |
| Window wiper operates correctly. |  | |
| Inspect and test the **Driver Side Rear Window**. | No damage, abnormalities or defects. |  | |  |  |
| Window wiper operates correctly. |  | |
| Inspect and test the **Observer Side Rear Window**. | No damage, abnormalities or defects. |  | |  |  |
| Window wiper operates correctly. |  | |
| Inspect and test the **Front Cab Door** | No damage, abnormalities or defects. |  | |  |  |
| Door operates correctly and can be locked using a padlock. |  | |
| Inspect and test the **Rear Cab Door** | No damage, abnormalities or defects. |  | |  |  |
| Door operates correctly and can be locked using the latch inside the cab. |  | |
| Inspect and test the **Driver Seat**. | No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| Recline function operates correctly. |  | |
| Slide function operates correctly. |  | |
| Inspect and test the **Observer Seat**. | No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| Recline function operates correctly. |  | |
| Slide function operates correctly. |  | |
| Perform a visual inspection of the equipment in the **Communications Equipment Locker**.  If any issues are noticed take a photo and include this with this document. | All components are present.  No damage, abnormalities, defects, or out-of-service tags. | . | |  |  |
| DLC (NIU II) |  | |
| DLC Interpreter |  | |
| TIM |  | |
| Data Radio |  | |
| Guard Tone Radio |  | |
| Guard Tone Decoder |  | |
| DCV1 |  | |
| Document Shelf |  | |  |  |
| Test the **Cab Dome Light** using the switch on the side of the driver’s console. | Switch and light are operational. |  | |  |  |
| Test the **Toilet Comp Light** using the switch on the side of the driver’s console. | Switch and light are operational. |  | |  |  |
| Test the **Nose Cab Light** using the switch on the side of the driver’s console. | Switch and light are operational. |  | |  |  |
| Test the **Driver Side** **Lights** using the switch on the driver side ceiling panel. | Switch and light are operational. |  | |  |  |
| Test the **Observer** **Side** **Lights** using the switch on the observer side ceiling panel. | Switch and light are operational. |  | |  |  |
| Test the **Gage Lights** using the switch on the driver’s console. | Switch and lights are operational. |  | |  |  |
| Test the **In-Cab head/ditch light** using the switch on the driver’s console. | Switch and lights are operational.  The panel headlight indicators should be lit for both the top and bottom headlights.  If one headlight is out, it should correspond with the panel indicator (I.E. the matching panel indicator is not lit). |  | |  | Most loco’s have two panel indicator LED’s, however, some have one LED which is split in the middle. The left & right LED halves indicate a headlight each. If one headlight is out, the corresponding indicator should be out. |
| Perform a visual inspection of the locomotive cab area.  If any issues are noticed take a photo and include this with this document. | All components are present.  No damage, abnormalities, defects, or out-of-service tags. | |  |  |  |
| Driver console and equipment | |  |
| Observer console | |  |
| Ceiling | |  |
| Perform a visual inspection of the locomotive toilet area.  If any issues are noticed take a photo and include this with this document. | No damage, abnormalities, defects, or out-of-service tags. | |  |  |  |
| Generally clean and free from smell | |  |
| Perform a visual inspection of the external locomotive equipment.  If any issues are noticed take a photo and include this with this document. | All components are present.  No damage, abnormalities, defects, or out-of-service tags. | |  |  |  |
| ATP Tacho | |  |
| ATP Antenna | |  |
| Short Hood Cab Coils | |  |
| Long Hood Cab Coils | |  |
| DLC Tacho | |  |
| ECP Trainline Cables | |  |
| Front Left ECP Junction Box | |  |
| Front Right ECP Junction Box | |  |
| Rear Left ECP Junction Box | |  |
| Rear Right ECP Junction Box | |  |
| Shorthood Coupler | |  |
| Cow Catcher | |  |
| Test the **Short Hood Headlights** and **Short Hood Ditch Lights** using the switch on the driver’s console. | Switch and lights are operational. |  | |  |  |
| Test the **Long Hood Headlights** using the switch on the driver’s console. | Switch and lights are operational. |  | |  |  |
| Test the **Step Lights** using the switch on the driver’s console. | Front left step (2 lights) |  | |  |  |
| Front right step (2 lights) |
| Rear left step (2 lights) |
| Rear right step (2 lights) |
| Driver side ground (2 lights) |
| Observer side ground (2 lights) |
| Test the **Crosswalk Lights** using the switch on the engine control panel. | Front platform |  | |  |  |
| Front coupler |
| Rear platform |
| Rear coupler |
| Driver side platform top (2 lights) |
| Driver side platform near door (2 lights) |
| Observer side platform top (2 lights) |
| Test the **Front Number Lights** using the switch on the engine control panel. | Switch and lights are operational. |  | |  |  |
| Test the **Short Hood Class Lights** using the switch on the engine control panel. | Switch and lights are operational. |  | |  |  |
| Test the **Long Hood Class Lights** using the switch on the engine control panel. | Switch and lights are operational. |  | |  |  |
| Test the **Strobe Lights** using the switch on the overhead console. | Switch and lights are operational. |  | |  |  |
| BlackBox GPS System | | | | | |
| Check the 8002CS BlackBox GPS Recorder LEDs. | POWER (Green): ON | |  |  |  |
| COMMS (Orange): FLASHING | |  |  |
| SDB (Red): ON | |  |  |
| Check the R120 GPS unit LEDs. | POWER (Red): ON | |  |  | Either the GPS or DGPS LED must be ON. |
| GPS (Yellow): See notes | |  |  |
| DGPS (Green): See notes | |  |  |
| Using the RTRD laptop BlackBox GPS tracking system, find the locomotive. | Locomotive has a recently updated position. | |  |  |  |
| Test the **Lead Axle Sand** using the switch on the driver’s console. | Switch and sand are operational. |  | |  |  |
| Test the **Manual Sand** using the switch on the driver’s console. | Switch and sand are operational. |  | |  |  |
| Bell | | | | | |
| Test the **Bell** using the switch on the driver’s console. | Switch and bell are operational. |  | |  |  |
| Horn | | | | | |
| Test the Town & Country **Horn** using the button on the driver’s console. | Button and horn are operational. |  | |  |  |
| Auto Uncoupler | | | | | |
| Test the **Auto Uncoupler** using the switch on the driver’s side overhead console. | Auto uncoupler operates correctly. |  | |  |  |
| Air Conditioner | | | | | |
| Inspect and test the **Air Conditioner**. | No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| Fan function operates correctly. |  | |
| Cool function operates correctly. |  | |
| Hand Held Radio Charger | | | | | |
| Inspect the hand held radio charger, plug in a radio to test the operation of the charger base | No damage, abnormalities, defects, or out-of-service tags. Charger confirmed as working |  | |  |  |
| AM/FM Radio | | | | | |
| Inspect and test the **AM/FM Radio**. | No damage, abnormalities, defects, or out-of-service tags. |  | |  |  |
| Radio operates correctly and signal is received. |  | |
| Driver side speaker operates correctly. |  | |
| Observer side speaker operates correctly. |  | |

