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A82 TARGET
7196/0043

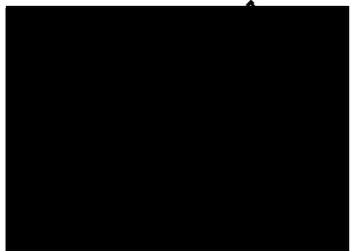
Site Acceptance Test
UTMC 4x15 100 (and 160) Signs
Transport Scotland

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Document Status

Issue	Date	ECR	Signature	Changes
1	02/02/2010			First Release

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Glossary of Acronyms and Terms

ETT	Engineer's Test Terminal – Lap-top personal computer loaded with test programmes and diagnostics.
DET	Digital Earth Tester
MCB	Mains Contact Breaker
UTMC	Urban Traffic Management and Control
VMS	Variable Message Sign



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1 Introduction

1.1 General

This document provides a series of checks which, when carried out on a VMS installed at site, will demonstrate that the equipment is:

- undamaged in transit (physical inspection)
- correctly installed, including alignment
- fully prepared for site use
- locally commissioned in preparation for use within the communications system (see below)
- complete and ready for formal hand-over to the appropriate Authority

This document will record details of site tests used to demonstrate the operation of the signs at their designated locations.

Tests will include: electrical tests to check wiring and earthing; local tests using a portable PC; and finally operation from the UTMC Control system.

All checks will be performed and recorded by Techspan Systems Engineer(s), and witnessed by the Client's Authorised Representative.

Any points requiring attention or rectification will be noted and a method and programme agreed for any remedial action.

The sign will already have been shown to conform to TR1100 "General Specification for Motorway Signs, Signalling and Communications Equipment".

1.2 Communications

Communication to the VMS is via UTMC. Equipment to achieve transmitted signals is supplied by others and installed in the Techspan VMS at the time of installation and commissioning.

Typically, a Router will be installed and wired by the Client's Engineering representative and the communications is checked out as part of this procedure.

In the event that equipment to complete this is not available, a local test will be carried out to prove operation of the VMS.



2 Physical Checks & Inspection

The VMS and structure will have been fully tested and inspected prior to despatch.

The following inspections are to be made with reference to the installation: details of any defects are to be recorded.

Corrective actions should be undertaken immediately if possible. In the event that this cannot be done, the defect should be noted and arrangements made to correct the problem.

Item	Pass/Fail	Corrected / Action by:
VMS paintwork	✓	
Structure paintwork	✓	
VMS alignment	✓	
Grout complete / rings removed	✓	
Cable gland(s) tight	✓	
Earth leads correctly terminated	✓	
Adjuster rods cut and protected (if applicable)	N/A	
All bolts/nuts tightened. Base bolts painted.	✓	

3 Initial Checks

3.1 Cable Tests

Prior to the local commissioning of the UTMC Sign, evidence must be shown by the Client's Representative that satisfactory tests have been completed on the infrastructure, power, and earth cabling.

Power and data cables must be tested to ensure compliance with MCG1022. In addition the power cable(s) must be tested to comply with MCHW Cl. 1424 along with the relevant parts of BS7671.

3.2 Test Setup

Before the test is undertaken the power cable MUST be isolated from the sign and the mains input. To isolate the mains power cable, the isolator within the sign must be opened and the MCB within the Mains Supply Box next to the sign set to '**Isolate**' and locked in this position in order to isolate the power cable and the VMS.

3.3 Insulation Resistance

'Stage 2' tests will be carried out on the power cable. The results of these tests are to be recorded along with the type of cable used. Insulation tests between each pair of power conductors to the third will be measured, using a Megger BM11D, and the results recorded in this document.

3.4 Earth Continuity Test

The earthing integrity of the structure and enclosure must be checked prior to connection of incoming mains. A suitable earth tester such as a Megger DET5/2D Digital Earth Tester [DET] will be used to measure the impedance to ground.

If practical, a single measurement with the DET will be made between the case of the sign and metal rods placed in the ground, using the fall-of-potential method.

