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I. Application

This document defines the communications method for control of the NEC LCD monitor, Exx? series when using an external controller.
II. Preparation

2. Connectors and wiring

2.1 RS-232C Remote control

Connector: 9-pin D-Sub
Cable: Cross (reversed) cable or null modem cable

(Please refer “Controlling the LCD TV via RS-232C Remote control” on User’s manual.)

2.2 LAN control

Connector: RJ-45 10/100 BASE-T
Cable: Category 5 or higher LAN cable

(Please refer “Controlling the LCD TV via LAN control” on User’s manual.)
III. Communication specification

3. Communication Parameter

3.1 RS-232C Remote control

- **Communication system**: Asynchronous
- **Interface**: RS-232C
- **Baud rate**: 9600bps
- **Data length**: 8bits
- **Parity**: None
- **Stop bit**: 1 bit
- **Communication code**: ASCII

3.2 LAN control

- **Communication system**: TCP/IP (Internet protocol suite)
- **Interface**: Ethernet (CSMA/CD)
- **Communication layer**: Transport layer (TCP)
  - Using the payload of TCP segment.
- **IP address**: (Default) Automatic setup
  - If you need to change, please refer "Network settings" on User’s manual.
- **Port No.**: 7142 (Fixed)

(Note)
The monitor will disconnect the connection if no packet data is received for 15 minutes. And the controller (PC) has to re-connect to control the monitor again, after 15 minutes or more.

3.3 Communication timing

The controller should wait for a reply packet before the next command is sent.

(Note)
When the following commands are sent, a controller should wait for specified period after receiving the reply command before sending the next command.

- Power On, Power Off: 15 seconds
- Input, Factory Reset: 10 seconds
4. Communication Format

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check Code</th>
<th>Delimiter</th>
</tr>
</thead>
</table>

The command packet consists of four parts, Header, Message, Check code and Delimiter. Note: Don’t add extra data (Example: padding data) after Delimiter.

Recommended sequence of a typical procedure to control a monitor is as follows,
[A controller and a monitor, two-way communication composition figure]

- For the general command (see the part "6.3. Operation Code (OP code) Table")

  - **Controller**
    - Get Parameter
      - Header Message Check Code Delimiter
    - Get Parameter Reply
      - Header Message Check Code Delimiter
    - Set Parameter
      - Header Message Check Code Delimiter
    - Set Parameter Reply
      - Header Message Check Code Delimiter
    - Get Parameter
      - Header Message Check Code Delimiter
    - Get Parameter Reply
      - Header Message Check Code Delimiter

  - **Monitor**

  - The controller sends command to get a value from the monitor that you want to change.
  - The monitor replies a current value of the requested item.
  - The controller sends commands to set an adjusted value.
  - The monitor replies to the controller for confirmation.
  - The controller sends command to get a value for confirmation.
  - The monitor replies an adjusted value.

- For the special command (see the part 7 to 24. and 5.5.2)

  - **Controller**
    - Command
      - Header Message Check Code Delimiter
    - Command Reply
      - Header Message Check Code Delimiter

  - **Monitor**

  - The control does not suitable for above fixed protocol; use the proper command for each control. Please refer section 5.5 and section 7 to 26.
  - The monitor replies a proper message defined for each
4.1 Header block format (fixed length)

<table>
<thead>
<tr>
<th>SOH</th>
<th>Reserved</th>
<th>Destination</th>
<th>Source</th>
<th>Message Type</th>
<th>Message Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
<td>5th</td>
<td>6th ~ 7th</td>
</tr>
</tbody>
</table>

1st byte) SOH: Start of Header
ASCII SOH (01h)

2nd byte) Reserved: Reserved for future extensions.
On this monitor, it must be ASCII '0'(30h).

3rd byte) Destination: Destination equipment ID. (Receiver)
Specify a commands receiver’s address.
The controller sets the "MONITOR ID" of the monitor controlled in here.
On the reply, the monitor sets '0' (30h), always.

"MONITOR ID" to "Destination Address" conversion table is as follows,

<table>
<thead>
<tr>
<th>Monitor ID</th>
<th>Destination Address</th>
<th>Monitor ID</th>
<th>Destination Address</th>
<th>Monitor ID</th>
<th>Destination Address</th>
<th>Monitor ID</th>
<th>Destination Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41h('A')</td>
<td>26</td>
<td>5Ah('Z')</td>
<td>51</td>
<td>73h</td>
<td>76</td>
<td>8Ch</td>
</tr>
<tr>
<td>2</td>
<td>42h('B')</td>
<td>27</td>
<td>5Bh</td>
<td>52</td>
<td>74h</td>
<td>77</td>
<td>8Dh</td>
</tr>
<tr>
<td>3</td>
<td>43h('C')</td>
<td>28</td>
<td>5Ch</td>
<td>53</td>
<td>75h</td>
<td>78</td>
<td>8Eh</td>
</tr>
<tr>
<td>4</td>
<td>44h('D')</td>
<td>29</td>
<td>5Dh</td>
<td>54</td>
<td>76h</td>
<td>79</td>
<td>8Fh</td>
</tr>
<tr>
<td>5</td>
<td>45h('E')</td>
<td>30</td>
<td>5Eh</td>
<td>55</td>
<td>77h</td>
<td>80</td>
<td>90h</td>
</tr>
<tr>
<td>6</td>
<td>46h('F')</td>
<td>31</td>
<td>5Fh</td>
<td>56</td>
<td>78h</td>
<td>81</td>
<td>91h</td>
</tr>
<tr>
<td>7</td>
<td>47h('G')</td>
<td>32</td>
<td>60h</td>
<td>57</td>
<td>79h</td>
<td>82</td>
<td>92h</td>
</tr>
<tr>
<td>8</td>
<td>48h('H')</td>
<td>33</td>
<td>61h</td>
<td>58</td>
<td>7Ah</td>
<td>83</td>
<td>93h</td>
</tr>
<tr>
<td>9</td>
<td>49h('I')</td>
<td>34</td>
<td>62h</td>
<td>59</td>
<td>7Bh</td>
<td>84</td>
<td>94h</td>
</tr>
<tr>
<td>10</td>
<td>4Ah('J')</td>
<td>35</td>
<td>63h</td>
<td>60</td>
<td>7Ch</td>
<td>85</td>
<td>95h</td>
</tr>
<tr>
<td>11</td>
<td>4Bh('K')</td>
<td>36</td>
<td>64h</td>
<td>61</td>
<td>7Dh</td>
<td>86</td>
<td>96h</td>
</tr>
<tr>
<td>12</td>
<td>4Ch('L')</td>
<td>37</td>
<td>65h</td>
<td>62</td>
<td>7Eh</td>
<td>87</td>
<td>97h</td>
</tr>
<tr>
<td>13</td>
<td>4Dh('M')</td>
<td>38</td>
<td>66h</td>
<td>63</td>
<td>7Fh</td>
<td>88</td>
<td>98h</td>
</tr>
<tr>
<td>14</td>
<td>4 Eh('N')</td>
<td>39</td>
<td>67h</td>
<td>64</td>
<td>80h</td>
<td>89</td>
<td>99h</td>
</tr>
<tr>
<td>15</td>
<td>4Fh('O')</td>
<td>40</td>
<td>68h</td>
<td>65</td>
<td>81h</td>
<td>90</td>
<td>9Ah</td>
</tr>
<tr>
<td>16</td>
<td>50h('P')</td>
<td>41</td>
<td>69h</td>
<td>66</td>
<td>82h</td>
<td>91</td>
<td>9Bh</td>
</tr>
<tr>
<td>17</td>
<td>51h('Q')</td>
<td>42</td>
<td>6Ah</td>
<td>67</td>
<td>83h</td>
<td>92</td>
<td>9Ch</td>
</tr>
<tr>
<td>18</td>
<td>52h('R')</td>
<td>43</td>
<td>6Bh</td>
<td>68</td>
<td>84h</td>
<td>93</td>
<td>9Dh</td>
</tr>
<tr>
<td>19</td>
<td>53h('S')</td>
<td>44</td>
<td>6Ch</td>
<td>69</td>
<td>85h</td>
<td>94</td>
<td>9 Eh</td>
</tr>
<tr>
<td>20</td>
<td>54h('T')</td>
<td>45</td>
<td>6Dh</td>
<td>70</td>
<td>86h</td>
<td>95</td>
<td>9Fh</td>
</tr>
<tr>
<td>21</td>
<td>55h('U')</td>
<td>46</td>
<td>6Eh</td>
<td>71</td>
<td>87h</td>
<td>96</td>
<td>A0h</td>
</tr>
<tr>
<td>22</td>
<td>56h('V')</td>
<td>47</td>
<td>6Fh</td>
<td>72</td>
<td>88h</td>
<td>97</td>
<td>A1h</td>
</tr>
<tr>
<td>23</td>
<td>57h('W')</td>
<td>48</td>
<td>70h</td>
<td>73</td>
<td>89h</td>
<td>98</td>
<td>A2h</td>
</tr>
<tr>
<td>24</td>
<td>58h('X')</td>
<td>49</td>
<td>71h</td>
<td>74</td>
<td>8Ah</td>
<td>99</td>
<td>A3h</td>
</tr>
<tr>
<td>25</td>
<td>59h('Y')</td>
<td>50</td>
<td>72h</td>
<td>75</td>
<td>8Bh</td>
<td>100</td>
<td>A4h</td>
</tr>
<tr>
<td>ALL</td>
<td>2Ah('*')</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ex.) If you want to control a monitor that has the "ID No." as '1', specify a destination address 'A'(41h). If you want to control all of the monitors which are connected by a daisy chain, specify a destination address '*' (2Ah).
4th byte) Source: Source equipment ID. (Sender)

