

NR/SIG/10663 Signal Maintenance Specifications		
NR/SMS/Part/T		
Maintenance Specifications & Specified Tests Index for Telecom Assets		
Issue No: 03	Issue Date: 05/03/16	Compliance Date: 04/06/16

- This section contains the maintenance specifications and specified tests for assets owned by Telecoms that are maintained by Signalling.

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1. Dial up Equipment Test

- 1.1 Invoke a dial-up at the system extremity. Carry out audio tests and token exchanges to confirm access to the radio chain via the dial-up.

Note: To avoid token data clashes disconnect the SC from the radio chain via the 4-wire or 'E' type by disconnecting the antenna

- 1.2 Reconnect the SC or 'E' type to the radio chain at the end of the tests where applicable.
- 1.3 Repeat 1.1 for all the other dial-ups in the system.
- 1.4 'Auto Test' the system from the signallers console to confirm the operation of the link through each base station.

2. Token Level Test

Token levels should be consistent throughout the system. If the levels become too high or low this can affect the system performance resulting in intermittent token exchange. Quantitative measurements should be taken over the radio chains to identify any trends or potential problems.

Equipment

The following test equipment is required to complete these tests:

- Hand Portable Radio
- Marconi 2955A Radio Communications Test Set or equivalent
- Through Line Power Meter
- BNC to BNC Connecting Lead

These tests perform a 'Heath Check' on the system

- 2.1 *Measure* the data token levels (1200Hz & 1800Hz) at the radio chain extremities and the central point to the radio chain with the appropriate dial-up invoked.
This will test token levels over both directions of the radio chain

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Note: To avoid token data clashes disconnect the 4-wire & Type 'E' base station where applicable.

- 2.2 Connect the through line power meter to the fixed station and the 2955 to the low level output port of the meter using a BNC to BNC lead. Select 'TX Test' on the 2955 and adjust to give oscilloscope output with 3.0kHz deviation on the vertical scale. Adjust the vertical scale to monitor 1200Hz and 1800Hz data levels. Typically the level should centre around 1.75kHz deviation with 1200Hz slightly below and 1800Hz slightly above.
System problems will start developing if levels drop below 1kHz deviation. If there is a significant departure from expected readings the reason for this should be fully investigated and rectified as corrective maintenance. Record all the readings.

3. Data Telegram Validity Test

Equipment

The following test equipment is required to complete these tests:

- Test Radio Reference Source
 - CDU Fitted with Test Software
- 3.1 Using the test radio reference source or CDU fitted with test software carry out data token exchanges at the radio chain extremities and the central point to the radio chain with the appropriate dial-up invoked to test for valid data telegrams over both directions of the radio chain.
- 3.2 Carry out three test token exchanges. *Check* that the results on the Test CDU Display are as in following table:

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Test	Results
Validity of data telegram bits	4T and 'VVVVVVVVVVVVVVVV' for each perfect token transmission.
Validity of forward and reverse handshakes	03H for each perfect handshake transmission.

Consistent responses of 3T or 4T and 3H should be expected at all points of the system. Record all the readings.

End

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Safety: Mains voltage at 240V AC are present in the charger, extreme caution must be taken (See NR/SMS/EL00 Hazards Associated with Electrical Supplies).

1. Over Voltage Alarm and Shutdown

- 1.1 Disconnect the load from the charger and connect the digital multimeter across the battery terminals.
- 1.2 Adjust RV1 on the control PWB clockwise to increase the battery float voltage. *Observe* the upper LED on the Hi/Low volts alarm board and *Check* that it illuminates at approximately 14V.
- 1.3 Continue the clockwise adjustment of RV1 until the upper LED on the volts disconnect board illuminates and *Check* that the charger shuts down after approximately five seconds.
- 1.4 *Check* that the voltage reading on the multimeter is approximately 14.3V.
- 1.5 Reconnect the load to the charger and set RV1 on control PWB back to the correct float voltage.
 - 13.8V.

2. Under Voltage Alarm and Shutdown

- 2.1 Disconnect the load and the battery from the charger and connect the digital multimeter across the battery terminals.
- 2.2 Adjust RV1 on the control PWB anti-clockwise to decrease the battery float voltage. *Observe* the upper LED on the Hi/Low volts alarm board and *Check* that it illuminates at approximately 13V.
- 2.3 Continue the anticlockwise adjustment of RV1 until the lower LED on the volts disconnect board illuminates and *Check* that the charger shuts down after approximately five seconds.
- 2.4 *Check* that the voltage reading on the multimeter is approximately 10.4V.

