

Siemens Traffic Controls Limited  
Sopers Lane  
Poole  
Dorset  
BH17 7ER

## **V26 MODEM**

### **INSTALLATION, COMMISSIONING AND MAINTENANCE HANDBOOK**

**(STORES CODE - 07 1015 02)**

**(Siemens Midas V26 Transponder Modem Handbook)**

**(V26 MODEM STORES CODE - 94 9013 02)**

THIS DOCUMENT IS ELECTRONICALLY HELD AND APPROVED IN AMW

PREPARED : Peter Horwood  
FUNCTION : Technical Specialist  
DATE : 14<sup>th</sup> June 1999

© Crown Copyright 1999

## Product Support

Technical Support is provided by STCL Engineering for the benefit of the Highways Agency and its installation and maintenance contractors. Technical Support is provided for the items included in the Installation, Commissioning and Maintenance sections of this Handbook. The Telephone Help Line is available between the hours of 9.00 a.m. and 5.00 p.m., Monday to Friday (excluding Bank Holidays); Outside office hours use the Fax Help Line or e-mail.

Telephone: (01202) 782064

Fax: (01202) 782545

e-mail: [brian.cherry@poole.siemens.co.uk](mailto:brian.cherry@poole.siemens.co.uk)

Brian Cherry, Project Manager  
Siemens Traffic Controls Limited  
Sopers Lane  
Poole  
Dorset  
BH17 7ER

## CONTENTS

1. INTRODUCTION .....	4
1.1 Purpose.....	4
1.2 Scope.....	4
1.3 Related Documents .....	4
1.3.1 Required Documents.....	4
1.3.2 Reference Documents .....	5
1.4 Abbreviations.....	6
1.5 Issue State .....	6
1.6 SAFETY WARNING .....	7
2. GENERAL DESCRIPTION .....	8
3. INSTALLATION .....	9
4. COMMISSIONING.....	10
5. MAINTENANCE .....	11
6. TECHNICAL SPECIFICATIONS .....	12
6.1 External Connections .....	13
6.1.1 Protective Earth.....	13
6.1.2 RS232 IDC and D-Type Connectors .....	13
6.1.3 Leased Line Connections.....	13
6.1.4 Switch Settings.....	14
APPENDIX A - TECHNICAL DRAWINGS .....	15
APPENDIX B - PART NUMBERS .....	16
LAST PAGE.....	17

## 1. INTRODUCTION

### 1.1 Purpose

This handbook contains the information needed to install and maintain the STCL MIDAS V26 Modem. In the interests of Health and Safety, when installing, using or servicing the equipment, the instructions in Section 1.6 should always be followed.

### 1.2 Scope

This document covers the general description and installation, commissioning and maintenance instructions for the MIDAS V26 Modem for use in the STCL MIDAS Transponder. This Handbook contains specific information for Highways Agency installations.

### 1.3 Related Documents

#### 1.3.1 Required Documents

The documents in the following table are referred to in the text of this handbook, and **are required** when installing, commissioning and maintaining MIDAS modem equipment.

STCL Documents	667/HB/26766/ETC	MIDAS Transponder System Handbook
Highways Agency Drawings	MCX 0156 Sheets 1 and 2 MCX 0594	NMCS Installation Cabinet 600 Installation Drawing NMCS 2 Midas Transponder and Outstation 600 Cabinet Arrangement
	MCX 0834 Sheets 1 - 4	600 Cabinet Equipment Configuration

## 1.3.2 Reference Documents

The documents in the following table may be referred to in the text of this handbook, but are not required when installing, commissioning and maintaining MIDAS modem equipment.

