



**XRS**<sup>™</sup> *CONNECT*  
SMART/ADAPTABLE/RUGGED

# **XRS**<sup>™</sup> **CONNECT**

**AT COMMAND REFERENCE MANUAL**

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# Table of Contents

<b>Copyright Notice</b> .....	<b>2</b>
<b>Disclaimer</b> .....	<b>2</b>
<b>Introduction</b> .....	<b>4</b>
Abbreviations and Definitions .....	4
References .....	4
AT Command Syntax .....	5
Commands .....	5
Notifications .....	6
Responses .....	6
General Commands .....	7
Channel Control Commands .....	9
Radio Commands .....	10
Audio Commands .....	11
CTCSS/DCS Commands .....	11
SelCall Commands .....	12
Bluetooth® Commands .....	13
P25 Location Services Commands .....	13

## Introduction

This document describes the AT-command based messages that are used as the communication protocol between an application and the XRS™ Connect radio via Bluetooth® ('Classic' or 'Low Energy').

## Abbreviations and Definitions

Abbreviation	Definition
AT	Abbreviation of 'Attention'. Always used to start a command line to be sent from TE to ME.
DCE	Data circuit terminating equipment (the radio).
DTE	Data terminal equipment (the equipment connected to the radio interface).
DTMF	Dual-tone multi-frequency signalling.
DTR	Data terminal ready.
FNE	Fixed network equipment.
GSM	Global system for mobile communications.
MAC	Media access control.
ME	Mobile equipment (the radio). Same as DCE and MT.
MS	Mobile station (another radio).
MT	Mobile terminal (the radio).
PEI	Peripheral equipment interface.
RSSI	Received signal strength indicator.
TCS	Transparent character stream.
TE	Terminal Equipment e.g. computer
UE	User equipment.
[...]	Square brackets indicate that the enclosed parameters are optional, and may be omitted. In command line, the brackets themselves are omitted.
<...>	Angle brackets are used to indicate the names of parameters or other syntactical elements. In command line, the brackets themselves are omitted.

*Table 1 - Abbreviations and Definitions*

## References

1. ITU-T V.250 Series V: Data communication over the telephone network; Control procedures; Serial asynchronous automatic dialling and control.
2. ITU-T V.253 Series V: Data communication over the telephone network; Control procedures; Control of voice-related functions in a DCE by an asynchronous DTE.
3. 3GPP TS 27.007: 3rd generation partnership project; Technical specification group core network and terminals; AT command set for user equipment (UE).
4. ITU-T V.24: Series V: Data communication over the telephone network; Interfaces and voiceband modems; List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE).

5. TIA-102.BAIB-A: November 2014: Project 25, Tier 1 Location Services Specification.
6. NMEA 0183: Version 3.01: Standard For Interfacing Marine Electronic Devices.

## AT Command Syntax

### Commands

There are three forms of AT Commands:

- Action
- Question
- Help

For cases where there is no stored value for the command, it cannot be questioned.

Commands start with AT and finish with a carriage return (<CR>) character. A line feed (<LF>) character may optionally be used after the carriage return.

### Action

Action commands can take one of the three forms listed in the following table:

Action Command	Description
AT<command><CR>	Runs a command. Radio responds with a result code.
AT<command>=<value><CR>	Runs <command> with <value>. Radio responds with a result code.
AT<parameter><value><CR>	Sets <parameter> to <value>. Radio responds with a result code.

*Table 2 - AT Command Action Commands*

### Question

Question commands take the following form:

Question Command	Description
AT<command>?<CR>	Query the value of a parameter. Radio responds with an information text response containing the value of the parameter, followed by a result code.

*Table 3 - AT Command Question Commands*

## Help

Help commands can take one of the following two forms:

Help Command	Description
AT<command>=?<CR>	Returns a help menu for the command.
AT=?<CR>	Lists all available commands.

Table 4 - AT Command Help Commands

## Notifications

The radio will send unsolicited or asynchronous notifications for certain events, commands or operations. Such notifications take the following form:

+<Notification>:<space><data><CR><LF>

## Responses

The radio issues the following two types of responses:

- Information text
- Result codes

### Information Text Responses and Verbosity Control

Information text responses consist of three parts: a header, text and trailer.