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- 2.5 Reconnect the load and the battery to the charger and set RV1 on control PWB back to the correct float voltage.
- 13.8V.
- 2.6 NHL Only:
Confirm with the signaller (for both test in section 2 and 3) that the mains failure alarm and the mains reconnection have been recorded on the signalling centre terminal.

End

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Safety: High frequency RF signals are generated to the aerial; always disconnect the power to the fixed station before removing or reinstating any connections to the aerial.

Equipment

The following test equipment is required to complete this test:

- Through Line Power Meter
- Sighting Compass
- Dummy load 50Ω 50W

General

When taking readings using a Through Line Power Meter the lowest available full scale range should be used to maintain the accuracy of the instrument.

If reverse readings are obtained the cause can be with the feeder, connections or the antenna. To locate the cause connect a dummy load at various points within the antenna system.

Note. This work may require an approved aerial contractor. A spurious frequency from a faulty TX tray can give a poor reverse reading on the through line power meter; care must be taken when interpreting these results. Generally a spurious TX tray will give a fairly low reverse reading and the system performance will not be adversely effected as the bulk of the transmit power will be on the TX frequency. However if the spurious element is on the same frequency as the base stations receive frequency this can have a detrimental effect on the system performance.

Antenna Type	Designation	Elements
Centre fed Dipole	AG	1
Cardoid Array	AN	2
Yagi	AE	3

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1. Antenna Test

- 1.1 *Check* all the coaxial cables and connectors. *Check* for any damage and water ingress.
- 1.2 *Check* the condition of the aerial mast, the security of feeder cables and the aerial elements. Report any deficiencies as corrective maintenance.
- 1.3 *Check* that the antenna is correctly aligned to the bearing detailed in the site information.
- 1.4 Connect up the through line power meter in line with the antenna feed for forward power measurement. Key-up the transmitter on the monitor panel and *Measure* the forward power. *Check* it is within $\pm 10\%$ of that detailed in the site documentation.
Disconnect the power to the fixed station before disconnecting any coaxial connections
- 1.5 Connect up the through line power meter in line with the antenna feed for reverse power measurement. Key-up the transmitter on the monitor panel and *Measure* the reverse power. *Check* that it is $< 2\%$ of forward power. Readings of $> 2\%$ of forward power shall be reported as corrective maintenance.
Rectification work may possibly have to be escalated to an approved aerial contractor.
- 1.6 *Check* all connections are secure and the aerial feeder is connected to the fixed station and the power is on. Carry out an audio test with the signalling control centre.

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Caution: ESD precautions are always to be taken when taking measurements or making adjustments within the fixed station. Appendix A details general information regarding use of test equipment and methods of connection.

General

Certain parameters may require to be adjusted to suit specific site conditions reference should be made to the site logbook before commencing work. All readings, both before and after adjustment, shall be recorded on the NR/SMS record card. The methodology of testing from the control rack outwards shall be adopted for these tests. After work has been completed on a radio chain a final check of data levels at the extremity of the chain shall be recorded on site documentation. See NR/SMS/IR11.

Equipment

The following test equipment is required to complete this service:

- Multimeter
- Marconi 2955A Radio Communications Test Set
- Test Leads (N-Type to N-Type, N-Type to BNC, BNC to 1.5mm plugs & BNC to test probes)

1. Duplex Testing

The 2955A is set up to transmit a tone sequence to the fixed station to mimic another fixed station keying up and transmitting a 1.5kHz signal along the 'radio chain' (100ms burst of 3825Hz SAT tone followed by 4.9secs of 1.0kHz test tone).

The 2955A sends an RF signal to the fixed station and demodulates the RF signal re-transmitted by the fixed station.

To Measure a Type CA Fixed Station through Level

1.1 Connect the 2955A as per Appendix A, 'Connect A'.

1.2 Select 'Duplex Test'

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- 1.3 Select 'RF Gen' and set the frequency to that of the site under test (e.g. for channel 101 enter 197.150MHz). Set the level to -80dBm.
- 1.4 Select 'Tones', then select 'Sequential' and then select 'User Defined'. This should have the following stored:
 - 3825Hz Tone 1
 - 1kHz Tone 2
 - Duration 100ms

If these are not already stored, set the above parameters before continuing
- 1.5 Select 'Continue'. Enter '0' then press 'Next Tone', enter '1' then press 'Next Tone'. Continue pressing '1' and 'Next Tone' until the screen is full with 1x 3825Hz and 10x 1kHz. Select 'Next Page' and fill the screen with 11x 1kHz. Select 'Continuous' to start the tone sequence.
- 1.6 Select 'Return' to monitor the fixed station through level (± 1.5 kHz deviation).