If such a measurement cannot be made, then two separate measurements must be made. The first is at the base of the structure to ground with the DET, using the fall-of-potential method. The second is to be made between the base of the structure and the sign enclosure using conventional resistance measurement techniques.

The resistance(s) measured is to be recorded in this document.



3.5 Test Completion

If the above tests are successful the isolator and MCB should be made active to power the sign.

4 Test Sequence

4.1 Electrical Check

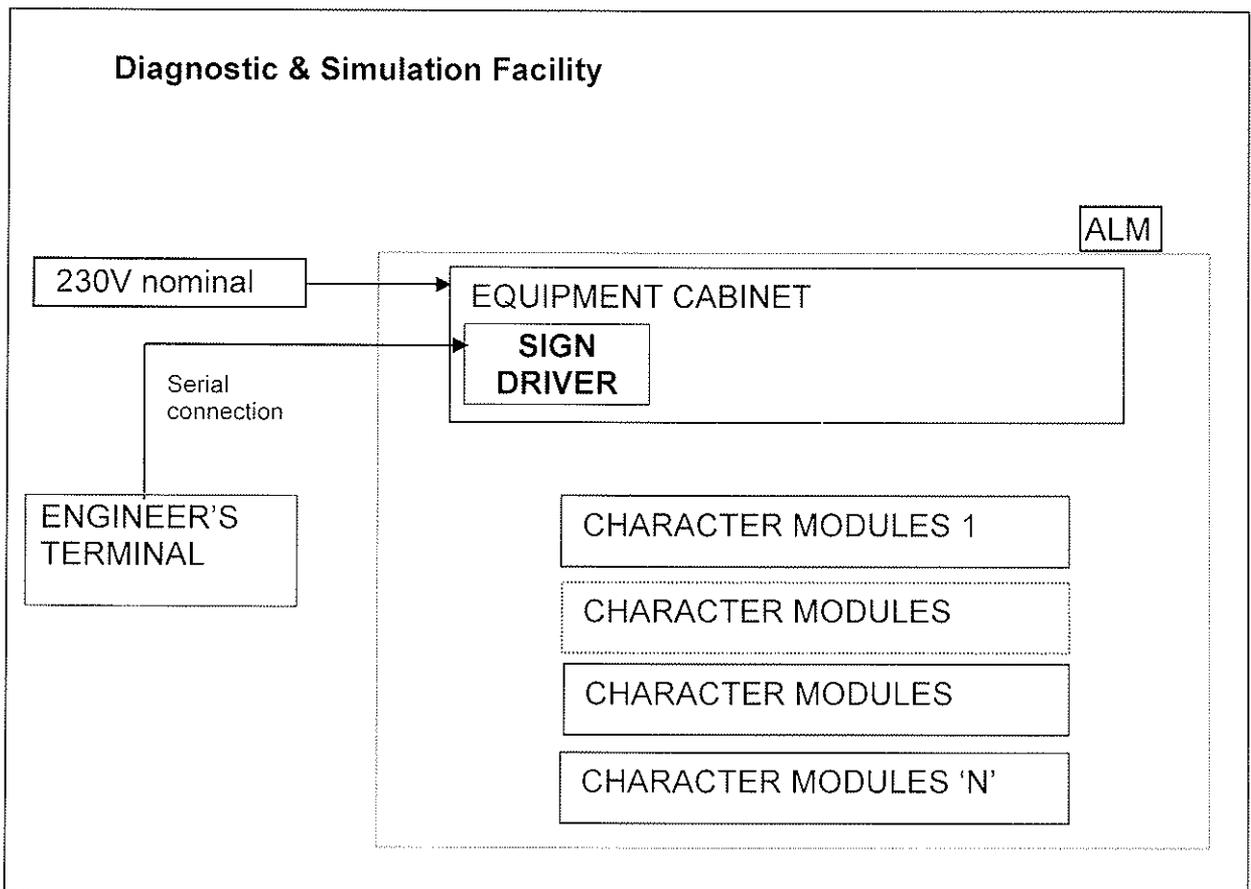
Measure and Record Electrical Test results on the certificate provided.

