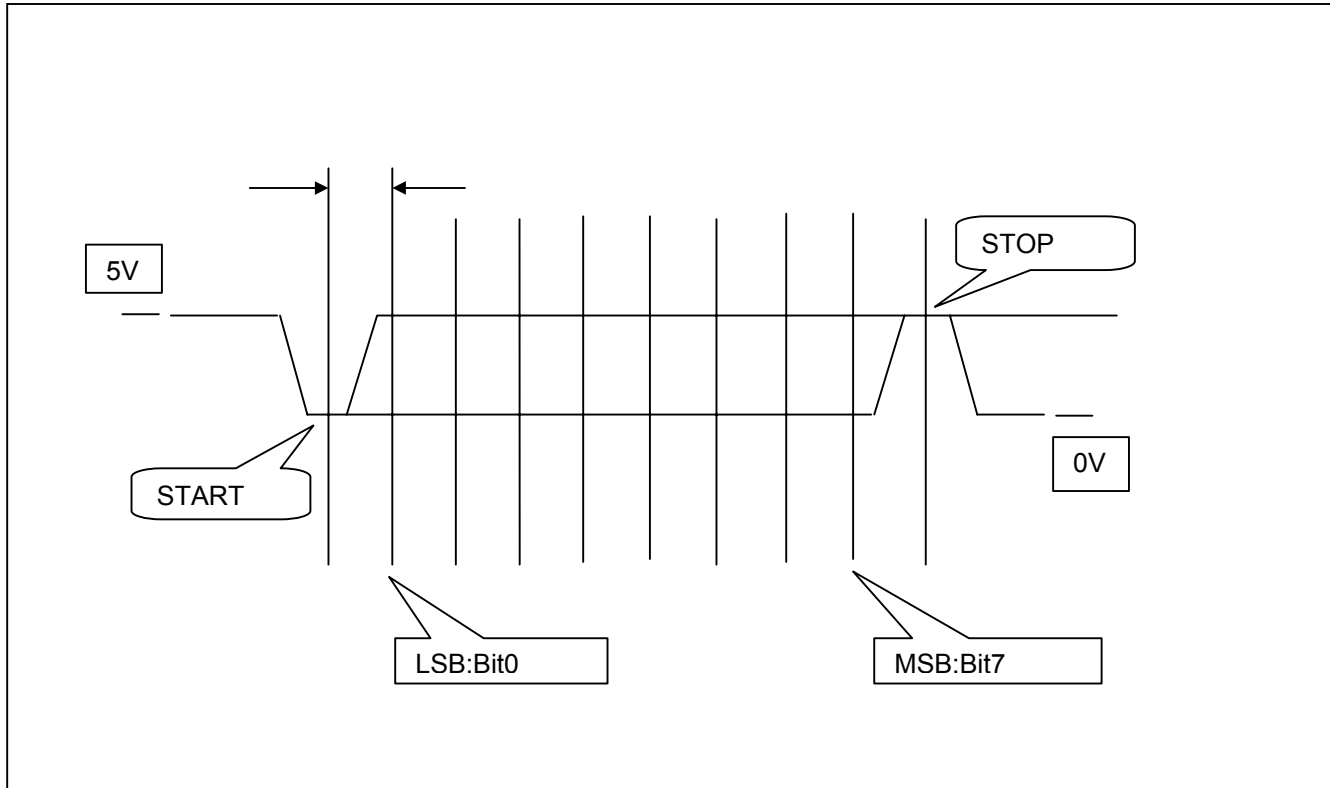
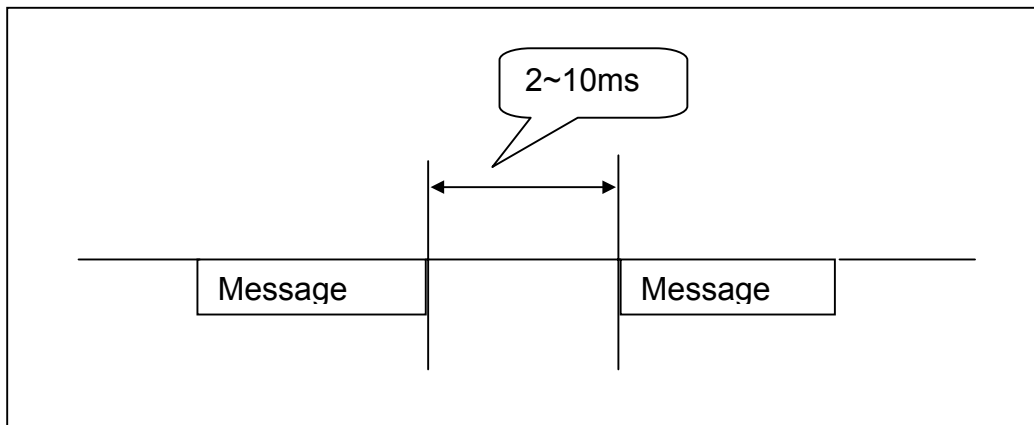


