REMOTE CONTROL PROTOCOL

Alteia
Professional Receivers and Decoders

Software Version 2.3 (and later)

M2/PSR/9xx[B][C], M2/PDU/9xx, M2/P8R/9xx, M2/PTR[E]/9xx[A] and Options

Typical Alteia Receiver

ENGLISH (UK)

READ THIS FIRST!

If you do not understand the contents of this manual
DO NOT OPERATE THIS EQUIPMENT**.**

Also, translation into any EC official language of this manual can be made available, at your cost.

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Se non si capisce il contenuto del presente manuale
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LÄS DETTA FÖRST!

Om Ni inte förstår informationen i denna handbok
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En översättning till detta språk av denna handbok kan också anskaffas, på Er bekostnad.

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O utilizador poderá também obter uma tradução do manual para o português à própria custa.

SUOMI

LUE ENNEN KÄYTTÖÄ!

Jos et ymmärrä käsikirjan sisältöä
ÄLÄ KÄYTÄ LAITETTA.

Käsikirja voidaan myös suomentaa asiakkaan kustannuksella.

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LÆS DETTE FØRST!

Udstyret må ikke betjenes
MEDMINDRE DE TIL FULDE FORSTÅR INDHOLDET AF DENNE HÅNDBOG.
Vi kan også for Deres regning levere en dansk oversættelse af denne håndbog.

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ΜΗΝ ΛΕΙΤΟΥΡΓΗΣΕΤΕ ΑΥΤΟΝ ΤΟΝ ΕΞΟΠΛΙΣΜΟ.

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Si no entiende el contenido de este manual
NO OPERE ESTE EQUIPO.

Podemos asimismo suministrarle una traducción de este manual al (idioma) previo pago de una cantidad adicional que deberá abonar usted mismo.

List of Contents

About this Manual

This manual provides instructions and information for the Remote Control Protocol of the Alteia and Alteia *plus* family of receivers and decoders.

This manual should be kept in a safe place for reference for the life of the equipment. It is not intended that this manual will be amended by the issue of individual pages.

Any revision will be by a complete reissue. Further copies of this manual can be ordered from the address shown on *page vi.* If passing the equipment to a third party, also pass on the relevant documentation.

Issues of this manual are listed below:

Issue	Date	Software Version	Comments
1	Sept 1998	1.0	Initial issue
1r 1	July 1998	1.0 – 2.2	Manual range restricted to Software versions 1.0 – 2.2. New language boxes and Contact information. Index rebuilt.
2	Aug 1999	1.0 - 2.3	Text and table content changes done in all chapters, new sections 2.2.14 and tables 3.24 – 3.27 have been inserted.
3	Nov 1999	1.0 - 2.3	Reformat to TANDBERG Television Ltd. Annex C: Calculation of the Checksum, added. Small changes to 3-4 - 3-5.
4	May 2000	2.3 – 2.4	Reformat to new TANDBERG Television Ltd housestyle. Addition in Chapter 6 of remote control relay commands. Small change to Table 3.11. Index entries expanded and rebuilt.
5	Sept 2000	2.3 – 2.6	Reformat to new corporate housestyle. DVB BISS entries added to Chapters 2 and 3.

The following associated manuals are also available:

- ST.TM.E9200: Alteia Professional Receivers and Decoders
- ST.QR.E9200: Quick Reference Guide
- ST.MM.E9200: Maintenance Manual
- ST.QR.Director.E9200: Quick Reference Guide
  (Using the Alteia Receiver with the NDS Director System)

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Warnings, Cautions and Notes

Heed Warnings

All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

Read Instructions

All the safety and operating instructions should be read before this product is operated.

Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

The safety and operating instructions should be retained for future reference.

> **WARNINGS....**
>
> **WARNINGS GIVE INFORMATION WHICH, IF STRICTLY OBSERVED, WILL PREVENT PERSONAL INJURY OR DEATH, OR DAMAGE TO PERSONAL PROPERTY OR THE ENVIRONMENT. THEY ARE BOXED AND SHADED FOR EMPHASIS, AS IN THIS EXAMPLE, AND ARE PLACED IMMEDIATELY PRECEDING THE POINT AT WHICH THE READER REQUIRES THEM.**

> **CAUTIONS...**
>
> Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

> **NOTES...**
>
> Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

EMC Compliance

This equipment is certified to the EMC requirements detailed in *Annex B, Technical Specification*. To maintain this certification, only use the leads supplied or if in doubt contact Customer Services.

Contact Information

TANDBERG Television Customer Services

Support Services

Our primary objective is to provide first class customer care that is tailored to your specific business and operational requirements. All levels are supported by one or more service performance reviews to ensure the perfect partnership between TANDBERG Television and your business.

Levels of Support

We offer a number of support service levels so you can choose the one most appropriate to your business requirements.

- For the initial 12 months, Bronze Level Support is provided free on this product. An extended time period can be purchased for this level.

- Silver Level Support extends the coverage to include on-site support, preventive maintenance and discount on pre-designed training.

- The Gold Level Support gives an enhanced support package. It builds on the Silver Level by including advanced repair exchange, an account focused engineer, version migration support and further discount on predesigned training.

Where to Find Us

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Technical Training

Training Courses

TANDBERG Television provides a wide range of training courses on the operation and maintenance of our products and on their supporting technologies. TANDBERG can provide both regularly scheduled courses and training tailored to individual needs. Courses can be run either at your premises or at one of our dedicated training facilities.

Where to Find Us

For further information on TANDBERG Television's training programme please contact us:

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International Facsimile   +44 23 8048 4467

E-mail Address: training@tandbergtv.com
Internet Address   http://www.tandbergtv.com

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Strategic Park
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Technical Publications

If you need to contact TANDBERG Television Technical Publications regarding this publication, e-mail: techpubs@tandbergtv.com.

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Chapter 1

Setting up the Remote Control

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List of Illustrations

List of Tables

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1.1   Introduction

1.1.1   Scope of this Manual

Hardware

The Receiver (PSR9xx[B][C], PTR[E]9xx[A] and P8R9xx) and Decoder (PDU9XX), referred to collectively as a receiver, are components of the ALTEIA range of equipments. They are designed for use by broadcasters and distributors of video and audio services.

Software

This manual includes commands which are backwardly compatible with TANDBERG Television Ltd System 3000 Receivers (software versions 3.3 and later). **All new commands that are exclusive to the Alteia and Alteia *plus* ranges are highlighted by the use of shading.** This specification applies to Alteia software versions 2.3 and later. Not all Alteia models or software versions support all commands, please check the Instruction Manual for your model to see which commands will be valid.

Receiver / Decoder / DVB-T

Some of the protocol described in this manual is only used by the Receiver or the DVB-T and is not implemented by the Decoder. The affected sections have the legend **Receiver only** or **DTTV only** as part of the appropriate headings and captions.

1.1.2   Local Control

Local control of the receiver is enabled by using the front panel controls (see *ST.TM.E9200 Instruction Manual, Alteia Professional Receivers and Decoders*) which operate in conjunction with the front panel display menus.

1.1.3   Remote Control

Alternatively, the serial Control port at the rear of the receiver can be used to configure and control the receiver instead of the front panel controls. The front panel REMOTE CTRL LED is lit when in this mode.

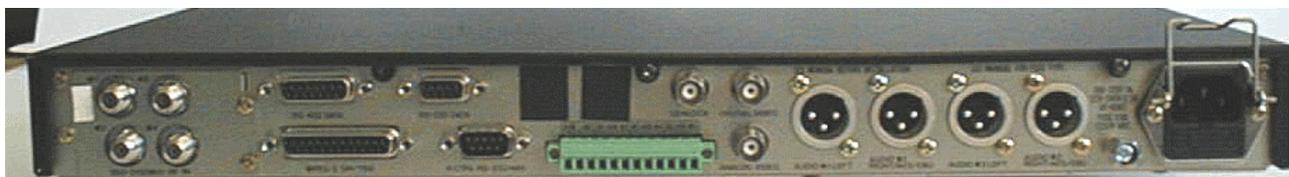
Figure 1.1: Rear View of a Typical Receiver

The protocol employed to operate over the communications link between the Control port and the receiver is proprietary. It can be used to offer remote control for use by the customer to develop his own configuration and control application software. *Chapters 2* to *6* of this manual describe the protocol for the Alteia Receiver / Decoder / DVB-T.

NOTES...

1. The M2/PRO/CTRL software will not cover all the protocol items described in this manual. Check with Customer Services for specific requirements.

2. The use of the protocol is subject to licensing restrictions; information in this manual should not be disclosed or passed to an unauthorised third party.

1.2   Control Connector

1.2.1   RS-232

Table 1.1 gives the specification for the control connector located at the rear of the receiver for use with RS-232.

Table 1.1: RS-232 Control Connector Specification

Item	Specification
Connector type	9-way D-type male
Connector designation	CONTROL
Standards	EIA RS-232C (ITU-T BT V.24)
Configuration	DTE
Line length	< 15 metres
Baud rate	9600
Protocol	TANDBERG Television / SCC proprietary
	Data bits: 8
	Stop bits: 1
	Parity: none

Table 1.2 describes the Control connector pins.

Table 1.2: Connector Pin-out for RS-232

Connector Pin	Description
Pin 1	Received Line Signal Detector (RSD)
Pin 2	Receive Data (RxD)
Pin 3	Transmit Data (TxD)
Pin 4	Data Terminal Ready (DTR)
Pin 5	Ground
Pin 6	DCE Ready (DCE)
Pin 7	Request to Send (RTS)
Pin 8	Clear to Send (CTS)

1.2.2 RS-485

Table 1.3 gives the specification for the control connector located at the rear of the receiver for use with RS-485.

Table 1.3: RS-485 Control Connector Specification

Item	Specification
Connector type	9-way D-type male
Connector designation	CONTROL
Standards	EIA RS-485
Configuration	DTE
Line length	< 15 metres
Baud rate	9600
Protocol	TANDBERG Television / SCC proprietary
	Data bits: 8
	Stop bits: 1
	Parity: none

Table 1.4 describes the Control connector pins.

Table 1.4: Connector Pin-out for RS-485

Connector Pin	Description
Pin 4	Receive Data (RXA)
Pin 5	Ground
Pin 6	Transmit Data (TXZ)
Pin 7	Transmit Data (TXY)
Pin 8	Receive Data (RXB)

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Chapter 2

Commands and Acknowledgements

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2.1 Command Syntax

2.1.1 Summary

The format for remote controls is in the form:

$$\backslash ADDR:CMD;SUB=NNN\ldots\_\$FF_{C_R}$$

…where the parts are summarised in *Table 2.1*.

Table 2.1: Summary of Command Message Components

String	Description
\ADDR	This preamble string is the Access number of an receiver, 000 is the default and is used throughout the examples in this manual.
:CMD	The command group associated with a functional area within the receiver. Command group identifiers include TUN (4:2:2 Receiver only), SYS etc.
;SUB	The subcommand specifying the parameter to be altered.
=NNN..._	The control string or argument which specifies the action required, it is variable in length and is defined in the following tables.
$FF	An optional checksum. This is a truncated eight bit sum of all the characters sent except the "$" checksum lead-in character. It is sent as two hexadecimal digits with the MSB first. Throughout this document, the value FF is used as an example.
C_R	Carriage return (which is used to terminate the message).

The colon (:) and semi-colon (;) before the command group and the sub-command group are mandatory. The equals sign (=) after the sub-command group is only necessary if a control string or value is to follow.

2.1.2 General

All messages begin with a preamble string. The main command follows and then the sub-command with a terminator character. This string is suffixed with the checksum lead-in character ($) and then the checksum. The complete message is terminated with a carriage return.

Only one sub-command may be sent in a command frame, there is no concatenation of commands between the main command and the checksum.

A brief description is given in *Table 2.1*, following is a more detailed description.

2.1.3 Preamble and Addressing

All messages to and from a receiver begin with the string \ADDR (where ADDR is the receiver's Access number). If a number has not been allocated (using the front panel menu structure or the remote control IDN command - see *Chapter 5, Remote Commands and Replies*) the default 000 is used. The range is 000 to 998 with 999 reserved for future use.

Incorrectly addressed commands are ignored by the receiver.

2.1.4   Main Command (:CMD)

Each main command consists of a three letter mnemonic preceded by a colon. This string defines the area of receiver operation to which the command applies.

2.1.5   Sub-Command (;SUB)

This is a three letter mnemonic preceded by a semi-colon. It specifies the parameter to be altered or status to be returned.

2.1.6   Control String or Argument (=NNN...)

Following the main and sub-commands is an optional control string (or argument) which specifies the actions of the commands. When present, the control string is preceded by the equals sign (=). The string can either be a numerical value or a text defining the required state.

2.1.7   Termination (_)

Each command set ends with an underscore character which terminates the complete string. This is not necessarily the end of the message, the checksum and Carriage Return (C$_R$) may follow.

2.1.8   Checksum ($FF)

Messages sent from the receiver always contains a checksum. It is optional on messages sent to the receiver. The checksum is preceded by the $ identifier. If a received checksum is incorrect, the message is ignored.

In the examples throughout this book, the value FF is used to indicate a checksum. This will not normally be the case as the actual value depends on the contents of the rest of the message.

2.2   Commands

2.2.1   Tuner Commands (TUN)

Tuner commands control the function and operation of the L-band tuner. The tuner command format is:

\OOO: TUN; SUB=NNN..._FFC_R$

Table 2.2: Tuner Commands

SUB	Description	NNN...	Description
FRQ	Manually tune to given frequency	dddddd	125 kHz steps
LNB	Set LNB local oscillator frequency (See Note...)	dddddd	125 kHz steps
POL	Set the LNB polarisation	HOR	Horizontal Polarisation
		VER	Vertical Polarisation
SPC	Not Used	NRM	Returns NAK
		INV	
RFI	RF input Port	NO X	X=1..4
RFS	Get RFI Status	----	NO X (X =1..4)
LO2	Set LNB local oscillator frequency 2 (See Note...)	dddddd	125 kHz steps
SOF	Set Switch over point (See Note...)	dddddd	125 kHz steps
PWR	LNB DC Output	ON	DC output enabled
		OFF	DC output disabled
		BST	DC output boosted
SER	Set Search Range	dddd	1 kHz steps (range 0001 to 5000)
MOD	Set Modulation Type	QPS	QPSK
		BPS	BPSK
		8PS	8PSK
SRQ	Requests tuner status	—	Refer to *Chapter 3.*

> **NOTE...**
> To set LNB to "no LNB" use command LNB with frequency of 0. To set LNB to "normal LNB" use command LNB with frequency set to oscillator 1 frequency as required. To set " dual LNB" first use command LNB to set oscillator 1 frequency, the use command L02 to set oscillator 2 frequency. Finally use command SOF to set the switch over frequency (above which oscillator 2 is selected). This order of commands must be followed when setting a dual LNB.

2.2.2 Decoder Commands (DEC)

Decoder commands control the function and operation of the Decoder. The Decoder command format is:

\OOO: DEC; SUB=NNN..._FFC_R$

Table 2.3: Decoder Commands

SUB	Description	NNN...	Description
DSR	Set Decoder Source	AUT	Auto
		SPI	SPI
		ASF	ASI-Fibre
		ASC	ASI-Copper
SRQ	Requests Decoder status	—	Refer to *Chapter 3*.