To Measure a Type CB Fixed Station Through Level

- 1.7 Connect the 2955A as per Appendix A, 'Connect A' and 'Connect C'.
- 1.8 Carry out 1.2 to 1.6 for the direction 'A to B'.
- 1.9 Reverse the connections of the fixed stations to the 2955A.
- 1.10 Carry out 1.2 to 1.6 for the direction 'B to A'.

Note: Check that the fixed stations are connected correctly to avoid transmitting into the 2955A Rx BNC connector.

2. Station Type CA (NHL) & A (WHL)

Receiver

- 2.1 Measure the Rx frequency. Check that it is within ± 400 Hz of the stated frequency on the site documentation.

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- 2.2 *Measure* the 12dB SINAD. *Check* that it is <-114dBm.
Adjust as necessary.
- 2.3 Set the squelch threshold to -114dBm via R4 on the AA9018.
- 2.4 Set the AF output level to 0dBm $\pm$ 0.2dB on the monitoring panel, AF and 0v for 1kHz modulated at 1.5kHz via R8 on the AA9018 (equivalent to -3.5dBm for 1.5kHz modulated at 1.5kHz).
- 2.5 *Check* that the Rx AF distortion has been optimised to at least <7%.
Ideally it should be <2%

SAT Tone Receiver

- 2.6 *Measure* the 3825Hz SAT sensitivity. This should be 250Hz to 325Hz.
- 2.7 Optimise the bandwidth of the SAT receiver to $\pm$ 50Hz.

Transmitter

- 2.8 *Measure* the TX output frequency. *Check* that it is within $\pm$ 200Hz of the stated frequency on the site documentation.
Adjust as necessary
- 2.9 *Measure* the TX output power. *Check* it is at the value stated in the site documentation.
Adjust as necessary via R14 on the PA971
- 2.10 *Measure* the peak deviation. This should be approximately $\pm$ 2.5kHz.
- 2.11 *Measure* the TX output on the monitoring panel AF. *This should be -17dBm to -18dBm for 1kHz@1.5kHz deviation.*
- 2.12 *Check* that the TX distortion has been optimised to at least <7%.
Ideally it should be <2%

SAT Tone Transmitter

- 2.13 *Set* the SAT level to 1kHz $\pm$ 100Hz deviation

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2.14 Set the SAT frequency to 3825Hz $\pm$ 4Hz.

2.15 Check that the SAT pulse is set at 100ms.

Modem Transmit Levels

2.16 Set the transmit levels to -1.6dBm for data '1' (1200Hz) and -5.1dBm for data '0' (1800Hz).
Measure on the modem via TP9 and adjust via R13

Modem Receive Levels

2.17 FX409 Hardware:
Set the receive level to 0dBm for Data '1' (1200Hz) and Data '2' (1800Hz)

2.18 FX419 Hardware:
Set the receive level to -3.8dBm for Data '1' (1200Hz) and Data '2' (1800Hz)

Note: Measure on the modem via TP9 and adjust via R13 for both items of software.

Watchdog Timer

2.19 Check that the watchdog timer operates when the modem is reset.

Duplexor

2.20 Measure the output from the TX tray and then the output from the duplexor. Calculate the insertion loss by comparing these two measurements.
This should be $<2\text{dB}$

2.21 Measure the duplexor de-sensitivity by taking a 12dB SINAD reading with the fixed station not transmitting, and then with the TX on key.
This should be $<2\text{dB}$

Duplex Test

2.22 Measure the through level for the fixed station. This should be 1.5kHz for a 1kHz tone.
Adjust as necessary on R7 on EQ981

Final Site Check

2.23 Confirm that all links are returned to normal

positions and that all connectors are secure.
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- 2.24 Reset modem unit.
- 2.25 Contact RETB control and confirm that system is operating correctly.

3. Station Type CB (NHL) & B (WHL)

All the tests in this section shall be carried out for each repeating half station.

