

**Optoelectronics, Inc.**  
**Xplorer™**  
**ASCII Serial Interface Specification**

**Interface Version: 3.4**

**March 25, 2010**

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**INTRODUCTION**

This document describes the ASCII COMMAND serial interface of the Xplorer™, a hand-held test receiver capable of sweeping and locking on to near-field FM VHF and UHF transmissions. The Xplorer™ is capable of capturing and storing up to 500 frequencies, along with the number of occurrences, or hits, of each frequency, the time and date the frequency was last detected, the audio and DTMF enable status, the signal strength, and the audible and subaudible signaling information. This data can then be downloaded to a personal computer for storage and analysis. The Xplorer™ can be remotely controlled by a host computer via the serial interface.

This document was written to assist the programmer in developing software applications for the Xplorer™. Optoelectronics, Inc. assumes no responsibility for the accuracy of the information contained in this document, and is under no obligation to provide technical support on matters pertaining to this document, or to provide notification of changes or corrections to this document.

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### ABOUT THE INTERFACE

Unlike previous Optoelectronics products, the command structure of the Xplorer™ ASCII command set is not based on the Icom CI-V standard. Instead, the new command set was developed to provide full control of the instrument, as well as the ability to download data stored in memory. A primary advantage of this new command scheme is that the Xplorer™ can be tested under remote control using a personal computer running a common terminal emulator program, such as HyperTerminal™.

The Xplorer™ serial interface is full-duplex with EIA-232D compatible voltage levels. The communications parameters for the serial interface are listed in Table 1 below.

**Table 1. Communications Parameters.**

<b>DATA RATE</b>	9,600 bps
<b>START BITS</b>	1
<b>DATA BITS</b>	8
<b>PARITY</b>	NONE
<b>STOP BITS</b>	1

To connect the Xplorer™ to a personal computer, a miniature (3.5 mm) stereo phone jack is provided on the top panel. The Xplorer™ receives commands on the RING terminal and transmits responses on the TIP terminal of the stereo phone jack. Signal ground is provided on the SHIELD terminal of the phone jack. Since the Xplorer™ serial interface is compatible with EIA-232D voltage levels, no external interface converter box is required to connect the Xplorer™ to a standard personal computer COM port. An interface cable for connecting the Xplorer™ to a PC is available.

For ReactionTune™ applications, a subminiature (2.5 mm) phone jack is provided on the top panel. The TIP terminal provides the TTL equivalent of the EIA-232 transmit data signal to drive ReactionTune™-capable receivers. Signal ground is provided on the SHIELD terminal of the phone jack.

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### COMMAND REFERENCE

The Xplorer™ accepts ASCII commands over the serial interface when the INTERFACE configuration parameter is set to ASCII COMMAND from the front panel. In this section, all command and response bytes are expressed as ASCII characters. Each command and response string is terminated with an ASCII Carriage Return (<CR>) character (0x0D). Any ASCII Line Feed (<LF>) characters (0x0A) received by the Xplorer™ will be ignored and discarded.

The Xplorer™ processes commands one at a time. After a command is issued, the host computer must wait for the complete response before issuing a new command. Any further command characters received by the Xplorer™ while a previous command is being processed, will be ignored and discarded. Issuing a new command while a previous response is being returned may result in some or all of the previous response to be truncated prematurely. It should be noted that the command characters are case sensitive, and any erroneous or unrecognized command will cause the Xplorer™ to return the command error response (**ERROR<CR>**).

The Xplorer™ recognizes 21 different ASCII commands, which are summarized in Table 2 below. Following the command summary table is a detailed description of each of the commands.

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**Table 2. Xplorer™ Serial Interface ASCII Command Summary.**

COMMAND	DESCRIPTION
BK	Blocks
CB	Clear Blocks
CFG	Configuration
CL	Clear Lockouts
CM	Clear Memory
DS	Display Select
DT	Date/Time
FSO	Frequency/Signal Strength Output
HD	Hold
ID	Identification
LO	Lockout
LS	Lockout Status
MD	Mode
MR	Memory Read
PR	Parameter Recall
PS	Parameter Store
RM	Read Measurements
SF	Sweep Frequency
SK	Skip
ST	Store
VF	VFO Frequency

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**BLOCKS Command**

This command specifies the BLOCKS status, or instructs the unit to return the current BLOCKS status.