Rotel RS232 Serial Bus Communication

1. 1 Byte Waveform format

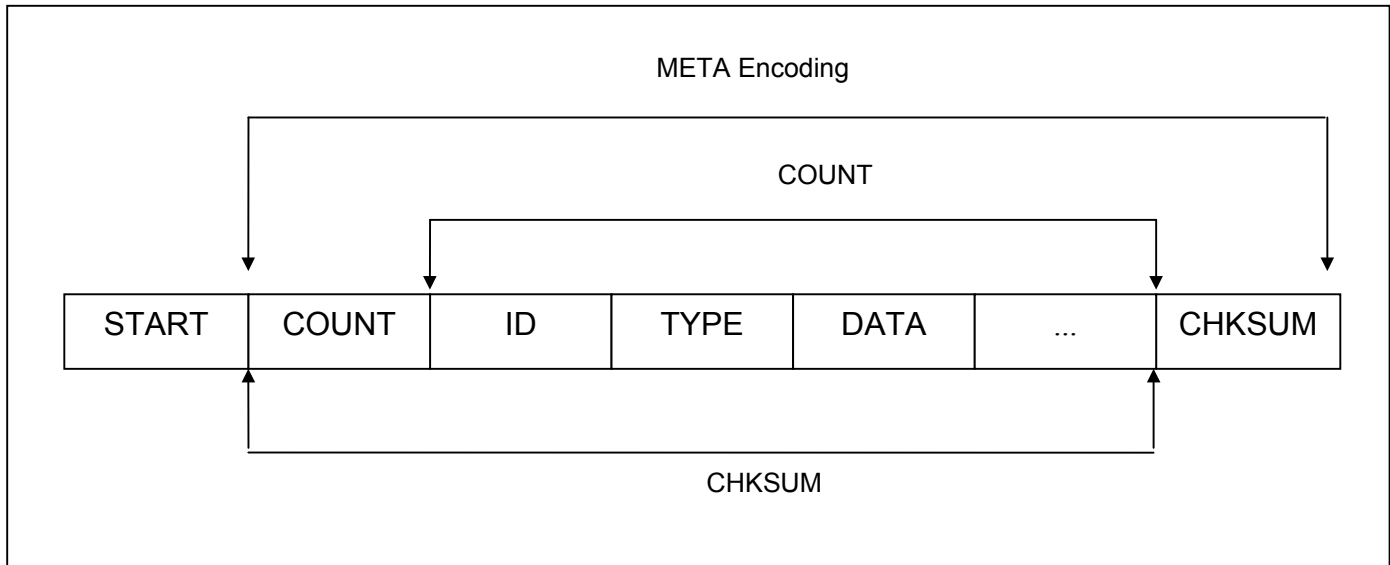


2. Bus Status Test



- A. Test starts to see if line is empty for 2~10msec before transmitting new message.
- B. Line test time is fixed in 2~10msec randomly.

3. Message Structure



Start: 0xFE

- Whenever 0xFE is received this indicates the start of a new message. The start code is always 0xFE.

Count

- This byte indicates the total number of bytes from the ID byte to the Data byte(s).

ID

- The device ID byte of the model being controlled. The protocol for each model will specify the correct ID.

Type

- The message type - 0x10 for Command (Transmit) messages, and 0x20 for feedback status (Receive) messages.

Data

- The data or commands to transmit.

Checksum

- The total value of all bytes except Start. Calculate by adding each byte. In the case that the total is larger than 2 digits, drop the most significant bit.

Example 1: Transmit command Volume Up to RSP 1098

0xFE 0x03 0xA0 0x10 0x0B 0xBE

Start: 0xFE Always 0xFE

Count: 0x03 Indicates 3 bytes to follow - (ID, Type, 1 Data byte)

ID: 0xA0 ID byte for RSP 1098

Type: 0x10 Indicates command type

Data: 0x0B Data value for Volume Up

Chk: 0xBE Checksum - calculate $0x03 + 0xA0 + 0x10 + 0x0B = 0xBE$

Example 2: Transmit command Power On to RSX 1055

0xFE 0x03 0xC3 0x10 0x4B 0x21

Start: 0xFE Always 0xFE
Count: 0x03 Indicates 3 bytes to follow - (ID, Type, 1 Data byte)
ID: 0xC3 ID byte for RSX 1055
Type: 0x10 Indicates command type
Data: 0x4B Data value for Power On
Chk: 0x21 Checksum - calculate $0x03 + 0xC3 + 0x10 + 0x4B = 0x121$
The most significant bit of 1 is dropped leaving 0x21.

