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PROJECT : UTC

Factory / Site Acceptance Test Schedules for the STCL OpenVMS-Based UTC System

Customer :

Date of FAT / SAT :

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1 INTRODUCTION

1.1 Purpose

This document defines a procedure to be carried out for Factory Acceptance Tests and/or Site Acceptance Tests to demonstrate the functions of an STCL UTC system installation.

1.2 Scope

This document applies to a UTC system functional demonstration.

1.3 Related Documents

- 1.3.1 666/UH/16940/000 System Requirements Specification for a VMS UTC System
- 1.3.2 666/UH/16940/XXX UTC Customer Requirements Specification
- 1.3.3 666/HB/16940/000 Operator Handbook for a VMS UTC System
- 1.3.4 666/HD/16940/000 Data Preparation Handbook for a VMS UTC System.
- 1.3.5 666/HE/16940/000 System Handbook for a VMS UTC System
- 1.3.6 666/HF/16940/000 SCOOT User Guide
- 1.3.7 666/HG/16940/000 System Management Guide for a VMS UTC System
- 1.3.8 666/HH/16940/000 A Guide to Data Preparation for a VMS UTC System
- 1.3.9 666/HI/16940/000 Data File Format Guide for a VMS UTC System
- 1.3.10 666/KE/16066/000 UTC glossary of terms
- 1.3.11 MCE 0360C Department of Transport Urban Traffic Control Functional Specification, TCC/1144/3, July 1983

1.4 Definitions

For standard references see Reference 1.3.10

1.5 Issue State and Amendments

- Issue 2A Corrections added after internal review
- Issue 3 Issued after internal review
- Issue 4 Revised to separate test results from test procedures
- Issue 5 Data backup test added

2 GENERAL DESCRIPTION

2.1 Introduction

This document specifies the Factory and Site Acceptance Test procedures for the Siemens UTC System.

This procedure demonstrates that the system has been correctly configured and installed and illustrates some key functions of the STCL UTC SCOOT System.

2.2 Conduct of the Tests

2.2.1 The customer shall appoint an officer to act as its representative during the tests. Hereinafter the representative shall be referred to as "The Supervisor".

2.2.2 The company shall appoint one of its staff to manage the conduct of the tests. Hereinafter this person shall be referred to as "The Demonstrator".

2.2.3 The Supervisor or other nominated members of the customer's staff may operate the equipment during any of the acceptance tests accompanied by the company's representative.

2.2.4 STCL shall be responsible for providing all hardware and software for the tests, unless otherwise agreed with the customer.

2.2.5 Except where agreed between the Supervisor and the Demonstrator all the tests will be carried out on the system configured as required under the contract.

2.2.6 Unless the Customer wishes to take up the provisions of section 2.2.3 above, the Company shall operate the equipment during the tests.

2.2.7 The layout of the tests is designed for experienced users in order to give maximum flexibility in conducting the tests. The appendix gives more details of particular test methods, but they are suggestions only; they are not intended to be exhaustive.

2.2.8 This schedule is designed to cover the majority of standard installations and configurations. Additional tests for non-standard features can be agreed and recorded in the section at the end of the standard tests.

2.3 Test Conditions

- 2.3.1 A test shall be considered to have failed if it proves impossible to complete the procedures laid down in the schedule due to the failure of some part of the system supplied by the Company, or that the state of the system at the end of the test is such that further tests cannot be undertaken without remedial action being taken.
- 2.3.2 The tests shall be conducted using two copies of the schedule, one copy to be retained by the Customer and the other copy by the Company. Any comments, notes, deletions, additions and records of pass or failure shall be made in both copies. Alternatively, one copy may be marked up and a photocopy made of the test results for the Customer at the end of the tests.
- 2.3.3 At the completion of each test the Supervisor and the Demonstrator shall complete and sign both copies of the test summary sheet included with each schedule. The test shall not be complete and no other test shall be started until the above has been carried out.
- 2.3.4 Prior to the commencement of each test, the Demonstrator shall explain to the Supervisor :
- (a) what the test will demonstrate;
 - (b) how the test will be carried out;
 - (c) what result is expected.
- 2.3.5 The test will be considered successful if the Supervisor agrees at the end of the test that section 2.3.4 above can be fully complied with or that the failure was not due to equipment or software supplied by the company.
- 2.3.6 The test schedules and the above clauses shall have been agreed to by the Customer and the Company before the commencement of the tests.
- 2.3.7 In the event of a test failing as defined in section 2.3.1, one of the following actions will be taken:
- (a) the test shall be repeated at the end of the site demonstration, before the post demonstration meeting;
 - (b) the test shall be repeated at a time to be agreed between the Customer and the Company;
 - (c) the test shall be declared redundant;

It is assumed that the Company will have taken the necessary steps to resolve the problem(s) which cause the test to fail, and that this work will not interfere with the completion of other tests, unless this is so agreed by the Supervisor and the Demonstrator.

2.4 Test Completion

The criteria for successful completion of the tests will be that all demonstrations that are possible on a live system with the Customer's data are completed successfully. Some tests may be completed in a different way on the Customer's Site to that described in this schedule due to operational constraints.

This schedule will be used as a guide, and any changes in the procedures will be agreed between the Demonstrator and Supervisor and noted on the results sheets.