2.2.3 DVB-T Commands (DTV)

DTV commands control the function and operation of the DTV tuner. The DTV command format is:

$$\backslash OOO: DTV; SUB = NNN...\_\$FFC_R$$

Table 2.4: DVB-T Commands

SUB	Description	NNN...	Description
CHN	UHF Channel #	dd	21..69
CHS	Channel Space	6	6 MHz
		7	7 MHz
		8	8 MHz
OFS	Offset	POS	Positive offset (sets offset to +1)
		ZER	Zero offset
		NEG	Negative offset (sets offset to –1)
OFV	Offset Value (See Note...)	d	Value of 1....9
GDI	Guard Interval	1/32	Guard Interval 1/32
		1/16	Guard Interval 1/16
		1/8	Guard Interval 1/8
		¼	Guard Interval ¼
BER	BER Alarm Threshold (post Viterbi)	XE-X	Set threshold above which bit error ratio alarm operates
SDM	Signal Degradation Mode (Old Command)	OFF	Same as SDV=0
		ON	Same as SDV=1
ERR	Requests Current BER	none	Returns
			\000:DTV;PRE=n.nnE-n_POST=n.nnE-n_$FFC_R
			Where n.nnE-n are VITERBI Error Values
OCM	OFDM Carrier Mode	2	2k
		8	8k
SDV	Signal Degradation Mode	d	d=0....7 where 0=OFF
DHS	Hierarchy Stream	HP	High Priority
		LP	Low Priority
INS	Input Selection	UHF	UHF Input
		BAS	Baseband
		IUH	Inverted UHF Input
		IBA	Inverted Baseband
SRQ	Requests Current status	none	Refer to *Chapter 3*.

> **NOTE...**
>
> Will give a positive offset of the value specified if OFS was last set to ZER or POS. Will give a negative offset of the value specified if OFS was last set to NEG.

2.2.4   Demodulator Commands (DEM)

Demodulator commands control the process of turning the QPSK or BPSK signals into a bit-stream for demultiplexing. The expected symbol rate and FEC coding can be altered using these commands. The demodulator command format is:

$$\text{\textbackslash OOO: DEM; SUB=NNN..._\$FFC}_R$$

Table 2.5: Demodulator Commands

SUB	Description	NNN...	Description
FEC	Forward Error Correction Rate	1/2	FEC rate 1/2
		2/3	FEC rate 2/3
		3/4	FEC rate 3/4
		4/5	FEC rate 4/5
		5/6	FEC rate 5/6
		6/7	FEC rate 6/7
		7/8	FEC rate 7/8
		1/1	Returns NAK
		8/9	FEC rate 8/9
BER	Set BER alarm Threshold	XE-X	Set threshold above which BER alarm operates.
SIG	Set Signal Level Alarm Threshold	000-255[1]	Set signal level below which signal level alarm operates.
SYM	Symbol Rate	250000[2]	e.g. 25 Mbit/s / 100 bit/s steps.
SRQ	Demodulator Status Request	—	Refer to *Chapter 3.*

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[1] Three digit decimal with leading zero padding.
[2] Six digit decimal number with leading zero padding.

2.2.5 Audio 1 Commands (AUD)

Audio commands allow the configuration of the Audio 1 sound circuits. They have the following format:

\000: AUD; SUB=NNN..._FFC_R$

> **NOTE...**
>
> The receiver's audio 1 output will automatically adjust its mode to suit the incoming signal. For example, if the receiver is set for stereo and the incoming signal is dual mono, the output will be dual mono. The commands listed in *Table 2.6* allow further flexibility.

Table 2.6: Audio 1 Commands

SUB	Description	NNN...	Description
ROU	Set Audio Routing	ST	Stereo, L to Left and R to Right
		M1	Mono, to Left and Right (Not supported at present by Alteia)
		M2	Mono, L to Left and Right
		M3	Mono, R to Left and Right
LEV	System Gain	Mdd	06~18 system gain in dB
OUT	Select output type	ANA	Analogue
		PRO	Professional AES/EBU
		SPD	Consumer SPDIF
		AC3	Consumer IEC958 AC3
DFL	Default Language	XXX	3 char language format (Lower case)
LVL	Output level	NEGdd	Negative, dd = 01 ~30 (level offset x 0.1 dB)
		POSdd	Positive, dd = 00 ~30 (level offset x 0.1 dB)
ADM	AC3 downmixing mode	CON	Conventional Stereo
		PLS	Pro Logic Stereo
OPS	Output Source	0	Normal Audio
		1	Test Sequence 1
		2	Test Sequence 2
		3	Test Sequence 3
		4	Test Sequence 4
		5	Test Sequence 5
SRQ	Requests Audio Status	—	Refer to *Chapter 3.*

2.2.6 Audio 2 Commands (AU2)

Audio commands allow the configuration of the Audio 2 sound circuits. They have the following format:

\000:AU2;SUB=NNN..._FFC_R$

> **NOTE...**
>
> The receiver's audio 2 output will automatically adjust its mode to suit the incoming signal. For example, if the receiver is set for stereo and the incoming signal is dual mono, the output will be dual mono. The commands listed in *Table 2.7* allow further flexibility.

Table 2.7: Audio 2 Commands

SUB	Description	NNN...	Description
ROU	Set Audio Routing	ST	Stereo, L to Left and R to Right
		M1	Mono, to Left and Right (Not supported at present by Alteia)
		M2	Mono, L to Left and Right
		M3	Mono, R to Left and Right
LEV	System Gain	Mdd	06~18 system gain in dB
OUT	Select output type	ANA	Analogue
		PRO	Professional AES/EBU
		SPD	Consumer SPDIF
		AC3	Consumer IEC958 AC3
DFL	Default Language	XXX	3 char language format (Lower case)
LVL	Output level	NEGdd	Negative, dd = 01 ~30 (level offset x 0.1 dB)
		POSdd	Positive, dd = 00 ~30 (level offset x 0.1 dB)
ADM	AC3 downmixing mode	CON	Conventional Stereo
		PLS	Pro Logic Stereo
OPS	Output Source	0	Normal Audio
		1	Test Sequence 1
		2	Test Sequence 2
		3	Test Sequence 3
		4	Test Sequence 4
		5	Test Sequence 5
SRQ	Requests Audio Status	——	Refer to *Chapter 3.*

2.2.7 Video Commands (VID)

These commands enable the selection of various TV line standards and enable a choice of output if the receiver loses its input. The format is:

\OOO:VID;SUB=NNN..._FFC_R$

Table 2.8: Video Commands

SUB	Description	NNN...	Description
625	Set 625 Colour Standard	PALI	PAL- I
		PALB	PAL BG
		PALN	PAL N
		ALAM	Alarm (Not supported at present by Alteia)
525	Set 525 Colour Standard	NTSC	NTSC-M with pedestal
		NTSN	NTSC-M without pedestal
		PALM	PAL-M
		ALAM	Alarm (Not supported at present by Alteia)
ERR[1]	Set Freeze or Black Frame on Video Loss	FRZ	Freeze Frame on video loss
		BLK	Black frame on video loss
OSD	Not Used		Returns ACK
SYN	Not Used		Returns ACK
CAL	Not Used		Returns ACK
SAR	Read Video Aspect Ratio	none	Returns 4/3 or 16/9
LVL		NEGdd	Negative, dd = 01~30 (level offset % relative to
		POSdd	Positive, dd = 00~30 normal output)
BMD	Set Boot Mode	525	525 line video
		625	625 line video
ASR	Returns Boot Mode	none	Returns 525 or 625
OPS	Output Source	00	Normal Video
		01	625 Test 1
		02	625 Test 2
		03	625 Test 3
		04	625 Test 4
		05	625 Test 5
		06	625 Test 6
		07	625 Test 7
		08	625 Test 8
		09	625 Test 9
		10	625 Test 10
		11	625 Test 11
		12	625 Test 12
		13	625 Test 13
		14	625 Test 14
		15	625 Test 15
		16	625 Test 16
		17	525 Test 1
		18	525 Test 2
		19	525 Test 3

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[1] The NO SYNCS option is not supported by the Remote Control Protocol.

SUB	Description	NNN...	Description
		20	525 Test 4
		21	525 Test 5
		22	525 Test 6
		23	525 Test 7
		24	525 Test 8
		25	525 Test 9
		26	525 Test 10
		27	525 Test 11
		28	525 Test 12
		29	525 Test 13
		30	525 Test 14
		31	525 Test 15
		32	525 Test 16
SRQ	Requests Video Status	—	Refer to *Chapter 3.*
EDH	Error detection Hierarchy	ENA	Enable EDH pass- through
		DIS	Disable EDH pass - through
EAC	Embedded Audio Channel	LEF	Left channel only
		RIG	Right channel only
		BOT	Both channels
		NON	None (Disable)
EAD	Embedded Audio Data ID	xxx	3 digit hex number in range 0x000 -> 0x7FF
FSY	Frame Sync (Genlock)	ENA	Enabled Frame Sync Output
		DIS	Disabled Frame Sync Output
FS6	Frame Sync Offset for 625	POSnnnnn	Positive offset – in range 0 to + 13824
		NEGnnnnn	Negative offset – in range –1 to -13824
FS5	Frame Sync Offset for 525	POSnnnnn	Positive offset – in range 0 to + 13728
		NEGnnnnn	Negative offset – in range –1 to -13728

2.2.8   4:2:2 Mode Commands

The 4:2:2 Mode commands control the video aspect ratio settings. The general format is as follows:

\000:422;SUB=NNNNNN..._FFC_R$

Table 2.9: 4:2:2 Commands

SUB	Description	NNN...	Description
VAR	Video Aspect Ratio	4:3	Monitor aspect ratio
		16:9	
SRQ	Requests Current Settings	—	Refer to *Chapter 3*.

2.2.9   System Index Bypass Service Selection (SIB)

System index bypass selection commands are used to control directly which elementary streams are required. This bypasses the Service Guide and other Service Information (SI) tables. The general form of the message is as follows:

\000:SIB;XXX=NNNNNN_FFC_R$

Table 2.10: System Index Bypass Commands

SUB	Description	NNN...	Description
VID	Select Video	0000-1FFF[1]	Select Video by PID.
AUD	Select Audio 1	0000-1FFF[1]	Select Audio 1 by PID.
AU2	Select Audio 1	0000-1FFF[1]	Select Audio 1 by PID.
TTX	Select Teletext	0000-1FFF[1]	Select Teletext by PID.
HSD	Select Sync Data	0000-1FFF[1]	Select High Speed Data by PID.
LSD	Select Async Data	0000-1FFF[1]	Select Low Speed Data by PID.
OP1	Not Supported		Returns NAK
OS1	Not Supported		Returns NAK
OP2	Not Supported		Returns NAK
OS2	Not Supported		Returns NAK
PCR	Program Clock Reference	0000-1FFF[1]	Select Program Clock Reference by PID.

---

[1] Four digit hexadecimal number with leading zero padding.

2.2.10 Subtitle/VBI Commands (SVB)

Subtitle/VBI commands allow the configuration of VBI re-insertion and Subtitle language. They have the following format:

\OOO:SVB;SUB=NNN..._FFC_R$

Table 2.11: Subtitle/VBI Commands

SUB	Description	NNN...	Description
DFL	Set Default Language	XXX	3 character language code (Lower case)
SBT	Select DVB Subtitles	XXX	3 character language code (Lower case)
VIT	VITS Insertion	CCR	Enable insertion of CCIR VITS
		FCC	Enable insertion of FCC/UK VITS
		DIS	Disable VITS insertion
SRQ	Requests Subtitle/VBI Status	—	Refer to *Chapter 3*.
VTC	VITC Insertion	ENA	Enable VITC insertion
		DIS	Disable VITC insertion
GCR	GCR Insertion	ENA	Enable GCR insertion
		DIS	Disable GCR insertion
EN5	525 line VBI Reinsertion Enables	xxxx	16 bit hex value indicating lines to be enabled. See Table 2.12
EN6	625 line VBI Reinsertion Enables	xxxx	16 bit hex value indicating lines to be enabled. See Table 2.12
SRQ	Requests Subtitle/VBI Status	—	Refer to *Chapter 3*.

Table 2.12: VBI line Bit Values

VBI Line	Pattern (hex)
8	0001
9	0002
10	0004
11	0008
12	0010
13	0020
14	0040
15	0080
16	0100
17	0200
18	0400
19	0800
20	1000
21	2000
22	4000
23	8000

A set bit indicates that the corresponding VBI line is enabled, a clear bit denotes that the corresponding VBI line is disabled.

2.2.11   Transport Stream Output Commands (TSO)

Transport Stream Output Commands allow the configuration of the ASI option module (when present). They have the following format:

\000:TSO;SUB=NNN..._$FFC_R

Table 2.13: TSO Commands

SUB	Description	NNN...	Description
CAM	TS Stream Route	PRE	Pre-CA
		PST	Post-CA
ENA	TSO Fibre Output	ENA	Enable Fibre Output
		DIS	Disable Fibre Output
SRQ	Requests TSO Status	—	Refer to *Chapter 3.*

2.2.12   Service Selection Commands (SER)

Once a service has been selected, the service enquiry command (refer to *Chapter 4, Service Enquiry Commands and Replies*) can be used to identify available auxiliary elementary streams. Service selection commands can then be used to control which service or part of a service is received from the current transport stream.

There are also sub-commands to allow the selection of a service without reference to the service guide.

The service selection command format is:

\OOO:SER;SUB=NNN..._FFC_R$

Table 2.14: Service Selection Commands

SUB	Description	NNN...	Description
STR	Select Start Up Service by Index into Service Guide	00000-00255[1]	Not used. Always returns ACK.
SEL	Select Service from Service Guide. *See Note following.*	00000-00255[1]	Select Service by offset in Guide. First entry has offset 0.
SID	Select Service by ID	TTTTT, NNNNN, SSSSS[1]	Select Service by Transport, Network and Service IDs.
FAV	Select a Favourite Service	nn[2]	00 to 19
AUD	Select Audio 1	0000-1FFF[3]	Select Audio 1 by PID.
LSD	Select Async Data	0000-1FFF[3]	Select Low Speed Data by PID.
OP1 OS1 OP2 OS2	Not Supported		Returns ACK
A1L	Select Audio 1	XXXXX	Select Audio 1 by reference from (ENQ:AUN)
A2L	Select Audio 2	XXXXX	Select Audio 2 by reference from (ENQ:AUN)
DFT	Set Default Favourite Service	nn	00 to 19, 20[4]
CLR	Clear a Favourite Service	nn	00 to 19 (Not supported at present by Alteia)
SET	Set Favourite Service	nn	00 to 19 Store current service in NVRAM.
SAQ	Service Acquisition Mode	ACO	Actual only
		ATH	Actual and Other (Not supported at present by Alteia)
SRQ	Service Status request	—	Refer to *Chapter 3*.

> **NOTE...**
> ENQ;NUM returns the total number of services (0 to 65535). SEL is limited to 256.

---

[1] Five digit decimal with leading zero padding.
[2] Two digit decimal with leading zero padding.
[3] Four digit hexadecimal number with leading zero padding.
[4] Indicates that last valid service is used as default.

2.2.13   CA Commands (CAS)

The CA command format is:

\000: CAS; SUB=NNN…_FF_R$

Table 2.15: Service Selection Commands

SUB	Description	NNN...	Description
MPS	Medium Priority Stream	VID	Video
		AUD	Audio 1
		AU2	Audio 2
		TXT	Teletext
		DVS	DVB Subtitles
		LSD	Async Data
		HSD	Sync Data
		VBI	VBI Data
LPS	Low Priority Stream	VID	Video
		AUD	Audio 1
		AU2	Audio 2
		TXT	Teletext
		DVS	DVB Subtitles
		LSD	Async Data
		HSD	Sync Data
		VBI	VBI Data
RAM	RAS Mode	FIX	Fixed
		DSN	DSNG
		SCA	Secondary CA
		DIS	Disable RAS and Secondary CA
BIS	BISS Mode	DIS	Disabled
	Mode 1	MO1	Mode 1
	Mode 2	MO2	Mode 2
	Mode 3	MO3	Mode 3
BM1	BISS Mode 1 Key	XXXXXXXXXXXX	12 characters (6 byte hex) 0 to F
BM2	BISS Mode 2 Key	XXXXXXXXXXXXXX	14 characters (7 byte hex) 0 to F
BKE	BISS Mode 2 & 3 fixed bits	XX	1 character (1 byte hex) 0 to F
DSK	DSNG Key	XXXXXXX	0 to 9999999
SRQ	Service Status request	—	Refer to *Chapter 3.*

2.2.14   NCP Commands (NCP)

The NCP commands allow access to the NDS Director NCP pending command buffers and executed command buffers from the remote control. The following commands will always work whether or not the Alteia is in remote control mode, since it is likely that the Alteia will be in over air control mode when they are issued through the remote control.