Highways Agency	TRG 1068 (Feb 1991)	Electro Magnetic Compatibility Test for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
	MCG 1088 B (Jan 1996)	NMCS2 MIDAS Transponder Acceptance Test Specification
	TR 1100 A (Feb 1991)	Technical & Quality Control Requirements for Systems, including parts of Systems, Manufactured, Supplied, Installed or Maintained
	TR 2066 C (Aug 1993)	HDLC Multi-drop Communications Electrical and Protocol
	TR 2130 B (May 1993)	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Road Traffic Control Equipment
	TR 2142 A (July 1993)	Message Control Message Sign Equipment
	TR 2146 A (June 1994)	MIDAS Outstation Link Specification
	TR 2168 C (Jan 1996)	MIDAS Transponder Specification
	TR 2171 A (June 1994)	LCC - Transponder Link Specification
	TR 2172 B (Sept 1994)	MIDAS Engineer's Terminal Link Specification
	TR 2173 C (Jan 1996)	MIDAS Message Specification
	TR 2178 C (Jan 1996)	MIDAS Interface Unit Specification
CCITT	K20	Lightning protection
	V.24	Definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
	V.26 Modem standard	2400 BPS Modem standard for use on leased lines
	V.28	Electrical Interface Specification
British Standards	BS6328 Part 1	BABT Specification. Apparatus for connection to Private Circuits
	BS EN 41003	Particular Safety requirements for equipment to be connected to telecommunications equipment
	BS EN 60950	Specification for Safety of Information Technology equipment, including electrical Business equipment
	BS7671	IEE Wiring Regulations
EC Directive	93/263/EEC	EEC Telecommunications Terminal Equipment Conformity Directive

## 1.4 Abbreviations

BABT	British Approvals Board of Telecommunications
BPS	Bits Per Second
CD	Carrier Detect
COBS	Control Office Base System
DC	Direct Current
DPSK	Digital Phase Shift Keying
HDLC	Higher level Data Link Control
IDC	Insulation Displacement Connector
IEE	Institution of Electrical Engineers
LCC	Local Communications Controller
LED	Light Emitting Diode
MIDAS	Motorway Incident Detection and Automatic Signalling
NMCS2	National Motorway Communications System Mk 2
PC	Personal Computer
PCB	Printed Circuit Board
PPC	Power PC
STCL	Siemens Traffic Controls Limited
TPR	Transponder

## 1.5 Issue State

- 1 Initial HA Submission
- 2 Incorporating HA comments
- 3 Further amendments
- 4 Incorporating HA comments

## 1.6 SAFETY WARNING

In the interests of Health and Safety when installing, using or servicing this equipment the following instructions must be noted and adhered to:

- i) Only skilled or instructed personnel with relevant technical knowledge and experience, who are also familiar with the safety procedures required when dealing with modern electrical and electronic equipment are to be allowed to use and/or work on the equipment.
- ii) Such personnel must take heed of all relevant notes, cautions and warnings in this handbook and any other document or handbook associated with the MIDAS V26 Modem including, but not restricted to, the following:
  - a) The equipment must be correctly connected to the specified incoming power supply.
  - b) The equipment must be disconnected/isolated from any incoming power supply before removing any protective covers, or working on any part from which protective covers have been removed.
  - c) All wiring must be carried out in accordance with the requirements of BS7671 (IEE Wiring Regulations).

## 2. GENERAL DESCRIPTION

The V26 Modem consists of a single extended Eurocard. It provides the interface between a CCITT V.24 Interface and an analogue leased line. It is a 4-wire multi-drop modem but can be programmed to 2-wire for other applications or used in point to point installations. In HA installations which use leased lines, 4-wire point to point mode is used. Where longitudinal lines are used the modem should be in 4-wire multi-drop mode, and should be switched to present a high impedance. Data modulation/demodulation used is Phase Shift Keying.

It transmits/receives synchronous data in half duplex mode into a 600Ω or a 300Ω load. It requires a single 5 Volt DC power supply which is provided by the Transponder. The transmission data rate is set to 2400 bits per second. Line protection circuitry incorporated on the board provides lightning protection.

An anti-streaming timer is used to stop faulty outstations from continuously transmitting data, stopping other outstations from communicating. If the anti-streaming timer is enabled only a limited amount of time will be allowed for transmission of data.