2.5 Approach

The approach taken throughout the tests is to initiate changes in the quiescent system using an operator terminal or via external inputs e.g. vehicle detectors, and monitor the results. This will be done in one or more of the following ways:

- (a) observing messages output on the system terminals,
- (b) observing the changes in controller state, test boxes,
- (c) observing the changes in "live update" pictures,
- (d) using the MONI, DIPM and OVRB operator commands to monitor OTU control and reply data.
- (e) using the OVRB facility to modify control and reply data.

2.6 Assumptions

The basic assumptions for the Customer's Site demonstrations (SAT) are :

- (a) Only the functions actually required by the user and included in their data will be demonstrated. If a particular test does not apply then NA (Not Applicable) shall be entered in the result sheet.
- (b) The entire system has been successfully tested at the factory prior to delivery.
- (c) The SCOOT subsystem is as supplied to STCL and cannot be demonstrated until after successful validation is complete.
- (d) Enough OTUs have been commissioned to show the operation of the system to the street.
- (e) The live data has been prepared and is available on the system.
- (f) The instation hardware has successfully passed the Visual Inspection.

2.7 System Configuration

The instation hardware configuration should be as supplied under the contract.

3 VISUAL INSPECTION

3.1 Introduction

The following tests refer only to the equipment supplied under the current contract.

3.2 Equipment Layout

3.2.1 The Supervisor shall ensure that all items of installation equipment are present as specified in the Company's contract and as required by this specification before proceeding with any tests or demonstrations.

3.2.2 The Supervisor shall check that the equipment housings, racking, sub-assemblies and components are not damaged and are as specified in the company's tender and the works specification.

3.2.3 The Supervisor shall ensure that no unnecessary sharp edges or non-essential protrusions are present on any item of equipment.

3.2.4 It shall be demonstrated that, with the exception of temporary connections:

- (a) connections have been correctly made;
- (b) cabling and wiring forms are correctly supported and there is no strain at bends or hinged panels or where cables are terminated in terminating blocks;
- (c) terminals carrying high voltage, greater than 50V, are shrouded;
- (d) [for SAT only] a suitable means of interconnecting a computer system to line termination racks has been provided.

3.2.5 The Supervisor shall verify that all handles, controls and locks have adequate strength for their intended use and that pre-set controls cannot be accidentally operated.

3.2.6 The Supervisor shall ensure that mechanical connections are fixed correctly and are not loose, and that where appropriate locking washers etc., have been fitted.

3.2.7 The Supervisor shall verify that:

- (a) all plugs and sockets are suitable for the connections required;
- (b) that they can be removed and replaced easily without placing undue strain on cable connections or printed circuit boards;
- (c) that all connections are correctly made.

3.3 Electrical Safety

3.3.1 The Supervisor shall verify that the marking and labelling of the equipment is of an acceptable standard, in particular:

- (a) that each piece of equipment has a label giving its functional code, or title, type number and serial number;
- (b) that all high voltage warning labels are present and correctly placed.

4 TEST DEFINITIONS

4.1 Physical Inspection

Physical Inspection	Accepted Y/N
All equipment present and no defects	
All equipment connected (Mains/Data cables)	
Comments	

4.2 Logging On and Basic System Operation

Logging On and Basic System Operation	Accepted Y/N
Menus Operation and Commands	
TMC/TCC Status	
Database editor	
Maps, Generation, live updates, linking	
Importing Maps from MMI PC	
Comments	

4.3 Faults

Faults	Accepted Y/N
System	
Equipment	
Power	
Comments	

4.4 TUAC

TUAC	Accepted Y/N
Basic Menus	
Add /Edit Users	
Comments	

4.5 Timetable

Timetable	Accepted Y/N
Day of Week	
Day or Year Schedules	
Comments	

4.6 Plans

Plans	Accepted Y/N
Fixed time Plan Create/Edit	
SCOOT Plan Create/Edit	
Green Wave	
Comments	

4.7 Junction control

Junction control	Accepted Y/N
Fixed Time	
SCOOT	
Comments	

4.8 Equipment control/monitoring

Equipment control/monitoring	Accepted Y/N
MONI	
DIPM	
LVAL	
NFTD	
RFTD	
Comments	

4.9 Data storage/presentation

Data storage/presentation	Accepted Y/N
ASTRID	
VEGA	
TDDD/GDDD	
Comments	

4.10 Uninterruptible Power Supply (UPS)

Uninterruptible Power Supply (UPS)	Accepted Y/N
Connection	
Comments	

4.11 Transmission system

Transmission system	Accepted Y/N
Standard (same building)	
Remote TC12	
Comments	

4.12 Printers

Printers	Accepted Y/N
Logging	
Colour	
Networked	
Comments	

4.13 Additional MMI PC

Additional MMI PC	Accepted Y/N
XVision/Hummingbird loaded correctly	
Connection to UTC, use of common commands and printing	
Comments	

4.14 Plasma screen

Plasma screen	Accepted Y/N
Single Screen Operation	
Multi Screen	
Comments	

4.15 RMS

RMS	Accepted Y/N
Normal Operation with OMU connection	
Fault Transfer to UTC and/or PREFECT	
Comments	