The NCP buffer access command format is:

\000: NCP; SUB=NNN…FF_R$

Table 2.16: NCP Commands

SUB	Description	NNN...	Description
PCC	Return number of commands in the pending command buffer	None	Returns \000:NCP;PCC=nnn_$FFC_R Where nnn is the (decimal) number of pending messages
GPM	Return pending message from buffer	ddd	Message number to get, valid values are between 1 and the return value of PCC (decimal)
ECC	Return number of commands in the executed command buffer	None	\000:NCP;ECC=nnn_$FFC_R Where nnn is the (decimal) number of executed messages
GEM	Return executed message from buffer	ddd	Message number to get, valid values are between 1 and the return value of ECC (decimal)

The GPM and GEM messages will have similar reply formats:

$\000:NCP;GPM=nnn\_DAT=hh..._\$FFC_R$

$\000:NCP;GEM=nnn\_DAT=hh..._\$FFC_R$

Where:

nnn is the (decimal) message number in the buffer (same as requested)

hh... is the whole NCP message returned in ASCII hexadecimal format with every 2 ASCII digits representing 1 byte of the original message

If a request is made for a message that does not exist then the Alteia will reply with:

$\000:NCP;GPM=nnn\_DAT=\_ \$FFC_R$

or

$\000:NCP;GEM=nnn\_DAT=\_ \$FFC_R$

2.3 Message Acknowledgements

2.3.1 Types of Commands

Commands which do not request a status message produce an acknowledgement message which confirms receipt. There are two types of message. The positive acknowledgement message confirms correct interpretation of the received command. The negative acknowledgement message confirms receipt of a command but is unable to recognise or support it.

Table 2.17: Message Acknowledgement Types

Message Type	String
Positive	\000:XXX;YYY=ACK_$FFCR
Negative	\000:XXX;YYY=???_$FFCR

2.3.2   Acknowledgement Messages

Use of the Acknowledgement Message

The acknowledge message gives feedback to the operator concerning the action taken by a receiver on receipt of a command. The acknowledgement is one of two types:

1. command is accepted and processed (positive acknowledgement);

2. command is not understood/supported (negative acknowledgement).

Positive Acknowledge Message

This message indicates that a command has been correctly received and it was not a Status request. The format of the message is:

$$\text{\textbackslash 000:XXX;YYY=ACK\_\$FFC}_R$$

…where XXX and YYY are the command and sub-command of the received message.

Negative Acknowledgement Message

This message indicates that a command was received but not recognised. The format of this message is:

$$\text{\textbackslash 000:XXX;YYY=???\_\$FFC}_R$$

…where XXX and YYY are the command and sub-command of the received message. The field ??? is one of the following entries:

1. NAK - command not recognised;

2. LCL - receiver in Local Control (therefore the command is ignored).

2.3.3   Ignored Commands

Commands that are clearly incorrect due to possible communications errors will be ignored. The sender should time-out and then retransmit the command. The number of retries in this situation should be controlled to prevent indefinite loops.

> **NOTE...**
> If it is the checksum which is incorrect, the message is ignored.

Chapter 3

Request Status Commands and Messages

Contents

BLANK

3.1 Scope of this Chapter

Status request commands produce status information. All other commands produce an acknowledgement that the command was correctly interpreted or it was rejected.

3.2 Request Status

3.2.1 Alarm Status (SYS;SRQ)

This is discussed more fully in *Chapter 6, System Commands and Replies*

Table 3.1: Alarm Status

Command String	Response Message
\000:SYS;SRQ_FFC_R$	\000:SYS;STA=XXXX_FFC_R$

> **NOTE...**
>
> XXXX the hex value representing a bit mask of the current error status of the receiver. The mask is as shown in *Table 3.2*.

Table 3.2: Alarm Status Bit Mask

Bit Mask	Information Carried	Alteia Equivalent
0010	Temperature Over Threshold	Temperature
0020	Signal Level Too Low	Sig Level
0040	Module 2 Error	Not used
0080	Module 1 Error	Not used
0100	Low-speed Data Error	ASYNC Data
0200	Audio Lock	Audio 1
0400	Unsupported Video Standard	Not used
0800	Video Lock	Video
1000	Demux Lock	Not used
2000	BER Over Threshold	BER
4000	CA Alarm	CA
8000	Demod Lock	Input

3.2.2   System Status (SYS;SRS)

Table 3.3: System Status

Command String	Response Message
\000:SYS:SRS_FFC_R$	\000:SRS;CMO=LOM_SRB=DIS_5VS=22_FFC_R$

The values/conditions following the sub-command are shown in *Table 3.4*.

Table 3.4: System Status Message Sub-Commands

Sub-Command	Description	Range
CMO	Control Mode	LOM : Local Mode
		RCM : Remote Mode
		OAM : Over-Air Mode
SRB	Set Small Rate Buffer Mode	ENA : Enable
		DIS : Disable
5VS	525 Video Start Line	22
		23

3.2.3   Tuner Status (TUN)

Table 3.5: Tuner Status

Command String	Response Message Example
\000:TUN;SRQ_FFC_R$	\000:TUN;FRQ=094000_AFC=ON._LNB=080000_PWR=OFF._POL=HOR_SPC=NRM_RFI=1_ LNT=DUA_LO2=080000_SOF=012800_SER=5000_MOD=QPS_FFC_R$

The values/conditions following the sub-commands are shown in *Table 3.6*.

Table 3.6: Tuner Status Message Sub-Commands

Sub-Command	Description	Range
FRQ	Tuner Frequency	Decimal number x 125 kHz steps
AFC	Automatic Frequency Control	Returns OFF.
LNB	LNB Local Oscillator frequency	Decimal number x 125 kHz steps
PWR	LNB power	ON.[1], OFF or BST (boosted output)
POL	Polarisation	VER: Vertical HOR: Horizontal
SPC	Spectrum (not used)	Always returns NRM
RFI	RF input Port	1 ~ 4
LNT	LNB Type	NOR: Normal DUA: Dual NO: No LNB
LO2	LNB Local Oscillator Frequency 2	Decimal number x 125 kHz steps
SOF	LNB Switchover Frequency	Decimal number x 125 kHz steps
SER	Search Range	Decimal number x 1 kHz steps
MOD	Modulation Mode	QPS: QPSK BPS: BPSK 8PS: 8PSK

3.2.4 Decoder Status (DEC)

Table 3.7: Decoder Status

Command String	Response Message Example
\000:DEC;SRQ_FFC_R$	\000:DEC;DSR=AUT_LOC=188_FFC_R$

The values/conditions following the sub-commands are shown in *Table 3.8*.

Table 3.8: Decoder Status Message Sub-Commands

Sub-Command	Description	Range
DSR	Decoder Source	AUT: Auto SPI: SPI ASF: ASI Fibre ASC: ASI Copper
LOC	Packet Lock	188: Locked to 188 Packet 204: Locked to 204 Packet NLC: Not Locked

---

[1] Three characters including trailing full-stop.

3.2.5　DVB-T Status (DTV)

Table 3.9: DVB-T Status

Command String	Response Message Example
\000:DTV;SRQ_FF_R$	\000:DTV;CHN=21_OFS=POS_GDI=1/32_BER=1E-5_SDM=OFF_OCM=2_CHS=8_ BE1=44E-2_BE2=44E-2_HFE=1/2_LFE=2/3_OFV=5_SDV=0_DHS=HP_INS=UHF_ PRS=255_DHM=1_MDL=64QAM_FF_R$

Table 3.10. shows the values/conditions following the sub-commands.

Table 3.10: DVB-T Status Message Sub-Commands

Sub-Commands	Description	Range
CHN	UHF Channel #	nn : 21 to 69
OFS	Offset	POS: Positive offset
		ZER: Zero offset
		NEG: Negative offset
GDI	Guard Interval	1/32: Guard Interval 1/32
		1/16: Guard Interval 1/16
		1/8: Guard Interval 1/8
		1/4: Guard Interval 1/4
BER	BER Alarm Threshold (post Viterbi)	Threshold above which bit error ratio alarm operates XE-X
SDM	Signal Degradation Mode	Returns ON or OFF
		ON is any set value from 1 to 7
OCM	OFDM Carrier Mode	2: 2k
		8: 8k
CHS	Channel Space	6: 6 MHz
		7: 7 MHz
		8: 8 MHz
BE1	Pre VITERBI BER	n.nnE-n
BE2	Post VITERBI BER	n.nnE-n
HFE	FEC Rate High	1/2 , 2/3, 3/4, 5/6, or 7/8
LFE	FEC Rate Low	1/2 , 2/3, 3/4, 5/6, or 7/8
OFV	Offset Value	d = 0 to 9 (if OFS=ZER then OFV=0)
SDV	Signal Degradation Value	d = 0 to 7 where 0=off
DHS	Hierarchy stream	HP = High Priority
		LP = Low Priority
INS	Input Selection	UHF
		BAS = Baseband
		IUH = Inverted UHF
		IBA = Inverted Baseband
PRS	Post RS errors	ddd = 0 to 255
DHM	Hierarchy Mode	d = 1 to 4
MDL	Modulation Type	QPSK 16QAM 64QAM

3.2.6   Demodulator Status (DEM)

Table 3.11: Demodulator Status

Command String	Response Message
\000:DEM;SRQ_$FFC~R~	\000:DEM;FEC=3/4_SYM=250000_BER=4E-2_SIG=128_$FFC~R~

*Table 3.12.*shows the values/conditions following the sub-commands.

Table 3.12: Demodulator Status Messages

Sub-Command	Description	Range
FEC	Forward Error Correction rate	1/2 :FEC rate 1/2 2/3: FEC rate 2/3 3/4: FEC rate 3/4 4/5: FEC rate 4/5 5/6: FEC rate 5/6 6/7: FEC rate 6/7 7/8: FEC rate 7/8 8/9: FEC rate 8/9
SYM	Symbol rate	Decimal number x 100 bit/s steps
BER	BER alarm Threshold	Threshold above which BER alarm operates. XE-X
SIG	Signal Level Alarm Threshold	Signal level below which signal level alarm operates. 0 ~ 255

3.2.7 Audio 1 Status (AUD)

Table 3.13: Audio 1 Status

Command String	Response Message
\000:AUD:SRQ_$FFC_R	\000:AUD;ROU=ST_LEV=M18_OUT=ANA_DFL=ENG_LVL=POS10_ADM=CON_OPS=0_ CLN=ENG-ENG-M_$FFC_R

The values/conditions following the sub-command are shown in *Table 3.14*.

Table 3.14: Audio 1 Status Message Sub-Command

Sub-Command	Description	Range	
ROU	Audio output routing	ST	Stereo, L to Left and R to Right
		M1	Mono, to Left and Right
		M2	Mono, L to Left and Right
		M3	Mono, R to Left and Right
LEV	System Gain	Mdd	06~18 in dB
OUT	Select output type	ANA	Analogue
		PRO	Professional AES/EBU
		SPD	Consumer SPDIF
		AC3	Consumer IEC958 AC3
DFL	Default Language	XXX	3 char language format (lower case)
LVL	Output level	NEGdd	Negative, dd = 01 ~30 (level offset x 0.1 dB)
		POSdd	Positive, dd = 00 ~30 (level offset x 0.1 dB)
ADM	AC3 downmixing mode	CON	Conventional Stereo
		PLS	Pro Logic Stereo
OPS	Output Source	0	Normal Audio
		1	Test Sequence 1
		2	Test Sequence 2
		3	Test Sequence 3
		4	Test Sequence 4
		5	Test Sequence 5
CLN	Current Language	XXX-XXX-X	Where:
			First XXX: Left Channel Language (3 char format lower case)
			Sec XXX: Right Channel Language (3 char format lower case)
			Last X: M= MPEG, A=AC3

3.2.8   Audio 2 Status (AU2)

Table 3.15: Audio 2 Status

Command String	Response Message
\000:AU2:SRQ_$FFC_R	\000:AUD;ROU=ST_LEV=M18_OUT=ANA_DFL=ENG_LVL=POS10_ADM=CON_OPS=0_ CLN=ENG-ENG-M _$FFC_R

The values/conditions following the sub-command are shown in *Table 3.16*.

Table 3.16: Audio 2 Status Message Sub-Command

Sub-Command	Description	Range	
ROU	Audio output routing	ST	Stereo, L to Left and R to Right
		M1	Mono, to Left and Right
		M2	Mono, L to Left and Right
		M3	Mono, R to Left and Right
LEV	System Gain	Mdd	06~18 in dB
OUT	Select output type	ANA	Analogue
		PRO	Professional AES/EBU
		SPD	Consumer SPDIF
		AC3	Consumer IEC958 AC3
DFL	Default Language	XXX	3 char language format (lower case)
LVL	Output level	NEGdd	Negative, dd = 01 ~30 (level offset x 0.1 dB)
		POSdd	Positive, dd = 00 ~30 (level offset x 0.1 dB)
ADM	AC3 downmixing mode	CON	Conventional Stereo
		PLS	Pro Logic Stereo
OPS	Output Source	0	Normal Audio
		1	Test Sequence 1
		2	Test Sequence 2
		3	Test Sequence 3
		4	Test Sequence 4
		5	Test Sequence 5
CLN	Current Language	XXX-XXX-X	Where:
			First XXX: Left Channel Language (3 char format lower case)
			Sec XXX: Right Channel Language (3 char format lower case)
			Last X: M= MPEG, A=AC3

3.2.9   Video Status (VID)

Table 3.17: Video Status

Command String	Response Message
\000:VID:SRQ_FFC_R$	\000:VID;625=PALI_525=PALM_ERR=BLK_OSD=NO._SYN=000_LVL=P10_BMD=625_OPS =00_FRT=nn.nn_VLS=525_SAR=4/3_EDH=ENA_EAC=LEF_EAD=xxx_FSY=ENA_FSL=LOC _FS6=POSnnnnn_FS5=POSnnnnn_FFC_R$

Table 3.18 shows he values/conditions following the sub-command.

Table 3.18: Video Status Message Sub-Commands

Sub-Command	Description	Range
625	625 line colour standard setting	PALI
		PALB
		PALN
		ALAM
525	525 line colour standard setting	NTSC: NTSC-M with pedestal
		NTSN: NTSC-M without pedestal
		PALM: PAL-M
		ALAM: Alarm
ERR[1]	Video output setting on loss of video	FRZ: Freeze Frame on video loss
		BLK: Black frame on video loss
OSD	On screen display setting on loss of input	Always Returns NO
SYN	Sync period on video loss	Always Returns 000
LVL	Video Output Level	NEGdd: Negative, dd = 01~30 (level offset % relative
		POSdd: Positive, dd = 00~30 to normal output)
BMD	Boot Mode	525
		625
OPS	Output Source	00: Normal Video
		01: 625 Test 1
		02: 625 Test 2
		03: 625 Test 3
		04: 625 Test 4
		05: 625 Test 5
		06: 625 Test 6
		07: 625 Test 7
		08: 625 Test 8
		09: 625 Test 9
		10: 625 Test 10
		11: 625 Test 11
		12: 625 Test 12
		13: 625 Test 13
		14: 625 Test 14
		15: 625 Test 15
		16: 625 Test 16

---

[1] The NO SYNCS option is not supported by the Remote Control Protocol.