Specify a sender address.

The controller must be '0' (30h).

On the reply, the monitor sets the own MONITOR ID in here.

5th byte) Message Type: (Case sensitive.)

Refer to section 4.2 "Message block format" for more details.

ASCII 'A' (41h): Command.
ASCII 'B' (42h): Command reply.
ASCII 'C' (43h): Get current parameter from a monitor.
ASCII 'D' (44h): "Get parameter" reply.
ASCII 'E' (45h): Set parameter.
ASCII 'F' (46h): "Set parameter" reply.

6th - 7th bytes) Message Length:

Specify the length of the message (that follows the header) from STX to ETX.

This length includes STX and ETX.

The byte data must be encoded to ASCII characters.

Ex.) The byte data 3Ah must be encoded to ASCII characters '3' and 'A' (33h and 41h).

The byte data 0Bh must be encoded to ASCII characters '0' and 'B' (30h and 42h).
4.2 Message block format

"Message block format" is allied to the "Message Type" in the "Header".

Refer to the section 4.1 "Header block format" for more detail.

1) Get current parameter

The controller sends this message when you want to get the status of the monitor.

For the status that you want to get, specify the "OP code page" and "OP code",
refer to "Appendix A. Operation code table".

"Message format" of the "Get current parameter" is as follows,

<table>
<thead>
<tr>
<th>STX</th>
<th>OP code page</th>
<th>OP code</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
</tr>
</tbody>
</table>

➢ Refer to section 5.1 "Get current parameter from a monitor." for more details.

2) Get Parameter reply

The monitor will reply with the status of the requested item specified by the controller
in the "Get parameter message".

"Message format" of the "Get parameter reply" is as follows,

<table>
<thead>
<tr>
<th>STX</th>
<th>Result</th>
<th>OP code page</th>
<th>OP code</th>
<th>Type</th>
<th>Max value</th>
<th>Current Value</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>MSB</td>
<td>LSB</td>
</tr>
</tbody>
</table>

➢ Refer to section 5.2 "Get parameter reply" for more details.

3) Set parameter

The controller sends this message to change a setting of the monitor.

Message format of the "Set parameter" is as follows,

<table>
<thead>
<tr>
<th>STX</th>
<th>OP code page</th>
<th>OP code</th>
<th>Set Value</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>MSB</td>
</tr>
</tbody>
</table>

➢ Refer to section 5.3 "Set parameter" for more details.

4) Set Parameter reply

The monitor replies with this message for a confirmation of the "Set parameter message".

Message format of the "Set parameter reply" is as follows,

<table>
<thead>
<tr>
<th>STX</th>
<th>Result</th>
<th>OP code page</th>
<th>OP code</th>
<th>Type</th>
<th>Max value</th>
<th>Requested setting Value</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>MSB</td>
<td>LSB</td>
</tr>
</tbody>
</table>

➢ Refer to section 5.4 "Set parameter reply" for more details.

5) Command

"Command message" format depends on each command.

Usually, this "command message" is used for some non-slider controls and some special operations,
such as "Get timing report", "power control", etc. Refer to section 5.5 "Commands message" for
more details.

6) Command reply

The monitor replies to a query from the controller.

"Command reply message" format depends on each command.

Refer to section 5.5 "Commands message" for more details.
4.3 Check code

Check code is the Block Check Code (BCC) between the Header and the End of Message except SOH.

\[
D_{n+1} = D_1 \text{ XOR } D_2 \text{ XOR } D_3 \text{ XOR } \ldots \text{ XOR } D_n
\]

XOR: Exclusive OR

Following is an example of a Check code (BCC) calculation.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH</td>
<td>Reserved</td>
<td>Destination</td>
<td>Source Type</td>
</tr>
<tr>
<td>01</td>
<td>30</td>
<td>41</td>
<td>30 45</td>
</tr>
<tr>
<td>D_0</td>
<td>D_1</td>
<td>D_2</td>
<td>D_3</td>
</tr>
</tbody>
</table>

Check code (BCC) \( D_{17} = D_1 \text{ XOR } D_2 \text{ XOR } D_3 \text{ XOR } \ldots \text{ XOR } D_{16} \text{ XOR } D_{16} \)

\[= 30h \text{ XOR } 41h \text{ XOR } 30h \text{ XOR } 45h \text{ XOR } 30h \text{ XOR } 41h \]

\[\text{xOR } 02h \text{ XOR } 30h \text{ XOR } 30h \text{ XOR } 31h \text{ XOR } 30h \text{ XOR } 30h \]

\[\text{xOR } 30h \text{ XOR } 36h \text{ XOR } 34h \text{ XOR } 03h \]

\[= 77h \]
4.4 Delimiter

Packet delimiter code; ASCII CR(0Dh).
5. Message type

5.1 Get current Parameter from a monitor.

<table>
<thead>
<tr>
<th>STX</th>
<th>OP code page</th>
<th>OP code</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
</tr>
<tr>
<td>1st byte</td>
<td>2nd-3rd</td>
<td>4th-5th</td>
<td>6th</td>
</tr>
</tbody>
</table>

Send this message when you want to get the status of a monitor.