4.16 PREFECT

PREFECT	Accepted Y/N
Normal Operation	
Fault Transfer from UTC/RMS	
Comments	

4.17 External time source

External time source	Accepted Y/N
Synchronization	
Time Display	
Comments	

4.18 Modem connection

Modem connection	Accepted Y/N
Remote access	
Comments	

4.19 Roving Terminal(s)

Roving Terminal(s)	Accepted Y/N
Equipment supply, UTC Access	
Comments	

4.20 Data Backup (Archive)

Data Backup	Accepted Y/N
Archive to DAT	
Comments	

4.21 Additional Features

Use this section to record any features particular to this system

	Accepted Y/N
Comments	

	Accepted Y/N
Comments	

	Accepted Y/N
Comments	

Factory / Site Acceptance Summary*

The equipment and software supplied to _____ as the
SCOOT Urban Traffic Control system incorporating SCOOT are accepted:
in their entirety *
except for the following defects to be remedied * :

Supervisor: _____

Demonstrator: _____

Date: _____

*Delete where appropriate.

Appendix A - Test Methods

These tests are organised in sections in the same order as the Test Definitions. It is not intended that these test are the definitive method of testing; many other possibilities exist due to the highly variable nature of the set-up. Some tests are included as demonstrations of standard features; these need not be included if the user is familiar with them.

4.1 Physical Inspection

No particular tests specified

4.2 Logging On and Basic System Operation

Purpose: To prove that invalid command mnemonics are rejected by the system and show that a previously entered command line can be recalled, modified and re-entered.

Action : In the MMI Command Entry window use invalid command lines including 2, 3, and 4 letter mnemonics, some containing control and escape sequences, that do not appear in the list of valid commands in the Operators Handbook (Reference 1.3.3). Some should contain valid mnemonics and invalid parameters.

Result : The commands are rejected and no further action is taken by the system. Invalid commands are not echoed to any other terminal.

Action : Select a command from the list of valid commands in the top window of the Command Entry.

Result : The command line is displayed ready to be actioned.

Action : Using the left and right cursor keys and the backspace key to delete the previous character alter the command line to contain a valid command mnemonic and fields. Press carriage return.

Result : The cursor moves as requested and the characters are deleted as requested. The command is accepted by the system and the requested action is carried out.

Purpose: This test demonstrates the TMC/TCC status panel, which reflects the condition of the central computer network.

Action : Select the Layout menu on the User UTC Session Window. Select the Status Panel option.

Result : The Status Panel window is displayed. This window shows the status of all connected TMC and TCC computers and whether system and operational alarms are on or off.

Note : When executing this test, reference should be made to the appropriate handbooks for operator commands and data entry and preparation.

Purpose: To commence the data preparation session.

Action : At a terminal directly connected to the computer enter the command
- DBAS

Result: The data preparation command file is invoked and a menu of options is displayed.

Action : Attempt to enter the same command on a second terminal.

Result : The command is rejected with a warning message that the program is already active.

Purpose: To test the graphical picture generation software.

Action : This test takes the form of an operator session which exercises the facilities of the picture generation software. No details of the test will be specified here, it is left to the discretion of the tester. However the test could involve the following:

- a) edit an existing picture,
- b) create a new picture. This picture could contain examples of live update field types. If necessary a second picture may be created.
- c) Create equipment on different layers.

Result: No result is specified here as this test takes the form of an interactive user session.

Purpose: This test proves the ability of the system to display fixed and live update data in a picture created previously.

Action : Open a Live Graphics Update Window on an MMI Terminal and load the chosen picture.

Result : The requested picture is displayed. The active plan number and other live update data can be checked by reference to the timetable and by use of the DIPM command. Layers can be selected to be visible or invisible.

Purpose: To prove the driving of the Alarm panel.

Action : Enter the TEST ALM operator command.

Result : The system alarms (both audible and visual) are turned on.

Action : Enter the command XTES ALM.

Result : The Alarm panel will be returned to normal operation and any alarms present at the start of the test which have not been acknowledged will be re-displayed.

4.3 Faults

Warning: The majority of tests in this section should only be carried out on live equipment with care. Otherwise use the simulated system.

Purpose: To prove that setting a fault results in the correct message being written to the terminals with unsolicited output enabled and to the system log. The correct operation of the graphics map is also checked.

Action : Using the FLTY command set some equipment faulty, and define some icons in the graphics editor to "Highlight when faulty".

Result : Each fault causes a message to be written to all terminals in the system and also in the system log (LOGO). For each fault an entry will be made in the fault log (LSTF). For each fault the graphics map icon for the equipment will flash. Isolating and other faults will cause different indications.

Action : Enter the ACKD command

Result : The icons will change from flashing to steady.

Action : Use the XFLT command to clear the faults.

Result : The faults are removed from the fault log and they are not re-reported and the graphics map highlights are extinguished.

Purpose: To check that outstation faults are reported correctly at the control centre.

Action : Using appropriate outstation equipment (signal controllers, counting detectors), OVRB or a test set, simulate a number of equipment failures.

Result : For each failure the appropriate message is output to the terminals. Output the system log on a terminal to check that the fault detection has been logged. Output the fault log on a terminal to check that the fault has been recorded.