1. Locomotive Communications (LOW RISK – DRIVER NOT REQUIRED)

| **Table 4: Locomotive Communications** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Check the ATS links on the CDU | ATP |  |  | ATP links will establish when the subsystems are turned ON.  Green – healthy  Red – Comms down |
| CDU |  |  |
| DLC |  |  |
| PTP |  |  |
| Check the DLC links on the CDU | ATS |  |  | Green – healthy  Red – Comms down |
| CDU |  |  |
| Fastbrake |  |  |
| TIM |  |  |
| EIU |  |  |
| PTC |  |  |
| Check the Ethernet links on the SDIS | EAB |  |  | Green – healthy  Yellow- degraded  Red – comms down |
| End of Train |  |  |
| Event Recorder |  |  |
| CDS DLC |  |  |
| GPS |  |  |
| Consist Modem |  |  |
| Fuel Monitor |  |  |
| AAP |  |  |
| Check the PTP links on the SDIS | SDIS1 |  |  | Green – healthy  Yellow- degraded  Red – comms down |
| SDIS2 |  |  |
| CIO |  |  |
| Check the Arcnet Health on the SDIS | Arcnet 0 link is healthy (Green) |  |  |  |
| Arcnet 1 link is healthy (Green) |  |  |

1. Pneumatic Brake Test (HIGH RISK – DRIVER REQUIRED)

| **Table 5: Pneumatic Brake Test** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Perform a pneumatic brake test as per Epic and FastBrake Full Brake Test - RTIO-AM-0143924. | Results as per Epic and FastBrake Full Brake Test - RTIO-AM-0143924. |  |  | Attach results. |

1. Satellite Phone (LOW RISK – DRIVER NOT REQUIRED)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 6: Satellite Phone** | | | | |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Check the satellite handset networking settings. | DCHP: |  |  |  |
| IP Address: |  |  |
| Subnet Mask: |  |  |
| Gateway IP: |  |  |
| Primary DNS: |  |  |
| Check the satellite reception signal level shown on the handset screen. | At least 5 bars of signal level. |  |  |  |
| Record the SIM serial number. | SIM Serial Number: |  |  |  |
| Record the Satellite modem IMEI number. | IMEI Number: |  |  |  |
| Prior to final programming, make a test call and record the SIM phone number. | SIM Phone Number: |  |  |  |
| Perform a test call to 7 Mile Supervisor. | Test call is successful. |  |  |  |

1. End of Train (LOW RISK – DRIVER NOT REQUIRED)

| **Table 7: End of Train** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Using the GE screen, set the EOT ID to **99999**. | EOT ID is accepted |  |  | Leave a note if you’re unable to enter any EOT information |
| SDIS receives rear brake values from the test EOT marker. |  |
| Check the *Operator Log* on the CDU. | Correct locomotive ID is displayed for log of EOT change. |  |  |  |

1. Wheel Measurement (LOW RISK – DRIVER NOT REQUIRED)

| **Table 8: Wheel Measurement** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | Outcome | Unit | Signature | **Notes** |
|  |  | Text |  | UserSignature |  |
| Measure the **Drivers 5th wheel** (DIVA tachometer 1) using the digital wheel measuring tool.  Take 6 measurements.  Ensure results are valid. +/- 2 mm of each other.  Calculate the average measurement. | 6 x measurements  +/- 2mm | Tachometer 1: | mm |  | Note: Some wheels produce sporadic measurements with the digital tool and cannot be averaged. In this instance revert back to the 10 revolution test to calculate wheel diameters.  3 Step protection required.  Ensure the wheel is clean from grease/dirt, the tool is sitting flush with flange face and avoid placing on inner lip for accurate results. |
| Measure the **Observers 3rd wheel** (DIVA tachometer 2) using the digital wheel measuring tool.  Take 6 measurements.  Ensure results are valid. +/- 2 mm of each other.  Calculate the average measurement. | 6 x measurements  +/- 2mm | Tachometer 2: | mm |  | Note: Some wheels produce sporadic measurements with the digital tool and cannot be averaged. In this instance revert back to the 10 revolution test to calculate wheel diameters.  3 Step protection required.  Ensure the wheel is clean from grease/dirt, the tool is sitting flush with flange face and avoid placing on inner lip for accurate results. |

1. L15000 ATP

| **Table 9: L15000 ATP** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | Outcome | Signature | **Notes** |
|  |  | Text | UserSignature |  |
| Static Tests - VCU DIP Switch Verification | | | | |
| Record the DIP switch settings on the VCU and compare the DIP switch settings on the ATP logs. | N/A |  |  |  |