For the status that you want to get, specify the “OP code page” the “OP code”, refer to “Appendix A. Operation code table”.

1st byte) STX: Start of Message

ASCII STX (02h)

2nd-3rd bytes) OP code page: Operation code page.

Specify the “OP code page” for the control which you want to get the status.

Refer to “Appendix A Operation code table” for each item.

OP code page data must be encoded to ASCII characters.

Ex.) The byte data 02h must be encoded to ASCII characters '0' and '2' (30h and 32h).

OP code page 02h -> OP code page (Hi) = ASCII '0' (30h)

OP code page (Lo) = ASCII '2' (32h)

Refer to Operation code table. (Appendix A)

4th-5th bytes) OP code: Operation code

Refer to "Appendix A Operation code table" for each item.

OP code data must be encoded to ASCII characters.

Ex.) The byte data 3Ah must be encoded to ASCII characters '3' and 'A' (33h and 41h).

OP code 3Ah -> OP code (Hi) = ASCII '3' (33h)

OP code (Lo) = ASCII 'A' (41h)

Refer to Operation code table.

6th byte) ETX: End of Message

ASCII ETX (03h)
5.2 "Get parameter" reply

<table>
<thead>
<tr>
<th>STX</th>
<th>Result</th>
<th>OP code page</th>
<th>OP code</th>
<th>Type</th>
<th>Max value</th>
<th>Current Value</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>2nd-3rd</td>
<td>4th-5th</td>
<td>6th-7th</td>
<td>8th</td>
<td>9th</td>
<td>10th-13th</td>
<td>14th-17th</td>
</tr>
</tbody>
</table>

The monitor replies with a current value and the status of the requested item (operation code).

1st byte) STX: Start of Message

   ASCII STX (02h)

2nd-3rd bytes) Result code.
   These bytes indicate a result of the requested commands as follows,
   00h: No Error.
   01h: Unsupported operation with this monitor or unsupported operation under current condition.

This result code from the monitor is encoded to ASCII characters.

Result code is always 00h (No Error). Because monitor does not reply any command to the controller when monitor gets an unsupported command on Exx7.

Ex.) The byte data 00h is encoded to ASCII character '0' and '0' (30h and 30h).

4th-5th bytes) OP code page: Operation code page.
   These bytes indicate a replying item's OP code page.
   This returned value from the monitor is encoded to ASCII characters.
   Ex.) The byte data 02h is encoded to ASCII character '0' and '2' (30h and 32h).

Refer to the operation code table.

6th-7th bytes) OP code: Operation code
   These bytes indicate a replying item's OP code.
   This returned value from the monitor is encoded to ASCII characters.
   Refer to the operation code table.

Ex.) The byte data 1Ah is encoded to ASCII character '1' and 'A' (31h and 41h).

8th-9th bytes) Type: Operation type code
   00h: Set parameter
   Like the Auto Setup function which automatically changes the parameter.
   This returned value from the monitor is encoded to ASCII characters.
   Ex.) The byte data 01h is encoded to ASCII character '0' and '1' (30h and 31h).

10th-13th bytes) Max. value: Maximum value which monitor can accept. (16bits)
   This returned value from the monitor is encoded to ASCII characters.
   Ex.) '0','1','2' and '3' means 0123h (291)

14th-17th bytes) Current Value: (16bits)
   This returned value from the monitor is encoded to ASCII characters.
   Ex.) '0','1','2' and '3' means 0123h (291)
18th byte) ETX: End of Message

ASCII ETX (03h)
5.3 Set parameter

Send this message to change monitor’s adjustment and so on.

The controller requests a monitor to change value.

1st byte) STX: Start of Message

ASCII STX (02h)

2nd-3rd bytes) OP code page: Operation code page

This OP code page data must be encoded to ASCII characters.

Ex.) The byte data 02h must be encoded to ASCII '0' and '2' (30h and 32h).

Refer to the Operation code table.

4th-5th bytes) OP code: Operation code

This OP code data must be encoded to ASCII characters.

Ex.) OP code 1Ah -> OP code (Hi) = ASCII '1' (31h)

OP code (Lo) = ASCII 'A' (41h)

Refer to the Operation code table.

6th-9th bytes) Set value: (16bit)

This data must be encoded to ASCII characters.

Ex.) 0123h -> 1st (MSB) = ASCII '0' (30h)

2nd = ASCII '1' (31h)

3rd = ASCII '2' (32h)

4th (LSB) = ASCII '3' (33h)

> ASCII '0'-'9' and 'A'-'F' should be used for Set value.

10th byte) ETX: End of Message

ASCII ETX (03h)
### 5.4 "Set parameter" reply

<table>
<thead>
<tr>
<th>STX</th>
<th>Result</th>
<th>OP code page</th>
<th>OP code</th>
<th>Type</th>
<th>Max value</th>
<th>Requested setting Value</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>Hi</td>
<td>Lo</td>
<td>10th-13th</td>
<td>14th-17th</td>
</tr>
</tbody>
</table>

The Monitor echoes back the parameter and status of the requested operation code.

1st byte) STX: Start of Message

    ASCII STX (02h)

2nd-3rd bytes) Result code

    ASCII '0''0' (30h, 30h): No Error.
    ASCII '0''1' (30h, 31h): Unsupported operation with this monitor or unsupported operation under current condition.

4th-5th bytes) OP code page: Echoes back the Operation code page for confirmation.

    Reply data from the monitor is encoded to ASCII characters.
    Ex.) OP code page 02h -> OP code = ASCII '0' and '2' (30h and 32h)

    Refer to Operation code table.

6th-7th bytes) OP code: Echoes back the Operation code for confirmation.

    Reply data from the monitor is encoded to ASCII characters.
    Ex.) OP code 1Ah -> OP code (Hi) = ASCII '1' (31h)

    OP code (Lo) = ASCII 'A' (41h)

    Refer to Operation code table

8th-9th bytes) Type: Operation type code

    ASCII '0''0' (30h, 30h): Set parameter

    Like Auto Setup function, that automatically changes the parameter.

10th-13th bytes) Max. value: Maximum value that monitor can accept. (16bits)

    Reply data from the monitor is encoded to ASCII characters.
    Ex.) '0''1''2''3' means 0123h (291)

14th-17th bytes) Requested setting Value: Echoes back the parameter for confirmation. (16bits)

    Reply data from the monitor is encoded to ASCII characters.
    Ex.) '0''1''2''3' means 0123h (291)

18th byte) ETX: End of Message

    ASCII ETX (03h)
5.5 Commands

"Command message format" depends on each command. Some commands are shown with usage. Refer to section 7 to 25.

5.5.2 Get Timing Report and Timing reply.

The controller requests the monitor to report the displayed image timing.