However, if the command length is incorrect, or if any of the specified BLOCKS parameters is not valid, then the command is ignored, and the ERROR response is returned.

Command: **BK:n,t,aaaa.aaaaaa,bbbb.bbbbbb<CR>**  
Query: **BK:n?<CR>**  
Response: **BK:n,t,aaaa.aaaaaa,bbbb.bbbbbb<CR>**

**n** is a 1-digit ASCII decimal value in the range **0** to **9** representing the specified block location.

**t** is a 1-digit ASCII decimal value representing the specified block type, as follows:

- 0** = BLOCK OFF
- 1** = INCLUDE BLOCK
- 2** = EXCLUDE BLOCK

**aaaa.aaaaaa** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the specified block A frequency in MHz.

**bbbb.bbbbbb** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the specified block B frequency in MHz.

**CLEAR BLOCKS Command**

This command instructs the unit to clear the BLOCKS.

However, if the command length is incorrect, or if the specified security code is not valid, then the command is ignored, and the ERROR response is returned.

Command: **CB:ssssssss<CR>**  
Response: **CB<CR>**

**ssssssss** is an 8-digit ASCII decimal value representing the security code. This unique 8-digit code (**52386527**) must be correctly specified to clear the BLOCKS.

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**CONFIGURATION Command**

This command specifies the CONFIGURATION settings, or instructs the unit to return the current CONFIGURATION settings.

However, if the command length is incorrect, or if any of the specified CONFIGURATION settings is not valid, then the command is ignored, and the ERROR response is returned.

Command: **CFG:a,b,c,d,e,f,g,h,i,j,k,l,m,n,o<CR>**

Query: **CFG?<CR>**

Response: **CFG:a,b,c,d,e,f,g,h,i,j,k,l,m,n,o<CR>**

**a** is a 1-digit ASCII decimal value representing the BACKLIGHT setting, as follows:

- 0** = BACKLIGHT OFF
- 1** = BACKLIGHT AUTO
- 2** = BACKLIGHT ON

**b** is a 1-digit ASCII binary value representing the AUDIO setting, as follows:

- 0** = AUDIO OFF
- 1** = AUDIO ON

**c** is a 1-digit ASCII binary value representing the DTMF setting, as follows:

- 0** = DTMF OFF
- 1** = DTMF ON

**d** is a 1-digit ASCII decimal value representing the AUTO SKIP (DWELL TIME) setting, as follows:

- 0** = AUTO SKIP OFF
- 1** = AUTO SKIP AFTER 1 SECOND
- 2** = AUTO SKIP AFTER 3 SECONDS
- 3** = AUTO SKIP AFTER 5 SECONDS
- 4** = AUTO SKIP AFTER 10 SECONDS
- 5** = AUTO SKIP AFTER 15 SECONDS
- 6** = AUTO SKIP AFTER 20 SECONDS

**e** is a 1-digit ASCII binary value representing the AUTO HOLD setting, as follows:

- 0** = AUTO HOLD OFF
- 1** = AUTO HOLD ON

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**f** is a 1-digit ASCII binary value representing the AUTO STORE setting, as follows:

**0** = AUTO STORE OFF  
**1** = AUTO STORE ON

**g** is a 1-digit ASCII binary value representing the CAPTURE setting, as follows:

**0** = CAPTURE EVERY  
**1** = CAPTURE UNIQUE

**h** is a 1-digit ASCII binary value representing the LOCKOUTS setting, as follows:

**0** = LOCKOUTS OFF  
**1** = LOCKOUTS ON

**i** is a 1-digit ASCII binary value representing the BLOCKS setting, as follows:

**0** = BLOCKS OFF  
**1** = BLOCKS ON

**j** is a 1-digit ASCII decimal value representing the VFO FINE setting, as follows:

**0** = 5 kHz  
**1** = 10 kHz  
**2** = 12.5 kHz  
**3** = 25 kHz  
**4** = 30 kHz  
**5** = 50 kHz  
**6** = 100 kHz

**k** is a 1-digit ASCII decimal value representing the VFO COARSE setting, as follows:

**0** = 1 MHz  
**1** = 5 MHz  
**2** = 10 MHz

**l** is a 1-digit ASCII binary value representing the NRZ DECODE setting, as follows:

**0** = DCS DECODE  
**1** = LTR DECODE

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**m** is a 1-digit ASCII binary value representing the SQUELCH CONTROL setting, as follows:

- 0** = INTERNAL SQUELCH CONTROL
- 1** = EXTERNAL SQUELCH CONTROL

**n** is a 1-digit ASCII binary value representing the SWEEP DISPLAY setting, as follows:

- 0** = CHANNEL FREQUENCY
- 1** = MEASURED FREQUENCY

**o** is a 1-digit ASCII binary value representing the SIGNAL DISPLAY setting, as follows:

- 0** = BARGRAPH SIGNAL STRENGTH
- 1** = NUMERIC SIGNAL STRENGTH

**CLEAR LOCKOUTS Command**

This command instructs the unit to clear the LOCKOUTS.

However, if the command length is incorrect, or if the specified security code is not valid, then the command is ignored, and the ERROR response is returned.

Command: **CL:ssssssss<CR>**  
Response: **CL<CR>**

**ssssssss** is an 8-digit ASCII decimal value representing the security code. This unique 8-digit code (**52386527**) must be correctly specified to clear the LOCKOUTS.

**CLEAR MEMORY Command**

This command instructs the unit to clear the MEMORY.

However, if the command length is incorrect, or if the specified security code is not valid, then the command is ignored, and the ERROR response is returned.

Command: **CM:ssssssss<CR>**  
Response: **CM<CR>**

**ssssssss** is an 8-digit ASCII decimal value representing the security code. This unique 8-digit code (**52386527**) must be correctly specified to clear the MEMORY.

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### DISPLAY SELECT Command

This command specifies the DISPLAY SELECT settings, or instructs the unit to return the current DISPLAY SELECT settings.

However, if the command length is incorrect, or if any of the specified DISPLAY SELECT settings is not valid, then the command is ignored, and the ERROR response is returned.

Command: **DS:a,bb,ccc,d,e,fff,gg<CR>**

Query: **DS?<CR>**

Response: **DS:a,bb,ccc,d,e,fff,gg<CR>**

**a** is a 1-digit ASCII decimal value representing the MEASUREMENT SELECT setting, as follows:

- 0** = SIGNAL STRENGTH measurement
- 1** = CTCSS measurement
- 2** = NRZ measurement
- 3** = DTMF measurement

**bb** is a 2-digit ASCII decimal value representing the CONFIG SELECT setting, as follows:

- 00** = INTERFACE config
- 01** = RECEIVER config
- 02** = PCR1000 VOLUME config
- 03** = PCR1000 SQUELCH config
- 04** = BACKLIGHT config
- 05** = AUDIO config
- 06** = DTMF config
- 07** = AUTO SKIP config
- 08** = AUTO HOLD config
- 09** = AUTO STORE config
- 10** = CAPTURE config
- 11** = LOCKOUTS config
- 12** = BLOCKS config
- 13** = VFO FINE config
- 14** = VFO COARSE config
- 15** = NRZ DECODE config
- 16** = SQUELCH CONTROL config
- 17** = SWEEP DISPLAY config
- 18** = SIGNAL STRENGTH DISPLAY config
- 19** = CLEAR LOCKOUTS config
- 20** = CLEAR BLOCKS config
- 21** = CLEAR MEMORY config

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- 22** = YEAR config
- 23** = MONTH config
- 24** = DAY config
- 25** = HOURS config
- 26** = MINUTES config
- 27** = SECONDS config

**ccc** is a 3-digit ASCII decimal value in the range **000** to **999** representing the LOCKOUT SELECT.

**d** is a 1-digit ASCII decimal value in the range **0** to **9** representing the BLOCK SELECT.

**e** is a 1-digit ASCII decimal value representing the BLOCK PARAMETER, as follows:

- 0** = FREQUENCY A block parameter
- 1** = FREQUENCY B block parameter
- 2** = TYPE block parameter