1. ECP (LOW RISK – DRIVER NOT REQUIRED)

| **Table 10: ECP** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Connect an ETM to the locomotive brake pipe and the long hood junction box B.  Ensure all other locomotive junction box cables are terminated.  Ensure ATP L15000 has been started as per Appendix G. (Check CDU Displays **StartUp**) | CDU displays:  Authority: **StartUp** |  |  |  |
| Move the ABH to *Full*. (record the Voltage on the Outcome)  Press *ECP SETUP*.  Press *RUN*.  Follow the prompts to enter ECP Run mode. | During sequencing CDU displays:  POWER: **24V** |  |  | Record the Outcome displayed on the CDU.. |
| Wait for ECP to enter Run mode. Check if the CDU displays the expected result and note the values on the outcome column. | CDU displays:  ECP Mode: **RUN**  POWER: **230V**  Authority: **ECPTest** |  |  | Record/Check the Outcome displayed on the CDU.. |
| Move the ABH to lower the TBC to less than 50%. | CDU displays:  **ATP PENALTY**  TBC %: **100**  No ATP alarms (Authority box does not become highlighted) |  |  | Record the Outcome displayed on the CDU.. |
| Move the ABH to *SUP*.  Follow the prompts to acknowledge the penalty.  Move the ABH to *REL*.  Record the BP value on the outcome | CDU displays:  Authority: **StartUp**  TBC % : **0**  BP (kPa) : **620 ± 21** |  |  | Record the Outcome displayed on the CDU.. |
| Move the ABH to *FULL*.  Record the TBC and BP readings on the outcome. | TBC % : **100**  BP (kPa) : **620 ± 21** |  |  | Record the Outcome displayed on the CDU.. |
| Press *ECP*.  Press *ECP INFO*.  Press *VIEW LOCO PS*. | The correct locomotive number is displayed. |  |  | Check/Record the Outcome displayed on the CDU.. |
| Press *ECP*.  Press *ECP INFO*.  Press *POWER CONTROL*.  Press *TL PWR OFF*. | CDU displays:  POWER: **OFF** or **---** |  |  |  |
| Press *POWER CONTROL*. (record readings)  Press *TL PWR AUTO*.  Follow the prompts to apply trainline power. | CDU displays:  POWER: **230V** |  |  | Check/Record the Outcome displayed on the CDU.. |
| Press *ECP SETUP*.  Press *CUT-OUT*.  Follow the prompts to cut out ECP. | CDU displays:  ECP Mode: **OFF**  POWER: **OFF** or **---** |  |  |  |
| Disconnect the termination at one of the shorthood junction boxes.  Press *ECP SETUP*.  Press *SWITCH*.  Follow the prompts to enter ECP Switch mode. | CDU displays:  **NO HEAD END TERMINATION**  POWER: **OFF** or **---** |  |  |  |
| Disconnect the ETM from the locomotive.  Terminate the long hood junction box B cables.  Press *ECP SETUP*.  Press *SWITCH*.  Follow the prompts to enter ECP Switch mode. | CDU displays:  ECP Mode: **SWITCH** |  |  |  |
| Press *ECP SETUP*.  Press *CUT-OUT*.  Follow the prompts to cut out ECP. | CDU displays:  ECP Mode: **OFF**  POWER: **OFF** or **---** |  |  |  |
| Terminate the shorthood junction box cables. | N/A | N/A |  |  |

1. DLC RF testing

| **Table 11: DLC RF Testing – Antenna and Filter Tests** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| **Note: To protect the FieldFox during testing ensure that voice and DLC radios are powered down prior to starting.** | | | | |
| DLC Data Radio Antenna and Feeder | | | | |
| **DLCDR\_ANT\_RL**  Set the FieldFox range to 440.0MHz to 460.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to DLC Data Radio antenna cable at the Triple Filter 450-451 MHz port (if installed) or at the radio (if filter not installed).  Set the FieldFox marker #1 to 450.000MHz.  Set the FieldFox marker #2 to 451.000MHz.  All points between 450 MHz and 451 MHz must be below 9.5 dB to pass.  Record the minimum return loss between the two markers.  Save as: **<LOCOID>\_DLCDR\_ANT\_RL** | Return Loss > 9.5 dB |  |  | The minimum return loss is the highest point on the scope. This must be between 450 MHz and 451 Mhz.  Site comms must be informed if the result is less than 14 dB. |
| DLC Guard Tone Radio Antenna and Feeder | | | | |
| **DLCGT\_ANT\_RL**  Set the FieldFox range to 400.0MHz to 420.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to DLC Guard Tone Radio antenna cable at the Triple Filter 400-420MHz port (if installed) or at the radio (if filter not installed).  Measure the minimum return loss.  Save as: **<LOCOID>\_DLCGT\_ANT\_RL** | Return Loss > 9.5 dB |  |  | The minimum return loss is the highest point on the scope.  Site comms must be informed if the result is less than 14 dB. |
| DLC Data Radio Filter | | | | |
| **DLCDR\_FILTER\_IL**  Set the FieldFox range to 440.0MHz to 460.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF OUT test lead to the Triple Filter 450-451MHz antenna side port.  Connect the RF IN test lead to the Triple Filter 450-451MHz radio side port.  Set the FieldFox marker #1 to 440.000MHz.  Set the FieldFox marker #2 to 450.000MHz.  Set the FieldFox marker #3 to 451.000MHz.  Set the FieldFox marker #4 to 460.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_ DLCDR\_FILTER\_IL** | M1 Loss > 15 dB | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 1.5 dB | M2: |
| M3 Loss < 1.5 dB | M3: |
| M4 Loss > 25 dB | M4: |
| **DLCDR\_CABLE\_IL**  Set the FieldFox range to 440.0MHz to 460.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF IN test lead to the radio end of the DLC Data Radio – Triple Filter cable and the RF OUT to the filter end.  Set the FieldFox marker #1 to 450.000MHz.  Set the FieldFox marker #2 to 451.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_ DLCDR\_CABLE\_IL** | M1 Loss < 2.5 dB | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 2.5 dB | M2: |  |
| **DLCDR\_FILTER\_TX\_RL**  Set the FieldFox range to 440.0MHz to 460.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to the DLC Data Radio – Triple Filter cable at the radio end.  Terminate the Triple Filter 450-451MHz antenna side port with a 50Ω load.  Set the FieldFox marker #1 to 450.000MHz.  Set the FieldFox marker #2 to 451.000MHz.  Record the return loss at the two markers.  Save as: **<LOCOID>\_ DLCDR\_FILTER\_TX\_RL** | M1 Return Loss > 15 dB | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Return Loss > 15 dB | M2: |
| **DLCDR\_FILTER\_RX\_RL**  Set the FieldFox range to 440.0MHz to 460.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to the Triple Filter 450-451MHz antenna side port.  Terminate the DLC Data Radio – Triple Filter cable with a 50Ω load at the radio end.  Set the FieldFox marker #1 to 450.000MHz.  Set the FieldFox marker #2 to 451.000MHz.  Record the return loss at the two markers.  Save as: **<LOCOID>\_ DLCDR\_FILTER\_RX\_RL** | M1 Return Loss > 15 dB | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Return Loss > 15 dB | M2: |
| DLC Guard Tone Radio Filter | | | | |
| **DLCGT\_FILTER\_IL**  Set the FieldFox range to 350.0MHz to 450.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF OUT test lead to the Triple Filter 400-420MHz antenna side port.  Connect the RF IN test lead to the Triple Filter 400-420MHz radio side port.  Set the FieldFox marker #1 to 360.000MHz.  Set the FieldFox marker #2 to 400.000MHz.  Set the FieldFox marker #3 to 420.000MHz.  Set the FieldFox marker #4 to 445.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_ DLCGT\_FILTER\_IL** | M1 Loss > 20 dB | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 1.5 dB | M2: |  |
| M3 Loss < 1.5 dB | M3: |  |
| M4 Loss > 20 dB | M4: |  |
| **DLCGT\_CABLE\_IL**  Set the FieldFox range to 350.0MHz to 450.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF IN test lead to the radio end of the DLC Guard Tone Radio – Triple Filter cable and the RF OUT to the filter end.  Set the FieldFox marker #1 to 400.000MHz.  Set the FieldFox marker #2 to 420.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_ DLCGT\_CABLE\_IL** | M1 Loss < 2.5 dB | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 2.5 dB | M2: |  |
| **DLCGT\_FILTER\_TX\_RL**  Set the FieldFox range to 400.0MHz to 420.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to the DLC Guard Tone Radio – Triple Filter cable at the radio end.  Terminate the Triple Filter 400-420MHz antenna side port with a 50Ω load.  Measure the minimum return loss.  Save as: **<LOCOID>\_ DLCGT\_FILTER\_TX\_RL** | Return Loss > 15 dB |  |  | Site comms must be informed if the expected results are not met. |
| **DLCGT\_FILTER\_RX\_RL**  Set the FieldFox range to 400.0MHz to 420.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to the Triple Filter 400-420MHz antenna side port.  Terminate the DLC Guard Tone Radio – Triple Filter cable with a 50Ω load at the radio end.  Measure the minimum return loss.  Save as: **<LOCOID>\_ DLCGT\_FILTER\_RX\_RL** | Return Loss > 15 dB |  |  | Site comms must be informed if the expected results are not met. |