<table>
<thead>
<tr>
<th>STX</th>
<th>Command code</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'0'</td>
<td>'7'</td>
</tr>
</tbody>
</table>

- Send "07" (30h, 37h) as Get Timing Report command.
- Complete "Get Timing Report" command packet as follows;

ASCII: 01h-30h-41h-30h-41h-30h-34h-02h-30h-37h-03h-CHK-0Dh

SOH-'0'-'A'-'0'-'A'-'0'-'4'-STX-'0'-'7'-ETX-CHK- CR

The monitor replies status as the following format;

<table>
<thead>
<tr>
<th>STX</th>
<th>Command</th>
<th>SS</th>
<th>H Freq.</th>
<th>V Freq.</th>
<th>ETX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'4'</td>
<td>'E'</td>
<td>Hi</td>
<td>Lo</td>
<td></td>
</tr>
</tbody>
</table>

- SS: Timing status byte
  - Bit 7 = 1: Sync Frequency is out of range.
  - Bit 6 = 1: Unstable count
  - Bit 5-2: Reserved (Don't care)
  - Bit 1 = 1: Positive Horizontal sync polarity
    0: Negative Horizontal sync polarity.
  - Bit 0 = 1: Positive Vertical sync polarity.
    0: Negative Vertical sync polarity.

- H Freq: Horizontal Frequency in unit 0.01kHz
- V Freq: Vertical Frequency in unit 0.01Hz

  Ex.) When H Freq is '1''2''A''9' (31h, 32h, 41h, 39h), it means 47.77kHz.
5.5.3 NULL Message

The NULL message returned from the monitor is used in the following cases;

- To tell the controller that the monitor does not have any answer to give to the host (not ready or not expected)
- A null message will be returned by the monitor if the "Start Proof of Play" command is sent and the monitor has already started Proof of Play.
- A null message will be returned by the monitor if the "Stop Proof of Play" command is sent and the monitor has not started Proof of Play.
- Complete "NULL Message" command packet as follows;
  01h-30h-30h-41h-42h-30h-34h-02h-42h-45h-03h-CHK-0Dh
  SOH-'0'-'0'-'A'-'B'-'0'-'4'-STX-'B'-'E'-ETX-CHK-CR
IV. Control Commands

6. Typical procedure example

The following is a sample of procedures to control the monitor, these are examples of "Get parameter" and "Set parameter".

6.1. How to change the "Backlight" setting.

Step 1. The controller requests the Monitor to reply with the current brightness setting and capability to support this operation. (Get parameter)

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'0'-Monitor ID-'0'-C-'0'-6'</td>
<td>STX-'0'-0-1-0-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID from which you want to get a value.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'C' (43h): Message type is "Get parameter command".
'0'-6' (30h, 36h): Message length is 6 bytes.

Message
STX (02h): Start of Message
'0'-0' (30h, 30h): Operation code page number is 0.
'1'-0' (31h, 30h): Operation code is 10h (in the OP code page 0).
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

Step 2. The monitor replies with current Backlight setting and capability to support this operation.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-0'-Monitor ID-'0'-1'-2'</td>
<td>STX-'0'-0-0-0-1'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-0'-3'-2'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'D' (44h): Message Type is "Get parameter reply".
'1'-2' (31h, 32h): Message length is 18 bytes.

Message
STX (02h): Start of Message
'0'-0' (30h, 30h): Result code. No error.
'0'-0' (30h, 30h): Operation code page number is 0.
'1'-0' (31h, 30h): Operation code is 10h (in the page 0).
'0'-0' (30h, 30h): This operation is "Set parameter" type.
'0'-0'-6'-4' (30h, 30h, 36h, 34h): Backlight max value is 100(0064h).
'0'-0'-3'-2' (30h, 30h, 33h, 32h): Current Backlight setting is 50(0032h).
ETX (03h): End of Message
Step 3. The controller request the monitor to change the Backlight setting

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'0'-'E'-'0'-'A'</td>
<td>STX-'0'-01h-'0'-10h-'0'-05h-'0'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID of which you want to change a setting.
Ex.) If Monitor ID is '1', specify 'A'.
'E' (45h): Message type is "Set parameter command".
'0'-'A' (30h, 41h): Message length is 10 bytes.

Message
STX (02h): Start of Message
'0'-'0' (30h, 30h): Operation code page number is 0.
'1'-'0' (31h, 30h): Operation code is 10h (in the page 0).
'0'-'5'-0' (30h, 30h, 35h, 30h): Set Backlight setting 80(0050h).
ETX (03h): End of Message

Step 4. The monitor replies with a message for confirmation.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-01h-'0'-10h-'0'-05h-'0'-ETX</td>
<td>BCC</td>
<td>CR</td>
<td></td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'F' (46h): Message type is "Set parameter reply".
'1'-'2' (31h, 32h): Message length is 18 bytes.

Message
STX (02h): Start of Message
'0'-0' (30h, 30h): Result code. No error.
'0'-0' (30h, 30h): Operation code page number is 0.
'1'-0' (31h, 30h): Operation code is 10h (in the page 0).
'0'-0' (30h, 30h): This operation is "Set parameter" type.
'0'-0'-'6'-4' (30h, 30h, 36h, 34h): Backlight max value is 100(0064h).
'0'-0'-'5'-0' (30h, 30h, 35h, 30h): Received a Backlight setting was 80(0050h).
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.
Delimiter
CR (0Dh): End of packet

- Repeat Step 1 and Step 2, if you need to check the Backlight setting. (Recommended)
### 6.2. Operation Code (OP code) Table