4.2 Equipment Required

The following test equipment will be required:

- Laptop PC to be used as the ETT.
- Serial RS232 cable

4.3 Test Set up



Using the cat 5 cable, connect the Ethernet port on the laptop PC (ETT) directly to the Ethernet port on the Sign Driver inside the sign,

Switch on the PC (hereafter referred to as the ETT), and run the test program.



4.4 Local Operation Test (Outstation)

From the ETT run "signdiag" and check the Sign for any internal errors.

The only error that should be reported, if everything is functioning correctly, is a watchdog fault.

4.4.1 Test 1a

From the ETT type, 'TESTMESS 10'. All pixels should be on and flasher active.

4.4.2 Test 1b

From the ETT type, 'TESTMESS 11'. Line check - Lines identified with line number.

4.4.3 Test 1c

From the ETT type, 'TESTMESS 12'. Character check - 'A' through 'O' displayed on each line.

4.4.4 Test 1d

From the ETT type, 'TESTMESS 0'. Sign display will blank

4.5 Operation from the Instation

4.5.1 Test 2a – Message Test 1

Request the client to set the Instation to display the following message on the sign;

<i>15 Character Display</i>
TEST COUNT1
TEST COUNT2
TEST COUNT3
TEST COUNT4

Note: Where there are less than four counters available, ignore the unused test message.

Confirm that the Sign shows the correct output.

Confirm that the UTMC Instation reads back the correct setting for the Sign.

4.5.2 Test 2b – Message Test 2

Request client to set the Instation to display the following message on the Sign:

<i>15 Character Display</i>
ABDCEFGHIJKLON
123456789012345
ONMLKJIHGFEDCBA
543210987654321



Note: Where there are less than four counters ignore the unused test message.

Confirm that the UTMC instation reads back the correct setting for the Sign.

4.5.3 Test 2c – Random Message Test

Request the client to set the display to a standard message

Confirm that the Sign shows the correct output.

Confirm that the UTMC Instation reads back the correct setting for the sign.

4.6 Final Check

Run Sign diagnostics, collect the data and save to a file using the sign serial no as the filename eg 6131/0007 would be file 61310007.dat. Pass this file to QA or Engineering for storage.



5 VMS & Site Detail

Transport Scotland VMS Reference	
Type of VMS	MS 4x15 100mm / 160mm
VMS Serial Number	7196/0043
Geographic Location	A82 TARGET
Electronic Address	
Date of Installation	12.8.14
Date of SAT	12.8.14
Engineer(s) on Site	[REDACTED]
Communications Equipment fitted	N/A
Follow up Works (List)	—



6 Results Sheet

Sign s/n	7196/0043
IDT router no.	
Location	A82 TARGET

Test Results		
Weather: <i>WET</i>	Ground Temp: <i>11°C</i>	Test Date: <i>12-8-14</i>
Cable Type:		
1. Over-sheath withstand test In Ground (2KV)		<i>Pass/Fail</i>
2. Conductor withstand test In Ground (2KV)		<i>Pass/Fail</i>

Insulation Resistance			
Conductor	Phase (P) to N + E	Neutral (N) to P + E	Earth (E) to P + N
Test Value (> 1MΩ)	<i>7999mΩ</i>	<i>7999mΩ</i>	<i>7999mΩ</i>

Conductor Continuity	<i>Pass/Fail</i>	Comment
Sign to Earth (< 10Ω)		

Operational Test	Result	Comments
PHYSICAL CHECK	<i>✓</i>	
TEST 1a – 'TESTMESS 10	<i>✓</i>	
TEST 1b – 'TESTMESS 11	<i>✓</i>	
TEST 1c – 'TESTMESS 12	<i>✓</i>	
TEST 1d – 'TESTMESS 0	<i>✓</i>	
TEST 2a – Message Test 1	<i>✓</i>	
TEST 2b – Message Test 2	<i>✓</i>	
TEST 2c – Random Message Test	<i>✓</i>	
FINAL CHECK	<i>✓</i>	