1. DLC DYNAMIC (HIGH RISK – DRIVER REQUIRED)

| **Table 12: DLC Dynamic** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | Outcome | Signature | **Notes** |
|  |  | Text | UserSignature |  |
| Setup (HIGH RISK – DRIVER REQUIRED) | | | | |
| Note DLC Tower version 1.9 required for NIU-II locos | N/A |  |  |  |
| Place the DLC transponders 5m in front of the locomotive, and 3m apart. | N/A |  |  |  |
| Switch the ICSS Cut-Out Switch to the ‘Cut-In’ position.  Setup the locomotive for Dark Territory.  Setup the locomotive in ATP Screen 2 as Single Engine, and shorthood first. | ATP completes start-up without error.  CDU displays ATP Data  Max Speed = 100  Authority = DarkTerr  Direction = NoCabSig |  |  | Check/Record the Outcome displayed on the CDU. |
| DLC Interpreter LED is steady green |  |  |  |
| Drive the locomotive over the DLC transponders at less than 5km/h. | CDU updates ATP Data  Section = YB |  |  | Check/Record the Outcome displayed on the CDU. |
| The **DLC SESSION** soft-key is available. |  |
| Press the **DLC SESSION** soft-key. | The CDU shows the DLC Session window with the countdown message:  “DLC Entry Point: ## metres to go” |  |  |  |
| Stop the train after the countdown message reaches zero.  Access the Operation Log on the CDU. | The Operation Log shows the entry:  “LOCO IN DLC AREA, YANDI B” |  |  | For efficiency, test L15k\_Over\_Speed can be performed at this time. |
| Set the reverser to neutral.  Set the throttle to idle.  Release the automatic brake. (BP = 620 kPa)  Release the independent brake (maintain enough brake to prevent locomotive movement).  (BC = 60 kPa)  Access the DLC Session window on the CDU. | The **ACTIVATE DLC** soft-key is available. |  |  |  |
| Press the **ACTIVATE DLC** soft-key. | The DLC Session window displays the message:  “Independent Handle: Move to Apply” |  |  | Check/Record the Outcome displayed on the CDU. |
| The **ACK ALARM** soft-key is available. |  |
| Press the **ACK ALARM** soft-key. | The DLC Session window shows no messages. |  |  |  |
| The **ACTIVATE DLC** soft-key is available. |  |
| Apply the automatic brake. (BP < 540 kPa)  Fully apply the independent brake. (BC > 450 kPa)  Press the **ACTIVATE DLC** soft-key. | The DLC Session window displays the message:  “Automatic Handle: Move to Release” |  |  | Check/Record the Outcome displayed on the CDU. |
| The **ACK ALARM** soft-key is available. |  |
| Press the **ACK ALARM** soft-key. | The DLC Session window shows no messages. |  |  |  |
| The **ACTIVATE DLC** soft-key is available. |  |
| Set the engine control switch to isolate.  Release the automatic brake. (BP = 620 kPa)  Set the reverser to forward.  Set the throttle to notch 1.  Press the **ACTIVATE DLC** soft-key. | The DLC Session window displays the messages:  “Throttle Handle: Move to Idle”  “Reverser Handle: Move to Neutral” |  |  | Check/Record the Outcome displayed on the CDU. |
| The **ACK ALARM** soft-key is available. |  |
| Press the **ACK ALARM** soft-key. | The DLC Session window shows no messages. |  |  |  |
| The **ACTIVATE DLC** soft-key is available. |  |
| Set the reverser to neutral.  Set the throttle to idle.  Set the engine control switch to run.  Press the **ACTIVATE DLC** soft-key. | The DLC Session window displays the message:  “XXXX Waiting for link to Tower”  Where XXXX is the locomotive number. |  |  | Check/Record the Outcome displayed on the CDU.. |
| Request the tower to link to the locomotive (using the correct locomotive ID). | The tower confirms that the link is established. |  |  | Check/Record the Outcome displayed on the CDU. |
| The CDU shows the crew message:  “DLC STANDBY MODE SELECTED” |  |
| Access the DLC Session window. | The DLC Session window displays the message:  “Check independent handle in release.” |  |  |  |
| Set the independent brake handle to release.  Set locomotive headlights to off. | BC > 450 kPa |  |  | Check/Record the Outcome displayed on the CDU. |
| DLC Automatic Mode (HIGH RISK – DRIVER REQUIRED) | | | | |
| Request the DLC tower to press the AUTO button on the DLC load-out panel.  Request the DLC tower to set the speed set-point to 0.7km/h. | The CDU shows the crew message:  “DLC AUTO MODE SELECTED” |  |  | Check/Record the Outcome displayed on the CDU. |
| Request the DLC tower to start the auto run.  Record readings on the column. | Independent brake is fully released (BC = 0 kPa) |  |  | Check/Record the Outcome displayed on the CDU. |
| Both overhead console LED Headlight indicators are ON |  |
| Bell rings for at least 5 seconds before locomotive moves. |  |
| Locomotive accelerates to speed set-point. |  |
| Bell stops when locomotive speed is greater than 0.2 km/h. |  |
| The CDU shows the crew message:  “DLC AUTO MODE RUNNING” |  |
| Independent brake is fully released (BC = 0 kPa) |  |
| Request the DLC tower to stop the auto run. Record the BC value on the column. | Locomotive decelerates to a stop. |  |  | Check/Record the Outcome displayed on the CDU. |