Five LEDs show the status of the modem board. They can be switched off independently to conserve power. They are:

LED	Colour	Action	Meaning
LP1	Green	1Hz Flash	Modem initialised and running (RUN)
		Off	Modem initialising, powered down or faulty
LP2	Red	On	Transmit Data (TXD) active
LP3	Red	On	Receive Data (RXD) active
LP4	Red	On	Request to Send (RTS) active
LP5	Red	On	Data Carrier Detect (DCD) active



### 3. INSTALLATION

- Switch the transponder off.
- Remove the top cover of the modem and set the switches as described in Section 6.1.4. Replace the modem cover.
- Connect the 4-way telephone line cable from the installation kit to TB1 as described in section 6.1.3.
- Remove the TPR front cover.
- Fit the card guides supplied with the modem to the rack in the correct orientation so that the modem LEDs will be visible through the aperture in the front panel.
- Slide in the Modem card.
- Connect the Earth connection to the equipment Earthing Point using the fixings supplied in the installation kit.
- Connect the 18-way flat cable to PL3 on the V26 modem and to the Power Processor PCB PL4.
- Replace the TPR front cover.
- Connect the 4-way telephone line cable by connecting the wires to the Klippon connector TBG4 to the rear of the 600 cabinet (see MCX 0594).

## 4. COMMISSIONING

- Switch on the transponder.
- Wait five seconds.
- Check the Green LED is flashing (indicating Modem is initialised and running).
- If the LCC, COBS and interconnecting wiring are installed and configured correctly the Red LEDs should now start flashing to indicate data transmission and reception. Check communications are established with the instation by observing these LEDs and interrogating the instation.

If data communications do not establish, check for correct signal levels. The STCL V26 modem should receive down to -30dBm and should launch -13dBm into a 600Ω load or -16dBm into 300Ω if the switches are set correctly.

Where the receive levels are correct and the switch settings are correct but there is no communications link established, then either the modem or the transponder is at fault. Swap out the modem and if that does not remove the fault refer to the fault finding section of the transponder handbook (see Section 1.3.1 for details). If the modem is faulty, it should be returned to a depot with the appropriate repair facilities, with a label stating the nature of the fault.

## 5. MAINTENANCE

Faulty modems should be replaced as described below and returned to a depot with the relevant repair facilities with a label stating the nature of the fault.

- Disconnect 4 wires from TBG4 on the rear of the 600 cabinet.
- Remove the TPR front panel.
- Remove the 18-way flat cable from the Power Processor PCB PL4.
- Disconnect the earth lead from the TPR.
- Remove the 4 wires of the telephone line cable from TB1.
- Slide the faulty board out.
- Remove the covers from both modems.
- Set up switches on the replacement board to match the switch set-up on the old board.
- Replace the modem covers.
- Re-connect the 4 wires of the telephone line cable to TB1 as described in section 6.1.3.
- Slide in the replacement board.
- Make earth connection to Modem Earthing Point on the TPR.
- Re-connect the 18-way flat cable to the Power Processor PCB PL4.
- Replace the TPR front panel.
- Re-connect the 4 wires to TBG4 on the rear of the 600 cabinet.

## 6. TECHNICAL SPECIFICATIONS

Mechanical	Size	Single extended Eurocard 100mm x 220mm x 30mm
	Weight	200g
Electrical	Voltage Current	+5 volt D.C. +/- 5% 100mA max.
Protocol	Baud Rate	2400 BPS CCITT Recommendation V26 B (DPSK - Digital Phase Shift Keying)
	Carrier Frequency	1800 Hz +/- 7Hz
Levels	Transmit	-13dBm into 600Ω (Default) -16dBm into 300Ω
	CD OFF to ON Threshold	-32dBm
	CD ON to OFF Threshold	-36dBm
Timings	RTS/CTS Delay	25msec nominal
	Carrier Detect Response Time	10msec maximum
Line Termination	High Impedance	>30kΩ at 3600Hz (default)
	300Ω Line	600Ω
	600Ω Line	1200Ω
Environmental	Temperature	-20°C to 70°C
	Humidity	0 to 95%

## 6.1 External Connections

### 6.1.1 Protective Earth

Earth to the protection circuit is provided by a PCB mounted solder pin connected to the Earth lead. This is then wired to the TPR rack on installation.