Receiver

- 3.1 *Measure* the RX frequency. Ensure it is within $\pm 400\text{Hz}$ of the stated frequency on the site documentation.
Adjust as necessary.
- 3.2 *Measure* the 12dB SINAD. Check that it is $< -114\text{dBm}$.
Adjust as necessary.
- 3.3 Set the squelch threshold to -114dBm via R4 on the AA9018.
- 3.4 Set the AF output level to $0\text{dBm} \pm 0.2\text{dB}$ on the monitoring panel, AF and 0v for $1\text{kHz}@1.5\text{kHz}$ via R8 on the AA9018 (equivalent to -3.5dBm for $1.5\text{kHz}@1.5\text{kHz}$).
- 3.5 *Check* that the RX AF distortion has been optimised to at least $< 7\%$.
Ideally it should be $< 2\%$

SAT Tone Receiver

- 3.6 *Measure* the 3825Hz SAT sensitivity. This should be 250Hz to 325Hz.
- 3.7 Optimise the bandwidth of the SAT receiver to $\pm 50\text{Hz}$.

Transmitter

- 3.8 *Measure* the TX output frequency. *Check* it is within $\pm 200\text{Hz}$ of the stated frequency on the site documentation.
Adjust as necessary.

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Adjust as necessary via R14 on the PA971

- 3.10 Measure the peak deviation. This should be approximately $\pm 2.5\text{kHz}$.
- 3.11 Measure the TX output on the monitoring panel AF. This should be -17dBm to -18dBm for 1kHz @ 1.5kHz deviation.
- 3.13 Check that the TX distortion has been optimised to at least $<7\%$. Ideally it should be $<2\%$

SAT Tone Transmitter

- 3.14 Set the SAT level to $1\text{kHz} \pm 100\text{Hz}$ deviation.
- 3.15 Set the SAT frequency to $3825\text{Hz} \pm 4\text{Hz}$.
- 3.16 Check that the SAT pulse is set at 100ms .

Modem Transmit Levels (NHL Only)

- 3.17 Set the transmit levels to -1.6dBm for data '1' (1200Hz) and -5.1dBm for data '0' (1800Hz). Measure on the modem via TP9 and adjust via R13

Modem Receive Levels (NHL Only)

- 3.18 FX419 Hardware:
Set the receive level to -3.8dBm for Data '1' (1200Hz) and Data '2' (1800Hz)
Measure on the modem via TP9 and adjust via R13 for both items of software

Watchdog Timer (NHL Only)

- 3.19 Check that the watchdog timer operates when the modem is reset.

Duplex Test

- 3.20 Measure the through level in each direction for the fixed station. This should be 1.5kHz for a 1kHz tone. Adjust as necessary on R7 of EQ981

Final Site Check

- 3.21 Confirm that all links are returned to normal positions and that all connectors are secure.

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3.22 Reset modem unit

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3.23 Contact RETB control and confirm that system is operating correctly.

4. Station Type SC (NHL) & C (WHL)

This test shall be carried out in conjunction with the tests on the Control Rack.

Receiver

- 4.1 *Measure* the RX frequency. *Check* that it is within $\pm 400\text{Hz}$ of the stated frequency on the site documentation.
Adjust as necessary
- 4.2 *Measure* the 12dB SINAD. *Check* that it is $< -114\text{dBm}$.
Adjust as necessary
- 4.3 Set the squelch threshold to -114dBm via R4 on the AA9018.
- 3.4 Set the AF output level to 0dBm on the monitoring panel, AF and 0v for 1kHz modulated at 1.5kHz via R8 on the AA9018 (equivalent to -3.5dBm for 1.5kHz modulated at 1.5kHz).
- 4.5 *Check* that the RX AF distortion has been optimised to at least $< 7\%$.
Ideally it should be $< 2\%$

SAT Tone Receiver

- 4.6 WHL only:
Measure the 3825Hz SAT sensitivity. This should be 250Hz to 325Hz . ()
- 4.7 WHL only:
Optimise the bandwidth of the SAT receiver to $\pm 50\text{Hz}$. ()

Transmitter

- 4.8 *Measure* the TX output frequency. *Check* that it is within $\pm 200\text{Hz}$ of the stated frequency on the site documentation.
Adjust as necessary

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- 4.9 *Measure* the TX output power. *Check* that it is at the value stated in the site documentation.

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Adjust as necessary via R14 on the PA971

- 4.10 *Measure the peak deviation. This should be approximately $\pm 2.5\text{kHz}$.*
- 4.11 *Measure the TX output on the monitoring panel AF. This should be -17dBm to -18dBm for 1kHz @ 1.5kHz modulation.*
- 4.12 *Check that the TX distortion has been optimised to at least $<7\%$. Ideally it should be $<2\%$*

SAT Tone Transmitter

- 4.13 Set the SAT level to 1kHz deviation.
- 4.14 Set the SAT frequency to $3825\text{Hz} \pm 4\text{Hz}$.
- 4.15 Check that the SAT pulse is set at 100ms .