| Independent brake is fully applied  (BC > 450 kPa). |  |
| Request the DLC tower to press the STANDBY button on the DLC load-out panel. | Both Headlights are off as indicated on the overhead console. |  |  | Check/Record the Outcome displayed on the CDU. |
| The CDU shows the crew message:  “DLC STANDBY MODE SELECTED” |  |
| DLC Manual Forward Mode (HIGH RISK – DRIVER REQUIRED) | | | | |
| Request the DLC tower to press the MANUAL button, then the MANUAL FORWARD button on the DLC load-out panel. | The CDU shows the crew message:  “DLC MANUAL MODE SELECTED” |  |  | Check/Record the Outcome displayed on the CDU. |
| Request the DLC tower to start the manual run.  Record BC values on the column provided.  (Check/Record the Outcome displayed on the CDU.) | Independent brake is fully released (BC = 0 kPa) |  |  | Ensure no alarms have been produced on the monitor at the DLC tower |
| Both overhead console LED Headlight indicators are ON |  |
| Bell rings for at least 5 seconds before locomotive moves. |  |
| Locomotive accelerates to speed set-point. |  |
| Bell stops when locomotive speed is greater than 0.2 km/h. |  |
| The CDU shows the crew message:  “DLC AUTO MODE RUNNING” |  |
| Independent brake is fully released (BC = 0 kPa) |  |
| Request the DLC tower to stop the manual run. Record the BC reading on the column | Locomotive decelerates to a stop. |  |  | Check/Record the Outcome displayed on the CDU. |
| Independent brake is fully applied  (BC > 450 kPa). |  |
| Request the DLC tower to press the STANDBY button on the DLC load-out panel. | Both Headlights are off as indicated on the overhead console. |  |  |  |
| The CDU shows the crew message:  “DLC STANDBY MODE SELECTED” |  |
| DLC Manual Reverse Mode (HIGH RISK – DRIVER REQUIRED) | | | | |
| Request the DLC tower to press the MANUAL button, then the MANUAL REVERSE button on the DLC load-out panel. | The CDU shows the crew message:  “DLC MANUAL MODE SELECTED” |  |  | Check/Record the Outcome is displayed on the CDU. |
| Request the DLC tower to start the manual run.  Record the BC values/readings on the column. | Independent brake is fully released (BC = 0 kPa) |  |  | Ensure no alarms have been produced on the monitor at the DLC tower |
| Both overhead console LED Headlight indicators are ON |  |
| Bell rings for at least 5 seconds before locomotive moves. |  |
| Locomotive accelerates to speed set-point. |  |
| Bell stops when locomotive speed is greater than 0.2 km/h. |  |
| The CDU shows the crew message:  “DLC AUTO MODE RUNNING” |  |
| Independent brake is fully released (BC = 0 kPa) |  |
| Request the DLC tower to stop the manual run. Record the BC values provided on the column. | Locomotive decelerates to a stop. |  |  | Check/Record the Outcome displayed on the CDU. |
| Independent brake is fully applied  (BC > 450 kPa). |  |
| Request the DLC tower to press the STANDBY button on the DLC load-out panel. | Both Headlights are off as indicated on the overhead console. |  |  | Check/Record the Outcome displayed on the CDU. |
| The CDU shows the crew message:  “DLC STANDBY MODE SELECTED” |  |
| DLC Emergency Stop (HIGH RISK – DRIVER REQUIRED) | | | | |
| Request the DLC tower to perform an emergency stop. Record corresponding Brake pressures on the column, | Locomotive applies emergency brake.  (BP = 0 kPa) |  |  | Check/Record the Outcome displayed on the CDU. |
| Independent brake is fully applied.  (BC > 450 kPa) |  |
| Request the DLC tower to recover the brakes. Record the corresponding Brake pressure on the column, | Automatic brake is released.  (BP = 620 kPa) |  |  | Check/Record the Outcome displayed on the CDU. |
| Independent brake is fully applied.  (BC > 450 kPa) |  |
| DLC Unlink (HIGH RISK – DRIVER REQUIRED) | | | | |
| Request the DLC tower to unlink from the locomotive. Record the BP value on the column | CDU displays crew message:  “DLC Unlinked” |  |  | Check/Record the Outcome displayed on the CDU. |
| Automatic brake is released.  (BP = 620 kPa) |  |
| Independent brake is fully applied.  (BC > 450 kPa) |  |
| Move the independent brake handle to the release position. Record the BP value | Independent brake remains fully applied.  (BC > 450 kPa) |  |  | Check/Record the Outcome displayed on the CDU. |
| Set the reverser to forward. Record the BC value. | Independent brake is released.  (BC = 0 kPa) |  |  | Check/Record the Outcome displayed on the CDU. |
| Fully apply the independent brake. Record the BC value. | Independent brake is applied.  (BC > 450 kPa) |  |  | Check/Record the Outcome displayed on the CDU. |
| Overspeed Detection (HIGH RISK – DRIVER REQUIRED) | | | | |
| Setup the locomotive in ATP Screen 2 as Single Engine, shorthood first and max speed 5. | CDU displays ATP Data  Max Speed = **5**  Authority = **DarkTerr**  Direction = **NoCabSig** |  |  |  |
| Drive the locomotive at more than 10km/h overspeed.  Do not acknowledge any alarms. | ATP alerts the driver, then applies a penalty brake. |  |  |  |
| Clear any penalties to recover air | Air should recover |  |  |  |