Tested:	Witnessed:
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Appendix A: INSTALLATION CERTIFICATE



ELECTRICAL INSTALLATION, COMPLETION AND INSPECTION CERTIFICATE: PAGE 1 OF 3 PAGES	CERTIFICATE NO:	T020 - 037.
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DETAILS OF CLIENT

TRANSPORT
SCOTLAND

ADDRESS OF INSTALLATION

182
TARGET

DETAILS OF INSTALLATION

Extent of installation covered by the certificate

4X15 160mm

Installation Type

New
 Addition
 Alteration

DETAILS OF CONTRACTOR

TECHSPAN SYSTEMS

COMMENTS ON EXISTING INSTALLATION

OTHER RECORDS See attached Schedule if applicable

SUPPLY CHARACTERISTICS		Nature of supply parameters		Characteristics of primary supply Overcurrent protective devices	
System Type(s)	Number and type Of live conductors	Nominal Voltage(s)	Maximum Demand (Load)	BS EN	Type
TN-S <input type="checkbox"/>	1 phase 2 wire <input checked="" type="checkbox"/> 3 phase 3 wire <input type="checkbox"/>	248.8 V	16 A/phase	60898-1	MCB
TN-C-S <input checked="" type="checkbox"/>	3 phase 3 wire <input type="checkbox"/> 3 phase 4 wire <input type="checkbox"/>	50 Hz	External earth Fault loop impedance	Nominal current rating	16 A
TT <input type="checkbox"/>	Other <input type="text"/>	Prospective Fault Current		Short circuit capacity	957 kA

DETAILS OF INSTALLATION AT ORIGIN			Details of installation earth electrode – if applicable		
Means of earthing		Type e.g. rod, tape etc.	Electrode resistance, R _s	Location	Method of measurement
Distributors facility <input type="checkbox"/>	Installation earth electrode <input type="checkbox"/>				
Earthing conductor		Main protective bonding conductors and bonding of Extraneous conductive parts		Main switch or circuit breaker	
Conductor material	Conductor CSA	Conductor material	Conductor CSA	Type BS EN	Current Rating
Cu	2.5 mm ²	Cu	10 mm ²	61008	16 A
Continuity Check <input type="checkbox"/>		Oil Service <input type="checkbox"/>	Gas service <input type="checkbox"/>	Voltage Rating	RCD operating Current I _{Δn}
		Water Service <input type="checkbox"/>	Structural Steel <input type="checkbox"/>	240V	30mA
		Other Service <input type="checkbox"/>		No of Poles	RCD operating Time at I _{Δn}
				2	9 ms
					Supply conductors CSA
					10 mm ²
					Supply conductors material
					Cu



Techspan Systems	ELECTRICAL INSTALLATION, COMPLETION AND INSPECTION CERTIFICATE:
	PAGE 2 OF 3 PAGES

DETAILS OF THE INSTALLATION

Equipment

Site

DESIGN

I, being the person responsible (as indicated by my signature below), for the Design of the electrical installation, particulars of which are described on page * of this document CERTIFY that the said work for which I have been responsible is to the best of my knowledge and belief in accordance with the Regulations for Electrical Installations by the Institution of Electrical Engineers, 17th Edition, except for the departures, if any, stated in this document.

The extent of liability of the signatory is limited to the work described above as the subject of this certificate.

For the Design of the Installation:

Name (in Block Letters) Position

For and on behalf of

Address

Signature Date

CONSTRUCTION

I, being the person responsible (as indicated by my signature below) for the Construction of the electrical installation, particulars of which are described on page * of this document CERTIFY that the said work for which I have been responsible is to the best of my knowledge and belief in accordance with the Regulations for Electrical Installations by the Institution of Electrical Engineers, 17th Edition, except for the departures, if any, stated in this document.

The extent of liability of the signatory is limited to the work described above as the subject of this certificate.