Action : Enter the XFLT command for one fault that is still present at the outstation.

Result : The fault is re-reported.

Action : Remove all faults at the outstation and clear the faults in the system using the XFLT commands.

Result : The faults are cleared in the fault log and do not get re-reported.

Purpose: To check what happens when there are complete OTU/line failures of varying duration and frequency.

- Action:**
- a) Use the command MONI to check that control and reply bits are being sent and received correctly from a chosen OTU.
 - b) Use the command LSTF to check that no faults are currently recorded for this piece of equipment.
 - c) Simulate OTU failures of varying duration & frequency by disconnecting or shorting the line to the OTU. Alternatively simulate the fault by using OVRB.
 - d) Repeat the LSTF command after a fault has been reported to confirm the fault has been logged.
 - e) The LTEC command can be used to determine how many transmission failures there have been in the last hour.

- Result:**
- a) The MONI display shows the failure of the OTU replies for the disconnection period.
 - b) Control equipment on this OTU is isolated.
 - c) No fault message is output on the terminals when the individual transmission faults occur.
 - d) If transmission fails for 3 or more consecutive seconds a message indicating this is output and the equipment is isolated. If transmission resumes then the equipment is reconnected after 30 seconds.
 - e) If transmission fails for periods of less than 3 seconds totaling to 15 seconds in a three minute period then a persistent transmission failure is reported and the equipment is isolated. If transmission resumes then the equipment is reconnected after 3 minutes.
 - f) If transmission fails for periods of less than 3 minutes totalling 15 seconds in an hour period then an intermittent transmission failure is reported and the equipment is isolated. If transmission resumes then the equipment is reconnected after one hour.

Note : Results are dependent on the System wide variables set in the data base.

Purpose : To prove that instation addresses can be monitored independently and the control and reply data stored in disc files.

Action : Enter the commands :

LOTU E01001 m n

LOTU E01001 o p

where n, o, p and m are instation addresses known to be working.

Action : Enter a MONI command for the each address above and once the screen has filled request a snap shot dump.

Result : 2 print outs covering each address for a defined time.

Action : Terminate the logging with the following commands :

XLOT E01001 m n

XLOT E01001 o p

Result : For each XLOT command the system acknowledges that the logging has been terminated.

Action : Use the DLOT command to print for each address the time period covered by the MONI prints.

Result : 2 print outs are obtained which match the MONI prints with regard to the control/reply data and the bit definitions.

Purpose: To confirm that a 'Plan compliance' fault is reported if the controller changes to an incorrect stage after the four minute period following a traffic plan change involving the controller under test.

Action: a) Call up a live update and/or a MONI or OVRB display for a controller.

b) Check that the controller is not isolated. Enter the command 'PLAN' to change plan for this controller.

c) Use OVRB to simulate the actions of the controller in following the control bits of the plan.

d) After a cycle of normal operation, and while the controller is not in an intergreen, change the stage reply bit to something other than the force bit being sent out.

Result: a) A plan compliance fault is not reported until a period of 4 minutes has elapsed since a plan change.

b) A plan compliance error message is output.

c) The controller is isolated by fault if the fault is of that type.

d) The corresponding graphics icons operate as defined above.

Purpose: To demonstrate that faults on junctions are summarised and displayed on the DIPM display

Action: Start a DIPM display for the junction used previously, before the fault is cleared.

Result: A message is displayed on the DIPM screen showing that the junction has a fault.

The above test can be repeated for any junction fault if required.

Purpose: To ensure that, when simultaneous GA and GB reply bits are returned by an intersection controller, the controller is isolated and appropriate messages are produced.

Action:

- a) Call up a MONI display for a controller (without LO reply bit) operating under local or plan control.
- b) Generate simultaneous GA, GB reply bits by switching the lamps off or by using the OVRB command.
- c) Check that GA and GB are now being returned.
- d) Use the LSTF command to confirm that the controller is now isolated due to lamps off/manual control.

Result:

- a) The Lamps Off message is returned.
- b) The controller is isolated.
- c) No control bits are being sent out.
- d) The corresponding graphics icon (if applicable) flashes.

Purpose: To ensure that, when the simultaneous GA and GB reply bits are no longer returned, the controller is reconnected and appropriate messages are produced.

Action: With the MONI display still active from the previous test and the GA and GB reply bits being returned, switch the lamps back on or remove the override by OVRB.

Result: The controller is reconnected and control bits are again sent to the controller. The corresponding graphics icon is extinguished.