1. Driver Assist (HIGH RISK – DRIVER REQUIRED)

| **Table 13: Driver Assist** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Ensure all penalties are cleared. | Driver Assist is available on the CDU. |  |  | This step requires the CDU flash card update with LEADER |
| Using the CDU:  Press *LEADER*  Press *F5*, *F5*, *F6*, *F5*.  Press *1* (Display Menu)  Press *5* (GPS Data Display)  Record the GPS coordinates | All GPS data (Latitude to Heading) is indicated as valid.  Latitude, longitude is approximately: -20.75, 116.75 |  |  |  |
| Press *1* (Air Brake Data Menu)  Press *2* (Air Brake Data Validity) | All air brake analog data is indicated as valid. |  |  |  |
| Press *X*  Press *4* (Air Brake Discrete Data Validity Display) | All air brake discrete data is indicated as valid. |  |  |  |
| Press *X*, *X*  Press *2* (Display Engine Data Menu)  Press *1* (Analog Data Display) | All engine analog data is indicated as valid. |  |  |  |
| Set the Gen Field C/B to On.  Move the reverser to Forward.  Move the throttle to DB8.  Record the DB value | DB Excitation ≈ 70V  Check/Record the Outcome displayed on the CDU. |  |  | Drivers or qualified & competent personnel must be used for tests requiring throttle movements using authorised methods. |
| Flick the L2 Diagnostics switch.  On the GE screen, enter the Loco Monitor screen.  Press Propulsion, then Page Down.  Find the Main Alt Raw V reading.  Perform a self-load test.  Compare the Main Generator Voltage reading on the  CDU to the Main Alt Raw V reading on the GE screen. | Main Generator Voltage ≈ Main Alt Raw V | M G V = |  | Drivers or qualified & competent personnel must be used for tests requiring throttle movements using authorised methods. |
| M alt V = |  |
| Press *X*  Press *2* (Engine Discrete Data Display)  Switch the engine control switch between RUN and  ISOLATE. | In RUN:  Not in Isolate: \*  In ISOLATE:  Not in Isolate: - |  |  |  |
| Press *X*  Press *3* (Engine Discrete Data Validity Display) | All engine discrete data is indicated as valid. |  |  |  |
| Press *X*, *X*, *X* | The remote diagnostic screen is exited |  |  |  |
| When the locomotive is under power, check that the amps are displayed on the main CDU screen. | Amps are displayed. |  |  | This should be done during the DLC or ATP dynamic tests, or use a driver to run the locomotive against the brakes. |
| From the main CDU screen, press *LEADER*.  Press *LOGIN*. | Login to back office is successful, if messages indicate file transfers are taking place e.g. screen displays:  “Transferring file: speed\_restriction.dat”  After all files are transferred, the Consist Summary screen is displayed |  |  |  |

