UDC Controller - Attenuator Commands
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1   Introduction

All the commands must start with the same header (ATN - case sensitive) and followed by the ID number of the board. The ID numbers must be between `00` and `31` (two characters format). Commands without these parameters are ignored. The examples below show commands from the computer to the device `>>`, and the the device response `<<`. All commands and responses terminate with Carriage Return (CR - `\r` - `0x0d`).

2   Commands

2.1   Configure One Attenuator

The `A` command is used to set only one attenuator:

Command: `ATNxxAyyzz`, where

>   `xx`: ATN board ID, `00<=x<=31`
>   `yy`: attenuator No., `00<=yy<=11`
>   `zz`: attenuator value: `00<=zz<=31`

Response: `atnxxok`

Example:

```
>> ATN01?
<< atn01m010203040506070809101112
>> ATN01A1130
<< atn01k
>> ATN01?
<< atn01m010203040506070809101130
```

2.2   Configure All Step Attenuators

You can use the `M` command if you want to configure multiple attenuators:

Command: `ATNxxMAABB...LL`, where

>   `M`: multiple attenuators
>   `AA`: value of atten. `00`
>   `BB`: value of atten. `01`
>   `...`
>   `LL`: value of atten. `11`

Response: `atnxxok`

Example:

```
>> ATN01M121110090807060504030201
<< atn01ok
>> ATN01?
<< atn01m121110090807060504030201
```

2.3   Configure Solar Attenuator

The `L` configures the Low-Gain mode, this adds the solar attenuator.

The `H` configures the High-Gain mode, this bypass the solar attenuator.

Command: `ATNxxL` or `ATNxxH`, where

>   `xx`: ATN board ID, `00<=x<=31`

Response: `atnxxok`

Example:

```
>> ATN01L
<< atn01ok
>> ATN01?
<< atn01m121110090807060504030201l
>> ATN01H
<< atn01ok
>> ATN01?
<< atn01m121110090807060504030201h
```

2.4   Read Current Configuration

The status request `?` command returns the config values of all step attenuators and solar attenuator. If the device is restarted, these values correspond to the default values stored in the EEPROM memory (except the solar attenuator). This is the command syntax:

Command: `ATNxx?`, where

>   `xx`: ATN board ID, `00<=xx<=31`

Response: `atnxxmAABB...LL*`, where

>   `m`: multiple attenuators
>   `AA`: value of atten. `00`
>   `BB`: value of atten. `01`
>   `...`
>   `LL`: value of atten. `11`
>   `*`: solar attenuator status, l: low gain, atten. ON; h: high gain, atten. OFF.

Example:

```
>> ATN01?
<< atn01m010203040506070809101112l
```

2.5 Read Config in EEPROM

You can use the `R` command to print out default configuration (stored in EEPROM) of the device:

Command: `ATNxxR` Response: `atnxxmAABB...LLixx`,

where

    `ixx:` is the ID stored

Example:

```
>> ATN01R
<< atn01m010203040506070809101112i01
```

2.6 Write Config in EEPROM

The `W` command is used if you want to store your actual configuration as default (EEPROM):

Command: `ATNxxW`

Response: `atnxxok`

Example:

```
>> ATN01R
<< atn01m010203040506070809101112i01
>> ATN01M121110090807060504030201
<< atn01ok
>> ATN01W
<< atn01ok
>> ATN01R
<< atn01m121110090807060504030201i01
```

2.7 Configure Default Stored in EEP-ROM

Use the `D` command to configure the default (EEPROM):

Command: `ATNxxD`

Response: `atnxxok`

Example:

```
>> ATN01R
<< atn01m121110090807060504030201i01
>> ATN01D
<< atn01ok
>> ATN01?
<< atn01m121110090807060504030201
```

2.8 Change Controller Device ID

If you want to change the device ID, you can use the `I` command to change the device ID: WARNING: this command does not resolve ID conflicts if several devices are connected to the same bus (e.g. RS485/422).

Command: `ATNxxIww`, where

    `xx:` actual device ID
    `ww:` new device ID

Response: `atnwwok`

If you do not know the device ID (e.g. first time programmed device), and you want to reset this value, you can send an `I` command to everybody. WARNING: only one device connected, this could produce ID conflict later.

Setup ID, read status and check EEPROM:

```
>> ATNXXI02
>> ATN02?
<< atn02m121110090807060504030201
>> ATN02R
<< atn01m121110090807060504030201i01
```

Store new ID in EEPROM (permanent change):

```
>> ATN02W
<< atn02ok
>> ATN02R
<< atn02m121110090807060504030201i02
```

3 Error Codes

The device is expecting digits after the command character. If there is an error, the device will return an error code `01` (`atnxxERR01`, `xx`: device ID). The example shows the `a`, `w`, and `x` not digit characters:

```
>> ATN01A0awx
<< atn01ERR01
>> ATN01M01010101aa01010101010101
<< atn01ERR01
```

If the device ID is out of range, the device will return an error code `02`. For example an ID change from `01` to `80`, the valid range is between `0` and `31`:

```
>> ATN01I80
<< atn01ERR02
```

The device will return an error code `03` if the attenuator number is out of range (between `0` and `11`). This example tries to configure the attenuator `15`:

```
>> ATN01A1500
<< atn01ERR03
```

The device will return an error code `04` if the attenuator value is out of range (between `00` and `31`). This example tries to configure the attenuator `11` to `64`:

```
>> ATN01A1164
<< atn01ERR04
```

The attenuator setup command `A` only accepts ten (10) characters of configuration. If a different number if provided, the device returns an error code `09`. For example:

```
>> ATN01A010203
<< atn01ERR09
```

If you are trying to use the `M` command, and do not provide all the parameters (30 characters - $12 \times 2 + 6$), the device will return an error code `10`:

```
>> ATN01M1122334455
<< atn01ERR10
```

The `M` command also returns an error code `05` if one of the attenuator values is out of range:

```
>> ATN01M010101010101010101010199
<< atn01ERR05
```

The ID change command `I` only accepts eight (8) characters of configuration. If a different number if provided, the device returns an error code `08`. For example:

```
>> ATN01I1
<< atn01ERR08
```

Commands related to status and EEPROM only accepts six (6) characters. If a different number if provided, the device returns an error code `07`. Example:

```
>> ATN01
<< atn01ERR07
```

Note: this error message is disabled, message ignored
Finally, if the command does not exits, the device will return an error code `06`:

```
>> ATN01T
<< atn01ERR06
```

4 Examples

- Setup maximum attenuation ($15.5dB$) for all the devices: `ATN01M313131313131313131313131`
- Setup attenuators in sequence from $0.5dB$ to $6.0dB$, in steps of $0.5dB$: `ATN01M010203040506070809101112`
- Setup attenuators in sequence from $6.0dB$ to $0.5dB$, in steps of $0.5dB$: `ATN01M121110090807060504030201`
- Setup all attenuators to $11.5dB$: `ATN01M212121212121212121212121`