<header><text><trailer>

The format of the header and text is determined by the V (verbosity) parameter. When set to 0 (ATV0), the default, the header is blank and the text does not contain a type prefix, only the returned value. When set to 1 (ATV1), the header is <CR><LF> and the text will contain a type prefix corresponding to the associated command. The trailer is always <CR><LF>.

	ATV0	ATV1
<Header>		<CR><LF>
<Text>	<value>	<value> <prefix>:<space><value>
<Trailer>	<CR><LF>	<CR><LF>

Table 5 - Effect of V on response text formats

The following table illustrates the difference in output for the +GMI command which is used to query the radio's manufacturer (GME).

Command	ATV0	ATV1
AT+GMI?<CR>	GME<CR><LF>	<CR><LF>+GMI:<space>GME<CR><LF>

Table 6 - Example response text formats

## Result Codes

The table below lists the available result codes.

Response	Description
OK	Acknowledges execution of a command.
ERROR	Error indication. Could be command syntax error, invalid parameter or other problem.

Table 7 - Standard result codes

## General Commands

The table that follows lists the general commands and notifications that are supported.

Command Syntax	Description
ATI<id>	Request manufacturer specific information. Supported IDs are: 0 – Manufacturer, i.e. GME 1 – Model (<name>,< ID>), e.g. XRS-370C,1 2 – Radio firmware (<version>,< package>), e.g. v1.41,34 3 – serial number, e.g. 40500528 4 – MAC address, e.g. 34:81:F4:15:D2:CF 5 – Hardware revision, e.g. 1 6 – “GRAPI” PEI version, e.g. 1.0 7 – EEPROM structure version, e.g. 1 8 – Bluetooth® module firmware revision, e.g. v1.0
ATZ ATZ0	Revert radio settings to defaults (keep user channels and SelCall contacts).
AT&F AT&F0	Revert radio to factory default settings (erase user channels and contacts)
AT+GMI	Request manufacturer information. Reply: GME
AT+GMM	Request model identification (name, ID). Example reply: XRS-370C,1
AT+GMR	Request radio firmware revision (version, package). Example reply: v1.41,34

Command Syntax	Description
AT+GSN	Request serial number. Returns the radio serial number. Example reply: 40400338
AT+GOI	Request the MAC address. Example reply: 34:81:F4:15:D2:CF
ATE<value>	Command echo on/off. 0 – DCE does not echo characters. 1 – DCE echoes characters (power-on default).
ATV<value>	Response verbosity. 0 – Non-verbose response (power-on default). 1 – Verbose response.
AT+WGRST	Restart (reboot) the radio.

Table 8 - Supported General Commands and Syntaxes

Notification Syntax	Description
+WGPTT: <state>,[timer]	Transmit (PTT) notification. Where: <state>: 0 – Not transmitting. 1 – Transmitting (voice only). 2 – Transmitting (voice and data).  <timer>: Time in seconds until next allowed data transmission, as per class licence restrictions. Only applicable when PTT state is 2.
+WGPOW: <state>	Power state notification. <state>: 0 – Booting up. 1 – Running. 2 – Reset initiated. 3 – Power down initiated. 4 – Power down. 5 – Low battery voltage.