**fff** is a 3-digit ASCII decimal value in the range **000** to **499** representing the MEMORY SELECT.

**gg** is a 2-digit ASCII decimal value representing the MEMORY PARAMETER setting, as follows:

- 00** = FREQUENCY memory parameter
- 01** = HITS memory parameter
- 02** = TIME memory parameter
- 03** = DATE memory parameter
- 04** = AUDIO STATUS memory parameter
- 05** = DTMF STATUS memory parameter
- 06** = SIGNAL STRENGTH memory parameter
- 07** = CTCSS memory parameter
- 08** = DCS memory parameter
- 09** = DTMF memory parameter
- 10** = LTR memory parameter

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**DATE/TIME Command**

This command specifies the date and time, or instructs the unit to return the current date and time.

However, if the command length is incorrect, or if any of the specified date or time parameters is not valid, then the command is ignored, and the ERROR response is returned.

Command: **DT:yyyy-mm-dd,hh:mm:ss<CR>**  
Query: **DT?<CR>**  
Response: **DT:yyyy-mm-dd,hh:mm:ss<CR>**

**yyyy-mm-dd** is an 8-digit ASCII decimal value representing the DATE in **year-month-day** format. The **year** field must be in the range **2000** to **2099**. The **month** field must be in the range **01** to **12**. The **day** field must be in the range **01** to **31**.

**hh:mm:ss** is a 6-digit ASCII decimal value representing the TIME in 24-hour **hour:minute:second** format. The **hour** field must be in the range **00** to **23**, where **00** = midnight. The **minute** field must be in the range **00** to **59**. The **second** field must be in the range **00** to **59**.

**FREQUENCY / SIGNAL STRENGTH OUTPUT Command**

This command specifies the FREQUENCY / SIGNAL STRENGTH OUTPUT setting, or instructs the unit to return the current FREQUENCY / SIGNAL STRENGTH OUTPUT setting.

However, if the command length is incorrect, or if the specified FREQUENCY / SIGNAL STRENGTH OUTPUT setting is not valid, then the command is ignored, and the ERROR response is returned.

Command: **FSO:e<CR>**  
Query: **FSO?<CR>**  
Response: **FSO:e<CR>**

**e** is a 1-digit ASCII binary value representing the FREQUENCY / SIGNAL STRENGTH OUTPUT setting, as follows:

- 0** = FREQUENCY / SIGNAL STRENGTH OUTPUT disabled
- 1** = FREQUENCY / SIGNAL STRENGTH OUTPUT enabled

If FREQUENCY / SIGNAL STRENGTH OUTPUT is enabled, and INTERFACE is set to ASCII COMMAND, and the unit is in SWEEP mode, then each time a new frequency is detected, or when a currently active frequency is no longer present, the unit automatically outputs a string containing the frequency and signal strength, as follows:

Response: **FS:fff.fffff,ss<CR><LF>**

**fff.fffff** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the frequency in MHz.

**ss** is a 2-digit ASCII decimal value in the range **00** to **50** representing the SIGNAL STRENGTH.

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### HOLD Command

This command activates the HOLD function, provided that the unit is in SWEEP mode. If the unit is not in SWEEP mode, then this command has no effect.

However, if the command length is incorrect, then the command is ignored, and the ERROR response is returned.

Command: **HD<CR>**  
Query: **HD?<CR>**  
Response: **HD:e<CR>**

**e** is a 1-digit ASCII binary value representing the HOLD status, as follows:

**0** = HOLD inactive  
**1** = HOLD active

### IDENTIFICATION Command

This command instructs the unit to return the instrument identification string. The identification string is unique to the Xplorer™, and includes the Digital Board and RF Board software version, and the Interface version.

However, if the command length is incorrect, then the command is ignored, and the ERROR response is returned.

Query: **ID?<CR>**  
Response: **ID:XPLORER,ddd,rrr,iii<CR>**

**ddd** is a 3-digit ASCII decimal value in the range **000** to **999** representing the Digital Board software version.