Modem Transmit Levels

- 4.16 Set the transmit levels to -1.6dBm for data '1' (1200Hz) and -5.1dBm for data '0' (1800Hz).
Measure on the modem via TP9 and adjust via R13

Modem Receive Levels

- 4.17 FX409 Hardware:
Set the receive level to 0dBm for Data '1' (1200Hz) and Data '2' (1800Hz)
- 4.18 FX419 Hardware:
Set the receive level to -3.8dBm for Data '1' (1200Hz) and Data '2' (1800Hz)
Measure on the modem via TP9 and adjust via R13 for both items of software

Watchdog Timer

- 4.19 Check that the watchdog timer operates when the modem is reset.

Duplexor (WHL Only)

- 4.20 Measure the output from the TX tray and then the output from the duplexor. Calculate the insertion loss by comparing these two measurements.

This should be $\leq 2\text{dB}$

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- 4.21 *Measure* the duplexor de-sensitivity by taking a 12dB SINAD reading with the fixed station not transmitting, and then with the TX on key.
This should be <3dB

Duplex Test (WHL only)

- 4.22 *Measure* the through level for the fixed station. This should be 1.5kHz for a 1kHz tone.
Adjust as necessary on R7 on EQ981

Final Site Check

- 4.22 Confirm that all links are returned to normal positions and that all connectors are secure.
- 4.33 Reset modem unit.
- 4.34 Contact RETB control and confirm that system is operating correctly.

5. Station Type CD (NHL) & D (WHL)

This test shall be carried out in conjunction with the tests on the Control Rack.

Receiver

- 5.1 *Measure* the Rx frequency. *Check* that it is within $\pm 400\text{Hz}$ of the stated frequency on the site documentation.
Adjust as necessary
- 5.2 *Measure* the 12dB SINAD. *Check* that it is $< -114\text{dBm}$.
Adjust as necessary
- 5.3 Set the squelch threshold to -114dBm via R4 on the AA9018.
- 5.4 Set the AF output level to 0dBm on the monitoring panel, AF and 0v for 1kHz modulated at 1.5kHz via R8 on the AA9018 (equivalent to -3.5dBm for 1.5kHz modulated at 1.5kHz).
- 5.5 *Check* that the RX AF distortion has been optimised to at least $< 7\%$.
Ideally it should be $< 2\%$

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- 5.6 *Measure the RX to telecom line output on HU983.
Check that it is +2dBm $\pm$ 0.2dB.*

Transmitter

- 5.7 *Measure the TX output frequency. Check that it is within $\pm$ 200Hz of the stated frequency on the site documentation.
Adjust as necessary*
- 5.7 *Measure the TX output power. Check that it is at the value stated in the site documentation.
Adjust as necessary via R14 on the PA971*
- 5.8 *Measure the peak deviation. This should be approximately $\pm$ 2.5kHz.*
- 5.9 *Measure the TX output on the monitoring panel AF. This should be -17dBm to -18dBm for 1kHz @ 1.5kHz deviation.*
- 5.10 *Check that the TX distortion has been optimised to at least <7%.
Ideally it should be <2%*
- 5.11 *Measure the AF level required at the hybrid output to produce a transmitted signal of 1kHz @ 1.5kHz deviation.
This should be -9dBm $\pm$ 1dB.*

SAT Tone Transmitter

- 5.12 Set the SAT level to 1kHz deviation.
- 5.13 Set the SAT frequency to 3825Hz $\pm$ 4Hz.
- 5.14 Check that the SAT pulse is set at 100ms.

Modem Transmit Levels (NHL only)

- 5.15 Set the transmit levels to -1.6dBm for data '1' (1200Hz) and -5.1dBm for data '0' (1800Hz).
Measure on the modem via TP9 and adjust via R13

Modem Receive Levels (NHL only)

- 5.16 FX419 Hardware:
Set the receive level to -3.8dBm or Data '1' (1200Hz) and Data '2' (1800Hz)

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Measure on the modem via TP9 and adjust via R13 for both items of software

Watchdog Timer (NHL only)

- 5.17 Check that the watchdog timer operates when the modem is reset.

Final Site Check

- 5.18 Confirm that all links are returned to normal positions and that all connectors are secure.
- 5.19 Reset modem unit.
- 5.20 Contact RETB control and confirm that system is operating correctly.