Table 9 - Notification Syntaxes



## Channel Control Commands

Command Syntax	Description
AT+WGCHU	Radio channel up.
AT+WGCHD	Radio channel down.
AT+WGCHS=<zone>,<channel>	Radio channel down. Where: <zone> – the new zone ID (1 .. 8). <channel> – the new channel ID (1 .. 130).
AT+WGCHR=<zone>,<channel>	Retrieve information about the chosen channel. Where: <zone> – the zone ID (1 .. 8). <channel> – the channel ID (1 .. 130).  Response (standard CB channel): <channel>,<type>,"<name>",<scanmemA>,<scanmemB>,<scanmemC>,<rxonly>,<silentmem>,<quietmem>,<duplex>  Response (custom channel): <channel>,<type>,"<name>",<scanmemA>,<scanmemB>,<scanmemC>,<rxonly>,<silentmem>,<quietmem>,<rxfreq>,<txfreq>,<rxsubtone>,<txsubtone>,<efl>  Where: <channel> – the channel ID (1 .. 130). <type> – 0 for standard CB or 1 for custom channels. <name> – the channel name. <scanmemA> – 1 channel is in scan memory A, 0 otherwise. <scanmemB> – 1 channel is in scan memory B, 0 otherwise. <scanmemC> – 1 channel is in scan memory C, 0 otherwise. <silentmem> – 1 channel is in silent memory, 0 otherwise. <quietmem> – 1 channel is in quiet memory, 0 otherwise. <duplex> – 1 channel is in duplex mode, 0 otherwise. <rxonly> – 1 channel is receive only, 0 otherwise. <rxfreq> – receive frequency of the channel in Hertz. <txfreq> – transmit frequency of the channel in Hertz. <rxsubtone> – Not used. <txsubtone> – Not used. <efl> – ACMA ELF identifier or similar if imported from channel database, 0 otherwise.
AT+WGCHL=<zone>	List all channels in a zone. <zone> – the zone ID (1 .. 8).  Response consists of a line of information for every channel in the zone (standard CB and custom channels), in the same format as the response to the AT+WGCHR command.
AT+WGCHL	List all channels in current zone. Response parameters identical to response for AT+WGCHL=<zone>.
AT+WGZS=<zone>	Set the radio's current zone. <zone> – the new zone ID (1 .. 8).

Command Syntax	Description
AT+WGZR=<zone>	Read zone information. <zone> – the zone ID (1 .. 8).  Response: <zone>,"<name>",<version>,<enabled>,<channels>  Where: <zone> – the zone ID (1 .. 8). <name> – the name of the zone. <version> – not used. <enabled> – not used. <channels> – number of valid custom channels in the zone.
AT+WGZR	Read zone information for current zone. Response parameters identical to response for AT+WGZR=<zone>.
AT+WGZL	List all zones. Response consists of a line of information for every zone, in the same format as the response to the AT+WGZR command.
Notification Syntax	Description
+WGCHS: <zone>,<chnl>	Channel change notification. Where: <zone> – the zone ID (1 .. 8). <chnl> – the channel ID (1 .. 130).
+WHZS: <zone>	Zone change notification. <zone> – the zone ID (1 .. 8).

Table 10 - Channel Control Commands

## Radio Commands

Command Syntax	Description
AT+WGDUP=<enabled>	Enable/disable duplex on current channel, if allowed.
AT+WGSCAN=<start>	Start/stop scanning process using current scan memory setting.
AT+WGSCM=<enabled>	Set/unset current channel in scan memory.
Notification Syntax	Description
+WGDUP: <enabled>	Duplex enabled/disabled on current channel notification.
+WGSCAN: <enabled>	Scanning started/stopped notification.
+WGSCM: <enabled>	Set/unset current channel in scan memory notification.

Table 11 - Radio Commands

## Audio Commands

Command Syntax	Description
AT+WGAV=<volume>	Set the radio's volume level. <volume> – volume level (1 .. 31).
AT+WGASQ=<enable>	Enable or disable the squelch. <enable> – 0 to disable squelch, 1 to enable.
Notification Syntax	Description
+WGAV: <volume>	Notification of volume change. <volume> – volume level (1 .. 31).
+WGASQ: <enable>	Notification of squelch enable/disable. <enable> – 0 for squelch disabled, 1 for enabled.

Table 12 - Audio Commands

## CTCSS/DCS Commands

Command Syntax	Description
AT+WGCSM=<enable>	Set/unset the current channel in silent memory. <enable> – 0 to disable silent on current channel, 1 to enable.
Notification Syntax	Description
+WGCSM: <enable>	Notification of current channel silent memory set/unset. <enable> – 1 if added to silent memory, 0 if removed from silent memory.