<table>
<thead>
<tr>
<th>Item</th>
<th>OP code page</th>
<th>OP code</th>
<th>Parameters</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOR TEMPERATURE</td>
<td>00h</td>
<td>0Ch</td>
<td>00h: No mean 23h: Warm 3Fh: Normal 5Ah: Cool</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00H</td>
<td>14H</td>
<td>00h: No mean 02h: NATIVE 08h: Custom (Read only)</td>
<td>When setting to Native, should use this OP code</td>
</tr>
<tr>
<td>Clock</td>
<td>00h</td>
<td>0Eh</td>
<td>0: Max</td>
<td></td>
</tr>
<tr>
<td>Brightness</td>
<td>00h</td>
<td>10h</td>
<td>0: dark 100(64h): bright</td>
<td></td>
</tr>
<tr>
<td>Contrast</td>
<td>00h</td>
<td>12h</td>
<td>0: low 100(64h): high</td>
<td></td>
</tr>
<tr>
<td>Auto Set Up</td>
<td>00h</td>
<td>1Eh</td>
<td>0: No mean 1: Execute</td>
<td></td>
</tr>
<tr>
<td>Horizontal Position</td>
<td>00h</td>
<td>20h</td>
<td>0: Left side  Max.: Right side</td>
<td></td>
</tr>
<tr>
<td>Vertical Position</td>
<td>00h</td>
<td>30h</td>
<td>0: Bottom side Max.: Top side</td>
<td></td>
</tr>
<tr>
<td>Clock Phase</td>
<td>00h</td>
<td>3Eh</td>
<td>0: Max.</td>
<td></td>
</tr>
<tr>
<td>Input Source</td>
<td>00h</td>
<td>60h</td>
<td>0: No mean 1: VGA 5: VIDEO 9: Tuner (TV tuner model only) 12(0Ch): COMPONENT 17(11h): HDMI1 18(12h): HDMI2 130(82h): HDMI3 135(87h): USB</td>
<td></td>
</tr>
<tr>
<td>Audio Speaker Volume Adjust</td>
<td>00h</td>
<td>62h</td>
<td>0: whisper 100(64h): loud</td>
<td>In case TV tuner model, only English, French and Spanish can be selected.</td>
</tr>
<tr>
<td>Language select</td>
<td>00h</td>
<td>68h</td>
<td>00h: No mean 01h: English 02h: German 03h: French 04h: Spanish 05h: Japanese 06h: Italian 09h: Russian 08h: Chinese 0Fh: Czech</td>
<td></td>
</tr>
<tr>
<td>Sharpness</td>
<td>00h</td>
<td>8Ch</td>
<td>0: dull 24(18h): sharp</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>02h</td>
<td>1Fh</td>
<td>0: pale 100(64h): deep</td>
<td></td>
</tr>
<tr>
<td>TV-CHANNEL UP/DOWN</td>
<td>00h</td>
<td>88h</td>
<td>0: No mean 1: UP 2: DOWN</td>
<td>This operation requires supported TV tuner model.</td>
</tr>
<tr>
<td>Item</td>
<td>OP code page</td>
<td>OP code</td>
<td>Parameters</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
</tbody>
</table>
| MUTE             | 00h          | 8Dh     | 0: UNMUTE (Set only)  
1: MUTE  
2: UNMUTE          |                                              |
| TREBLE           | 00h          | 8Fh     | 0: Min.  
|                  |              |         | 50: (Center)  
|                  |              |         | 100(64h): Max.        |                                              |
| HUE              | 00h          | 90h     | 0: purplish  
|                  |              |         | 100(64h): greenish       |                                              |
| BASS             | 00h          | 91h     | 0: Min.  
|                  |              |         | 50: (Center)  
|                  |              |         | 100(64h): Max.        |                                              |
| BRIGHTNESS       | 00h          | 92h     | 0: dark  
|                  |              |         | 100(64h): bright       |                                              |
| BALANCE          | 00h          | 93h     | 0: Left  
|                  |              |         | 30(1Eh): (Center)  
|                  |              |         | 60(3Ch): Right        |                                              |
| Key Lock         | 00h          | FBH     | 0: No mean  
|                  |              |         | 1: UNLOCK  
|                  |              |         | 2: ALL LOCK          |                                              |
| MENU DISPLAY TIME | 00h      | FCh   | 0-1: Do not set.  
2: 10s  
3: 15s  
48(30h): 240s      | 5sec/step                                       |
| PICTURE MODE     | 02h          | 1Ah     | 0: No operate  
4: Standard  
5: Theater  
8: Custom  
23(17h): Dynamic  
24(18h): Energy Saving  
25(19h): Game  
26(1Ah): HDR Dynamic (except for E327)  
27(1Bh): HDR Video (except for E327) |                                              |
| NOISE REDUCTION  | 02h          | 26h     | 0: Off  
|                  |              |         | 3: High          |                                              |
| MTS              | 02h          | 2Ch     | 0: No mean  
2: SAP  
4: stereo  
5: mono        |                                              |
| MONITOR ID       | 02h          | 3Eh     | 1-100: ID                  |                                              |
| IR Control       | 02h          | 3Fh     | 0: No mean  
1: Normal  
4: Lock (off)       |                                              |
| Input Detect     | 02h          | 40h     | 0: First detect  
2: None  
4: Custom detect    |                                              |
| Size             | 02h          | 70h     | 0: No mean  
1: Normal  
2: Full  
3: Wide  
4: Zoom  
10(0Ah): Cinema  
11(0Bh): Auto |                                              |
<table>
<thead>
<tr>
<th>Item</th>
<th>OP code</th>
<th>OP code</th>
<th>Parameters</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Contrast</td>
<td>02h</td>
<td>8DH</td>
<td>0 : No mean 1 : Off 2 : On</td>
<td></td>
</tr>
<tr>
<td>Gamma</td>
<td>02h</td>
<td>E8h</td>
<td>0: No mean 200(C8h): Low 220(DCh): Mid 240(F0h): High</td>
<td></td>
</tr>
<tr>
<td>Custom Detect Priority 1</td>
<td>10h</td>
<td>2Eh</td>
<td>0: No mean 1: VGA(RGB) 5: VIDEO</td>
<td></td>
</tr>
<tr>
<td>Custom Detect Priority 2</td>
<td>10h</td>
<td>2Fh</td>
<td>12(0Ch): COMPONENT 17(11h): HDMI1 18(12h): HDMI2</td>
<td></td>
</tr>
<tr>
<td>Custom Detect Priority 3</td>
<td>10h</td>
<td>30h</td>
<td>130(82h): HDMI3</td>
<td></td>
</tr>
<tr>
<td>Closed Caption</td>
<td>10h</td>
<td>84H</td>
<td>0 : No mean 1 : Off 2 : CC1 3 : CC2 4 : CC3 5 : CC4 6 : TT1 7 : TT2 8 : TT3 9 : TT4</td>
<td></td>
</tr>
<tr>
<td>Sound mode</td>
<td>10h</td>
<td>B2h</td>
<td>0: No mean 1: Standard 2: Movie 3: Music 4: News 5: Custom</td>
<td></td>
</tr>
<tr>
<td>Audio Language</td>
<td>10h</td>
<td>B3h</td>
<td>0: No mean 2: English 3: French 10(0Ah): Spanish</td>
<td></td>
</tr>
<tr>
<td>Light Sensor</td>
<td>10h</td>
<td>C8h</td>
<td>0: No mean 1: OFF, 2: ON 3: No mean</td>
<td></td>
</tr>
<tr>
<td>BACKLIGHT DIMMING</td>
<td>11h</td>
<td>4Eh</td>
<td>0: No mean 1: OFF 2: Low 4: High</td>
<td></td>
</tr>
<tr>
<td>USB POWER</td>
<td>11h</td>
<td>75h</td>
<td>0: No mean 1: ON 3: OFF</td>
<td></td>
</tr>
<tr>
<td>Speaker Select</td>
<td>11h</td>
<td>BAh</td>
<td>0: No mean 1: OFF 2: ON 3: AUTO</td>
<td></td>
</tr>
</tbody>
</table>
7. Power control procedure

7.1 Power status read

1) The controller requests the monitor to reply a current power status.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID- '0'- 'A'- '0'- '6'</td>
<td>STX-'0'- '1'- 'D'- '6'- ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h): Start of Header
- '0' (30h): Reserved
- Monitor ID: Specify the Monitor ID from which you want to get status.
  - Ex.) If Monitor ID is '1', specify 'A'.
- '0' (30h): Message sender is the controller.
- 'A' (41h): Message Type is "Command".
- '0'- '6' (30h, 36h): Message length is 6 bytes.

**Message**
- STX (02h): Start of Message
- '0'- '1'- 'D'- '6': Get power status command.
- ETX (03h): End of Message

**Check code**
- BCC: Block Check Code
  - Refer to the section 4.3 “Check code” for a BCC calculation.

**Delimiter**
- CR (0Dh): End of packet

2) The monitor returns with the current power status.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'- '0'-Monitor ID- 'B'- '1'- '2'</td>
<td>STX-'0'- '2'- '0'- '0'- 'D'- '6'- '0'- '0'- '4'- '0'- '0'- '0'- ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h): Start of Header
- '0' (30h): Reserved
- '0' (30h): Message receiver is the controller.
- Monitor ID: Indicate a replying Monitor ID.
  - Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
- 'B' (42h): Message Type is "Command reply".
- '1'- '2' (31h, 32h): Message length is 18 bytes.