Sub-Command	Description	Range	
		17: 525 Test 1	
		18: 525 Test 2	
		19: 525 Test 3	
		20: 525 Test 4	
		21: 525 Test 5	
		22: 525 Test 6	
		23: 525 Test 7	
		24: 525 Test 8	
		25: 525 Test 9	
		26: 525 Test 10	
		27: 525 Test 11	
		28: 525 Test 12	
		29: 525 Test 13	
		30: 525 Test 14	
		31: 525 Test 15	
		32: 525 Test 16	
FRT	Frame Rate	nn.nn	Frequency in Hz
VLS	Video Line Standard	525	
		625	
SAR	PEL Aspect Ratio	4/3	
		16/9	
EDH	Error detection Hierarchy	ENA	EDH pass- through enabled
		DIS	EDH pass – through disabled
EAC	Embedded Audio Channel	LEF	Left channel only
		RIG	Right channel only
		BOT	Both channels
		NON	None (Disable)
EAD	Embedded Audio Data ID	xxx	3 digit hex number
FSY	Frame Sync (Genlock)	ENA	Frame Sync Output enabled
		DIS	Frame Sync Output disabled
FSL	Frame Sync (Genlock) lock	LOC	Frame Sync Output locked
		NLC	Frame Sync Output disabled
FS6	Frame Sync Offset for 625	POSnnnnn	Positive offset – in range 0 to + 13824
		NEGnnnnn	Negative offset – in range –1 to -13824
FS5	Frame Sync Offset for 525	POSnnnnn	Positive offset – in range 0 to + 13728
		NEGnnnnn	Negative offset – in range –1 to -13728

3.2.10   4:2:2 Mode status

Table 3.19: 4:2:2 Mode Status

Command String	Response Message
\000:422:SRQ_FFC_R$	\000:422;VAR=4:3_VCF=420X _FFC_R$

The values/conditions following the sub-command are shown in *Table 3.20*.

Table 3.20: 4:2:2 Mode Status Message Sub-Commands

Sub-Command	Description	Range
VAR	Video aspect ratio	4:3
	(Monitor)	16:9
VCF	Video configuration	420
		422

3.2.11   Subtitle/VBI Status (SVB)

Table 3.21: Subtitle/VBI Status

Command String	Response Message
\000:SVB:SRQ_FFC_R$	\000:SVB;DFL=eng_SBT=eng_VIT=ENA_VTC=ENA_GCR=ENA_EN5= 0040_EN6=0131_FFC_R$

Table 3.22 shows the values/conditions following the sub-command.

Table 3.22: Subtitle/VBI Status Message Sub-Commands

Sub-Command	Description	Range	
DFL	Default Language	XXX	3 Character Language Code (lower case)
SBT	DVB Subtitles	XXX	3 Character Language Code (lower case)
VIT	VITS Insertion	CCR	Enabled CCIR VITS
		FCC	Enabled FCC/UK VITS
		DIS	Disabled
VTC	VITC Insertion	ENA	Enable VITC insertion
		DIS	Disable VITC insertion
GCR	GCR Insertion	ENA	Enable GCR insertion
		DIS	Disable GCR insertion
EN5	525 line VBI Reinsertion Enables	xxxx	16 bit hex value indicating lines to be enabled. See Table 3.23
ENG	625 line VBI Reinsertion Enables	xxxx	16 bit hex value indicating lines to be enabled. See Table 3.23

Table 3.23: VBI Line Bit Values

VBI Line	Pattern (hex)
8	0001
9	0002
10	0004
11	0008
12	0010
13	0020
14	0040
15	0080
16	0100
17	0200
18	0400
19	0800
20	1000
21	2000
22	4000
23	8000

A set bit indicates that the corresponding VBI line is enabled, a clear bit denotes that the corresponding VBI line is disabled.

Table 3.24: Subtitle/VBI Input Lines

Command String	Response Message
\000:SVB;ILS_FFC_R$	\000;SVB;IL11=NON_IL12=NON_IL13= CCV_IL14=NON_ IL15=NON_ IL16=NON_ IL17=NON_IL18=NON_IL19=NON_IL20=NON_IL21=NON_IL22=NON_IL23=NON_FFC_R$

This status command returns the VBI types available in the input video for re-insertion. The values/conditions following the sub-command are shown in *Table 3.25*.

Table 3.25: Subtitle/VBI Input Lines Sub-Commands

Sub Command	Description	Range	
IL11	VBI input on line 11	NON	No data available
		CCV	Closed captioning / VCHIP
		WSS	Wide Screen Signalling
		AML	AMOL (1 or 2)
		VIX	Video Index
		VPS	Video Programming System
IL12 to IL23	As above for other VBI input lines		

Table 3.26: Subtitle/VBI Output Lines

Command String	Response Message
\000:SVB;OLS_$FFC_R	\000;SVB;OL11=NON_OL12=NON_OL13= CCV_OL14=NON_ OL15=NON_OL16=NON_ OL17=NON_OL18=NON_ OL19=NON_OL20=NON_OL21=NON_OL22=NON_ OL23=NON_$FFC_R

This status command returns the actual VBI/teletext/test signals types present on the output video. The values/conditions following the sub-command are shown in *Table 3.27*

Table 3.27: Subtitle/VBI Output Lines Sub-Commands

Sub-Command	Description	Range	
OL11	VBI output on line 11	NON	No data / Line disabled
		CCV	Closed captioning / VCHIP
		WSS	Wide Screen Signalling
		AML	AMOL (1 or 2)
		VIX	Video Index
		VPS	Video Programming System
		TXT	EBU Teletext
		ITS	Insertion Test Signal (VITS)
		GCR	Ghost Cancelling Reference (GCR)
		VTC	Vertical Interval Time Code (VITC)
OL12 to OL23	As above for other VBI output lines		

3.2.12 Transport Stream Output Status (TSO)

Table 3.28: TSO Status

Command String	Response Message
\000:TSO:SRQ_$FFC_R	\000:TSO;CAM=PRE_ENA=DIS_$FFC_R

The values/conditions following the sub-command are shown in *Table 3.29*.

Table 3.29: TSO Status Message Sub-Commands

Sub-Command	Description	Range
CAM	TS Stream Route	PRE : Pre-CA
		PST : Post CA
ENA	TSO Fibre Output	ENA : Enable Fibre Output
		DIS : Disable Fibre Output

3.2.13   Service Status Message (SER)

Table 3.30: Service Status

Command String	Response Message
\000:SER;SRQ_FFC_R$	\000:SER;SRQ=AAAAAAAA_FFC_R$

Where AAAAAAAA is an 8 character string as described in *Table 3.31.*

Table 3.31: Service Status Message

String	Description	Alteia Equivalent
STARTUP.	Start up	N/A
WAIT.DEM	Waiting for Demodulator lock	Not Locked
NO.DEMOD	Demod lock timeout	N/A
WAIT.DCH	Waiting for Dchip lock	N/A
NO.DCHIP	Dchip lock timeout	N/A
WAIT.PMT	Waiting for Program Map Table	Waiting for Service List
NO.DDESC	No delivery descriptor	N/A
SERV.ABS	Service not provided	N/A
NO.PAT..	Program Association Table not present	N/A
NO.SERV.	Service not listed	N/A
NO.PMT..	Program Map Table not present	N/A
RUNNING.	Running	Running

3.2.14   Operational Status (OPR)

Table 3.32: Operational Status

Command String	Response Message
\000:OPR;SRQ_FFC_R$	\000:OPR;SIG=000_ALR=hhhh_BER=XE-N_ALL=XXXXX_SAQ=ACO_$FFCR

The values/conditions following the subcommand are shown in *Table 3.33*.

Table 3.33: Operational Status Sub-Commands

Sub-Command	Description

SIG	The signal strength, in arbitrary units:
	    00-99 decimal
	    000-999
	If it is not implemented, 00(0) is returned.

ALR	Alarm flags, 4 byte hex number, representing 16 bits (see Note 1)
BER	Bit error ratio, $XXx10^{-N}$
ALL	Alarm flags, 5 byte hex number representing 17 bits (see Note 2)
SAQ	Service Acquisition Mode ACO: Actual only ATH: Actual and Other

> **NOTES...**
>
> 1. 16 bit version of alarm flags for backward compatibility. Refer to *Table 6.2* in *Chapter 6*. A bit set to 1 indicates alarm condition.
>
> 2. 17 bit version of the alarm flags for Alteia. Refer to *Table 6.3* in *Chapter 6*. A bit set to 1 indicates alarm condition.

3.2.15 CA Status (CAS)

Table 3.34: CA Status

Command String	Response Message
\000:CAS;SRQ_$FFC_R	\000:CAS;CSS=CLR_CST=01_CID=XX.XX_*CAC=AAA...A_BCV= AAA...A _CMN= AAA...A _CHT= AAA...A _CMA= AAA...A _CDS= AAA...A_LPS=LSD_RAM=FIX_DSK=0000001_ BIS=DIS_BM1=XXXXXXXXXXXX_BM2=XXXXXXXXXXXXXX_BKW=XX_*$FFCR

The values/conditions following the subcommand are shown in *Table 3.35*.

Table 3.35: CA Status Sub-Commands

Sub-Command	Description	Range
CSS	Service Status	NSS = No Service Selected
		CLR = Clear
		RAA = RAS Authorised
		RAU = RAS Unauthorised
		BIA = BISS Authorised
		BIU = BISS Unauthorised
		VGA = VGUARD Authorised
		VGU = VGUARD Unauthorised
		NCA = No CA Installed
CST	CA Status	00 = Card Inserted
		01 = Card Removed
		04 = Card Invalid
		05 = Service Blocked
		06 = Invalid Packet
		07 = Card Unauthorised
		08 = Hardware Failure
		09 = Clear But Restricted
		10 = Service Blacked Out
		11 = Service Expired
		12 = CA Warning
		13 = CA Warning
		14 = Pairing Error
		15 = CA Warning
		16 = CA Warning
		17 = CA Warning
		21 = CA Warning
		22 = CA Warning

Sub-Command	Description	Range
CID	CAS ID	dddd = 4 digit CAS ID Number
CAC	CA Code Version	AAA…A : up to 20 Character string
BCV	CA Boot Code Version	AAA…A : up to 20 Character string
CMN	CA Model Number	AAA…A : up to 20 Character string
CHT	CA Hardware Type	AAA…A : up to 20 Character string
CMA	CA Manufacturer Number	AAA…A : up to 20 Character string
CDS	Download Status	AAA…A : up to 20 Character string
MPS	Medium Priority Stream	VID = Video
		AUD = Audio 1
		AU2 = Audio 2
		TXT = Teletext
		DVS = DVB Subtitles
		LSD = Async Data
		HSD = Sync Data
		VBI = VBI Data
LPS	Low Priority Stream	VID = Video
		AUD = Audio 1
		AU2 = Audio 2
		TXT = Teletext
		DVS = DVB Subtitles
		LSD = Async Data
		HSD = Sync Data
		VBI = VBI Data
RAM	RAS Mode	FIX = Fixed
		DSN = DSNG
		SCA = Secondary CA
		DIS = RAS and Secondary CS disabled
BIS	BISS Mode	DIS = Disabled
		MO1 = Mode 1
		MO2 = Mode 2
		MO3 = Mode 3
BM1	BISS Mode 1 Key	XXXXXXXXXXXX = 12 characters (6 byte hex) 0 to F
BM2	BISS Mode 2 Key	XXXXXXXXXXXXXX = 14 characters (7 byte hex) 0 to F
BKE	BISS Mode 2 & 3 fixed bits	XX = 1 character (1 byte hex) 0 to F
DSK	DSNG Key	XXXXXXX = 0 to 9999999

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Service Enquiry Commands and Replies

Contents

List of Tables

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4.1 Scope of this Chapter

Service Enquiry Commands and Replies are concerned with information relating to the available services on the receiver.

4.2 Enquiry Command Summary

Service enquiry commands are used to interrogate the service information on the current transport stream. It also retrieves information relating to the current service. The general form of the service enquiry message is:

$$\text{\textbackslash OOO:ENQ;SUB=NNNNNN\_\$FFC}_R$$

Table 4.1: Service Enquiry Commands

SUB	Description	NNN...	Description
STR	Start up Service Index (not used)	none	Always Returns 00000
SID	Service ID	none	Request Transport, Network and Service IDs
NET	Network Name	none	Request Network Name
NAM	Service Name	none	Request Service Name
AUN	Number of Audio Streams	none	Request Number of Audio Streams
AUX	Audio 1 Stream Information	0000-1FFF[1]	Request Audio 1 Stream Information
VIN	Number of Video Streams	none	Always Returns 1
VIX	Video Stream Information	0000-1FFF[1]	Request Video Stream Information
PCN	Number of Program Clock References	none	Always Returns 1
PCX	Program Reference Clock Information	0000-1FFF[1]	Request Program Clock Reference Stream Information
LSN	Number of Low Speed Data Streams	none	Request Number of Low Speed Data Streams
LSX	Low Speed Data Stream Information	0000-1FFF[1]	Request Low Speed Data Stream Information
ON1	Not Supported		Always Returns 00000
OX1	Not Supported		Always Returns PIDS of 0000
ON2	Not Supported		Always Returns 00000
OX2	Not Supported		Always Returns PIDS of 0000
HSN	Number of High Speed Data Streams	none	Request Number of High Speed Data Streams
HSX	High Speed Data Stream Information	0000-1FFF[1]	Request High Speed Data Stream Information
A2X	Audio 2 Stream Information	0000-1FFF[1]	Request Audio 2 Stream Information
TTN	Number of Teletext Streams	none	Request Number of Teletext Streams
TTX	Teletext Stream Information	0000-1FFF[1]	Request Teletext Stream Information
FET	Get Front end Type	none	SAT = Satellite DEC = Decoder DTV = DTTV
CTX	Get Current Teletext	none	Returns Current Teletext PID
AUE	Get Audio Language	0000-1FFF[1]	Returns XXX-XXX-X Where: First XXX:=Left Channel Language (3 char format lower case) Sec XXX:=Right Channel Language (3 char format lower case) Last X: M= MPEG, A=AC3, L=Linear
CDV	Get Current DVB Subtitle Language	none	Returns: XXX 3 Character Language Format (lower case)

---

[1] Four digit hexadecimal number with leading zero padding.

SUB	Description	NNN...	Description
DVN	Number of DVB Subtitle Streams	none	Request Number of DVB Subtitle Streams
DVX	DVB Subtitle Stream Information	0000-1FFF[1]	Request DVB Subtitle Stream Information
CHS	Get Current High Speed Data	none	Returns Current High Speed Data PID
CLS	Get Current low Speed Data	none	Returns Current Low Speed Data PID
SAQ	Get Current Service Acquisition Mode	none	ACO : Actual Only
			ATH : Actual and Other
FAV	Favourite Service Information	00-19[2]	Request Favourite Channel information
NUM	Number of Services	none	Request Number of Services
SER	Service Information	00-99[2]	Request Service Information
SRQ	Elementary Stream Status	none	Request Elementary Stream Status

---

[1] Four digit hexadecimal number with leading zero padding.
[2] Two digit decimal number with leading zero padding.