**rrr** is a 3-digit ASCII decimal value in the range **000** to **999** representing the RF Board software version.

**iii** is a 3-digit ASCII decimal value in the range **000** to **999** representing the Interface version.

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**LOCKOUT Command**

This command adds the current SWEEP FREQUENCY or the current VFO FREQUENCY to the LOCKOUTS.

However, if the command length is incorrect, or if the frequency select parameter is not valid, then the command is ignored, and the ERROR response is returned.

Command: **LO:s<CR>**

Response: **LO:ffff.ffffff<CR>**

**s** is a 1-digit ASCII binary value representing the specified frequency, as follows:

**0** = SWEEP FREQUENCY

**1** = VFO FREQUENCY

**ffff.ffffff** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the stored frequency in MHz.

**LOCKOUT STATUS Command**

This command specifies the LOCKOUT STATUS, or instructs the unit to return the current LOCKOUT STATUS.

However, if the command length is incorrect, or if any of the specified LOCKOUT STATUS parameters is not valid, then the command is ignored, and the ERROR response is returned.

Command: **LS:nnn,e<CR>**

Query: **LS:nnn?<CR>**

Response: **LS:nnn,e,ffff.ffffff<CR>**

**nnn** is a 3-digit ASCII decimal value in the range **000** to **999** representing the specified lockout location.

**e** is a 1-digit ASCII binary value representing the specified lockout enable setting, as follows:

**0** = LOCKOUT OFF

**1** = LOCKOUT ON

**ffff.ffffff** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the specified lockout frequency in MHz.

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**MODE Command**

This command specifies the OPERATING MODE, or instructs the unit to return the current OPERATING MODE.

However, if the command length is incorrect, or if the specified OPERATING MODE parameter is not valid, then the command is ignored, and the ERROR response is returned.

Command: **MD:mm<CR>**

Query: **MD?<CR>**

Response: **MD:mm<CR>**

**mm** is a 2-digit ASCII decimal value in the range **00** to **06** representing the OPERATING MODE, as follows:

- 00** = SWEEP mode
- 01** = VFO mode
- 02** = CONFIG mode
- 03** = LOCKOUTS mode
- 04** = BLOCKS mode
- 05** = MEMORY mode
- 06** = TIME/DATE mode







### **SWEEP FREQUENCY Command**

This command instructs the unit to return the current SWEEP FREQUENCY.

However, if the command length is incorrect, then the command is ignored, and the ERROR response is returned.

Query: **SF?<CR>**  
Response: **SF:ffff.ffffff<CR>**

**ffff.ffffff** is a 10-digit ASCII decimal value representing the SWEEP FREQUENCY in MHz.

### **SKIP Command**

This command instructs the unit to SKIP over the current sweep frequency, provided that the unit is in SWEEP mode. If the unit is not in SWEEP mode, then this command has no effect.

However, if the command length is incorrect, then the command is ignored, and the ERROR response is returned.

Command: **SK<CR>**  
Response: **SK<CR>**

### **STORE Command**

This command stores the current SWEEP FREQUENCY or the current VFO FREQUENCY, and all associated data, in memory.

However, if the command length is incorrect, or if the frequency select parameter is not valid, then the command is ignored, and the ERROR response is returned.

Command: **ST:s<CR>**  
Response: **ST:ffff.ffffff<CR>**

**s** is a 1-digit ASCII binary value representing the specified frequency, as follows:

**0** = SWEEP FREQUENCY  
**1** = VFO FREQUENCY

**ffff.ffffff** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the stored frequency in MHz.

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**VFO FREQUENCY Command**

This command instructs the unit to return the current VFO FREQUENCY.

However, if the command length is incorrect, or if the specified VFO FREQUENCY is not valid, then the command is ignored, and the ERROR response is returned.

Command: **VF:fff.ffffff<CR>**

Query: **VF?<CR>**

Response: **VF:fff.ffffff<CR>**

**fff.ffffff** is a 10-digit ASCII decimal value in the range **0030.000000** to **2000.000000** representing the VFO FREQUENCY in MHz.