**Message**
- STX (02h): Start of Message
- '0'- '2' (30h, 32h): Reserved data
- '0'- '0' (30h, 30h): Result code
  - 00: No Error.
  - 01: Unsupported.
- 'D'- '6' (44h, 36h): Display power mode code
- '0'- '0' (30h, 30h): Parameter type code is "Set parameter".
- '0'- '0'- '0'- '4' (30h, 30h, 30h, 34h): Power mode is 4 types.
- '0'- '0'- '0'- '1' (30h, 30h, 30h, 31h): Current power mode
  - 0001: ON
  - 0002: No mean
  - 0003: Power save
  - 0004: OFF (same as IR power off)
- ETX (03h): End of Message

**Check code**
- BCC: Block Check Code
Refer to the section 4.3 “Check code” for a BCC calculation.

Delimiter
CR (0Dh): End of packet
7.2 Power control

1) The controller requests the monitor to control monitor power.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID-'0'-A-'0'-C</td>
<td>STX-'C'-2-'0'-3-'D'-6-'0'-0-0-1-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to change a setting.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-C (30h, 43h): Message length is 12 bytes.

Message
STX (02h): Start of Message
'C'-2-0-3-D-6 (43h, 32h, 30h, 33h, 44h, 36h): power control command
'0'-0-0-1 (30h, 30h, 30h, 31h): Power mode
0001: ON
0002, 0003: Do not set.
0004: OFF (same as the power off by IR)
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies a data for confirmation.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-0-Monitor ID-'B'-0-E</td>
<td>STX-'0'-0-C-2-0-3-D-6-0-0-0-1-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'N'-N: Message length
Note.) The maximum data length that can be written to the monitor at a time is 32bytes.
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

Message
STX (02h): Start of Message
'0'-0 (30h, 30h): Result code. No error.
'C'-2-0-3-D-6 (43h, 32h, 30h, 33h, 44h, 36h): power control reply command
The monitor replies same as power control command to the controller.
'0'-0-0-1 (30h, 30h, 30h, 31h): Power mode
0001: ON
0002, 0003: Do not set.
0004: OFF (same as the power off by IR)
ETX (03h): End of Message
Check code
BCC: Block Check Code
Refer to the section 4.3 “Check code” for a BCC calculation.

Delimiter
CR (0Dh): End of packet
10. Get Timing Report


The controller requests the monitor to report the displayed image timing.

1) The controller requests the monitor to get timing report.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'Monitor ID-'0'-'A'-'0'-'4'</td>
<td>STX-'0'-'7'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID from which you want to get status.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message Type is "Command".
'0'-'4' (30h, 34h): Message length is 4 bytes.

Message
STX (02h): Start of Message
'0'-'7' (30h, 37h): Get Timing Report command.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

Complete "Get Timing Report" command packet as follows;
ASCII: 01h-30h-41h-30h-41h-30h-34h-02h-30h-37h-03h-CHK-0Dh
SOH-'0'-'A'-'0'-'A'-'0'-'4'-STX-'0'-'7'-ETX-CHK-CR

2) The monitor replies Timing report to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH- '0'-'0'-'Monitor ID-'B'-0'-0'-'4'</td>
<td>STX- '0'- 'E'-SS-H Freq-V Freq-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'0'-'4' (30h, 45h): Message length

Message
STX (02h): Start of Message
'4'- 'E' (34h, 45h): Timing reply command
SS: Timing status byte
Bit 7 = 1: Sync Frequency is out of range.
Bit 6 = 1: Unstable count
Bit 5-2: Reserved (Don't care)
Bit 1: 1: Positive Horizontal sync polarity
0: Negative Horizontal sync polarity.
Bit 0: 1: Positive Vertical sync polarity
0: Negative Vertical sync polarity.
H Freq: Horizontal Frequency in unit 0.01kHz

V Freq: Vertical Frequency in unit 0.01Hz

Ex.) When H Freq is '1''2''A''9' (31h, 32h, 41h, 39h), it means 47.77kHz.

Check code
BCC: Block Check Code
Refer to the section 4.3 “Check code” for a BCC calculation.

Delimiter
CR (0Dh): End of packet
11. Serial No. & Model Name Read

11.1 Serial No. Read

This command is used in order to read a serial number.

1) The controller requests the monitor to read a serial number.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'0'-Monitor ID- '0'-'A'-'0'-'6'</td>
<td>STX-'C'-'2'-'1'-'6'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
- SOH (01h): Start of Header
- '0' (30h): Reserved
- Monitor ID: Specify the Monitor ID which you want to get serial number.
  - Ex.) If Monitor ID is '1', specify 'A'.
- '0' (30h): Message sender is the controller.
- 'A' (41h): Message type is "Command".
- '0'-'6'(30h, 36h): Message length

Message
- STX (02h): Start of Message
- 'C'-'2'-'1'-'6' (43h, 32h, 31h, 36h): Serial No. command
- ETX (03h): End of Message

Check code
- BCC: Block Check Code
  - Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
- CR (0Dh): End of packet

2) The monitor replies the serial No. data to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'0'-Monitor ID- 'B'-N-N</td>
<td>STX-'C'-'3'-'1'-'6'-Data(0)-Data(1)-...-Data(n)-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
- SOH (01h): Start of Header
- '0' (30h): Reserved
- '0' (30h): Message receiver is the controller.
- Monitor ID: Indicate a replying Monitor ID.
  - Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
- 'B' (42h): Message type is "Command reply".
- N-N: Message length
  - Note.) The maximum data length that can be returned from the monitor at a time is 32bytes.
  - Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

Message
- STX (02h): Start of Message
- 'C'-'3'-'1'-'6' (43h, 33h, 31h, 36h): Serial No. reply command
- Data(0)-Data(1)-...-Data(n):Serial Number

- The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).
  - Ex.) For example when receiving Serial Number data 33h 31h 33h 32h 33h 33h 33h 34h
    - Step1: Serial Number data is encoded as character string.
      - Example: 33h 31h 33h 32h 33h 33h 33h 34h -> '3','1','3','2','3','3','3','4'
    - Step2: Decode pairs of ASCII characters to hexadecimal values.
      - Example: '3','1','3','2','3','3','3','4' -> 31h 32h 33h 34h
    - Step3: Byte data represents the ASCII string data.
      - Example: 31h 32h 33h 34h -> "1234"
      - Result: Serial Number is "1234".

Note: No null termination character is sent.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 “Check code” for a BCC calculation.

Delimiter
CR (0Dh): End of packet
11.2 Model Name Read

This command is used in order to read the Model Name.

1) The controller requests the monitor to read Model Name.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID-</td>
<td>STX-'C'-1'-1'-7'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h): Start of Header
- '0' (30h): Reserved
- Monitor ID: Specify the Monitor ID which you want to get Model Name.
  - Ex.) If Monitor ID is '1', specify 'A'.
- '0' (30h): Message sender is the controller.
- 'A' (41h): Message type is "Command".
- '0'-'6' (30h, 36h): Message length

**Message**
- STX (02h): Start of Message
- 'C'-1'-1'-7' (43h, 32h, 31h, 37h): Model Name command
- ETX (03h): End of Message

**Check code**
BCC: Block Check Code
Refer to the section 4.3 “Check code” for a BCC calculation.

**Delimiter**
CR (0Dh): End of packet

2) The monitor replies the model name data to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-</td>
<td>STX-'C'-3'-1'-7'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

| Data(0) -Data(1)----Data(n):Model name |

- The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

- **Step1:** Model Name data is encoded character string.
  - Ex.) When receiving Model Name data 35h 30h 33h 33h 33h 32h 33h 37h: 45h 33h 32h 37h
  - Step1: Model Name data is encoded character string.
  - Step2: Decode pairs of ASCII characters to hexadecimal values.
  - Step3: Byte data represents the ASCII string data.
- The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).
- EtX (03h): End of Message
Check code
BCC: Block Check Code
Refer to the section 4.3 “Check code” for a BCC calculation.