- Purpose:** To check that the presence of the RR bit is detected and that whilst present, the junction is removed from computer control.
- Action:**
- a) Call up a MONI display for a junction with the RR bit available.
 - b) Using the test set or OVRB introduce one or more non-isolating fault conditions on the junction.
 - c) Simulate the RR bit.
- Result:** The junction is shown to be remote attended and any control information previously being sent out is terminated.
- Action:** Remove the RR bit.
- Result:** The junction is reconnected to the system. The previous fault conditions present are cleared and the junction resumes normal operation.
-
- Purpose:** To confirm the behaviour of a SCOOT detector when it has been occupied or unoccupied for the required period of time.
- Action:**
- a) Select a detector on which zero occupancy (or constant occupancy) can be simulated.
 - b) Set "CHAN TRAF 1" to ensure checking is operational.
 - c) Arrange for the detector to indicate zero occupancy (or constant occupancy). Use the VALU DSTS command to check that the detector is currently clear of faults.
 - d) Check the correct receipt of the simulated SCOOT detector information, using the OTU Monitor display. After a period defined by the SETH parameter (SFTH for constant occupancy) repeat the VALU DSTS command.
- Result:** The detector changes to the suspect state.
- Action:** Leave the detector simulator used above unoccupied for a further period defined by the ETHR parameter (FTHR parameter).
- Result:** The detector changes to the faulty state and a suitable message is output.
- Action:** Use either the command XFLT or the command CHAN DSTS to attempt to clear the detector fault.
- Result:** The detector status only changes from faulty to the suspect state.
- Action:** Resume normal replies to the detector.
- Result:** After about 1 minute of valid replies the detector state changes to OK and a fault clear message is output.

Warning: This test requires shutting the UTC system down. It should only be performed if agreed with the Customer.

Purpose: To prove the recovery of the system after a power failure.

Action : Note the current state of the system with respect to operational plans and controller states.

Check the system time against an independent timepiece.

Switch off the power to the traffic computer. After a period of 5 minutes restore the power and take no other action.

Result : The system time is correct.

A System Restart message is in the system log.

When the system has reached a quiescent state, check the operational plans are the same as those before the power failure, allowing for any timetable changes.

4.4 TUAC

Warning: This test requires restarting the UTC system. It should only be performed if agreed with the Customer.

Purpose: To demonstrate different operator access levels.

Action : Enter the command TUAC and select the User option. Set up a user with an Access level of 8. Enter UPDA USERS to update the database.

Result : The new data is sent to all TCCs.

Action : Log out and re-login as the Access level 8 User. Attempt to use higher level commands (such as DBAS, KILL, TUAC or TIME). Attempt lower level commands (such as OUTT, LOGO or LSTF).

Result : The higher level commands are rejected. The lower level commands are accepted.

Log out and re-login as level 16 user.

4.5 Timetable

Purpose: To display the contents of any specified timetable.

Action : Enter the command OUTT with valid parameters as described in the operators handbook

Result : The requested timetable or part timetable is listed on the operators terminal. The entries can be checked against the timetable data.

Purpose: To show that a timetable may be edited.

Action: Enter timetable preparation using the TTBP command from an MMI terminal. Select options to edit the current time of day timetable. Add some valid events and attempt to add invalid events. Prepare the timetable.

Result: Invalid events are rejected immediately with suitable error messages. The modified timetable then prepares successfully.

Purpose: To re-start the UTC/SCOOT system in the middle of the day to test the optimisation process of events in the timetable.

Action : Inspect the timetable to ensure, if possible, that it contains a number of linked and non-linked events. In particular it could contain the following -

- a) ISOL followed by an XISO.
- b) CHAN events for the same SCN parameter.
- c) DIMO followed by an XDIM.

Shut down the TMC with the KILL command. Re-start the system at a suitable time after the above events are due.

Result : The computer restarts and loads the traffic software and data areas automatically and then starts the traffic system.

The Timetable actions are optimised so that events which "cancel each other out" are not executed.

Purpose: To show that the Day of Week timetable may be modified.

Action: Use data preparation to modify the day of week timetable to use a different set of time of day timetables. Attempt to include some errors.

Result: The errors are rejected.

Action: Prepare the timetables.

Result: The timetables prepare successfully.

Action: Exit the timetable preparation program without implementing the modified timetable. Enter an UPDA TIMETABLES command.

Result: The new time of day timetable is implemented.

Purpose: To show that the Day of Year timetable may be modified.

Action: Use timetable preparation to modify the day of year timetable to use different time of day timetables from those specified in the day of week timetable on several days including the current day. Attempt to include some errors.

Result: The errors are rejected.

Action: Prepare the timetables.

Result: The timetables prepare successfully.

Action: Exit the timetable preparation program implementing the modified timetable.

Result: The time of day timetable specified in the day of year rather than the day of week timetable is implemented.

Purpose: To show that the timetable is implemented correctly at UTC System start up.

Warning: **This test should only be performed if it is possible to shut the UTC system down without any adverse effects.**

Action: Kill the System using the KILL command for all VAX and/or Alpha computers. List the Operator Journal to find the time of the last command. Allow enough time to elapse for a number of timetable events to become due. Restart the system and carefully note, using the System Log if necessary, the timetable events which are actioned before the system reaches a quiescent state.

Result: It should be found that only those timetable events scheduled to occur after the time of the last Journal entry and before the current time are actioned. The timetable is not actioned from the beginning.

4.6 Plans

Purpose: To show that invalid command lines for the PPRP command are rejected.

Action: Enter the following commands :

- (a) PPRP nnn where nnn is an invalid plan number
- (b) PPRP t nnn where nnn is a valid plan number and t is an invalid plan type
- (c) PPRP emmmmm nnn where e is an invalid equipment type, mmmmm is a valid SCN, and nn is a valid plan
- (d) PPRP emmmmm t nnn where emmmmm is a valid equipment and SCN, t is a valid plan type and nnn is an invalid plan number

Result: The commands are all rejected with the appropriate error messages.

