## FREQUENCY ADJUSTMENT                                                 2-3

### Introduction                                                        2-3.1

The FE-5680A output frequency can be adjusted digitally over the RS-232 interface (pins 8 and 9).  This feature is available as option 2, and is not available on units purchased without this option.  The frequency can be adjusted with a resolution of 1.7854E-7 Hz.  For an FE-5680A device with an output frequency of 10 MHz, this corresponds to a relative frequency setting resolution of  1.7854E-14.

In order to perform frequency adjustments to the FE-5680A over the serial interface, commands conforming to the protocol described in this section must be sent.  The signal levels must conform to the RS-232C requirements.  Commands are sent to the FE-5680A using the TX line (pin 9), and responses from the FE-5680A are received on the RX line (pin 8).  The TX and RX signals are referenced to system ground, pin 5.

This Section describes the serial message protocol between the FE-5680A and a computer.

### Protocol Format                                                     2-3.2

Each message is comprised of a command header and optional data. The command header has a command ID, message length and command checksum. Some messages may have data as well. If data is present, data is appended after the command checksum and its length is dependent of the specific command.

Command format:

[Command ID] [Message length] [Command checksum] [Data…Data…Data…] [Data Checksum]

Where:

Command ID – 8 bit unsigned integer
Message Length – 16 bit unsigned integer
Command Checksum – 8 bit unsigned integer
Data – Variable length data
Data Checksum – 8 bit unsigned integer calculated by taking the exclusive-or of each byte

Table 5 illustrates the byte ordering of the serial message protocol. If a particular command does not have any associating data, then the message length is 4 bytes.

**Table 5**

| Message Section | Offset | Description |
|---|---|---|
| Command Header | 0 | Command ID |
| | 1 | Low-byte of message length |
| | 2 | High byte of message length |
| | 3 | Check of byte offset 0,1, and 2 |
| Data | 4 | Data Byte 0 |
| | 5 | Data Byte 1 |
| | . | |
| | . | |
| | . | |
| | n | Data Byte n |
| | n+1 | Checksum of byte 4 to n |

**Commands**                                                                 **2-3.3**

## 2-3.3.1 Set Frequency Offset, Save to EEPROM – 2Ch

This command is used to perform a frequency adjustment which will be "remembered" by the FE-5680A.  If the FE-5680A is turned off after this type of frequency adjustment, it will return to the adjusted frequency setting after being powered on at a later time.  Typically this command is used for infrequent frequency adjustments used to correct the FE-5680A output for frequency aging effects.

The offset sent to the FE-5680A with this command is saved in EEPROM memory.  The EEPROM can be written to at least 100,000 times with no loss of information, however, if too many writes are performed (more than 100,000) the validity of the stored values could become questionable.  It is recommended that this command be used no more than once per hour.  This insures a life of >10 years for the EEPROM memory.

**Input Command:**     2C 09 00 25 aa bb cc dd <cs>
**Data:**

      aa bb cc dd     32 bit signed integer where aa is the most significant byte and dd
                        is the least significant byte of the 32 bit signed integer.

**Data Length:**     4 bytes

**Command Length:**   9 bytes

**Remarks:**          This command sets the frequency offset. Value represents a 32
                            bit  signed integer.

Range:               7F FF FF FF = 2,147,483,647 = +383 Hz
                      80 00 00 00 = -2,147,483,647 =  -383 Hz

## 2-3.3.2 Set Frequency Offset, Don't Save to EEPROM – 2Eh

This command is used to perform a frequency adjustment which will **not** be "remembered" by the FE-5680A. If the FE-5680A is turned off after this type of frequency adjustment, it will return to the pre-adjusted frequency setting after being powered on at a later time. Typically this command is used for locking the FE-5680A to a more stable reference. There is no limit on how often this command can be sent to the FE-5680A.

**Input Command:**    2E 09 00 27 aa bb cc dd <cs>
**Data:**

      aa bb cc dd    32 bit signed integer where aa is the most significant byte and dd
                         is the least significant byte of the 32 bit signed integer.

**Data Length:**        4 bytes

**Command Length:**  9 bytes

**Remarks:**          This command sets the frequency offset. Value represents a 32bit signed integer.

Range:             7F FF FF FF = 2,147,483,647 = +383 Hz
                 80 00 00 00 = -2,147,483,647 =  -383 Hz

## *2-3.3.3 Request Frequency Offset – 2Dh*

**Input Command:**     2D 04 00 29

**Command Length:**   4 bytes

**Response:**               2D 09 00 24 aa bb cc dd <cs>

**Data:**

> aa bb cc dd     32 bit signed integer where aa is the most significant byte and
> dd is the least significant byte of the 32 bit signed integer.

**Data Length:** 4 bytes

**Response Length:**   9 bytes

**Remarks:**               This command reads the Frequency Offset value. Value
represents a 32 bit signed integer.