4.3 Network and Service Enquiries

4.3.1 Network Level Enquiries

Table 4.2: Network Enquiry Commands and Replies

Service Enquiry	Command String	Response Message
Network Name (NET)	\000:ENQ;NET_FFC_R$	\000:ENQ;NET=AAAAAAAA...AAAAA_FFC_R$ The length of the string AAAAA.... is up to 30 characters.

4.3.2 Service Level Enquiries

Table 4.3: Service Enquiry Commands and Replies

Service Enquiry	Command String	Response Message
Service ID (SID)	\000:ENQ;SID_FFC_R$	\000:ENQ;SID= NNNNN,NNNNN,NNNNN _FFC_R$ Where NNNNN,NNNNN,NNNNN is the transport stream ID followed by the original network ID and then the service ID. These are in decimal, leading zero packed to give a five digit number in the range 0-65535.
Service Name (NAM)	\000:ENQ;NAM_FFC_R$	\000:ENQ;NAM= AAAAAAAA...AAAAA_FFC_R$ The length of the string AAAAA.... is up to 30 characters.
Number of Services (NUM) *See Note following this table.*	\000:ENQ;NUM_FFC_R$	\000:ENQ;NUM=NNNNN_FFC_R$ NNNNN is the number of services (in decimal) leading zero packed, to give a five digit number in the range 0-65535.
Favourite Services (FAV) *Each of the favourite services has to be queried separately.*	\000:ENQ;FAV=NN_FFC_R$	\000:ENQ;FAV=NN,AAAAAAAA...AAAAA_FFC_R$ NN is the number of the service subject to the current enquiry (in the range 01 to 19). The length of the string AAAAA.... is up to 30 characters. A returned string of "Memory Not Set" indicates that no service has been stored in that particular memory in the receiver.
Available Services (SER) *Each of the available services has to be queried separately. The number of available services is obtained using the NUM (number of services) command.*	\000:ENQ;SER=NN_FFC_R$	\000:ENQ;SER=NN,AAAAAAAA...AAAAA_FFC_R$ NN is the service subject to the enquiry. The length of the string AAAAA.... is up to 30 characters. Requesting details of a service out of range gives unpredictable results.
Elementary Streams Status Response	\000:ENQ;SRQ_FFC_R$	\000:ENQ;AUD=PPPP_VID=PPPP_PCR=PPPP_LSD=PPPP_OP1=PPPP_OS1=PPPP_OP2=PPPP_OS2=PPPP_HSD=PPPP_AU2=PPPP_TTX=PPPP_FFC_R$ The PID for each elementary stream is returned in place of PPPP. A value of 0 denotes a return PID as FFFF.

	Returned PID Values			
	OP1	OS1	OP2	OS2
Always Returns	0000	0000	0000	0000

> **NOTE...**
>
> ENQ;NUM returns the total number of services (0 to 65535). In practice there are unlikely to be more than 100 services in a multiplex. If there are, ENQ;SER can only query the first hundred (NN = 00 to 99, where 00 is the first service etc).

4.4 Elementary Stream Enquiries

4.4.1 Enquiring for the Number of Each Type

Table 4.4: Commands for Requesting the Number of Streams

Service Enquiry	Command String	Response Message
Number of Audio Streams (AUN)	\000:ENQ;AUN_FFC_R$	\000:ENQ;AUN=NNNNN_FFC_R$
Number of Video Streams (VIN)	\000:ENQ;VIN_FFC_R$	\000:ENQ;VIN=00001_FFC_R$
Number of Program Clock References	\000:ENQ;PCN_FFC_R$	\000:ENQ;PCN=00001_FFC_R$
Number of Option 1 Streams (ON1)	\000:ENQ;ON1_FFC_R$	\000:ENQ;ON1=00000_FFC_R$
Number of Option 2 Streams (ON1)	\000:ENQ;ON2_FFC_R$	\000:ENQ;ON2=00000_FFC_R$
Number of Low Speed Data Streams (LSN)	\000:ENQ;LSN_FFC_R$	\000:ENQ;LSN=NNNNN_FFC_R$
Number of High Speed Data Streams (HSN)	\000:ENQ;HSN_FFC_R$	\000:ENQ;HSN=NNNNN_FFC_R$
Number of Teletext Streams (TTN)	\000:ENQ;TTN_FFC_R$	\000:ENQ;TTN=NNNNN_FFC_R$
Number of DVB Subtitle Streams (DVN)	\000:ENQ; DVN _FFC_R$	\000:ENQ; DVN =NNNNN_FFC_R$

> **NOTE...**
> NNNNN in the replies is the number of services (in decimal) leading zero packed, to give a five digit number in the range 00000-08191.

4.4.2 Requesting Stream Information

The following Service Enquiry commands return information about a single specified stream. Each stream has to be queried separately. The number of streams for each elementary service is found by using the appropriate "Number of Streams" command (listed in *Table 4.4*).

Table 4.5: Commands for Requesting Stream Information

Service Enquiry	Command String	Response Message
Audio 1 Stream Information (AUX)	\000:ENQ;AUX=NNNN_FFC_R$	\000:ENQ;AUX=NNNN,PPPP,XXXXXXX_FFC_R$ First XXX:=Left Channel Language[1] Sec XXX:=Right Channel Language[1] Last X: M= MPEG, A=AC3, L=Linear
Video Stream Information (VIN)	\000:ENQ;VIN=NNNN_FFC_R$	\000:ENQ;VIN=NNNN,PPPP,AAAAAAA_FFC_R$
Program Clock Reference Information (PCX)	\000:ENQ;PCX=NNNN_FFC_R$	\000:ENQ;PCX=NNNN,PPPP,AAAAAAA_FFC_R$
Option 1 Stream Information (OX1)	\000:ENQ;OX1=NNNN_FFC_R$	\000:ENQ;OX1=NNNN,0000,0000000_FFC_R$
Option 2 Stream Information (OX2)	\000:ENQ;OX2=NNNN_FFC_R$	\000:ENQ;OX2=NNNN,0000,0000000_FFC_R$
Low Speed Data Stream Information (LSX)	\000:ENQ;LSX=NNNN_FFC_R$	\000:ENQ;LSX=NNNN,PPPP,AAAAAAA_FFC_R$
High Speed Data Stream Information (HSX)	\000:ENQ;HSX=NNNN_FFC_R$	\000:ENQ;HSX=NNNN,PPPP,AAAAAAA_FFC_R$
Audio 2 Stream Information (A2X)	\000:ENQ;A2X=NNNN_FFC_R$	\000:ENQ;A2X=NNNN,PPPP,XXXXXXX_FFC_R$ First XXX:=Left Channel Language[1] Sec XXX:=Right Channel Language[1] Last X: M= MPEG, A=AC3, L=Linear
Teletext Stream Information (TTX)	\000:ENQ;TTX=NNNN_FFC_R$	\000:ENQ;TTX=NNNN,PPPP,AAAAAAA_FFC_R$
DVB Subtitle Stream Information (DVX)	\000:ENQ; DVX =NNNN_FFC_R$	\000:ENQ; DVX =NNNN,PPPP,XXX0000_FFC_R$ Where XXX = Language[1]

---

[1] Three character language format.

NOTES...

1.   1. NNNN is the stream index, offset from 0. This value is not the PID, it is an offset from 0 to the value returned in the "Number of Streams (see *Table 4.4*) request.

2.   2. PPPP is the PID in hexadecimal, in the range 0000 to 1FFF followed by a stream description (AAAAAAA - which may be null).

3.   3. Requesting details of a non-existent stream may lead to unpredictable results!

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Chapter 5

Remote Commands and Replies

Contents

List of Tables

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5.1 Scope of this Chapter

This chapter gives information relating to the configuration of the receiver under control. Remote commands are used to interrogate the equipment remotely via an RS-232 link.

5.2 Command Format

The general form of the remote control message is as follows:

$\backslash$OOO: REM; SUB=NNNNNN _$FFC_R

The replies to this command are described in the following paragraphs.

Table 5.1: Remote Control Sub-Commands

SUB	Description	NNN...	Description
IDN[1]	Set Ident	0-999	Set New Remote Control Address
MOD	Return Model Number String (up to 30 characters)	none	Return receiver Model Number
PTS	Return Part Numbers	none	Response: \000:REM;DPN=AAA…A_OPN=AAA…A_
			UPN=AAA…A_IPN=AAA…A_$FFC_R
			DPN=AAA…A Demux Part #
			OPN=AAA…A Output Board Part #
			UPN=AAA…A Microprocessor Board Part #
			IPN=AAA…A Front End Part #
			Where AAA…A is a 20 Character string
PNS	Return Part Numbers	none	Not supported – Returns all zeroes (0)
SFV	Return Software Versions	none	Response: \000:REM;ACV=AAA…A_CCV=AAA…A_DCV=AAA…A_
			DIC=AAA…A_UCV=AAA…A_$FFC_R
			ACV=XX.XX Demux APP Code Version
			CCV=XX.XX Demux Core Code Version
			DCV=XX.XX Demux DRV Code Version
			DIC=XX.XX Demux DIAG Code Version
			UCV=X.X.XXX Microprocessor Board Code Version
			Where AAA…A is a 20 Character string
SWV	Return Software Versions	none	Returns micro board code version X.X.XXX
SNM	Return Serial Number String (up to 30 characters)	none	Returns DEMUX Serial Number
MBR	Return Multiplexer Bit Rate	none	Always Returns NOT KNOWN
VRS	Return Video Resolution	none	Return Video Resolution
VBR	Return Video Bit Rate	none	Always Returns NOT KNOWN
LBR	Return Low Speed Data Bit Rate	none	Return Low Speed Data Bit-Rate (decimal value in baud)
OR1	Not Supported	none	Always Returns NOT SUPPORTED
OR2	Not Supported	none	Always Returns NOT SUPPORTED

---

[1] The response to the IDN command will contain the original receiver address and not the newly programmed address.

SUB	Description	NNN...	Description
HBR	Return High Speed Data Bit Rate	none	Return High Speed Data Bit-rate (decimal value in kbit/s)
STR	Self test Result	None	8 digit HEX Number
OPT	Model Option	none	20 Character String
CAM	Return CA Module Identifier	none	Always Returns NON
VDM	Return Video Memory Size	none	Always Returns 32
ST9	Return ST90 Software Ver	none	Returns micro board code version X.X.XXX
RIN	Set Remote Interface	232	RS232 (*See Section 5.10*)
		485	RS485

5.3 OFDM Status

An additional general query command to request details on current board/signal status is as follows:

\000: REM; DTV _FFC_R$

The reply to this command is:

\000: REM; DTV=XX_FEC=1/2_QAM=QPSK_FFC_R$

> **NOTE...**
> The Alteia does not support this command

Table 5.2: General Query Sub-Commands

SUB	Description	Value		
FEC	Return High Forward Error Correction	1/2		
		2/3		
		3/4		
		5/6		
		7/8		
QAM	Return Modulation Type:	QPSK		
		16QAM		
		64QAM		
DTV=XX	Hex Value for Lock State:	Bit 0 = Not reset	Always 0
		Bit 1 = Timing recovery in lock	Always 0
		Bit 2 = AFC in lock	Always 0
		Bit 3 = AGC OK	Inverse of AGC Alarm Status
		Bit 4 = TPS in lock	Inverse of TPS Alarm Status
		Bit 5 = Output error rate probably below threshold	Inverse of BER Alarm Status
		Bit 6 = Board power up check fault	Always 0
		Bit 7 = Signal degradation mode	0=OFF, 1=Modes 1 to 7

5.4 Variable Length Strings (SNM)

Table 5.1 contains a number of entries indicating a maximum string length of 30 characters. These strings are of variable length with no specific formatting for the layout of the returned string. For example, the command \000:REM:SNM_FFC_R$ returns a response message with the format: \000:REM;SNM=123456_FFC_R$.

5.5 Conditional Access Module (CAM)

The CA system module information can be retrieved using the CAM sub_command as follows:

   \000:REM;CAM_FFC_R$

The format of the response message is:

   \000:REM;CAM=NON_FFC_R$

5.6 Video Memory (VDM)

The amount of memory fitted in the receiver can be retrieved using the VDM sub_command as follows:

   \000:REM;VDM_FFC_R$

The format of the response message is:

   \000:REM;VDM=32_$FFCR

…where the response 32 is the amount of memory fitted (in Mbits).

5.7 Video Resolution (VRS)

The compressed video resolution is returned as two, five character ASCII values representing decimal numbers, separated by a comma. The values are packed with leading zeros if required. Horizontal resolution is given first, followed by vertical. The following illustrates the format:

   \000:REM;VRS_$FFCR

The format of the response message is:

   \000:REM;VRS=00704,00576 _$FFCR

> **NOTE...**
> The values returned are the size of the decompressed picture before upsampling for display in the receiver.

5.8 Bit-Rates (MBR/ORn)

Multiplexer, Video, Low Speed Data, High Speed Data rates are returned as short character ASCII strings with or without decimal points. Strings such as "Not Applicable", "Not Known" and "Variable" may also be returned.

For example, for the Multiplexer, the format is as follows:

\000: REM; MBR_FFC_R$

The format of the response message is:

\000: REM; MBR=Not Known _$FFCR

Another example, for Low Speed Data, would be as follows:

\000: REM; LBR_$FFCR

The format of the response message is:

\000: REM; LBR=9600 baud _$FFCR

5.9 ST90 Software Version Number (ST9)

The version number of the software for the ST90 micro controller does not apply to the ALTEIA series. However if the command:

\000: REM; ST9_$FFCR

is used the format of the response message is:

\000: REM; ST9=X.X.XXX_$FFCR

...where X.X.XXX represents the software version number for the microprocessor board.

5.10 Set Remote Interface (RIN)

This command allows the electrical interface of the remote control to be set via the remote control. This is intended for factory test and should not be used in the normal operation.

Chapter 6

System Commands and Replies

Contents

List of Tables

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6.1 Scope of this Chapter

System commands allow the setting and reading of the alarm relay status and mask in the receiver. If fitted with the Remote Authorisation System (RAS), the available system commands increase to allow the setting and verifying of scrambling keys when in Satellite News Gathering (SNG) mode.

6.2 Command Format

The general form of the system commands is as follows:

\000:SYS;SUB=NNNNNN _$FFCR

The replies to this command are described in the following paragraphs.

Table 6.1: System Control Sub Commands

SUB	Description	NNN...	Description	
SET	Set Alarm Relay Mask	XXXX		
MSK	Read Alarm Relay Mask	none		
RST	Reset receiver to Factory Defaults	none		
SAM	Set Summary Alarm Mask	XXXXX	Hex Value	See *Table 6.3*
AAL	Read Summary Alarm Mask	none	Hex Value	See *Table 6.3*
RL1	Assign Alarm Relay 1	XXXXX	Hex Value	See *Table 6.3*
RL2	Assign Alarm Relay 2	XXXXX	Hex Value	See *Table 6.3*
RL3	Assign Alarm Relay 3	XXXXX	Hex Value	See *Table 6.3*
RL4	Assign Alarm Relay 4	XXXXX	Hex Value	See *Table 6.3*
RL5	Assign Alarm Relay 5	XXXXX	Hex Value	See *Table 6.3*
RL6	Assign Alarm Relay 6	XXXXX	Hex Value	See *Table 6.3*
ALR	Read Alarm Relay Settings	none		
CMO	Control Mode	LOM	Local Mode	
		RCM	Remote Mode	
		OAM	Over-Air Mode	
SRB	Set Small Rate Buffer Mode	ENA	Enable	
		DIS	Disable	
5VS	525 Video Start Line	22		
		23		
SRS	Request System status	none		
SRQ	Request Alarm Status	none		

6.3 Set Alarm Relay Mask (SET) Sub-Command

The alarm relay mask is set using the following command:

\000:SYS;SET=XXXX_$FFCR

…where XXXX is the mask setting - see *Section 6.7.*

The response is the normal ACK or NAK, as appropriate.