1. Voice Radio System

| **Table 14: Voice Radio System** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | | **Signature** | **Notes** |
|  |  | **Text** | | **UserSignature** |  |
| **Note: To protect the FieldFox during testing ensure that voice and DLC radios are powered down prior to starting.** | | | | | |
| Voice Radio 1 Antenna and Feeder |  |  | |  |  |
| **VR1\_ANT\_RL**  Set the FieldFox range to 470.0MHz to 490.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to Voice Radio 1 antenna cable at the Triple Filter 470-500MHz port (if installed) or at the radio (if filter not installed).  Measure the minimum return loss.  Save as: **<LOCOID>\_VR1\_ANT\_RL** | Return Loss > 9.5dB |  | |  | Site comms must be informed if the result is less than 14 dB. |
| Voice Radio 2 Antenna and Feeder | | | | | |
| **VR2\_ANT\_RL**  Set the FieldFox range to 470.0MHz to 490.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the test lead to Voice Radio 2 antenna cable at the High Pass Filter (if installed) or at the radio (if filter not installed).  Measure the minimum return loss.  Save as: **<LOCOID>\_VR2\_ANT\_RL** | Return Loss > 9.5dB |  | |  | Site comms must be informed if the result is less than 14 dB. |
| Voice Radio 1 Filter | | | | | |
| **VR1\_FILTER\_IL**  Set the FieldFox range to 450.0MHz to 520.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF OUT test lead to the Triple Filter 470-500MHz antenna side port.  Connect the RF IN test lead to the Triple Filter 470-500MHz radio side port.  Set the FieldFox marker #1 to 470.000MHz.  Set the FieldFox marker #2 to 477.000MHz.  Set the FieldFox marker #3 to 482.000MHz.  Set the FieldFox marker #4 to 490.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_VR1\_FILTER\_IL** | M1 Loss < 1.5 dB | | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 1.5 dB | | M2: |
| M3 Loss < 1.5 dB | | M3: |
| M4 Loss < 1.5 dB | | M4: |
| **VR1\_CABLE\_IL**  Set the RF Analyser range to 450.0MHz to 520.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF IN test lead to the radio end of the Voice Radio 1 – Triple Filter cable and the RF OUT to the filter end.  Set the RF Analyser marker #1 to 470.000MHz.  Set the RF Analyser marker #2 to 477.000MHz.  Set the RF Analyser marker #3 to 482.000MHz.  Set the RF Analyser marker #4 to 490.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_ VR1\_CABLE\_IL** | M1 Loss < 1.5 dB | | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 1.5 dB | | M2: |
| M3 Loss < 1.5 dB | | M3: |
| M4 Loss < 1.5 dB | | M4: |
| **VR1\_FILTER\_TX\_RL**  Set the FieldFox range to 470.0MHz to 490.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the RF IN test lead to the Voice Radio 1 – Triple Filter cable at the radio end.  Terminate the Triple Filter 470-500MHz antenna side port with a 50Ω load.  Measure the minimum return loss.  Save as: **<LOCOID>\_VR1\_FILTER\_TX\_RL** | Return Loss > 15 dB | |  |  | Site comms must be informed if the expected results are not met. |
| **VR1\_FILTER\_RX\_RL**  Set the FieldFox range to 470.0MHz to 490.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the RF OUT test lead to the Triple Filter 470-500MHz antenna side port.  Terminate the Voice Radio 1 – Triple Filter cable with a 50Ω load at the radio end.  Measure the minimum return loss.  Save as: **<LOCOID>\_VR1\_FILTER\_RX\_RL** | Return Loss > 15 dB | |  |  | Site comms must be informed if the expected results are not met. |
| Voice Radio 2 Filter - TO BE COMPLETED IF FILTER IS INSTALLED | | | | | |
| **VR2\_FILTER\_IL**  Set the FieldFox range to 450.0MHz to 520.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF OUT test lead to the High Pass Filter antenna side port.  Connect the RF IN test lead to the High Pass Filter radio side port.  Set the FieldFox marker #1 to 470.000MHz.  Set the FieldFox marker #2 to 477.000MHz.  Set the FieldFox marker #3 to 482.000MHz.  Set the FieldFox marker #4 to 490.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_VR2\_FILTER\_IL** | M1 Loss < 1.5 dB | | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 1.5 dB | | M2: |
| M3 Loss < 1.5 dB | | M3: |
| M4 Loss < 1.5 dB | | M4: |
| **VR2\_CABLE\_IL**  Set the RF Analyser range to 450.0MHz to 520.0MHz.  Connect test leads to the FieldFox RF ports and join the cables using an adaptor.  Select measurement - *Measure (1) / More / Insertion Loss (2 Port)*.  Calibrate the unit - *Cal (5) / Start Cal.*  Connect the RF IN test lead to the radio end of the Voice Radio 2 – High Pass Filter cable and the RF OUT to the filter end.  Set the RF Analyser marker #1 to 470.000MHz.  Set the RF Analyser marker #2 to 477.000MHz.  Set the RF Analyser marker #3 to 482.000MHz.  Set the RF Analyser marker #4 to 490.000MHz.  Record the loss at the markers.  Save as: **<LOCOID>\_ VR2\_CABLE\_IL** | M1 Loss < 1.5 dB | | M1: |  | Site comms must be informed if the expected results are not met. |
| M2 Loss < 1.5 dB | | M2: |
| M3 Loss < 1.5 dB | | M3: |
| M4 Loss < 1.5 dB | | M4: |
| **VR2\_FILTER\_TX\_RL**  Set the FieldFox range to 470.0MHz to 490.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the RF OUT test lead to the Voice Radio 2 – High Pass Filter cable at the radio end.  Terminate the High Pass Filter antenna side port with a 50Ω load.  Measure the minimum return loss.  Save as: **<LOCOID>\_VR2\_FILTER\_TX\_RL** | Return Loss > 15 dB | |  |  | Site comms must be informed if the expected results are not met. |
| **VR2\_FILTER\_RX\_RL**  Set the FieldFox range to 470.0MHz to 490.0MHz.  Connect a test lead to the FieldFox RF OUT port.  Select measurement - *Measure (1) / Return Loss (dB)*.  Calibrate the unit - *Cal (5) / Start Cal*.  Connect the RF OUT test lead to the High Pass Filter antenna side port.  Terminate the Voice Radio 2 – High Pass Filter cable with a 50Ω load at the radio end.  Measure the minimum return loss.  Save as: **<LOCOID>\_VR2\_FILTER\_RX\_RL** | Return Loss > 15 dB | |  |  | Site comms must be informed if the expected results are not met. |
| Voice Radio Test Calls | | | | | |
| Perform a test call to 7 Mile Tower using radio 1. | Test call is successful. |  | |  |  |
| Perform a test call to 7 Mile Tower using radio 2. | Test call is successful. |  | |  |  |

1. Ground Fault Test (LOW RISK – DRIVER NOT REQUIRED)

| **Table 15: Ground Fault Test** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Put all circuit breakers and light switches into the on position. | N/A | N/A | N/A |  |
| Perform a check on the test light by testing across the knife switch terminals. | Test light is illuminated. |  |  |  |
| Set the L15000 isolation switch to ISOLATED.  Perform a ground test on the positive knife switch terminal using the 15W test light box. | No ground faults are present.  Test light is not illuminated. |  |  |  |
| Perform a ground test on the negative knife switch terminal using the 15W test light box. | No ground faults are present.  Test light is not illuminated. |  |  |  |
| Set the L15000 isolation switch to CUT-IN.  Perform a ground test on the positive knife switch terminal using the 15W test light box. | No ground faults are present.  Test light is not illuminated. |  |  |  |
| Perform a ground test on the negative knife switch terminal using the 15W test light box. | No ground faults are present.  Test light is not illuminated. |  |  |  |