Purpose: To prepare fixed-time plans.

Action: Enter the command :

PPRP

Result: The on-line plan preparation screen is displayed.

Action: Edit selected plans with both valid and invalid data. In particular, set up a number of the following conditions:

- a) For an intersection, set two successive stages to be the same. This should not be accepted.
- b) For a pelican, set the cycle time equal to the minimum cycle time allowed (minimum green to vehicles + the "NOT GX" period). This should be accepted.

The following requirements should be borne in mind when producing test plans and examples might be produced that illustrate various points.

- a) A plan shall consist of an Intersection SCN, a cycle time and for each step in the plan a "stage action" and a start time;
- b) A stage action shall consist of one or more stage identifiers, "A" to "H", optionally underlined, followed by an optional "!";
- c) At least one event in a plan must contain only one stage force bit;

- d) The start time of each stage is zero or greater and less than the cycle time;
- e) The start time of a stage is at least one second greater than the previous stage;
- f) The duration of each stage is not less than the stage minimum green plus the preceding inter-green;
- g) The cycle time is greater than the sum of each stage's upper minimum green and preceding upper inter-green time + 5 seconds;
- h) The durations of alternative stage sequences are the same;
- i) Only one alternative stage sequence is allowed;
- j) The cycle time is less than 256 seconds;
- k) All stages configured on a controller do not have to be mentioned in the plan. Any missing stages are raised as warnings only;
- l) Only the stage to stage transitions specified by the user in the UTC System data can occur;
- m) Any stages flagged as demand dependant by the user in the UTC System data have either :-
 - The stage is underlined, indicating that either the stage D bit (where configured), should be sent with the F bit, otherwise the DX bit should be sent with the F bit.
 - The stage is not underlined, indicating that the stage F bit should be sent by itself. This is known as a nominate stage action. This must be followed by an added stage action indicating that the same stage F bit should be sent together with that for the nominate stage. Together these are known as a nominate-add pair. An added stage action is a non-demand dependent stage. The result is that if the demand dependent stage does not operate its time should be given to the added stage.
- n) Plans which have multiple demand dependent events or gap-out events may be marked such that timing errors are ignored.
- o) Individual plan events may be marked such that plan compliance is inhibited.
- p) Up to 5 previous plans can be selected from a list of historical plan data.

For Pelican plans the following requirements should be tested :

- a) Each 'non-green to vehicle' stage is not less than the minimum limits set in the system data for the controller,

b) Each 'vehicle green' stage is greater than or equal to the specified minimum limit.

Result: Invalid data in some of the above requirements will not be accepted at the data entry stage (for example - cycle time greater than 256 seconds). The remainder will be raised as faults when processed.

Action: From the Process Menu select the plans which have been modified and process them.

Result: The plans are prepared in turn and the invalid data is rejected with messages indicating the error.

Action: Correct the invalid data and re-prepare the rejected plans.

Result: All plans are accepted.

Action: Exit from PPRP, selecting the SAVE option.

Result: After a short delay the processed plans are installed and used by the system.

Purpose: To prepare SCOOT translation plan data.

Action: a) Enter the command :

PPRP SCOOT nnn where nnn is a valid SCOOT translation plan number

b) Attempt to include the following invalid data :

- if multi-nodes are available, put one or more controller on SCOOT control and others in LOCAL mode.
- incorrect number of SCOOT stages.

c) Press return to process the plan.

Result: Invalid data is rejected with suitable messages.

Action: Correct the invalid data. Reprocess the plan.

Result: The plan prepares successfully.

Note : For the next test a controller should exist on the system with a removable stage.

Action: a) Start data preparation, and from the Edit SCOOT data option change the removable stage on a node or the equipment SCNs on a node such that a translation plan will become invalid.

b) Process the data and exit data preparation.

c) Enter the command :

PPRP SCOOT nnn

where nnn is the SCOOT translation plan number modified above.

d) Press return to process the plan.

Result: Invalid data is rejected with suitable messages.

Action: Correct the invalid data. Reprocess the plan.

Result: The plan prepares successfully.

Purpose: To prepare green wave data.

Action: a) From the "-" prompt enter the command :

PPRP GREENWAVE nnn where nnn is a valid green wave plan number

b) Attempt to include the following invalid data :

- A delay greater than 900 seconds
- A leaving window value greater than 255 seconds.
- More than one stage force bit.
- A GO bit.
- A demand-dependent stage without a specific demand or DX bit present.
- More than one event for an equipment.
- A second line repeating one equipment, with different times.

c) Press return to process the plan.

Result: Invalid data is rejected with suitable messages.

Action: Correct the invalid data. Reprocess the green wave plan.

Result: The plan prepares successfully.

4.7 Junction Control

Purpose: To demonstrate that OVRB is capable of modifying control and reply data.

Action :

- a) call up an OVRB display for a configured test OTU.
- b) using MONI on another terminal verify that the display matches the data being sent to and received from the OTU. Otherwise use an on-line OTU WITH CARE.
- c) using the left and right cursor keys move the cursor to select the bits to be modified in the control word.
- d) use the 0 key to reset bits and the 1 key to set bits.
- e) use the "Num Lock" (PF1 on VT type keyboards) key to start a continuous overwrite.