### 6.1.2 RS232 IDC and D-Type Connectors

Signal Name	Input/Output	18-way IDC Pin No. (PL3)	25-way D-Type Pin No. (SK1 Not fitted)
TXD	Input	3	2
TXCLK	Output	4	15
RXD	Output	5	3
RTS	Input	7	4
RXCLK	Output	8	17
CTS	Output	9	5
DSR	Output	11	6
SGND	-	13	7
DTR	Input	14	20
CD	Output	15	8
RI	Output	18	22
XTC	Input	-	24
+5V	-	16, 17	9, 10
0V	-	10, 12	18, 19

### 6.1.3 Leased Line Connections

Signal	TB1 Pin	Function	Cable Colour	T600 TBG4
TXA	1	Transmit A	Blue/White	3
RXA	2	Receive A	Orange/White	1
RXB	3	Receive B	White/Orange	2
TXB	4	Transmit B	White/Blue	4

## 6.1.4 Switch Settings

For HA installations use the default settings.

Switch	Slot	Position	Default	Function
S1	1	ON	Y	Transmit level <sup>1</sup>
		OFF		Invalid
	2	ON	Y	No Anti-Streaming
		OFF		Anti-Streaming Enabled (10 sec)
	3	ON	Y	CTS/RTS Delay=25mS
		OFF		CTS/RTS Delay=10mS
	4	OFF	Y	Not Used
	5	OFF	Y	Not Used
6	OFF	Y	Not Used	
7	OFF	Y	Not Used	
8	OFF	Y	Not Used	
S2	1	ON	Y	Enable Run LED
	2	ON	Y	Enable Transmit LED
	3	ON	Y	Enable Receive LED
	4	ON	Y	Enable Data Carrier Detect LED
	5	ON	Y	Enable Request-To-Send LED
	6	ON	Y	Not Used
	7	ON	Y	Not Used
	8	ON	Y	Not Used
S3	1	ON		External DSP Memory
		OFF	Y	Boot PROM
	2	ON	Y	Watchdog Enabled
		OFF		Watchdog Disabled
S4	1	OFF	Y	Tx Line Termination <sup>2</sup>
	2	OFF	Y	Tx Line Termination
S5	1	OFF	Y	Rx Line Termination <sup>2</sup>
	2	OFF	Y	Rx Line Termination
S6	1	ON	Y	4-Wire
		OFF		2-Wire

<sup>1</sup> S1.1 must be set correctly; if not, BAPT approval may be invalidated.

<sup>2</sup> Line Termination Impedances by S4 and S5:

Slot 1	Slot 2	Termination Impedance
off	off	> 30kΩ @ 3600 Hz
off	on	1200Ω
on	off	> 30kΩ @ 3600 Hz
on	on	600Ω

## APPENDIX A - TECHNICAL DRAWINGS

This Appendix contains the following drawings:

667/GA/26768/000	V26 Modem PCB Assy
667/GA/26769/ETC	V26 Modem PCB Assy
667/DA/26769/ETC	V26 Modem Circuit Diagram
667/GA/26789/000	Power PC Modem Cable Form (MIDAS)

The following pages in this Appendix are not included in the page numbering of this document.

## APPENDIX B - PART NUMBERS

<b>Equipment Description</b>	<b>Part No</b>
V26 Modem kit without packaging	667/1/26745/000
V26 Modem kit with packaging	667/1/26745/001
V26 Modem assembly	667/1/26768/000
V26 Modem PROM	667/1/12752/000
RS232 Power PC - Modem cable	667/1/26789/000
V26 Modem (Leased line) PCB Assembly	667/1/26769/000
V26 Modem (Leased line) SM Kit of parts	667/5/26769/000