Delimiter
CR (0Dh): End of packet
12. Firmware Version
12.1 Firmware Version Read
This command is used in order to read a firmware version.

1) The controller requests the monitor to reply a firmware version.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID- '0'-<code>A'-'0'-</code>8'</td>
<td>STX-<code>C'-</code>A'-<code>0'-</code>2'-TY-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header:
- SOH (01h): Start of Header
- '0' (30h): Reserved
- Monitor ID: Specify the Monitor ID of which you want to change a setting.
  - Ex.) If Monitor ID is '1', specify 'A'.
- '0'-`8'(30h, 38h): Message length (8bytes)

Message:
- STX (02h): Start of Message
- `C'-`A'-`0'-`2' (43h, 41h, 30h, 32h): Firmware Version Command
- TY: Firmware Type
  - Firmware: 00h (30h, 30h)
  - LAN FW: 01h (30h, 31h)
- ETX (03h): End of Message

Check code:
- BCC: Block Check Code
  - Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter:
- CR (0Dh): End of packet

2) The monitor replies a firmware version to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID- <code>0'-</code>B'-<code>N'-</code>N'</td>
<td>STX-<code>C'-</code>B'-<code>0'-</code>2'-ST-TY-Data(0)-Data(1)-...-Data(n)-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header:
- SOH (01h): Start of Header
- '0' (30h): Reserved
- '0' (30h): Message receiver is the controller.
- Monitor ID: Indicate a replying Monitor ID.
  - Ex.) When this byte is set to 'A', replying monitor’s ID is '1'.
- `B'-`42h': Message type is "Command reply".
- `N'-`N': Message length
  - Note.) The maximum data length that can be returned from the monitor at a time is 32bytes.

Message:
- STX (02h): Start of Message
- `C'-`B'-`0'-`2' (43h, 42h, 30h, 32h): Firmware Version Read reply
- ST: Error Status
  - No Error: 00h (30h, 30h)
  - Error: 01h (30h, 31h)
- TY: Firmware Type
  - Firmware: 00h (30h, 30h)
  - LAN FW: 01h (30h, 31h)
- Data(0)-Data(1)-...-Data(n): Version Number
Check code

BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet
13. LAN MAC Address

13.1 LAN MAC Address Read
This command is used in order to read the MAC Address.

1) The controller requests the monitor to read MAC Address

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID-'0'-A-'0'-8</td>
<td>STX-'C'-2'-2'-A-'0'-2'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h) : Start of Header
- '0' (30h) : Reserved
- Monitor ID: Specify the Monitor ID from which you want to get status.
  - Ex.) If Monitor ID is '1', specify 'A'.
- '0' (30h) : Message sender is the controller.
- 'A' (41h) : Message Type is "Command".
- '0'-8 (30h, 38h) : Message length is 8 bytes.

**Message**
- STX (02h): Start of Message
- 'C'-2'-2'-A': LAN read command.
- '0'-2': MAC Address
- ETX (03h): End of Message

**Check code**
- BCC: Block Check Code
- Refer to the section 4.3 "Check code" for a BCC calculation.

**Delimiter**
- CR (0Dh): End of packet

2) The monitor replies MAC Address to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-0-Monitor ID- 'B'-LN(H)-LN(L)</td>
<td>STX-'C'-3'-2'-A'-RC-'0'-2'- IPV-MAC(0)-....-MAC(n)-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h): Start of Header
- '0' (30h): Reserved
- '0' (30h): Message receiver is the controller.
- Monitor ID: Indicate a replying Monitor ID.
  - Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
- 'B' (42h): Message Type is "Command reply".
- LN(H)-LN(L): Message length (byte length), from STX to ETX

**Message**
- STX(02h): Start of Message
- 'C'-3'-2'-A': LAN read reply command.
- RC: Reply result Code
  - '0'-0' (30h, 30h): Normal
  - 'F'-F' (46h, 46h): Abnormal
- '0'-2': MAC Address
- IPV: IPv4 or IPv6
  - '0'-4' (30h, 34h): IPv4
  - '0'-6' (30h, 36h): IPv6
- MAC(0-n): MAC Address
  - In the case of IPv4 -> n = 4
- ETX (03h): End of Message
Check code

BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter

CR (0Dh): End of packet
14. Direct TV Channel Read & Write

When DTV unit (Option unit) is installed, channel settings is read and write directly.

14.1 Direct TV Channel Read & Reply

1) The controller requests the monitor to read channel information.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH='0'-Monitor ID='0'-A'-0'-6'</td>
<td>STX='C'-2'-2'-C'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to get Model Name.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'6'(30h, 36h): Message length

Message
STX (02h): Start of Message
'C'-2'-2'-C' (43h, 32h, 32h, 43h): Direct TV Channel Read command
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies the result to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH='0'-0'-Monitor ID='B'-1'-2'</td>
<td>STX='C'-3'-2'-C'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'1'-2'(31h, 32h): Message length = 18bytes

Message
STX (02h): Start of Message
'C'-3'-2'-C' (43h, 33h, 32h, 43h): Direct TV Channel read reply command
MajorCH: Major Channel (00000000h – FFFFFFFFh),
'0'-0'-0'-0'-0'-0'-0'-0' = 'F'-F'-F'-F'-F'-F'-F'-F'
MinorCH: Minor Channel (0000h – FFFFh),
'0'-0'-0'-0'-0'-0' = 'F'-F'-F'-F'-F'
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet
14.2 Direct TV Channel Write & Reply

1) The controller requests the monitor to write channel information.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID- '0'- 'A'- '1'- '2'</td>
<td>STX-'C'- '2'- '2'- 'D'- MajorCH-MinorCH-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to get Model Name.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'1'- '2' (31h, 32h): Message length = 18bytes

Message
STX (02h): Start of Message
'C'- '2'- '2'- 'D' (43h, 32h, 32h, 44h): Direct TV Channel write command
MajorCH: Major Channel (00000000h – FFFFFFFFh),
'M0'– 'M9'– 'M0'– 'M9'– 'M0'– 'M9'– 'M0'– 'M9' – 'F'– 'F'– 'F'– 'F'– 'F'– 'F'– 'F'– 'F'
MinorCH: Minor Channel (0000h – FFFFh),
'M0'– 'M9'– 'M0'– 'M9' – 'F'– 'F'– 'F'– 'F'
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies the result to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'- '0'-Monitor ID- 'B'- '1'- '2'</td>
<td>STX-'C'- '3'- '2'- 'D'- MajorCH-MinorCH-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'1'- '2' (31h, 32h): Message length = 18bytes

Message
STX (02h): Start of Message
'C'- '3'- '2'- 'D' (43h, 33h, 32h, 43h): Direct TV Channel write reply command
MajorCH: Major Channel (00000000h – FFFFFFFFh),
'M0'– 'M9'– 'M0'– 'M9'– 'M0'– 'M9'– 'M0'– 'M9' – 'F'– 'F'– 'F'– 'F'– 'F'– 'F'– 'F'– 'F'
MinorCH: Minor Channel (0000h – FFFFh),
'M0'– 'M9'– 'M0'– 'M9' – 'F'– 'F'– 'F'– 'F'
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet
15. Input Name
15.1 Input Name Read
This command is used in order to read the setting of Input Name.