4. Meta Encoding

To keep the device from encountering the start byte 0xFE in any position other than as the start byte, any occurrence of the bytes 0xFE or 0xFD in the command string must be converted to either 0xFD 0x00 (for 0xFD) or 0xFD 0x01 (for 0xFE). This will allow the string to pass while masking any occurrence of the byte 0xFE except as the start byte.

Example 2: Transmit command Power On to RSP 1098

0xFE 0x03 0xA0 0x10 0x4B 0xFE

In order for this command to function, the string must be meta encoded to instead look like this:

0xFE 0x03 0xA0 0x10 0x4B 0xFD 0x01

Start: 0xFE Always 0xFE
Count: 0x03 Indicates 3 bytes to follow - (ID, Type, 1 Data byte)
Note the count byte does not change to reflect the extra byte from Meta Encoding.
ID: 0xA0 ID byte for RSP 1098
Type: 0x10 Indicates command type
Data: 0x4B Data value for Power On
Chk: 0xFE Checksum - calculate $0x03 + 0xA0 + 0x10 + 0x4B = 0xFE$
This is then changed to 0xFD 0x01 to avoid sending the byte 0xFE to the device.

Note: When sending data, send up to 16 bytes maximum per string. Any larger strings should be broken up into 2 strings when transmitting.

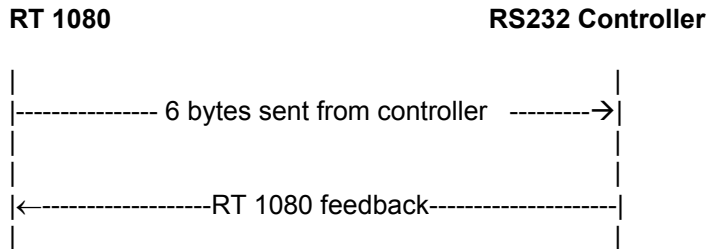
RT 1080 RS232 Communication Session Example

Figure 1: RT 1080 DISPLAY



Message sent to RT 1080 “Frequency Down”

Transmitting a frequency down command:



Byte number and value (HEX)	Description
Byte 1: FE	Start Code - Always the same
Byte 2: 03	Count Byte - Amount of bytes to follow
Byte 3: 21	Device ID - RT 1080 always 21
Byte 4: 10	Message Type - Always 10 for command
Byte 5: 18	Command Key - In this case frequency down
Byte 6: 4C	Checksum of all bytes except start code byte

RT 1080 feedback to RS232 port:

Each feedback is a result of a request by either an RS232 command sent or by front panel or remote selections selected. In each case the controller will receive 21 bytes, always starting a new message with “FE”.

Breakdown of message 1:

Byte Value	Description
Byte 1: FE	Start code
Byte 2: 12	Byte count of this message
Byte 3: 21	Device ID - 21 for RT 1080
Byte 4: 20	Message Type - Always 20 for receiving a message
Byte 5: 00	Flag word 1 - Empty no bit set
Byte 6: 00	Flag word 2 - Empty no bit set
Byte 7: 34	Flag word 3 - Bit 3 A, Bit 4 Ant, Bit 5 FM are set
Byte 8: 00	Flag word 4 - Empty nothing set
Byte 9: 40	Flag word 5 - One bit set
Byte 10: 20	Display 1 st digit space
Byte 11: 39	Display 2 nd digit Symbol 9
Byte 12: 30	Display 3 rd digit Symbol 0
Byte 13: 2E	Display 4 th digit Symbol .
Byte 14: 31	Display 5 th digit Symbol 1
Byte 15: 30	Display 6 th digit Symbol 0
Byte 16: 4D	Display 7 th digit Symbol M
Byte 17: 48	Display 8 th digit Symbol H
Byte 18: 1E	Display 9 th digit Symbol RS
Byte 19: 20	Display 10 th digit Symbol "space"
Byte 20: 32	Display 11 th digit Symbol 2
Byte 21: E4	Checksum of message excluding start code byte

Byte 1 - Start - Always 0xFE

Byte 2 - Count

Byte 3 - ID - Unique ID for each model

Byte 4 - Type - Always 0x20 for feedback

Bytes 5-9 - Flag Words - Each flag word contains 8 bits which will be turned on or off to indicate the currently displayed items on the display of the unit.

Bytes 10-20 - Display characters - Each byte contains the hex equivalent value of an ASCII character that is on the display of the unit.

Byte 21 - Checksum - Total value of all bytes excluding the Start byte.