Table 13 - CTCSS/DCS Commands

## SelCall Commands

Command Syntax	Description
AT+WGSQM=<enable>	Set/unset the current channel in quiet memory. <enable> – 1 added to quiet memory, 0 removed from quiet memory.
AT+WGSQ=<mode>,<force>	Set quiet mode on/off. Where: <mode> – 0 off, 1 on. <force> – 1 force quiet mode on even if current channel is not in quiet memory, 0 otherwise.
AT+WGSD=<format>,<ident>	Initiate a selective call. Where: <format> – 0 <ident> is an index into radio's SelCall contact list, 1 <ident> is an explicit SelCall identification number.
AT+WGSCID=<ident>	Set radio's own SelCall ident. <ident> – SelCall ident (5 digits).

Table 14 - SelCall Command Syntaxes

Notification Syntax	Description
+WGSQM: <enabled>	Notification that current channel is set/unset from quiet memory.
+WGSQ: <enabled>	Notification that quiet mode has been set/unset on the radio.
+WGSR: <type>,<ident>,<index>	Notification that a SelCall has been received from another radio. Where: <type> – not used (0). <ident> – SelCall ident of calling radio. <index> – index into radio's SelCall list (0 .. 19), -1 if not listed.
+WGSCID: <ident>	Notification that the radio's own SelCall ident has changed. <ident> – new SelCall ident.

Table 15 - SelCall Notification Syntaxes

## Bluetooth® Commands

Command Syntax	Description
AT+WGBTNM=<name>	Set Bluetooth® module name. Note that connection will terminate the existing connection. <name> – new name of device, maximum length 12 characters. The actual name will be preceded by the text “XRS-”.
AT+WGBPS=<type>	Set Bluetooth® pairing type on next radio power-on. <type> – 0 for open pairing, 1 for secure passkey confirm pairing.

Table 16 - Bluetooth® Commands

## P25 Location Services Commands

Command Syntax	Description
AT+WGTLOC=<time>,<lat>,<lng>	Set location coordinates and timestamp used in the P25 Tier1 Location Services NMEA transmit string. Where: <time> – timestamp in UTC time, format hhmmss (e.g. 142659). <lat> – latitude in signed decimal degrees (e.g. -33.76796). <lng> – longitude in signed decimal degrees (e.g. 150.95983).
AT+WGTMSG="<msg>"	Set user data string used in the P25 Tier1 Location Services NMEA transmit string. Where: <msg> – AT-escaped user data string. The maximum length of this string is 32 bytes, with NMEA character escaping [6]. The XRS™ Location Services application uses the convention “@<username>#<status>” (e.g. “@JohnSmith#My status message”).

Table 17 - P25 Location Services Command Syntaxes

Notification Syntax	Description
+WGRMLLOC: time<fix>,<lat>,<lng>,"<UID>","<msg>"	<p>Notification of P25 Location Services data received from another radio.</p> <p>Where:</p> <p>&lt;time&gt; – Timestamp in UTC time, format hhmmss (e.g. 142659).</p> <p>&lt;fix&gt; – Location fix quality, 6=estimated fix, 0=no fix.</p> <p>&lt;lat&gt; – latitude in signed decimal degrees (e.g. -33.76796).</p> <p>&lt;lng&gt; – longitude in signed decimal degrees (e.g. 150.95983).</p> <p>&lt;UID&gt; – Optional user ID, XRS™ allows this to set to the SelCall ID.</p> <p>&lt;msg&gt; – AT-escaped user data string. The XRS™ Location Services application uses the convention "@&lt;username&gt;#&lt;status&gt;" (e.g. "@JohnSmith#My status message").</p>
+WGRXLOC: <src>,<ID>,"<str>"	<p>Verbose notification of P25 Location Services data received from another radio.</p> <p>Where:</p> <p>&lt;src&gt; – source of received data, 1 for P25 Tier1 Location Services data.</p> <p>&lt;ID&gt; – not used, omitted.</p> <p>&lt;str&gt; – verbatim P25 NMEA Location Services string [5], AT escaped, with original NMEA character escaping [6], as received.</p>

Table 18 - P25 Location Services Notification Syntaxes



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