1) The controller requests the monitor to reply Input Name setting.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'0'-Monitor ID-'0'-A-'0'-8'</td>
<td>STX-'C'-A-'0'-4-'0'-0'-ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h): Start of Header
- '0' (30h): Reserved
- Monitor ID: Specify the Monitor ID of which you want to change a setting.
  - Ex.) If Monitor ID is '1', specify 'A'.
- '0' (30h): Message sender is the controller.
- 'A' (41h): Message type is "Command".
- '0'-8' (30h, 38h): Message length (8bytes)

**Message**
- STX (02h): Start of Message
- 'C'-A-'0'-4' (43h, 41h, 30h, 34h): Input Name Command
- '0'-0' (30h. 30h): Read
- ETX (03h): End of Message

**Check code**
- BCC: Block Check Code
  - Refer to the section 4.3 “Check code” for a BCC calculation.

**Delimiter**
- CR (0Dh): End of packet

2) The monitor replies Input Name to the controller.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-0'-Monitor ID-B'-LN(H)-LN(L)</td>
<td>STX-'C'-B'-0'-4'-0'-0'-ETX</td>
<td>Data(0)-Data(1)-Data(2)- --- -Data(n)-ETX</td>
<td>BCC</td>
</tr>
</tbody>
</table>

**Header**
- SOH (01h): Start of Header
- '0' (30h): Reserved
- '0' (30h): Message receiver is the controller.
- Monitor ID: Indicate a replying Monitor ID.
  - Ex.) When this byte is set to 'A', replying monitor's ID is '1'.
- 'B' (42h): Message type is "Command reply".
- LN(H)-LN(L): Message length (byte length), from STX to ETX
  - Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

**Message**
- STX (02h): Start of Message
- 'C'-B'-0'-4' (43h, 42h, 30h, 34h): Input Name command reply
- '0'-0' (30h, 30h): Read
- Data(n): Input name "n = Max 14"
  - The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).
  - Ex.) For example when receiving Data(n) of 35h 36h 34h 37h 34h 31h
    - Step1: Input Name data is encoded as character code.
      - Example: 35h 36h 34h 37h 34h 31h -> '5'-6'-4'-7'-4'-1'
    - Step2: Decode pairs of ASCII characters to hexadecimal values.
      - Example: '5'-6'-4'-7'-4'-1' -> 56h 47h 41h
    - Step3: Byte data represents the ASCII string data.
Example:
56h 47h 41h -> "VGA"
Result: Input Name is "VGA".
Note: No null termination character is sent.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet
15.2 Input Name Write

This command is used in order to write the setting of Input Name.

1) The controller requests the monitor to write Input Name.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'Monitor ID- '0'- 'A'- LN(H)- LN(L)</td>
<td>STX-'C'- 'A'- '0'- '4'- '0'- '1'- Data(0)- Data(1)- Data(2)- ... - Data(n)- ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**

SOH (01h): Start of Header
'SO' (30h): Reserved
Monitor ID: Specify the Monitor ID of which you want to change a setting.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
LN(H)-LN(L): Message length (byte length), from STX to ETX
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

**Message**

STX (02h): Start of Message
'C'- 'A'- '0'- '4' (43h, 41h, 30h, 34h): Input name Command
'0'- '1' (30h, 31h): Write
Data(n): Input name *n = Max 14

The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).
Ex.) In the case of Input Name "VGA"
Step1: Input Name data is handled as character code.
Example:
"VGA" -> 56h 47h 41h (ASCII)
Step2: The hexadecimal value of each original character is encoded as two ASCII characters representing the value.
Example:
56h 47h 41h -> '5'-'6'-'4'-'7'-'4'-'1'
Result: The following data is assigned to Data(n).
35h 36h 34h 37h 34h 31h

ETX (03h): End of Message

**Check code**

BCC: Block Check Code
Refer to the section 4.3 "Check code" for a BCC calculation.

**Delimiter**

CR (0Dh): End of packet

2) The monitor replies a written in result.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'- '0'- 'Monitor ID- 'B'- '0'- 'A'</td>
<td>STX- 'C'- 'B'- '0'- '0'- '0'- '0'- '1'- ST- ETX</td>
<td>BCC</td>
<td>CR</td>
</tr>
</tbody>
</table>

**Header**

SOH (01h): Start of Header
'0' (30h): Reserved
'Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', replying monitor's ID is '1'.
'B' (42h): Message type is "Command reply".
'0'- 'A' (30h, 41h): Message length (10bytes)

**Message**

STX (02h): Start of Message
'C'- 'B'- '0'- '4' (43h, 42h, 30h, 34h): Input name Command
'0'- '1' (30h, 31h): Write
ST: Status
00h (30h, 30h): No Error
01h (30h, 31h): Error
ETX (03h): End of Message

Check code

BCC: Block Check Code

Refer to the section 4.3 "Check code" for a BCC calculation.

Delimiter

CR (0Dh): End of packet
## 15.3 Input Name Reset

This command is used in order to reset the Input Name.

1) The controller requests the monitor to reset Input Name.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-'0'-Monitor ID-'A'-STX-'C'-A-'0'-4-'0'-2-ETX</td>
<td>BCC</td>
<td>CR</td>
<td></td>
</tr>
</tbody>
</table>

**Header**

- **SOH (01h):** Start of Header
- **'0' (30h):** Reserved
- **Monitor ID:** Specify the Monitor ID of which you want to change a setting.
  - Ex.) If Monitor ID is '1', specify 'A'.
- **'0' (30h):** Message sender is the controller.
- **'A' (41h):** Message type is "Command".
- **'0'-8' (30h, 38h):** Message length (8bytes)

**Message**

- **STX (02h):** Start of Message
- **'C'-A-'0'-4' (43h, 41h, 30h, 34h):** Input Name Command
- **'0'-2' (30h, 32h):** Reset
- **ETX (03h):** End of Message

**Check code**

- **BCC:** Block Check Code
  - Refer to the section 4.3 "Check code" for a BCC calculation.

**Delimiter**

- **CR (0Dh):** End of packet

2) The monitor replies result.

<table>
<thead>
<tr>
<th>Header</th>
<th>Message</th>
<th>Check code</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOH-'0'-Monitor ID-'A'-STX-'C'-B-'0'-4-'0'-2-ST-ETX</td>
<td>BCC</td>
<td>CR</td>
<td></td>
</tr>
</tbody>
</table>

**Header**

- **SOH (01h):** Start of Header
- **'0' (30h):** Reserved
- **'0' (30h):** Message receiver is the controller.
- **Monitor ID:** Indicate a replying Monitor ID.
  - Ex.) When this byte is set to 'A', replying monitor’s ID is '1'.
- **'B' (42h):** Message type is "Command reply".
- **'0'-A' (30h, 41h):** Message length (10bytes)

**Message**

- **STX (02h):** Start of Message
- **'C'-B-'0'-4' (43h, 42h, 30h, 34h):** Input name Command
- **'0'-2' (30h, 32h):** Reset
- **ST: Status**
  - **00h (30h, 30h):** No Error
  - **01h (30h, 31h):** Error
- **ETX (03h):** End of Message

**Check code**

- **BCC:** Block Check Code
  - Refer to the section 4.3 "Check code" for a BCC calculation.

**Delimiter**

- **CR (0Dh):** End of packet
All data are subject to change without notice.