1. GPO Test

| **Table 16: GPO Test** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Equipment** | **Location** | **Connector** | **Measurement** | **Measurement** | **Initial** |
|  |  |  |  | **Text** | **UserSignature** |
| Carry out the following tests on the Microwave/Kettle GPO’s | | | | | |
| GPO | HCN | GPO 1 | Verify correct polarity (when connecting L, N & PE indications to the test equipment) |  |  |
| Check and record that the voltage is 240V +/- 5% |  |  |
| Check and record the Fault Loop Impedance (loop impedance of L to PE) is less than 1.53 ohms |  |  |
| Check and record Prospective Earth Fault Current (PEFC) |  |  |
| Verify the RCD does not trip the test equipment set at 50% of its operating current |  |  |
| Verify the RCD does not trip with the tester on ½ operating current at reverse polarity |  |  |
| Verify RCD trips with test equipment set at 100% of its operating current rating |  |  |
| Verify RCD trips with test equipment set at 100% of its operating current rating at reverse polarity |  |  |
| Verify RCD trips with testtest equipment set at 500% of its operating current rating at 50ms |  |  |
| Verify RCD trips with tester on 500% of its operating current rating at for 50ms on reverse polarity |  |  |

1. Self Load Test (HIGH RISK – DRIVER REQUIRED)

| **Table 17: Self Load Test** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Unit** | **Signature** | **Notes** |
|  |  | **Text** |  | **UserSignature** |  |
| Put the locomotive into self-load mode.  Change one of the SDIS to the *Inbound / Outbound* screen. | Oil Pressure: 170 -250 |  | kPa |  |  |
| Fuel Pressure: 520 - 620 |  | kPa |
| Gradually Move the throttle to notch **8**.  Let the locomotive settle in notch 8 for 1 minute  Record the values from SDIS. | Amps: N/A |  | Amps |  |  |
| Volts: N/A |  | Volts |
| kW: N/A |  | kW |
| RPM: N/A |  | RPM |
| Leave the throttle in notch **8**.  Record the values from the *Self Load* screen. | Main Alternator Volts: 1090 |  | V |  |  |
| Auxiliary Load: 213 |  | kW |
| Engine Speed: 1050 |  | RPM |
| Grid Blower #1: 3062 |  | RPM |
| Grid Blower #2: 3063 |  | RPM |
| Grid Blower #3: 3063 |  | RPM |
| Ambient Air Temperature: N/A |  | Deg C. |
| Leave the throttle in notch **8**.  Record the statistics from the *Inbound / Outbound* screen. | Gross Power: 3270 - 3356 |  | kW |  |  |
| Load Control Pot: 100 |  | % |
| Engine Water Pressure: 320 - 370 |  | kPa |
| Oil Pressure: 650 - 850 |  | kPa |
| COP Pressure: -0.65 to -1.50 |  | kPa |
| Horse Power Available: 3355 |  | kW |
| Turbo Speed: 19500 - 22500 |  | RPM |
| Engine Water Temp Inlet: 80-90 |  | Deg. C |
| Engine Lube Oil Temp Inlet: 75 - 85 |  | Deg. C |
| Available Traction Kilowatts: 3197 |  | kW |
| Engine Water Temp Outlet: 85 - 94 |  | Deg. C |
| Oil Outlet Temp: 85 - 95 |  | Deg. C |
| Fuel Pressure: 470 - 550 |  | kPa |
| Intake Air Manifold Pressure: 340 - 372 |  | kPa |
| Battery Volts: 69 - 73 |  | V |
| Manifold Air Temp: 44 - 54 |  | Deg. C |
| Pre Turbine Temp Left: 550 - 600 |  | Deg. C |
| Pre Turbine Temp Right: 550 - 600 |  | Deg. C |

1. Shut Down / Start Up Test (LOW RISK – DRIVER NOT REQUIRED)

| **Table 18: Shut Down or Start Up Test** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Shut down the locomotive, open all circuit breakers, and then open the knife switch. | N/A |  |  | Ensure the handbrake is on during this test. |
| Start up the locomotive.  Note any issues encountered during start-up. | N/A |  |  |  |
| View the active faults screen on the SDIS.  Record any active faults. | N/A |  |  |  |

1. RF Verification

| **Table 19: RF Verification** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Commissioning Engineer to acknowledge RF verification is complete | RF screen shots are on HDD and RF verification spreadsheet is complete | N/A |  |  |

1. Logs (LOW RISK – DRIVER NOT REQUIRED)

| **Table 20: LOGS** | | | | |
| --- | --- | --- | --- | --- |
| **Action** | **Expected Result** | **Outcome** | **Signature** | **Notes** |
|  |  | **Text** | **UserSignature** |  |
| Download the logs from the **Event Recorder USB Download Port** using a USB drive.  Save the file as **<LOCOID>\_<DDMMYY>\_ER\_USB** | Logs can be downloaded and inspected. |  |  |  |
| Download the logs from the **Event Recorder** using a laptop.  Save the file as **<LOCOID>\_<DDMMYY>\_ER\_LAP** | Logs can be downloaded and inspected. |  |  |  |
| Use **DAS** to confirm that all **Event Recorder** inputs are correctly operating. | All inputs are received in multiple positions throughout the testing. |  |  | Use the DAS *Exception Scan* function to find times when the inputs change.  Fuel sensor inputs for EVO only. |
| Time stamp on the log is correct.  (8 hours behind WST) |  |  |
| Check the fuel sensor input for intermittent failures (drops to zero). |  |  |
| Download the logs from the **ATP Recorder Card Extender** using a flash card reader.  Save the file as **<LOCOID>\_<DDMMYY>\_ATP\_FL** | Logs can be downloaded and inspected. |  |  | Locate record ID 95 in WLANA and press F5 to check the locomotive ID.  Loco ID Plug to be given to Commissioning Engineer. |
| Download the logs from the **ATP Recorder Card** using a laptop.  Save the file as **<LOCOID>\_<DDMMYY>\_ATP\_LAP** | Logs can be downloaded and inspected. |  |  |  |
| Download the logs from the **FastBrake** using a laptop.  Save the file as **<LOCOID>\_<DDMMYY>\_FB** | Logs can be downloaded and inspected. |  |  |  |
| Download the logs from the **DLC** using a laptop.  Save the files in a folder named **<LOCOID>\_<DDMMYY>\_DLC** | Logs can be downloaded and inspected. |  |  |  |

| **COMMISSIONING - AC - NIU II Pre-Installation Inspection - Signatures** | | | |
| --- | --- | --- | --- |
| **Name** | **Date** | **Comments** | **Signature** |
| %USERS.NAME% |  |  |  |