For the Construction of the Installation:

Name (in Block Letters) Position

For and on behalf of

Address

Signature Date



Techspan Systems

ELECTRICAL INSTALLATION, COMPLETION AND INSPECTION CERTIFICATE: PAGE 3 OF 3 PAGES

INSPECTION AND TEST

I being the person responsible (as indicated by my signature below) for the Inspection and Test of the electrical installation, particulars of which are described on page * of this document CERTIFY that the said work for which I have been responsible is to the best of my knowledge and belief in accordance with the Regulations for Electrical Installations by the Institution of Electrical Engineers, 17th Edition, except for the departures, if any, stated in this document.

The extent of liability of the signatory is limited to the work described above as the subject of this certificate

For the Inspection and Test of the Installation:

Name (in Block Letters)

Position

For and on behalf of

Address

Techspan House,
Griffin Lane,
Aylesbury,
Bucks. HP19 8BP

I RECOMMEND that this installation be further tested and inspected after an interval not exceeding years.

Signature

Date

12.8.14

APPENDIX V. 4x15 UTMC MS3 VMS

VMS Techspan Integration Test

Sign Type/Size – MS3 4x15 (UTMC)

ITEM	DESCRIPTION	RESULT
1.	Record the Site/Sign Number/location.	VMSC7/A82 S/N – 7196/0043
2.	Record the date.	14 th August 2014
3.	Record the electronic address of the VMS	ip address [REDACTED]
4.	Ensure sign is OBTAINABLE at the instation.	✓
5.	Disconnect comms to the VMS. Confirm sign is reported UNOBTAINABLE at the Instation. Reconnect comms and confirm sign is reported OBTAINABLE at the Instation.	✓
6.	Set “SIGN UNDER TEST” message with Amber Lanterns ON from the Instation. Ensure sign sets and lanterns are on. Confirm sign status at the instation.	✓
7.	Disconnect comms from the VMS. Ensure the VMS blanks within predetermined time (90seconds). Confirm sign is reported UNOBTAINABLE at the Instation	✓ (19 minutes)
8.	Reconnect comms to the VMS. Ensure the sign re-sets. Confirm sign status at the instation.	✓
9.	Switch OFF power to the VMS. Ensure sign is reported UNOBTAINABLE at the Instation.	✓
10.	Restore power to the VMS. Ensure the sign re-sets and the lanterns are ON. Confirm the status shows set at the Instation.	✓
11.	Clear the sign from the Instation. Ensure the sign blanks and lanterns are off.	✓

	Confirm status shown at the Instation.	
12.	Set "SIGN UNDER TEST message with Lanterns ON from the Instation. Ensure the sign sets with Lanterns ON. Confirm status at the Instation.	✓
13.	Induce a Lantern fault (Top Lantern). Confirm Lantern fault is reported at the Instation.	✓
14.	Remove Lantern fault (Top Lantern). Confirm Lantern fault clears at the Instation.	✓
15.	Induce a Lantern fault (Bottom Lantern). Confirm Lantern fault is reported at the Instation.	✓
16.	Remove Lantern fault (Bottom Lantern). Confirm Lantern fault clears at the Instation.	✓
17.	Operate Lantern breaker Confirm all lanterns are off and message is ON. Confirm Lantern fault reported at the Instation.	Unable to perform due to access issues. Does not affect the operation of the VMS
18.	Remove Lantern fault. Ensure the message and Lanterns are ON. Confirm Lantern fault clears at the Instation.	Unable to perform due to access issues. Does not affect the operation of the VMS
19.	Disconnect power from a random LED module. Ensure the VMS blanks within a predetermined time (90 seconds). Confirm fault is reported at the Instation.	✓
20.	Reinstate power to LED module. Ensure sign re-sets and the Lanterns are ON. Confirm fault clears at the Instation.	✓
21.	Remove communication from a random LED module. Ensure the VMS blanks within a predetermined time (90 seconds).	✓