6.4   Read Current Relay Mask (MSK) Sub-Command

The alarm relay mask is returned in response to the Read Current Relay Mask request:

   \000:SYS;MSK_$FFCR

The format of the response message is:

   \000:SYS;MSK=XXXX_$FFCR

…where XXXX is the current mask setting - see *Section 6.7.*

6.5   Reset (RST) Sub-Command

The RST sub-command can be used to reset the receiver to factory defaults. The command will be actioned after a positive acknowledgement has been issued. The reset operation may take over 30 seconds. This may cause the receiver number to be reset etc.

6.6   System Alarm Status (SRQ)

The system alarm status is returned in response to the system alarm status request:

   \000:SYS;SRQ_$FFCR

The format of the response message is:

   \000:SYS;SRQ=XXXX_$FFCR

…where the value XXXX is the hex value representing a bit map of the current error status of the receiver. The alarm status returned in the Operational Status- Alarm Flag (OPR;ALR) command (see *Chapter 3, Request Status Commands and Messages*) is the same as that returned by the SRQ sub-command.

Table 6.2 shows the bit values which can be used to configure or decode the mask.

6.7 Alarm Status and Mask Bit Map Patterns (for SET, MSK and SRQ)

Table 6.2 shows how the 16-bit value used in the commands in the title (above) is used to convey information about the individual alarms.

Table 6.2: Alarm Bit Mask/Status Values

Alarm	Pattern	Alteia Equivalent
AL_TEMPERATURE_LEVEL	0x0010	Temperature
AL_SIGNAL_LEVEL	0x0020	Sig Level
AL_MODULE2_LOCK	0x0040	Not used
AL_MODULE1_LOCK	0x0080	Not used
AL_LS_DATA_LOCK	0x0100	ASYNC Data
AL_AUDIO_LOCK	0x0200	Audio 1
AL_UNSUPPORTED_VIDEO_STD	0x0400	Not used
AL_VIDEO_LOCK	0x0800	Video
AL_DEMUX_LOCK	0x1000	Not used
AL_BER_OVER_THRESHOLD	0x2000	BER
AL_CA_ALARM	0x4000	CA
AL_DEMOD_LOCK	0x8000	Input

In the case of alarm status requests, a set bit indicates the alarm is active, a clear bit denotes that the alarm is not set.

In the case of the alarm mask setting, a set bit indicates that the corresponding alarm is masked.

6.8 Set Summary Alarm Relay Mask (SAM) Sub-Command

The alarm relay mask is set using the following command:

    \OOO:SYS;SAM=XXXXX_$FFCR

…where XXXXX is the mask setting - see *Section 6.12.* (Multiple alarms may be assigned to the summary alarm relay.)

The response is the normal ACK or NAK as appropriate.

6.9 Read Summary Alarm Relay Mask (AAL) Sub-Command

The alarm relay mask is returned in response to the Read Current Relay Mask request:

    \OOO:SYS;AAL_$FFCR

The format of the response message is:

    \OOO:SYS;AAL=XXXXX_$FFCR

…where XXXXX is the current mask setting - see *Section 6.12.*

6.10 Assign Alarm Relay (RLN) Sub-Command

The assign alarm relay is set using the following command:

    \000:SYS;RLn=XXXXX_$FFCR

...where n = Relay 1~6 and XXXXX is the mask setting - see *Section 6.12.* (Multiple alarms may be assigned to each relay)

The response is the normal ACK or NAK, as appropriate.

6.11 Read Alarm Relay (ALR) Sub-Command

The alarm relay mask is set using the following command:

    \000:SYS;ALR_$FFCR

The Response is:

    \000:SYS;ALR;RL1=XXXXX_RL2=XXXXX_RL3=XXXXX_
    RL4=XXXXX_RL5=XXXXX_RL6=XXXXX_$FFCR

...where XXXXX is the mask setting - see *Section 6.12.*

6.12 Summary Alarm Status and Mask Bit Map Patterns

Table 6.3 shows how the 16-bit value used in the commands above is used to convey information about the individual alarms.

Table 6.3: Summary Alarm Bit Mask/Status Values

Alarm	Pattern	
ALARM_FAN_STATUS	0x00001	
ALARM_TEMPERATURE	0x00002	
ALARM_LNB_VOLTAGE	0x00004	Receiver only
ALARM_CA	0x00008	
ALARM_SYNC_DATA	0x00010	
ALARM_ASYNC_DATA	0x00020	
ALARM_AUDIO_2	0x00040	
ALARM_AUDIO_1	0x00080	
ALARM_VBI	0x00100	
ALARM_VIDEO	0x00200	
ALARM_SIG_LEVEL	0x00400	Receiver only
ALARM_BER	0x00800	Receiver/DTTV only
ALARM_INPUT	0x01000	
ALARM_TPS	0x02000	DTTV only
ALARM_POST_RS	0x04000	DTTV only
ALARM_PMT	0x08000	DTTV only
ALARM_TIME_SYNC	0x10000	DTTV only

In the case of alarm status requests, a set bit indicates the alarm is active, a clear bit denotes that the alarm is not set.

In the case of the alarm mask setting, a set bit indicates that the corresponding alarm is masked.

6.13 Remote Control Alarm Relay Command (RON, ROF, SON, SOF)

The state of the alarm, fail and summary relays can be set directly using the following command:

    \OOO:RLY;SUB=xx_ $FFCR

Table 6.4: Relay State Commands

SUB	Description	NNN...	Description
RON	Switch relay on	XX	Hex mask, see *note...*
			Switching on the relay using these commands will NOT light the associated alarm LED. Conversely, switching off the relay will not extinguish the associated LED.
			Table 6.5.
ROF	Switch relay off	XX	Hex mask, see *note...*
			Switching on the relay using these commands will NOT light the associated alarm LED. Conversely, switching off the relay will not extinguish the associated LED.
			Table 6.5.
SON_	Switch summary relay on	-	-
SOF_	Switch summary relay off	-	-

NOTE...

Switching on the relay using these commands will NOT light the associated alarm LED. Conversely, switching off the relay will not extinguish the associated LED.

Table 6.5: Hex Mask Values for Relay State Commands

XX	Description
0x01	Command operates on Alarm Relay 1
0x02	Command operates on Alarm Relay 2
0x04	Command operates on Alarm Relay 3
0x08	Command operates on Alarm Relay 4
0x10	Command operates on Alarm Relay 5
0x20	Command operates on Alarm Relay 6

6.14 Additional CA Commands

6.14.1 Additional Commands

The Remote Authorisation System (RAS) can be run in one of two modes: either fixed-link or SNG. The fixed-link mode runs with fixed scrambling keys which are programmed into the receiver in the factory. The SNG mode is intended to support the reception of signals scrambled by an SNG Codec (where the scrambling key is programmable by the operator). In receiver software builds supporting RAS, the MDS sub-command can be used to select the receiver descrambling mode, and the SKY and SKQ sub-commands allow the setting and verification of the SNG scrambling keys.

Table 6.6: System Control RAS Sub-Commands

SUB	Description	NNN...	Description
SKY	Set 32 bit SNG Descrambling Key	XXXXXXXX	
SKQ	Verify 32 bit SNG Descrambling Key	none	
MDS	CA Mode	FIX[1]	For RAS fixed link operation
		SNG	Allows user to enter RAS keys through the OSD or via the SKY remote sub-command
		SCA	For Secondary CA
		DIS	Disable RAS and Secondary CA
MRQ	Request RAS Descrambling Key Mode Status	none	

6.14.2 SNG Descrambling Key Setting (SKY)

When using an receiver with the SNG Codec, the user can enter the required descrambling key with the SKY sub-command. The format is as follows:

    \000:SYS;SKY=1234567_$FFCR

The format of the response message is:

    \000:SYS:SKY=ACK_$FFCR

The response could also be NAK or LCL (see *Chapter 2, Commands and Acknowledgements*).

6.14.3 Verifying the SNG Key (SKQ)

The SKQ command can be used to request a return of the SNG key.

    \000:SYS;SKQ=1234567_$FFCR

The format of the response message is:

    \000:SYS:SKQ=1234567_FFC_R$

> **NOTE...**
> Software builds not supporting RAS may reject these commands.

---

[1] In the fixed link mode, the descrambling key is not accessible via the remote port.

6.14.4   CA Mode Setting (MDS)

The MDS sub-command is used to set the descrambling mode of the receiver (if fitted with the RAS descrambling module or Secondary CA descrambling module).

> \000:SYS;MDS=XXX_$FFCR

…where XXX is either FIX (for RAS fixed links), SNG (for RAS SNG Codec mode), SCA (for Secondary CA) or DIS (for disabled).

The format of the response message is:

> \000:SYS:MDS=ACK_$FFCR

6.14.5   Read Current Descrambling Mode (MRQ)

The MRQ sub-command is used to read the current descrambling mode.

> \000:SYS;MRQ_$FFCR

The format of the response message is:

> \000:SYS:MRQ=XXX_$FFCR

…where XXX is either FIX (for RAS fixed links), SNG (for RAS SNG Codec mode), SCA (for Secondary CA) or DIS (for disabled).

> **NOTE…**
>
> Software builds not supporting RAS may reject these commands.

BLANK

Annex A

Glossary

The following list covers most of the abbreviations, acronyms and terms used in TANDBERG Television Limited Manuals. All terms may not be included in this manual.

μm	Micro metres (10^{-6} metres).
3:2 pulldown	A technique used when converting film material (which operates at 24 pictures per second) to 525-line video (operating at 30 pictures per second).
4:2:0	Digital video coding method in which the colour difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the colour difference signals are sampled at half the luminance rate.
5B6B	Block code (5 binary bits encoded to 6 binary bits).
ac	Alternating Current.
ADPCM (Adaptive Differential Pulse Code Modulation)	A reduced bit-rate variant of PCM audio encoding (see also PCM). This algorithm encodes the difference between an actual audio sample amplitude and a predicted amplitude and adapts the resolution based on recent differential values.
ACC	Authorisation Control Computer.
ADT	Audio, Data And Teletext.
AFC	Automatic Frequency Control.
AFS	Automation File Server.
AGC	Automatic Gain Control.
AMOL I and II (Automatic Measure of Lineups I and II)	Used by automated equipment to measure programme viewing ratings.
ASI	Asynchronous Serial Interface.
ASIC (Application-Specific Integrated Circuit)	A customised chip designed to perform a specific function.
Async	Asynchronous.
ATM (Asynchronous Transfer Mode)	A source independent transport mechanism, supporting variable bit-rate transmission, which uses fixed length packets (called cells) to transfer user data.
ATSC	Advanced Television Standards Committee.
B3ZS	Interface code (bipolar with three successive zeros substituted). Similar coding scheme to HDB3.
Backward Compatibility	A newer coding standard is backward compatible with an older standard if decoders designed to operate with the older coding standard are able to continue to operate by decoding all or part of a bit-stream produced according to the newer coding standard.
BAT (Bouquet Association Table)	Part of the service information data. The BAT provides information about bouquets. It gives the name of the bouquet and a list of associated services.

Baud Rate	The rate of transfer of digital data when the data comprises information symbols that may consist of a number of possible states. Equivalent to bit-rate when the symbols only have two states (1 and 0). Measured in Baud.
BCC	Broadcast Control Computer.
BER	Bit Error Rate: A measure of transmission quality. It is generally shown as a negative exponent, (e.g., 10^{-7} which means 1 out of 10^7 bits are in error or 1 out of 10,000,000 bits are in error).
	Also:
	Bit Error Ratio: The ratio of error bits to total error bits in a transport stream.
Bit-Rate	The rate of transfer of digital data when the data comprises two logic states, 1 and 0. Measured in bit/s.
Block; Pixel Block	An 8 row by 8 column matrix of luminance sample values, or 64 DCT coefficients (source, quantised, or dequantised).
Bouquet	A collection of services (TV, radio, and data, or any combination of the three) grouped and sold together, and identified in the SI as a group. A single service may be in several bouquets.
B-Picture; B-Frame (Bidirectionally Predictive Coded Picture/Frame)	A picture that is coded using motion-compensated prediction from previous I or P frames (forward prediction) and/or future I or P frames (backwards prediction). B frames are not used in any prediction.
BPSK (Binary Phase Shift Keying)	A data modulation technique.
Buffer	A memory store used to provide a consistent rate of data flow.
BW	Bandwidth.
CA (Conditional Access)	The technology used to control the access to viewing services to authorised subscribers through the transmission of encrypted signals and the programmable regulation of their decryption by a system such as viewing cards.
CAT (Conditional Access Table)	Part of the Service Information data. The CAT identifies the PID in which conditional access management data (EMMs) is being carried, per CA provider.
C-Band	The portion of the electromagnetic spectrum which spans the frequency range of approximately 4 GHz to 6 GHz. Used by communications satellites. Preferred in tropical climates because it is not susceptible to fading.
CCIR	*See:* ITU-R.
CCITT	*See:* ITU-T.
Channel	A particular bandwidth on which an individual viewing service is broadcast.
Channel Coding	A form of coding for the conversion of a digital signal into a signal that is matched to the characteristics of the transmission channel.
Closed Captioning	A TV picture subtitling system used with 525-line analogue transmissions.
Codec	The combination of a coder followed by a complementary decoder located respectively at the input and output of a transmission path.
COFDM (Coded Orthogonal Frequency Division Multiplex)	A modulation system used particularly for terrestrial digital broadcasting.
Compression	Reduction in the number of bits used to represent an item of data. For the purposes of a broadcast system, it is the process of reducing digital information by discarding redundant portions of information that are not required upon reconstitution to produce viewing clarity.
Compression System	Responsible for compressing and multiplexing the video/audio/data bit-streams, together with the authorisation stream. The multiplexed data stream is then transmitted to the satellite or cable head-end.
Cr/Cb	Chrominance difference signals. These signals, in combination with the luminance signal (Y), define the colour of a particular point on a TV line.
CRC (Cyclic Redundancy Check)	A mathematical algorithm that computes a numerical value based on the bits in a block of data. This number is transmitted with the data and the receiver uses this information and the same algorithm to insure the accurate delivery of data by comparing the results of algorithm and the number received. If a mismatch occurs, an error in transmission is presumed.
CVBS (Composite Video Blanking and Synchronisation)	Analogue TV signals, e.g. PAL, NTSC.
dB (Decibels)	A ratio of one quantity (usually signal power) to another. Common variants are suffixed by an additional letter signifying that a single power measurement is referenced to a standard value:
	dBm - decibels relative to 1 mW
	dBW - decibels relative to 1 W.
DCE	Data Communications Equipment.