Result : The reply bits are being modified by the OVRB command.

Purpose: To prove the selection of fixed time plans by operator command.

Action: Ensure that no high priority plans are running e.g. Greenwave or Controller checks. Enter a PLAN command to select a new plan (possibly including some controllers on local) for a single sub-area. Use the LSTS command or the displays.

Result: Messages are displayed to indicate that the timetable plan has been cancelled and the new plan started. The sub-area is operating under the new plan.

Purpose: To prove that the operator plan takes priority over any timetable plan changes.

Action: Arrange for a timetable plan change to become due on the sub-area being used while the operator imposed plan is still active.

Result: A message is displayed on the display to indicate that a plan change is due, but the operator plan is not removed.

Purpose: To prove that an operator plan can be cancelled by an operator command.

Action: With the operator plan introduced still active, enter an operator command (XPLA) to cancel the plan on one specified junction.

Result: The operator plan is cancelled and the specified sub-area reverts to the timetable plan. Messages appear on the display to confirm this. Use the LSTS/DIPM command to check that the timetable plan is now active.

Action: Enter the XPLA command to cancel the plan introduced previously on the sub-area.

Result: All junctions revert to the timetable plan.

Purpose: To confirm that SCOOT control may be implemented on a node or region by operator command.

Action: Select SCOOT control on a node (which is not isolated by fault) or region by use of the SCOO command from an operator's terminal.

Result: Use the VALU IMPL command to confirm that SCOOT control is now implemented. On other terminals use the DIPM display to show that the equipment is being given stage requests determined by the SCOOT node.

Purpose: To confirm that SCOOT control may be removed by operator command.

Action: Cancel SCOOT control on one of the nodes above by use of the XSCO command.

Result: Use the VALU IMPL command to confirm that SCOOT control is no longer implemented. Use the DIPM display to show that the junction has reverted to stage requests determined by the current timetable fixed-time plan. The stage control bits being sent to the street are those given by the current fixed-time plan. The SCOOT node is changing stage according to its region cycle time and stage times (use M17).

4.8 Equipment Control/Monitoring

Purpose: To show that it is possible to monitor, on a terminal, the control and reply words being sent between the instation and an OTU.

Action: a) Use the command MONI or OVRB to call up a display of the control and reply bits from a chosen test OTU. This can be by reference to individual items of equipment on the OTU or by reference to instation addresses.

b) Cancel the display once more and repeat the command for an OTU which is defined but currently set to invalid (if one is available).

Result: The displays are produced as required.

Purpose: To show that it is possible to monitor, on a terminal, the control and reply words being sent between the instation and an OTU and the stage of the current plan used at that OTU.

Action: Use the command DIPM to call up a display of the control and reply bits from a chosen test OTU.

Result: The displays are produced as required.

Purpose: To show that it is possible to monitor, on a terminal, the SCOOT link data that is used for validation.

Action: Use the command LVAL [Link SCN] to call up a display of the data from a SCOOT link on a chosen test OTU.

Result: The displays are produced as required. Note that some data updates only once per cycle.

Purpose: To show that it is possible to monitor, on a terminal, the SCOOT node data that is used for validation.

Action: Use the command LVAL to call up a display of the data from a SCOOT link on a chosen test OTU.

Result: The displays are produced as required. Note that some data updates only once per cycle.

- Purpose:** To show that it is possible to monitor, on a terminal, the SCOOT region data that is used for validation.
- Action:** Use the command LVAL [Region SCN] to call up a display of the data from a SCOOT link on a chosen test OTU.
- Result:** The displays are produced as required. Note that some data updates only once per cycle.

4.9 Data Storage/Presentation

- Purpose:** To show that the ASTRID subsystem is enabled and may be used to display traffic data. Note that ASTRID is highly configurable and also needs SCOOT to have been previously active in order to have entered data.
- Action:** Use the command ASTD or select Astrid display from the SCOOT Specials list on the SCOOT menu on the UTC Session Window. Select the desired node from the presented list. (Refer to the ASTRID User Guide for details of the set up of new nodes.)
- Result:** The required display is produced. The display reflects the selected data type of the node.
-
- Purpose:** To show that the VEGA command may be used to display the demand and queues on a specified normal or entry link. The link does not need to be under SCOOT control.
- Action:** Use the command VEGA on a single SCOOT link. Monitor the display for one cycle. Check reds/greens against the M14 event driven message. Check queue size also using M14.
- Result:** The required display is produced and is updated every 4 seconds or when the value of a significant parameter changes. The display is seen to "suspend" (i.e. no updates occur) during the period when the SCOOT model is suspended for the link (as does M14). The scales for each histogram reflect the current values of the QCMQ, STOC and the cycle time.
- Note :** Changes of QCMQ, STOC and JNYT and cycle time will cause the VEGA display to be re-plotted. Changes in offset or split will not cause the display to be re-plotted.

Purpose: To show that the TDDD command may be used to display the stages and offsets on a specified set of junctions.

Action: Use the command TDDD [Computer SCN] (e.g. H01001). Select an existing route from the presented list. (New routes can be set up using the "Create" option from the File menu on the TDDD display.)

Result: The required display is produced and is updated every second. The display reflects the red/amber/green state of each of the junctions on the route for each cycle.