	Confirm fault is reported at the Instation.	
22.	Reinstate communication to LED module. Ensure sign re-sets and the Lanterns are ON. Confirm fault clears at the Instation.	✓
23.	Induce internal communication fault (remove internal communication cable from between the sign driver-led driver). Ensure the VMS blanks within a predetermined time (90 seconds). Confirm fault at the instation.	✓
24.	Remove internal communication fault (refit internal communication cable from the sign driver). Ensure sign re-sets and the Lanterns are ON. Confirm fault at the instation.	✓
25.	Induce an ALM fault (remove ALM cable from LED controller) Confirm ALM fault is reported at the Instation.	✓
26.	Reinstate ALM fault. Confirm ALM fault is cleared at the Instation.	✓
27.	Induce a heater fault (switch off heater breaker) Confirm Heater fault is reported at the Instation.	✓
28.	Remove heater fault. Confirm Heater fault is cleared at the Instation.	✓
29.	Clear the sign from the Instation. Ensure the sign blanks and the Lanterns are off. Confirm status and that no faults are showing at the Instation.	✓

Tested By: [REDACTED]
Date: 14th August 2014

APPENDIX G. Setup and Pre-SAT Test Procedure

This procedure should be carried out following the installation of new VMS sites containing the MPC, Paknet or Modem.

The first object is to set up the MPC and establish the communications link to the instation.

Follow the procedure below for MPC Set Up Part 1, then either the Paknet or Modem Set Up procedure (as applicable), followed by the MPC Set Up Part 2.

MPC SET UP - PART 1

ITEM	DESCRIPTION	RESULT
1.	Record the site number.	MPC C7
2.	Record the date.	14 th August 2014
3.	Record MPC electronic site address.	98
4.	Record MPC Software Version.	4.1D
5.	Record the serial number of a) PSTN Modem b) GPRS Router c) Paknet Pad	S3532270209729784
6.	Record the serial number of the MPC	TZ1J01030282
7.	Check MPC leads are in the correct sockets (i.e. refer to installation drawings for correct channels)	✓
8.	Set electronic address of the MPC by inserting the appropriate address plug into the indent socket.	Not Applicable
9.	Record the incoming voltage.	248.8 V
10.	Measure Earth resistance between the MPC and the cabinet earth stud. Ensure resistance is less than 0.5 ohms	Not Applicable

The following procedure should be followed if a GPRS Router is installed.

GPRS ROUTER SET UP

ITEM	DESCRIPTION	RESULT
1.	Ensure all GPRS cables connected.	✓
2.	GPRS router for the relevant site is.	S3532270209729784
3.	Switch on power to MPC	✓
4.	Switch on the GPRS router	✓
5.	Using the GPRS embedded web page note the signal strength.	-80dbm
6.	Connect the PC to the engineers test terminal (RJ45 to 9way "D" type female).	Pre-configured
7.	Run the MPC Engineers Terminal software and select the Configuration, "Configure as TCP" option. Wait for the MPC to reboot.	Pre-configured
8.	When the MPC reboots, on the MPC ET select the Configuration, "Set Advanced Config" option, click "submit" and then tick the boxes where the IP Address and Gateway need to be changed. On the MPC3/MPC4 the Outstation ID will need setting but not on the MPC2. Then click "Submit" and wait for the MPC to restart.	Pre-configured
9.	Ensure the Ethernet port of the MPC is connected to the GPRS router with a cross-over network cable. Ensure that channel 4 on the MPC is configured as "unused" and is not connected to anything. Request the MPC site data to be downloaded.	Pre-configured

MPC SET UP - PART 2

ITEM	DESCRIPTION	RESULT
1.	Confirm through Engineers terminal that the MPC has been configured correctly and that the site data has been down loaded from the instation.	✓
2.	Confirm that the MPC is polling the VMS and the sign is responding. NOTE: Ensure the VMS is switched on and the VMS electronic address is set.	✓
3.	Using the Engineers Terminal PC via MPC, set the VMS message "SIGN UNDER TEST" with lanterns on. Confirm sign sets correctly.	✓
4.	Using the Engineers Terminal PC via the MPC, clear the VMS and ensure the sign blanks.	✓
5.	Rectify any outstanding faults and clear the MPC and VMS fault logs.	✓
6.	Confirm with the instation that the VMS is shown obtainable with no faults reported.	✓

Tested By:


Date: 14th August 2014