DCT (Discrete Cosine Transform)	An invertible, discrete orthogonal transformation. The values associated with blocks of pixel samples are transformed from the spatial domain into the frequency domain, producing coefficients in which spatially redundant information can be removed. Can be forward DCT or inverse DCT.
DDS	Direct Digital Synthesiser.
Decoder	The unit containing the electronic circuitry necessary to decode encrypted signals. Some decoders are separate from the receiver but, in satellite TV broadcasting, the term is often used interchangeably as a name for an Integrated Receiver Decoder (IRD). (The term IRD, or IRD/Decoder, is usually associated with satellite TV broadcasting while Cable systems are based on Converters or on Set-Top Boxes/Converters.)
Decoding Time-stamp	A field that may be present in a PES packet header that indicates the time that an access unit is to be decoded in the system target decoder.
Differential Coding	Method of source coding using the difference between the value of a sample and a predicted value.
DIL	Dual In Line.
DIN	Deutsches Institut für Normung.
Downlink	The part of the communications satellite circuit that extends from the satellite to the Earth.
DPCM (Differential Pulse Code Modulation)	A process in which a signal is sampled and the difference between each sample of a signal and its predicted value is derived from the succession of quantised values is converted by coding into a digital signal.
DSNG	Digital Satellite News-Gathering.
DSP	Digital Signal Processor.
DTE/DCE (Data Terminal Equipment/Data Communication Equipment)	Components in a packet switching network.
DTH (Direct To Home)	The term used to describe uninterrupted transmission from the satellite directly to the subscriber - that is, no intermediary cable or terrestrial network utilised.
DVB (Digital Video Broadcasting)	A European project which has defined transmission standards for digital broadcasting systems using satellite (DVB-S), cable (DVB-C) and terrestrial (DVB-T) media, created by the EP-DVB group and approved by the ITU. Specifies modulation, error correction, etc. (see EN 300 421). DVB-PI refers to DVB Professional Interfaces.
DVB SI	Digital Video Broadcasting Service Information.
Earth	Technical Earth: Ensures that all equipment chassis within a rack are at the same potential, usually by connecting a wire between the Technical earth terminal and a suitable point on the rack. This is sometimes known as a Functional earth.
	Protective Earth: Used for electric shock protection. This is sometimes known as a safety earth.
EBU	European Broadcast Union.
ECM	Entitlement Checking Message.
EIA	Electronics Industries Association (USA).
EIT (Event Information Table)	A component of the Service Information (SI) stream which contains information about events or programmes such as event name, start time, duration, etc.
Elementary Stream	A generic term for a coded video, coded audio or coded other bit-stream.
EMC	Electromagnetic Compatibility.
EMM	Entitlement Management Message.
Ethernet	A means by which machines are connected and communicate over a network.
ETS	European Telecommunications Standard.
ETSI	European Telecommunications Standards Institute.
FCC	Federal Communications Commission.
FDM (Frequency Division Multiplex)	A common communication channel for a number of signals, each with its own allotted frequency.
FEC	Forward Error Correction.
	Also:
	Future ECM Computer: responsible for preparation of FECMs from Programme Information.
FFT (Fast Fourier Transformation)	A fast algorithm for performing a discrete Fourier transform.
FIFO (First In, First Out)	A type of buffer.

Footprint	The area of the Earth's surface covered by a satellite's downlink transmission. Also (generally) the area from which the satellite can receive uplink transmissions.
FTP	File Transfer Protocol.
G.703	The ITU-T standard which defines the physical and electrical characteristics of hierarchical digital interfaces.
GOP (Group of Pictures)	MPEG video compression works more effectively by processing a number of video frames as a block. The NDS System Encoder normally uses a 12 frame GOP, every twelfth frame is an I frame.
GUI	Graphical User Interface.
HDTV	High Definition Television.
HPA (High Power Amplifier)	Used in the signal path to amplify the modulated and up-converted broadcast signal for feeding to the uplink antenna.
Hub	A device in a multipoint network at which branch nodes interconnect.
ICAM (Integrated Conditional Access Module)	Embedded in the IRD and responsible for descrambling and packet filtering and reception. It also contains the physical interface to the subscriber's viewing card.
IEC	International Electrotechnical Committee.
IF (Intermediate Frequency)	Usually refers to the 70 MHz or 140 MHz output of the modulator in satellite and cable transmission applications.
Interframe Coding	Predictive coding where values for prediction are taken from the previous and the current frame. That is, coding exploits temporal redundancy by using forward or backward prediction to produce P or B Frames.
Intraframe Coding	Coding of a macroblock or picture that uses information only from that macroblock or picture. Exploits spatial redundancy by using DCT to produce I Frames.
IP	Internet Protocol.
I-picture; I-frame (Intracoded Picture/Frame)	A picture/frame which is coded using purely intra coding, with reference to no other field or frame information. The I frame is used as a reference for other compression methods.
IPPV (Impulse Pay Per View)	One-time events that the subscriber purchases 'on impulse' using pre-arranged credit from the SMS, not as part of a subscription.
IRD (Integrated Receiver Decoder)	The receiver with an internal decoder which is connected to the subscriber's TV. The IRD is responsible for receiving and de-multiplexing all signals. The unit receives the incoming signal and decodes it when provided with a control word by the viewing card. (Domestic IRDs are also known as Set-Top Units or Set-Top Boxes.)
IRE (Institute of Radio Engineers)	No longer in existence but the name lives on as a unit of video amplitude measurement. This unit is 1% of the range between blanking a peak white for a standard amplitude signal.
ISDN (Integrated Services Digital Network)	An ISDN line usually refers to a 64 kbit/s data line.
ISO	International Standards Organisation.
ITS (Insertion Test Signal)	A suite of analogue test signals placed on lines in the VBI. Also known as VITS.
ITT	Invitation To Tender.
ITU-R	International Telecommunications Union - Radiocommunications Study Groups (was CCIR).
ITU-T	International Telecommunications Union - Telecommunications Standardisation Sector (was CCITT).
JPEG (Joint Photographic Experts Group)	An ISO/IEC international standards group developing an image compression algorithm for continuous tone still colour pictures.
Kbps / kbps	1024 bits per second / 1000 bits per second.
Ku-band	The portion of the electromagnetic spectrum which spans the frequency range of approximately 12 GHz to 14 GHz. Used by communications satellites. Preferred for DTH applications because this range of frequency is less susceptible to interference.
LAN (Local Area Network)	A network which provides facilities for communications within a defined building or group of buildings in close proximity.
L-band	The frequency band from 950 MHz to 2150 MHz which is the normal input frequency range of a domestic IRD. The incoming signal from the satellite is down-converted to L-band by the LNB.
LED	Light Emitting Diode.
LNB (Low Noise Block Down-Converter)	The component of a subscriber satellite transmission receiving dish which amplifies the incoming signal and down-converts it to a suitable frequency to input to the IRD (typically 950 MHz - 1600 MHz).
LO	Local Oscillator.
LSB	Least significant bit.

LVDS	Low Voltage Differential Signal. *Also:* Low Voltage Differential Serial interface.
Macroblock	The four 8 x 8 blocks of luminance data and the two (for 4:2:0 chrominance format), four (for 4:2:2) or eight (for 4:4:4) corresponding 8 x 8 blocks of chrominance data coming from a 16 x 16 section of the luminance component of the picture. Macroblock can be used to refer to the sample data and to the coded representation of the sample values and other data elements.
Mbps	Mega (million) bits per second.
MCC (Multiplex Control Computer)	A component of the compression system. Using information from the AFS, the MCC sets up the configuration for the multiplexers under its control. An MCC controls the main and backup multiplexer for each transport stream.
MCPC	Multiple Channels Per Carrier.
MEM	One of the range of Tandberg Television compression system control element products. The MEM holds a model of the system hardware. Using this model, it controls the individual system elements to configure the output multiplexes from the incoming elementary streams. The MEM monitors the equipment status and controls any redundancy switching.
MMDS (Multichannel Microwave Distribution System)	A terrestrial microwave direct-to-home broadcast transmission system.
Motion Compensation	The use of motion vectors to improve the efficiency of the prediction of sample values. The prediction uses motion vectors to provide offsets into the past and/or future reference frames or fields containing previously decoded sample values that are used to form the prediction error signal.
Motion Estimation	The process of estimating motion vectors in the encoding process.
Motion Vector	A two-dimensional vector used for motion compensation that provides an offset from the co-ordinate position in the current picture or field to the co-ordinates in a reference frame or field.
MP@ML (Main Profile Main Level)	A subset of the MPEG-2 standard which supports digital video transmissions from around 2 to 15 Mbit/s over both satellite and cable channels.
MPEG (Moving Pictures Experts Group)	The name of the ISO/IEC working group which sets up the international standards for digital television source coding.
MPEG-2	Industry standard for video and audio source coding using compression and multiplexing techniques to minimise video signal bit-rate in preparation for broadcasting. Also known as ISO/IEC 13818 [1]. Supersedes the MPEG-1 standard. The standard is split into layers and profiles defining bit-rates and picture resolutions.
MSB	Most significant bit.
MSymbol/s	Mega Symbols per second (10^6 Symbols per second)
Multiplex	A number of discrete data streams (typically 8 to 12) from encoders that are compressed together in a single DVB compliant transport stream for delivery to a modulator.
MUSICAM (Masking pattern adapted Universal Sub-band Integrated Coding And Multiplexing)	An audio bit-rate reduction system relying on sub-band coding and psychoacoustic masking.
Mux (Multiplexer)	Transmission multiplexer: receives EMMs from the ACC, ECMs from the BCC, video/audio data from the encoders, and the SI stream from the SIC. It then multiplexes them all into a single DVB-compliant transport stream, and delivers the signal to the uplink after modulation. The multiplexer also contains the cypher card which scrambles the services according to the control words supplied by the BCC.
Network	In the context of broadcasting: a collection of MPEG-2 transport stream multiplexes transmitted on a single delivery system, for example, all digital channels on a specific cable system.
NICAM (Near Instantaneously Companded Audio Multiplex)	
NIT (Network Information Table)	Part of the service information data. The NIT provides information about the physical organisation of each transport stream multiplex, and the characteristics of the network itself (such as the actual frequencies and modulation being used).
nm	Nano metres (10^{-9} metres).
NTSC (National Television Systems Committee)	The group which develops standards used in television broadcast systems in the United States. Also adopted in other countries (e.g. Mexico, Canada, Japan). This system uses 525 picture lines and a 60 Hz field frequency.

NVOD (Near Video On Demand)	A method of offering multiple showings of movies or events. The showings are timed to start at set intervals, determined by the broadcaster. Each showing of a movie or event can be sold to subscribers separately.
NVRAM (Non-volatile Random Access Memory)	Memory devices which, although permitting random read/write access, will not lose their information when power is removed. Stores the default configuration parameters set by the user.
OFDM	Orthogonal Frequency Division Multiplexing.
OSD (On-screen display)	Messages and graphics, typically originating from the SMS, and displayed on the subscriber's TV screen by the IRD, to inform the subscriber of problems or instruct the subscriber to contact the SMS.
Packet	A unit of data transmitted over a packet-switching network. A packet consists of a header followed by a number of contiguous bytes from an elementary data stream.
PAL (Phase Alternation by Line)	A colour television broadcasting system developed in Europe that uses 625 picture lines and a 50 Hz field frequency.
PAT (Program Association Table)	Part of the service information data. For each service in the multiplex, the PAT carries the basic mapping of all the data in the transport stream, associating each programme with a Program Map Table.
PCM (Pulse Code Modulation)	A process in which a signal is sampled, each sample is quantised independently of other samples, and the resulting succession of quantised values is encoded into a digital signal.
PCR (Program Clock Reference)	A time-stamp in the transport stream from which the decoder timing is derived.
Pel (Picture Element)	Also known as a pixel.
PES (Program Elementary Stream)	A sequential stream of data bytes that has been converted from original elementary streams of audio and video access units and transported as packets. Each PES packet consists of a header and a payload of variable length and subject to a maximum of 64 kBytes. A time-stamp is provided by the MPEG-2 systems layer to ensure correct synchronisation between related elementary streams at the decoder.
PID	Packet Identifier: the header on a packet in an elementary data stream which identifies that data stream. An MPEG-2/DVB standard.
	Also: Project Initiation Document, Programme ID.
PIN (Personal Identification Number)	A password used to control access to programming and to set purchase limits. Each subscriber household can activate several PINs and may use them to set individual parental rating or spending limits for each family member.
Pixel; Picture Element	The digital representation of the smallest area of a television picture capable of being delineated by the bit-stream.
pk-pk	Peak to peak.
PLL	Phase-Locked Loop.
PMT (Program Map Table)	Part of the Service Information data. Each programme has a PMT which lists the component parts (the elementary streams of video, audio, etc.) for the various programmes being transmitted.
P-picture/P-frame	A picture/frame produced using forward prediction. It contains predictions from either previous I frames or previous P frames. The P frame is used as a reference for future P or B frames.
ppm	Parts per million.
PPV (Pay Per View)	A system of payment for viewing services based on a usage/event basis rather than on on-going subscription. Subscribers must purchase viewing rights for each PPV event that they wish to view. PPV events may be purchased as IPPV or OPPV (q.v.).
Program	A sequence of instructions for a computer.
	A concept having a precise definition within ISO 13818-1 (MPEG-2). For a transport stream, the time base is defined by the PCR. The use of the PCR for timing information creates a virtual channel within the stream.
Programme	A linking of one or more events under the control of a broadcaster. For example, football match, news show, film show. In the MPEG-2 concept, the collection of elementary streams comprising the programme have a common start and end time. A series of programmes are referred to as events.
PROM (Programmable Read-Only Memory)	A device which may be written once with data for permanent storage, and then read whenever required. Special types of PROM permit the erasure of all data by Ultra Violet light (EPROM) or by application of an electronic signal (EEPROM).
PS (Program Stream)	A combination of one or more PESs with a common timebase.
PSI (Program Specific Information)	Consists of normative data which is necessary for the demultiplexing of transport streams and the successful regeneration of programs. (*See also:* service information).
PSIP (Program System Information Protocol)	The ATSC equivalent of SI for DVB.

PSK (Phase Shift Keying)	A method of modulating digital signals particularly suited to satellite transmission.
PSR (Professional Satellite Receiver)	*See also:* IRD.
PSU	Power Supply Unit.
QAM (Quadrature Amplitude Modulation)	A method of modulating digital signals which uses combined techniques of phase modulation and amplitude modulation. It is particularly suited to cable networks.
QPSK (Quadrature Phase Shift Keying)	A form of phase shift keying modulation using four states.
Quantising: Quantisation	A process in which the continuous range of values that a quantity may assume is divided into a number of predetermined adjacent intervals and in which any value within a given interval is represented by a single predetermined value within the interval.
	Also:
	A restriction of the number of DCT coefficient values, resulting in a limiting of the luminance and chrominance information.
RAM (Random Access Memory)	A volatile storage device for digital data. Data may be written to, or read from, the device as often as required. When power is removed, the data it contains is lost.
RF	Radio Frequency.
ROM (Read-Only Memory)	A non-volatile storage device for digital data. Data has been stored permanently in this device. No further information may be stored (written) there and the data it holds cannot be erased. Data may be read as often as required.
RS (Reed Solomon coding)	An error detection and correction coding system which is applied to the Transport Stream before transmission to counter the effects of interference.
RLC (Run Length Coding)	Minimisation of the length of a bit-stream by replacing repeated characters with an instruction of the form 'repeat character *x y* times'.
SCPC	Single Channel Per Carrier.
Scrambling	Alteration of the characteristics of a television signal in order to prevent unauthorised reception of the information in clear form.
	Also:
	A process (in digital transmission) used to combine a digital signal with a pseudo-random sequence, producing a randomised digital signal, conveying the same information, in order to facilitate transmission.
SDT (Service Description Table)	Provides information in the SI stream about the services in the system; for example, the name of the service, the service provider, etc.
SELV	Safety Extra Low Voltage (EN 60950).
Set-Top Box (STB)	The cable equivalent of the IRD (q.v.).
SFN	Single Frequency Network.
SI (Service Information)	Digital data describing the delivery system, content and scheduling/timing of broadcast data streams. SI data provides information to enable the IRD to automatically demultiplex and decode the various streams of programmes within the multiplex. Specified in ISO/IEC 13818[1].
Smart Card	*See:* Viewing Card.
SMATV (Satellite Mast Antenna Television)	A distribution system which provides sound and television signals to the households of a building or group of buildings, typically used to refer to an apartment block.
SMPTE	Society of Motion Picture and Television Engineers.
SMS (Subscriber Management System)	A system which handles the maintenance, billing, control and general supervision of subscribers to conditional access technology viewing services provided through cable and satellite broadcasting. The SMS system provided by NDS links a number of Users on a LAN with Batch Processors and a File Server providing access to a Database and a separate dedicated Conditional Access Interface Server which communicates with an Authorisation Control Centre (ACC).
	An SMS can be an automatic (e.g. Syntellect) system where subscribers order entitlements by entering information via a telephone. Alternatively, an SMS can be a manual system which requires subscribers to speak with an operator who manually enters their entitlement requests. Some systems support multiple SMSs.
SNG	Satellite News-Gathering.
SNMP	Simple Network Management Protocol.