Purpose: To show that the GDDD command may be used to display sensor data on a specified junction (flow, occupancy etc.).

Action: Use the command GDDD. Select an existing sensor from the presented list. (New sensors can be set up using the "Create" option from the File menu on the GDDD display.)

Result: The required display is produced. The display reflects the original set up of the sensor when first entered: parameters such as the time period displayed and the update rate are pre-configured.

4.10 Uninterruptible Power Supply (UPS)

Warning: The power connections should be checked carefully before conducting this test and it should only be performed at a time when a failure and potential shut down of the UTC system can be tolerated.

Purpose: To prove that the UPS is correctly connected and configured in the correct mode.

Action : Disconnect the mains supply input to the UPS for the agreed support time.

Result : The equipment supported remains powered and functioning. The UPS gives an indication of running in support mode (this will vary depending on the type of UPS, but typically includes periodic audible warnings).

Action : Reconnect the mains supply input to the UPS.

Result : The equipment supported remains powered and functioning. The UPS gives an indication of running in normal mode (this will vary depending on the type of UPS, but typically includes silent running and a green visual indicator).

4.11 Transmission System

No additional tests specified for standard transmission system; previous tests demonstrate the functionality of the transmission system, in particular the section on faults.

Purpose: To prove that a remote TC12 system is correctly connected and configured.

Action : Disconnect a transmission line from the remote TC12 to its controlled equipment.

Result : The appropriate equipment warning message is generated at the local instation.

Action : Reconnect the transmission line from the remote TC12. Disconnect the transmission line from the local instation to the remote TC12.

Result : The appropriate warning messages are generated at the local instation for the remote TC12 and all its connected equipment.

4.12 Printers

Purpose: To prove that the logging printer is correctly connected and configured.

Action : Route a status report to the printer e.g. LOGO or LSTF >T01001 where T01001 is the logging printer SCN, or substitute actual SCN.

Result : At the monochrome printer associated with the terminal a print out of the report is printed.

Purpose: To prove that the displays produced by the MONI, OVRB and DIPM commands can have snap shot dumps made of the display and sent to a monochrome printer.

Action : For one of the above commands call up the display and press CTRL and P simultaneously.

Result : At the monochrome printer associated with the terminal a print out of the display when CTRL P was typed is printed.

These or similar tests should be repeated to test all the connected printers (e.g. networked and colour graphics printers) by using their appropriate SCNs from all available positions.

4.13 Additional MMI PC

No particular tests specified; use any combination of MMI PCs and tests to ensure the all PCs are functional. E.g. a combination of several commands such as MONI, DIPM, NFTD, EDAV, DBAS or TUAC.

4.14 Plasma Screen

No particular tests specified; use any combination of screens and tests to ensure the all screens are functional.

4.15 RMS

Purpose: To prove that an RMS system is correctly connected and configured.

Action : Disconnect the link from the UTC system to the RMS system.

Result : The RMS link lost warning message is generated by the UTC system.

Action : Reconnect the link from the UTC system to the RMS system.

Result : The RMS link restored warning message is generated by the UTC system.

Purpose: To prove that an RMS system can pass information to the UTC system if configured.

Action : Generate a fault on equipment being monitored by RMS.

Result : The RMS equipment fault message is generated by the UTC system.

4.16 Prefect

Purpose: To prove that a Prefect system is correctly connected and configured.

Action : Disconnect the link from the UTC system to the Prefect system.

Result : The Prefect link lost warning message is generated by the UTC system.

Action : Reconnect the link from the UTC system to the Prefect system.

Result : The Prefect link restored warning message is generated by the UTC system.

Action : Check the Prefect system for faults reported by the UTC system.

Result : The Prefect system has correctly recorded the various faults previously generated during the testing of the UTC system.

4.17 External Time Source

Purpose: To demonstrate that the external time source is correctly set up and the UTC system is synchronised.

Action : Check the time indicated by the external source e.g. by visual display of signal lock and/or confirmation by alternative reliable source. Check the time indicated by the UTC system e.g. by using a MONI or DIPM screen.

Result : The times are synchronised to the nearest second and agree with the alternative source.

4.18 Modem Connection

Purpose: To demonstrate that the system can be accessed from a remote source.

Action : Connect the remote modem to an external telephone line. Log into the system via the telephone line using a suitable terminal. No particular tests specified; use any combination of normal line mnemonic commands. (Note that you cannot use graphic based commands via the remote terminal).

Result : The remote terminal can access the system as though it was a directly connected terminal.

4.19 Roving Terminal

Purpose: To demonstrate that the roving terminal can be used to access the main system.

Action : Power up the roving terminal and use it to connect via a mobile telephone line. Log into the system. No particular tests specified; use any combination of normal line mnemonic commands. (Note that you cannot use graphic based commands via a remote terminal).

Result : The roving terminal can access the system as though it was a directly connected terminal.

4.20 Data Backup (Archive)

Purpose: To demonstrate that UTC data can be stored on a removable external medium for back up and/or archiving. This checks both the backup hardware and the controlling software.

Action : Create a DAT tape data backup of the current configuration using the "Backup" procedure in DBAS. This procedure is detailed in section 4 of the System Management Guide (ref 1.3).

Result : A backup tape is created.

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