6. Station Type E (WHL)

This test shall be carried out in conjunction with the tests on the Control Rack.

Receiver

- 6.1 Measure the Rx frequency. Check that it is within $\pm 400\text{Hz}$ of the stated frequency on the site documentation.
Adjust as necessary
- 6.2 Measure the 12dB SINAD. Check that it is $< -114\text{dBm}$.
Adjust as necessary
- 6.3 Set the squelch threshold to -114dBm via R4 on the AA9018.
- 6.4 Set the AF output level to 0dBm on the monitoring panel, AF and 0v for 1kHz modulated at 1.5kHz via R8 on the AA9018 (equivalent to -3.5dBm for 1.5kHz modulated at 1.5kHz).
- 6.5 Check that the Rx AF distortion has been optimised to at least $< 7\%$.
Ideally it should be $< 2\%$

Transmitter

- 6.6 Measure the TX output frequency. Check that it is within $\pm 200\text{Hz}$ of the stated frequency on the site documentation.

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Adjust as necessary

- 6.7 *Measure the TX output power. Check that it is at the value stated in the site documentation.
Adjust as necessary via R14 on the PA971*
- 6.8 *Measure the peak deviation. This should be approximately $\pm 2.5\text{kHz}$.*
- 6.9 *Measure the TX output on the monitoring panel AF. This should be -17dBm to -18dBm for 1kHz @ 1.5kHz deviation.*
- 6.10 *Check that the TX distortion has been optimised to at least $<7\%$.
Ideally it should be $<2\%$*

Final Site Check

- 6.11 Confirm that all links are returned to normal positions and that all connectors are secure.
- 6.12 Reset modem unit.
- 6.13 Contact RETB control and confirm that system is operating correctly.

7. Control Rack

These tests should be carried out in conjunction with the tests on the type 'C', 'SC', 'D', 'E' and 'CD' fixed stations.

Reference shall be made to Motorola site specific manuals when carrying out these tests. Anticipated test results for the NHL Control Rack are given italics. Any substantial variation from specified test results should be fully investigated before adjustments are carried out.

4 Wire Interface: Control Tones

- 7.1 At the fixed station *Measure the 2800Hz KEY TONE sensitivity at the output of the 4 wire interface. This should be $<-26\text{dBm} \pm 2\text{dB}$
Optimise the bandwidth of the KEY TONE receiver to $\pm 50\text{Hz}$.*
- 7.2 At the fixed station *Measure the level of the KEY TONE at the output from the 4 wire interface.*

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- 7.3 At the fixed station *Measure* the 2700Hz SQUELCH TONE sensitivity at the output of the 4 wire interface. This should be $<-26\text{dBm} \pm 2\text{dB}$.
Optimise the bandwidth of the KEY TONE receiver to $\pm 50\text{Hz}$.
- 7.4 At the fixed station measure the SQUELCH TONE level at the 4 wire interface.
This should be $-16\text{dBm} \pm 2\text{dB}$

4 Wire Interface: SSI Modem

- 7.5 At the control rack *Measure* the SSI modem input levels from the radio system. [MP4 MD7712M/00A]
This should be $0\text{dBm} \pm 0.2\text{dB}$
- 7.6 At the fixed station measure the token deviation to air at 1200Hz and 1800Hz.
This should be centred on 1.75kHz deviation.

Dial-Up Interface: Control Tones

This test requires to be carried out for each dial up site.

- 7.7 *Record* the link settings on LA982 7500/00
- 7.8 At the fixed station *Measure* the 2800Hz KEY TONE sensitivity on the 2 wire interface.
This should be $<-60\text{dBm} \pm 5\text{dB}$. Optimise the bandwidth of the KEY TONE receiver to $\pm 50\text{Hz}$.
- 7.9 At the fixed station measure the 2900Hz LINE HOLD TONE sensitivity on the 2 wire interface.
This should be $<-60\text{dBm}$. Optimise the bandwidth of the HOLD TONE receiver to $\pm 50\text{Hz}$
- 7.10 At the fixed station *Measure* the level of the LINE HOLD TONE at the output from the 2 wire hybrid.
This should be $>-38\text{dBm}$.

Dial-Up Interface: Modem

This test requires to be carried out for each dial up site.

- 7.11 *Measure* the SSI modem input level from the radio system. [MP4 MD7712M/00A]
This should be $0\text{dBm} \pm 0.2\text{dB}$.

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