Spatial Redundancy	Information repetition due to areas of similar luminance and/or chrominance characteristics within a single frame. Removed using DCT and Quantisation (Intra-Frame Coding).
SPI	Synchronous Parallel Interface.
Statistical Redundancy	Data tables are used to assign fewer bits to the most commonly occurring events, thereby reducing the overall bit-rate. Removed using Run Length Coding and Variable Length Coding.
STB (Set-Top Box)	*See*: IRD.
TAXI (Transparent Asynchronous Tx/Rx Interface)	A proprietary multiplexer interface.
TCP/IP (Transmission Control Protocol/Internet Protocol)	A set of communications protocols that may be used to connect different types of computers over networks.
TDM (Time Division Multiplex)	One common, physical communications channel for a number of signals, each with its own allotted time slot.
TDT (Time and Date Table)	Part of the Service Information. The TDT gives information relating to the present time and date.
Temporal Redundancy	Information repetition due to areas of little or no movement between successive frames. Removed using motion estimation and compensation (Inter-Frame Coding).
Time-stamp	A term that indicates the time of a specific action such as the arrival of a byte or the presentation of a presentation unit.
Transport Stream	A set of packetised elementary data streams and SI streams which may comprise more than one programme, but with common synchronisation and error protection.
	The data structure is defined in ISO/IEC 13818-1 [1] and is the basis of the ETSI Digital Video Broadcasting standards.
Transport Stream Packet Header	A data structure used to convey information about the transport stream payload.
TS	Transport stream. A combination of one or more fixed length PESs with independent timebases into a single stream.
TSP	Transport Stream Processor.
U	44.45 mm (rack height standard).
UART (Universal Asynchronous Receiver Transmitter)	A device providing a serial interface for transmitting and receiving data.
Upconvert/ Downconvert	The process by which the frequency of a broadcast transport stream is shifted to a higher (lower) frequency range.
Uplink	The part of the communications satellite circuit that extends from the Earth to the satellite.
UPS (Uninterruptable Power Supply)	A device that conditions the power supply to equipment to ensure continuous power and the avoidance of power surges. It also provides power from batteries, for a short time, in case of mains failure.
UTC	Universal Time, Co-ordinated (previously Greenwich Mean Time or GMT).
	Also
	Unique Title Code.
VITS	Vertical Interval Test Signal. *See:* ITS.
VPS	Video Programming System.
WSS (Wide Screen Switching)	Data used in wide-screen analogue services which enables a receiver to select the appropriate display mode.
WST	World System Teletext.
XILINX	A type of programmable Integrated Circuit.
Y (Luminance)	Defines the brightness of a particular point on a TV line.

Packet Identifiers (PIDs)

B.1   Introduction

Packet Identifiers (PIDs) are allocated to each Transport packet according to the elementary stream it carries. Although the System 3000 Multiplexer allocates default PIDs, the MCC has its own scheme and allocates them according to *Table B.1* (although equipment such as a Transport Stream Processor may modify the scheme).

> **NOTE...**
>
> In the following tables, the prefix 0x associated with the PID indicates that it is a hexadecimal number.

Table B.1: MCC Packet Identifier Allocations

Elementary Stream	PID	Port Number Range
Video	0x0200 + (port number - 1)	$1 \rightarrow 64$
Teletext	0x0240 + (port number - 1)	$1 \rightarrow 64$
Audio	0x0280 + (port number - 1)	$1 \rightarrow 128$
Asynchronous data[1]	0x0300 + (port number - 1)	$1 \rightarrow 128$
Synchronous data[2]	0x0380 + (port number - 1)	$1 \rightarrow 64$

The port number shown in *Table B.1* does not refer to the Encoder port, it is allocated to the system interface during set up. It is associated with a component through the appropriate screen and is used to ensure that inputs retain the same PID irrespective of switching arrangements within the system. The following tables gives the PIDs for specific use.

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[1] Asynchronous data can be fully formatted externally including the allocation of PIDs within the range 0x0400 → 0x04FF.

[2] Synchronous data can be fully formatted externally including the allocation of PIDs within the range 0x0400 → 0x04FF.

Table B.2: MPEG-2 Allocated PIDs

	PID	Refer to:
Program Association Table (PAT)	0x0000	*Paragraph B.2*
Program Map Tables (PMT)	0x0100 → 0x01FF	*Paragraph B.2*
Conditional Access Table (CAT)	0x0001	*Paragraph B.2*
Entitlement Checking Message (ECM)[3]	0x0500 → 0x08FF	(see MCC manual)
Entitlement Management Message (EMM)[4]	0x00C0 → 0x00FF	(see MCC manual)

NOTE...

PID numbers may be subject to change in future releases of the MCC software. Decoder or other system design making use of these fixed values instead of decoding the PSI is not recommended.

B.2 Program Specific Information (PSI)

Program Specific Information (PSI) is carried in the Transport stream to enable the receiver to decode the appropriate information from the multiple services carried.

PSI information is contained in four tables (note that the Network Information Table is not defined by the MPEG specification). The highest level table is the PROGRAM ASSOCIATION TABLE (PAT). This contains a list of the services within the Transport stream and the PIDs of a further set of tables (PROGRAM MAP TABLES - PMTs) which define the PIDs associated with the packets containing the elementary streams making up a service.

The NETWORK INFORMATION TABLE shown in *Figure B.1* is allocated Programme Number 0 by MPEG-2 but its contents are specified by DVB. It provides information relating to the physical network carrying the Transport Stream such as channel frequencies, etc.

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[3] There is a one-to-one mapping between ECMs and PIDs.
[4] There is a one-to-one mapping between EMMs and PIDs.
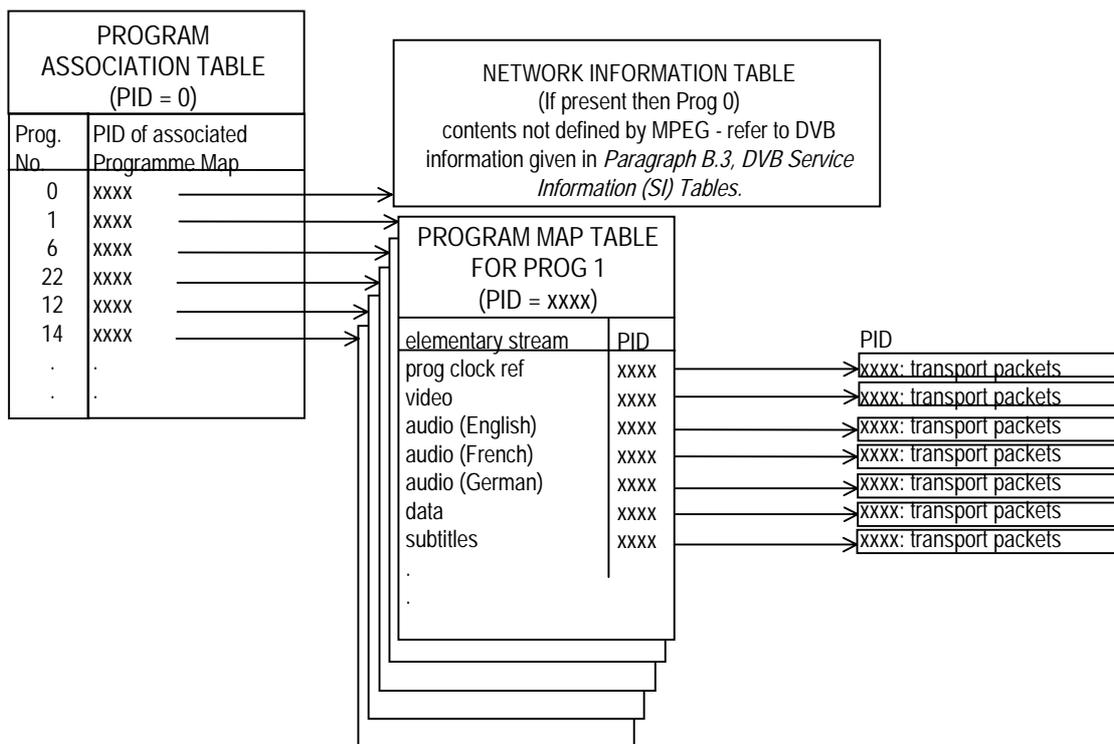
Figure B.1: Example of MPEG-2 PSI Tables

If any elementary streams are scrambled (for Conditional Access), a fourth table is created. This is the CONDITIONAL ACCESS TABLE. This table is defined by MPEG-2. It provides details of the scrambling system and PIDs associated with the packets containing the CA Entitlement Management Messages.

B.3 DVB Service Information (SI) Tables

B.3.1 General

The DVB standard for satellite transmission provides a flexible means of providing program information between system implementations. It provides SERVICE INFORMATION (SI) at a system layer level through the use of six tables. Using the DVB SI it is possible for a decoder to obtain information relating to other Transport Streams or networks thus allowing the PSR the means of automatic configuration and the user information for service selection.

The DVB SI complements the lower level information provided by MPEG-2's PSI.

B.3.2 Tables

Introduction

DVB specifies a number of tables to carry the SI information and allocates PIDs for each table. The System 3000 generates these tables by using text files. The six tables used are detailed in the following paragraphs.

Network Information Table (NIT)

This table has Program Number 0 allocated to it by MPEG-2 but its contents are specified in DVB. It provides information relating to the physical network which carries transport streams.

Bouquet Association Table (BAT)

This optional table provides information regarding bouquets (or specified collections of services). It gives the name of the Bouquet and a list of services for each bouquet.

Service Description Table (SDT)

This contains data describing the services in the system. It gives information such as service names and service provider etc.

Event Information Table (EIT)

This table contains data relating to events such as event names, start times and duration etc. The EIT can be implemented at various levels as required by the broadcaster/system integrator.

Running Status Table (RST)

This optional table can provide signalling of changes to the running status of events potentially with greater timing precision than can be achieved within the EIT.

Time and Date Table (TDT)

This table gives the present date and time.

B.3.3 DVB Allocated PIDs

DVB specifies the PIDs for each table and section. These are described in *Table B.3*.

> **NOTE...**
>
> In *Table B.3*, the prefix 0x associated with the PID indicates that it is a hexadecimal number.

Table B.3: DVB Allocated PIDs

	PID	Supported by System 3000?
Network Information Table (NIT)	0x0010	✔
Bouquet Association Table (BAT)	0x0011	✔
Service Description Table (SDT)	0x0011	✔
Event Information Table (EIT)	0x0012	✔ (Static)
Running Status Table (RST)	0x0013	
Time and Date Table (TDT)	0x0014	✔

BLANK

Calculating the Checksum

The checksum is calculated using the value given to each character in the ASCII character set. *Table B.1* shows the appropriate values.

Table B.1: ASCII Character Set

Ctrl	Dec	Hex	Char	Code		Dec	Hex	Char		Dec	Hex	Char		Dec	Hex	Char
^@	0	00		NUL		32	20	sp		64	40	@		96	60	`
^A	1	01	☺	SOH		33	21	!		65	41	A		97	61	a
^B	2	02	☻	STX		34	22	"		66	42	B		98	62	b
^C	3	03	♥	ETX		35	23	#		67	43	C		99	63	c
^D	4	04	♦	EOT		36	24	$		68	44	D		100	64	d
^E	5	05	♣	ENQ		37	25	%		69	45	E		101	65	e
^F	6	06	♠	ACK		38	26	&		70	46	F		102	66	f
^G	7	07	•	BEL		39	27	'		71	47	G		103	67	g
^H	8	08	◘	BS		40	28	(		72	48	H		104	68	h
^I	9	09	○	HT		41	29	)		73	49	I		105	69	i
^J	10	0A	◙	LF		42	2A	*		74	4A	J		106	6A	j
^K	11	0B	♂	VT		43	2B	+		75	4B	K		107	6B	k
^L	12	0C	♀	FF		44	2C	,		76	4C	L		108	6C	l
^M	13	0D	♪	CR		45	2D	–		77	4D	M		109	6D	m
^N	14	0E	♫	SO		46	2E	.		78	4E	N		110	6E	n
^O	15	0F	☼	SI		47	2F	/		79	4F	O		111	6F	o
^P	16	10	►	SLE		48	30	0		80	50	P		112	70	p
^Q	17	11	◄	CS1		49	31	1		81	51	Q		113	71	q
^R	18	12	↕	DC2		50	32	2		82	52	R		114	72	r
^S	19	13	‼	DC3		51	33	3		83	53	S		115	73	s
^T	20	14	¶	DC4		52	34	4		84	54	T		116	74	t
^U	21	15	§	NAK		53	35	5		85	55	U		117	75	u
^V	22	16	▬	SYN		54	36	6		86	56	V		118	76	v
^W	23	17	↨	ETB		55	37	7		87	57	W		119	77	w
^X	24	18	↑	CAN		56	38	8		88	58	X		120	78	x
^Y	25	19	↓	EM		57	39	9		89	59	Y		121	79	y
^Z	26	1A	→	STB		58	3A	:		90	5A	Z		122	7A	z
^[	27	1B	←	ESC		59	3B	;		91	5B	[		123	7B	{
^\	28	1C	∟	FS		60	3C	<		92	5C	\		124	7C	¦
^]	29	1D	↔	GS		61	3D	=		93	5D	]		125	7D	}
^^	30	1E	▲	RS		62	3E	>		94	5E	^		126	7E	~
^_	31	1F	▼	US		63	3F	?		95	5F	_		127	7F	⌂†

† ASCII code 127 has the code DEL. Under MS-DOS, this code has the same effect as ASCII 8 (BS). The DEL code can be generated by the CTRL + BKSP key.

For the entire message up to and including the last underscore, get the value of each character from the table add them together and then drop all but the first 2 hexidecimal digits. This entire operation is easier done in hex.

For the message **\000:SYS;SRQ_** this is

\	0x5C	+
0	0x30	+
0	0x30	+
0	0x30	+
:	0x3A	+
S	0x53	+
Y	0x59	+
S	0x53	+
;	0x3B	+
S	0x53	+
R	0x52	+
Q	0x51	+
_	0x5F	= 0x03B5

Only the 2 least significant digits are used for the check sum (that is 0xB5) so the entire message is

\000:SYS;SRQ_$B5Cr

Some other examples are:

\000:TUN;SRQ_$ADCr

\000:TUN;RFI=NO2_$A4Cr

\000:SER;SEL=00001_$BCCr

Expanding \000:TUN;RFI=NO2_ we get

\	0x5C	+
0	0x30	+
0	0x30	+
0	0x30	+
:	0x3A	+
T	0x54	+
U	0x55	+
N	0x4E	+
;	0x3B	+
R	0x52	+
F	0x46	+
I	0x49	+
=	0x3D	+
N	0x4E	+
O	0x4F	+
2	0x32	+
_	0x5F	= 0x04A4

Giving a checksum of 0xA4 as show above.

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The following conventions are used in this manual: a page number entry in **bold** indicates a reference to a heading; a page number entry in *italic* is a reference to a table or figure; otherwise the page number indicates a reference to an entry on that page.

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Command Name Index